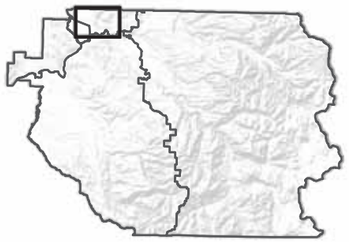
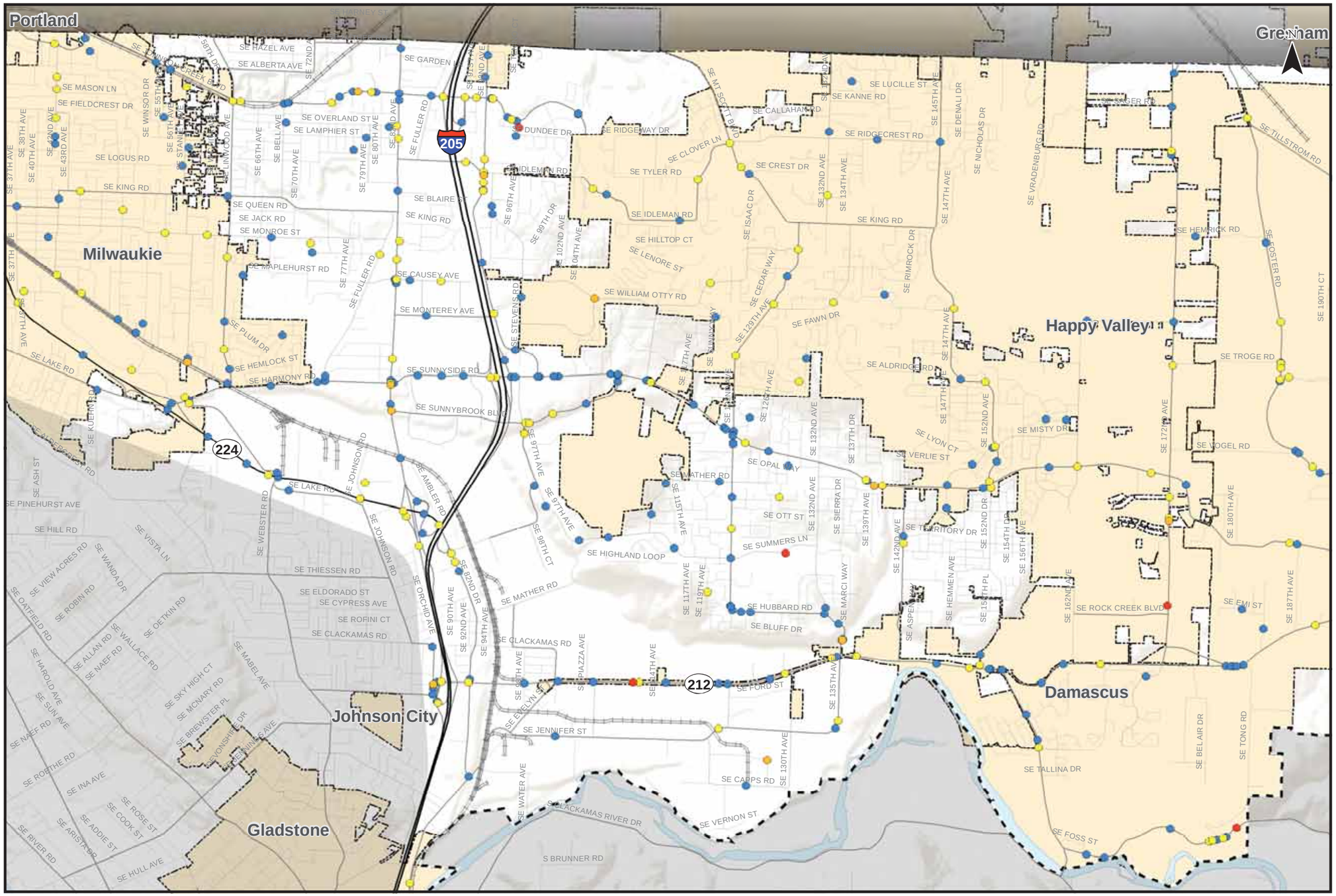
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Roadway Departure Crashes

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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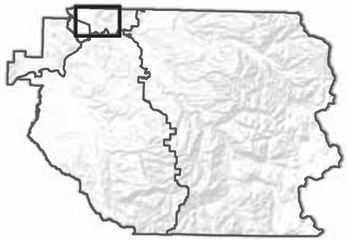
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Roadway Departure Crashes 2007-2010
Greater Clackamas Regional Center / Industrial Area

Figure
C 26

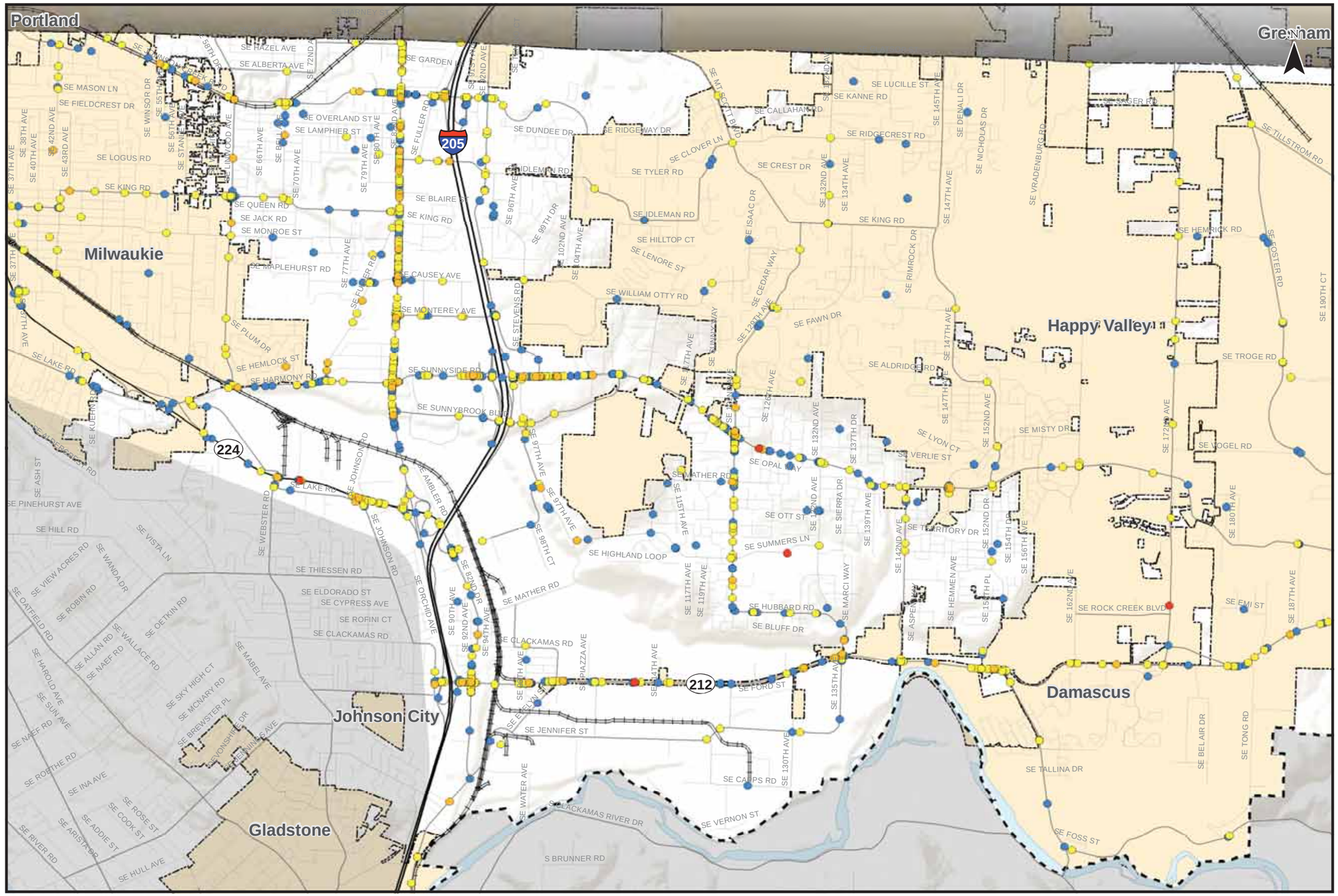
H:\proj\file\11732 - Clackamas County TSP\gis\11x17 Maps\26 Roadway Departure Crashes 2007-2010.mxd

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Crashes Involving Young Drivers (15-25 Years Old)

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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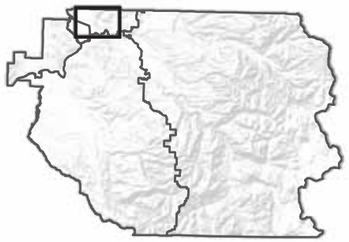
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Young Drivers (15-25 Years Old) 2007-2010
Greater Clackamas Regional Center / Industrial Area

Figure
C 27

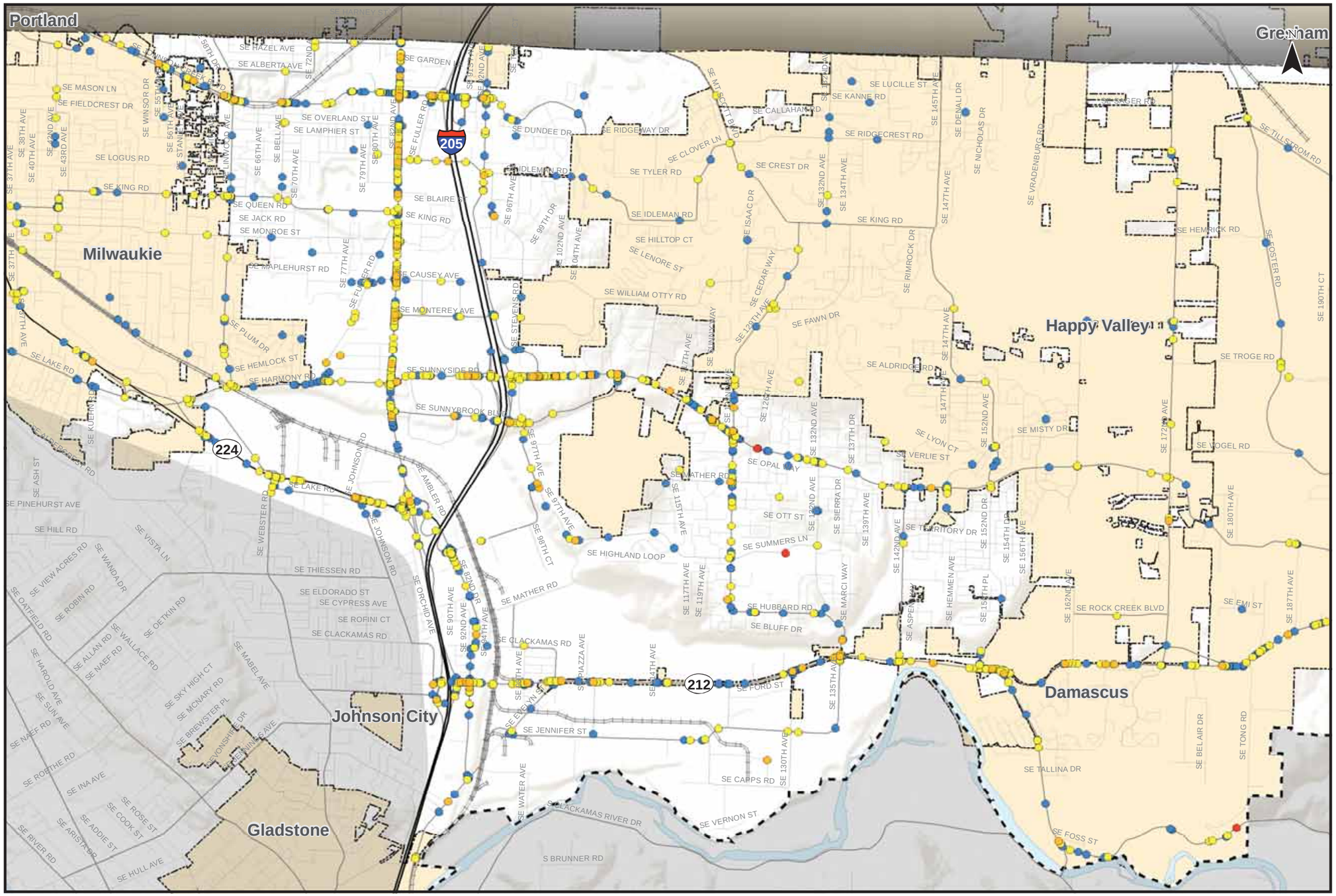
H:\proj\file\11732 - Clackamas County TSP\gis\11x17 Maps\27 Crashes Involving Young Drivers (15-25 Years Old).mxd

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Crashes Involving Aggressive Driving

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Aggressive Driving 2007-2010
Greater Clackamas Regional Center / Industrial Area

Figure
C 28

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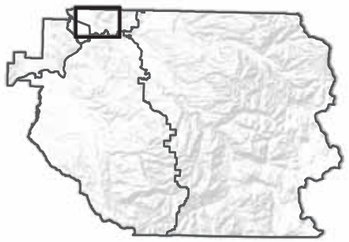
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Roadway Departure Crashes

- Fatal Crash
- Serious Injury Crash

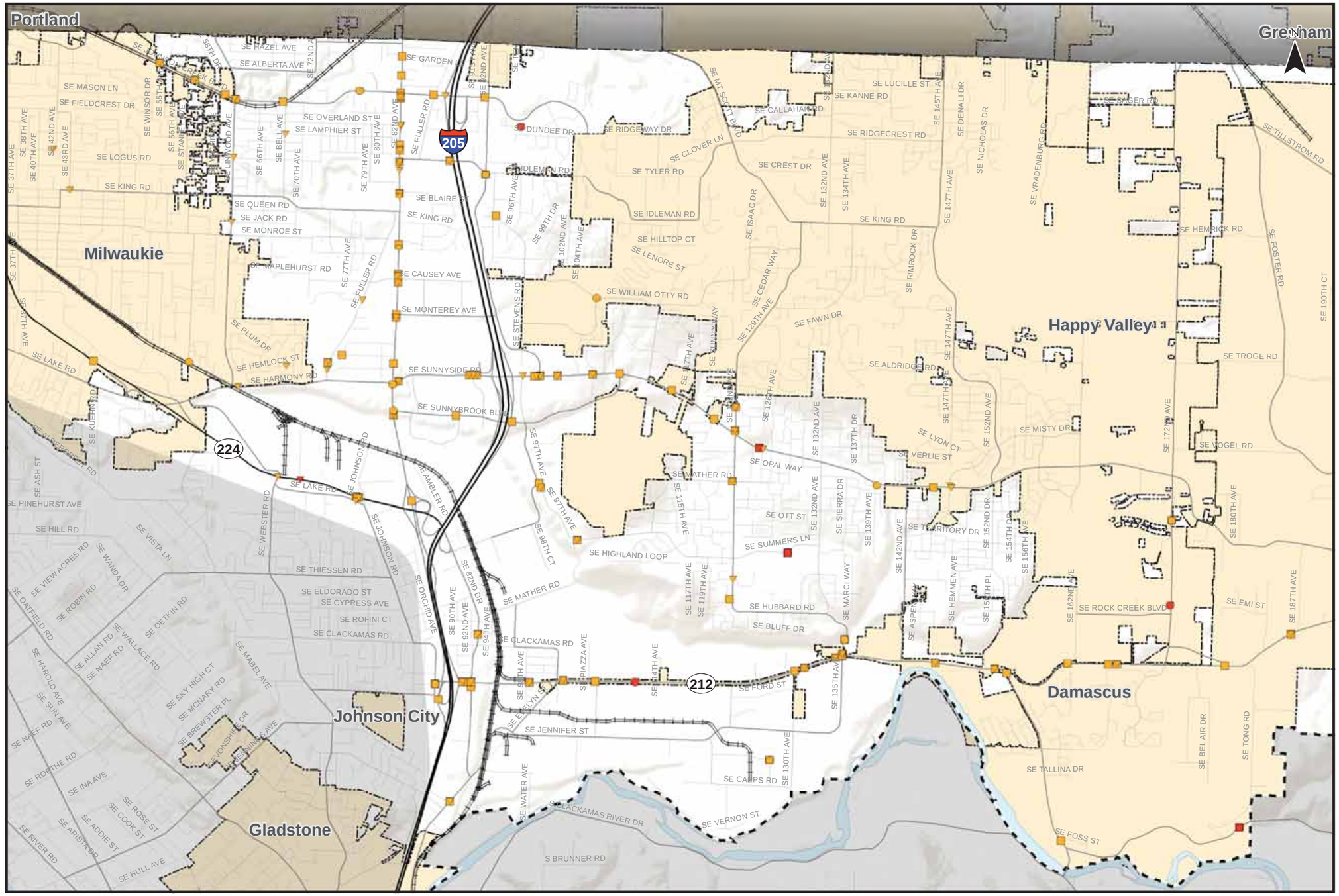
Crashes Involving Young Drivers (15-25 Years Old)

- Fatal crash
- Serious Injury Crash

Aggressive Driving Crashes

- Fatal Crash
- Severe Injury Crash

- Incorporated Areas
- County Boundary
- UGB



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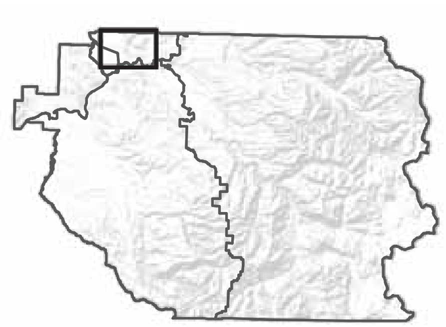
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes
Greater Clackamas Regional Center / Industrial Area

Figure
C 29

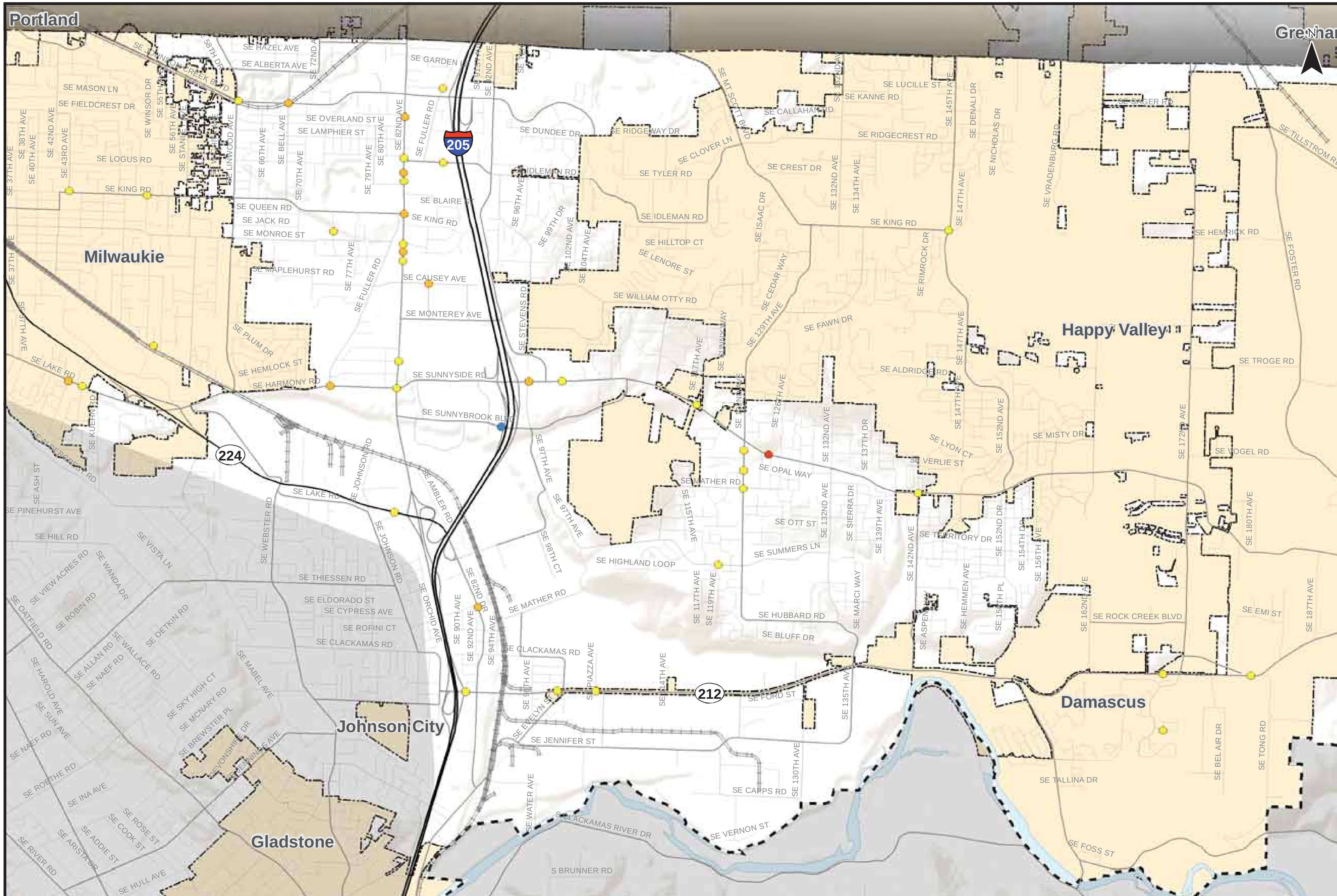
H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\29 Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes.mxd

CLACKAMAS COUNTY Transportation System Plan *Update*



Crashes Involving Pedestrians

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Pedestrians 2007-2010
Greater Clackamas Regional Center / Industrial Area

Figure
C 30

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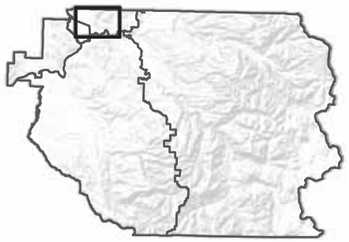
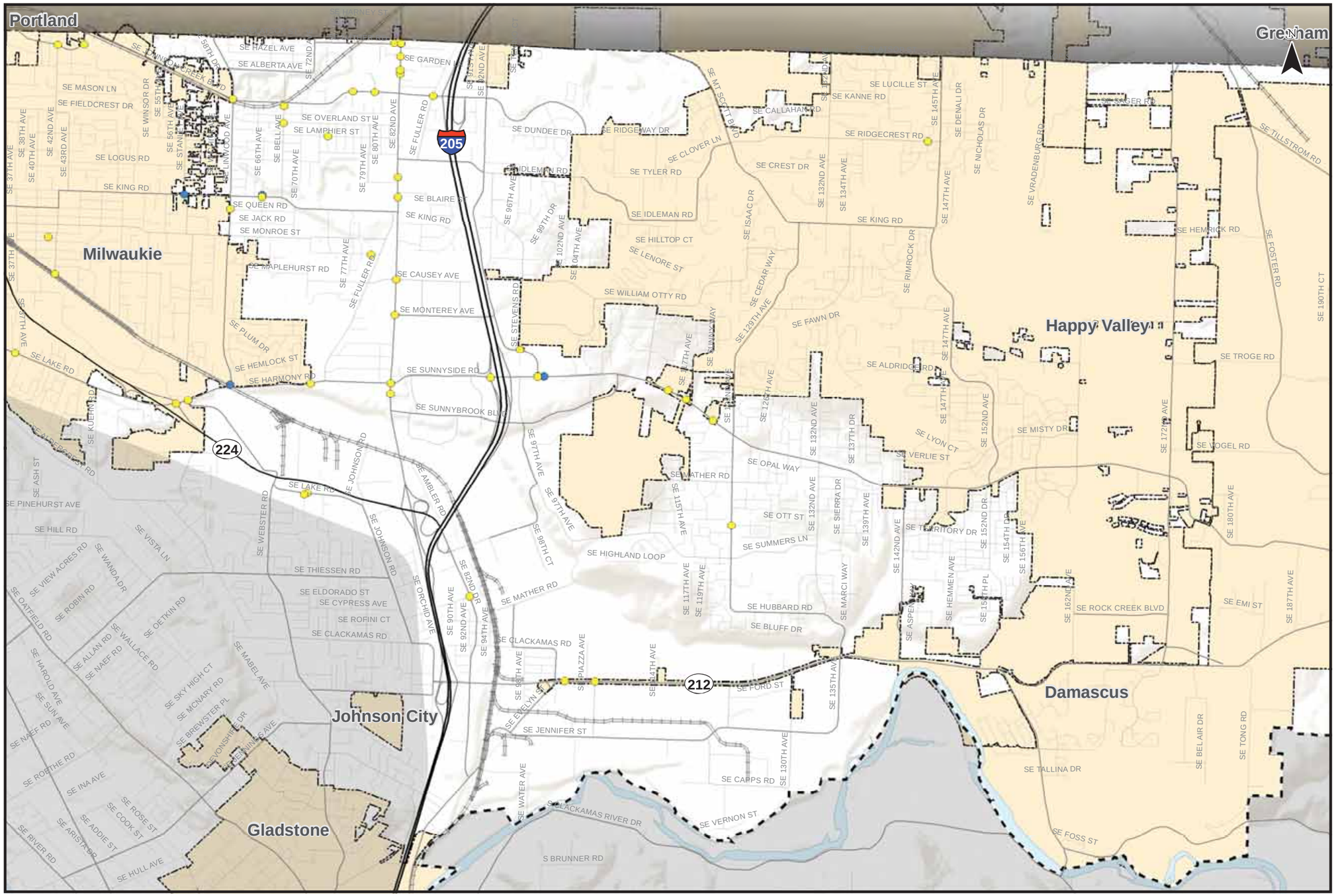
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Crashes Involving Bicycles

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Bicycles 2007-2010
Greater Clackamas Regional Center / Industrial Area

Figure
C 31

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Specific Safety Focus Intersections

County staff identified a number of safety focus intersections that were flagged for one or more of the following reasons:

- Approaching roads are offset;
- Sight distance is limited at or on approach to the intersection;
- Intersecting roads are skewed (do not intersect at 90-degrees);
- Geometry of approaching roads are challenging for motorists; and/or
- Intersection geometry or lane configuration is unconventional.

The purpose of identifying these types of intersections is to proactively consider potential improvements in advance of the intersections appearing on the County's priority location list discussed above (i.e., County SPIS locations shown in Figure C 24). The basic characteristics noted above are some geometric features that may make the driving task more difficult and therefore increase the risk of crashes occurring. For example, the American Association of State Highway and Transportation Officials (AASHTO)'s *Highway Safety Manual* notes skewed stop controlled intersections tend to experience more crashes than intersections with roads crossing at 90-degrees.[1]

Figure C 32 illustrates the location of these intersections and Table C 9 summarizes the locations.

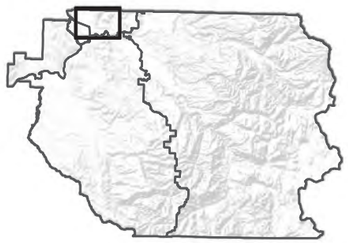
Table C 9 Safety Focus Intersections in the Greater Clackamas Regional Center/Industrial Area

Major Road	Minor Road	Reason Identified	County Safety Priority Location?	Located on a Candidate Safety Corridor?
Jennifer	130th	Higher Traffic Volumes Relative to Intersection Type	No	No
Jennifer	122nd Ave	Higher Traffic Volumes Relative to Intersection Type	No	No
King	Linwood	Frequency of Rear End Crashes	No	No
Linwood	Monroe	Intersection Skew	No	No
Telford	Rugg	Intersection Skew and Approach Geometry	No	No

The list of safety focus intersections shown in Table C 9 supplements the County's Safety Priority Locations and the Candidate road safety audit corridors discussed above. The intersections listed are primarily skewed intersections and/or have roadway curvature on approach to the intersection that may be challenging for motorists. These are candidate intersections for proactive improvements to help reduce the likelihood of crashes. In a forthcoming Transportation System Plan update report, potential projects, programs, studies and/or policies to improve these locations will be discussed.

[1] AASHTO. *1st Edition of the Highway Safety Manual*. 2010. (See Volume 3, Part D, page 14-16).

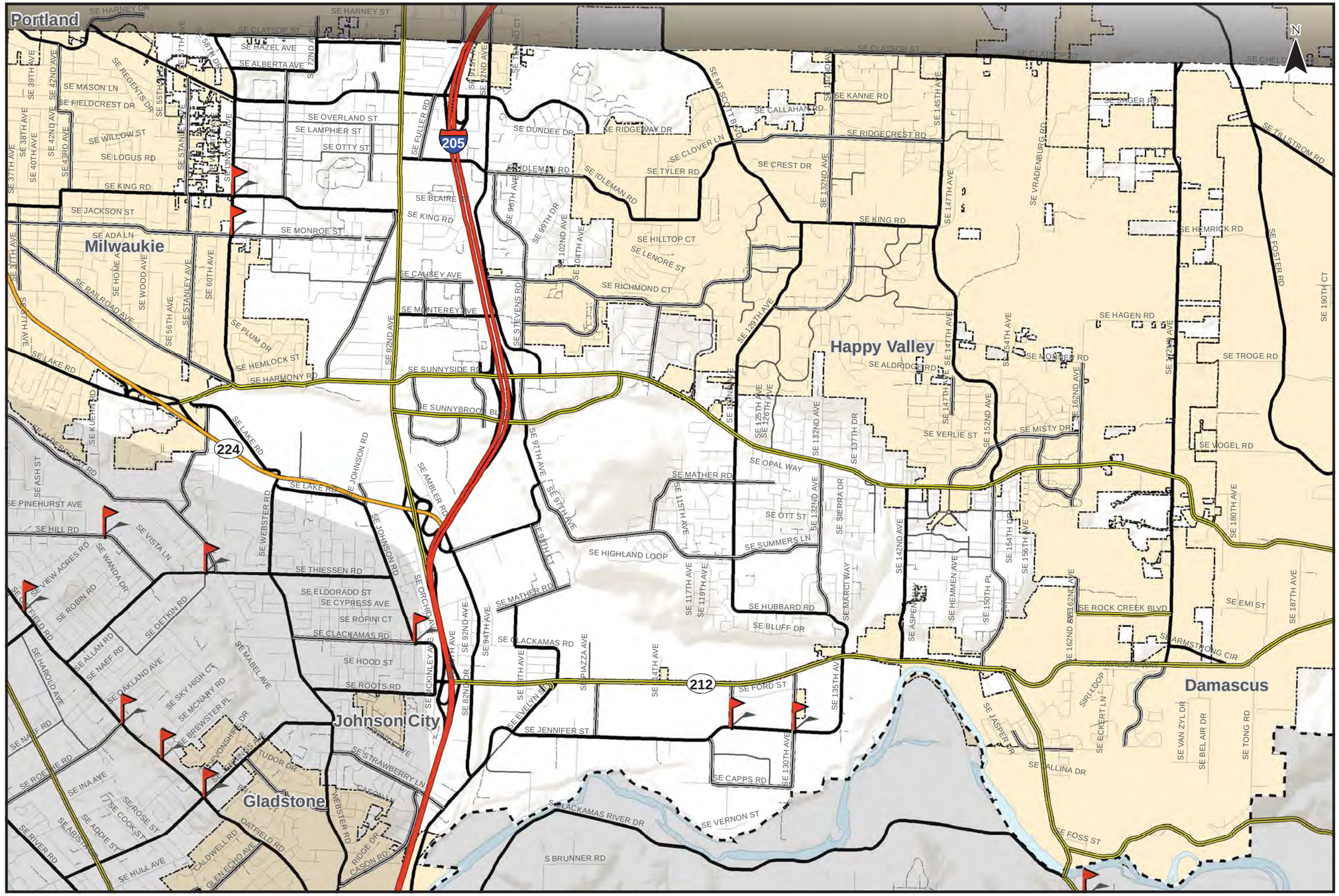
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Safety Focus Intersections

Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroad
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
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Data Source:
Clackamas County, Metro Data Resouce Center

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Safety Focus Intersections
Greater Clackamas Regional Center / Industrial Area

Figure
C 32

FUTURE BASE CONDITIONS – GREATER CLACKAMAS REGIONAL CENTER/INDUSTRIAL AREA

INTRODUCTION

This section summarizes the results of the analysis of future traffic conditions for the Greater Clackamas Regional Center/Industrial area. It evaluates the study intersections' performance in the year 2035 assuming growth and development occurs and some planned modifications are made to the transportation system. Two future base scenarios were analyzed:

1. **Low Build:** The low build scenario assumes that only planned transportation projects with funding currently allotted are completed.
2. **Full Build:** The full build scenario assumes that all planned transportation projects identified in the existing TSP before the year 2035 are completed.

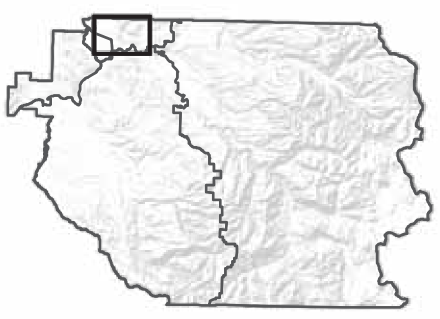
The projects included in these scenarios will be further evaluated based on criteria and measures corresponding to the County's vision, goals and objectives in the next stage of the TSP Update. Additional new projects to address gaps and deficiencies in the transportation system will also be assessed in the alternatives analysis. The approach and methodology to the Future Base Conditions analysis is further described in Section 2. This section focuses on the results of the analysis in terms of intersection and roadway operations.

2035 LOW BUILD SCENARIO

The low-build scenario assumes the completion of transportation projects identified in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted. The purpose of the low build scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are completed. The analysis will also indicate which projects in the low build scenario help bring the operations on intersection and roadways up to standards.

The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted to reflect this scenario, based on the low build capacity projects located in the Greater Clackamas Regional Center/Industrial Area and mapped in Figure C 33. The projects that affect roadway or intersection capacity are listed and described in Table C 10.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



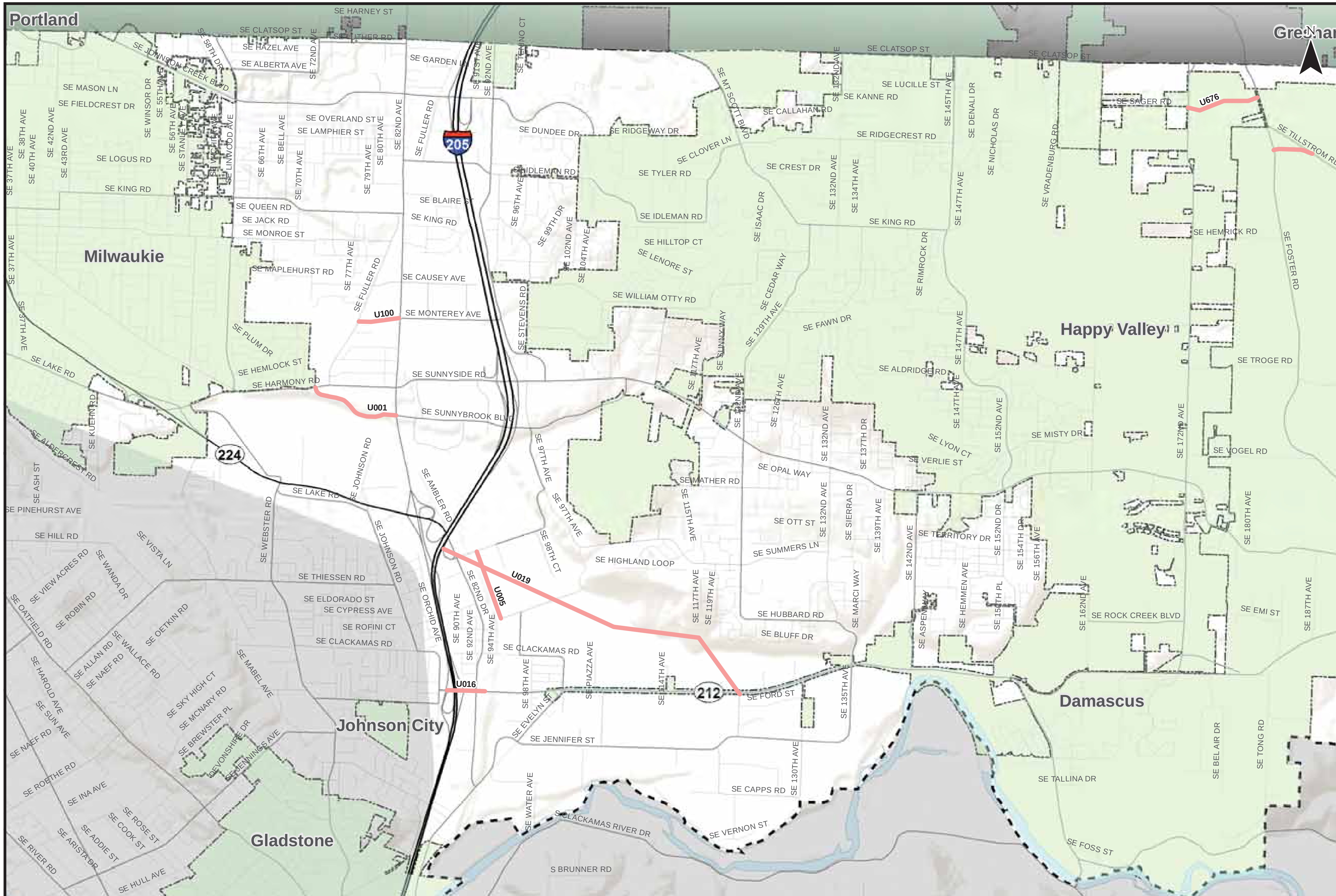
2035 Low Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB

This figure displays the projects included in the 2035 Low Build Scenario. The 2035 Low Build Scenario assumes the transportation projects in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted are completed by 2035. The purpose of the 2035 Low Build Scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are implemented.

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center



2035 Low Build Projects
Greater Clackamas Regional Center / Industrial Area

Figure
C 33

Table C 10 Low Build Projects in Greater Clackamas Regional Center/Industrial Area

Project	ID	Location	Description
Sunnybrook Rd Extension (W)	U001	82nd Avenue to Harmony Road	Extend as a minor arterial (4 lanes)
Industrial Way	U005	Lawnfield Road to Mather Road	New 3-lane collector
OR 212/224: 3rd westbound lane	U016	OR 212/224, UPRR viaduct to I-205	Restripe OR 212/224 to add 3rd WB lane (combination thru & right-turn lane @ 82nd Dr.); provide two signalized right-turn lanes to NB I-205 on-ramp; provide two right-turn lanes SB I-205 off-ramp to EB OR 212/224; install traffic signal @ I-205 SB ramp terminals to OR 212/224; re-align multi-use path from 82nd Dr. to I-205 NB on-ramp.
Sunrise Expressway Mainline	U019	I-205 to SE 122nd Ave. crossing OR 212/224	Construct 2-4 lane highway; construct new overcrossing structure over I-205 connecting 82nd Ave. and 82nd Dr.
Monterey Avenue	U100	82nd Avenue to Fuller Road	New 2-lane extension
Sager	U676	162nd to Foster	Improve to collector standards (3 lanes), and signalize Sager @172nd.

Study Intersection Analysis

Any low-build projects that affect lane configurations or traffic control at study intersections were accounted for and are noted in Figure C 34. The operations at the study intersections were analyzed based on the traffic volumes forecast under the low-build scenario and are illustrated in Table C 11 and Figure C 35. Signal timings were adjusted as appropriate to account for changes in the forecasted traffic volumes. Intersections that do not meet standards are noted in the figure.

Table C 11 2035 Low Build Traffic Operations Analysis Results at Study Intersections in the Greater Clackamas Regional Center/Industrial Area

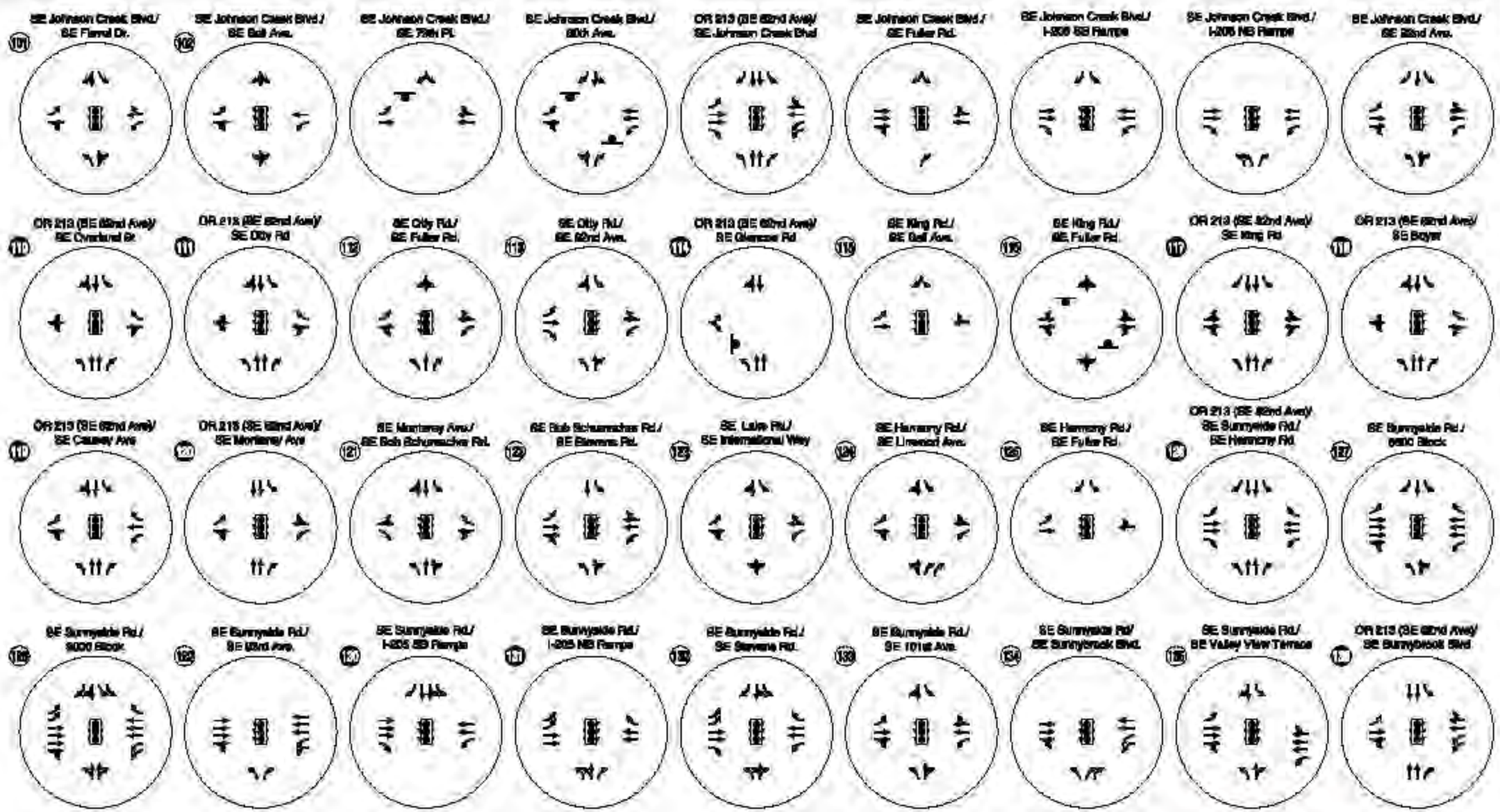
ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?
101	SE Johnson Creek Blvd/SE Flavel Dr	County	v/c = 0.99	Yes	No	Yes
102	SE Johnson Creek Blvd/SE Bell Ave	County	v/c = 0.99	Yes	No	Yes
103	SE Johnson Creek Blvd/SE 79th Pla	County	v/c = 0.99	Yes	No	Yes
104	SE Johnson Creek Blvd/80th Ave	County	v/c = 0.99	No	No	No (v/c=2.01)
105	OR 213 (SE 82nd Ave)/SE Johnson Creek Blvd	ODOT	v/c = 0.99	Yes	No	No (v/c=1.08)
106	SE Johnson Creek Blvd/SE Fuller Rd	County	v/c = 0.99	Yes	No	Yes
107	SE Johnson Creek Blvd/I-205 SB Ramps	ODOT	v/c = 0.85	Yes	No	Yes
108	SE Johnson Creek Blvd/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	No	Yes
109	SE Johnson Creek Blvd/SE 92nd Ave	County	v/c = 0.99	Yes	No	Yes
110	OR 213 (SE 82nd Ave)/SE Overland Street	ODOT	v/c = 0.99	Yes	No	Yes
111	OR 213 (SE 82nd Ave)/SE Otty Road	ODOT	v/c = 0.99	Yes	No	Yes
112	SE Otty Road/SE Fuller Rd	County	v/c = 1.1	Yes	No	Yes
113	SE Otty Road/SE 92nd Ave	County	v/c = 1.1	Yes	No	Yes

ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?
114	OR 213 (SE 82nd Ave)/SE Glencoe Rd	ODOT	v/c = 0.99	Yes	No	Yes
115	SE King Rd/SE Bell Ave	County	v/c = 0.99	Yes	No	Yes
116	SE King Rd/SE Fuller Rd	County	v/c = 0.99	Yes	No	No (v/c=1.40)
117	OR 213 (SE 82nd Ave)/SE King Rd	ODOT	v/c = 0.99	Yes	No	Yes
118	OR 213 (SE 82nd Ave)/SE Boyer	ODOT	v/c = 0.99	Yes	No	Yes
119	OR 213 (SE 82nd Ave)/SE Causey Ave	ODOT	v/c = 1.1	Yes	No	Yes
120	OR 213 (SE 82nd Ave)/SE Monterey Ave	ODOT	v/c = 1.1	Yes	Yes (U100)	Yes
121	SE Monterey Ave/SE Bob Schumacher Rd	County	v/c = 1.1	Yes	No	Yes
122	SE Bob Schumacher Rd/SE Stevens Rd	County	v/c = 1.1	Yes	No	Yes
123	SE Lake Rd/SE International Way	County	v/c = 0.99	Yes	No	No (v/c=1.39)
124	SE Harmony Rd/SE Linwood Ave	County	v/c = 0.99	Yes	No	No (v/c=1.11)
125	SE Harmony Rd/SE Fuller Rd	County	v/c = 1.1	Yes	No	Yes
126	SE Sunnyside Rd/SE Harmony Rd/SE 82nd Ave	ODOT	v/c = 1.1	Yes	No	Yes
127	SE Sunnyside Rd/8600 Block	County	v/c = 1.1	Yes	No	Yes
128	SE Sunnyside Rd/9000 Block	County	v/c = 1.1	Yes	No	Yes
129	SE Sunnyside Rd/SE 93rd Ave	County	v/c = 1.1	Yes	No	Yes
130	SE Sunnyside Rd/I-205 SB Ramps	ODOT	v/c = 0.85	Yes	No	No (v/c=0.98)
131	SE Sunnyside Rd/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	No	No (v/c=0.88)
132	SE Sunnyside Rd/SE Stevens Rd	County	v/c = 1.1	Yes	No	Yes
133	SE Sunnyside Rd/SE 101st Ave	County	v/c = 1.1	Yes	No	Yes
134	SE Sunnyside Rd/SE Sunnybrook Blvd	County	v/c = 0.99	Yes	No	No (v/c=1.12)
135	SE Sunnyside Rd/SE Valley View Terrace	County	v/c = 0.99	Yes	No	Yes
136	OR 213 (SE 82nd Ave)/SE Sunnybrook Blvd	ODOT	v/c = 1.1	Yes	Yes (U001)	No (v/c=1.35)
137	SE Sunnybrook Blvd/I-205 SB Ramps	ODOT	v/c = 0.85	Yes	No	Yes
138	SE Sunnybrook Blvd/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	No	No (v/c=0.89)
139	SE Sunnybrook Blvd/97th Ave	County	v/c = 1.1	Yes	No	Yes
140	OR 224/SE Rusk Rd	ODOT	v/c = 0.99	Yes	No	No (v/c=1.07)
141	OR 224/SE Lake Rd/SE Webster Rd	ODOT	v/c = 0.99	Yes	No	No (v/c=1.29)
142	SE Lake Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes
143	OR 224/SE Johnson Rd	ODOT	v/c = 0.99	Yes	No	No (v/c=1.60)
144	SE Sunnyside Rd/SE 122nd Ave	County	v/c = 0.99	Yes	No	No (v/c=1.03)
145	SE Sunnyside Rd/SE 132nd Ave	County	v/c = 0.99	Yes	No	Yes
146	SE Sunnyside Rd/SE 142nd Ave	County	v/c = 0.99	Yes	No	No (v/c=1.05)
147	SE Sunnyside Rd/SE 152nd Ave	County	v/c = 0.99	Yes	No	Yes
148	SE Sunnyside Rd/SE 162nd Ave	County	v/c = 0.99	Yes	No	Yes
149	SE Sunnyside Rd/SE 172nd Ave	County	v/c = 0.99	Yes	No	Yes
150	SE Mather Rd/SE 122nd Ave	County	v/c = 0.99	Yes	No	Yes
151	SE Summers Lane/SE 122nd Ave	County	v/c = 0.99	Yes	No	Yes
152	SE Hubbard Rd/SE 132nd Ave	County	v/c = 0.99	Yes	No	Yes
153	OR 212/I-205 SB Ramps	ODOT	v/c = 0.85	No	No	No (v/c=1.13)
154	OR 212/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	Yes (U156)	Yes

ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?
155	OR 212/SE 82nd Dr	ODOT	v/c = 0.99	Yes	Yes (U156)	Yes
156	OR 212/224/SE 102nd Ave	ODOT	v/c = 0.99	Yes	No	Yes
157	OR 224/SE Hubbard Rd/135th Ave	ODOT	v/c = 0.99	No	No	No (v/c=4.26)
158	OR 224/SE 142nd Ave	ODOT	v/c = 0.99	Yes	No	No (v/c=1.37)
159	OR 212/OR 224	ODOT	v/c = 0.99	Yes	No	No (v/c=1.58)
160	OR 212/SE 162nd Ave	ODOT	v/c = 0.99	Yes	No	Yes
161	OR 212/SE 172nd Ave	ODOT	v/c = 0.99	Yes	No	No (v/c=1.12)
162	SE Jennifer St/SE Evelyn St	County	v/c = 0.99	Yes	No	Yes
163	SE 82nd Dr/SE Jennifer Street	County	v/c = 0.99	Yes	No	Yes
164	SE Strawberry Lane/SE 82nd Dr	County	v/c = 0.99	Yes	No	Yes
165	OR 224/Springwater Rd	ODOT	v/c = 0.99	Yes	No	No (v/c>1.0)

As can be seen in Table C 11:

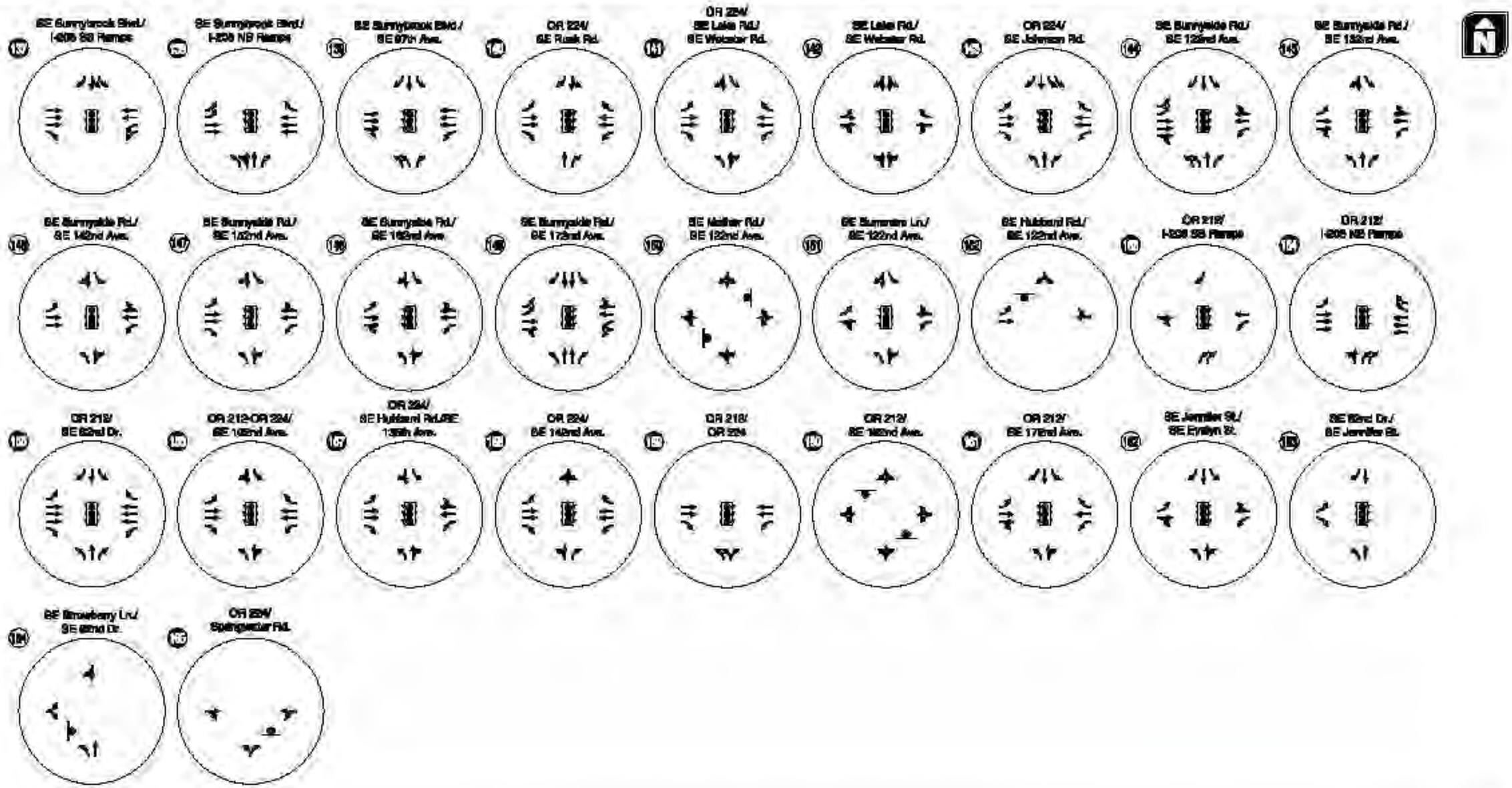
- The three study intersections that do not meet standards under the existing conditions continue to not meet standards in the low build scenario.
- An additional 18 intersections do not meet standards in the low build scenario that currently meet standards. Several of these intersections are located on OR 224 and SE Harmony Road in the vicinity of the Milwaukie Industrial area.
- Of the total 21 intersections that do not meet standards in the low-build scenario, one is impacted by a capacity project under the low build scenario. The intersection of OR 213 (SE 82nd Ave)/SE Sunnybrook Boulevard (136) is impacted by the Sunnybrook Extension between 82nd Avenue and Harmony Road. The intersection is currently a three-legged intersection, but the Sunnybrook Extension adds an eastbound approach to the intersection. The intersection does not meet standards under the low build scenario.
- The remaining 20 intersections that do not meet standards are not impacted by capacity projects under the low build scenario. While some of these intersections are operating only slightly over capacity, several have volume-to-capacity ratios far in excess of the standards. As seen in the table, the intersections of SE Johnson Creek Boulevard/80th Avenue (104), OR 224/SE Hubbard Road/135th Avenue (157), and OR 224/Springwater Road (165) are forecast to operate at volume-to-capacity ratios over 2.0. This will likely result in significant delays at these intersections for vehicles. *Appendix 8* contains detailed traffic operations analysis results.



- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT
- LANE REMOVED
- LANE ADDED

Low Build Lane Configuration and Traffic Control Devices
Greater Clackamas Regional Center/Industrial Area - 1

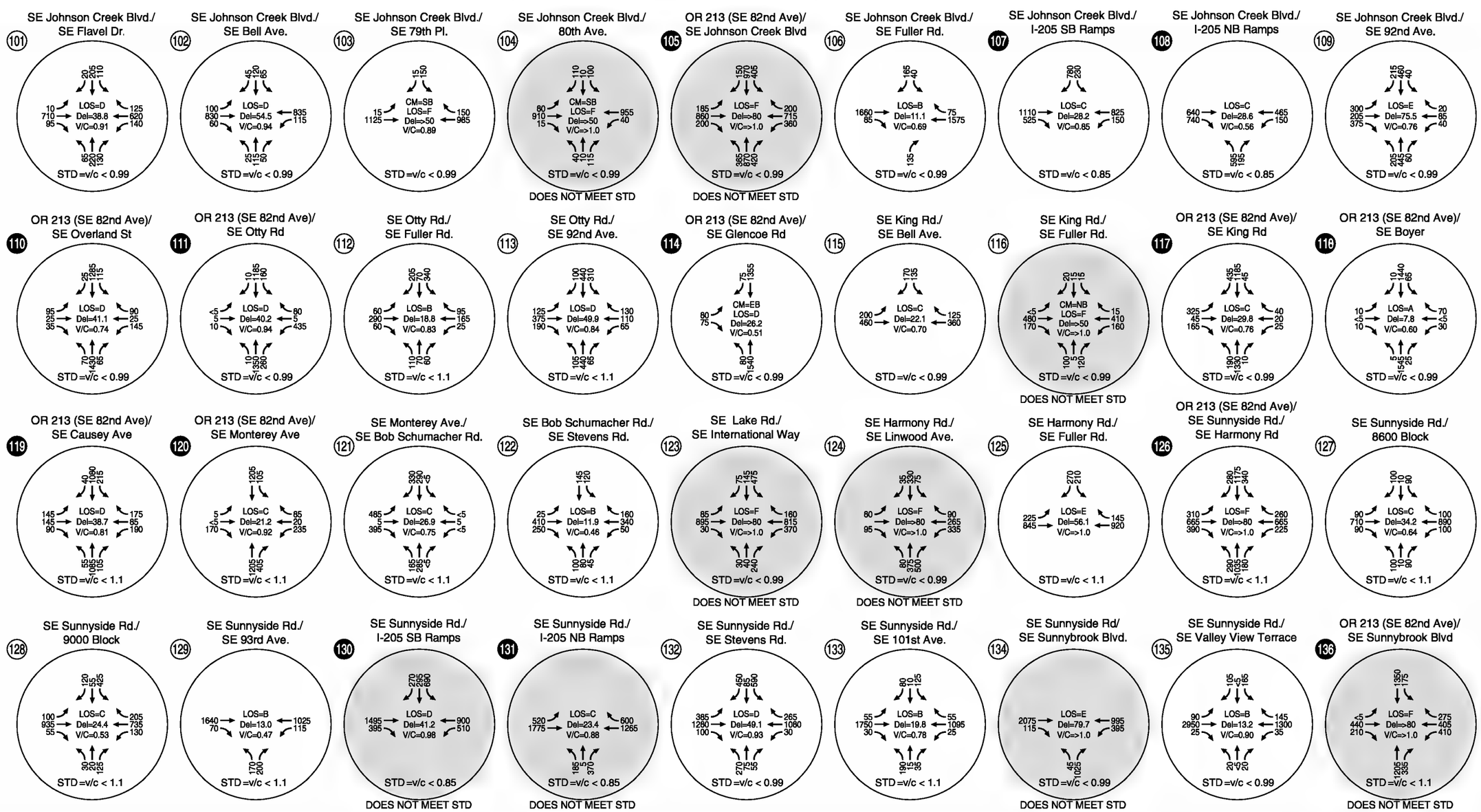
Figure C 34



- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT
- LANE REMOVED
- LANE ADDED

Low Build Lane Configuration and Traffic Control Devices
Greater Clackamas Regional Center/Industrial Area - 2

Figure C 34

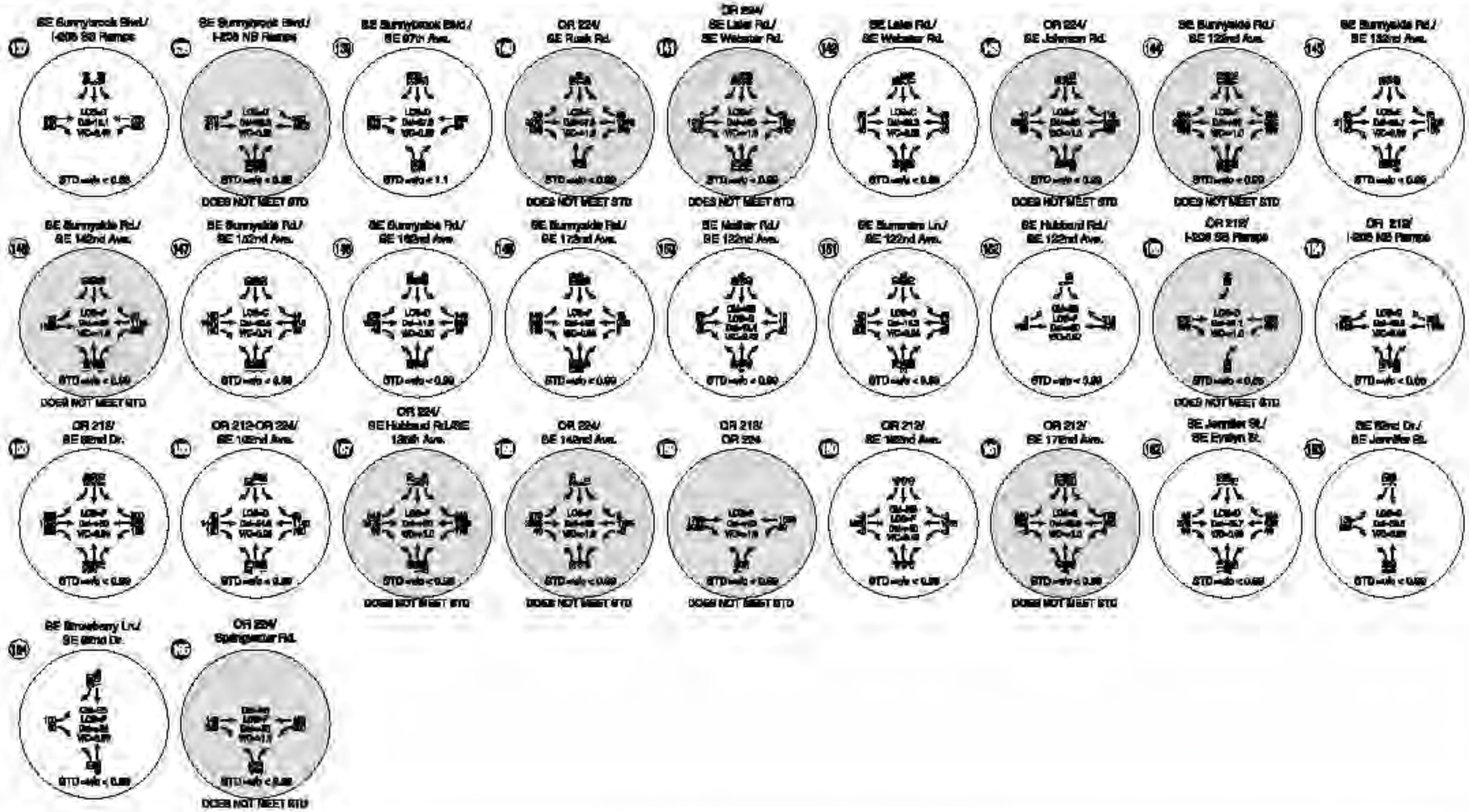


CM	=	CRITICAL MOVEMENT (UNSIGNALIZED)
LOS	=	INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del	=	INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C	=	CRITICAL VOLUME-TO-CAPACITY RATIO
STD	=	OPERATIONAL STANDARD
AWSC	=	ALL-WAY STOP CONTROL

Low Build Intersection Operations
PM Peak Hour
Greater Clackamas Regional Center/Industrial Area - 1

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Figure C 35



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

Low Build Intersection Operations
PM Peak Hour
Greater Clackamas Regional Center/Industrial Area - 2

Figure C 35

Roadway Segment Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways within Clackamas County. Figure C 36 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Low Build Scenario.

As is evident from Figure C 36, under the 2035 Low Build Scenario demand for travel continues to be highest along OR 212, SE Sunnyside Road, SE 82nd Avenue, SE Harmony Road, SE Johnson Creek Boulevard and SE Linwood Avenue. There is also a planned extension of OR 224 east of I-205 as part of the Sunrise Expressway Mainline project (U019) shown in the figure that would serve a relatively high volume of traffic.

Approximate Level of Congestion

The level of roadway segment congestion for the 2035 Low Build Scenario was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

Figure C 37 illustrates the relative congestion during the 2035 Low Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.

As can be seen in Figure C 37, under the 2035 Low Build Scenario, eastern portions of SE Sunnyside Road experience noticeably higher levels of congestion compared to the existing conditions extending from Sunnybrook Boulevard to incorporated areas of Happy Valley. Eastern portions of OR 212 approaching and extending into incorporated areas of Damascus are also estimated to experience noticeably higher levels of congestion compared to existing conditions. Table C 12 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table C 12 2035 Low Build Roadway Segment Congestion in Greater Clackamas Regional Center/Industrial Area

Roadway	Segment	Level of Congestion
I-205	South of study area to County boundary, not including the section between SE Sunnybrook Blvd and SE Sunnyside Rd	Nearing Congestion to Very Congested
OR 212/ OR 224	SE Lake Rd to SE Rusk Rd SE McKinley Ave to I-205 Railroad Crossing to SE 98th Ave Sunrise Expressway to Carver Hwy SE 16nd Ave to SE Tong Rd	Nearing Congestion to Very Congested
SE 132md Ave	SE Ridgecrest Rd to SE 132nd Ave	Nearing Congestion
SE 147th Ave	SE Monner Rd to SE King Rd	Nearing Congestion to Congested

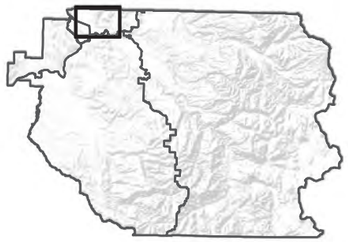
Roadway	Segment	Level of Congestion
SE 172nd Ave	Robs Way to SE Sager Rd	Very Congested
SE 45th Ave	SE 42nd Ave to SE Johnson Creek Blvd	Very Congested
SE Clatsop St	SE 132nd Ave to SE 162nd Ave	Nearing Congestion to Very Congested
SE Evelyn St	SE Strawberry Ln to SE 82nd Dr	Congested
SE Foster Rd	SE Troge Rd to SE Hemrick Rd	Nearing Congestion
SE Harmony Rd	SE Cedarcrest Dr to SE Fuller Rd	Nearing Congestion
SE King Rd	SE 129th Ave to SE 147th Ave	Nearing Congestion to Some Congestion
SE Linwood Ave	SE Johnson Creek Blvd to SE Alberta Ave	Nearing Congestion
SE Monterey Ave	SE 85th Ave to I-205	Nearing Congestion
SE Mt Scott Blvd	SE Ridgecrest Rd to SE Clatsop St	Some Congestion
SE Otty Rd/SE Idleman Rd/SE Tyler Rd	SE Fuller Rd to SE Mt Scott Blvd	Nearing Congestion to Very Congested
SE Ridgecrest Rd	SE 132nd Ave to SE Parkwood Way	Some Congestion
SE Sunnybrook Blvd	Oak Bluff Blvd to SE 97th Ave	Nearing Congestion to Some Congestion
SE Sunnyside Rd	Clackamas Town Center to SE 147th Ave	Nearing Congestion to Very Congested
SE Tong Rd	OR 212 to OR 224	Nearing Congestion to Very Congested
SE Webster Rd	SE Lake Rd to OR 224	Congested
SE Otty Rd	SE Valley View Terr to SE 117th Ave	Some Congestion
Sunrise Expressway	SE Mather Rd to OR 212	Nearing Congestion to Some Congestion

2035 FULL BUILD SCENARIO

The full build scenario includes all of the existing planned projects in the County's current TSP and the Metro RTP. The purpose of analyzing the full build scenario is to determine how currently planned transportation projects will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities that are forecast to perform above standards. In addition, the full build analysis will identify intersections and roadways that do not meet standards even with planned transportation projects.

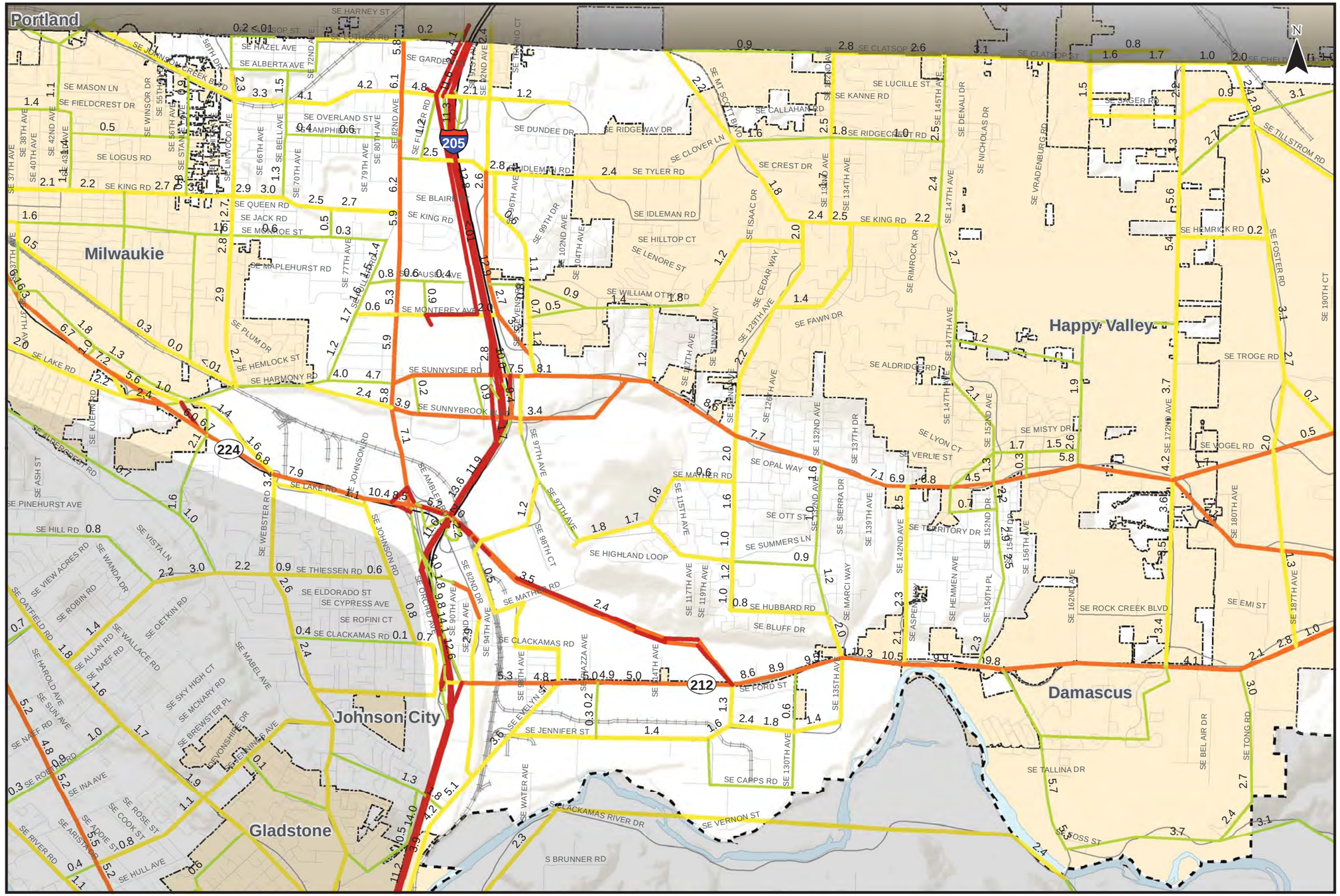
The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted based on projects in the full build scenario that affect roadway or intersection capacity, such as adding turn lanes. The capacity full build projects are mapped in Figure C 38 and listed and described in Table C 13.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



2035 Low Build Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Other
- #.# PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resouce Center

Evening Weekday Peak Hour Link Volumes 2035 Low Build Scenario
Greater Clackamas Regional Center / Industrial Area

Figure
C 36

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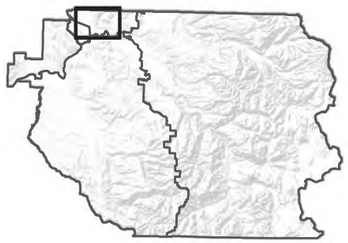
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Very Congested >1.10

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Nearing Congesion 0.8 - 0.9

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

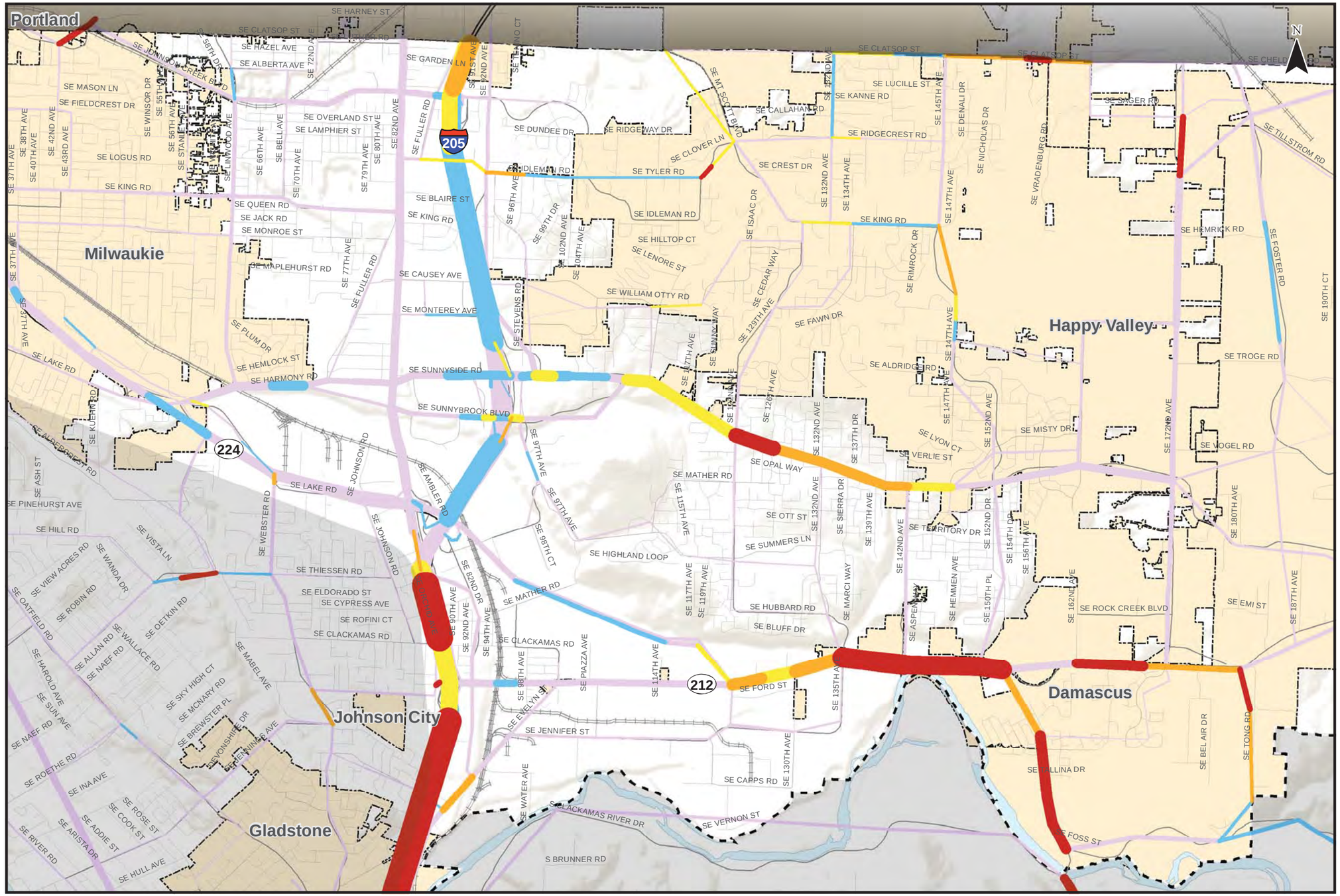
Less Congested <0.8

- 100 Vehicles
- 1,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County, Metro Data Resouce Center

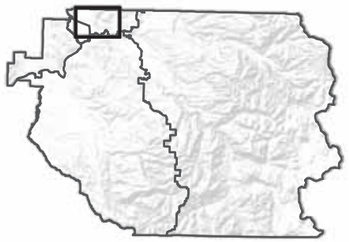


Evening Weekday Peak Hour Roadway Segment Congestion 2035 Low Build Scenario
Greater Clackamas Regional Center / Industrial Area

Figure
C 37

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\37 Evening Weekday Peak Hour Roadway Segment Congestion 2035 Low Build Scenario.mxd

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

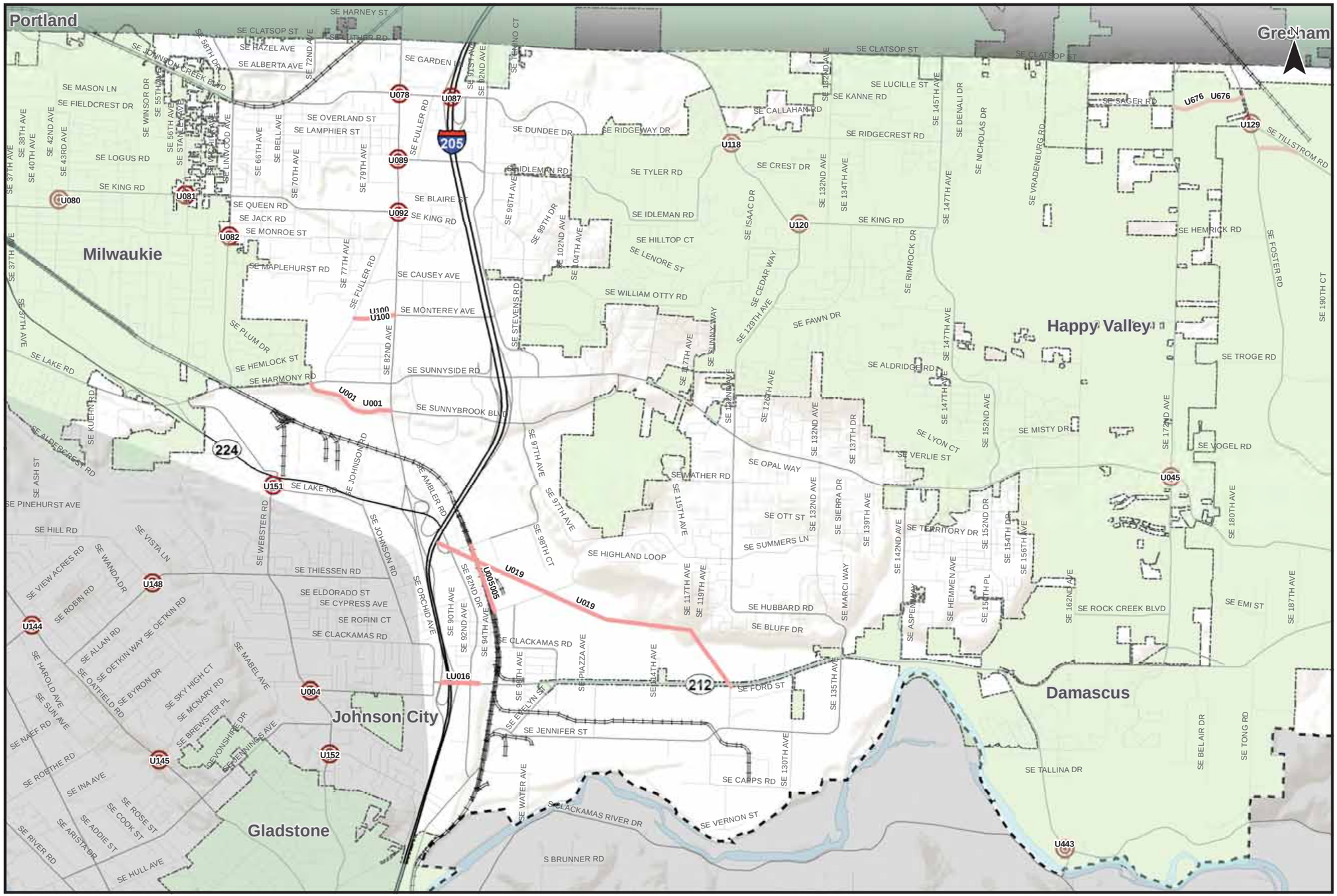


2035 Low Build Projects

- Intersection Projects
- Roadway Projects

2035 Full Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB



This figure displays the projects included in the 2035 Full Build Scenario. The 2035 Full Build Scenario includes the existing planned projects in the County's current TSP and the Metro RTP. The purpose of analyzing the Full Build Scenario is to determine how transportation projects that are currently planned will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities that are forecasted to perform above standards.

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

2035 Full Build Projects
Greater Clackamas Regional Center / Industrial Area

Figure
C 38

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Table C 13 Full Build Projects in the Greater Clackamas Regional Center/Industrial Area

Project	ID	Location	Description
Sunnybrook Rd Extension (W)*	U001	82nd Avenue to Harmony Road	Extend as a minor arterial (4 lanes)
Industrial Way*	U005	Lawnfield Road to Mather Road	New 3-lane collector
OR 212/224: 3rd westbound lane*	U016	OR 212/224, UPRR viaduct to I-205	Restripe OR 212/224 to add 3rd WB lane (combination thru & right-turn lane @ 82nd Dr.); provide two signalized right-turn lanes to NB I-205 On-ramp; provide two right-turn lanes SB I-205 Off-ramp to EB OR 212/224; install traffic signal @ I-205 SB ramp terminals to OR 212/224; re-align multi-use path from 82nd Dr. to I-205 NB On-ramp.
Sunrise Expressway Mainline*	U019	I-205 to SE 122nd Ave. crossing OR 212/224	Construct 2-4 lane highway; construct new overcrossing structure over I-205 connecting 82nd Ave. and 82nd Dr.
Monterey Avenue*	U100	82nd Avenue to Fuller Road	New 2-lane extension
Sager*	U676	162nd to Foster	Improve to collector standards (3 lanes), and signalize Sager @172nd.
Sunnyside Road	U045	Sunnyside Road/SE 172nd Ave Intersection	Install traffic signals and left-turn lanes
SE 122nd Avenue	U057	Sunnyside Road to Hubbard Road	Reconstruct and widen (3 lanes), add turn lanes
SE 132nd Avenue	U058	Sunnyside Road to Hubbard Road	Upgrade to standards (3 lanes), add sidewalks
79th Ave Extension	U066	Johnson Creek - King Rd	Build N-S collector (3 lanes) west of 82nd Ave
Johnson Creek Blvd.	U071	36th to 45th	Widen to minor arterial standards (4 lanes)
Johnson Creek Blvd.	U072	55th Avenue to Bell Avenue	Widen to 3 lanes
Johnson Creek Blvd.	U074	Bell Avenue to 82nd Avenue	Widen to 5 lanes plus bike lanes and sidewalks
Clatsop Street/Luther Road	U075	Luther - 72nd Ave. to 82nd: Clatsop, 82nd Ave. east to Fuller	Upgrade to collector standard (3 lanes) and signalize 82nd Avenue intersection
West Collector	U076	Luther Street to Johnson Creek Blvd.	Construct new collector (3 lanes)
82nd Avenue	U078	82nd Avenue/Johnson Creek Blvd. intersection	Add second southbound left-turn lane
Fuller Road extension	U079	Johnson Creek Blvd. to Hinkley Street	Extend street (2 lanes)
King Road	U080	Harrison/King/42nd intersection	Realign intersection, traffic signal
King Road	U081	King/Stanley intersection	Add turn lanes to Stanley
Linwood Avenue	U082	Linwood/Monroe intersection	Add curbs/sidewalks, improve horizontal alignments
Johnson Creek Blvd.	U087	1-205 - Johnson Creek interchange	Connect southbound off-ramp with Fuller, remove signal, upgrade with new ramps
Fuller Road	U088	Otty Street to Johnson Creek Blvd.	Widen to 3 lanes. Add turn lanes, sidewalks, on-street parking, central median, and landscaping.
Otty Street Realignment	U089	Otty Street/82nd Avenue/Otty Road	Realign Otty Street with Otty Road at 82nd Avenue
Otty Road	U090	82nd Avenue to 92nd Avenue	Improve to minor arterial standard (4 lanes). Widen street, add turn lanes, on-street parking, central median, landscaping, bike lanes and sidewalks
Fuller Road	U091	Otty to King/82nd Avenue	New 2-lane extension
Fuller Road disconnect	U092	Fuller Road/King Road intersection	Disconnect Fuller auto access to King Road
Monroe Street	U093	72nd Avenue to Fuller Road	Improve to collector standard (3 lanes)

Project	ID	Location	Description
Boyer Drive	U094	82nd Avenue to Fuller Road	New 2-lane extension
Fuller Road	U095	King Road to Harmony Road	Reconstruct and widen road to collector standards (3lanes)
Causey Avenue	U097	Fuller Road to I-205	Widen (3 lanes) and add bike lanes
SE 85th Avenue	U099	Causey Avenue to Monterey Avenue	Improve to collector standard (3 lanes) with bike lanes and sidewalks
Lake Road	U102	OR 224 west to Milwaukie city limits	Reconstruct, widen (4 lanes), turn lanes
Harmony Road	U104	82nd Avenue - OR 224	Widen to 5 lanes
82nd Avenue	U109	Sunnyside Road to Sunnybrook Road	Widen to 7 lanes with boulevard
Johnson Creek extension	U116	Altamont to Idleman Road	New 2-lane extension
Idleman Road	U117	Johnson Creek extension to Mt. Scott Blvd.	Reconstruct and widen to urban minor arterial standards (4 lanes), smooth curves
Mt. Scott Blvd.	U118	Idleman/Mt. Scott intersection	Realign and add left-turn lanes
Mt. Scott Blvd./King Road	U119	Idleman Road to 132nd Avenue	Reconstruct and widen (urban) (3 lanes). Improve grade.
King Road	U120	King Road/129th intersection	Add turn lanes, realign
SE 132nd Avenue	U121	King Road to Clatsop Street	Widen to 3 lanes
King Road	U122	132nd Avenue to 147th Avenue	Reconstruct, widen (3 lanes), turn lanes
SE 122nd/129th Avenue	U123	Sunnyside to King Road	Widen to 3 lanes
Causey extension	U124	I-205 Frontage Road to W. Otty Road	Collector (3 lanes) with bike lanes and sidewalks
William Otty Road extension	U125	Stevens Road to Valley View Terrace	New 2-lane collector
Valley View Terrace	U126	Sunnyside Road to Otty Road	Upgrade to collector (3 lanes) with bike lanes and sidewalks
Foster Road	U128	Tillstrom Road to Multnomah County Line	Four lane widening with left-turn lanes
Foster Road	U129	Foster Road/Tillstrom Road intersection	Install traffic signal, install southbound left-turn lane
Mather Road	U130	97th Avenue to 122nd Avenue	Reconstruct and widen (urban) (3 lanes).
Mather Road	U132	122nd Avenue to 132nd Avenue	New 2-lane extension
Summers Lane Ext. Phase 2	U133	122nd Avenue to 132nd Avenue	New 2-lane extension
SE 142nd Avenue	U135	Sunnyside Road to OR 212	Widen to 3 lanes
SE 152nd Avenue Phase 2	U136	Sunnyside Road to OR 212	Reconstruct and widen (urban) (3 lanes)
Webster Road	U151	Webster Road/Lake Road intersection	Add left-turn lanes
SE 82nd Drive	U156	OR 212 to Gladstone Phase 2	Widen to 5 lanes
Mather Road	U159	SE 82nd Drive to Industrial Way	Extend Mather Road across railroad to SE 82nd Drive
Mather Road	U160	Industrial Way to 98th	Widen to 3 lanes
Springwater Road	U184	OR 224 to Hattan Road	Four lane widening with left-turn lanes, widen bridge over Clack. River
Foster Road	U219	OR 212 to Troge Road	Four lane widening with left-turn lanes
Tillstrom Road	U220	SE 190th Drive to Foster Road	Remove or decrease horizontal curve along Foster Road, relocate intersection, install southbound left-

Project	ID	Location	Description
			turn lane
SE 242nd Avenue	U223	242nd/Sunshine Valley Road intersection	Install northbound right-turn lane
SE 242nd Avenue	U224	242nd/Tillstrom Road intersection	Install northbound left-turn lane and southbound right-turn lane
SE 82nd Drive	U338	OR 212 to Lawnfield Road	Widen to 5 lanes
OR-212 intersections	U423	SE 162nd to Anderson Rd.	Existing OR 212 remains two lanes with turn pockets from 162nd Ave. to Anderson Road south of limited access parkway. Include sidewalks, bike lanes, and a landscaped buffer.
OR 224	U443	Springwater Road/Hwy-224 intersection	Install traffic signal
162nd Ave. Extension South Phase 1	U464	Rock Creek Blvd. to Goose Hollow Dr.	Construct new 2 - 3 lane roadway with intersection improvements at OR-212/162nd on all 4 approaches. The second phase is Project #11346.
162nd Ave. Extension South Phase 2	U485	157th Ave. to Rock Creek Blvd.	Construct new 3 lane roadway with traffic signals and bridge over Rock Creek. The first phase is Project #10041. Improve north-south connectivity and provide congestion relief to 172nd Ave.
SE 242nd Avenue	U484	OR 212 to Multnomah County Line	Reconstruct and widen (rural) (3 lanes), add turn lanes
OR 212 widening to 5 lane blvd	U580	Sunrise Unit 1 Terminus - East Damascus limits	Widen OR 212 to a 5-lane blvd section through Damascus
Mt. Scott Blvd./King Rd. Improvements	U592	Happy Valley City limits to 145th Ave.	Widen to three lanes. Improve access to Happy Valley Town Center.
New Connection, Damascus	U595	177th to 190th	New arterial from the Rock Creek Blvd interchange. This portion is within Damascus.
Rock Creek Blvd. improvements	U608	OR 212/224 (planned Sunrise Corridor Rock Creek Interchange) to 177th Ave.	Construct new 5 lane roadway with sidewalks, bike lanes and traffic signals
SE Sunnyside Rd East Extension	U610	SE 172nd Ave. to SE 242nd Ave.	Extend Sunnyside Road east from 172nd Ave to 242nd Ave. Evaluate alignment options between Bohna Park Road and Tillstrom Road for the connection from Foster Road to 242nd Ave.
162nd Ave. Extension North	U673	Hagen Rd. to Clatsop St	Construct new 3 lane roadway with traffic signals.
Rugg Rd	U674	252nd Ave to 242nd Ave	Construct new roadway that adds E/W capacity in vicinity of Rugg Rd and connects Springwater Industrial area to Hwy 26
Cheldelin	U675	172nd to 190th	Improve to minor arterial (4 lanes) standards, signalize Cheldelin at 172nd, 182nd, and Foster.
162nd	U677	Foster to southern boundary of Pleasant Valley	Improve 162nd to collector standards (3 lanes), add signal at Foster @ 162nd.
172nd	U678	Cheldelin to south Boundary of Pleasant Valley	Improve 172nd Ave. to major arterial standards (3 lanes).
Sunrise Project:	U681	Webster Rd./OR 224 to 172nd Ave./OR 212	Acquire right-of-way: Webster Rd. to SE 172nd Ave. to accommodate six-through lane expressway, plus auxiliary lanes.
Sunrise Hwy	U682	Webster Rd./OR 224 to 172nd Ave./OR 212	Preliminary engineering and environmental impact statement (EIS) from Webster Rd. to SE 172nd.

* Project also included in Low Build Scenario.

Study Intersection Analysis

The operations at the study intersections that do not meet standards under the low build scenario were analyzed under the full build scenario using traffic volumes projected under the full build scenario. Figure C 39 illustrates the lane configurations and traffic control devices at the study intersections. The intersections that meet standards under the low build analysis were not analyzed under the full build scenario.

The intersection operation results are shown in Table C 14 and Figure C 40, with intersections that do not meet standards noted. Any full build projects that affect lane configurations at study intersections were accounted for and are noted in the figure and table as well. Signal timings were adjusted as appropriate to account for changes in the forecast traffic volumes. Intersections that do not meet standards are noted.

Table C 14 2035 Full Build Traffic Operations Analysis Results at Study Intersections in Greater Clackamas Regional Center/Industrial Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard in Low Build?	Full Build Project?	Meets Standard in Full Build?
104	SE Johnson Creek Blvd/80th Ave	County	v/c = 0.99	No	Yes (U074)	No (v/c=1.74)
105	OR 213 (SE 82nd Ave)/SE Johnson Creek Boulevard	ODOT	v/c = 0.99	No	Yes (U078)	No (v/c=1.04)
116	SE King Rd/SE Fuller Rd	County	v/c = 0.99	No	Yes (U092)	Yes
123	SE Lake Rd/SE International Way	County	v/c = 0.99	No	Yes (U104)	No (v/c=1.11)
124	SE Harmony Rd/SE Linwood Ave	County	v/c = 0.99	No	Yes (U104)	No (v/c=1.11)
130	SE Sunnyside Rd/I-205 SB Ramps	ODOT	v/c = 0.85	No	No	Yes
131	SE Sunnyside Rd/I-205 NB Ramps	ODOT	v/c = 0.85	No	No	Yes
134	SE Sunnyside Rd/SE Sunnybrook Blvd	County	v/c = 0.99	No	No	Yes
136	OR 213 (SE 82nd Ave)/SE Sunnybrook Blvd	ODOT	v/c = 1.1	No	Yes (U001)	No (v/c= 1.68)
138	SE Sunnybrook Blvd/I-205 NB Ramps	ODOT	v/c = 0.85	No	No	Yes
140	OR 224/SE Rusk Rd	ODOT	v/c = 0.99	No	No	No (v/c=1.13)
141	OR 224/SE Lake Rd/SE Webster Rd	ODOT	v/c = 0.99	No	No	No (v/c=2.01)
143	OR 224/SE Johnson Rd	ODOT	v/c = 0.99	No	No	No (v/c=1.73)
144	SE Sunnyside Rd/SE 122nd Ave	County	v/c = 0.99	No	No	Yes
146	SE Sunnyside Rd/SE 142nd Ave	County	v/c = 0.99	No	No	Yes
153	OR 212/I-205 SB Ramps	ODOT	v/c = 0.85	No	No	No (v/c=0.92)
157	OR 224/SE Hubbard Rd/135th Ave	ODOT	v/c = 0.99	No	No	No (v/c= 1.50)
158	OR 224/SE 142nd Ave	ODOT	v/c = 0.99	No	Yes (U135)	Yes
159	OR 212/OR 224	ODOT	v/c = 0.99	No	No	Yes
161	OR 212/SE 172nd Ave	ODOT	v/c = 0.99	No	No	No (v/c=1.54)
165	OR 224/Springwater Rd	ODOT	v/c = 0.99	No	Yes (U443)	No (v/c=4.06)

As seen in Table C 12, nine of the 21 intersections that do not meet standards in the low build scenario do meet standards in the full build scenario. The intersection of SE King Road/SE Fuller Road (116) is impacted by the Fuller Road project, which disconnects automobile access to King Road from Fuller Road. This project improves operations at the intersection so that it meets standards in the full build scenario. The widening of SE 142nd Avenue between Sunnyside Road and OR 212 improves operations at the intersection of OR 224/SE

142nd Avenue (158), so that the intersection meets standards in the full build scenario. Although there are not full build projects that directly impact the intersections at the I-205 ramps at SE Sunnyside Road and SE Sunnybrook Boulevard, SE Sunnyside Road/SE 122nd Avenue (144), SE Sunnyside Road/SE 142nd Avenue (146), or OR 212/OR 22, these intersections meet standards in the full build scenario due to traffic volume changes.

Twelve intersections do not meet standards in the full build scenario. Six of these intersections are impacted by full build projects, but continue to not meet standards. Despite the widening of SE Harmony Road planned between OR 224 and OR 213 (SE 82nd Ave) (U104), the intersections of SE Lake Road/SE International Way (123) and SE Harmony Road/SE Linwood Avenue (124) do not meet standards. The intersection of OR 224/Springwater Road (165) is signalized under the full-build scenario, but operates at a volume-to-capacity ratio over 4.0. *Appendix 8* contains detailed traffic operations analysis results.

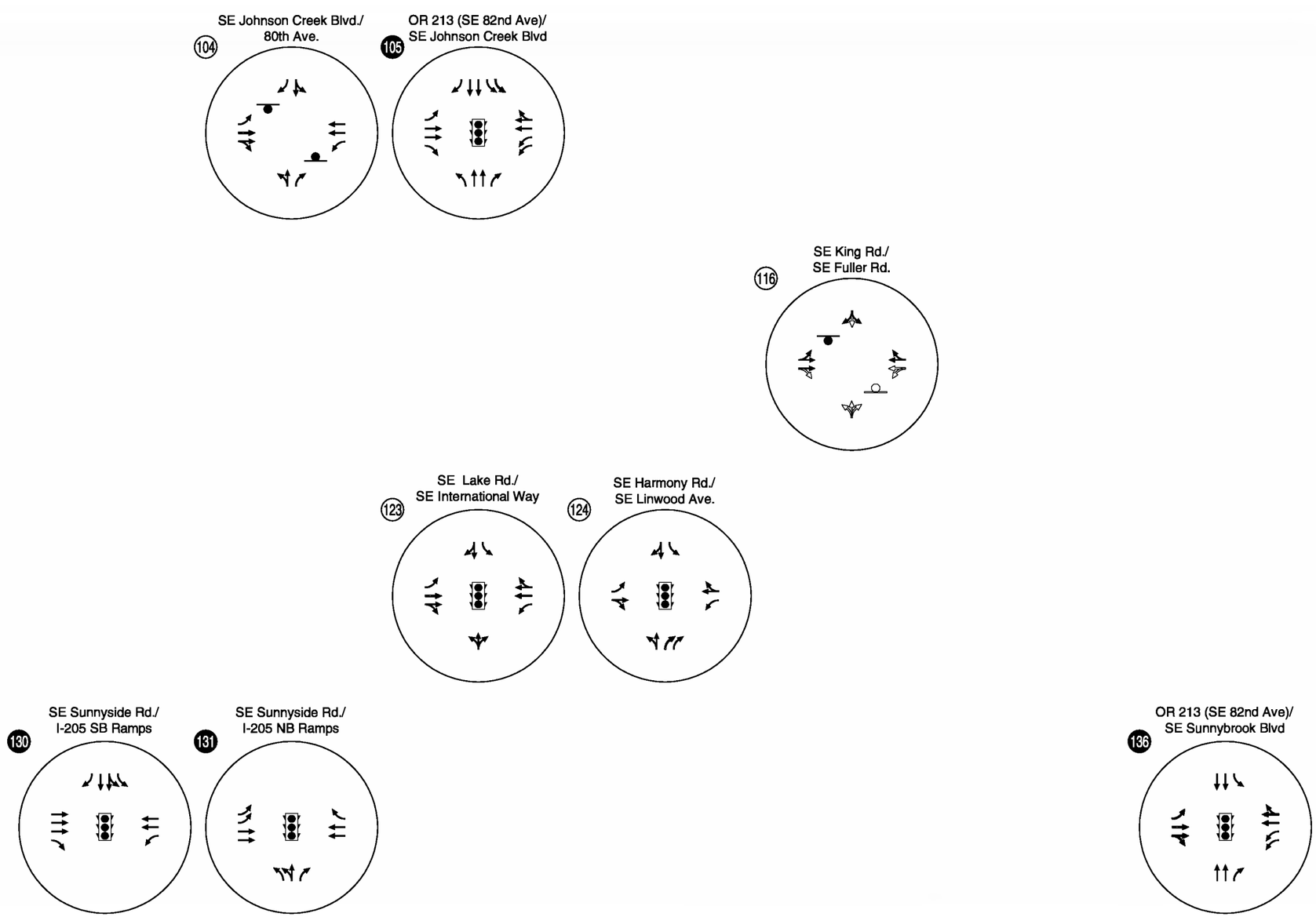
Roadway Segment Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure C 41 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Full Build Scenario.

As is evident from Figure C 41, under the 2035 Full Build Scenario demand for travel continues to be highest along OR 212, SE Sunnyside Road, OR 213 (SE 82nd Avenue), SE Harmony Road, SE Johnson Creek Boulevard and SE Linwood Avenue. The planned extension further east of OR 224 east of I-205 as part of the Sunrise Expressway Mainline project (U019) under the Full Build Scenario as a freeway-type facility carries a relatively high volume of traffic.



NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

- ## - ODOT STUDY INTERSECTION
- (##) - COUNTY STUDY INTERSECTION
- - STOP SIGN
- - TRAFFIC SIGNAL
- - ROUNDABOUT
- ⇨ - LANE REMOVED
- → - LANE ADDED

Full Build Lane Configuration and Traffic Control Devices
Greater Clackamas Regional Center/Industrial Area - 1

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Figure C 39

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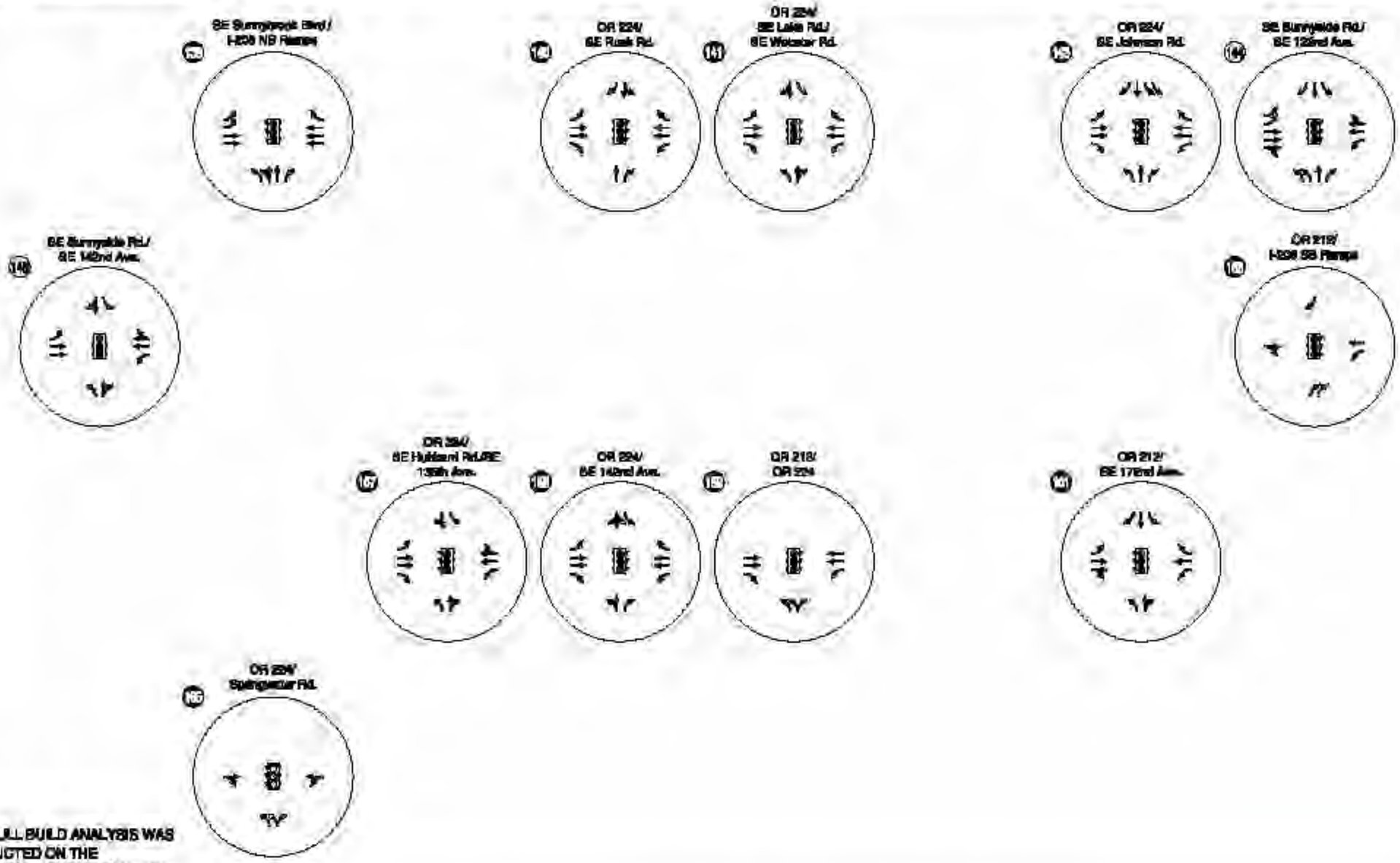
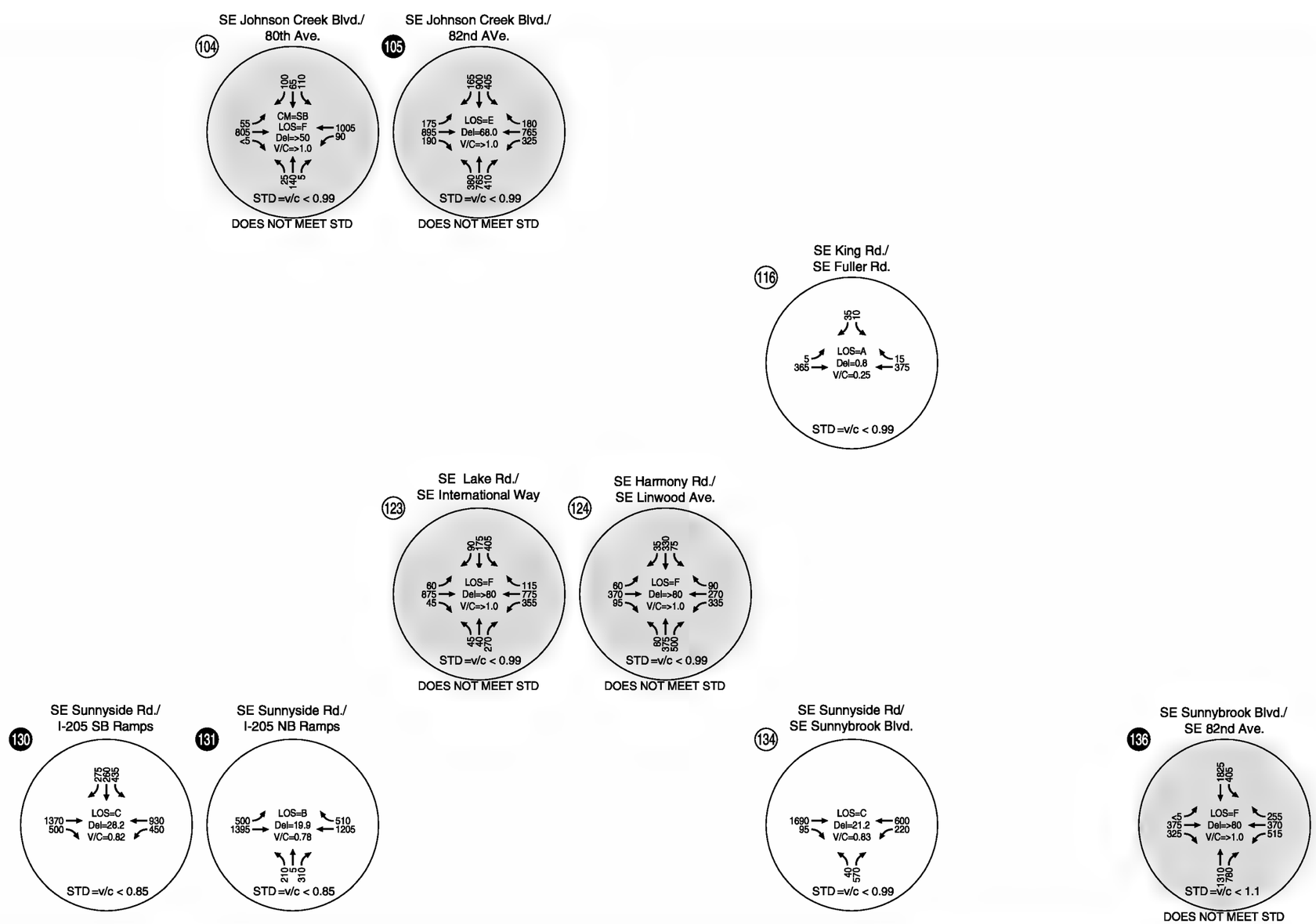


NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT
- LANE REMOVED
- LANE ADDED

Full Build Lane Configuration and Traffic Control Devices
Greater Clackamas Regional Center/Industrial Area - 2

Figure C 39



NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

CM	=	CRITICAL MOVEMENT (UNSIGNALIZED)
LOS	=	INTERSECTION LEVEL OF SERVICE (SIGNALIZED)/CRITICAL MOVEMENT LEVEL OF SERVICE (UNSIGNALIZED)
Del	=	INTERSECTION AVERAGE CONTROL DELAY (SIGNALIZED)/CRITICAL MOVEMENT CONTROL DELAY (UNSIGNALIZED)
V/C	=	CRITICAL VOLUME-TO-CAPACITY RATIO
STD	=	OPERATIONAL STANDARD
AWSC	=	ALL-WAY STOP CONTROL

Full Build Intersection Operations
PM Peak Hour
Greater Clackamas Regional Center/Industrial Area - 1

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Figure C 40

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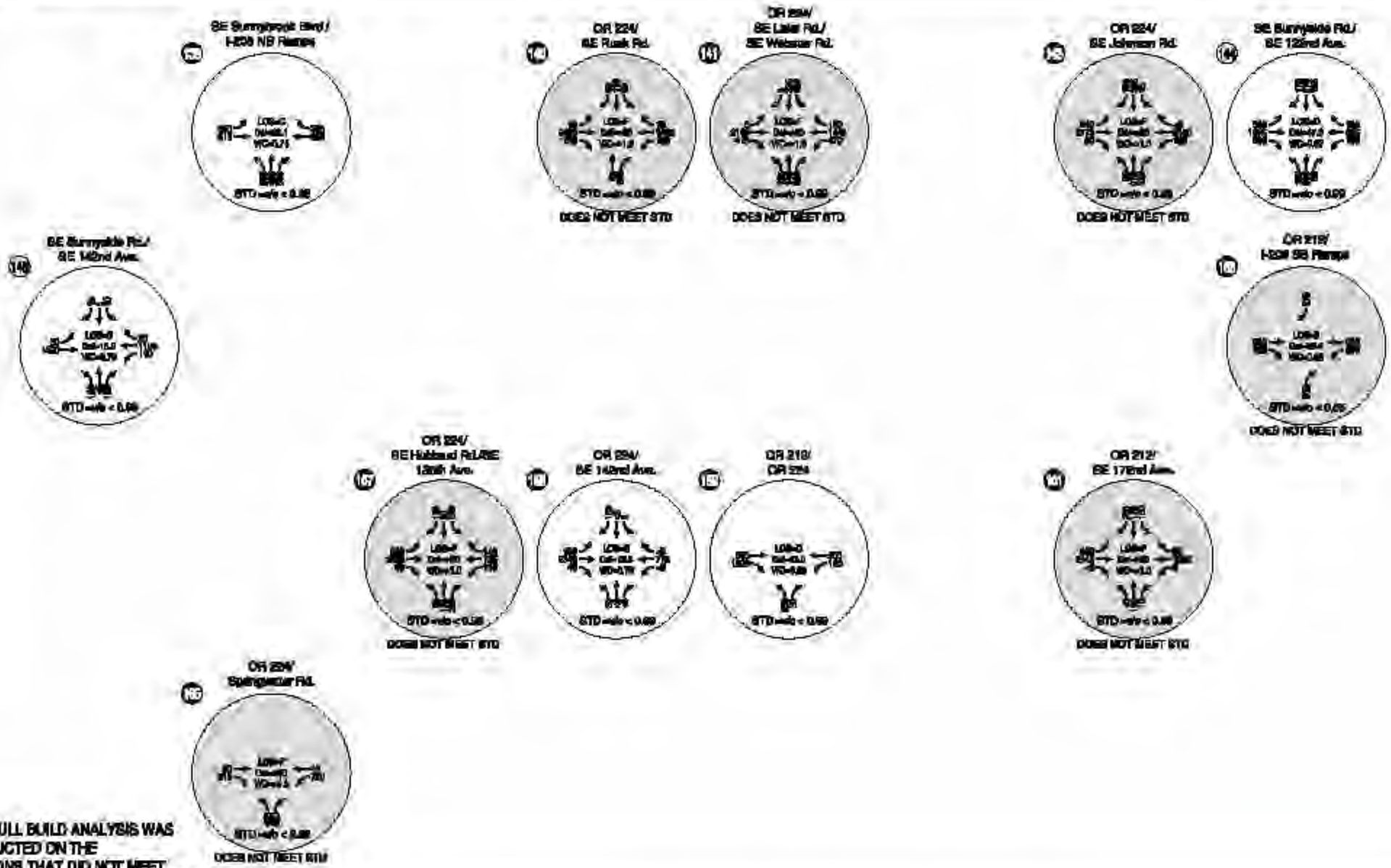


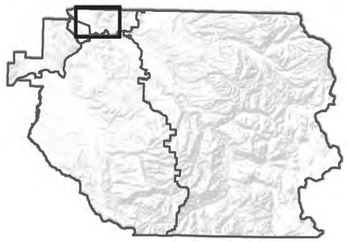
NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

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

Full Build Intersection Operations
PM Peak Hour
Greater Clackamas Regional Center/Industrial Area - 2

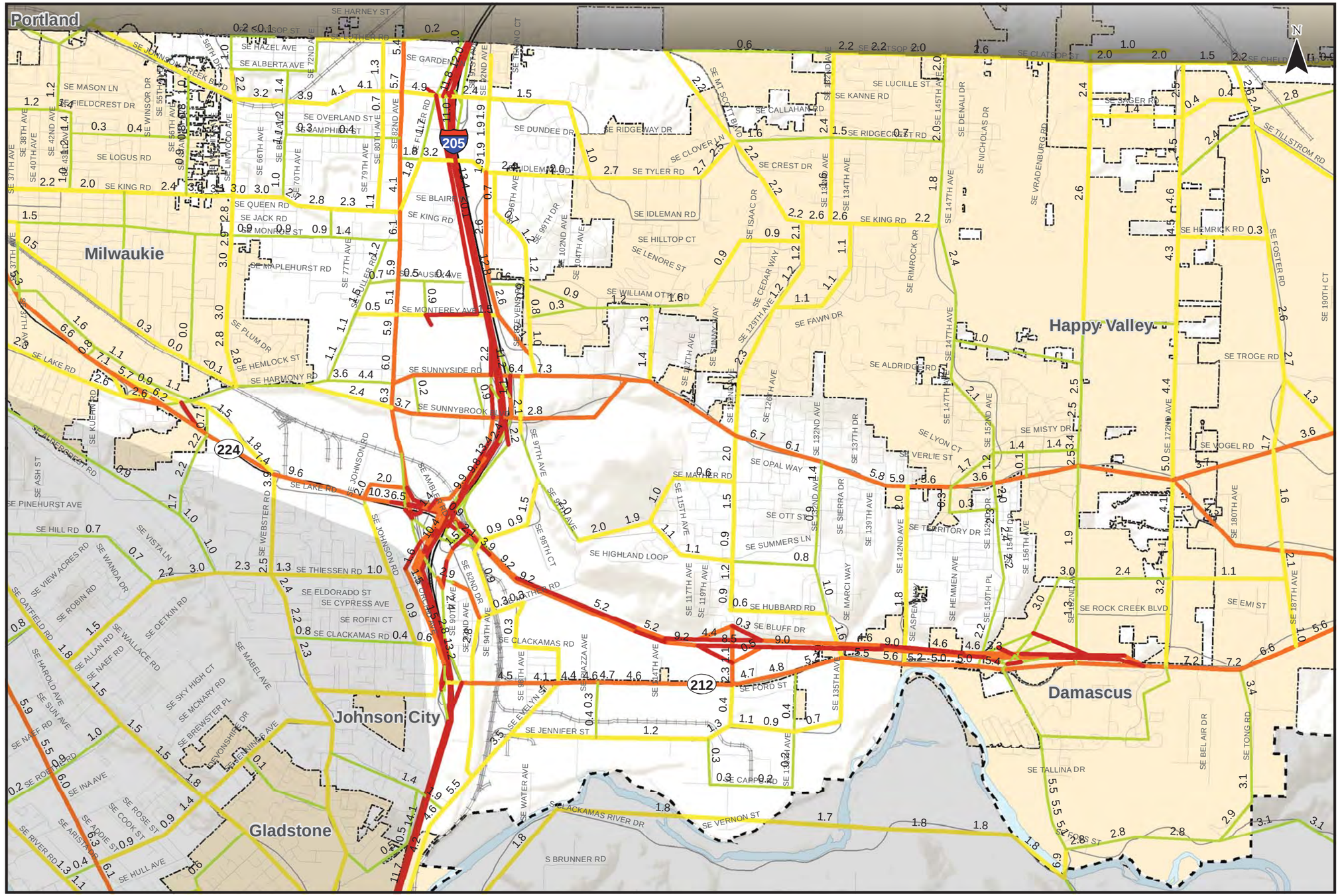
Figure C 40

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



2035 Full Build Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Oher
- #.# PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB



0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resouce Center

Evening Weekday Peak Hour Roadway Segment Volumes 2035 Full Build
Greater Clackamas Regional Center / Industrial Area

Figure
C 41

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Approximate Level of Congestion

The level of congestion experienced on roadway segments was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

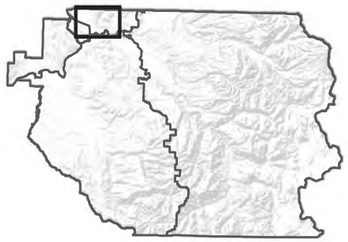
Figure C 42 illustrates the relative congestion during the 2035 Full Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.

As can be seen in Figure C 42, under the 2035 Full Build Scenario many of the segments along SE Sunnyside Road and OR 212 are no longer estimated to experience the relatively high levels of congestion experienced under the 2035 Low Build Scenario. The primary difference between the two scenarios is the longer extension of OR 224 as a freeway-type facility with the Sunrise Expressway Mainline project between I-205 and SE 172nd Avenue. Providing a new parallel facility along OR 212 greatly reduces the amount of traffic OR 212 and SE Sunnyside are required to try to serve. Table C 15 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table C 15 2035 Full Build Roadway Segment Congestion in Greater Clackamas Regional Center/Industrial Area

Roadway	Segment	Level of Congestion
I-205	South of study area to County boundary, not including the section around OR 224 interchange and SE Sunnyside Rd	Nearing Congestion to Very Congested
OR 212/ OR 224	SE Lake Rd to SE Webster Rd OR 212 to S Clackamas River Dr SE 172nd to SE Tong Rd	Nearing Congestion to Very Congested
SE 147th Ave	SE Monner Rd to SE King Rd	Nearing Congestion to Congested
SE 162nd Ave	SE Monner Rd to SE Hagan Rd	Nearing Congestion
SE Clatsop St	SE 147th Ave to SE 162nd Ave	Nearing Congestion to Some Congestion
SE King Rd	SE 129th Ave to SE 132nd Ave	Nearing Congestion
SE Linwood Ave	SE Johnson Creek Blvd to SE Alberta Ave	Nearing Congestion
SE Idleman Rd	SE 92nd Ave to SE 96th Ave	Nearing Congestion
SE Sunnybrook Blvd	Oak Bluff Blvd to I-204	Nearing Congestion to Some Congestion
SE Sunnyside Rd	Clackamas Town Center to I-205 SE 129th Ave to SE 126th Ave	Nearing Congestion to Some Congestion
SE Tong Rd	OR 212 to OR 224	Nearing Congestion to Very Congested
SE Webster Rd	SE Wilshire St to OR 224	Congested to Very Congested
SE Otty Rd	SE Valley View Terr to SE 117th Ave	Some Congestion

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Very Congested >1.10

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Nearing Congestion 0.8 - 0.9

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

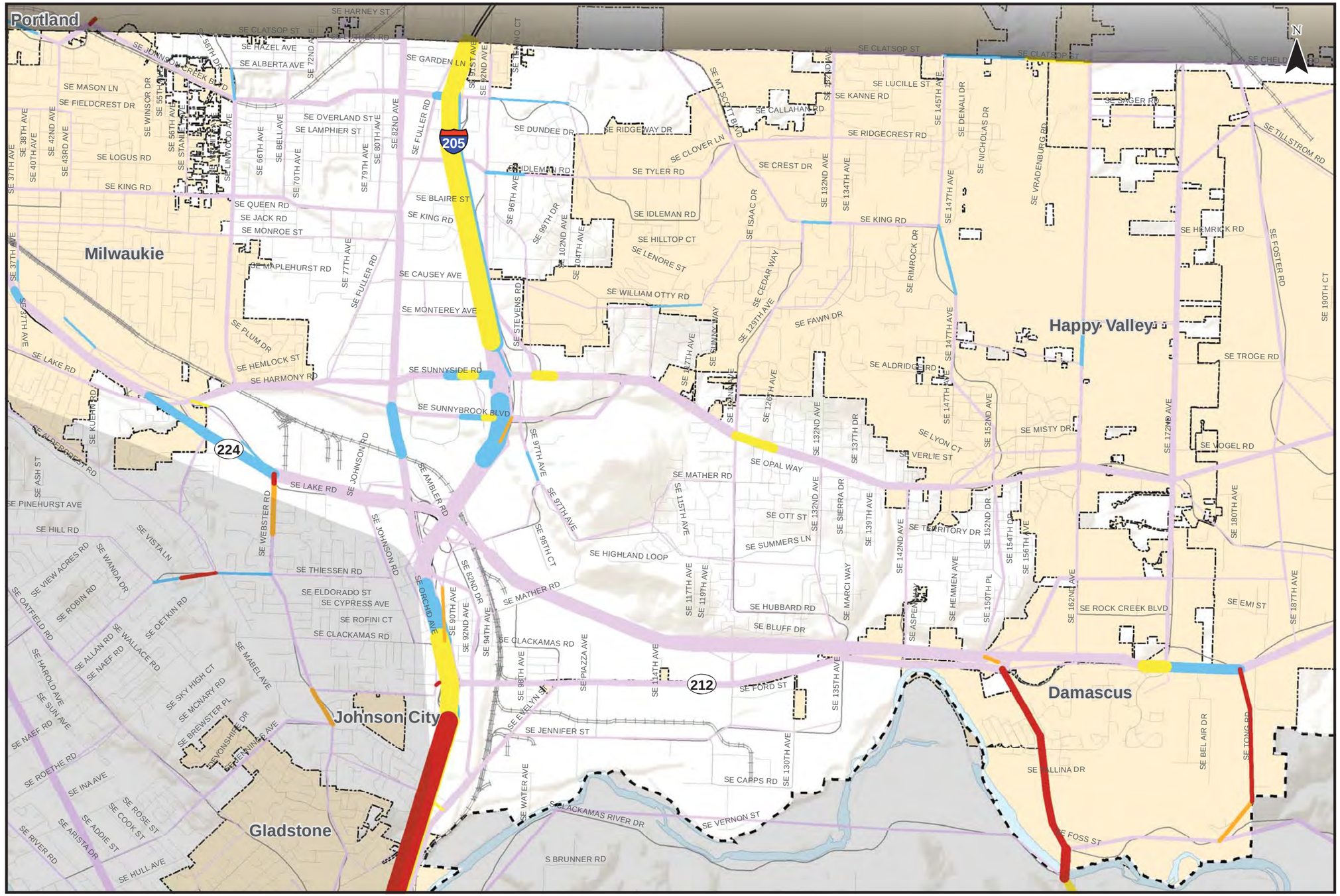
Less Congested <0.8

- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County, Metro Data Resouce Center



Evening Weekday Peak Hour Roadway Segment Congestion 2035 Full Build
Greater Clackamas Regional Center / Industrial Area

Figure
C 42

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COMPARISON OF EXISTING, 2035 LOW BUILD, AND 2035 FULL BUILD ANALYSIS RESULTS

Traffic volumes are forecast to increase noticeably. There are very few transportation projects planned and financed under the low build scenario. The full build scenario includes several roadway and intersection projects, mainly reconstructing and widening roadways, signalizing intersections, and adding turn lanes.

Intersection Operations Analysis

Table C 16 compares the intersection operation results for the existing, 2035 low build, and 2035 full build scenarios. The table also notes intersections that are impacted by low build and full build projects.

Table C 16 Comparison of Traffic Operations Analysis Results at Study Intersections in the Greater Clackamas Regional Town Center

ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
101	SE Johnson Creek Blvd/SE Flavel Dr	County	v/c = 0.99	Yes	No	Yes	-	-
102	SE Johnson Creek Blvd/SE Bell Ave	County	v/c = 0.99	Yes	No	Yes	-	-
103	SE Johnson Creek Blvd/SE 79th Pl	County	v/c = 1.1	Yes	No	Yes	-	-
104	SE Johnson Creek Blvd/80th Ave	County	v/c = 1.1	No	No	No	Yes	No
105	SE Johnson Creek Blvd/82nd Ave	ODOT	v/c = 0.99	Yes	No	No	Yes	No
106	SE Johnson Creek Blvd/SE Fuller Rd	County	v/c = 1.1	Yes	No	Yes	-	-
107	SE Johnson Creek Blvd/I-205 SB Ramps	ODOT	v/c = 0.99	Yes	No	Yes	-	-
108	SE Johnson Creek Blvd/I-205 NB Ramps	ODOT	v/c = 0.99	Yes	No	Yes	-	-
109	SE Johnson Creek Blvd/SE 92nd Ave	County	v/c = 1.1	Yes	No	Yes	-	-
110	SE Overland Street/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
111	SE Otty Road/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
112	SE Otty Road/SE Fuller Rd	County	v/c = 1.1	Yes	No	Yes	-	-
113	SE Otty Road/SE 92nd Ave	County	v/c = 1.1	Yes	No	Yes	-	-
114	SE Glencoe Rd/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
115	SE King Rd/SE Bell Ave	County	v/c = 0.99	Yes	No	Yes	-	-
116	SE King Rd/SE Fuller Rd	County	v/c = 1.1	Yes	No	No	Yes	Yes
117	SE King Rd/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
118	SE 82nd Ave/SE Boyer	ODOT	v/c = 0.99	Yes	No	Yes	-	-
119	SE Causey Ave/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-

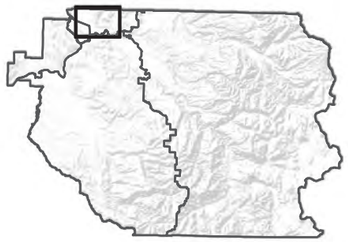
ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
120	SE Monterey Ave/SE 82nd Ave	ODOT	v/c = 0.99	Yes	Yes	Yes	-	-
121	SE Monterey Ave/SE Bob Schumacher Rd	County	v/c = 1.1	Yes	No	Yes	-	-
122	SE Bob Schumacher Rd/SE Stevens Rd	County	v/c = 1.1	Yes	No	Yes	-	-
123	SE Lake Rd/SE International Way	County	v/c = 0.99	Yes	No	No	Yes	No
124	SE Harmony Rd/SE Linwood Ave	County	v/c = 0.99	Yes	No	No	Yes	No
125	SE Harmony Rd/SE Fuller Rd	County	v/c = 1.1	Yes	No	Yes	-	-
126	SE Sunnyside Rd/SE Harmony Rd/SE 82nd Ave	ODOT	v/c = 0.99	Yes	No	No	No	No
127	SE Sunnyside Rd/8600 Block	County	v/c = 1.1	Yes	No	Yes	-	-
128	SE Sunnyside Rd/9000 Block	County	v/c = 1.1	Yes	No	Yes	-	-
129	SE Sunnyside Rd/SE 93rd Ave	County	v/c = 1.1	Yes	No	Yes	-	-
130	SE Sunnyside Rd/I-205 SB Ramps	ODOT	v/c = 0.85	Yes	No	No	No	Yes
131	SE Sunnyside Rd/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	No	No	No	Yes
132	SE Sunnyside Rd/SE Stevens Rd	County	v/c = 1.1	Yes	No	Yes	-	-
133	SE Sunnyside Rd/SE 101st Ave	County	v/c = 1.1	Yes	No	Yes	-	-
134	SE Sunnyside Rd/SE Sunnybrook Blvd	County	v/c = 1.1	Yes	No	No	No	Yes
135	SE Sunnyside Rd/SE Valley View Terrace	County	v/c = 1.1	Yes	No	Yes	-	-
136	SE Sunnybrook Blvd/SE 82nd Ave	ODOT	v/c = 0.99	Yes	Yes	No	No	No
137	SE Sunnybrook Blvd/I-205 SB Ramps	ODOT	v/c = 0.85	Yes	No	Yes	-	-
138	SE Sunnybrook Blvd/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	No	No	No	Yes
139	SE Sunnybrook Blvd/97th Ave	County	v/c = 1.1	Yes	No	Yes	-	-
140	OR 224/SE Rusk Rd	ODOT	v/c = 0.99	Yes	No	No	No	No
141	OR 224/SE Lake Rd/SE Webster Rd	ODOT	v/c = 0.99	Yes	No	No	No	No
142	SE Lake Rd/SE Webster Rd	County	v/c = 0.99	Yes	No	Yes	-	-
143	OR 224/SE Johnson Rd	ODOT	v/c = 0.99	Yes	No	No	No	No
144	SE Sunnyside Rd/SE 122nd Ave	County	v/c = 0.99	Yes	No	No	No	Yes
145	SE Sunnyside Rd/SE 132nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
146	SE Sunnyside Rd/SE	County	v/c = 0.99	Yes	No	No	No	Yes

ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
	142nd Ave							
147	SE Sunnyside Rd/SE 152nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
148	SE Sunnyside Rd/SE 162nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
149	SE Sunnyside Rd/SE 172nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
150	SE Mather Rd/SE 122nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
151	SE Summers Lane/SE 122nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
152	SE Hubbard Rd/SE 132nd Ave	County	v/c = 0.99	Yes	No	Yes	-	-
153	OR 212/I-205 SB Ramps	ODOT	v/c = 0.85	No	No	No	No	No
154	OR 212/I-205 NB Ramps	ODOT	v/c = 0.85	Yes	Yes	Yes	-	-
155	OR 212/SE 82nd Dr	ODOT	v/c = 0.99	Yes	Yes	Yes	-	-
156	OR 212/224/SE 102nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
157	OR 224/SE Hubbard Rd/135th Ave	ODOT	v/c = 0.99	No	No	No	No	No
158	OR 224/SE 142nd Ave	ODOT	v/c = 0.99	Yes	No	No	Yes	Yes
159	OR 212/OR 224	ODOT	v/c = 0.99	Yes	No	No	No	Yes
160	OR 212/SE 162nd Ave	ODOT	v/c = 0.99	Yes	No	Yes	-	-
161	OR 212/SE 172nd Ave	ODOT	v/c = 0.99	Yes	No	No	No	No
162	SE Jennifer St/SE Evelyn St	County	v/c = 0.99	Yes	No	Yes	-	-
163	SE 82nd Dr/SE Jennifer Street	County	v/c = 0.99	Yes	No	Yes	-	-
164	SE Strawberry Lane/SE 82nd Dr	County	v/c = 0.99	Yes	No	Yes	-	-
165	OR 224/Springwater Rd	ODOT	v/c = 0.99	Yes	No	No	Yes	No

Roadway Segment Operations Comparison

Figure C 43 compares the approximate change in congestion between the 2035 Low Build Scenario and 2035 Full Build Scenario. Implementing the full build projects decreases congestion (relative to the low build scenario) most significantly on OR 212 and SE Sunnyside Road. This is mainly due to the further extension of the Sunrise Expressway Mainline east from Webster Road to SE 172nd Avenue in the Full Build Scenario. Portions of other regional roadways also experience reduced congestion such as SE Monterey Avenue and SE Idleman Road.

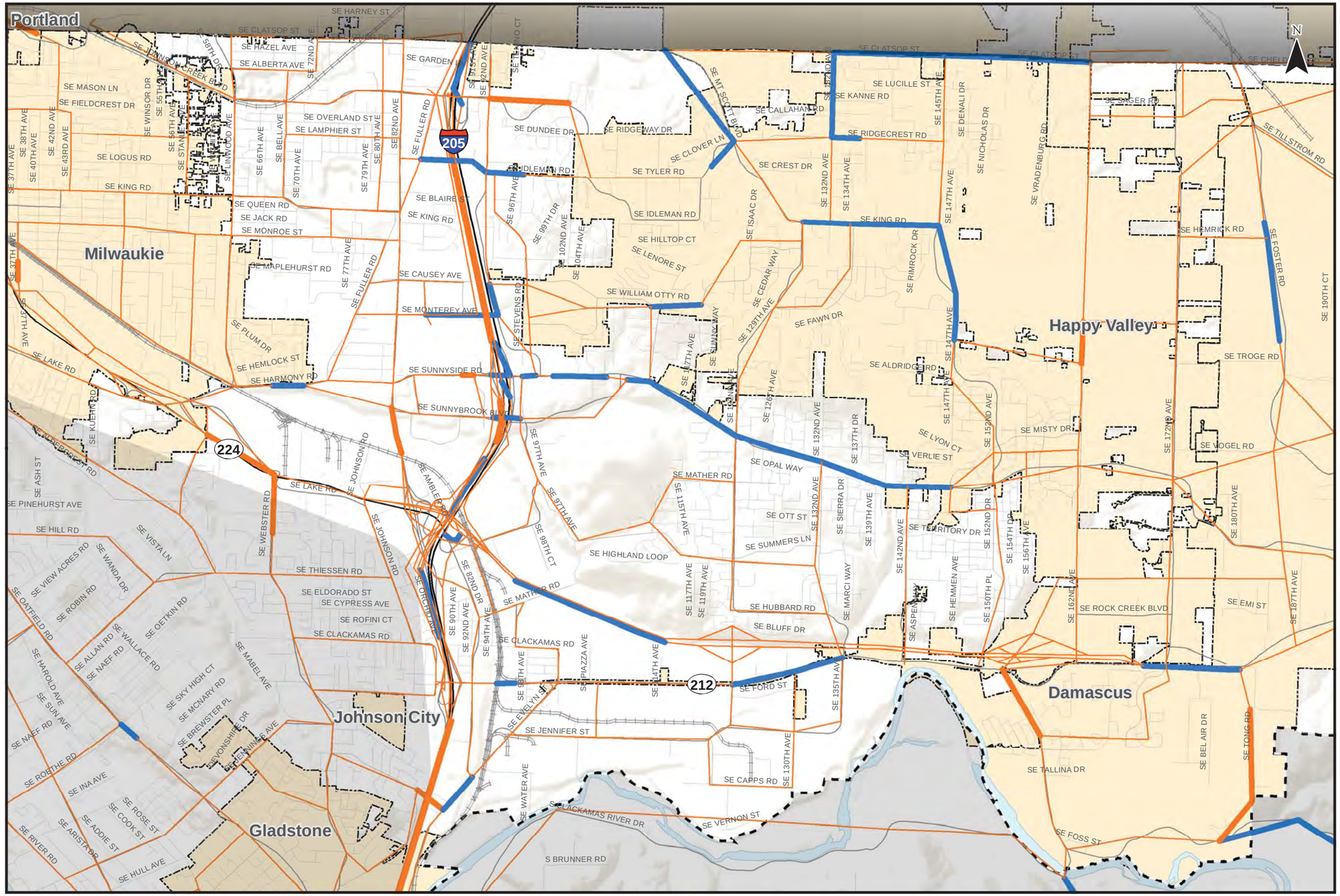
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Change in Congestion

Low to Full Build

- Congestion Increases
- Minimal Change
- Congestion Decreases
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resouce Center

Evening Weekday Peak Hour Roadway Segment Congestion Comparison of 2035 Low Build vs. 2035 Full Build Greater Clackamas Regional Center / Industrial Area

Figure
C 43

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Section 8
Northwest County

OVERVIEW OF KEY FINDINGS – NORTHWEST COUNTY

Existing and 2035 future conditions analysis was conducted for the transportation system in the Northwest County area. Key findings from this analysis are summarized below. The full analysis of the existing conditions and future base conditions follows.

Existing Conditions:

Transportation Disadvantaged Populations

- The unincorporated areas have low population with the exception of the small unincorporated areas within Lake Oswego in Rivergrove, which have suburban densities. The Stafford Road area does not have any significant transportation disadvantaged populations, but the unincorporated area west of Wilsonville has some small areas of disadvantaged populations. The eastern half of Wilsonville has higher concentrations of transportation disadvantaged populations.

Roadways

- Two of the five study intersections are operating at volume-to-capacity ratios that do meet performance standards:
  - SW Childs Road/SW Stafford Road
  - SW 65th Avenue/SW Stafford Road
- Roadway segments (excluding I-205 and I-5) are primarily uncongested during the weekday evening peak hour. Relatively short segments of Stafford Road south of Rosemont Road are estimated to experience some level of congestion.

Pedestrian System

- There are no deficiencies in the pedestrian system.
- Roadway shoulders are part of the rural roadway standards and are used by pedestrians in rural areas. The bicycle system gaps and deficiencies indicate areas where rural roads lack shoulders that are four feet or wider. These gaps and deficiencies should also be considered as important for rural pedestrians.
- While sidewalks are required in the County's urban areas, none of the streets in the County's urban areas in Lake Oswego are designated as part of the Essential Pedestrian Network.
- The County's Pedestrian Master Plan identifies priorities for filling in the pedestrian network gaps which will be reviewed using the TSP Vision and Goals evaluation criteria.

Bicycle System

- With the exception of Borland Road south of I-205, the rural portions have no shoulders wide enough to be designated as shoulder bikeways.
- The County's urban portions do not have any bicycle lanes.

- The County's Bike Master Plan identifies priorities for filling in the bicycle network gaps. The priority of these projects will be reviewed based on the TSP Vision and Goals evaluation criteria. They are shown in the table below.

Safety Corridors

- One candidate safety corridor was identified based on crash data review -- Stafford Road from S Rosemont Road to SW Mountain Road.

Transit

- Transit service consists of fixed-route bus and heavy rail service as well as dial-a-ride service.
- Transit Service Frequency: A majority of the services currently operate at LOS D or below throughout the day with respect to frequency. TriMet Line 96, however, operates at LOS A during the morning and evening peak time periods.
- Hours of Service: A majority of the services currently operate at LOS D or below throughout the day with respect to hours of service. TriMet Line 78 operates at LOS A.
- Transit Service Coverage: The current population and employment service coverage is LOS E. Some of the transit supportive areas not currently served by transit may require additional transit routes or new connections to existing routes in order to be served.
    - The number of transit supportive areas is expected to increase significantly throughout Northwest County by 2035. While many of these areas are expected to be served by existing transit services, the remaining areas will require additional service routes or connections to existing routes in order to be served.

2035 Future Base Conditions:

- Three of the five study intersections operate at volume-to-capacity ratios in excess of performance standards under both the Low Build and Full Build future conditions:
    - SW Borland Road /SW Stafford Road
    - SW Ellingson Road /SW 65th Avenue
    - SW 65th Avenue/SW Stafford Road
- Two intersections operate at volume-to-capacity ratios in excess of performance standards under the Low Build, but meet performance standards under Full Build:
    - SW Childs Road/SW Stafford Road
    - SW Mountain Road /SW Stafford Road
- Of the five study intersections that do not meet performance standards in Low Build scenario, four are modified by a Full Build Project (e.g., a turn lane or other physical change made to the intersection).
    - SW Childs Road/SW Stafford Road

  - SW Mountain Road /SW Stafford Road
  - SW Ellingson Road /SW 65th Avenue
  - SW 65th Avenue/SW Stafford Road

- Demand for travel is highest along Stafford Road, SW Borland Road, S Rosemont Road and SW Mountain Road under both the low build and full build future conditions.
- S Rosemont Road is estimated to experience some level of congestion under the 2035 Low and Full Build Scenarios. The remaining roadways (excluding I-205, I-5, and incorporated areas) are estimated to be uncongested.
- Overall, significant growth is forecast for the study roadways and intersections in this area.

EXISTING CONDITIONS - NORTHWEST COUNTY

INTRODUCTION

The Northwest County geographic area extends from the County's northwest boundary to the Willamette River. Portions of the area are inside the County's urban growth boundary (UGB), including the incorporated communities of Wilsonville, West Linn, Rivergrove, and Lake Oswego. These areas also fall within the Metro Urban Growth Boundary (UGB), as does the Stafford Hamlet. The Northwest County area also includes the unincorporated lands east and west of Wilsonville. Large sections of I-5 and I-205 run this area. The extent of the Northwest County area is illustrated in Figure NW 1.

LAND USE AND POPULATION

This section provides a general overview of existing land uses and population patterns. It identifies the activity centers in the area, reviews current land uses and zoning designations, assesses population density, and identifies transportation disadvantaged populations.

Activity Centers

The Northwest County area includes the incorporated areas of Lake Oswego, West Linn, and Wilsonville as well as the unincorporated Stafford community and other rural areas. The County's TSP update focuses on the communities, activities, and transportation systems within and surrounding the unincorporated communities of the County. It does take into consideration the employment, recreational and commercial activities taking place in incorporated areas that may attract trips from unincorporated areas and the reverse.

Figure NW 2 illustrates the locations of schools, parks, libraries, and other activity centers. The area is crisscrossed by three substantial physical elements – two man-made and one natural. These are the I-5 freeway, the I-205 freeway, and the Willamette River. These physical elements make transportation connections within the area and to other areas (e.g., from Northwest County to Southwest County) relatively challenging and constrained.

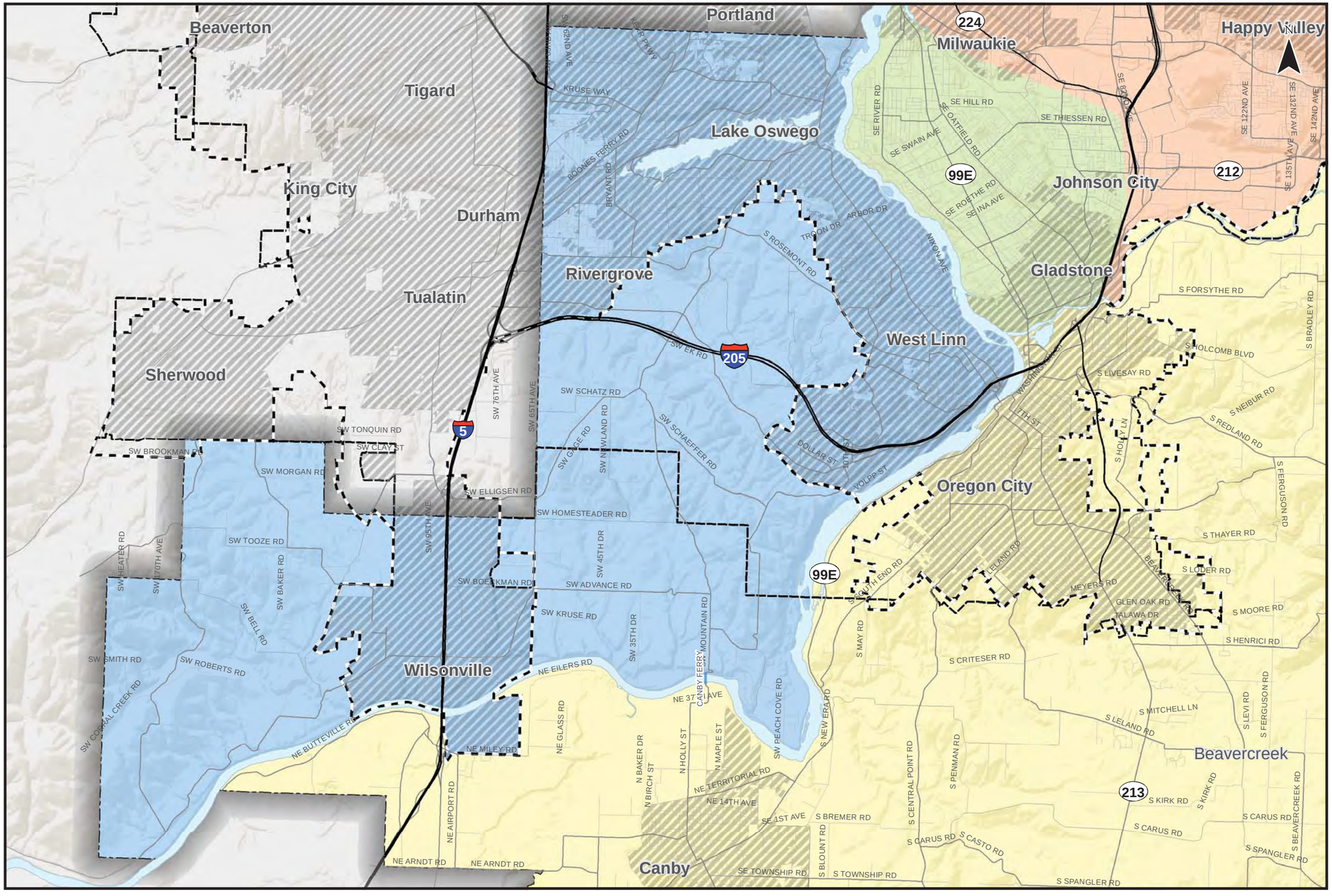
The major activity centers in terms of schools, government buildings, and shopping areas are located in Wilsonville, Rivergrove, Lake Oswego, and West Linn. The City of Wilsonville is a major employment center and home to several corporate headquarters and distribution firms. There is noteable industrial development in Wilsonville, as well as some rail service and suburban office buildings. Marylhurst University, which has about 2,000 students, is located on the Willamette River south of downtown Lake Oswego. Park/ride locations in Wilsonville, West Linn, and Lake Oswego allow travelers to park for free and take bus or light rail service into Portland.

The unincorporated community of Stafford is located south of Lake Oswego and west of West Linn, and bordered to the south by the Willamette River. It is also located within an Urban Reserve area, which means it is reserved by the Portland Metropolitan region for urban development further into the future. The urbanized development for this area is forecast beyond the 2035 horizon year for the County's TSP update. Therefore, the influence of more urban development in the Stafford area will not be taken into account in this current update. Stafford is currently home to approximately 2,200 residents.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Geographic Analysis Sub Areas

- East County
- Southwest County
- Greater McLoughlin Area
- Greater Clackamas Regional Center/ Industrial Area
- Northwest County
- Incorporated Areas
- County Boundary
- UGB
- Metro Area



Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Northwest County Geographic Analysis Sub Areas

Figure
NW 1

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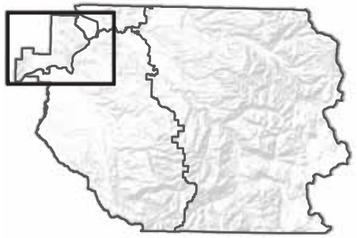
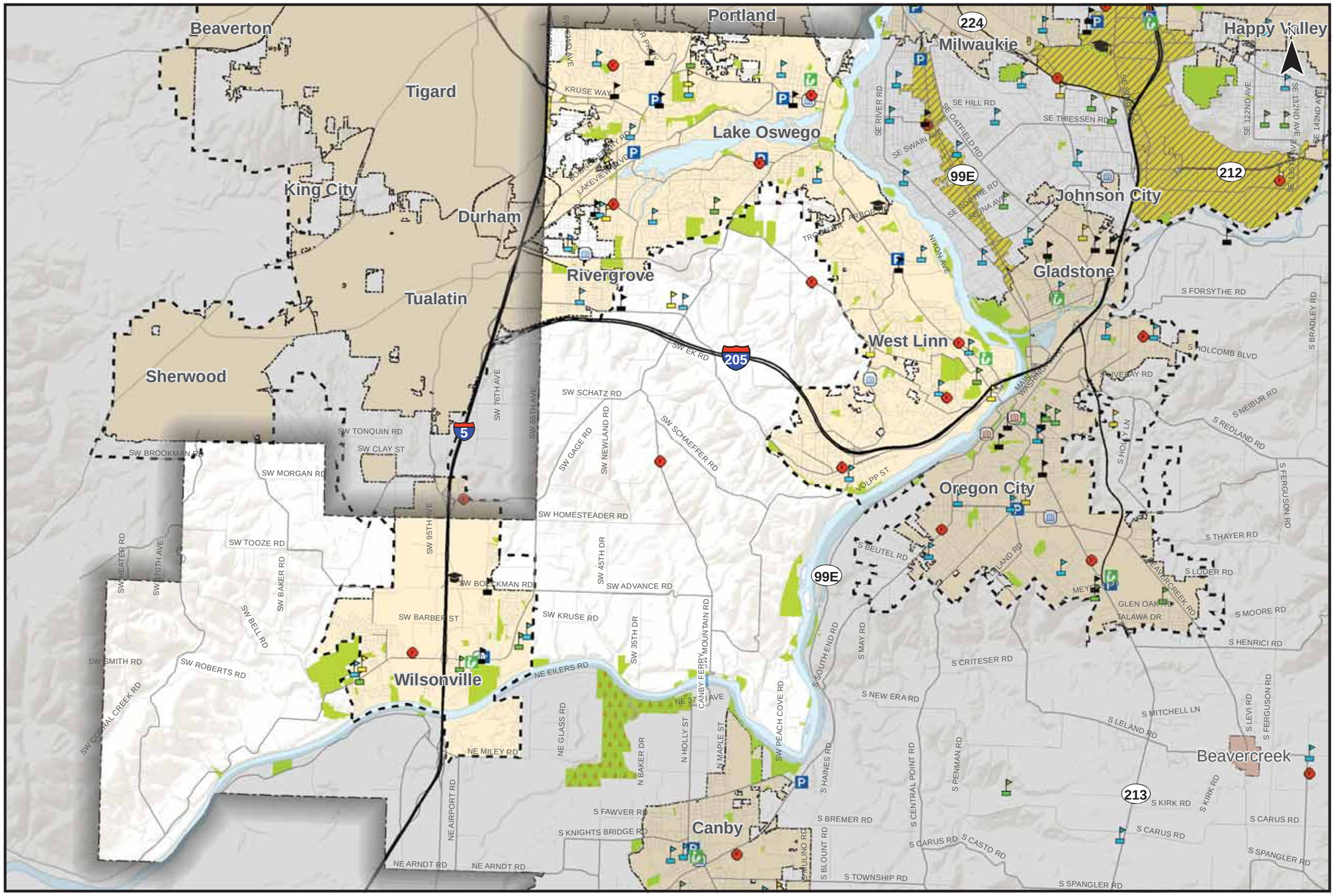
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



- Fire Stations
- Museum
- City Hall
- Libraries
- Park & Ride
- Light Rail

Schools

- Public Elementary
- Public Middle School
- Public High School
- Private K-12
- College or University
- Parks
- State Parks
- Mt. Hood National Forest
- Urban Activity Centers
- Incorporated Areas
- Rural Centers
- County Boundary
- UGB



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Coordinate System:
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Data Source:
Clackamas County, Metro Data Resouce Center

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Activity Centers
Northwest County

Figure
NW 2

Land Use and Zoning

Figure NW 3 illustrates the current basic land use zoning designations throughout the Northwest County area. Each land use's purpose, area of application, uses, and regulations are described in the *Clackamas County Zoning and Development Ordinance.* As seen in the figure, the unincorporated areas are primarily zoned timber district, exclusive farm use, and rural residential. The rural residential areas near Stafford and west of Wilsonville are urban reserves, meaning they are designated as suitable for urban development in the future. Large portions of Lake Oswego, Rivergrove, and West Linn are zoned urban low density residential.

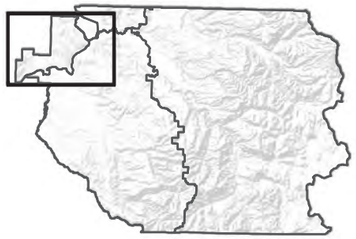
Population Inventory

Figure NW 4 illustrates the population density by census tract. From this figure, it is evident that the highest population density is in the most northwest portion of the County, closest to Portland. Portions of Lake Oswego, West Linn, and eastern Wilsonville also have higher population densities. The unincorporated areas are very low density with the exception of the small unincorporated areas within Lake Oswego in Rivergrove, which have suburban densities. In general, the population is most dense inside the urban growth boundary. Figures NW 5 through NW 8 illustrate demographic information about the households within Northwest County. Respectively, these figures show the elderly (age 65 and older) population, youth (age 17 and younger) population, low-income population, and vehicle ownership. The data within each of these figures were combined and used to identify the transportation disadvantaged populations.

Figure NW 9 illustrates the location of transportation disadvantaged populations. Transportation disadvantaged populations are defined as populations who have historically had significant unmet transportation needs or who have experienced disproportionate negative impacts from the transportation system. Transportation disadvantaged populations were mapped by census block and calculated by considering the location of elderly populations, youth populations , low-income populations earning less than 200% of the poverty line, non-white and non-Hispanic populations, households with 0-1 vehicles, households where no adult speaks English well, and residential areas within 500 feet of a freeway or highway. Overall, most of the Northwest County area is categorized as "Least Disadvantaged" or "Somewhat Disadvantaged." The Stafford Road area does not have any significant transportation disadvantaged populations, but the unincorporated area west of Wilsonville has some small areas of disadvantaged populations (although they are very low density). The eastern half of Wilsonville has significant areas of disadvantaged populations.

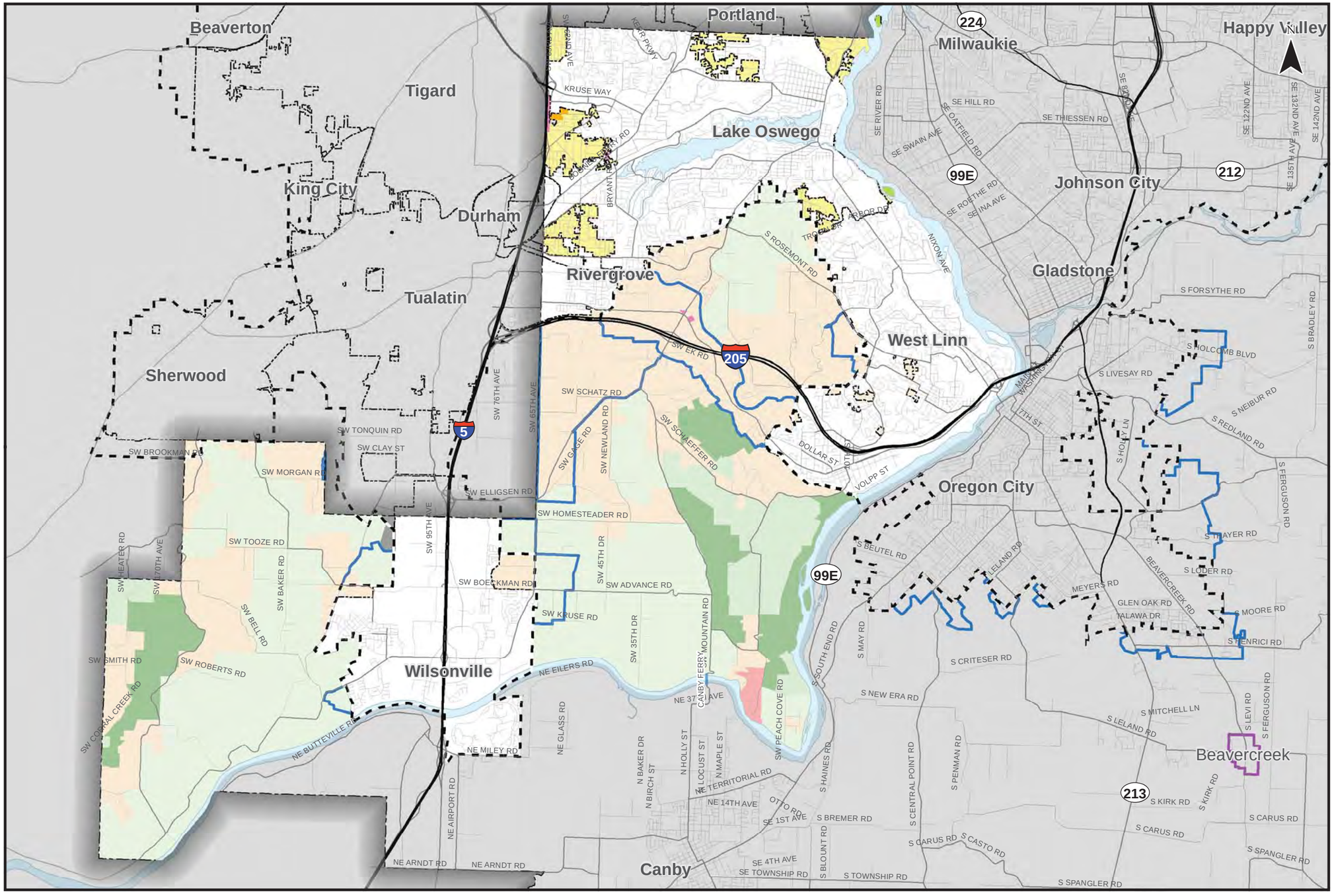
The purpose of mapping this information is to be aware of where the population is living while considering their needs to access different destinations. Population density and the location of disadvantaged populations will both be considered when identifying transportation projects to include in the TSP Update.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Zoning Designations

- Exclusive Farm Use
- Ag. / Forest District
- Timber District
- Rural Center
- Rural Residential, Future Urban
- Urban Low Density Residential
- Village Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Planned Mixed Use
- Village Community Service
- Open Space Management
- Urban Reserves
- Rural Centers
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Land Use Zoning Designations
Northwest County

Figure
NW 3

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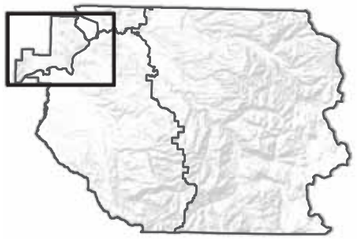
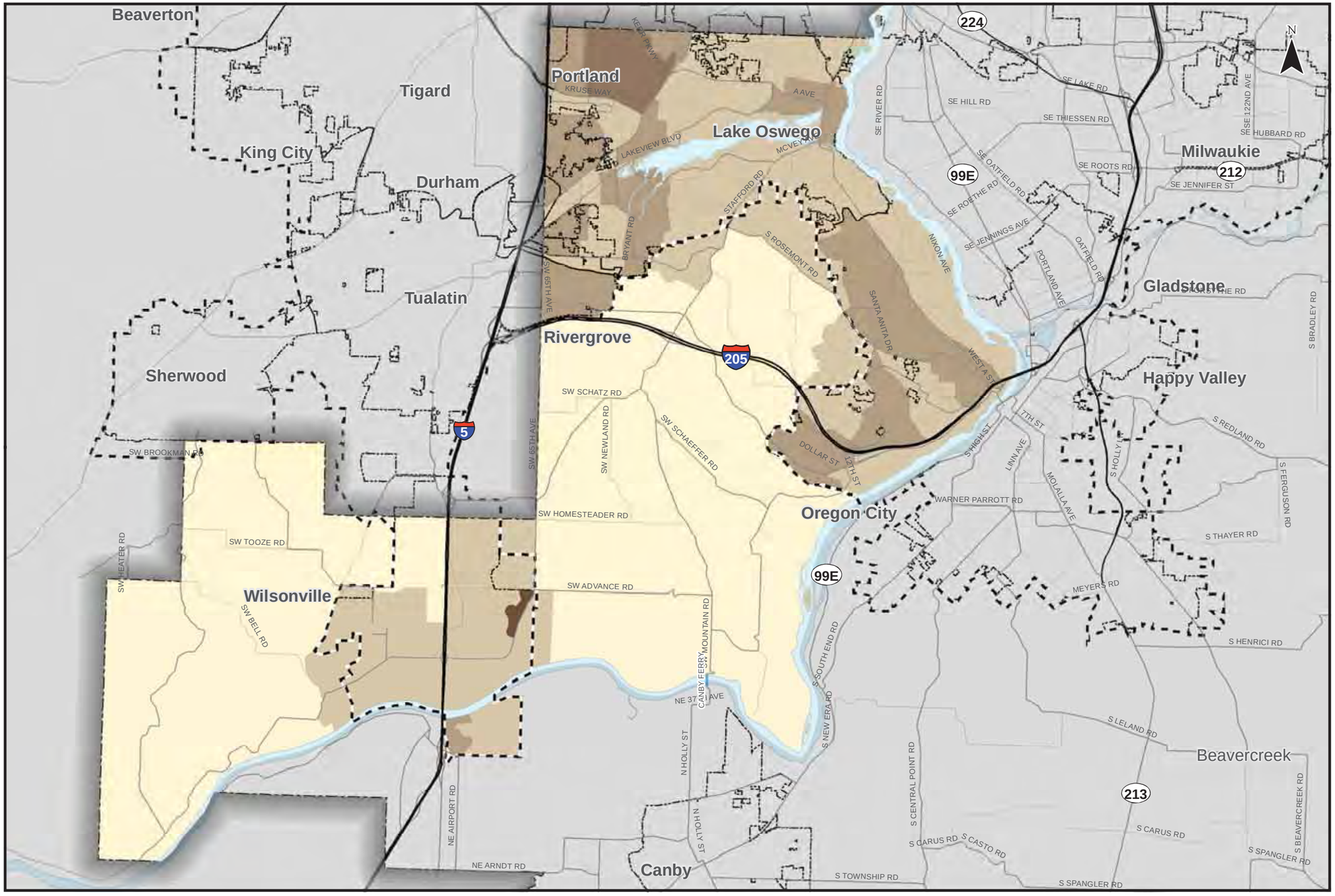
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



People Per Acre

- <1
- 1 - 5
- 6 - 8
- 9 - 12
- 13 - 17
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Population Density by Census Tract
Northwest County

Figure
NW 4

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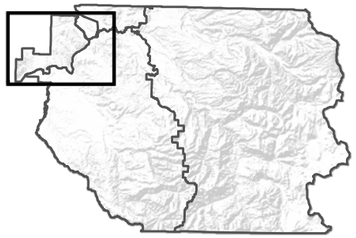
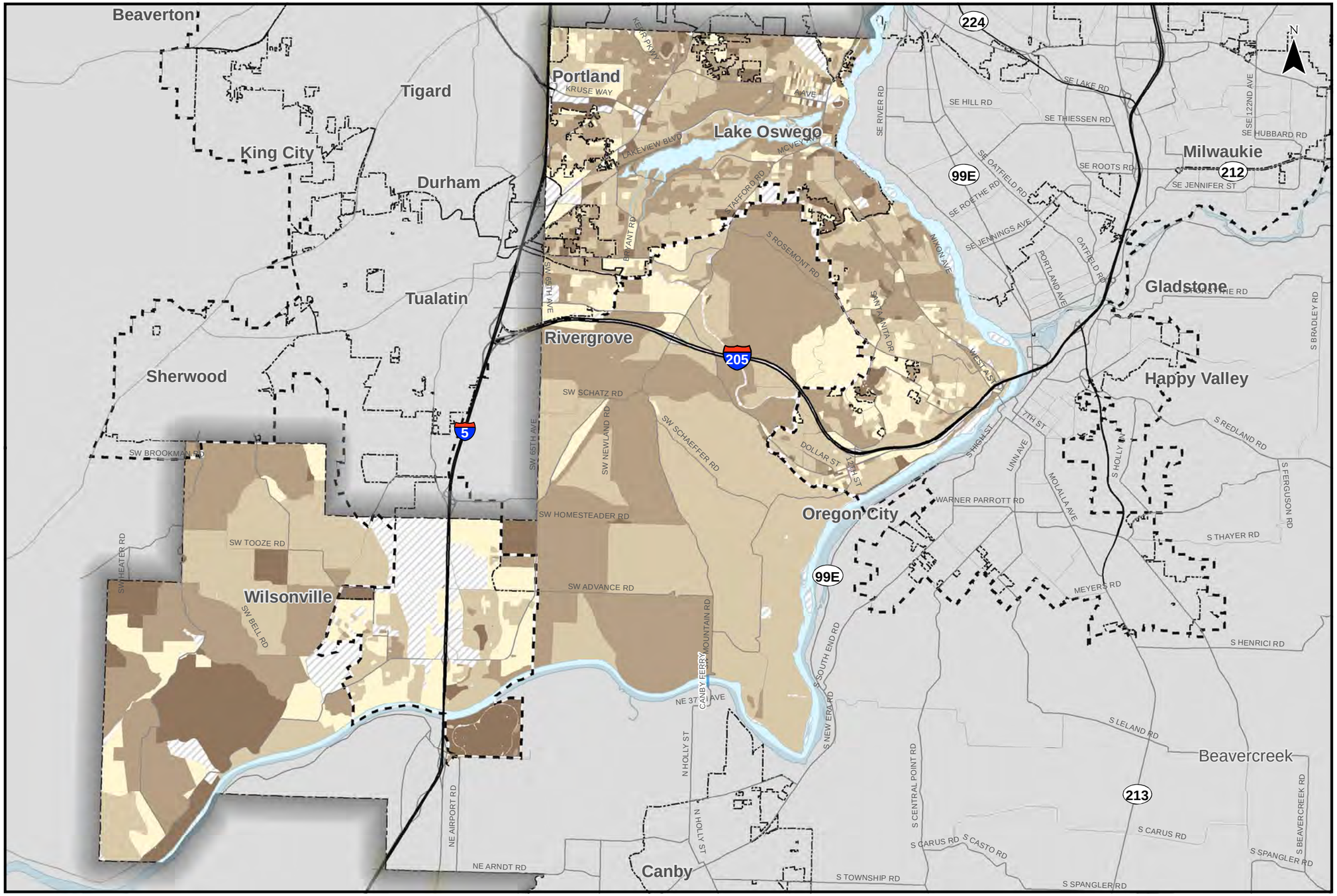
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Population Age 65 and Older

- 0% - 6%
- 6% - 15%
- 15% - 30%
- 30% - 100%
- No Data
- Incorporated Areas
- County Boundary
- UGB



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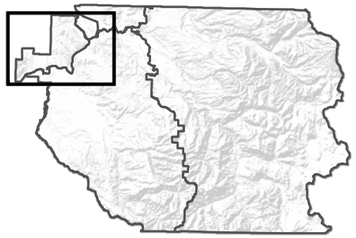
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

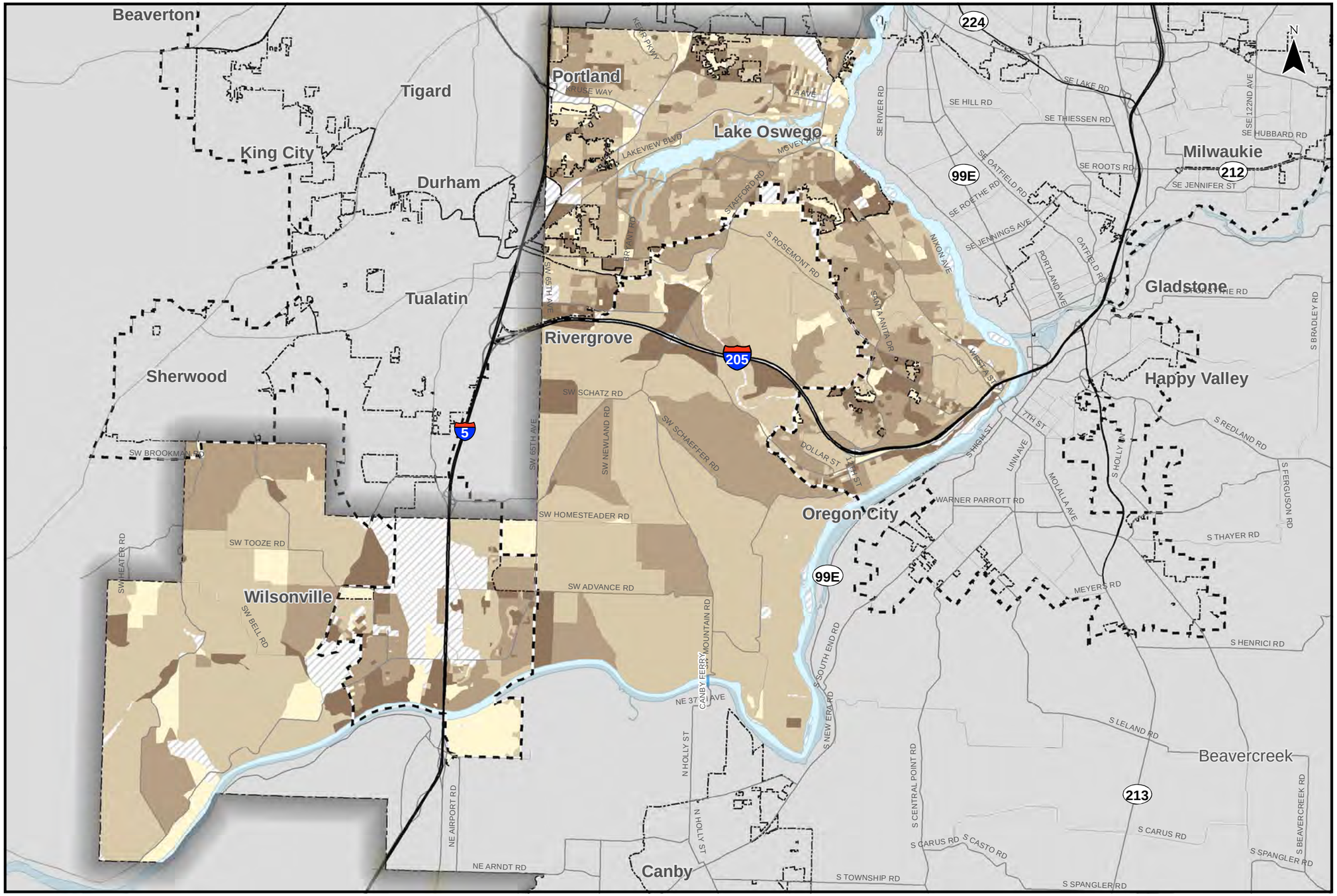
Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resouce Center

Elderly Population by Census Block
Northwest County

Figure
NW 5

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update





Population Under Age 18

- 0% - 10%
- 10% - 25%
- 25% - 33%
- 33% - 100%
- No Data
- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resouce Center

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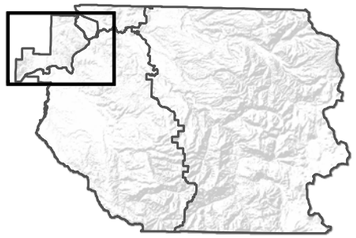
Youth Population by Census Block
Northwest County

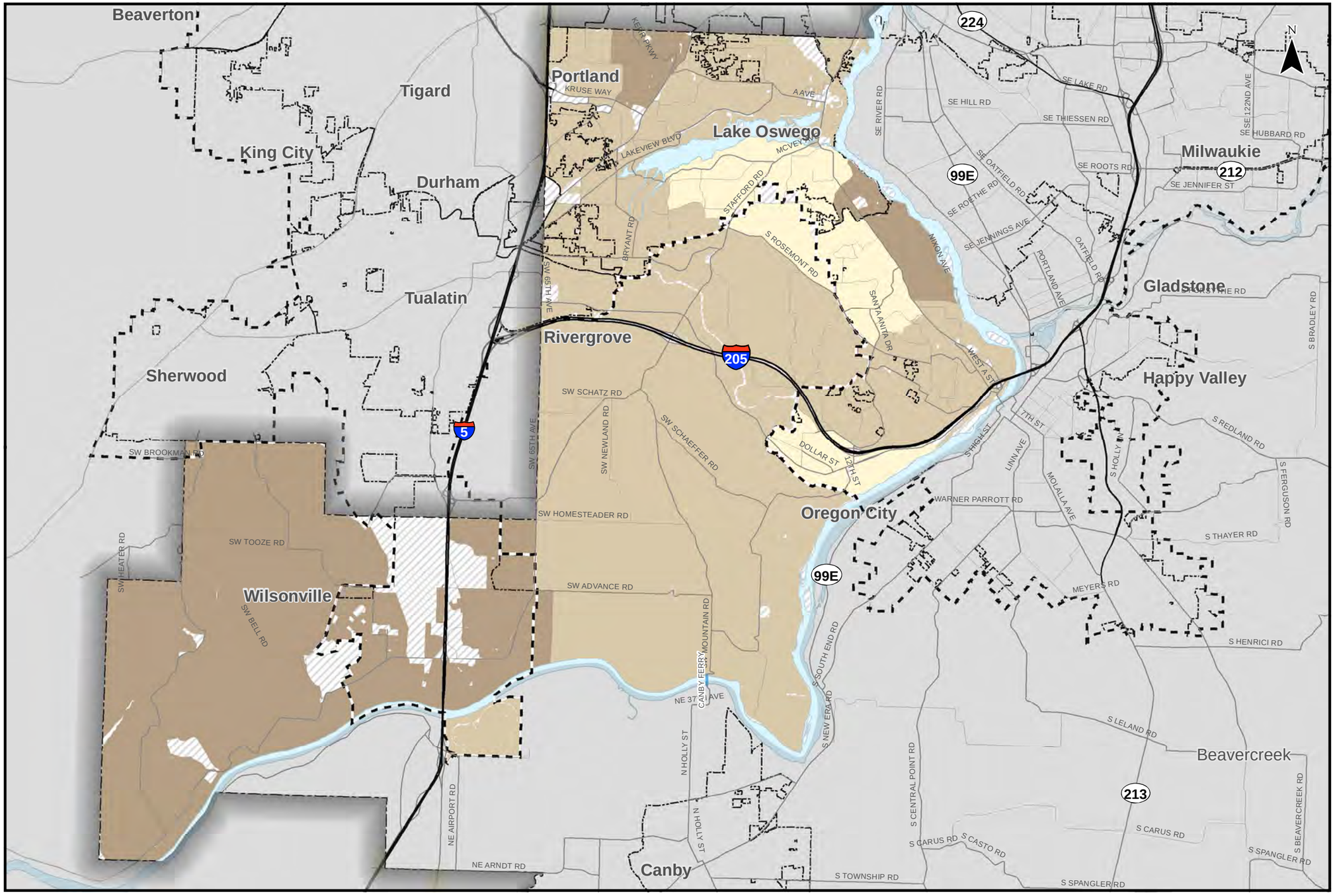
Figure
NW 6

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Population Under 200% Poverty

- 0% - 10%
- 10% - 20%
- 20% - 33%
- 33% - 100%
- No Data
- Incorporated Areas
- County Boundary
- UGB



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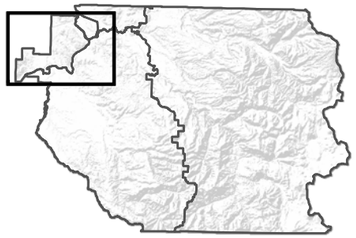
Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resouce Center

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\07 Low Income Population by Census Block.mxd

Low Income Population by Census Block
Northwest County

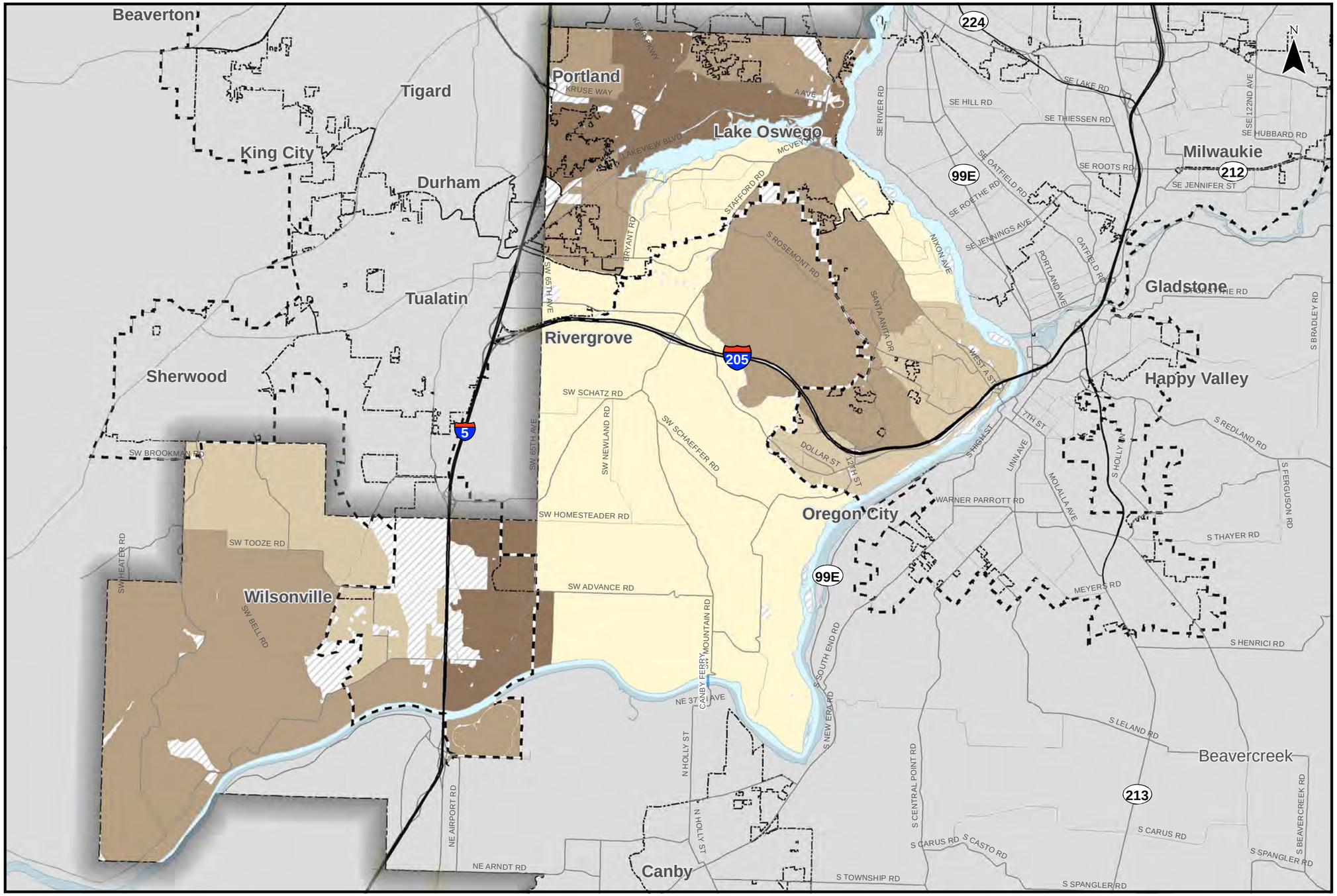
Figure
NW 7

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Households with Less Than Two Vehicles

- 0% - 10%
- 10% - 15%
- 15% - 25%
- 25% - 100%
- No Population/No Data
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

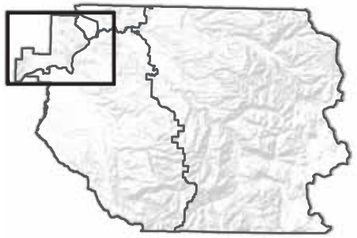
Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute Clackamas County, Metro Data Resouce Center

H:\proj\lie\117732 - Clackamas County TSP\gis\11x17 Maps\08 Vehicle Ownership by Census Block.mxd

Vehicle Ownership by Census Block
Northwest County

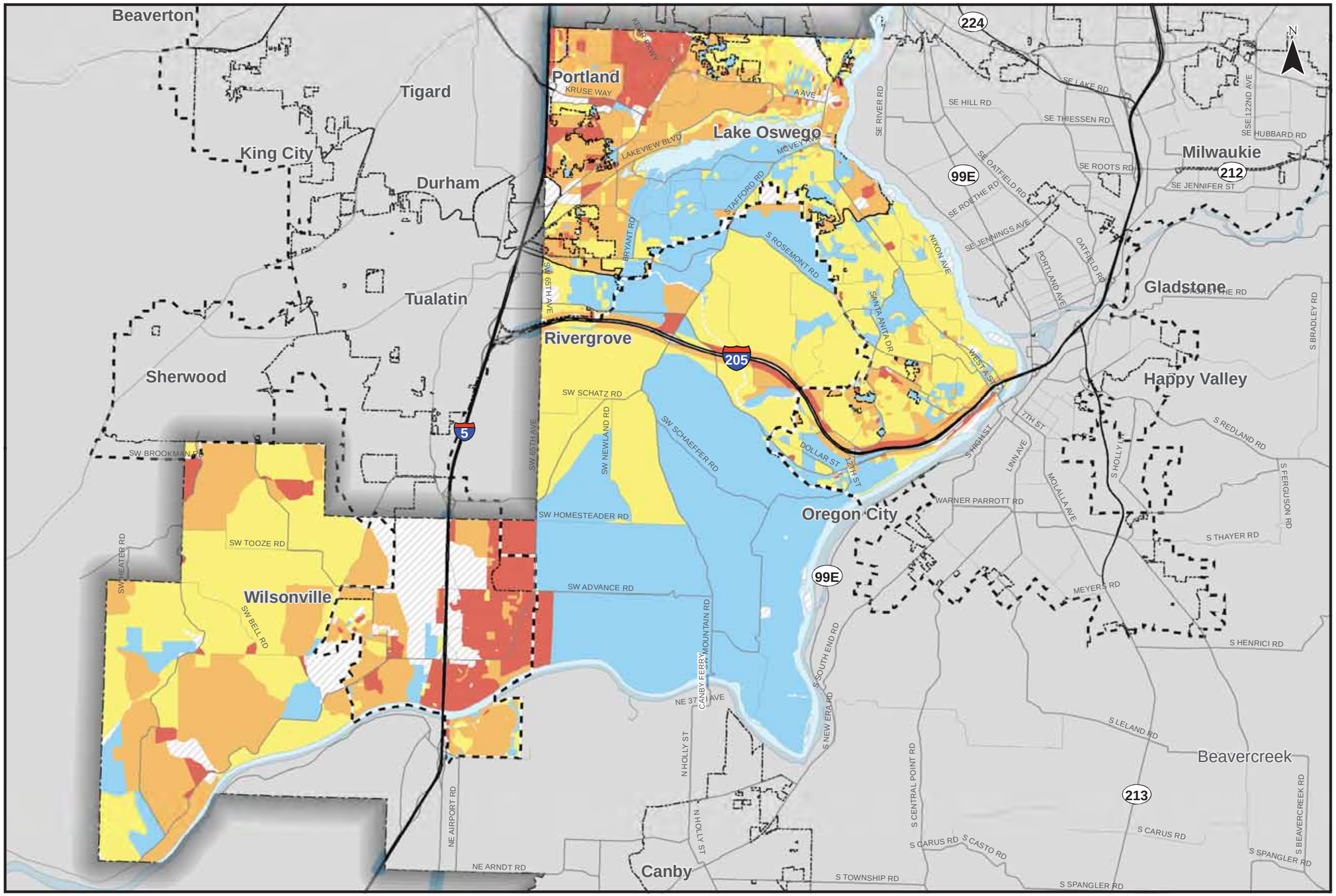
Figure
NW 8

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Transportation Disadvantaged

- No Data
- Least Disadvantaged
- Somewhat Disadvantaged
- Disadvantaged
- Most Disadvantaged
- Incorporated Areas
- County Boundary
- UGB



The Transportation Disadvantaged Index takes into account a number of demographic characteristics including age, income, ethnicity, vehicle ownership, ability to speak English, and proximity of freeway or highways to a household. The higher the index number the more disadvantaged the population is with respect to transportation.

More specifically the index is calculated at the census block level as the sum of people 65 and older, 17 and younger, under 200% of the poverty line, non-white and non-Hispanic, living in households with 0-1 vehicles, and living in households where no adult speaks English well. That sum is divided by total block population; twenty-five is added for areas within 500 feet of a freeway or highway. People fitting into multiple vulnerability categories are counted multiple times. Data at the household level is multiplied by 2.56 to convert it to a person unit. The number 2.56 is the average household size for Clackamas County. Data only available by tract is distributed among blocks based on the distribution of tract population.

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl

Data Source: US Census Bureau (2010 SF1, 5-year ACS estimates, Tiger/Line Shapefiles) Map and analysis by Liz Paterson, April 2012, Oregon Public Health Institute, Clackamas County, Metro Data Resouce Center

Transportation Disadvantaged Populations by Census Block
Northwest County

Figure
NW 9

TRANSPORTATION SYSTEM OPERATIONS ANALYSIS

This section summarizes the existing transportation system operations within the Northwest area. It includes a review of the roadway and intersection operations with a focus on vehicular travel, as well as the pedestrian and bicycle system, public transportation system, and crash analysis. A discussion of the methodology and approach for this analysis is provided in Section 3 of this report. While this report attempts to accurately reflect the existing conditions of the transportation system, it is not meant to serve as an all-encompassing and comprehensive final assessment. Rather, it is meant to serve as a starting point for discussion by the broader community about the current state of the transportation system in Clackamas County. This information will be used to help inform the development of the Clackamas County TSP.

Figure NW 10 illustrates the functional classification designations of the streets. A street's functional classification reflects its role in the transportation system and defines desired operational and design characteristics. Clackamas County has six functional street classifications:

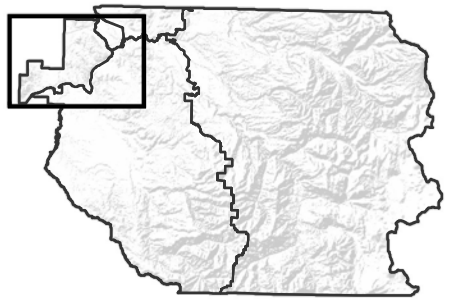
- Freeway and Expressway,
- Major Arterial,
- Minor Arterial,
- Collector,
- Connector, and
- Local Street.

These classifications and the role they play in defining a street's design and character are further described in *Section 3 Assumptions and Methods* of this report.

Figure NW 11 illustrates the existing signal locations and notes which roadways are maintained by the County. As seen in the figure, most signalized intersections are in the incorporated areas, particularly in Wilsonville, West Linn, and Lake Oswego. The County does not maintain most roadways in Wilsonville, West Linn, Lake Oswego, or portions of Rivergrove. There are also several state highways in the Northwest County maintained by ODOT, including I-5 and I-205.

Figure NW 12 maps at-grade railroad crossing locations. There are several railroad crossings along the Portland/Western rail line that runs through Wilsonville.

CLACKAMAS COUNTY Transportation System Plan *Update*

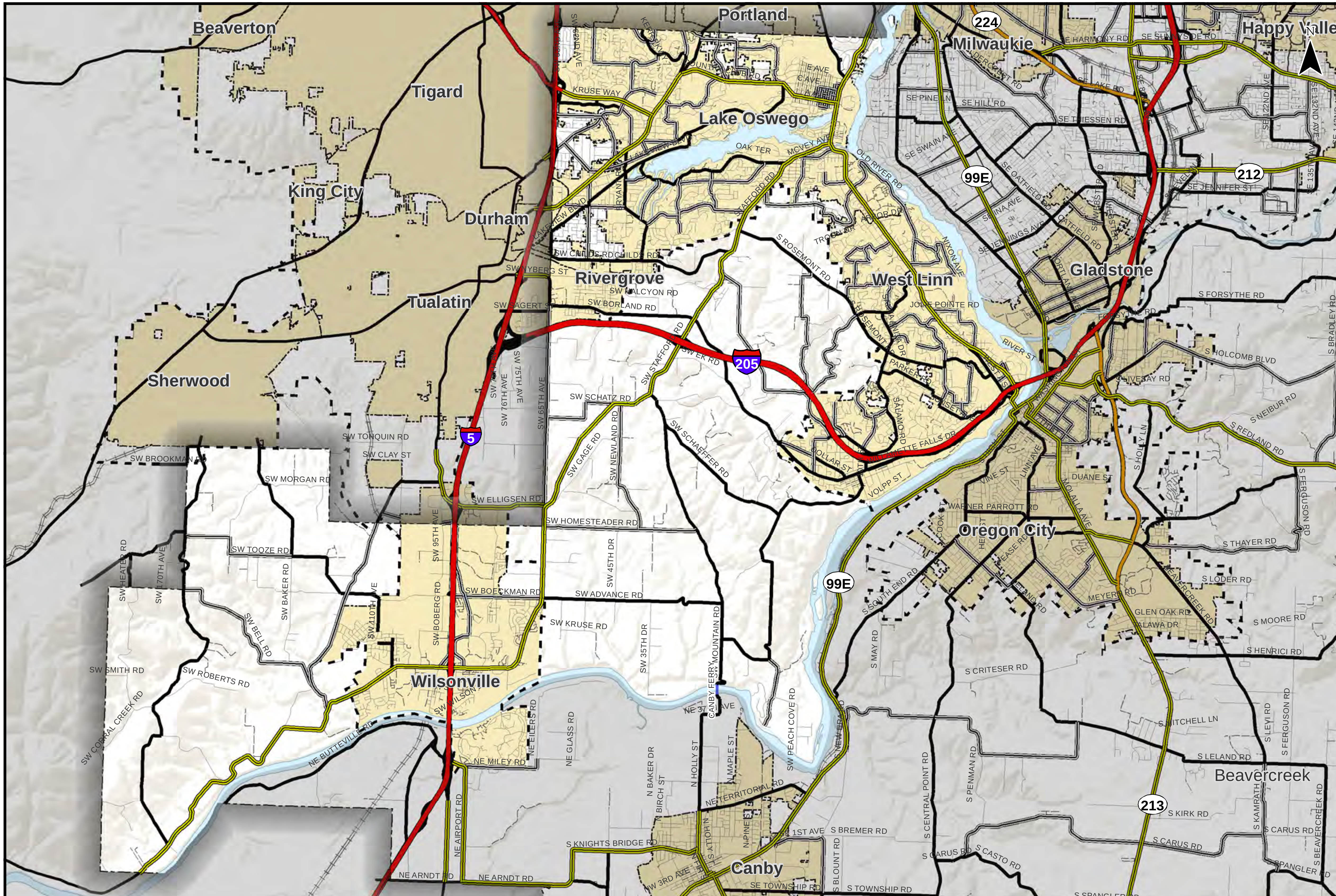


Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroads
- Ferry
- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

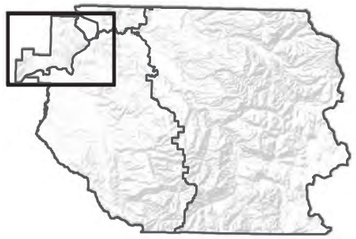
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center



Roadway Functional Classifications
Northwest County

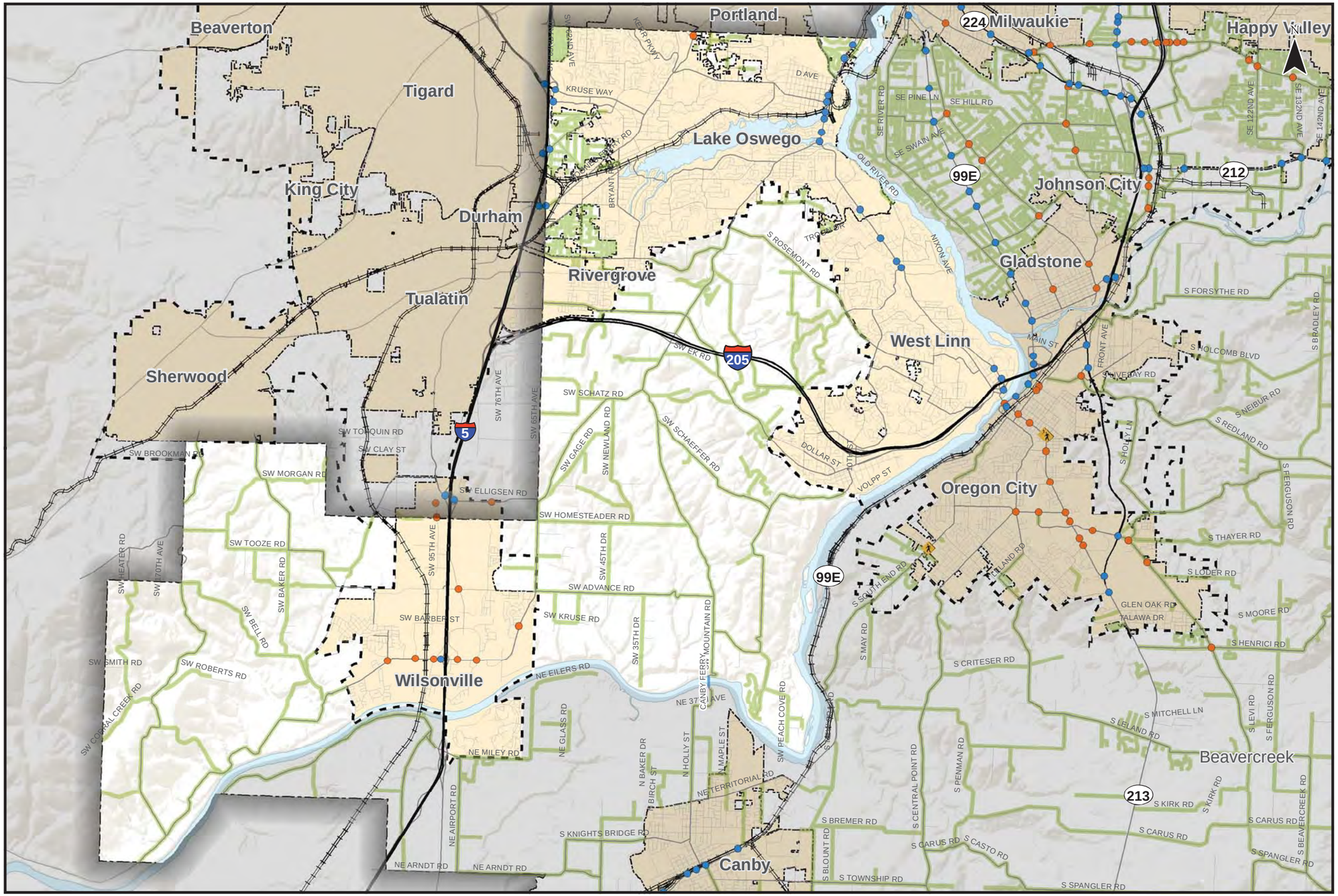
Figure
NW 10

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Existing Traffic Signals

- County Owned
- ODOT Owned
- Ped Crossing Flasher
- County Maintained Roads
- Incorporated Areas
- County Boundary
- UGB



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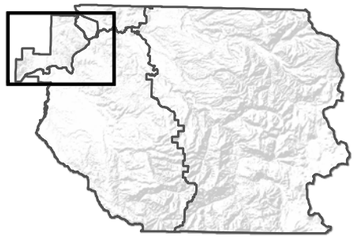
Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Existing Signal Locations
Northwest County

Figure
NW 11

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



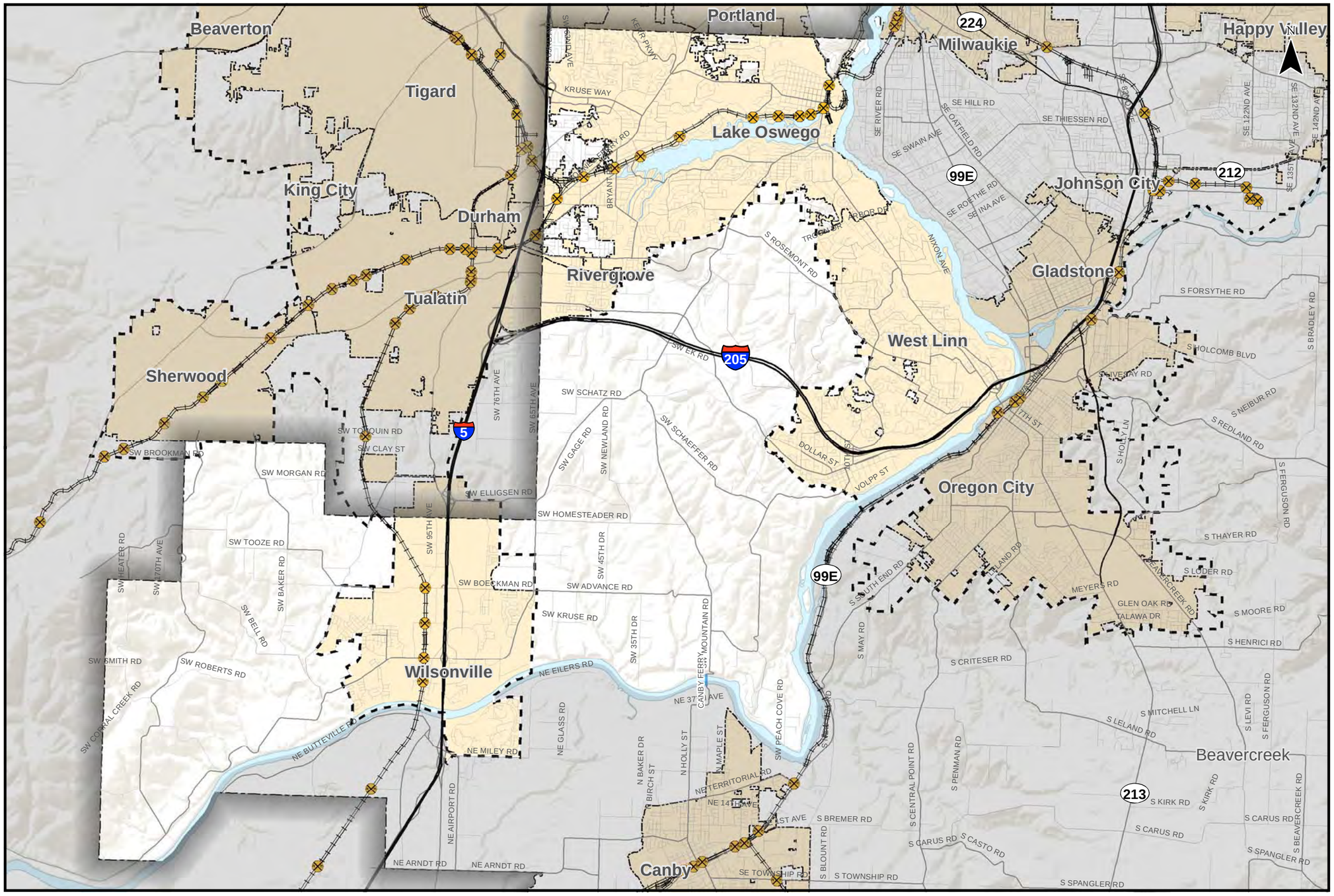
At-Grade Rail Crossings

Railroads

Incorporated Areas

County Boundary

UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

At-Grade Railroad Crossing Locations
Northwest County

Figure
NW 12

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Intersection and Road System Operations Analysis

This section summarizes the analysis and findings related to existing traffic operations with a focus on auto transportation modes. Operations were analyzed at key study intersections and roadway segments.

Study Intersection Traffic Operations Analysis

TSP study intersections were selected based on input from ODOT, city, and County staff. Figure NW 13 shows the location of each study intersection and notes whether intersections fall under the County's jurisdiction or the Oregon Department of Transportation's (ODOT's) jurisdiction. All five study intersections are on County facilities. Figure NW 14 shows the existing lane configurations and traffic control devices at each location. With the exception of the roundabout at the intersection of SW Borland Road and SW Stafford Road, all study intersections are currently stop-controlled.

Traffic Operations Analysis Results for Study Intersections

Existing traffic operations at the study intersections were assessed based on seasonally adjusted year 2012 turning movement counts, which reflect weekday p.m. peak hour traffic conditions. The operations at each intersection were compared to the respective performance standards. All study intersections are located outside the UGB and on County facilities. Therefore, the standard is level-of-service D. The process used to evaluate the traffic operations is more extensively described in *Section 3 Assumptions and Methods* of this report. The results are shown in Table NW 1 and Figure NW 15, with intersections that are operating below performance standards noted.

Table NW 1 Traffic Operations Analysis Results at Study Intersections in the Northwest County

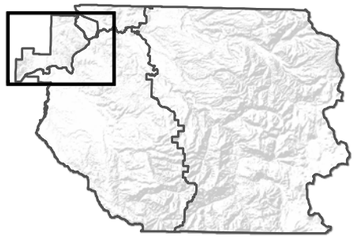
ID	Intersection	Jurisdiction	Performance Standard	Meets Standard?
301	SW Childs Rd/SW Stafford Rd	County	LOS = D	No (LOS=F)
302	SW Borland Rd/SW Stafford Rd	County	LOS = D	Yes
303	SW Mountain Rd/SW Stafford Rd	County	LOS = D	Yes
304	SW Ellingson Rd/SW 65th Ave	County	LOS = D	Yes
305	SW 65th Ave/SW Stafford Rd	County	LOS = D	No (LOS=E)

As shown, two intersections do not meet standards:

- SW Childs Road/SW Stafford Road (301) and
- SW 65th Avenue and SW Stafford Road (305).

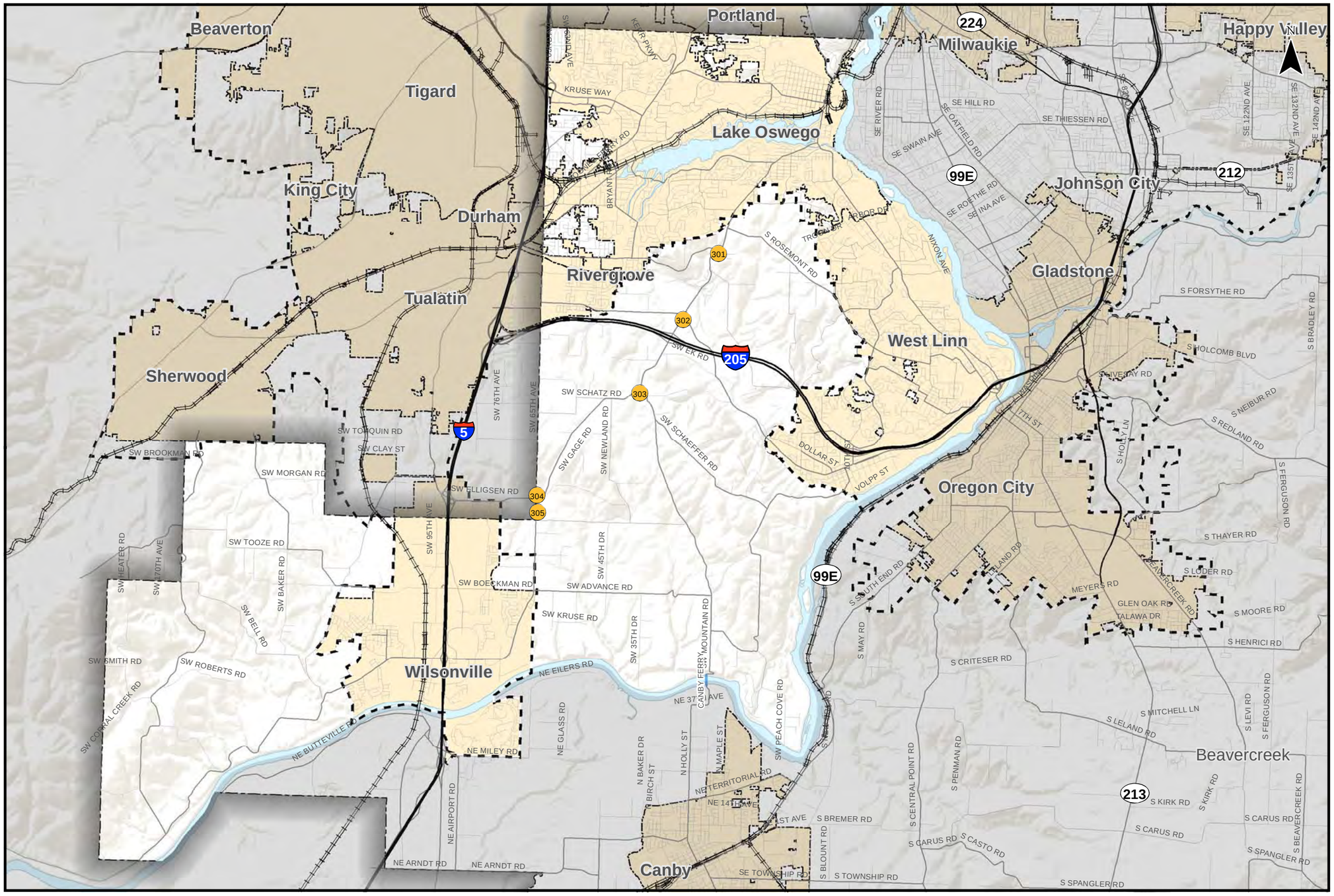
All other intersections operate below the volume-to-capacity ratio standards. *Appendix 8* contains detailed traffic operations analysis results.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Study Intersection Jurisdiction

- ODOT
- Clackamas County
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Transportation System Plan Study Intersections
Northwest County

Figure
NW 13

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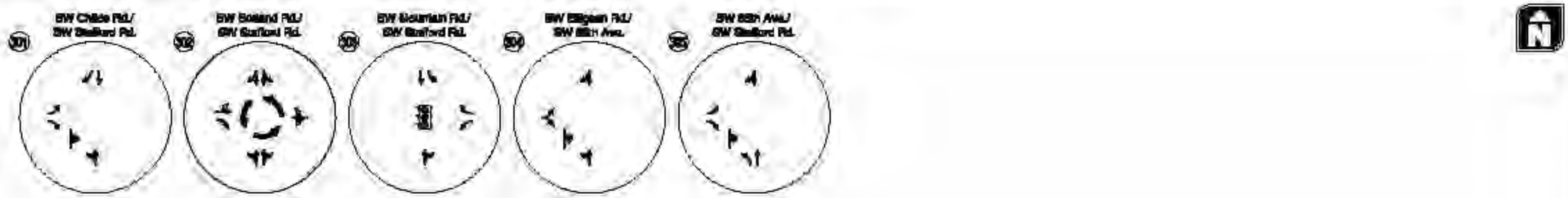
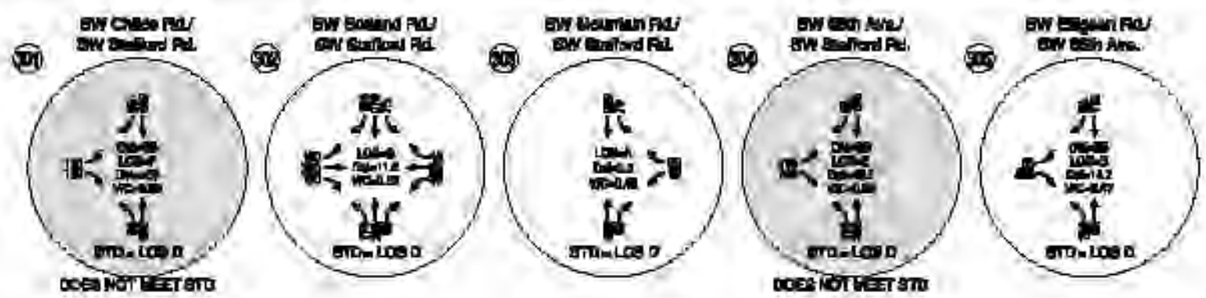


- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT

Existing Lane Configuration and Traffic Control Devices Northwest County

Figure NW 14



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

Existing Intersection Operations
PM Peak Hour
Northwest County

Figure
NW 15

Roadway Segment Operations Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure NW 16 illustrates the roadway link volumes from the weekday evening peak hour. The roadway segment volumes are from Metro's travel demand model; therefore, the roadway segment links approximate the actual roadway geometry. The roadway segment links in the model do not reflect roadway curvature. Also, the roadway segment link volumes from the model are provided for roadways of generally a major collector designation or higher, so traffic volume on local roads are not reflected.

As is evident from Figure NW 16, under the existing roadway system demand for travel is highest along Stafford Road, SW Borland Road, S Rosemont Road and SW Mountain Road.

Approximate Level of Congestion

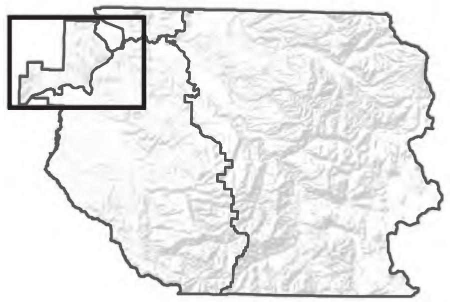
The level of congestion experienced on roadway segments was estimated using the roadway segment volumes from the Metro base model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion. Table NW 2 summarizes the level of congestion that corresponds to different volume-to-capacity ratios.

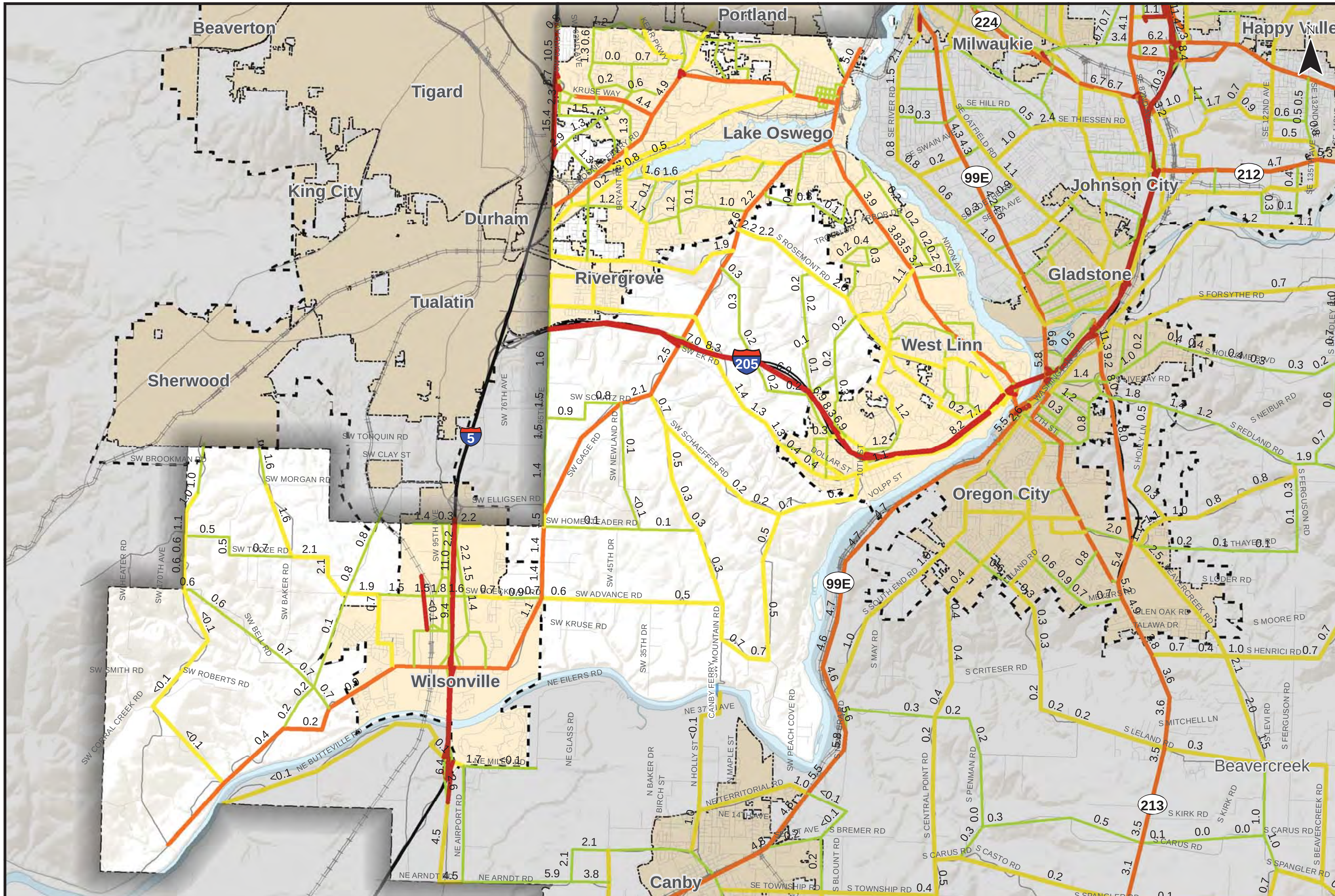
Table NW 2 Volume-to-Capacity Ranges for Roadway Segment Congestion Estimates

Congestion Level	Volume to Capacity Range
Very Congested	1.1 or greater
Congested	1.0 to 1.1
Some Congestion	0.9 to 1.0
Nearing Congestion	0.8 to 0.90
Less Congested	0.0 to 0.80

Figure NW 17 illustrates the relative congestion during the weekday evening peak hours on roadways based on the estimated roadway segment volumes and capacity. It is possible for the study intersection analysis results to indicate there are intersections experiencing relatively high amounts of delay on roadway segments that are shown as experiencing relatively minimal congestion. The roadway segment analysis considers only the capacity of the lanes on the segment and the volumes on the segment. It is an idealized assessment of volume to capacity (e.g., if all vehicles were traveling in the same direction along a roadway, how many vehicles could the roadway carry). In actuality, motorists experience congestion on roadway segments due to intersection operations. The purpose of the roadway segment analysis is to help identify if the delay being experienced (or anticipated to be experienced in the future) is primarily related to the intersection or the roadway segment.

CLACKAMAS COUNTY Update
TRANSPORTATION SYSTEM PLAN





2010 Base Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Lower Order Facility
- #.# PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County, Metro Data Resouce Center

Evening Weekday Peak Hour Link Volumes 2010 Base Year
Northwest County

Figure
NW 16

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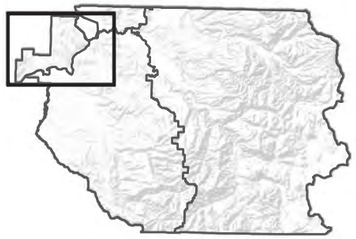
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Very Congested >1.10
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

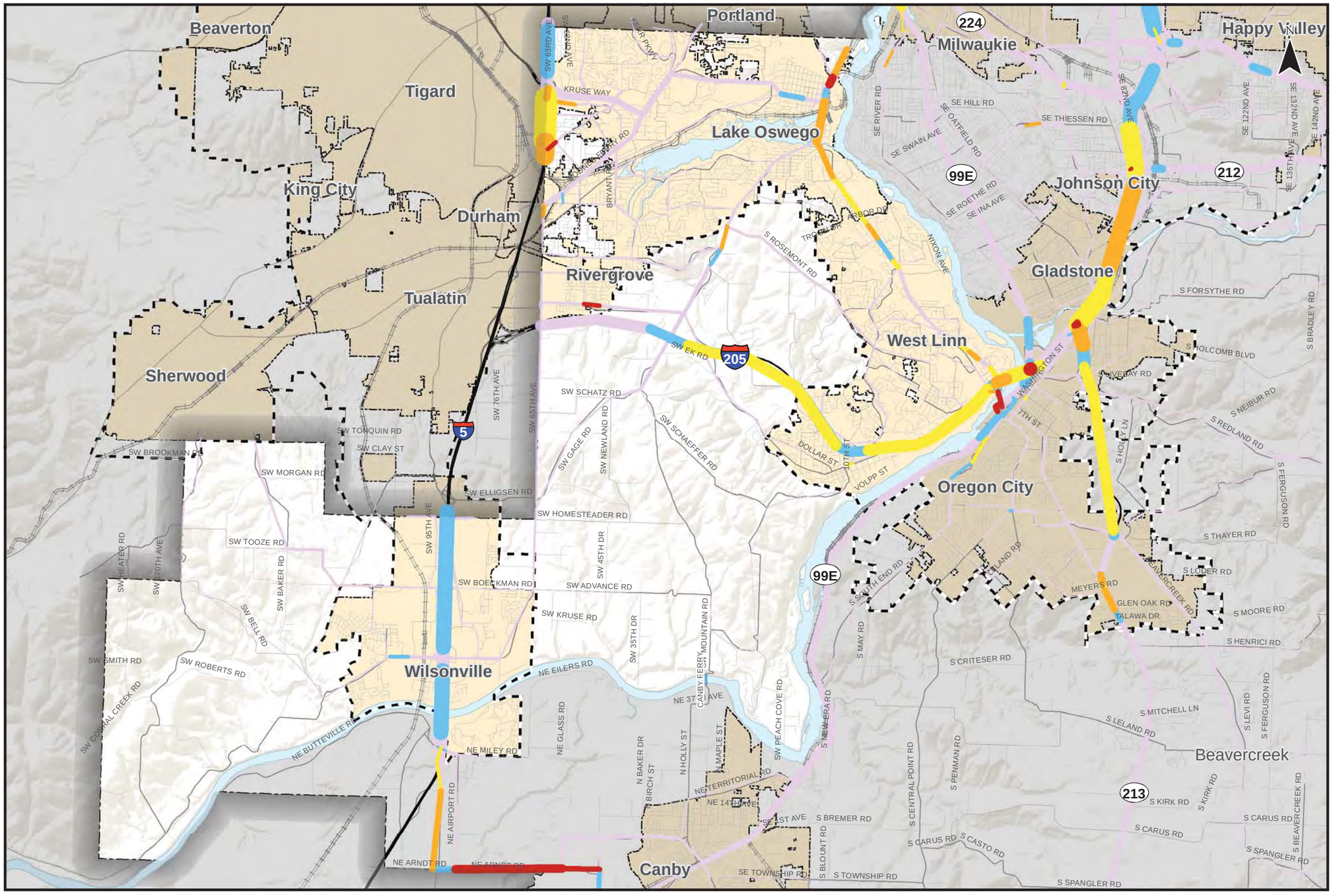
Nearing Congestion 0.8 - 0.9
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Less Congested <0.8
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source: Cambridge Systematics, Clackamas County, Metro Data Resouce Center



Evening Weekday Peak Hour Roadway Segment Congestion 2010 Base Year Northwest County

Figure
NW 17

H:\proj\lie\117732 - Clackamas County TSP\gis\11x17 Maps\17 Evening Weekday Peak Hour Roadway Segment Congestion 2010 Base Year.mxd

As can be seen in Figure NW 17, under the 2010 Base Year the roadway segments (excluding I-205 and I-5) are primarily uncongested during the weekday evening peak hour. Relatively short segments of Stafford Road south of Rosemont Road are estimated to experience some level of congestion. A similar analysis was conducted for two future year scenarios; the results of that analysis are discussed further below in the section presenting Future Conditions for Northwest County.

Table NW 3 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table NW 3 2010 Base Year Roadway Segment Congestion in Northwest County

Roadway	Segment	Level of Congestion
I-5	Through Wilsonville	Nearing Congestion
SW Wilsonville Rd	Western Wilsonville	Nearing Congestion
I-205	SW Stafford Rd to east border of area	Nearing Congestion to Congested
OR 43	Through Lake Oswego and portions of West Linn	Nearing Congestion to Very Congested
SW Stafford Rd	SW Johnson Rd to Rosemont Rd	Nearing Congestion to Congested
SW Borland Rd	Through south Rivergrove	Very Congested
SW A Ave	Through Lake Oswego	Nearing Congestion

Pedestrian and Bicycle System

Figure NW 18 illustrates the location of sidewalks, multi-use paths, and crosswalk signals. Figure NW 19 illustrates the location of bike lanes, multi-use paths and shoulder bikeways on roadways in the County. The information is based on inventory data obtained from the County, TriMet, and ODOT.

As shown in Figure NW 18, the majority of the unincorporated area in Northwest County is rural. The rural areas of the county have no sidewalks except a small portion of Rosemont Road. There are sidewalks within Lake Oswego, West Linn, and Wilsonville that are not shown in Figure NW 18. (*Note that the data shown within cities is not complete and primarily includes state and county facilities only.*) Sidewalks are required on all roadways in urban areas from local streets to Major Arterials, but are not required in rural areas. However, within "unincorporated communities," sidewalks or walkways are to be provided adjacent to or within areas of development, such as schools, businesses, or employment centers near or along highways. Based on rural standards, there are no gaps in the pedestrian system in the rural areas of the Northwest County area. However, roadway shoulders are part of the rural roadway standards and are used by pedestrians in rural areas. The bicycle system gaps and deficiencies in the following section indicate areas where rural roads lack shoulders that are four feet or wider. These gaps and deficiencies should also be considered as important for rural pedestrians. While the county's standards require sidewalks on all streets in the urban area, none of the streets in the county's urban areas west of Lake Oswego are designated as part of the Essential Pedestrian Network in the County's comprehensive plan (see *Appendix 5*).

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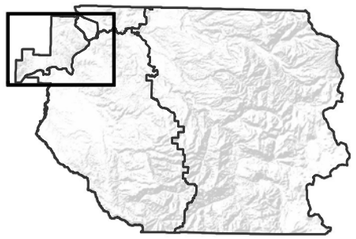
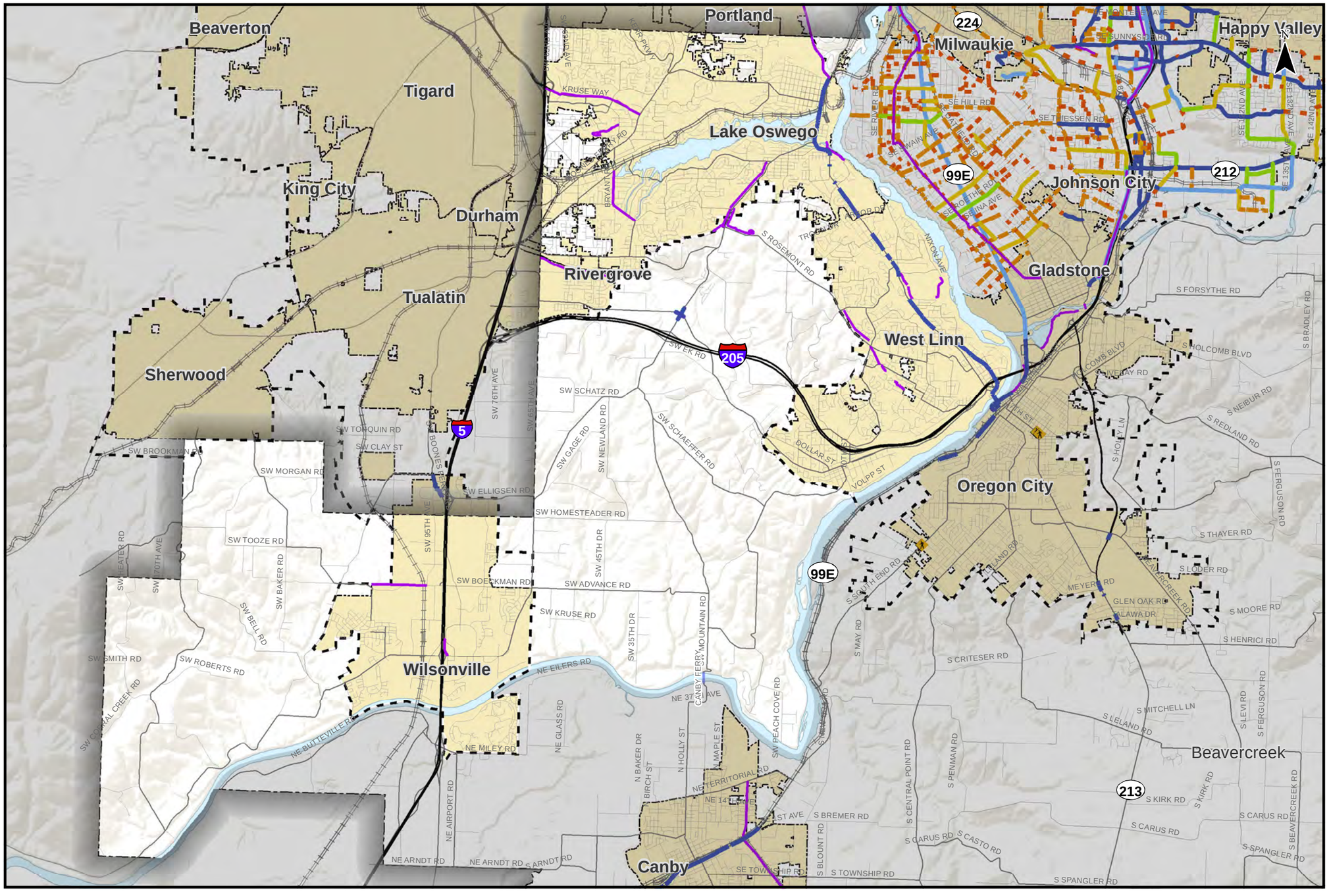


Pedestrian Network

- Sidewalks
- 76% to 99% Complete
- 51% to 75% Complete
- 26% to 50% Complete
- 1% to 25% Complete
- No Sidewalks
- Multi-Use Path
- Ped Crossing Flasher
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Essential Pedestrian Network
Northwest County

Figure
NW 18

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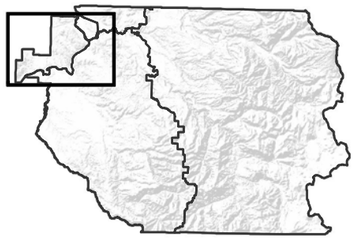
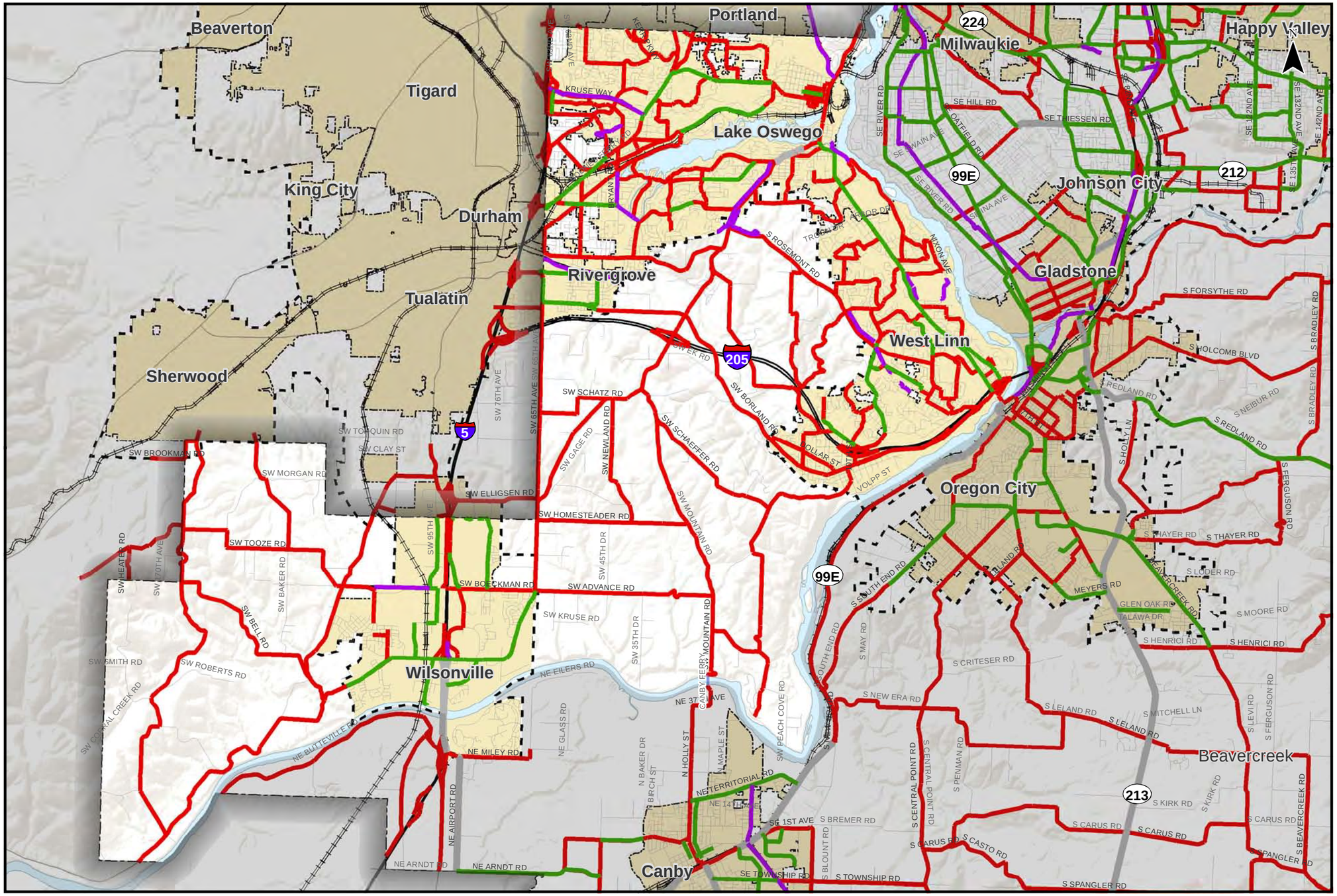
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Bike Facilities

- Bike Lane
- Multi-Use Path
- Shoulders (At Least 4ft Wide)
- Gap in Bikeway Network
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Existing Bikeway Network
Northwest County

Figure
NW 19

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As shown in Figure NW 19, with the exception of Borland Road south of I-205, the rural portions of the area have no shoulders wide enough to be designated as shoulder bikeways. However, there are some bicycle facilities within Lake Oswego, West Linn, and Wilsonville.

Bicycle facilities should be provided on all roadways designated as Collectors or higher (i.e. Major Arterials, Minor Arterials, Connectors, and Collectors). Based on the County's current design standards, in urban areas the facility should be a bike lane and in rural areas it should be a 6 foot shoulder. The County's current Comprehensive Plan identifies all collector and arterial roadways (urban and rural) as part of the Existing Bikeway Network (*see Appendix 5 for the County's essential pedestrian and bicycle network maps*). Existing gaps in the network include all roadways identified on the Existing Bikeway Network that do not have an existing bicycle facility (nearly all County collectors and arterials).

The County's Bicycle Master Plan identifies priorities for filling in the bicycle network gaps. The priority for these projects will be reviewed by applying the evaluation criteria of the TSP Vision and Goals. Table NW 4 below identifies the priority bicycle projects from the Bicycle Master Plan.

Table NW 4 Bicycle Master Plan Projects in the Northwest County Area

Bike Master Plan Project Number	Street Name	Section Description	Project Elements
B18	BONITA	Carman Drive to I-5	Bike lanes
B19	BOONES FERRY	Portions maintained by County	Bike lanes. Striping possibly in Tualatin / Lake Oswego jurisdiction.
B20	CARMAN	Kruse Way to I-5	Bike lanes, Reconstruction and Widening
B22	CHILDS	65th to Stafford Road	Bike lanes
B41	PILKINGTON	Boones Ferry to Childs Road	Bike lanes
RB 404	65TH	Stafford Rd to Tualatin	Widen / Shoulder Bikeways
RB 407	BORLAND	Tualatin to Stafford	Widen / Shoulder Bikeways
RB 408	BORLAND	Stafford Rd to West Linn	Widen / Shoulder Bikeways
RB 419	JOHNSON	Stafford Rd to West Linn	Widen / Shoulder Bikeways
RB 428	ROSEMONT	Stafford Rd to Summit	Widen / Shoulder Bikeways
RB 432	STAFFORD	Lake Oswego to Borland	Widen / Shoulder Bikeways
RB 433	STAFFORD	Borland to Mountain	Widen / Shoulder Bikeways
RB 434	STAFFORD	Mountain to Boeckman	Widen / Shoulder Bikeways

B= Urban Bike Facility, RB = Rural Bikeway

Public Transportation System

The public transportation system in Northwest County consists of fixed-route and dial-a-ride services as well as regional transit centers and park/rides. Frequent morning and evening peak hour service provides residents with the ability to use public transit for daily commuting, while less frequent mid-day, Saturday, and Sunday service provides residents with the ability to use public transit to access areas located throughout Clackamas County and the region.

Providers in Northwest County

Two transit agencies currently provide service in this area, including TriMet and South Metro Area Regional Transit (SMART). Figure NW 20 displays the fixed-route services provided by each agency. These services are discussed in greater detail below.

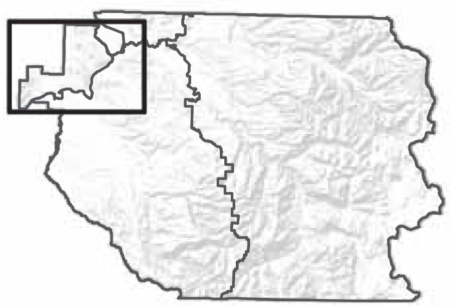
Fixed Route Service

TriMet

TriMet operates six fixed-route bus lines and one fixed-route heavy rail line in Northwest County, including lines 36, 37, 38, 78, 96, 154 and the WES Commuter Rail.

- Line 36 provides weekday service between the Tualatin Park/Ride and the Lake Oswego City Center via S Shore Boulevard from 5:52 a.m. to 6:26 p.m. on approximately 30 minutes headways during the morning peak period and 90 minute headways during all other times of the day.. During the morning and evening peak periods, Line 36 operates north of Lake Oswego along Riverside Drive to provide service to the Portland City Center. *Line 36 connects to SMART's Line 2X at the Tualatin Park/Ride.*
- Line 37 provides weekday service between the Tualatin Park/Ride and the Lake Oswego City Center via Boones Ferry Road and Country Club Road, from 7:03 a.m. to 5:54 p.m. on approximately 90 minute headways. *Line 37 connects to SMART's Line 2X at the Tualatin Park/Ride.*
- Line 38 provides weekday rush-hour service between the Tualatin Park/Ride and the Portland City Center via Terwilliger Boulevard from 5:57 a.m. to 6:27 p.m. on approximately 30-60 minute headways. L*ine 38 connects to SMART's Line 2X at the Tualatin Park/Ride.*
- Line 78 provides weekday service between the Beaverton Transit Center and the Lake Oswego City Center via the Washington Square Transit Center and the Tigard Transit Center from 5:32 a.m. to 12:27 a.m. on approximately 30 minute headways. *Line 78 connects to TriMet's WES Commuter Rail at the Beaverton Transit Center and the Tigard Transit Center where it also connects to Yamhill County Transit Authority's (YCTA) fixed-route services.*
- Line 96 provides weekday rush-hour service between the SW 95th Avenue and SW Commerce Circle in Wilsonville and the Portland City Center via the Tualatin Park & Ride from 5:17 a.m. to 9:00 p.m. on approximately 10-30 minute headways. *Line 96 connects to SMART in the SW 95th Avenue and SW Commerce Circle in Wilsonville and at the Tualatin Park & Ride.*
- Line 154 provides weekday service between West Linn's Willamette neighborhood and the Oregon City Transit Center via Willamette Falls Drive from 6:33 a.m. to 7:09 p.m. on approximately 70 minute headways. *Line 154 connects to CAT at the Oregon City Transit Center.*

CLACKAMAS COUNTY
TRANSPORTATION SYSTEM PLAN Update



- Bus Stops
- Route Number
- Park & Ride

Transit Providers

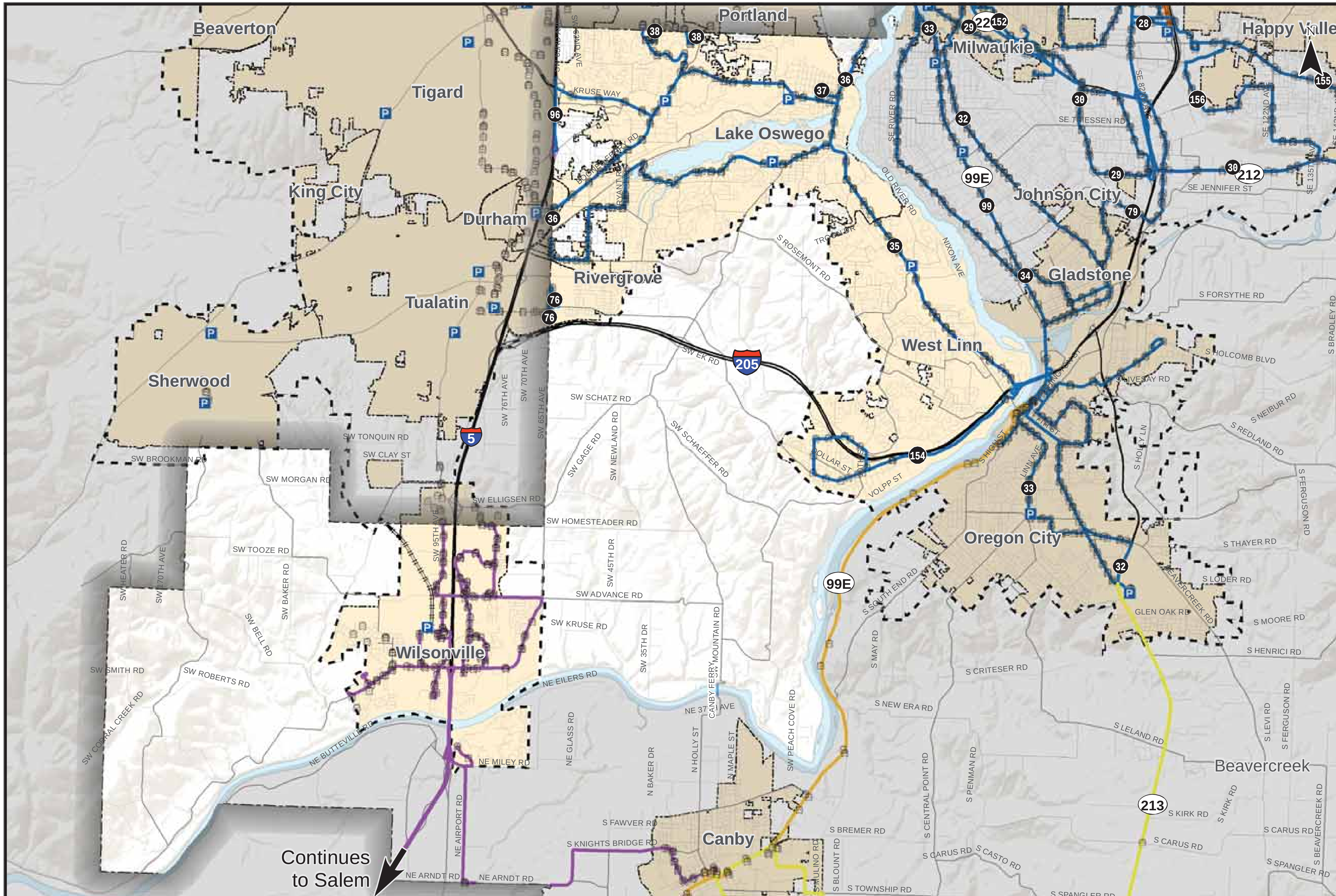
- Tri-Met
- SAM
- SCTD
- CAT
- MXT
- SMART

Tri-Met Rails

- MAX
- WES
- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center



Transit Service
Northwest County

Figure
NW 20

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- The WES Commuter rail provides weekday service between SMART Central and the Beaverton Transit Center via the Tualatin Park & Ride and the Tigard Transit Center during the morning peak period from 5:21 a.m. to 9:18 a.m. and the evening peak period from 3:28 p.m. to 7:25 p.m. on approximately 30 minute headways.

South Metro Area Regional Transit

South Metro Area Regional Transit (SMART) provides fixed-route and dial-a-ride services within the City of Wilsonville and the surrounding areas. SMART operates seven fixed-route bus lines within the Northwest County area, including Line 1X, 2X, 3, 4, 5, 6, and V. All routes begin and end at SMART Central in Wilsonville where they connect with TriMet's WES Commuter Train.

- Line 1X provides weekday rush-hour service between SMART Central and the Salem Transit Center via I-5 from 4:32 a.m. to 7:52 p.m. on approximately 30-60 minute headways.
- Line 2X provides weekday service between SMART Central and the Barbur Boulevard Transit Center via Parkway Avenue, Canyon Creek Road, and I-5 from 5:05 a.m. to 7:25 p.m. on approximately 30 minute headways during the morning and evening peak periods and on 60 minute headways during the mid-day peak period. *Line 2X connects to TriMet at the Tualatin Park/Ride and the Barbur Transit Center.*
- Line 3 provides weekday rush-hour service between SMART Central and the Canby Transit Center via Boones Ferry Road, I-5, and Airport Road from 6:30 a.m. to 6:58 p.m. on approximately 60 minute headways during the morning and evening peak periods. *Line 3 connects to CAT's Orange Line and SCTD's Molalla to Canby Line at the Canby Transit Center.*
- Line 4 provides weekday service between Boulder Creek and Boones Ferry Primary School via Smart Central from 4:57 a.m. to 7:42 p.m. on approximately 30 minute headways during the morning and evening peak periods and on 60 minute headways during the mid-day peak period. During the morning and evening peak periods, Line 4 continues south along Wilsonville Road to Graham Oak Nature Park.
- Line 5 provides weekday rush-hour service between SMART Central and Commerce Circle via SW 95th Avenue from 5:25 a.m. to 7:14 p.m. on approximately 30 minute headways during the morning and evening peak periods.
- Line 6 provides weekday service between SMART Central and Argyle Square via Canyon Creek Road from 6:29 a.m. to 7:39 p.m. on approximately 30 minute headways during the morning and evening peak periods.
- Line V provides weekday rush-hour service between SMART Central and Villebois via Kinsman, Wilsonville, and Brown Road four times per day; twice during the morning peak period and twice during the evening peak period.

Dial-A-Ride Service

TriMet's LIFT Paratransit Program provides dial-a-ride service to residents who are unable to use regular fixed-route services due to disabilities or disabling health conditions. The service is offered within three-

fourths of a mile beyond the outermost portions of TriMet's bus and light-rail lines. Service is not offered outside TriMet's service district. This service is available 4:30 a.m. to 2:30 a.m. seven days a week. *Effective September 2012 the LIFT service area and hours of service will match fixed route availability.*

SMART provides dial-a-ride service to Wilsonville residents who are unable to use fixed-route services. Service is offered Monday through Friday from 5:30 a.m. to 7:15 p.m., with limited service on Saturdays.

Transit Level-of-Service

The transit level-of-service analysis provided below is based on the methodology described in *TCRP Report 100: Transit Capacity and Quality of Service Manual*. Refer to the Methodology/Approach section for additional information about the level-of-service measures included in the analysis.

Service Frequency

Service frequencies differ by service provider and by route. Table NW 5 summarizes the transit level-of-service analysis results for service frequency. As shown, a majority of existing services currently at LOS D or below throughout the day.

Table NW 5 Service Frequency Level-of-Service Analysis – Northwest County

Provider	Routes	Service Frequency	LOS
TriMet	Line 36	30-90 minutes[2]	D-F
TriMet	Line 37	90 minutes[2]	F
TriMet	Line 38	30-60 minutes[2]	D-E
TriMet	Line 78	30 minutes	D
TriMet	Line 96	10-30 minutes	A-D
TriMet	Line 154	70 minutes	F
TriMet	WES	30 minutes[2]	D
SMART	Line 1X	30-60 minutes[2]	D-E
SMART	Line 2X	30-60 minutes[2]	D-E
SMART	Line 3	60 minutes[2]	E
SMART	Line 4	30-60 minutes[2]	D-E
SMART	Line 5	30 minutes[2]	D
SMART	Line 6	30 minutes[2]	D
SMART	Line V	40 minutes[2]	E

1. Service is less frequent on Saturday or Sunday.
2. No service is provided on Saturday or Sunday.

Hours of Service

The total number of hours transit service is provided differs by service provider and by route. Table NW 6 summarizes the transit level-of-service analysis results for hours of service. As shown, a majority of existing services currently operate at LOS D or below throughout the day.

Table NW 6 Hours of Service Level-of-Service Analysis – Northwest County

Provider	Routes	Hours of Service	LOS
TriMet	Line 36	12 hours[2]	D
TriMet	Line 37	11 hours[2]	D
TriMet	Line 38	6 hours[2]	E
TriMet	Line 78	19 hours[1]	A
TriMet	Line 96	11 hours[2]	D
TriMet	Line 154	12 hours[2]	D
TriMet	WES	8 hours[2]	E
SMART	Line 1X	15 hours[2]	C
SMART	Line 2X	15 hours[1]	C
SMART	Line 3	13 hours	D
SMART	Line 4	15 hours[1]	C
SMART	Line 5	8 hours[2]	E
SMART	Line 6	8 hours[2]	E
SMART	Line V	13 hours[2]	D

1. Service is less frequent on Saturday or Sunday.
2. No service is provided on Saturday or Sunday.

Service Coverage

Figure NW 21 displays the transit level-of-service analysis results for service coverage. Areas defined as transit supportive that have service are shown in blue. Areas defined as transit supportive that are lacking service are shown in red. Areas that have transit service, but do not qualify as a TSA, are shown in orange. A majority of the areas shown in red would require additional transit routes or the development of new pathway connections (to increase the area within a ¼ mile walk) to existing transit routes in order to be served.

The percentage of TSA's served and the corresponding level of service has been identified using the Transit Level of Service (TLOS) methodology. As shown in Table NW 7, the percent of transit supportive population areas served is 51 percent and the percent of transit supportive employment areas served is 54 percent. The corresponding LOS is E.

Table NW 7 Service Coverage Analysis – Northwest County

Area Type	Population	Employment
Transit Supportive Area (TSA)[1]	30,934	23,713
Transit Supportive Areas Served[2]	15,740	12,846
Percent TSA Served by Transit	51%	54%
Level of Service	LOS E	LOS E
Transit Supportive Areas without service	15,194	10,867
Transit Area Served[3]	34,372	18,610
Additional Areas Served	18,632	5,764

1. Area shown in blue and red in Figure NW 21.
2. Area shown in blue in Figure NW 21.
3. Area shown in blue and orange in Figure NW 21.

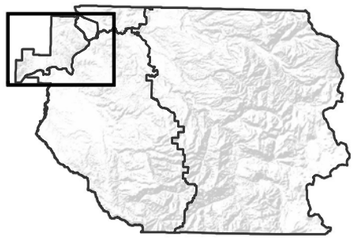
As shown in Table NW 7, 15,194 people and 10,867 jobs are located within TSA's that do not have transit service. These areas currently have a population and/or employment density that can support transit service and therefore should be included in future efforts to improve service routes and stop locations. As shown in Table NW 7, 34,372 people are currently served by transit. Of the total area served, 18,632 people and 5,764 jobs are located within areas that have transit service, but currently do not have the population and/or job density necessary to economically support transit service.

A few of the areas in Wilsonville and Lake Oswego along S Country Club Road, however, are shown in Figure NW 9 as containing a large portion of the transportation disadvantaged population in the Northwest County area and therefore the service provided in these areas is an important consideration.

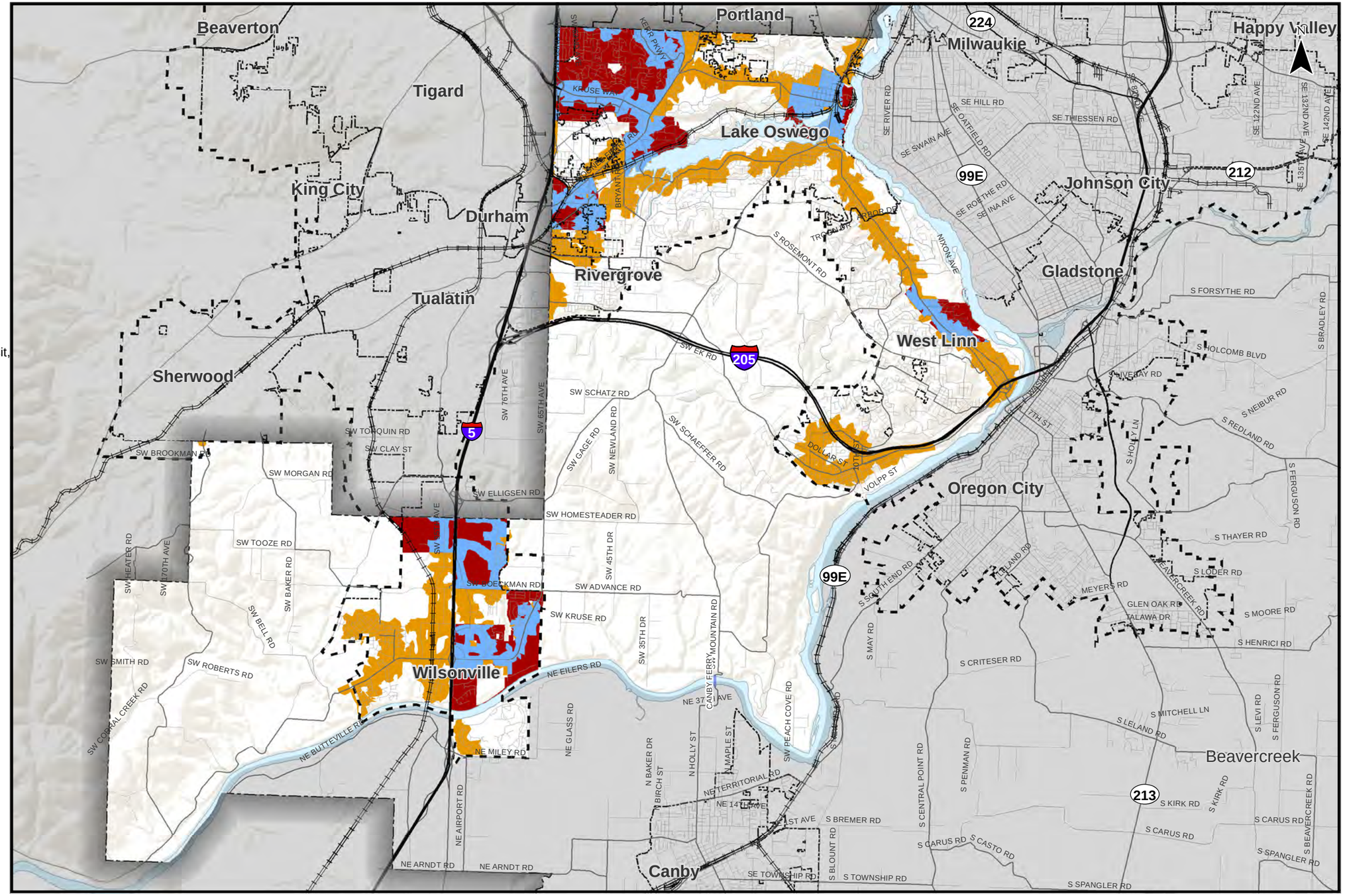
Future Transit Service Coverage

The future transit level-of-service analysis assumes that existing service frequencies, service hours, and service coverage is the same in the future. The only difference is the population and employment growth assumptions included in the regional traffic model and the resulting transit supportive areas. Figure NW 22 displays the future transit level-of-service analysis results for service coverage. As shown, the number of transit supportive areas is expected to increase significantly throughout most of Northwest County. While many of these areas are expected to be served by existing transit services, the remaining areas will require additional service routes or connections to existing routes in order to be served.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



- Areas with Density to Support Transit and Served by Transit
- Areas with Density to Support Transit, but Not Served by Transit
- Areas without Sufficient Density to Support Transit
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Existing Transit Supportive Areas Northwest County

Figure
NW 21

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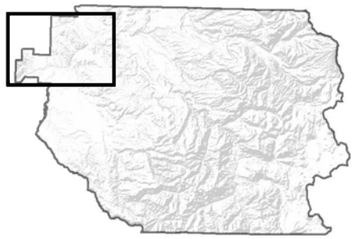
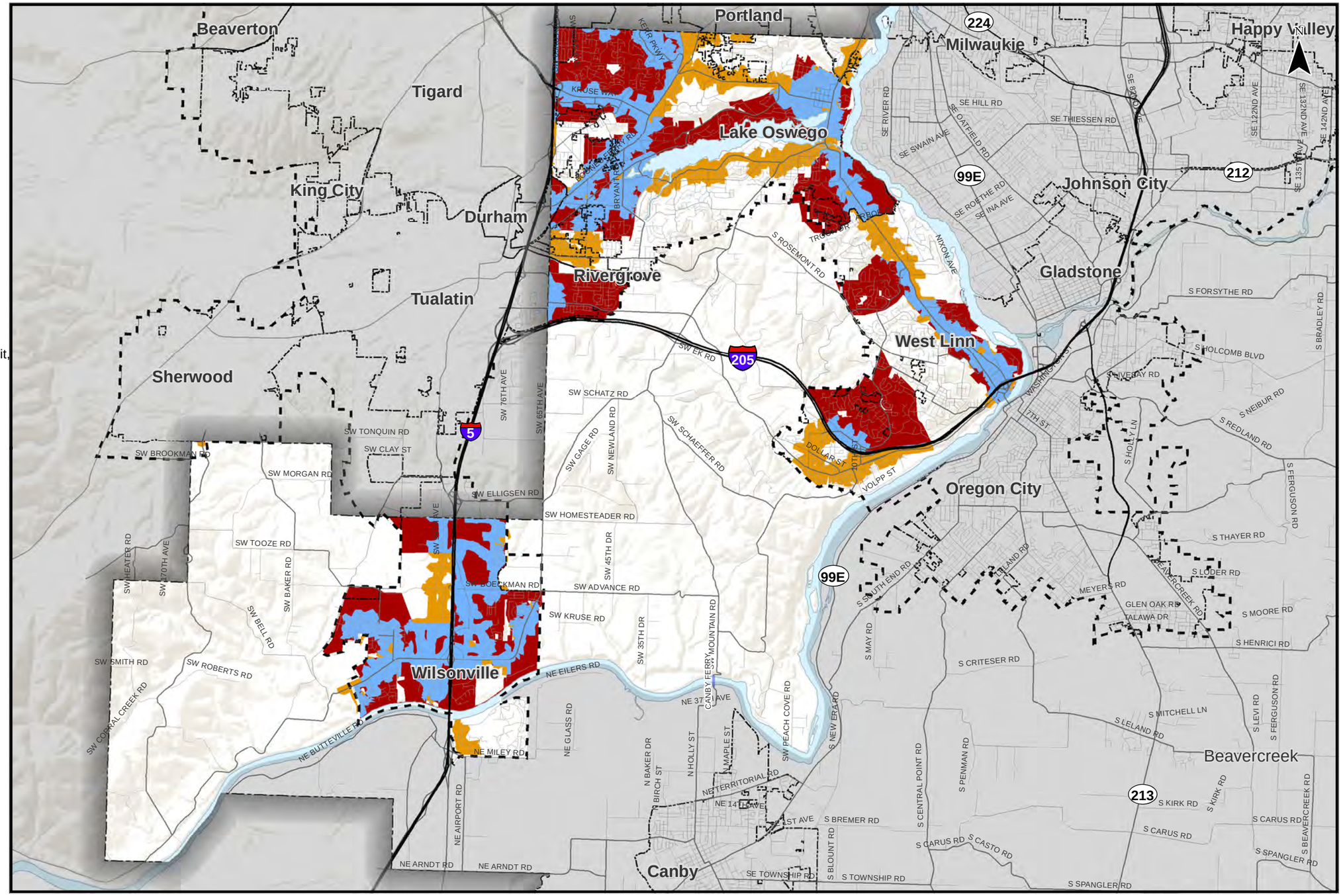
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



- Areas with Density to Support Transit and Served by Transit
- Areas with Density to Support Transit, but Not Served by Transit
- Areas without Sufficient Density to Support Transit
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Future Transit Supportive Areas
Northwest County

Figure
NW 22

H:\proj\file\11732 - Clackamas County TSP\gis\11x17 Maps\22 Future Transit Supportive Areas.mxd

CRASH ANALYSIS

The existing conditions crash analysis considered:

1) Locations within the County identified as safety priorities by the Oregon Department of Transportation;
2) Primary crash types contributing to the majority of serious injury and fatal crashes in the County; and
3) Specific safety focus intersections County staff has identified.

See *Section 3 Assumptions and Methods* for a description of the crash analysis methodology.

Figure NW 23 illustrates the reported crashes in the Northwest County area from 2007 through 2010. The following sub-sections take a closer look at the reported crash data to identify the historic trends and patterns that have contributed to the majority of fatal and serious injury crashes.

Statewide Safety Priority Locations

ODOT identifies top safety priority locations annually using a Statewide Priority Index System (SPIS). The locations in the top 5% and 10% are those that have historically experienced a higher number and/or higher severity of crashes. These locations are referred to as SPIS locations or SPIS sites. Clackamas County applies the same methodology as ODOT to County roadways to identify the top 20 to 25 locations on which to focus safety reviews and improvements.

Figure NW 24 illustrates the SPIS locations within the Northwest County area. There are two SPIS locations identified by ODOT; however both are located within incorporated areas of the County. Therefore, those respective cities are expected to consider and evaluate those locations within their transportation system plans.

Primary Crash Types Contributing to Serious Injury and Fatal Crashes

The following sub-sections and figures display the locations of the crash types that historically have led to the majority of serious injury and fatal crashes in the County as discussed in *Section 3 Methodology & Approach*:

- Roadway Departure Crashes ;
- Crashes Involving Young Drivers (ages 15 through 25 years old; and
- Crashes Involving Aggressive Driving (driving too fast, following too close).

Roadway departure crashes, crashes involving young drivers and crashes involving aggressive driving are not mutually exclusive categories. This means one crash could involve a young driver who ran off the road; this crash would be mapped as a roadway departure crash and as a crash involving a young driver. In addition to the three crash types above, crashes involving pedestrians and bicyclists are also mapped below. While the overall occurrence of crashes involving pedestrians and bicyclists may not be as high as other crash types, when those crashes do occur they often result in serious injuries or fatalities because pedestrians and bicyclists are more vulnerable than people traveling in motorized vehicles.

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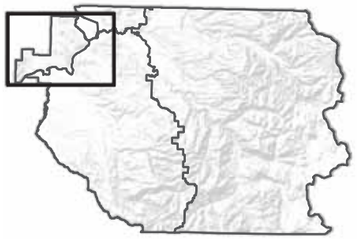
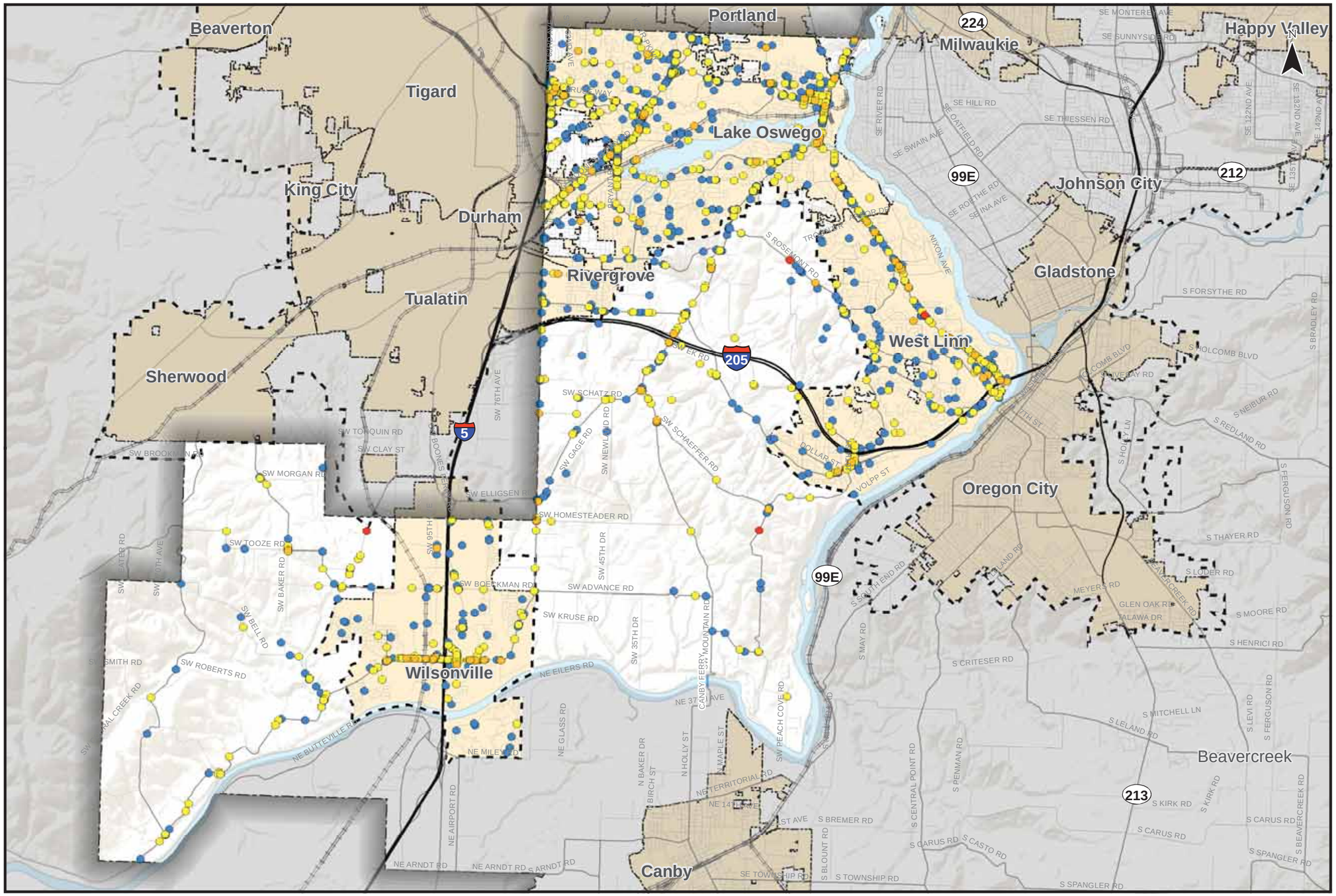


Reported Crashes
2007 Through 2010

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Reported Crashes 2007-2010
Northwest County

Figure
NW 23

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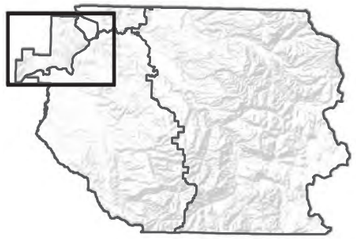

County SPIS Sites

ODOT SPIS Sites

- 5% Site
- 10% Site

Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroad

- Incorporated Areas
- County Boundary
- UGB

On an annual basis, the Oregon Department of Transportation identifies safety priority locations through their Statewide Priority Index System (SPIS). The SPIS process identifies locations for review and potential improvements based on their crash history. SPIS locations listed in the top 5% and top 10% represent locations that have historically experienced a higher number and/or higher severity of crashes than other locations in the state.

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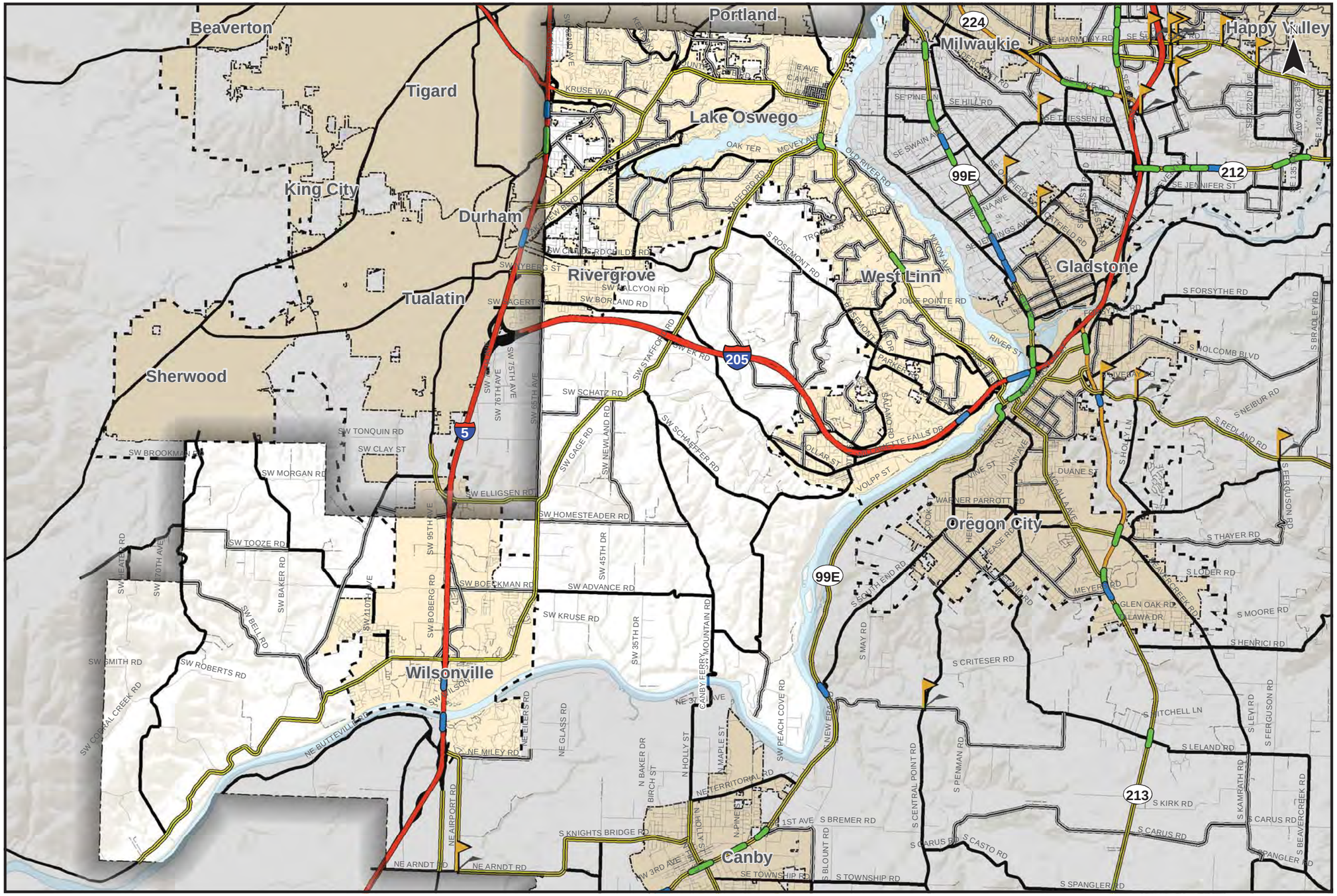
Data Source:
Clackamas County, Metro Data Resouce Center



Statewide Priority Index System Locations
Northwest County

Figure
NW 24

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The purpose of this assessment is to identify candidate road safety audit corridors for the County to study and evaluate in greater detail. A candidate safety corridor is a series of roadway segments and intersections that have experienced higher frequencies of roadway departure crashes, crashes involving young drivers, and crashes involving aggressive driving. Separate from the TSP update activities, the County will review the crash data for these corridors in greater detail, assess the existing physical features of the corridor (e.g., shoulder width, signs, pavement markings) and identify improvements to reduce crashes. Improvements would range from lower cost signing or pavement marking treatments to road reconstruction. Potential improvements include updating and/or installing new signs, new or enhanced pavement markings (e.g., STOP AHEAD pavement markings), moving roadside fixed objects, and adjusting roadside vegetation. Further study of the candidate road safety audit corridors and improvements to them will be addressed programmatically. This enables the County to assess each corridor in more detail on a case by case basis, identify cost-effective solutions and determine if other corridors within the County would also benefit from similar improvements.

From the analysis presented below, one corridor was identified in the Northwest County area: Stafford Road from S Rosemont Road to SW Mountain Road. The other potential corridors within the Northwest County area are within incorporated areas and therefore fall within the given jurisdiction's responsibility. Figure NW 25 illustrates the location of the candidate road safety audit corridor.

Roadway Departure Crashes, Crashes Involving Young Drivers, and Crashes Involving Aggressive Driving

Roadway departure crashes, crashes involving young drivers and crashes involving aggressive driving were mapped in two ways. First, each crash type was mapped and assessed separately to identify corridors where each crash type has occurred. Second, the serious injury and fatal crashes for each of those crash types were also mapped together to consider where the crash types over lap and focus attention on serious injury and fatal crashes. The results of both mapping exercises informed the candidate road safety audit corridors listed above.

Figure NW 26 illustrates the roadway departure crashes. The roadway departure crashes have primarily occurred along Stafford Road.

Figure NW 27 illustrates the crashes involving young drivers. Young drivers are defined as drivers age 15 through 25 years old. The location of these crashes reinforces the candidate road safety audit corridors identified for Stafford Road.

Figure NW 28 illustrates crashes involving aggressive driving. Aggressive driving includes vehicles traveling too fast for conditions, exceeding the posted speed, and following too closely. The locations of crashes involving aggressive driving also reinforces the candidate road safety audit corridors identified for Stafford Road.

Figure NW 29 illustrates serious injury and fatal crashes that were roadway departure crashes, involved young drivers, and/or involved aggressive driving. The purpose of this figure is to help focus on the corridors where serious injury and fatal crashes have occurred. However, there are relatively few serious injury and fatal crashes in the unincorporated areas of Northwest County. The Stafford Road candidate safety corridor was identified primarily based on the total number of roadway departure, young driver, and aggressive driving crashes that have occurred along it.

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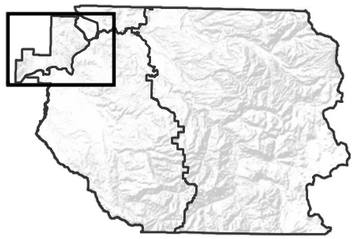
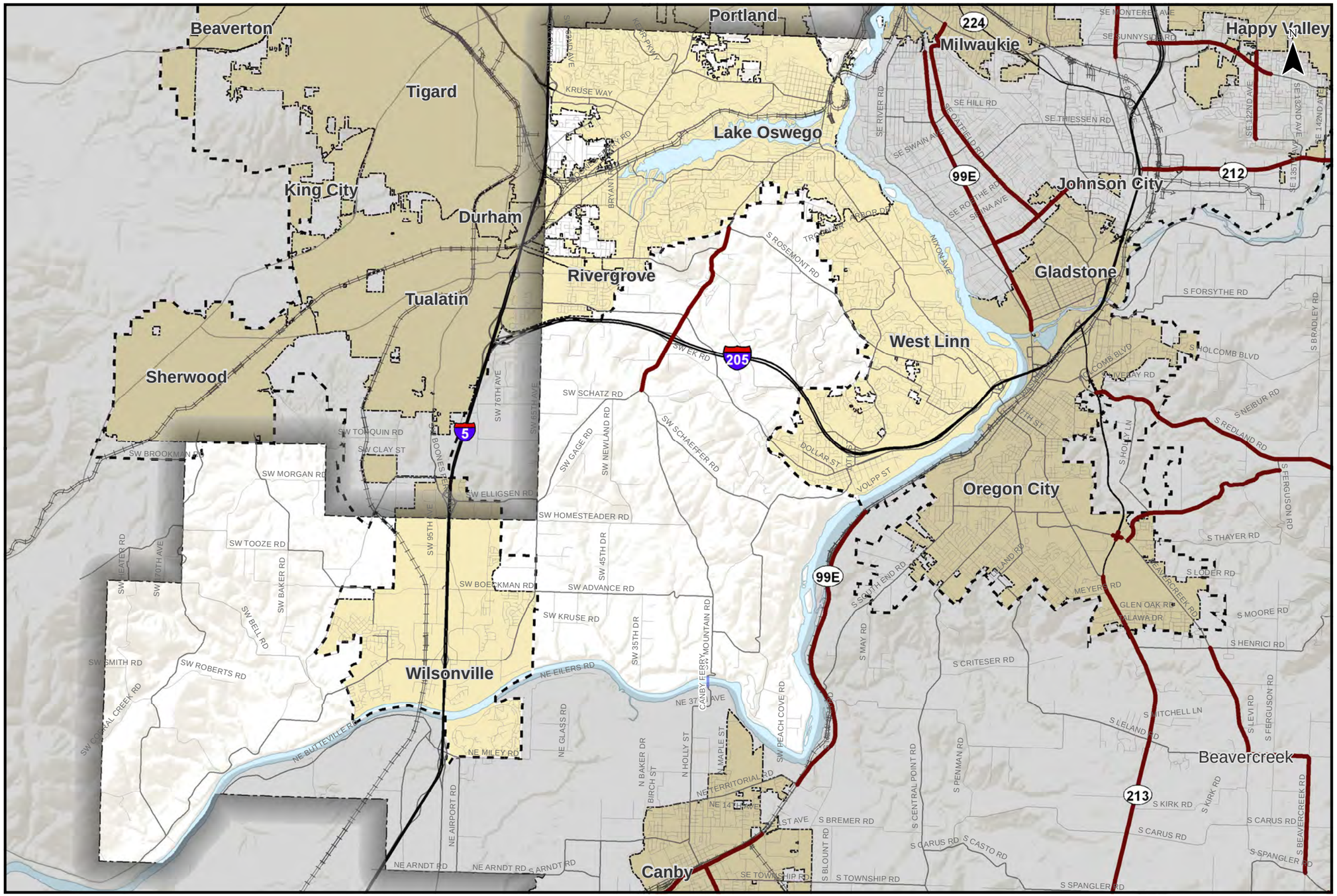


Candidate Road Safety Audit Corridors

Incorporated Areas

County Boundary

UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Candidate Road Safety Audit Corridors
Northwest County

Figure
NW 25

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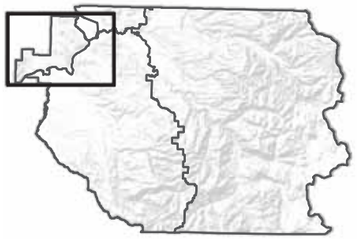
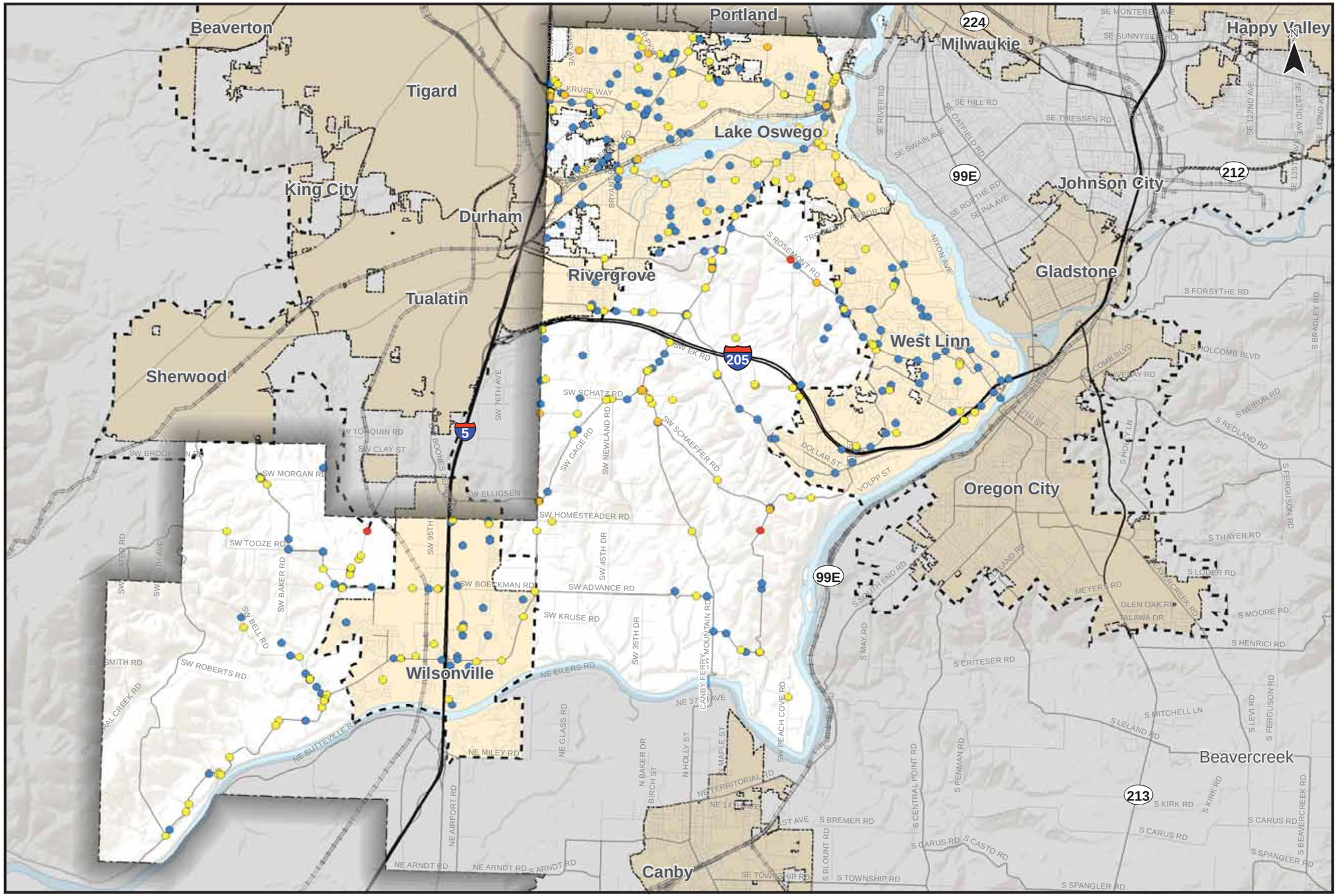
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Roadway Departure Crashes

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Roadway Departure Crashes 2007-2010
Northwest County

Figure
NW 26

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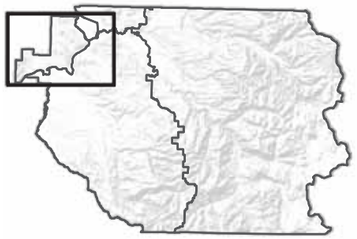
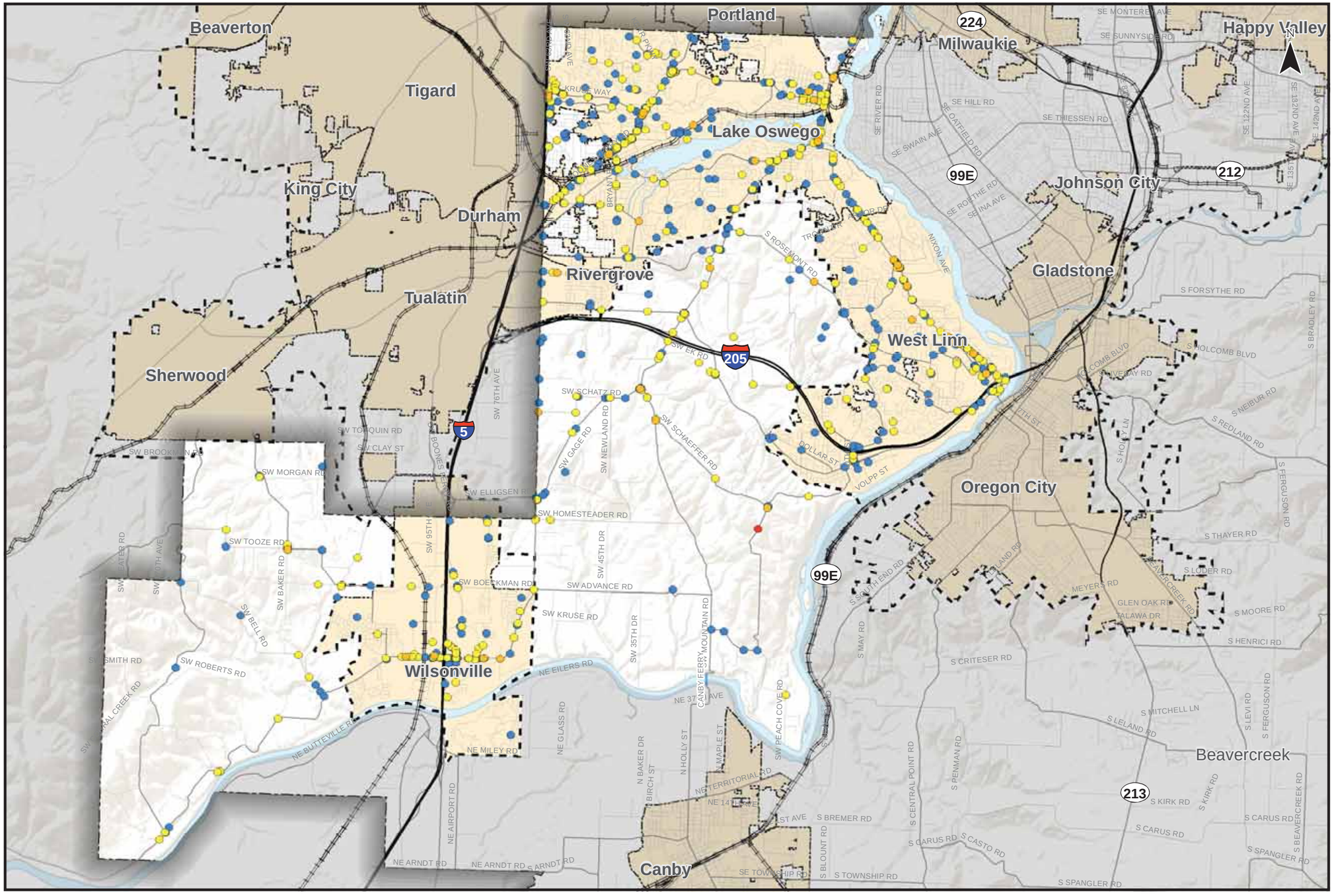
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Crashes Involving Young Drivers (15-25 Years Old)

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Data Source:
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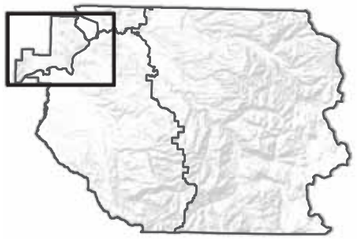
Oregon Department of Transportation

Crashes Involving Young Drivers (15-25 Years Old) 2007-2010
Northwest County

Figure
NW 27

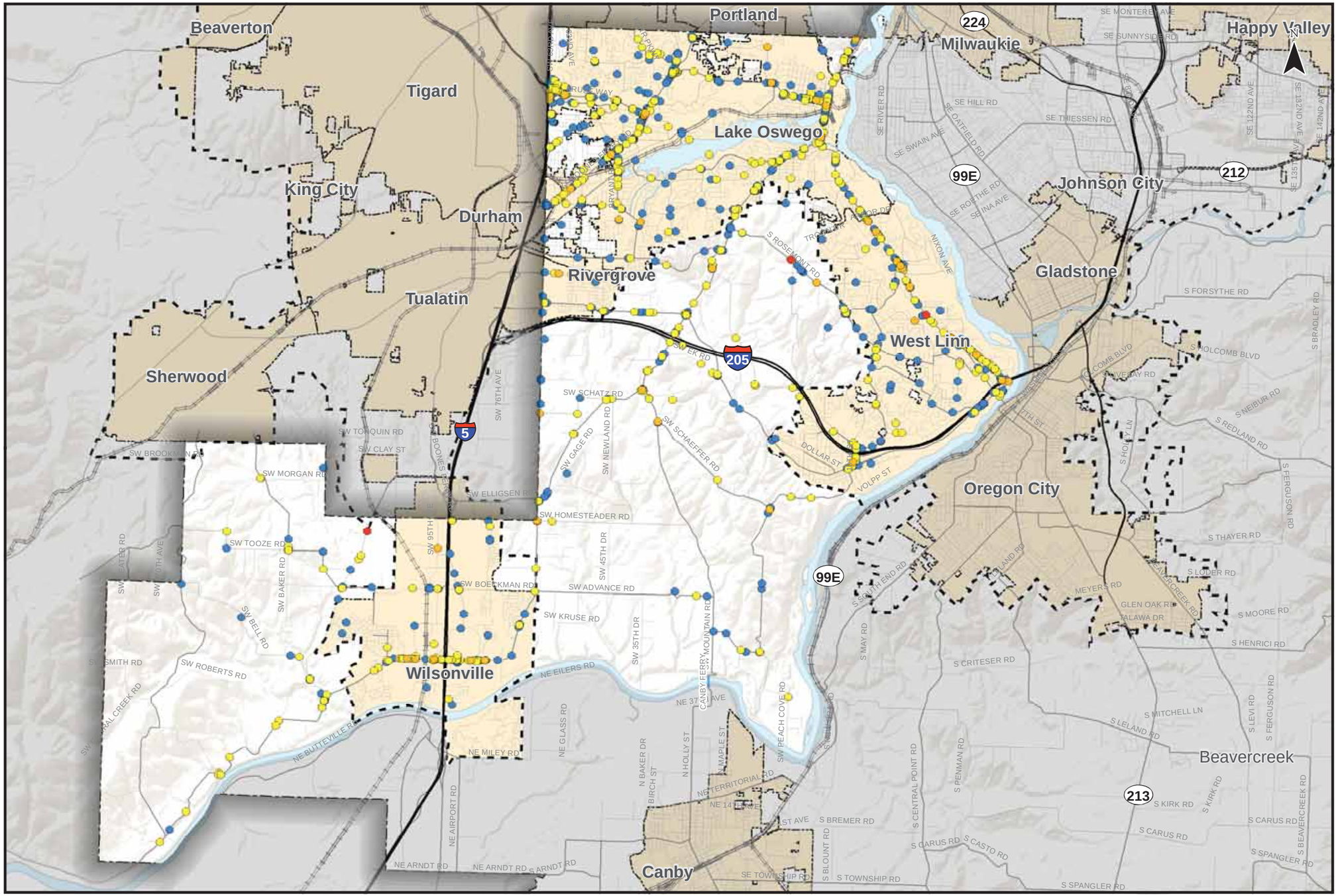
H:\proflile\11732 - Clackamas County TSP\gis\11x17 Maps\27 Crashes Involving Young Drivers (15-25 Years Old).mxd

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Crashes Involving Aggressive Driving

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Aggressive Driving 2007-2010
Northwest County

Figure
NW 28

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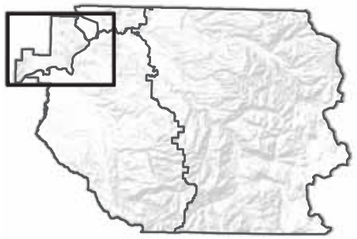
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Roadway Departure Crashes

- Fatal Crash
- Serious Injury Crash

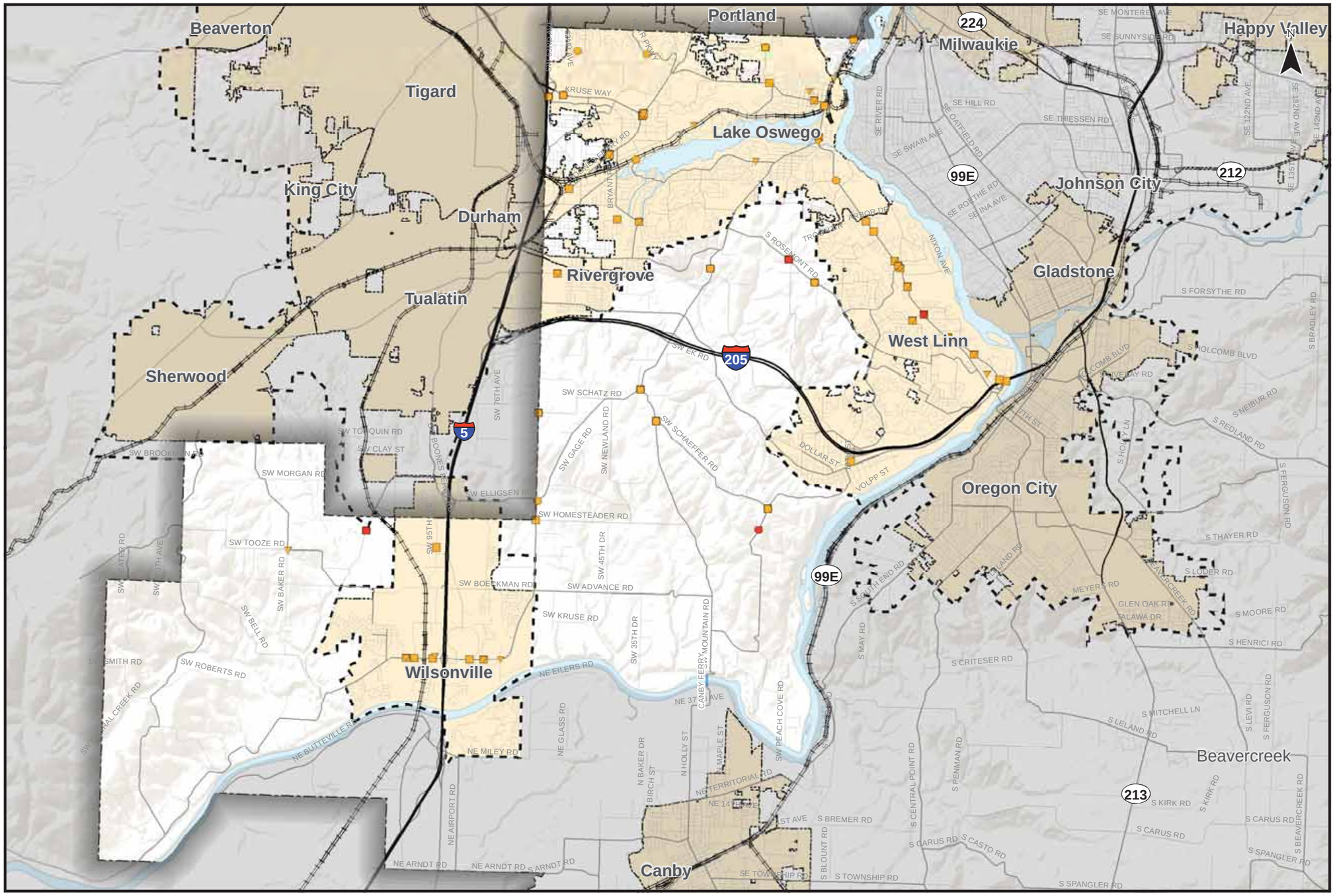
Crashes Involving Young Drivers (15-25 Years Old)

- Fatal crash
- Serious Injury Crash

Aggressive Driving Crashes

- Fatal Crash
- Severe Injury Crash

- Incorporated Areas
- County Boundary
- UGB



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Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes Northwest County

Figure
NW 29

H:\proglite\11732 - Clackamas County TSP\gis\11x17 Maps\29 Fatal & Serious Injury, Roadway Departure, Young Driver & Aggressive Driving Crashes.mxd

Crashes Involving Pedestrians or Bicyclists

In rural areas, crashes involving in pedestrians and bicyclists are small proportion of total reported crashes because of the lower volumes of pedestrians and bicyclists using the roadway.

Figure NW 30 and Figure NW 31 illustrate crashes involving pedestrians and bicyclists. The pedestrian and bicycle crashes within Northwest County from 2007 through 2010 have predominately occurred in the incorporated areas of Wilsonville, West Linn, and Lake Oswego. This is consistent with what is expected given that pedestrian and bicycle activity is higher in urban areas. The two crashes involving bicyclists that occurred along Stafford Road are included in the candidate safety corridor noted above.

Specific Safety Focus Intersections

County staff identified a number of safety focus intersections for one or more of the following reasons:

- Approaching roads are offset;
- Sight distance is limited on approach to or at the intersection;
- Intersecting roads are skewed (do not intersect at 90-degrees);
- Geometry of approaching roads are challenging for motorists; and/or
- Intersection geometry or lane configuration is unconventional.

The purpose of identifying these types of intersections is to proactively consider potential improvements in advance of the intersections appearing on the County's priority location list discussed above. The basic characteristics noted above are some geometric features that may make the driving task more difficult and therefore increase the risk of crashes occurring. For example, American Association of State Highway and Transportation Officials' (AASHTO's) *Highway Safety Manual* notes skewed stop controlled intersections tend to experience more crashes than intersections with roads crossing at 90-degrees.[1]

Figure NW 32 illustrates the location of these intersections. Table NW 8 summarizes the safety focus intersections.

[1] AASHTO. *1st Edition of the Highway Safety Manual*. 2010. (See Volume 3, Part D, page 14-16).

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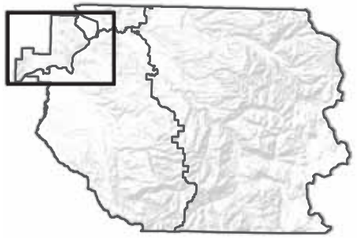
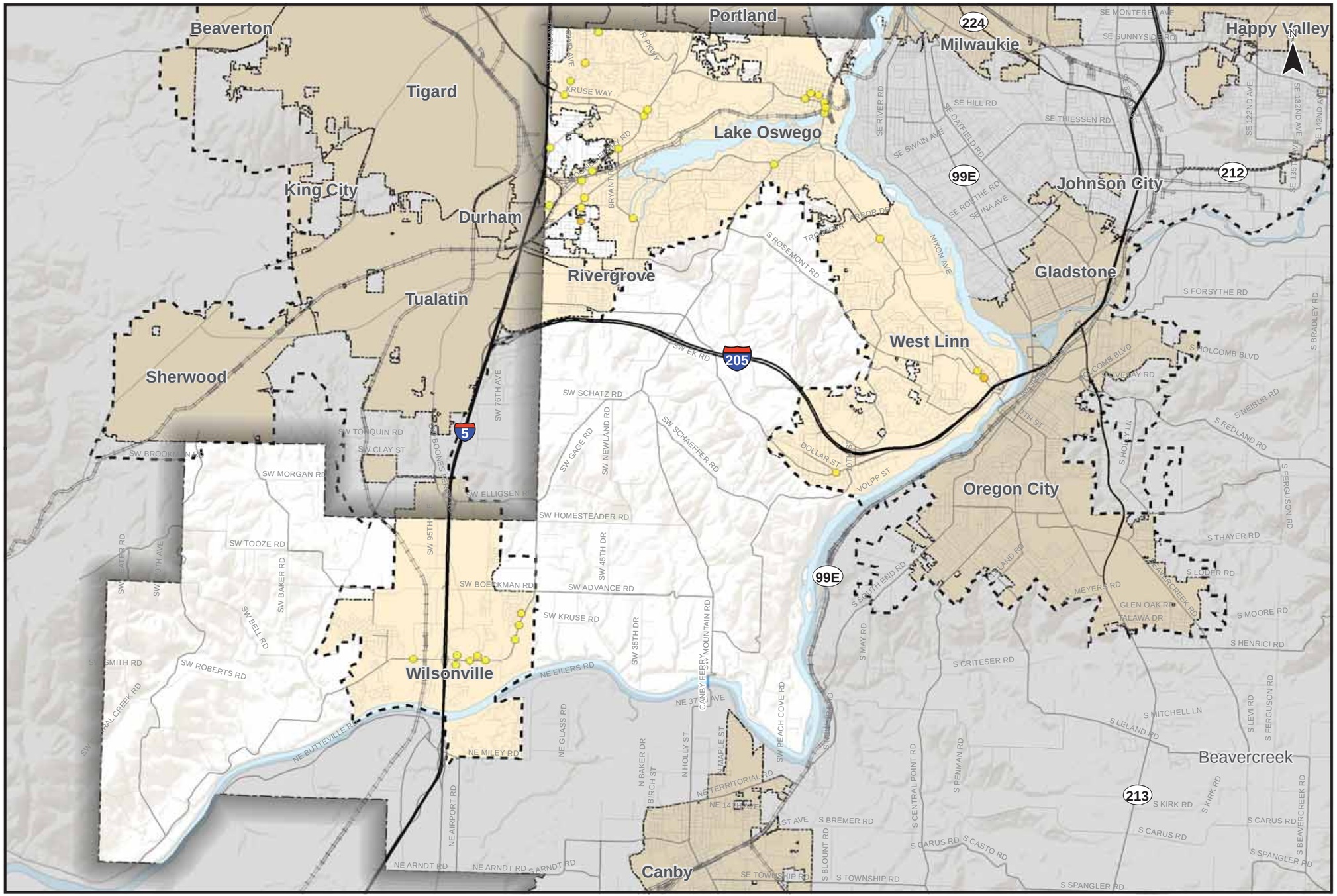


Crashes Involving Pedestrians

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center,
Oregon Department of Transportation

Crashes Involving Pedestrians 2007-2010
Northwest County

Figure
NW 30

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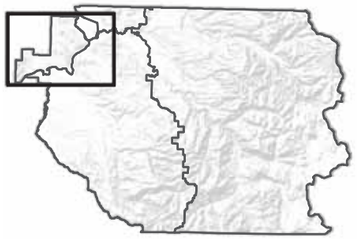
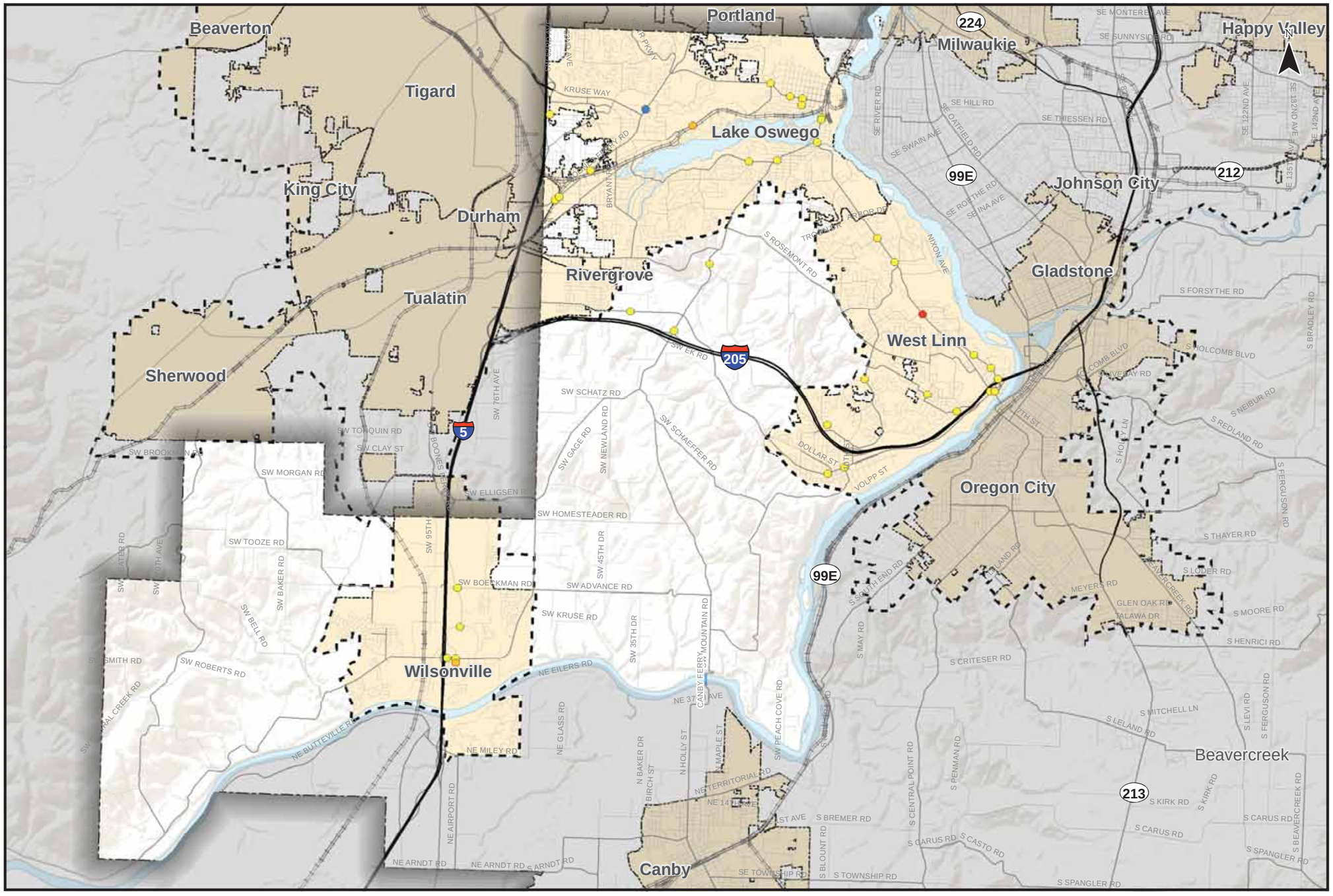


Crashes Involving Bicycles

- Fatal Crash
- Serious Injury Crash
- Minor Injury Crash
- Property Damage Only Crash
- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
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Data Source:
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Oregon Department of Transportation

Crashes Involving Bicycles 2007-2010
Northwest County

Figure
NW 31

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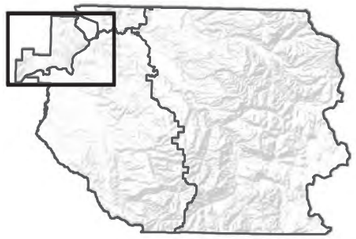
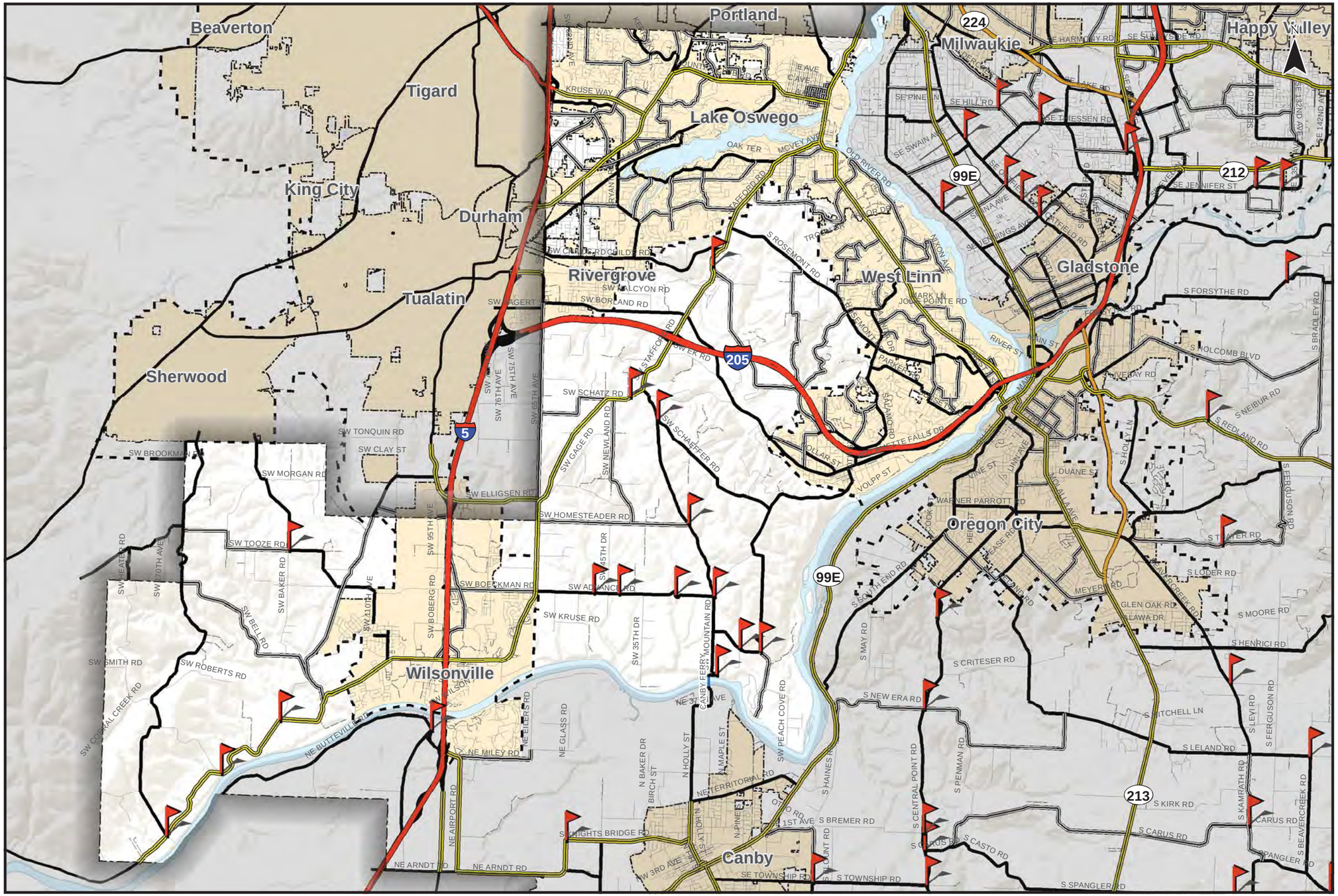


Safety Focus Intersections

Functional Classifications

- Freeway
- Expressway
- Major Arterial
- Minor Arterial
- Collector
- Connector
- Local
- Forest Service Paved
- Forest Aggregate Road
- General dirt, road or trail
- Other
- Railroad
- Incorporated Areas
- County Boundary
- UGB



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Data Source:
Clackamas County, Metro Data Resouce Center

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Safety Focus Intersections
Northwest County

Figure
NW 32

FUTURE BASE CONDITIONS – NORTHWEST COUNTY

INTRODUCTION

This section summarizes the results of the future traffic conditions and analysis for the Northwest County. It evaluates the study intersections performance in the year 2035 assuming growth and development occurs and some planned modifications are made to the transportation system. Two future base scenarios were analyzed:

1. **Low Build:** Assumes that only planned transportation projects with funding currently allotted are completed.
2. **Full Build:** Assumes that all transportation projects identified in the existing TSP planned before the year 2035 are completed.

The projects included in these scenarios will be further evaluated based on criteria and measures corresponding to the County's vision, goals and objectives in the next stage of the TSP Update. Additional new projects to address gaps and deficiencies in the transportation system will also be assessed in the alternatives analysis. The approach and methodology to the Future Base Conditions analysis is further described in *Section 3 Assumptions and Methods*. This section focuses on the results of the analysis in terms of intersection and roadway operations.

2035 LOW BUILD SCENARIO

The low-build scenario assumes the completion of transportation projects identified in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted. The purpose of the low build scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are completed. The analysis will also indicate which projects in the low build scenario help bring the operations on intersections and roadways up to standards.

The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted to reflect this scenario, based on the low build capacity projects in Northwest County and mapped in Figure NW 33. The projects that affect roadway or intersection capacity are listed and described in Table NW 9.

Table NW 9 Low Build Projects in Northwest County Area

Project	ID	Location	Description
Barber St. Extension from Kinsman Rd. to Villebois Village	U018	Kinsman Rd. to Villebois Village	Extend 3 lanes with sidewalks and bike lanes toreduce the need to use I-5 and OR 217 by providing needed connections to the Villebois Village housing development and employment areas in Wilsonville and with the new Commuter Rail site.
Kinsman Rd. Extension from Barber St. to Boeckman Rd.	U021	Barber St. to Boeckman Rd.	Extend 3 lanes with sidewalks and bike lanes. Provide freight access and capacity from Barber Street to Boeckman Road. A vital alternative to 110th which is being vacated. Serves as a parallel arterial to I-5.

Project	ID	Location	Description
Wilsonville Rd/1-5 Interchange Improvements	U676	Town Center Loop W to Boones Ferry Rd	Provide additional left-turn lanes, setback abutments, improve signal synchronization, fix sight distance problems, and provide for enhanced bike/pad safety.
Wilsonville Rd/I-5 Interchange Improvements	U677	N and S of interchange	Widen and lengthen on/off ramps

Study Intersection Analysis

Any low-build projects that affect lane configurations or traffic control at study intersections were accounted for and are noted in Figure NW 34. The operations at the study intersections were analyzed based on the traffic volumes forecasted under the low-build scenario and are illustrated in Table NW 10 and Figure NW 35. Intersections that do not meet standards are noted.

Table NW 10 Low Build Traffic Operations Analysis Results at Study Intersections in the Northwest County Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard in Existing Conditions?	Low Build Project?	Meets Standard in Low Build?
301	SW Childs Rd/SW Stafford Rd	County	LOS = D	No	No	No (LOS F)
302	SW Borland Rd/SW Stafford Rd	County	LOS = D	Yes	No	No (LOS E)
303	SW Mountain Rd/SW Stafford Rd	County	LOS = D	Yes	No	No (LOS F)
304	SW Ellingson Rd/SW 65th Ave	County	LOS = D	Yes	No	No (LOS E)
305	SW 65th Ave/SW Stafford Rd	County	LOS = D	No	No	No (LOS F)

As shown, the intersections of SW Childs Road/SW Stafford Road and SW 65th Avenue/SW Stafford Road continue to not meet performance standards. The three other intersections also do not meet standards in the low-build scenario, although they meet standards under existing conditions. There are no planned and financed capacity projects at any of the study intersections. *Appendix 8* contains detailed traffic operations analysis results.

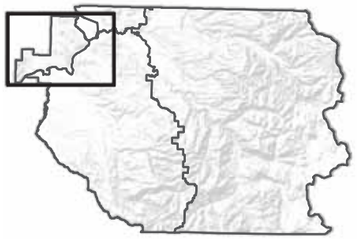
Table NW 8 Safety Focus Intersections in Northwest County Area

Major Road	Minor Road	Reason Identified	County Safety Priority Location?	Located on a Candidate Safety Corridor?
Advance Road	Mountain to Stafford	Approach Geometry	-	-
Advance/Boeckman	Mountain/35th Dr	Approach Geometry (Vertical Curve)	-	-
Advance/Boeckman	45th/53rd	Approach Geometry (Vertical Curve)	-	-
Baker Rd	Tooze Rd	Sight Distance	-	-
Hoffman Rd	Old Well Rd	Intersection Skew	-	-
Homesteader	Mountain	Intersection Skew and Sight Distance	-	-
Mountain Rd	N of Ferry	Approach Geometry	-	-
Mountain Rd	Schaeffer Rd	Intersection Skew and Sight Distance	-	-
Mountain Rd	Boeckman Rd / Advance	Approach Geometry and Sight Distance	-	-
Pete's Mountain	Peach Cove	Unconventional Geometry and Approach Geometry	-	-
Stafford Rd	Johnson	Sight Distance	-	Yes
Stafford Rd	Mountain to Newland	Intersection Crash History	-	-
Wilsonville Rd	Ladd Hill	Sight Distance	-	-
Wilsonville Rd	Grahams Ferry	Intersection Skew and Sight Distance	-	-
Wilsonville Rd	Edminston	Intersection Skew and Sight Distance	-	-

The list of safety focus intersections shown in Table NW 8 supplements the County's Safety Priority Locations and the Candidate road safety audit corridors discussed above. There is some overlap between the safety focus intersections and the previous safety locations presented. One of the safety focus intersections is located on the candidate safety corridor discussed above. The remaining intersections listed are either skewed intersection and/or have limited sight distance. These are candidate intersections for proactive improvements to help reduce the likelihood of crashes.

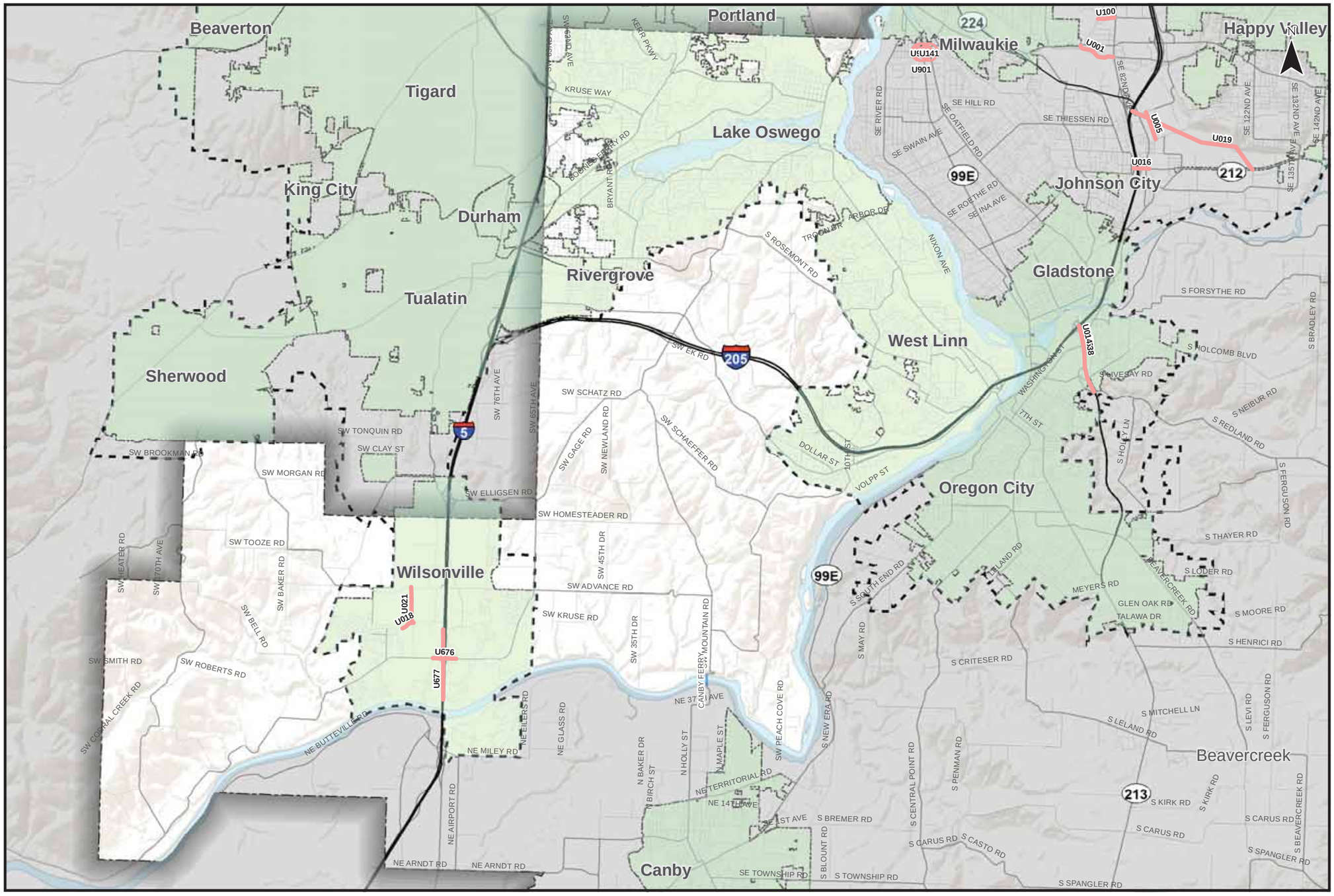
In a forthcoming Transportation System Plan update report, potential projects, programs, studies and/or policies to improve these locations will be discussed.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



2035 Low Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB



This figure displays the projects included in the 2035 Low Build Scenario. The 2035 Low Build Scenario assumes the transportation projects in the existing Clackamas County TSP and Metro Regional Transportation Plan (RTP) with funding currently allotted are completed by 2035. The purpose of the 2035 Low Build Scenario is to identify intersections and roadways that will not meet standards in 2035 if only the currently funded transportation projects are implemented.

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

2035 Low Build Projects
Northwest County

Figure
NW 33

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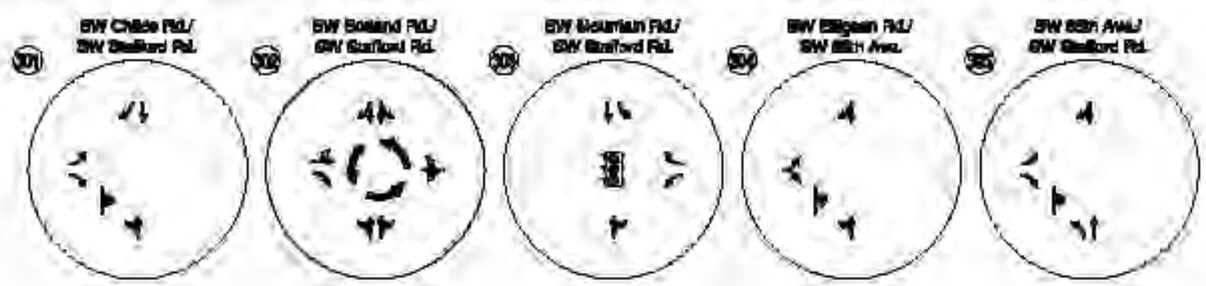


- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT
- LANE REMOVED
- LANE ADDED

Low Build Lane Configuration and Traffic Control Devices Northwest County

Figure NW 34

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

Low Build Intersection Operations
PM Peak Hour
Northwest County

Figure NW 35

Roadway Segment Analysis

The roadway segment operations analysis consists of considering the roadway segment volumes and approximate level of congestion based on a comparison of the volume to the segment capacity. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure NW 36 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Low Build Scenario.

As is evident from Figure NW 36, under the 2035 Low Build Scenario demand for travel continues to be highest along Stafford Road, SW Borland Road, S Rosemont Road and SW Mountain Road.

Approximate Level of Congestion

The level of roadway segment congestion experienced for the 2035 Low Build Scenario was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

Figure NW 37 illustrates the relative congestion during the 2035 Low Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.

As can be seen in Figure NW 37, under the 2035 Low Build Scenario, portions of Stafford Road extending from S Rosemont Road to the I-205 interchange with Stafford Road are estimated to experience noticeable increases in congestion relative to the existing conditions. Congestion is also estimated to increase along S Rosemont Road and SW Childs Road. Table NW 11 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table NW 11 2035 Low Build Roadway Segment Congestion in Northwest County Area

Roadway	Segment	Level of Congestion
I-5	Through Wilsonville	Nearing Congestion to Very Congested
SW Wilsonville Rd	Western Wilsonville	Nearing Congestion to Congested
I-205	SW Stafford Rd to east border of area	Nearing Congestion to Very Congested
OR 43	Through Lake Oswego and portions of West Linn	Nearing Congestion to Very Congested
SW Stafford Rd	I-205 to Rosemont Rd	Nearing Congestion to Very Congested
SW Borland Rd	Through south Rivergrove	Nearing Congestion to Very Congested
SW A Ave	Through Lake Oswego	Some Congestion
SW Childs Rd	Pilkington Rd to SW Stafford Rd	Some Congestion
S Rosemont Rd	SW Stafford Rd to SW Wilda Rd	Some Congestion
Boones Ferry Rd	Kruse Way to SW County Club Rd	Some Congestion

Figure NW 36 Evening Weekday Peak Hour Link Volumes 2035 Low Build Scenario in Northwest County

Table NW 12

Figure NW 37 Evening Weekday Peak Hour Roadway Segment Congestion 2035 Low Build Scenario in Northwest County

2035 FULL BUILD SCENARIO

The full build scenario includes all of the existing planned projects in the County's current TSP and the Metro RTP. The purpose of analyzing the full build scenario is to determine how all transportation projects that are currently planned will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities forecast to perform above standards. In addition, the full build analysis will identify intersections and roadways that do not meet standards even with planned transportation projects.

The forecast traffic volumes, roadway cross-sections, and intersection configurations were adjusted based on projects in the full build scenario that affect roadway or intersection capacity, such as the addition of turn lanes or roadway widening. The capacity full build projects are mapped in Figure NW 38 and listed and described in Table NW 13. There are several intersection and roadway projects planned. The majority of roadway projects involve reconstructing and widening rural roadways to three lanes to meet standards. There are also several signal projects planned.

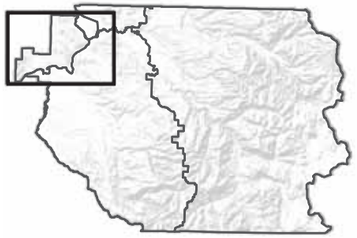
Table NW 13 Full Build Projects in Northwest County Area

Project	ID	Location	Description
Barber St. Extension from Kinsman Rd. to Villebois Village*	U018	Kinsman Rd. to Villebois Village	Extend 3 lanes with sidewalks and bike lanes toreduce the need to use I-5 and OR 217 by providing needed connections to the Villebois Village housing development and employment areas in Wilsonville and with the new Commuter Rail site.
Kinsman Rd. Extension from Barber St. to Boeckman Rd.*	U021	Barber St. to Boeckman Rd.	Extend 3 lanes with sidewalks and bike lanes. Provide freight access and capacity from Barber Street to Boeckman Road. A vital alternative to 110th which is being vacated. Serves as a parallel arterial to I-5.
Wilsonville Rd/1-5 Interchange Improvements*	U676	Town Center Loop W to Boones Ferry Rd	Provide additional left-turn lanes, setback abutments, improve signal synchronization, fix sight distance problems, and enhance bike/pad safety.
Wilsonville Rd/I-5 Interchange Improvements*	U677	N and S of interchange	Widen and lengthen on/off ramps
Bangy Road	U161	Bangy/Meadows intersection	Install traffic signal, turn lanes
Bangy Road	U162	Bangy/Bonita intersection	Install traffic signal, turn lanes
Carman Drive	U163	I-5 to Quarry Road	Reconstruct and widen (3 lanes), add turn lanes
Carman Drive	U164	Carman/Meadows Road intersection	Install traffic signal, turn lanes
Borland Road	U167	65th Avenue to Stafford Road	4 lane widening with left-turn lanes
Stafford Road	U168	Childs Rd to Rosemont Rd	4 lane widening with SB turn lane and NB turn lane
Stafford Road	U169	Stafford/Childs Road intersection	Install traffic signal, southbound turn lane and northbound turn lane
Stafford Road	U170	Johnson Road to Childs Road	4 lane widening with left-turn lanes
Stafford Road	U171	Borland Rd to Johnson Rd	4 lane widening with left-turn lanes
Stafford Road	U172	I-205 to Borland Rd	4 lane widening with left-turn lanes
Rosemont Road	U173	Stafford Road to Parker Road	Reconstruct and widen (3 lanes)
Rosemont Road	U174	Rosemont/Parker/Day intersection	Realign intersection, add turn lanes
Stafford Road	U177	Mountain Rd to I-205	4 lane widening with left-turn lanes
Stafford Road	U178	Newland Rd to Mountain Rd	4 lane widening with left-turn lanes

Project	ID	Location	Description
Stafford Road	U179	Boeckman Rd (Advance Rd) to Newland Rd	Reconstruct and widen (rural) (3 lanes)
65th Ave/ Elligsen/Stafford Rd.	U180	Elligsen Road to Stafford Road	Realign Elligsen Road to south, install northbound right-turn and southbound left-turn lane at new Stafford Road/Elligsen Road intersection
Ladd Hill Road	U272	Wilsonville Road to Washington County Line	Reconstruct and widen (rural) (3 lanes)
Childs Road	U462	Stafford Road to 65th Avenue	Reconstruct and widen - 2/3 lanes
Pete's Mountain Road	U466	Willamette Falls Road to Hoffman Road	Reconstruct and widen (rural) (3 lanes)
SW 65th Ave	U489	Nyberg to Childs Rd	Extension across Tualatin River from Nyberg to Childs Road
SW 65th Ave	U490	Sagert to Nyberg	Widen to 5 lanes from Sagert to Nyberg.
Boeckman Rd./I-5 Overcrossing Improvements	U501	Boberg Rd. to Parkway Ave.	Widen Boeckman Road bridge over I-5 to 3 lanes. Add bike/pedestrian connections to regional trail system.
OR 43 Improvements	U555	Holly St. to Arbor Dr.	Improve roadway with widening, installation of medians, turn lanes, street trees, signal interconnections, and bike lanes.
Brookman Rd	U679	OR 99W to Ladd Hill Rd	Reconstruct road to collector standards.
Ladd Hill Rd.	U680	Sunset Blvd to UGB	Upgrade street to arterial standards (4 lanes).

* Project also included in Low Build Scenario.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

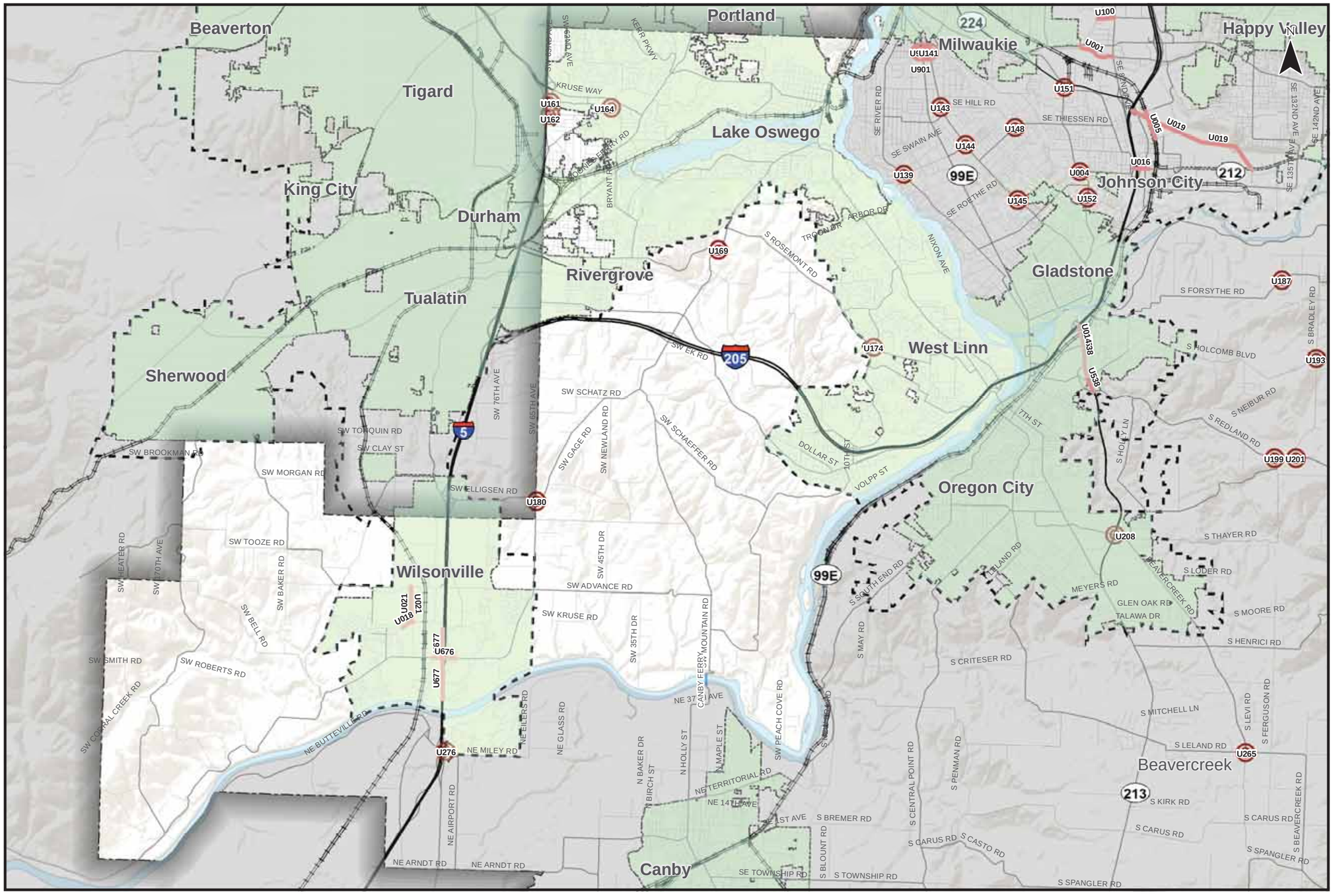


2035 Low Build Projects

- Intersection Projects
- Roadway Projects

2035 Full Build Projects

- Intersection Projects
- Roadway Projects
- City
- Incorporated Areas
- County Boundary
- UGB



This figure displays the projects included in the 2035 Full Build Scenario. The 2035 Full Build Scenario includes the existing planned projects in the County's current TSP and the Metro RTP. The purpose of analyzing the Full Build Scenario is to determine how transportation projects that are currently planned will improve future traffic operations. This will help identify which projects are necessary to address roadway and intersection operations that are below standard and which projects are located on facilities that are forecasted to perform above standards.

0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

2035 Full Build Projects
Northwest County

Figure
NW 38

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Study Intersection Analysis

The operations at the study intersections that do not meet standards under the low build scenario were analyzed under the full build scenario using traffic volumes projected under the full build scenario. Figure NW 39 illustrates the lane configurations and traffic control devices at the study intersections. The intersections that meet standards under the low build analysis were not analyzed under the full build scenario.

The intersection operation results are shown in Table NW 14 and Figure NW 40, with intersections that do not meet standards noted. Any full build projects that affect lane configurations at study intersections were accounted for and are noted in the figure and table as well. Signal timings were adjusted as appropriate to account for changes in the forecasted traffic volumes. Intersections that do not meet standards are noted.

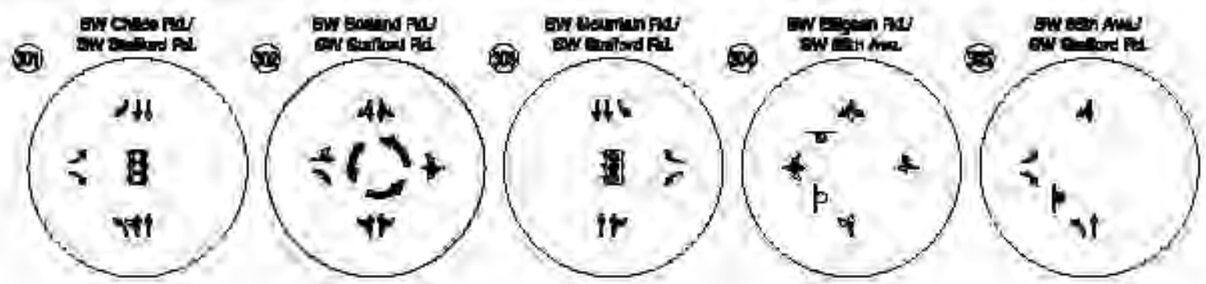
Table NW 14 2035 Full Build Traffic Operations Analysis Results at Study Intersections in Northwest County Area

ID	Intersection	Jurisdiction	Performance Standard	Meets Standard in Low Build?	Full Build Project?	Meets Standard in Full Build?
301	SW Childs Rd/SW Stafford Rd	County	LOS = D	No	Yes (U168, U169, U170, U462)	Yes
302	SW Borland Rd/SW Stafford Rd	County	LOS = D	No	No	No (LOS=F)
303	SW Mountain Rd/SW Stafford Rd	County	LOS = D	No	Yes (U177)	Yes
304	SW Ellingson Rd/SW 65th Ave	County	LOS = D	No	Yes (U180)	No (LOS=F)
305	SW 65th Ave/SW Stafford Rd	County	LOS = D	No	Yes (U180)	No (LOS=F)

As seen in the table, two of the intersections that did not meet standards under the low build scenario do meet standards under the full build scenario.

- Operations at the intersection of SW Childs Road/SW Stafford Road (301) improve significantly with the addition of a signal, a left-turn lane on the northbound approach, and an additional through lane on SW Stafford Road.
- The intersection of SW Mountain Road/SW Stafford Road (303) also meets standards under the full build scenario due to a capacity project that adds an additional through lane to Stafford Road.

Although SW Ellingson Road/SW 65th Avenue (305) and SW 65th Avenue/SW Stafford Road (304) are both impacted by the planned realignment of SW 65th Avenue/SW Ellingson Road/SW Stafford Road, they do not meet standards under the full build scenario. The roundabout at the intersection of SW Mountain Road/SW Stafford Road (302) is not impacted by any capacity projects in the full build scenario and does not meet standards. *Appendix 8* contains detailed traffic operations analysis results.

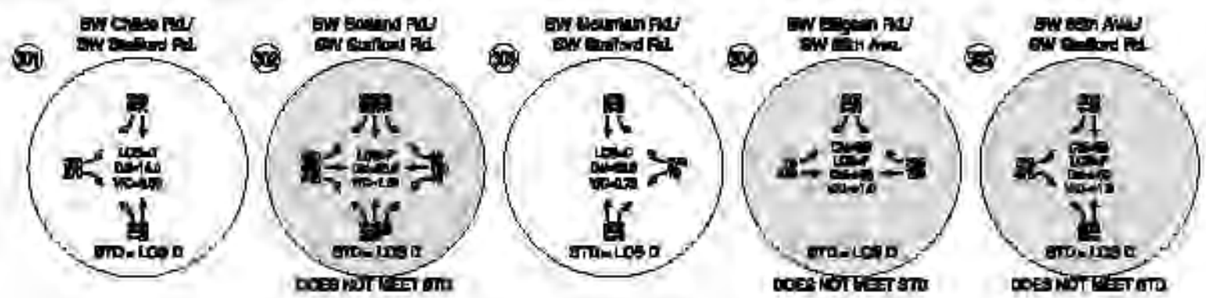


NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

- ODOT STUDY INTERSECTION
- COUNTY STUDY INTERSECTION
- STOP SIGN
- TRAFFIC SIGNAL
- ROUNDABOUT
- LANE REMOVED
- LANE ADDED

Full Build Lane Configuration and Traffic Control Devices Northwest County

Figure NW 39



NOTE: THE FULL BUILD ANALYSIS WAS ONLY CONDUCTED ON THE INTERSECTIONS THAT DID NOT MEET STANDARDS IN THE LOW BUILD ANALYSIS

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

Full Build Intersection Operations
PM Peak Hour
Northwest County

Figure NW 40

Roadway Segment Analysis

The following sub-sections present the roadway segment volumes and approximate congestion for the 2035 Full Build Scenario. *Section 3 Assumptions and Methods* provides additional details on the scope and approach to the analysis below.

Roadway Segment Volumes

The roadway segment volumes provide a sense of the demand for travel on the roadways. Figure NW 41 illustrates the roadway link volumes from the weekday evening peak hour for the 2035 Full Build Scenario.

As is evident from Figure NW 41, under the 2035 Full Build Scenario demand for travel continues to be highest along Stafford Road, SW Borland Road, S Rosemont Road and SW Mountain Road.

Approximate Level of Congestion

The level of congestion experienced on roadway segments was estimated using the roadway segment volumes from the Metro model and the roadway segment capacity. The volume was compared to the capacity to calculate a volume-to-capacity ratio that is used to estimate level of congestion.

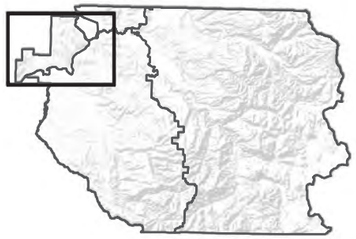
Figure NW 42 illustrates the relative congestion during the 2035 Full Build weekday evening peak hour on roadways based on the estimated roadway segment volumes and capacity.

As can be seen in Figure NW 42, under the 2035 Full Build Scenario Stafford Road is estimated to return to a relatively uncongested state compared to the 2035 Low Build Scenario. S Rosemont Road is still estimated to experience some level of congestion under the 2035 Full Build Scenario. The remaining roadways in the Northwest County area (excluding I-205, I-5, and incorporated areas) are estimated to be uncongested. Table NW 15 lists the roadway segments that have volume-to-capacity ratios over 0.8 and describes the level of congestion as nearing congestion, some congestion, congested, or very congested.

Table NW 15 2035 Low Build Roadway Segment Congestion in Northwest County

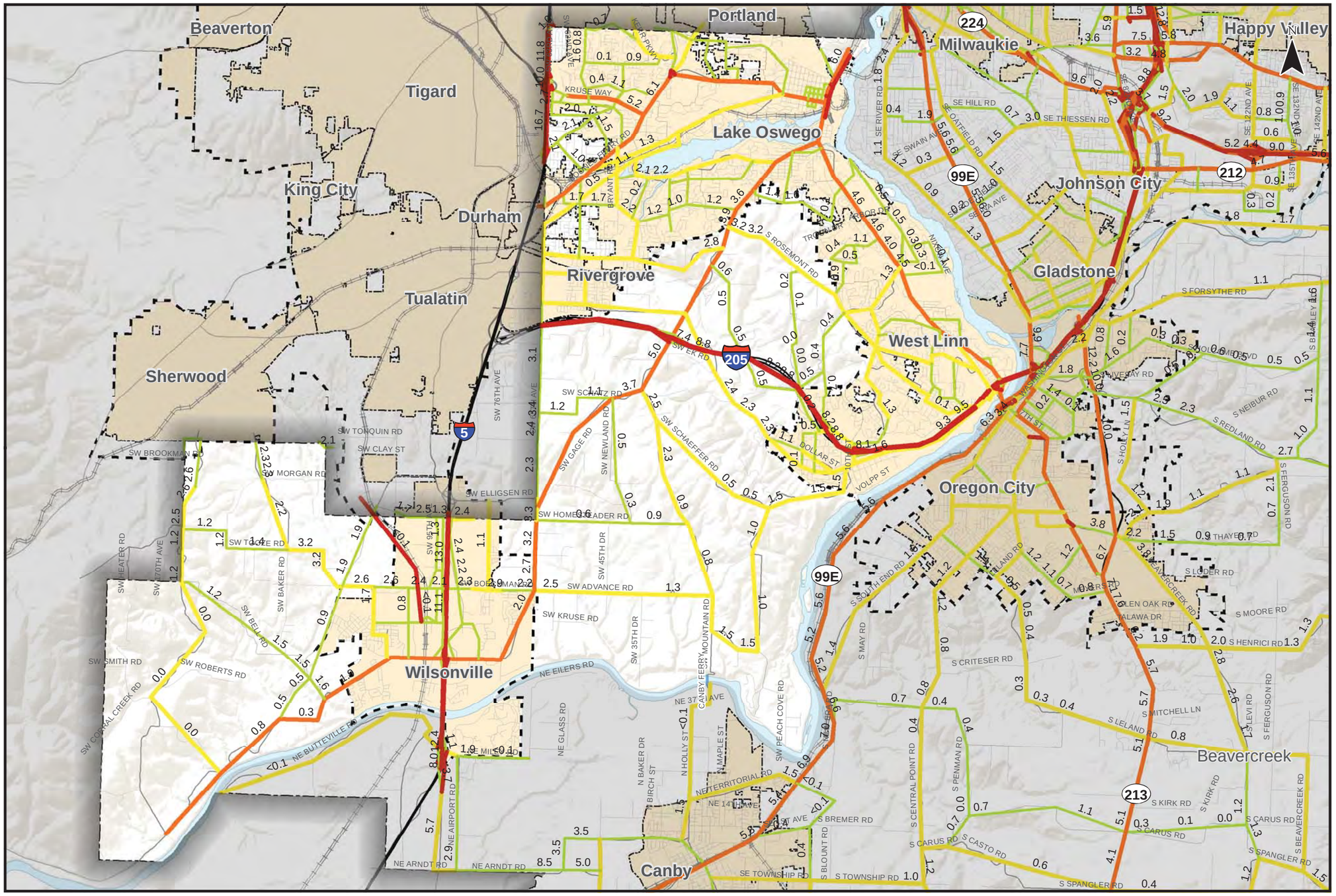
Roadway	Segment	Level of Congestion
I-5	Through Wilsonville	Congested to Very Congested
SW Wilsonville Rd	Western Wilsonville	Some Congestion to Nearing Congestion
I-205	SW Stafford Rd to east border of area	Nearing Congestion to Very Congested
OR 43	Through Lake Oswego and portions of West Linn	Nearing Congestion to Very Congested
SW Borland Rd	Through south Rivergrove	Nearing Congestion to Very Congested
SW A Ave	Through Lake Oswego	Nearing Congestion to Some Congestion
SW Childs Rd	Pilkington Rd to SW Stafford Rd	Nearing Congestion
S Rosemont Rd	SW Stafford Rd to SW Wilda Rd	Some Congestion
Boones Ferry Rd	Kruse Way to SW County Club Rd	Some Congestion

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



2035 Full Build Volumes

- Freeway
- Principal / Major Arterial
- Minor Arterial
- Oher
- #.# PM Weekday Traffic Volume in Thousands
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resouce Center

Evening Weekday Peak Hour Roadway Segment Volumes 2035 Full Build Northwest County

Figure
NW 41

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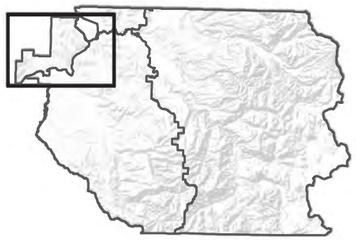
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Very Congested >1.10
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Congested 1.0 - 1.1
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Some Congestion 0.9 - 1.0
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Nearing Congestion 0.8 - 0.9
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

Less Congested <0.8
- 1,000 Vehicles
- 5,000 Vehicles
- 10,000 Vehicles

- Incorporated Areas
- County Boundary
- UGB

0 1 2 Miles

Coordinate System:
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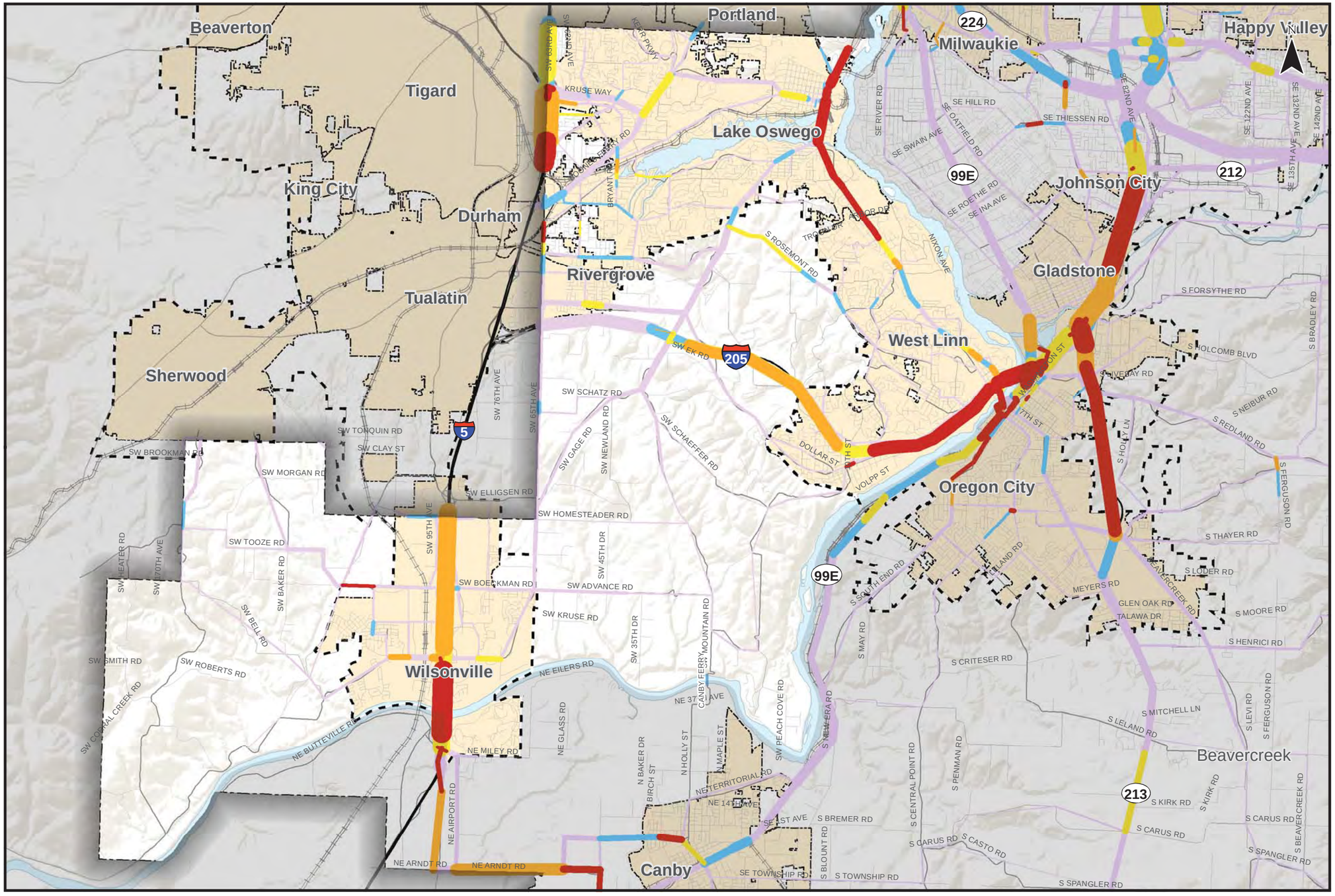
Data Source: Cambridge Systematics, Clackamas County, Metro Data Resouce Center



Evening Weekday Peak Hour Roadway Segment Congestion 2035 Full Build Northwest County

Figure
NW 42

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COMPARISON OF EXISTING, 2035 LOW BUILD, AND 2035 FULL BUILD ANALYSIS RESULTS

Traffic volumes are forecast to increase significantly by the year 2035. The increase in traffic volumes is most significant on SW Stafford Road. There are very few transportation projects planned and financed for the Northwest County under the low build scenario. The full build scenario includes several roadway and intersection projects, mainly reconstructing and widening roadways, signalizing intersections, and adding turn lanes.

Intersection Operations Analysis

Table NW 16 compares the intersection operation results for the existing, 2035 low build, and 2035 full build scenarios. The table also notes intersections that are impacted by low build and full build projects.

Table NW 16 Comparison of Traffic Operations Analysis Results at Study Intersections in Northwest County Area

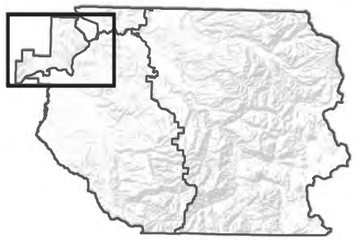
ID	Intersection	Jurisdiction	Performance Standard	Currently Meets Standard?	Low Build Project?	Meets Standard in 2035 Low Build?	Full Build Project?	Meets Standard in 2035 Full Build?
301	SW Childs Rd/SW Stafford Rd	County	LOS = D	No	No	No	Yes	Yes
302	SW Borland Rd/SW Stafford Rd	County	LOS = D	Yes	No	No	No	No
303	SW Mountain Rd/SW Stafford Rd	County	LOS = D	Yes	No	No	Yes	Yes
304	SW Ellingson Rd/SW 65th Ave	County	LOS = D	Yes	No	No	Yes	No
305	SW 65th Ave/SW Stafford Rd	County	LOS = D	No	No	No	Yes	No

As seen in the table, three intersections do not meet standards under the full build or low build scenario. Of these three intersections, two are impacted by full build projects.

Roadway Segment Operations Comparison

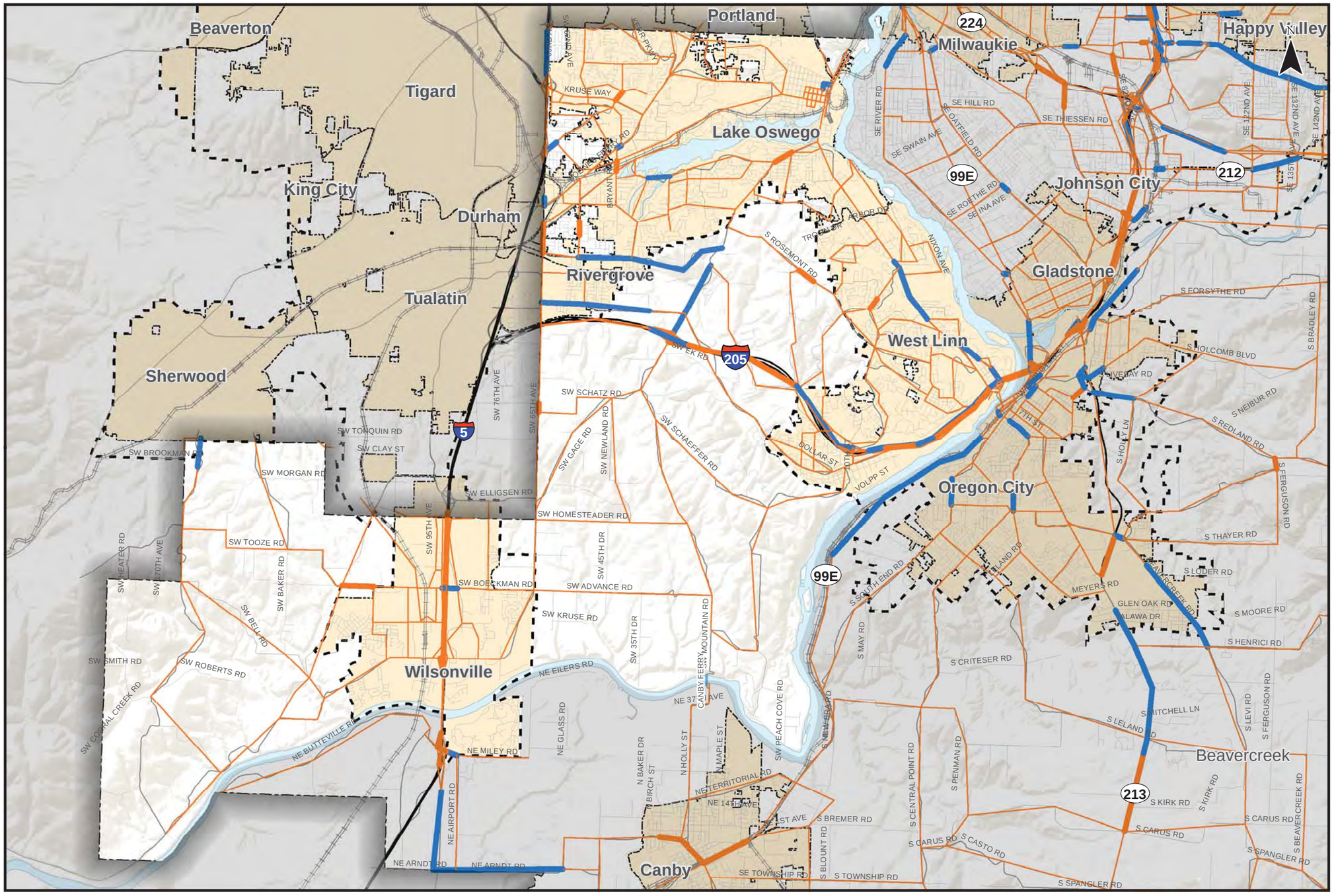
Figure NW 43 compares the approximate change in congestion between the 2035 Low Build Scenario and 2035 Full Build Scenario. As shown in Figure NW 43, implementing the full build projects decreases congestion (relative to low build scenario) most significantly on Stafford Road and NW Childs Road.

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update



Change in Congestion
Low to Full Build

- Congestion Increases
- Minimal Change
- Congestion Decreases
- Incorporated Areas
- County Boundary
- UGB



0 1 2 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Cambridge Systematics, Clackamas County,
Metro Data Resouce Center

Evening Weekday Peak Hour Roadway Segment Congestion Comparison of 2035 Low Build vs. 2035 Full Build Northwest County

Figure
NW 43

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Section 9
County-Wide Transportation System Plan Elements

COUNTY-WIDE TRANSPORTATION SYSTEM ELEMENTS

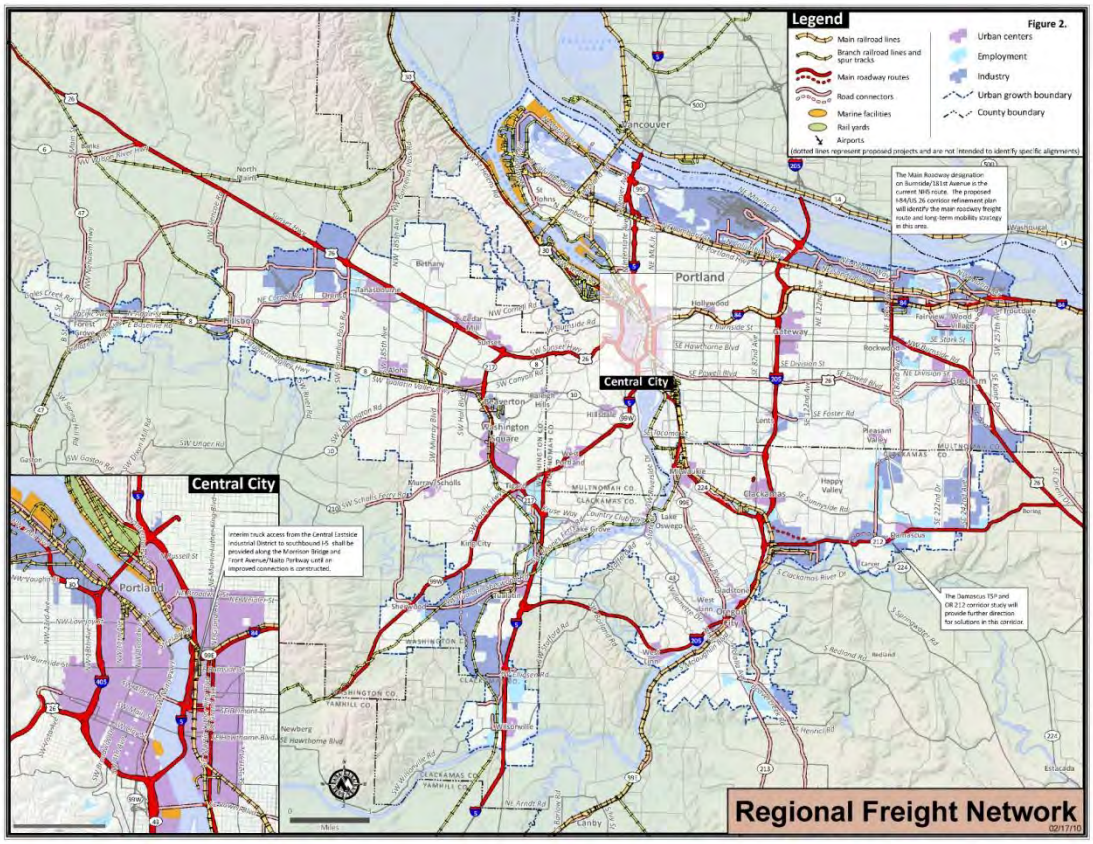
The following sections present and discuss information on truck freight routes, railroad system, air transportation system, pipeline transportation system, water transportation, and intra-modal and inter-modal connections within Clackamas County.

TRUCK FREIGHT ROUTES

A majority of freight traffic within Clackamas County occurs by truck along designated freight truck routes. These routes consist of both ODOT and County facilities and include interstate highways, statewide highways, and regional highways, as well as other arterial and collector roadways that support and augment the highway system. These routes provide interstate and intrastate connections to ports, intermodal facilities, and urban areas. The Oregon Highway Plan (OHP) identifies ODOT's designated freight truck routes, while the existing Clackamas County TSP identifies the County's. Figure W 1 illustrates the designated freight truck routes within Clackamas County according to the OHP and the existing Clackamas County TSP. ODOT's Routes are shown in red, while the County's routes are shown in blue.

The Metro 2035 Regional Freight Plan also identifies designated freight truck routes within Clackamas County. As shown in Metro's Regional Freight Network map in Exhibit W1 below, Metro accounts for a majority of both ODOT's and the County's routes, with a few notable differences: the County includes OR 43 and OR 224 as designated freight truck routes, while Metro does not; also Metro includes SE 242nd Avenue, while the County does not. The Clackamas County TSP update should address the differences between these plans.

Exhibit W1 Metro RTP Regional Freight Network Map



CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

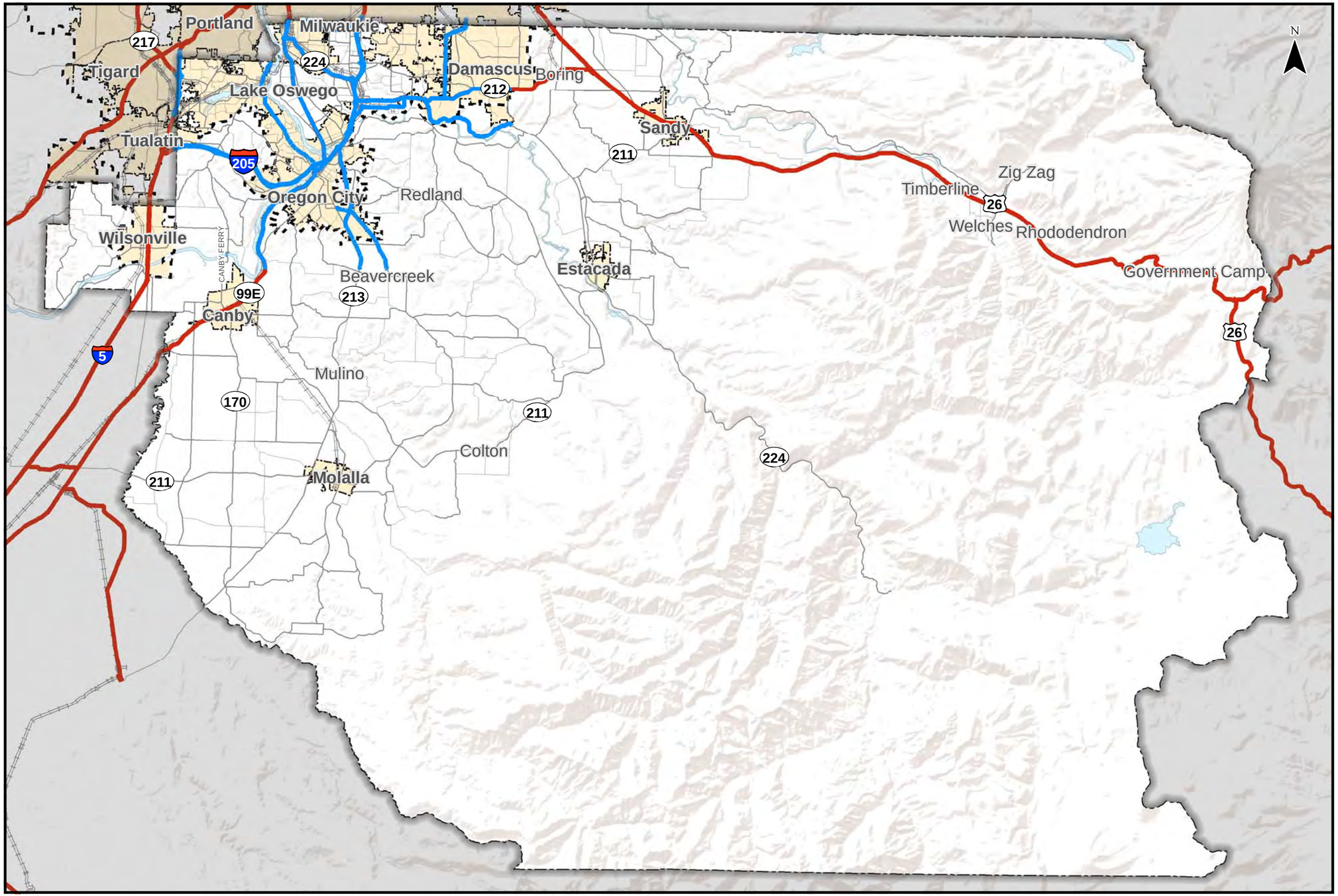
County Freight Routes

ODOT Freight Routes

Incorporated Areas

County Boundary

UGB



0 1 2 3 4 5 6 7 8 9 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Truck Freight Routes
Clackamas County

Figure
W 1

H:\profile\11732 - Clackamas County TSP\gis\11x17 Maps\W01 Truck Freight Routes.mxd

The East Clackamas Industrial Area is by far the largest industrial area located within Clackamas County, covering approximately 1,822 acres east and west of I-205 along Hwy 212 and Hwy 224. Access to the area is provided via I-205 on a statewide level, OR 212 and OR 224 on a regional level, and SE 82nd Avenue/SE Jennifer Street, as well as several other minor arterial, collector, and local streets, on a local level. Most of the major intersections located along all three roadways are grade separated or signalized with separate left and right turn lanes to accommodate heavy truck traffic, while most of the minor/unsignalized intersections have various access restrictions to prevent turn movements from the side streets.

As described above, I-205, OR 212, and OR 224 are designated as freight routes by the OHP, while I-205, OR 212, OR 224, and SE 82nd Avenue/SE Jennifer Street are designated as freight routes by the County TSP. Also described above, frequent transit service is provided along OR 212, OR 224, and SE 82nd Avenue/SE Jennifer Street by TriMet. Continuous pedestrian and bicycle facilities are also located along most of OR 212 as well as SE 82nd Avenue and segments of SE Jennifer Street. These particular facilities are currently designated to serve multiple modes and may benefit from treatments targeting how to serve each within the same right-of-way effectively.

Other industrial areas within Clackamas County are located to the north along SE Johnson Creek Road (119 acres); to the west along SE McLoughlin Boulevard (63 acres); to the east along OR 212 (145 acres); and in various other locations along major arterials such as 99E and OR 213; each of which have direct access to the regional, statewide, and interstate highway system. Given the location of these areas, with respect to the central city, transit, pedestrian, and bicycle access is more limited than in the East Clackamas Industrial Area.

RAILROAD SYSTEM

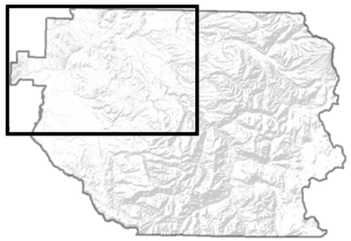
Clackamas County has passenger and freight rail service. Passenger service is provided by Amtrak and TriMet (WES) and freight rail service is provided by several railroads. The passenger and freight rail service is discussed below. The rail system, including Amtrak and WES stations, is depicted in Figure W 2.

Passenger Service

Amtrak provides service to Clackamas County via the Amtrak Cascades Line[1]. The Amtrak Cascade Line provides service between Vancouver, BC; Seattle, Tacoma; Portland; Salem; and Eugene. The Clackamas County Amtrak station is located in Oregon City on Washington Street. Several trains serve the station every day. The most up-to-date information on Amtrak passenger rail service is available at http://www.amtrak.com/.

[1] Source of passenger rail service information: http:///www.amtrak.com

CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN *Update*



Amtrak Stations

WES Stations

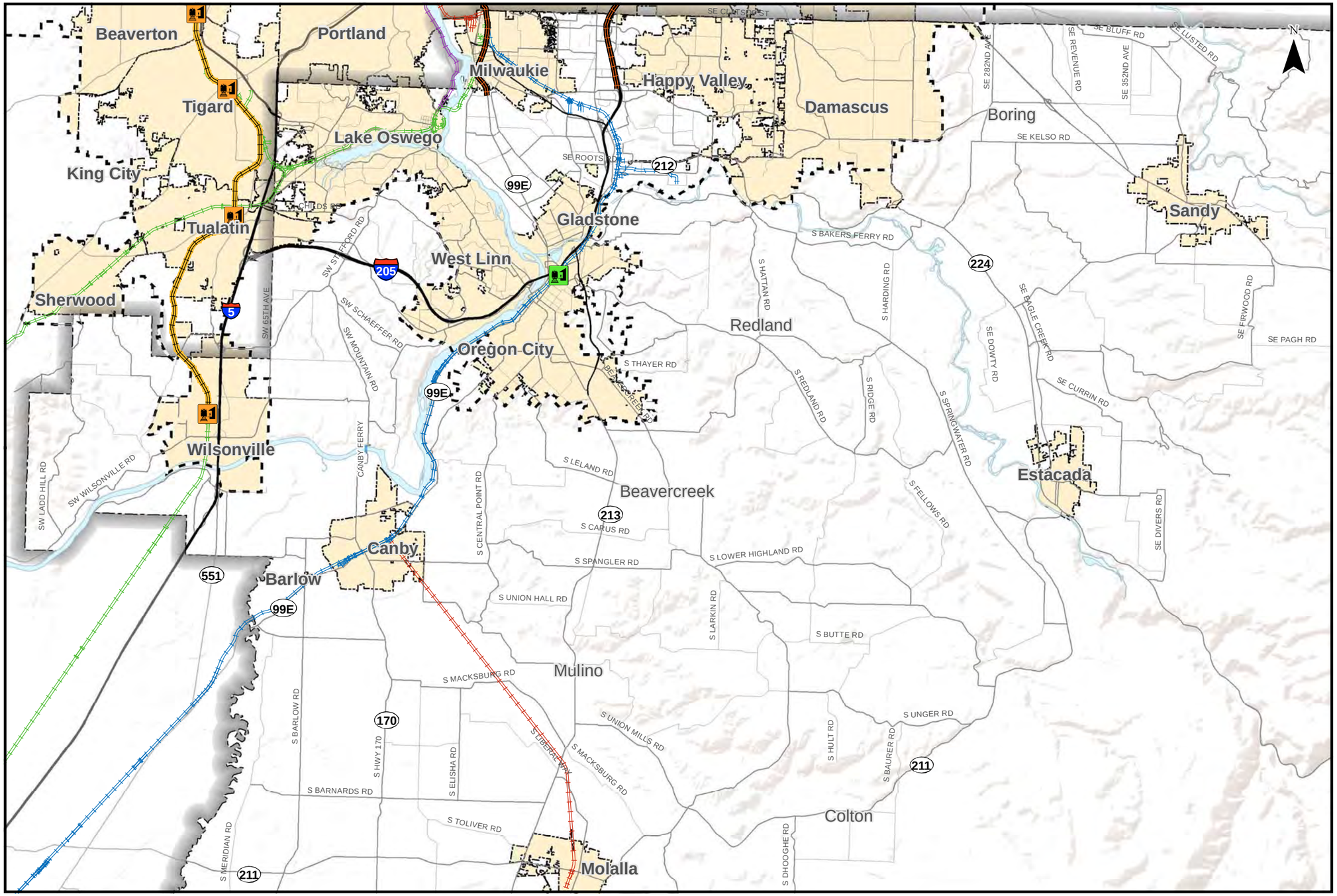
Railroads by Owner

- Oregon Pacific
- P&W
- UPRR
- Willamette Shore Trolley

Tri-Met Rails

- MAX
- WES

- Incorporated Areas
- County Boundary
- UGB



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Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Railroad System and Operators
Clackamas County

Figure
W 2

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Passengers traveling to/from Oregon City via Amtrak's Cascades Line can connect to other long distance Amtrak trains in Portland that provide access to other destinations in the United States. Passengers can connect to the Empire Builder line which serves Spokane, Milwaukee, St. Paul-Minneapolis, and Chicago. Passengers can also access the Coast Starlight Line, which provides daily service between Los Angeles and Seattle.

TriMet operates the Westside Express Service (WES) commuter rail, which connects Wilsonville, Tualatin, Tigard and Beaverton. The WES service runs about every thirty minutes during the weekday AM and PM peak hours. The WES stop locations provide connections to TriMet and other transit agency bus service as well as to TriMet's MAX light rail which provides connectivity to the much of the Portland Metro area as well as Portland International Airport (PDX). The most up-to-date schedules and route information are available at http://www.trimet.org. The Wilsonville WES stop is located at 9699 SW Barber Street.

Freight Service

Freight railroads are customarily divided into three economic categories, prescribed by the Surface Transportation Board (STB):

Class I railroads have annual gross revenues that exceeded $401.4 million in 2008. They earn approximately 92 percent of all freight railroad revenue and operate about 96,000 route miles in the U.S. Of the seven Class I railroads in the nation, BNSF and UPRR operate in Clackamas County.

Class II or Regional railroads operate 350 or more miles and have annual gross revenues exceeding $40 million. Nationally, regional railroads operate about 15,000 route miles and earn about 3.5 percent of all freight railroad revenue.

Class III or Shortline railroads have annual gross revenues less than $40 million. They earn about 4 percent of all freight railroad revenue and operate approximately 26,000 route miles in the U.S.

Clackamas County is mainly connected to the regional rail system through the rail lines in the northwestern portion of the county, which are considered part of the Portland Area rail corridor. This rail corridor is the densest in the state and carries the highest quantity of rail tonnage. It is considered the hub of most rail operations in the state. Therefore, Clackamas County's close proximity to the rail hubs in Portland provides connections to the Salem, Eugene, Southern, North Central, and East regions. The Burlington Northern Santa Fe (BNSF) and Union Pacific Railroad (UPRR) handle the majority of freight rail volumes in the state. The facilities and service provide by each within Clackamas County are described below.

Burlington Northern Santa Fe (BNSF)

BNSF is one of the two Class I railroads in Oregon and is Oregon's second largest carrier after UPRR. It operates primarily in the western two-thirds of the U.S. BNSF owns a portion of the railway located just north of Milwaukie. BNSF provides a direct connection with eastern Washington and Spokane. The northern portion of the railroad line also connects to a north-south railroad line providing service to main points along the west coast such as Portland, Seattle and Vancouver, BC. BNSF primarily handles Washington generated

products while UPRR handles Oregon generated products due to track ownership and operating rights established in agreements dating back to the 1800s and 1900s.

Within the Greater Clackamas Regional Center/Industrial Area BNSF owns and operates a portion of the rail line that runs north from Milwaukie to industrial areas in southeast Portland.

Union Pacific (UPRR)

UPRR is one of the two Class I railroads in Oregon and operates the most U.S. route miles. UPRR competes with BNSF for dominance of the railroad networks in the western-two thirds of the U.S. UPRR owns approximately 80% of the market share in Oregon. Within the County, UPRR operates along a rail line that runs north through Barlow and Canby, along the Willamette River through Oregon City and Gladstone, and through Johnson City to Milwaukie. Within the Southwest County subarea the UPRR runs along 99E through Barlow, Canby, and Oregon City. Within the Greater Clackamas Regional Center/Industrial Area the UPRR runs through Johnson City and Milwaukie. The rail line extends east parallel to OR 224/212 to the industrial areas south of Jennifer Street. There are also several southern extensions of the rail line to the industrial area north of OR 224 and east of SE Lake Road.

Oregon Pacific (OP)

OP is a shortline railroad that owns or leases less than one percent of the Oregon route miles of track. It consists of two divisions: the East Portland Branch and the Molalla Branch; the Molalla Branch is located in Clackamas County and is a Class I rail line.

Within Southwest County OP operates a rail line between Liberal (located south of Mulino) and Canby, where it connects to an interchange with UPRR. One round trip freight train runs from Canby to Liberal as often as three times per week. A spur was constructed in 2008 into the American Steel Complex south of Canby. A second freight train services the American Steel spur. In addition, the line services several other companies, including RSG Forest Products and Willamette Egg. The line will likely serve additional customers as Canby Industrial Park becomes developed with new businesses. The line continues south of Liberal to Molalla, but is no longer operational. This portion of the line is considered an at-risk corridor, as the track has been removed without STB approval.

Willamette Shore Trolley (WST) – Greater McLoughlin Area

The WST is a scenic trolley that runs along the western bank of the Willamette River from Lake Oswego to Riverwood. Although the trolley is not currently operating, it formally provided seasonal service. A portion of the rail line runs through the northern portion of the Greater McLoughlin Area.

Portland/Western Railroad (P&W)

P&W operates approximately 286 miles of railroad in the northern central Willamette Valley and Northwester Oregon. It has the most rail traffic of any short line in Oregon. The railroad has interchanges with both UP and BNSF in Portland. Other interchanges connect P&W lines to Astoria, Salem, Albany,

Corvallis, and other areas in eastern Oregon. In general, most P&W freight lines in the County run one round trip daily.

Within the Greater McLoughlin Area P&W operates a line that runs through Lake Oswego, crosses the Willamette River over a rail bridge, and runs north through the northern portion of the Greater McLoughlin Area. Within the Greater Clackamas Regional Center/Industrial Area P&W operates a rail line that runs north through the western portions of Milwaukie. There are several extensions of the rail line to the industrial areas East of Highway 99E before the P&W line connects to UPRR lines. Within Northwest County P&W operates a rail line that runs north through Wilsonville with several rail crossings in the city. The line connects with several other P&W lines in Durham, with one line running east through Lake Oswego.

Peninsula Terminal Company (PTC) – Clackamas Town Center

PTC is a switching operation adjacent to the BNSF main line in North Portland that services the industrial areas between SE 17th Avenue and SE Main Street. PTC operates three switchers twelve hours per day. Petroleum and chemicals are mainly transported on PTC's tracks. PTC connects with UPRR and BNSF at an interchange just south of its lines. PTC operates with FRA Class 1 track, which has no weight or dimensional restrictions.

AIR TRANSPORTATION SYSTEM

There are over 30 airports, airparks, and airfields located throughout Clackamas County that provide a variety of air transportation services to local residents as well as people traveling through. Figure W 3 illustrates the airport locations within Clackamas County. While a majority of the airports shown are private, five are open to the general public, including Valley View Airport, Lenhardt Airpark, Portland-Mulino Airport, County Squire Airpark, and Sandy River Airport.

- The Portland-Mulino Airport, located off Hwy 213 in Mulino, is one of the largest airports in Clackamas County with over 40 general aviation aircrafts, 34 aircraft T-hangers, and 25 tie-down spots. The Portland-Mulino Airport is publicly owned by the Port of Portland and managed by the Oregon Department of Aviation. The Port and the Federal Aviation Administration initiated a Master Plan update for the Portland-Mulino Airport in 2006. The plan was adopted in 2008 and in includes a number of improvement projects to be implemented over the next 20-years (see http://www.portofportland.com/mulino_home.aspx).
- Lenhardt Airpark is a privately owned, public use airport located along the eastern boundary of Clackamas County approximately three miles east of Hubbard. It has two asphalt runways, both of which are in good condition.
- County Squire Airpark is a privately owned, public use airport located in the center of Clackamas County approximately three miles south of Sandy. It has a single asphalt runway that is in poor condition (loose gravel on surface with grass growing in cracks).
- The Sandy River Airport is a privately owned, public use airport located in the center of Clackamas County approximately one mile northeast of Sandy. It has two turf runways, both of which are in good condition.

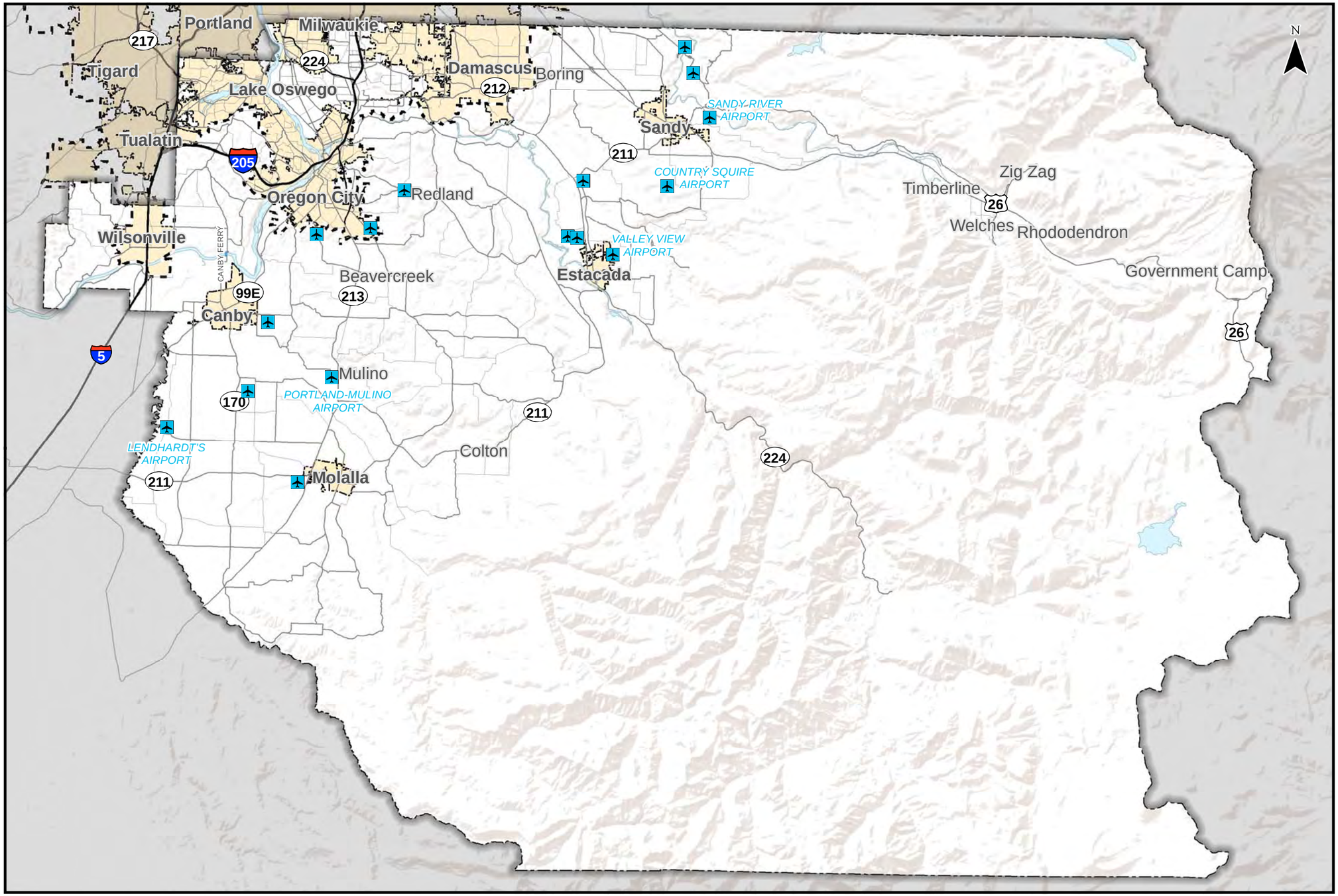
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Airports

Incorporated Areas

County Boundary

UGB



The airports mapped on this figure are those with three or more aircraft based at the airport. Smaller airports are not shown.

0 1 2 3 4 5 6 7 8 9 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Airport Locations
Clackamas County

Figure
W 3

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- Valley View airport is a privately owned, public use airport located in the center of Clackamas County approximately one mile northeast of Estacada. It has two asphalt runways, both of which are in good condition.

Both public and private airports within Clackamas County generally serve smaller flights and personal aircraft; private airports require special permission or private memberships.

PIPELINE SYSTEM

NW Natural provides natural gas to homes and businesses through Clackamas County. NW Natural gets its gas from the Northwest Pipeline. The Northwest Pipeline is a 4,000 mile bi-directional transmission system that crosses the states of Washington, Oregon, Idaho, Wyoming, Utah, and Colorado. As shown in Figure W 4, the Northwest Pipeline passes through the northwest corner of Clackamas County. The Northwest Pipeline is owned, operated, and maintained by Williams. Williams operates over 15,000 miles interstate pipelines across the United States. Williams has identified the following two major infrastructure improvement projects that will impact service to Clackamas County in the future:

1) The Molalla Capacity Replacement Project involves retiring 15 miles of 16-inch diameter pipeline between Williams Northwest Pipeline's Oregon City compressor station and its Molalla Meter Station and installing approximately 7.75 miles of new 20-inch diameter pipeline further south in order to replace the capacity associated with the retired segment of pipeline.
2) The Pacific Connector project involves installing a 234-mile, 36-inch diameter pipeline designed to transport up to 1 billion cubic feet of natural gas per day from the Jordan Cove LNG terminal in Coos Bay to markets in the Pacific Northwest.

Kinder Morgan's Pacific Operations includes approximately 3,000 miles of refined products pipeline, serving Arizona, California, Nevada, New Mexico, Oregon and Texas. The Oregon Line is a 114 mile pipeline that transports liquid petroleum products through west Clackamas County between the marine terminal in Portland and Eugene.

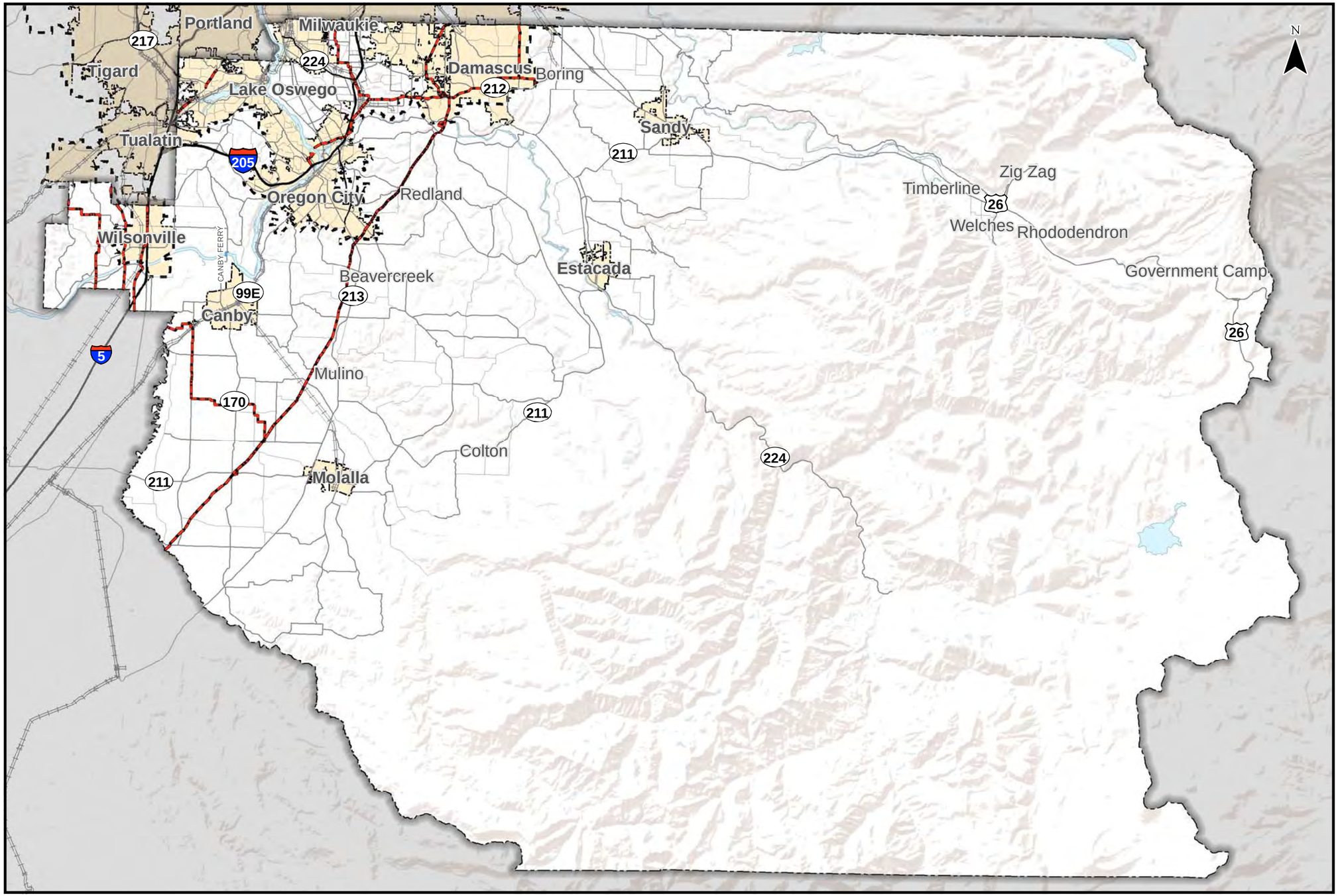
CLACKAMAS COUNTY TRANSPORTATION SYSTEM PLAN Update

Pipelines

Incorporated Areas

County Boundary

UGB



0 1 2 3 4 5 6 7 8 9 Miles

Coordinate System:
NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl
Data Source:
Clackamas County, Metro Data Resouce Center

Pipeline System
Clackamas County

Figure
W 4

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WATER TRANSPORTATION SYSTEM

The Willamette River and Clackamas River are the only navigable waterways within the Clackamas County. The Clackamas River flows from the east into the Willamette River, which flows northward through the northwest corner of the county to meet the Columbia River further to the north. The Columbia River then flows northwest to meet the Pacific Ocean, forming the border between Oregon and Washington states. The Willamette River carries both recreational and commercial vessels. The Willamette River caters to commercial operations by providing a waterborne through route for commercial vessels from the Willamette Valley to the Columbia River and the Port of Portland. From the Columbia River mouth to the Broadway Bridge, the Willamette River is a deep draft channel, maintained by the US Army Corps of Engineers at a depth of 40 feet. Above this point, and notably within the Oregon City area, the channel is maintained at a depth of 8 feet and a width of 150 feet.

Willamette Falls Locks

The Willamette Falls Locks is a seven gate, four chamber, lock system that lifts or lowers boats up to 50-feet in elevation to provide access to areas north and south of the Willamette Falls, which act as a natural barrier to water transportation on the Willamette River beyond the area located south of the Highway 43 Bridge in Oregon City. The locks are owned and operated by the United States Army Corps of Engineers, and although they are now closed, while they were in operation, passage through the locks was free for both commercial and recreational boats. The locks were closed in December 2011 due to excessive corrosion of the locks gate system and they are expected to remain permanently closed as the lack of traffic through the locks makes funding for any repairs a low priority.

The Canby Ferry

The Canby Ferry provides ferry service across the Willamette River between Canby and Wilsonville seven days a week from 6:45 a.m. to 9:15 p.m. whenever there is a vehicle to transport. The ferry has space for six cars, but also accommodates pedestrians, bicycles, and motorcycles. The Canby Ferry operates year-round except when the river is above 70 feet. Starting July 1, 2012 fares will be $2 for pedestrians, bicycles, and motorcycles, $4 for vehicles, and $8 for extra-long vehicles or trailers.

INTRA-MODAL AND INTER-MODAL FACILTIES

As discussed throughout this report, there are several intra-modal and inter-modal facilities located within Clackamas County that allow residents and goods to transfer between travel modes. Regional Transit Centers, such as the Gresham Central Transit Center and the SMART Center in Wilsonville provide a place for residents to access or transfer between transit services, such as fixed-route bus lines, light, and heavy rail. Park/rides, such as those in Sandy and Estacada provide a place for residents from far out communities with a place to park their cars a take transit. Other facilities, such as airports, marine docks, or rail yards (identified in Exhibit W 1) provide a place for people and goods to transfer between travel modes as well as travel throughout the region. Intra and inter-modal facilities are an important component of the regional transportation system within Clackamas County.

Section 10
References

REFERENCES

1. Oregon Department of Transportation. *Analysis Procedures Manual*. 2006.
2. *TCRP Report 100: Transit Capacity and Quality of Service Manual*. Transportation Research Board, Nation Research Council, 2003.
3. *NCHRP 255: Highway Traffic Data for Urbanized Area Project Planning and Design*. Transportation Research Board, National Research Council, 1982.

Section 11
Glossary

GLOSSARY

A

Adjustment – An additive or subtractive quantity that adjusts a parameter for a base condition to represent a prevailing condition.

Adjustment factor – A factor that adjusts a parameter for a base condition to represent a prevailing condition.

All-way stop-controlled (AWSC) intersection – An intersection with stop signs on all approaches. The driver's decision to proceed is based on a consensus of right-of-way governed by the traffic conditions of the other approaches and the rules of the road (e.g., the driver on the right has the right-of-way if two vehicles arrive simultaneously).

Analysis period – A single time period (for example, the peak 15 min of the peak hour) during which a capacity analysis is performed on a system element.

Annual average daily traffic (AADT) – The total volume of traffic passing a point or segment of a highway facility in both directions for 1 year divided by the number of days in the year.

Approach – A set of lanes at an intersection that accommodates all left-turn, through, and right-turn movements from a given direction.

Arterial street – A street interrupted by traffic control devices (e.g., signals, stop signs, or yield signs) that primarily serves through traffic and that secondarily provides access to abutting properties.

Automobile mode – A travel mode that includes all motor vehicle traffic using a roadway except transit buses. It includes such vehicles as trucks, recreational vehicles, motorcycles, and tour buses.

B

Bicycle – A vehicle with two wheels tandem, propelled by human power, and usually ridden by one person.

Bicycle facility – A road, path, or way specifically designated for bicycle travel, whether exclusively or with other vehicles or pedestrians.

Bicycle lane – A portion of a roadway designated by striping, signing, and pavement markings for the preferential or exclusive use of bicycles.

Bicycle mode – A travel mode under which a nonmotorized bicycle is used on a roadway or pathway.

Bus – A self-propelled, rubber-tired road vehicle designed to carry a substantial number of passengers (at least 16) and commonly operated on streets and highways.

Bus mode – A transit mode operated by rubber-tired vehicles that follow fixed routes and schedules along roadways.

Bus shelter – A structure with a roof and (typically) three enclosed sides that protects waiting transit passengers from wind, rain, and sun.

Bus stop – A designated area along a street where one or more buses can simultaneously stop to load and unload passengers. It can be on-line (buses stop wholly or partially in the travel lane) or off-line (buses stop out of the travel lane).

C

Capacity – The maximum sustainable hourly flow rate at which persons or vehicles reasonably can be expected to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, environmental, traffic, and control conditions.

Collector street – A surface street providing land access and traffic circulation within residential, commercial, and industrial areas.

Corridor – A set of parallel transportation facilities, for example a freeway and an arterial street.

Crosswalk – *See pedestrian crosswalk.*

D

Default value – A representative value that may be appropriate in the absence of local data.

Delay – Additional travel time experienced by a driver, passenger, bicyclist, or pedestrian beyond that required to travel at the desired speed.

Demand – The number of vehicles or other roadway users desiring to use a given system element during a specific time period, typically 1 h or 15 min.

Density – The number of vehicles occupying a given length of a lane or roadway at a particular instant.

Design hour – An hour with a traffic volume that represents a reasonable value for designing the geometric and control elements of a facility.

F

Facility – A length of roadway, bicycle path, or pedestrian walkway composed of a connected series of points and segments.

Flow rate – The equivalent hourly rate at which vehicles or other roadway users pass over a given point or section of a lane or roadway during a given time interval of less than 1 h, usually 15 min.

Freeway – A fully access-controlled, divided highway with a minimum of two lanes (and frequently more) in each direction.

H

Headway – The time between two successive vehicles as they pass a point on the roadway, measured from the same common feature of both vehicles (for example, the front axle or the front bumper).

High-occupancy vehicle (HOV) – A vehicle with a defined minimum number of occupants (>1); HOVs often include buses, taxis, and carpools, when a lane is reserved for their use.

Highway – A general term for denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way.

I

Interchange – A system of interconnecting roadways providing for traffic movement between two or more highways that do not intersect at grade.

Intersection delay – The total additional travel time experienced by drivers, passengers, or pedestrians as a result of control measures and interaction with other users of the facility, divided by the volume departing from the corresponding cross section of the facility.

L

Level of service (LOS) – A quantitative stratification of a performance measure or measures that represent quality of service, measured on an A–F scale, with LOS A representing the best operating conditions from the traveler's perspective and LOS F the worst.

Local street – A street that primarily serves a land-access function.

M

Major street – The street not controlled by stop signs at a two-way stop-controlled intersection.

Median – The area in the middle of a roadway separating opposing traffic flows.

Metropolitan Planning Organization (MPO) – A regional transportation planning and policy agency for urban areas with populations larger than 50,000.

Minor street – The street controlled by stop signs at a two-way stop-controlled intersection.

Mobility – The ability of people and goods to travel from place to place.

Mode – *See travel mode.*

Model – A procedure that uses one or more algorithms to produce a set of numerical outputs describing the operation of a segment or system, given a set of numerical inputs.

Multimodal – Being used by more than one travel mode.

Multimodal analysis – A type of HCM analysis where the LOS of each travel mode on a facility is evaluated simultaneously.

O

Off-ramp – A ramp that accommodates diverging maneuvers.

On-ramp – A ramp that accommodates merging maneuvers.

Oregon Highway Plan (OHP) – A plan prepared by the Oregon Transportation Commission in 1999 to guide the development and management of state highways for the next 20 years.

P

Park-&-Ride – Parking facilities where users can leave their vehicles and transfer to transit for the remainder of their trip.

Peak hour – The hour of the day in which the maximum volume occurs.

Peak hour factor (PHF) – The hourly volume during the analysis hour divided by the peak 15-min flow rate within the analysis hour; a measure of traffic demand fluctuation within the analysis hour.

Pedestrian – An individual traveling on foot.

Pedestrian crosswalk – A connection between pedestrian facilities across sections of roadway used by automobiles, bicycles, and transit vehicles. Crosswalks can be marked or unmarked.

Pedestrian mode – A travel mode under which a journey (or part of a journey) is made on foot along a roadway or pedestrian facility.

Performance measure – A quantitative or qualitative characterization of some aspect of the service provided to a specific road user group.

Puget Sound Regional Council – Regional transportation, economic development and growth management planning organization for central Puget Sound.

Q

Quality of service – A description of how well a transportation facility or service operates from a traveler's perspective.

Queue – A line of vehicles, bicycles, or persons waiting to be served due to traffic control, a bottleneck, or other causes.

R

Ramp – A dedicated roadway providing a connection between two other roadways; at least one of the roadways a ramp connects is typically a high-speed facility such as a freeway, multilane highway, or C-D roadway.

Roadway – That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles.

Regional Transportation Plan (RTP) – A long-term plan for a region's transportation system, usually conducted every 5 years and plan for thirty years into the future. RTPs are typically developed by a Metropolitan Planning Organization (MPO).

Rural – An area with widely scattered development and a low density of housing and employment.

S

Saturation flow rate – The equivalent hourly rate at which previously queued vehicles can traverse an intersection approach under prevailing conditions, assuming that the green signal is available at all times and no lost times are experienced.

Service measure – A performance measure used to define LOS for a transportation system element.

Shoulder – A portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles; emergency use; and lateral support of the subbase, base, and surface courses.

Shoulder bikeway – A bicycle facility where bicyclists use a paved shoulder, separated by striping from motor vehicle traffic, for travel along a roadway.

Side street – *See minor street.*

Sidewalk – A pedestrian facility located parallel and in proximity to a roadway.

Speed – A rate of motion expressed as distance per unit of time.

Statewide Priority Index System – A method for identifying potential safety problems on state highways.

Street – *See highway.*

Study period – See analysis period.

T

Traffic condition – A characteristic of traffic flow, including distribution of vehicle types in the traffic stream, directional distribution of traffic, lane use distribution of traffic, and type of driver population on a given facility.

Traffic control device – A sign, signal, marking, or other device used to regulate, warn, or guide traffic.

Transportation Analysis Zone (TAZ) – A unit of geography used in transportation planning models. A TAZ can vary in geographic size, but usually has a population of less than 3000 people. TAZs are constructed based on census block information.

Transportation System Plan (TSP) – A Long-range plan to identify a system of transportation facilities and services adequate to meet community needs, creates a 20-year plan for transportation projects.

Transit frequency – The count of scheduled fixed-route transit vehicles that stop on or near an urban street segment during the analysis period.

Transit mode – A travel mode in which vehicles (including buses, streetcars, and street-running light rail) stop at regular intervals along the roadway to pick up and drop off passengers.

Travel mode – A particular form of travel, for example, walking, bicycling, traveling by automobile, or traveling by bus.

Truck – A heavy vehicle engaged primarily in the transport of goods and materials or in the delivery of services other than public transportation.

Two-Way Stop-Controlled (TWSC) – The type of traffic control at an intersection where drivers on the minor street or drivers turning left from the major street wait for a gap in the major-street traffic to complete a maneuver.

U

Uncontrolled – Lacking a traffic control device that interrupts traffic flow (e.g., a traffic signal, stop sign, or yield sign).

Unsignalized intersection – An intersection not controlled by traffic signals.

Urban – An area typified by high densities of development or concentrations of population, drawing people from several areas within a region.

Urban Growth Boundary – A regional boundary, set used by local governments as a guide to zoning and land use decisions

V

Volume – The total number of vehicles or other roadway users that pass over a given point or section of a lane or roadway during a given time interval, often 1 h.

Volume-to-capacity (v/c) ratio – The ratio of flow rate to capacity for a system element.

Appendix 1
Functional Classifications

APPENDIX 1: FUNCTIONAL CLASSIFCATIONS

This memorandum provides further information on the functional classifications for County and ODOT facilities.

COUNTY FACILITIES

Clackamas County has established a functional classification system for roadways owned by the County in its current Comprehensive Plan. The Plan includes descriptions of the classifications as well as design guidelines. These will serve as starting points for the Clackamas County Transportation System Plan (TSP) update. Refinements or modifications to the functional classifications may be made, where appropriate and aligned with the County's vision, goals and objectives.

Table 1 Clackamas County Roadway Classifications and Purpose (Table V-2 Clackamas County Comprehensive Plan)

Functional Classification	Purpose	Land Access	Roadside Parking
Freeway/Expressway	Serves interregional and intraregional trips. Carries heavy volume at high speed.	Extremely limited**	Emergency Only
Major arterial	Carries local and through traffic to and from destinations outside local communities and connects cities and rural centers. Moderate to heavy volume; moderate to high speed.	Restricted**	Restricted
Minor Arterial	Connects collectors to higher order roadways. Carries moderate volume at moderate speed.	Restricted if an alternative is available	Generally restricted
Collector	Principle carrier within neighborhoods or single land use areas. Links neighborhoods with major activity centers, other neighborhoods, and arterials. Generally not for through traffic. Low to moderate volume; low to moderate speed. New collectors should intersect minor arterials rather than major arterials.	Generally allowed* Residential driveways are limited.	Generally allowed*
Connector	Collects traffic from and distributes traffic to local streets within neighborhoods or industrial districts. Usually longer than local streets. Low traffic volumes and speeds. Primarily serves access and local circulation functions. Not for through traffic. Allowed Traffic calming measures may be appropriate. A connector should connect to a collector or minor arterial.	Allowed	Allowed if width is sufficient
Local	Provides access to abutting property and connects to higher order roads. New local roads should intersect collectors, connectors, or, if necessary, minor arterials. Traffic calming measures may be appropriate. Not for through traffic.	Allowed	Allowed if width is sufficient
Alley	May be public or private, to provide access to the rear of property. Alleys should intersect local roads or connectors. Not for through traffic.	Allowed	Generally not allowed

* - May be restricted on collectors with high volume, high access, impaired visibility, or other significant problems.

** - The County accepts the State's access control standards for State facilities.

Table 2 Clackamas County Roadway Classifications and Design Guidelines (Table V-3 Clackamas County Comprehensive Plan)

Functional Classification	Number of Traffic Lanes	Minimum Right-of-Way Width*	Paved Width	Sidewalk/ Pathway	Bikeways	Landscape Strip**
Freeway/Expressway	4 to 8	Defer to Federal and State Standards	Defer to Federal and State	No	No	Defer to Federal and State
Major arterial	3 to 7 Urban 2 to 4 Rural	60'-125' More if needed for terrain, turn lanes or heavy volume	36'-98'	Yes In urban areas only	Yes	Yes In urban areas
Minor Arterial	2 to 5	60'-115'	36'-90'	Yes In urban areas only	Yes	Yes In urban areas
Collector	2 to 3	60'-85' Less if volume and land use density are low and terrain allows	32'-1'	Yes In urban areas only	Yes	Yes In urban areas
Connector	2	55'	28'-34' Residential 28'-40' Industrial	Yes In urban areas only	If ROW allows	Yes In urban areas
Local	2	40'-50'	28'	Yes***	No	Yes In urban areas
Alley	2	16'	16'	No	No	No

* - Preferred dimensions are not adjusted for adjacent land uses; additional right-of-way may be required for slope, sign, sidewalk and utility easements.

** - Required unless acquiring right-of-way is impractical due to wetlands, topographic conditions, resource protection, or preexisting development patterns.

*** - Sidewalks are required on all new streets within the Urban Growth Boundary and when development or redevelopment occurs on existing streets. (1/17/08)

ODOT FACILITIES

The Oregon Highway Plan (OHP) provides functional classifications for all state facilities. The classifications recognize that different highway types have importance for certain areas and users. They help to guide ODOT priorities for system investment and management. The Oregon Transportation Commission is responsible for establishing and modifying the classification system and routes in them. The classifications include the following:

Interstate Highways (NHS) provide connections to major cities, regions of the state, and other states. A secondary function in urban areas is to provide connections for regional trips within the metropolitan area. The Interstate Highways are major freight routes and their objective is to provide mobility. The management objective is to provide for safe and efficient high-speed continuous-flow operation in urban and rural areas.

Statewide Highways (NHS) typically provide inter-urban and inter-regional mobility and provide connections to larger urban areas, ports, and major recreation areas that are not directly served by Interstate Highways. A secondary function is to provide connections for intra-urban and intra-regional trips. The management objective is to provide safe and efficient, high-speed, continuous-flow operation. In constrained and urban

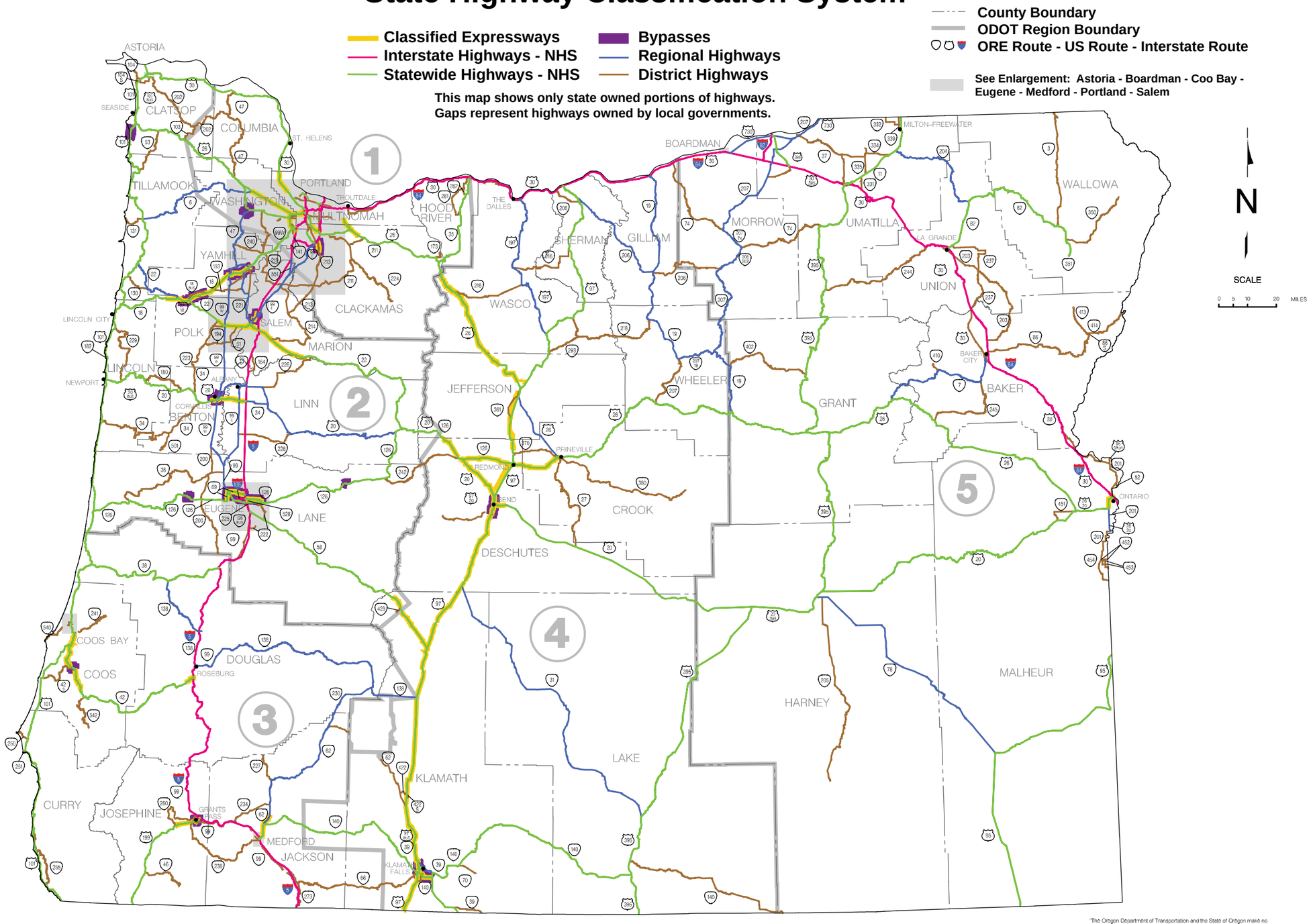
areas, interruptions to flow should be minimal. Inside Special Transportation Areas (STAs), local access may also be a priority.

Regional Highways typically provide connections and links to regional centers, Statewide or interstate Highways, or economic or activity centers of regional significance. The management objective is to provide safe and efficient, high-speed, continuous-flow operation in rural areas and moderate to high-speed operations in urban and urbanizing areas. A secondary function is to serve land uses in the vicinity of these highways. Inside STAs, local access is also a priority. Inside Urban Business Areas, mobility is balanced with local access.

District Highways are facilities of county-wide significance and function largely as county and city arterials or collectors. They provide connections and links between small urbanized areas, rural centers and urban hubs, and also serve local access and traffic. The management objective is to provide for safe and efficient, moderate to high-speed continuous-flow operation in rural areas reflecting the surrounding environment and moderate to low-speed operation in urban and urbanizing areas for traffic flow and for pedestrian and bicycle movements. Inside STAs, local access is a priority. Inside Urban Business Areas, mobility is balanced with local access.

Local Interest Roads function as local streets or arterials and serve little or no purpose for through traffic mobility. Some are frontage roads; some are not eligible for federal funding. Currently, these roads are District Highways or unclassified and will be identified through a process delineated according to Policy 2C. The management objective is to provide for safe and efficient, low to moderate speed traffic flow and for pedestrian and bicycle movements. Inside STAs, local access is a priority. ODOT will seek opportunities to transfer these roads to local jurisdictions.

State Highway Classification System



"The Oregon Department of Transportation and the State of Oregon make no representations, express or implied, as to the accuracy of the information or data contained herein. This information or data is provided with the understanding that it is not guaranteed to be correct or complete and conclusions drawn from such information are the responsibility of the user."

JUNE 2006
PROJECT # 1855

The performance standard applied at each intersection depends on the jurisdiction, location, and facility type. The following describes the performance standards applied at County and ODOT intersections. A table displaying the standard applied at each study intersection is provided as well.

COUNTY INTERSECTIONS

Clackamas County intersections inside the Metro UGB are subject to the standards in the Metro Regional Transportation Plan (RTP). Metro has developed motor vehicle performance indicators that vary based on location of the facility. The standards are based on volume-to-capacity ratios for the 1st hour and 2nd hour during the PM 2-Hour Peak, as well as during the Mid-Day One-Hour Peak. The v/c ratio standards for the 1st hour during the PM 2-Hour Peak were used. For signalized intersections, the v/c ratio standard applies to the overall intersection v/c ratio. At roundabouts, all-way stop-controlled intersection, and two-way stop controlled intersections, the v/c ratio applies to the critical movement. *Table 3.08-2 is provided below.*

According to the Clackamas County Comprehensive Plan, County intersections outside the Metro UGB have a performance standard of LOS "D". This standard refers to the average LOS experienced by all vehicles entering the intersection at signalized, all-way stop-controlled intersections, and roundabouts. At two-way stop controlled intersections, this standard refers to the LOS experienced by the critical movement at the intersection, typically a left-turn from the stop-controlled road. The standards in the Metro Functional Plan are shown in Table 3.08-2.

Table 6: Volume to Capacity Ratio Targets for Peak Hour Operating Conditions

VOLUME TO CAPACITY RATIO TARGETS OUTSIDE METRO[A,B,C,D]							
Highway Category	**Inside Urban Growth Boundary**					**Outside Urban Growth Boundary**	
	STA[E]	**MPO**	**Non-MPO Outside of STAs where non-freeway posted speed <= 35 mph, or a Designated UBA**	**Non-MPO outside of STAs where non-freeway speed > 35 mph, but <45 mph**	**Non-MPO where non-freeway speed limit >= 45 mph**	**Unincorporated Communities[F]**	**Rural Lands**
Interstate Highways	N/A	0.85	N/A	N/A	0.80	0.70	0.70
Statewide Expressways	N/A	0.85	0.80	0.80	0.80	0.70	0.70
Freight Route on a Statewide Highway	0.90	0.85	0.85	0.80	0.80	0.70	0.70
Statewide (not a Freight Route)	0.95	0.90	0.90	0.85	0.80	0.75	0.70
Freight Route on a Regional or District Highway	0.95	0.90	0.90	0.85	0.85	0.75	0.70
Expressway on a Regional or District Highway	N/A	0.90	N/A	0.85	0.85	0.75	0.70
Regional Highways	1.0	0.95	0.90	0.85	0.85	0.75	0.70
District / Local Interest Roads	1.0	0.95	0.95	0.90	0.90	0.80	0.75

Notes for Table 6

[A] Unless the Oregon Transportation Commission has adopted an alternative mobility target for the impacted facility, the mobility targets in Tables 6 are considered standards for purposes of determining compliance with OAR 660-012, the Transportation Planning Rule.

[B] For the purposes of this policy, the peak hour shall be the 30th highest annual hour. This approximates weekday peak hour traffic in larger urban areas. Alternatives to the 30th highest annual hour may be considered and established through alternative mobility target processes.

[C] Highway design requirements are addressed in the Highway Design Manual (HDM).

[D] See Action 1F.1 for additional technical details.

[E] Interstates and Expressways shall not be identified as Special Transportation Areas.

[F] For unincorporated communities inside MPO boundaries, MPO mobility targets shall apply.

ODOT INTERSECTIONS

ODOT presently uses volume-to-capacity ratio standards to measure vehicular highway mobility performance and make initial determinations of facility needs necessary to maintain acceptable and reliably levels of mobility. However, achieving necessary v/c targets will not necessarily be the determinant of the transportation solutions. ODOT recognizes that other transportation modes and regional and local planning objectives need to be considered as well. Highway mobility targets are used in transportation system planning to provide a measure by which the existing and future performance of the highway system can be evaluated. The Oregon Highway Plan (OHP) provides maximum volume-to-capacity ratios for all signalized and unsignalized intersections and interchange ramp terminals. Performance standards vary based on the highway category, the location of the facility (within a Special Transportation Area, Metropolitan Planning Organization, Urban Growth Boundary, unincorporated community or rural lands), and the posted speed on the facility. The Portland metropolitan area has separate v/c targets that were adopted with the understanding of the unique context and policy choices that have been made by local governments in that area. Higher v/c ratios indicate that the area is anticipated to have more traffic congestion because of the land use pattern that a region or local jurisdiction has committed to through adopted local policy. Operations on ODOT facilities are compared to the performance standards outlined in the OHP to identify deficiencies.

The Mobility Standard Guidelines for unsignalized intersections and signalized intersections other than crossroads of freeway ramps are provided in Table 6 and Table 7 of the OHP. At unsignalized intersections, the volume to capacity ratios in Tables 6 and 7 shall not be exceeded for either of the state highway approaches that are not stopped. Approaches at which traffic must stop, or otherwise yield the right of way, shall not exceed the volume to capacity ratios for District/Local Interest Roads in Table 6 and Table 7 within urban growth boundaries or 0.80 outside of urban growth boundaries. At signalized intersections other than crossroads of freeway ramps, the volume to capacity ratio for the intersection shall not exceed the volume to capacity ratios in Tables 6 and 7. Where two state highways of different classifications intersect, the lower of the volume to capacity ratios in the tables shall apply. Where a state highway intersects with a local road or street, the volume to capacity ratio for the state highway shall apply. At crossroads of freeway ramps, the maximum volume to capacity ratio for the ramp terminals of the interchange shall be the smaller of the values of the volume to capacity ratios for the crossroad, or 0.85.

Table 6: Volume to Capacity Ratio Targets for Peak Hour Operating Conditions

VOLUME TO CAPACITY RATIO TARGETS OUTSIDE METRO[A,B,C,D]							
Highway Category	**Inside Urban Growth Boundary**					**Outside Urban Growth Boundary**	
	STA[E]	**MPO**	**Non-MPO Outside of STAs where non-freeway posted speed <= 35 mph, or a Designated UBA**	**Non-MPO outside of STAs where non-freeway speed > 35 mph, but <45 mph**	**Non-MPO where non-freeway speed limit >= 45 mph**	**Unincorporated Communities[F]**	**Rural Lands**
Interstate Highways	N/A	0.85	N/A	N/A	0.80	0.70	0.70
Statewide Expressways	N/A	0.85	0.80	0.80	0.80	0.70	0.70
Freight Route on a Statewide Highway	0.90	0.85	0.85	0.80	0.80	0.70	0.70
Statewide (not a Freight Route)	0.95	0.90	0.90	0.85	0.80	0.75	0.70
Freight Route on a Regional or District Highway	0.95	0.90	0.90	0.85	0.85	0.75	0.70
Expressway on a Regional or District Highway	N/A	0.90	N/A	0.85	0.85	0.75	0.70
Regional Highways	1.0	0.95	0.90	0.85	0.85	0.75	0.70
District / Local Interest Roads	1.0	0.95	0.95	0.90	0.90	0.80	0.75

Notes for Table 6

[A] Unless the Oregon Transportation Commission has adopted an alternative mobility target for the impacted facility, the mobility targets in Tables 6 are considered standards for purposes of determining compliance with OAR 660-012, the Transportation Planning Rule.

[B] For the purposes of this policy, the peak hour shall be the 30th highest annual hour. This approximates weekday peak hour traffic in larger urban areas. Alternatives to the 30th highest annual hour may be considered and established through alternative mobility target processes.

[C] Highway design requirements are addressed in the Highway Design Manual (HDM).

[D] See Action 1F.1 for additional technical details.

[E] Interstates and Expressways shall not be identified as Special Transportation Areas.

[F] For unincorporated communities inside MPO boundaries, MPO mobility targets shall apply.

Table 7: Volume to Capacity Ratio Targets within Portland Metropolitan Region

VOLUME TO CAPACITY RATIO TARGETS INSIDE METRO[A,B]		
Location	**Target**	
	1st hour	**2nd hour**
Central City Regional Centers Town Centers Main Streets Station Communities	1.1	.99
Corridors Industrial Areas Intermodal Facilities Employment Areas Inner Neighborhoods Outer Neighborhoods	.99	.99
I-84 *(from I-5 to I-205)*	1.1	.99
I-5 North*(from Marquam Bridge to Interstate Bridge)*	1.1	.99
OR 99E *(from Lincoln Street to OR 224 Interchange)*	1.1	.99
US 26 *(from I-405 to Sylvan Interchange)*	1.1	.99
I-405[C] *(I-5 South to I-5 North)*	1.1	.99
Other Principal Arterial Routes I-205[C] I-84 *(east of I-205)* I-5 *(Marquam Bridge to Wilsonville)*[C] OR 217 US 26 *(west of Sylvan)* US 30 OR 8 *(Murray Blvd to Brookwood Avenue)*[C] OR 224 OR 47 OR 213 242nd/US26 in Gresham OR 99W	.99	.99

Notes for Table 7: Deficiency thresholds for two hour peak operating conditions through the planning horizon for state highway sections within the Portland metropolitan area urban growth boundary.

[A] Unless the Oregon Transportation Commission has adopted an alternative mobility target for the impacted facility, the mobility targets in Tables 7 are considered standards for purposes of determining compliance with OAR 660-012, the Transportation Planning Rule.

[B] The volume-to-capacity ratios in Table 7 are for the highest two consecutive hours of weekday traffic volumes. The second hour is defined as the single 60-minute period either before or after the peak 60-minute period, whichever is highest. See Action 1.F.1 for additional technical details.

[C] A corridor refinement plan, which will likely include a tailored mobility policy, is required by the Metro 2035 Regional Transportation Plan for this corridor.

PERFORMANCE STANDARDS AT STUDY INTERSECTIONS

The following table lists the performance standard applied at each study intersection.

ID	Intersection	Jurisdiction	In Metro UGB?	Category	Performance Standard (LOS or v/c)
101	SE Johnson Creek Blvd/SE Flavel Dr	County	Y	Arterial	0.99
102	SE Johnson Creek Blvd/SE Bell Ave	County	Y	Corridor	0.99
103	SE Johnson Creek Blvd/SE 79th Pla	County	Y	Corridor	0.99
104	SE Johnson Creek Blvd/80th Ave	County	Y	Corridor	0.99
105	SE Johnson Creek Blvd/82nd Ave	ODOT	Y	Corridor	0.99
106	SE Johnson Creek Blvd/SE Fuller Rd	County	Y	Corridor	0.99
107	SE Johnson Creek Blvd/I-205 SB Ramps	ODOT	Y	Freeway Ramp	0.85
108	SE Johnson Creek Blvd/I-205 NB Ramps	ODOT	Y	Freeway Ramp	0.85
109	SE Johnson Creek Blvd/SE 92nd Ave	County	Y	Corridor	0.99
110	SE Overland Street/SE 82nd Ave	ODOT	Y	Corridor	0.99
111	SE Otty Road/SE 82nd Ave	ODOT	Y	Corridor	0.99
112	SE Otty Road/SE Fuller Rd	County	Y	Station Community	1.1
113	SE Otty Road/SE 92nd Ave	County	Y	Regional Center	1.1
114	SE Glencoe Rd/SE 82nd Ave	ODOT	Y	Corridor	0.99
115	SE King Rd/SE Bell Ave	County	Y	Arterial	0.99
116	SE King Rd/SE Fuller Rd	County	Y	Corridor	0.99
117	SE King Rd/SE 82nd Ave	ODOT	Y	Corridor	0.99
118	SE 82nd Ave/SE Boyer	ODOT	Y	Corridor	0.99
119	SE Causey Ave/SE 82nd Ave	ODOT	Y	Regional Center	1.1
120	SE Monterey Ave/SE 82nd Ave	ODOT	Y	Regional Center	1.1
121	SE Monterey Ave/SE Bob Schumacher Rd	County	Y	Regional Center	1.1
122	SE Bob Schumacher Rd/SE Stevens Rd	County	Y	Regional Center	1.1
123	SE Lake Rd/SE International Way	County	Y	Arterial	0.99
124	SE Harmony Rd/SE Linwood Ave	County	Y	Arterial	0.99
125	SE Harmony Rd/SE Fuller Rd	County	Y	Regional Center	1.1
126	SE Sunnyside Rd/SE Harmony Rd/SE 82nd Ave	ODOT	Y	Regional Center	1.1
127	SE Sunnyside Rd/8600 Block	County	Y	Regional Center	1.1
128	SE Sunnyside Rd/9000 Block	County	Y	Regional Center	1.1
129	SE Sunnyside Rd/SE 93rd Ave	County	Y	Regional Center	1.1
130	SE Sunnyside Rd/I-205 SB Ramps	ODOT	Y	Freeway Ramp	0.85
131	SE Sunnyside Rd/I-205 NB Ramps	ODOT	Y	Freeway Ramp	0.85
132	SE Sunnyside Rd/SE Stevens Rd	County	Y	Regional Center	1.1
133	SE Sunnyside Rd/SE 101st Ave	County	Y	Regional Center	1.1
134	SE Sunnyside Rd/SE Sunnybrook Blvd	County	Y	Corridor	0.99
135	SE Sunnyside Rd/SE Valley View Terrace	County	Y	Corridor	0.99
136	SE Sunnybrook Blvd/SE 82nd Ave	ODOT	Y	Regional Center	1.1
137	SE Sunnybrook Blvd/I-205 SB Ramps	ODOT	Y	Freeway Ramp	0.85
138	SE Sunnybrook Blvd/I-205 NB Ramps	ODOT	Y	Freeway Ramp	0.85
139	SE Sunnybrook Blvd/97th Ave	County	Y	Regional Center	1.1
140	OR 224/SE Rusk Rd	ODOT	Y	OR 224	0.99
141	OR 224/SE Lake Rd/SE Webster Rd	ODOT	Y	OR 224	0.99

142	SE Lake Rd/SE Webster Rd	County	Y	Arterial	0.99
143	OR 224/SE Johnson Rd	ODOT	Y	OR 224	0.99
144	SE Sunnyside Rd/SE 122nd Ave	County	Y	Arterial	0.99
145	SE Sunnyside Rd/SE 132nd Ave	County	Y	Arterial	0.99
146	SE Sunnyside Rd/SE 142nd Ave	County	Y	Arterial	0.99
147	SE Sunnyside Rd/SE 152nd Ave	County	Y	Arterial	0.99
148	SE Sunnyside Rd/SE 162nd Ave	County	Y	Arterial	0.99
149	SE Sunnyside Rd/SE 172nd Ave	County	Y	Arterial	0.99
150	SE Mather Rd/SE 122nd Ave	County	Y	Arterial	0.99
151	SE Summers Lane/SE 122nd Ave	County	Y	Arterial	0.99
152	SE Hubbard Rd/SE 132nd Ave	County	Y	Arterial	0.99
153	OR 212/I-205 SB Ramps	ODOT	Y	Freeway Ramp	0.85
154	OR 212/I-205 NB Ramps	ODOT	Y	Freeway Ramp	0.85
155	OR 212/SE 82nd Dr	ODOT	Y	OR 224	0.99
156	OR 212/224/SE 102nd Ave	ODOT	Y	OR 224	0.99
157	OR 224/SE Hubbard Rd/135th Ave	ODOT	Y	OR 224	0.99
158	OR 224/SE 142nd Ave	ODOT	Y	OR 224	0.99
159	OR 212/OR 224	ODOT	Y	OR 224	0.99
160	OR 212/SE 162nd Ave	ODOT	Y	OR 212	0.99
161	OR 212/SE 172nd Ave	ODOT	Y	OR 212	0.99
162	SE Jennifer St/SE Evelyn St	County	Y	Arterial	0.99
163	SE 82nd Dr/SE Jennifer Street	County	Y	Arterial	0.99
164	SE Strawberry Lane/SE 82nd Dr	County	Y	Arterial	0.99
165	OR 224/Springwater Rd	ODOT	Y	OR 224	0.99
201	SE Park Ave/SE River Rd	County	Y	Arterial	0.99
202	SE Park Ave/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
203	SE Oatifield Rd/SE Park Ave	County	Y	Arterial	0.99
204	SE Courtney Ave/SE River Rd	County	Y	Arterial	0.99
205	SE Courtney Ave/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
206	SE Courtney Ave/SE Oatifield Rd	County	Y	Arterial	0.99
207	SE Oak Grove Blvd/SE Courtney Ave	County	Y	Arterial	0.99
208	SE Oak Grove Blvd/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
209	SE Hill Rd/SE Oatifield Rd	County	Y	Arterial	0.99
210	SE Concord Rd/SE River Rd	County	Y	Arterial	0.99
211	SE Concord Rd/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
212	SE Oatifield Rd/SE Concord Rd	County	Y	Arterial	0.99
213	SE Roathe Rd/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
214	SE Jennings Ave/SE River Rd	County	Y	Arterial	0.99
215	SE Jennings Ave/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
216	SE Jennings Ave/SE Oatifield Rd	County	Y	Arterial	0.99
217	SE Glen Echo Ave/SE River Rd	County	Y	Arterial	0.99
218	SE Glen Echo Ave/OR 99E	ODOT	Y	OR 99E (Lincoln to 224 interchange)	1.1
219	SE Thiessen Rd/SE Hill Rd	County	Y	Arterial	0.99
220	SE Thiessen Rd/SE Aldercrest Rd	County	Y	Arterial	0.99
221	SE Thiessen Rd/SE Webster Rd	County	Y	Arterial	0.99
222	SE Thiessen Rd/SE Johnson Rd	County	Y	Arterial	0.99
223	SE Roots Rd/SE Webster Rd	County	Y	Arterial	0.99

224	SE Jennings Ave/SE Webster Rd	County	Y	Arterial	0.99
225	SE Strawberyy Lane/SE Webster Rd	County	Y	Arterial	0.99
301	SW Childs Rd/SW Stafford Rd	County	N	Arterial	D
302	SW Borland Rd/SW Stafford Rd	County	N	Arterial	D
303	SW Mountain Rd/SW Stafford Rd	County	N	Arterial	D
304	SW Ellingson Rd/SW 65th Ave	County	N	Arterial	D
305	SW 65th Ave/SW Stafford Rd	County	N	Arterial	D
401	Clackamas River Dr & Springwater Rd	County	N	Arterial	D
402	S. Redland Road/S. Holly Lane	County	Y	Arterial	0.99
403	S. Redland Rd/S. Ferguson Rd	County	N	Arterial	D
404	S. Redland Rd/S. Bradley Rd	County	N	Arterial	D
405	S. Beavercreek Rd/S. Maple Lane Rd	County	Y	Arterial	0.99
406	S. Henrici Rd/OR 213	ODOT	N	District Highway, Rural	0.75
407	S. Henrici Rd/S. Beavercreek Rd	County	N	Arterial	D
408	South End Rd./OR 99E	ODOT	N	District Highway, Rural	0.75
409	S. Leland Rd/OR 213	ODOT	N	District Highway, Unincorporated Community (Beavercreek)	0.8
410	S. Leland Rd/S. Beavercreek Rd	County	N	Arterial	D
411	NE Miley Rd/NE Airport Rd	County	N	Arterial	D
412	Arndt Rd/NE Airport Rd	County	N	Arterial	D
413	Knights Bridge Rd/S. Barlow Rd	County	N	Arterial	D
414	Arndt Rd/Knights Bridge Rd	County	N	Arterial	D
415	Arndt Rd/S. Barlow Rd	County	N	Arterial	D
416	OR 99E/S. Barlow Rd	ODOT	N	District Highway, Rural	0.75
417	SE 13th Ave/S. Mulino Rd	County	N	Arterial	D
418	S. Spangler Rd/OR 213	ODOT	N	District Highway, Rural	0.75
419	Mulino Rd/OR 213	ODOT	N	District Highway, Unincorporated Community (Mulino)	0.8
420	S. Union Mills Rd/OR 213	ODOT	N	District Highway, Rural	0.75
421	S. Barnards Rd/OR 213	ODOT	N	District Highway, Rural	0.75
422	S. Union Mills Rd/S. Beavercreek Rd	ODOT	N	District Highway, Rural	0.75
423	OR 211/Barlow Rd	ODOT	N	District Highway, Rural	0.75
424	OR 211/Canby Marquam	ODOT	N	District Highway, Rural	0.75
501	OR 212 /SE 282nd Ave	ODOT	N	State Hwy, NHS, FR, Unincorporated Community (Boring)	0.7
502	OR 224 /SE 232nd Ave	ODOT	N	District Hwy, Rural	0.75
503	OR 224/OR 211	ODOT	N	District Hwy, Unincorporated Community (Eagle Creek)	0.8
504	US 26/Salmon River Rd	ODOT	N	State Hwy, NHS, FR, Unincorporated Community (Mt. Hood Village)	0.7
505	US 26/Government Camp West	ODOT	N	State Hwy, NHS, FR, Unincorporated Community (Government Camp)	0.7
506	US 26/Government Camp East	ODOT	N	State Hwy, NHS, FR, Unincorporated Community (Government Camp)	0.7

NHS = National Highway System, FR = Freight Route

This appendix describes the process used to develop design hour volumes for the Existing Conditions Analysis in the Clackamas County Transportation System Plan (TSP). Existing count volumes were collected in 2012 at the selected study intersections. Counts on state facilities were seasonally adjusted to reflect the 30th highest hour of traffic at the intersection. Seasonal factors were developed based on the methodology in the *Analysis Procedures Manual (APM).* The following methods were used to develop seasonal adjustments, as appropriate:

- On-Site ATR Method
- ATR Characteristic Table Method
- ATR Seasonal Trend Table Method

Each facility and the respective adjustments made are described below. Table 1 summarizes the adjustments made at all study intersections.

Highway: OR 213-SE 82nd Avenue (Cascade Highway North No. 68)

Segment: SE Johnson Creek Road to SE Sunnybrook Boulevard (10 intersections)

ATR: There is no ATR located along this segment of SE 82nd Avenue. Following the ATR Characteristics Table method we identified two ATR's, including 03-018 and 26-003 which are both located along commuter facilities within urbanized areas. Both facilities also have five lanes, a weekday traffic trend, and an AADT within 10 percent of the AADT within the study segment. However, 03-018 is located along an adjacent facility. Therefore, the traffic volumes along this segment of SE 82nd Avenue were adjusted based on 03-018 which has an adjustment of **1.03**.

Highway: OR 224 (Clackamas Highway No. 171)

Segment: SE Rusk Road to SE Johnson Road (three intersections)

ATR: 03-018 - This ATR is located along OR 224 within the study segment. The ATR has three years of traffic data available that result in an adjustment of 1.03. Given the location of the ATR with respect to the study intersections, the traffic volumes along this segment of OR 224 were adjusted by **1.03**.

Highway: 99E (Pacific Hwy East No. 81)

Segment: SE Park Avenue to SE Glen Echo Avenue (seven intersections)

ATR: There is no ATR located along this segment of 99E. Following the ATR Characteristics Table method we identified three ATR's, including 03-018, 26-003, and 27-006 which are all located along commuter facilities within urbanized areas. Each facility has five lanes, a weekday traffic trend, and an AADT within 10 percent of the AADT within the study segment. However, 03-018 is located along an adjacent facility. Therefore, the traffic volumes along this segment of 99E were adjusted based on 03-018 which has an adjustment of **1.03**.

Highway: OR 224/212 (Clackamas Highway No. 171)

Segment: I-205 to SE 172nd Ave (nine intersections)

ATR: 03-017 - This ATR is located along OR 224/212 within the study segment. The ATR has four years of traffic data available that result in an adjustment of 1.10. Given the location of the ATR with respect to the study intersections, the traffic volumes along this segment of OR 224/212 were adjusted by **1.10**.

Highway: OR 224 (Clackamas Highway No. 171)

Segment: S. Springwater Road to OR 211 (three intersections)

ATR: There is no ATR located along this segment of OR 224. Following the ATR Characteristics Table method we identified three ATR's, including 03-006, 05-006, and 09-015 which are all located along recreational summer/winter and summer facilities within rural areas. Each facility has two travel lanes, a weekend traffic trend, and an AADT within 10 percent of the AADT within the study segment. However, a review of the most recent data available for each ATR indicates that the adjustment factors would be greater than 1.30. Therefore, the traffic volumes along OR 224 were adjusted based on the Seasonal Trend Table method using an average of the commuter and summer trends which has an adjustment of **1.23**.

Highway: 99E (Pacific Highway East No. 81)

Segment: S South End Road to S Barlow Rd (two intersections)

ATR: There are no ATR's located along this segment of 99E. Following the ATR Characteristics Table method we identified two ATR's, including 18-018 and 27-006 which are both located along commuter facilities within small urban and urbanized areas. Both facilities also have five travel lanes and an AADT within 10 percent of the AADT within the study segment. However, a review of the last five years of traffic data indicates that the peak month of 18-018 changes significantly from year to year along with the percent of ADT. Therefore, the traffic volumes along this segment of 99E were adjusted based on ATR 27-006 which has an adjustment of **1.08**.

Highway: OR 211 (Woodburn-Estacada Highway No. 161)

Segment: S Barlow Rd to S Union Mills Road (three intersections) and OR 224 (one intersection)

ATR: 03-014 - This ATR is located several miles east of the intersections between S Barlow Road and S Union Mills Road and several miles west of the intersection at OR 224. The ATR has several years of traffic data available that result in an adjustment of 1.21. However, the AADT at the ATR is not within 10 percent of the AADT near the intersection. Therefore, a profile of the AADT was created for the ATR and compared to the profiles associated with the Seasonal Trend Table. The ATR profile most closely resembles an average of the commuter and summer trends which has an adjustment of 1.23. The traffic volumes along OR 211 at this intersection were adjustment by 1.23.

Highway: OR 213 (Cascade Highway North No. 68)

Segment: S Henrici Road to S Barnards Road (six intersections)

ATR: 03-020 - This ATR is located along OR 213 within the study segment. The ATR has one year of traffic data available that results in an adjustment of 1.07. Given that there is only one year of data available, a profile of the AADT was created for the ATR and compared to the profiles associated with the Seasonal Trend Table. The ATR profile most closely resembles the commuter trend which has an adjustment of 1.12. The traffic volumes along this segment of OR 213 were adjusted by **1.12**.

Highway: OR 212 (Clackamas-Boring Highway No. 174)

Segment: SE 282nd Avenue (one intersection)

ATR: There is no ATR located along this segment of OR 212. Following the ATR Characteristics Table method we identified three ATR's, including 03-006, 05-006, and 09-015 which are all located along recreational summer/winter and summer facilities within rural areas. Each facility has two travel lanes, a weekend traffic trend, and an AADT within 10 percent of the AADT within the study segment. However, a review of the most recent data available for each ATR indicates that the adjustments would be greater than 1.30. Therefore, the traffic volumes along OR 212 were adjusted based on the Seasonal Trend Table method using an average of the commuter and summer trends which has an adjustment of **1.23**.

Highway: US 26 (Mt. Hood Highway No. 26)

Segment: Salmon River Road to Government Camp Loop (three intersections)

ATR: 03-006 – This ATR is located along US 26 within the study segment. The ATR has several years of traffic data available that result in an adjustment of 1.44. However, the AADT at the ATR is not within 10 percent of the AADT near the intersection. Therefore, a profile of the AADT was created for the ATR and compared to the profiles associated with the Seasonal Trend Table. The ATR profile most closely resembles an average of the commuter and recreational summer and winter trends which has an adjustment of 1.35. The traffic volumes along US 26 at these intersections were adjustment by **1.35**. This adjustment factor exceeds the maximum seasonal adjustment of 1.30 recommended in the APM, suggesting that the traffic counts were taken outside the seasonal peak. Additional analysis at the US 26 study intersections has been performed as part of the Mt. Hood Highway EIS Capacity and other studies to supplement the TSP analysis.

The adjustments made to each facility are summarized in Table 1. It should be noted that no adjustments were made to intersections involving state highway ramps.

Table 1 Seasonal Adjustments to ODOT Facilities

Facility	Segment	Method	Adjustment
OR 213/82nd Avenue	SE Johnson Creek Road to SE Sunnybrook Boulevard	ATR Characteristic Table Method	1.03
OR 224	SE Rusk Road to SE Johnson Road	On-Site ATR Method (ATR 03-017)	1.03
OR 99E	SE Park Avenue to SE Glen Echo Avenue	ATR Characteristic Table Method	1.03
OR 224/ OR 212	I-205 to SE 172nd Avenue	On-Site ATR Method (ATR 03-017)	1.1
OR 224	S Springwater Road to Highway 211	ATR Seasonal Trend Table Method	1.23
OR 99E	S South End Road to S Barlow Road	ATR Characteristic Table Method	1.08
OR 211	S Barlow Road to S Union Mills Road, Highway 224	ATR Seasonal Trend Table Method	1.23
OR 213	S Henrici Road to S Barnards Road	ATR Seasonal Trend Table Method	1.12
OR 212	SE 282nd Avenue	ATR Seasonal Trend Table Method	1.23
US 26	Salmon River Road to Government Camp Loop	ATR Seasonal Trend Table Method	1.35

Appendix 4
Metro Memorandum Regarding Travel Demand Model

600 NE Grand Ave.
Portland, OR 97232-2736
503-797-1700
503-797-1804 TDD
503-797-1797 fax

www.oregon**metro.gov**

Metro | *Memo*

May 2, 2012

Administrative Interpretation of 2035 Regional Transportation Plan, No 2012-2

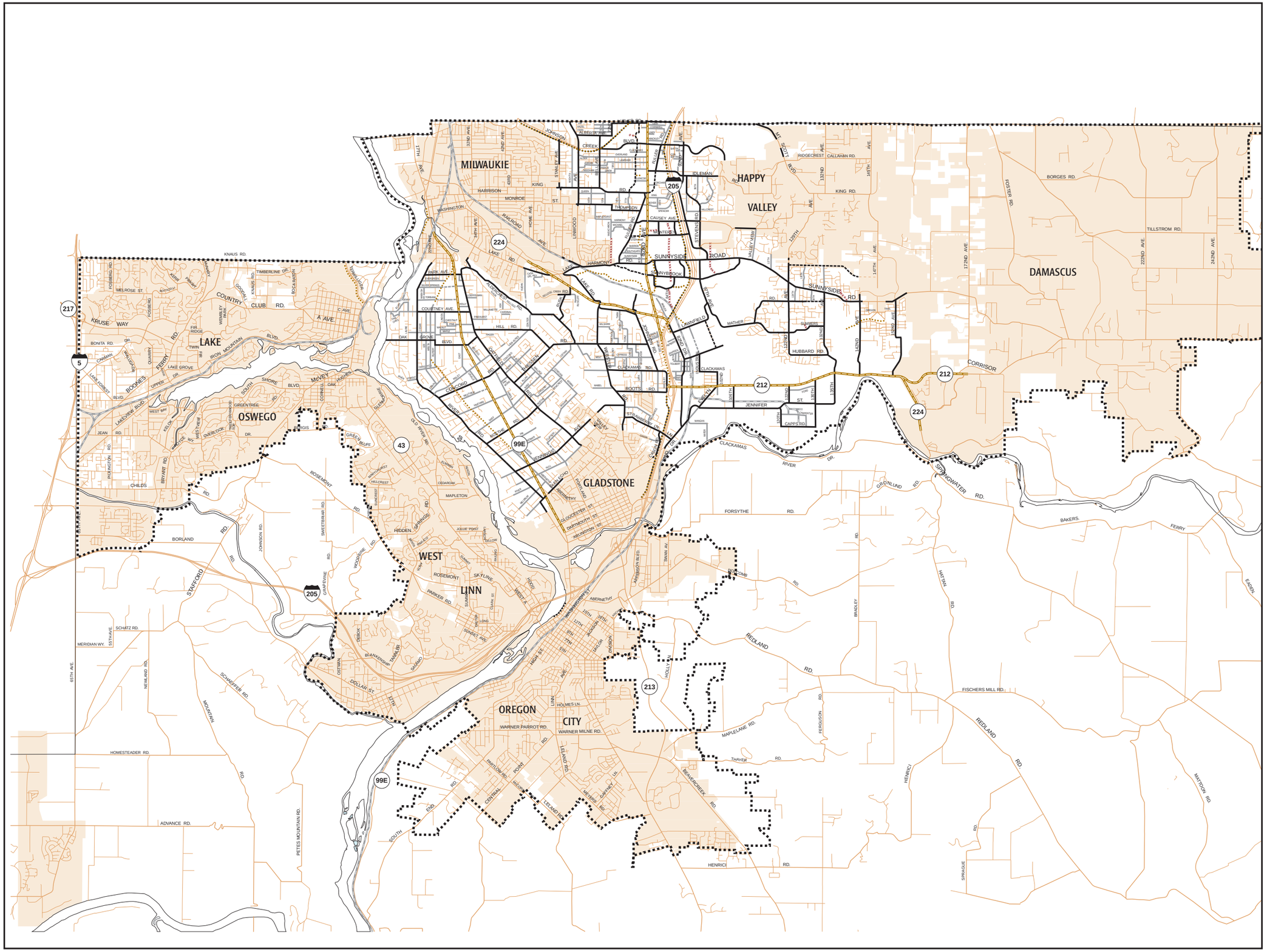
Guidance for Transportation System Plans and Corridor plans about regional population and employment forecasts recommended for use in planning efforts in 2012

Regional Transportation Functional Plan – 3.08.210B (1)

If the timing works for the local planning project, Metro staff recommends waiting to use the "Gamma" forecast scheduled for adoption by the end of 2012. If a jurisdiction needs to begin modeling before then, Metro staff recommends using the interim "2035 beta" forecast. Though it has not been regionally adopted, staff believes that it is more realistic than the forecast used in the 2035 RTP. Sometimes referred to as "Gen 2.3" – the RTP forecast is over 5 years old and its assumptions don't capture the impacts of the Great Recession and recent Urban Reserves decisions.

John Williams
Metro Deputy Director of Planning
Planning & Development Department

Appendix 5
Essential Pedestrian and Bicycle Networks



Essential Pedestrian Network

- STATE HIGHWAY
- ARTERIALS/COLLECTORS
- PROPOSED ARTERIALS/COLLECTORS
- LOCALS
- PROPOSED LOCALS
- PEDESTRIAN CONNECTION
- MULTI-USE TRAILS
- PORTLAND METROPOLITAN URBAN GROWTH BOUNDARY
- INCORPORATED CITIES

January 17 2008

N O R T H

0 1 2 3

S C A L E I N M I L E S

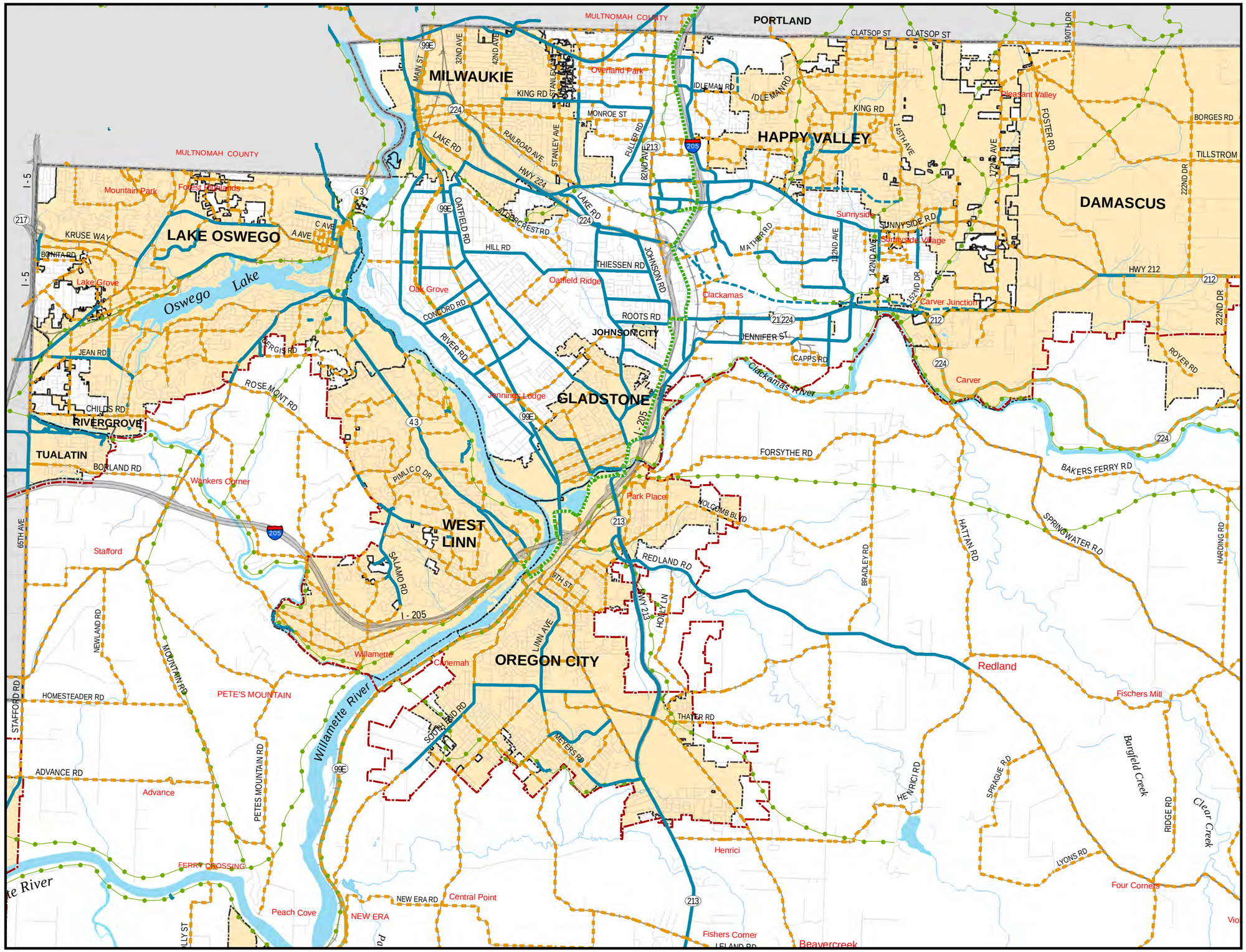
CLACKAMAS COUNTY

9101 SE SUNNYBROOK BLVD. • CLACKAMAS, OR 97015

CLACKAMAS COUNTY COMPREHENSIVE PLAN

MAP V-8

Freework/map/Gis/pedbike/2007-ped/urb_ped_kw07
Layers: 2ESS PedBord2



Planned Bikeway Network

Existing & Planned Bikeways

- EXISTING BIKEWAY
- PROPOSED BIKEWAY
- EXISTING MULTI-USE TRAIL
- PROPOSED MULTI-USE TRAIL
- PLANNED NEW ROADS (Will include bikeway)
- Metro Urban Growth Boundary

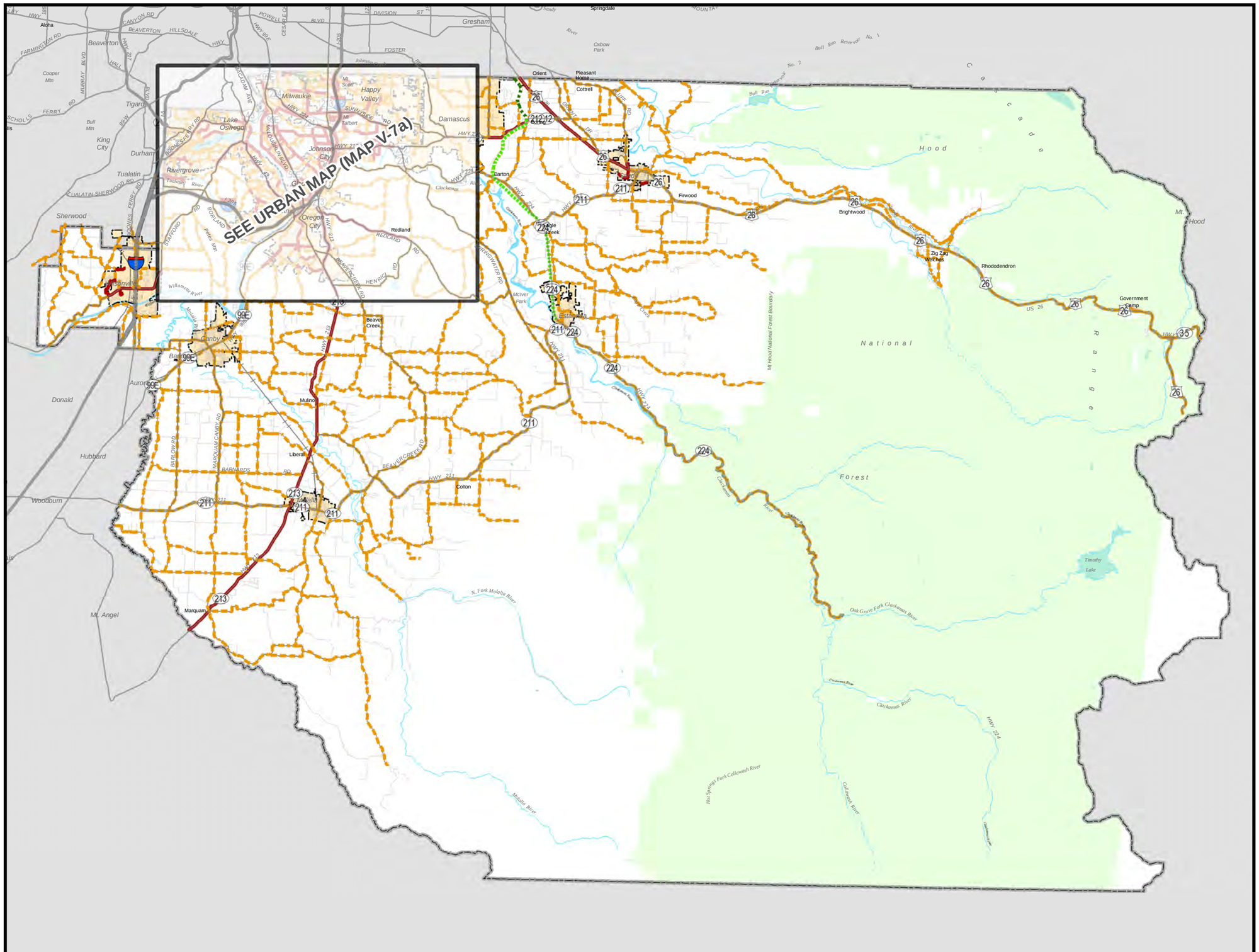
March 12 NORTH 2012

CLACKAMAS COUNTY

Department of Transportation & Development
150 Beavercreek Rd Oregon City, OR 97045

CLACKAMAS COUNTY COMPREHENSIVE PLAN

MAP V-7a



Planned Bikeway Network

Existing & Planned Bikeways

- EXISTING BIKEWAY
- EXISTING MULTI-USE TRAIL
- PROPOSED BIKEWAY
- PROPOSED MULTI-USE TRAIL

March 12 2012

NORTH

CLACKAMAS COUNTY

Department of Transportation & Development
150 Beavercreek Rd Oregon City, OR 97045

CLACKAMAS COUNTY
COMPREHENSIVE PLAN

MAP V-7b

The following table list and describes all capacity projects included in the Low Build Scenario modeling.

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U001	36	Sunnybrook Rd extension (W)	82nd Avenue to Harmony Road	Extend as a minor arterial (4 lanes)	Capacity/Safety	Urban	5 Year	Programmed	$10,557,643	To Fuller: Dev Agency
U002	62	Sunnyside Road Phase 4	152nd Avenue to 172nd Avenue	Widen to (5) lanes, with bridge , Install traffic signal and left-turn lanes	Road Capacity	Urban	5 Year	Complete	$29,602,160	Project was rephased--this became Sunnyside Phase 3
U003	65	SE 172nd Avenue	Sunnyside Road to Highway 212	Four lane widening with left-turn lanes, ext. of 172nd Ave to Hwy 212	Road Capacity	Urban	5 Year	Programmed	$28,461,639	RTP calls for 5 lanes and connection to Tillstrom
U005	101	Industrial Way	Lawnfield Road to Mather Road	New (3) lane collector	Project Design	Urban	5 Year	Programmed	$382,992	The improvements include new roadway construction, bike and pedestrian facilities, curve alignments, turn lanes, street lighting.
U006	102	SE 98th Avenue	Lawnfield Road to Mather Road	Widen to (3) lanes; Upgrade to collector standards	Road Capacity	Urban	20 Year	Complete	$8,782,075	Connect Mather to 98th.
U007	105	102nd industrial access improv.	102nd to Mather Road	Upgrade to collector standards (3 lanes)	Road Capacity	Urban	5 Year	Complete	$8,782,075	Improve 102nd Ave, Clackamas Rd and Industrial Way form Hwy 212 to Mather Rd with bike lanes and sidewalks. [MOVE IMPROVEMENTS OFF OF INDUSTRIAL NORTH OF MATHER, OVER TO 98TH FROM MATHER TO LAWNFIELD)
U008	120	Stafford Road	Stafford/Borland intersection	Install traffic signal and left-turn lanes on all approaches	Road Capacity	Rural	5 Year	Complete	$4,999,522	Intersection redesigned with a 2-lane roundabout
U009	127	Stafford Road	Stafford/Mountain intersection	Install traffic signal and southbound left-turn lane	intersection	Rural	5 Year	Complete	$1,564,689	Realign and widen Stafford Rd to provide SB turn lane. Widen Mountain Rd to provide separate WB right and left turn lanes.
U012		Highway 213@Mulino	Passmore Rd to Freeman Rd	Install NB left-turn lane and SB right-turn lane at Mulino. Continuous left- turn lane from Passmore Rd to Graves Rd. New Milk Creek bridge with three lanes				Complete		Includes water quality swale in NW quadrant of Freeman Rd intersection. Should widening, new three lane bridge over Milk Creek. Install curbs and sidewalks.
U014	S47	I-205/Hwy. 213 Interchange	Washington St. to I-205	Improve and widen OR 213, including reconstruction of intersection of OR 213 and Washington Street. Address safety and provide congestion relief.	Throughways			Programmed	$32,565,374	Same as U526, two 2001 TSP projects bundled into one RTP project
U016		OR 212/224: 3rd WB Lane	OR 212/224, UPRR viaduct to I-205	Restripe OR 212/224 to add 3rd WB lane (combination thru & right-turn lane @ 82nd Dr.); provide two signalized right-turn lanes to NB I-205 On-ramp; provide two right-turn lanes SB I-205 Off-ramp to EB OR 212/224; install traffic signal @ I-205 SB ramp terminals to OR 212/224; re-align multi-use path from 82nd Dr. to I-205 NB On-ramp.				Programmed		
U018		Barber St. Extension from Kinsman Rd. to Villebois Village	Kinsman Rd. to Villebois Village	Extend 3 lanes with sidewalks and bike lanes. The project will reduce the need to use I-5 and OR 217 by providing needed connections to the Villebois Village housing development and employment areas in Wilsonville and with the new Commuter Rail site.	Roads/bridges			Programmed	$13,174,174	
U019	S02	Sunrise Expressway mainline	I-205 to SE 122nd Ave. x OR 212/224	Construct 2-4 lane highway; construct new O'Xing structure over I-205 connecting 82nd Ave. and 82nd Dr.				Programmed	$222,036,643	See U386
U020	S40	Highway 224	se 232nd Drive/Hwy-224 intersection	Install eastbound left-turn lane and westbound right-turn lane				Programmed		
U021		Kinsman Rd. Extension from Barber St. to Boeckman Rd.	Barber St. to Boeckman Rd.	Extend 3 lanes with sidewalks and bike lanes. Provide freight access and capacity from Barber Street to Boeckman Road. A vital alternative to 110th which is being vacated. Serves as a parallel arterial to I-5.	Freight & Roads/bridges			Programmed	$15,342,732	
U039		Webster Road	Webster/Jennings and Roots intersection	Southbound right turn lane		Urban	20 Year	Partial		Part of U004
U051	31	Monterey Avenue	82nd Avenue to 92nd Avenue	Widen to (3) lanes with parking to main street standards	Road Capacity	Urban	5 Year	Complete	$4,557,860	Widened to 3-lane section from SE 82nd Ave to I-205. New signal at 85th. Accommodating increased traffic within Clackamas Regional Center
U052	58	Sunnybrook extension east	97th Avenue to Sunnyside at 108th Avenue	New (5) lane arterial	Road Capacity	Urban		Complete	$10,336,921	
U053	59	Sunnyside Road Phase 1	Stevens to 122nd Avenue	Widen to (5) lanes, with bridge	Road Capacity	Urban	5 Year	Complete	$14,501,922	
U054	60	Sunnyside Road Phase 2	122nd Avenue to 132nd Avenue	Widen to (5) lanes	Road Capacity	Urban	5 Year	Complete	$23,266,050	Project was rephased--this became Sunnyside Phase 2.1
U060	86	Oatfield Road	Oatfield Road/Roethe Road intersection	Install signal and left-turn lanes, improve approach grade on Roethe Road	intersection	Urban	5 Year	Complete	$937,208	
U061	106	Jennifer/135th	130th-135th and Jennifer-Highway 212	Two lane extension and reconstruction of 135th	Road Capacity	Urban		Complete	$1,211,690	
U062	114	Stafford Road	Stafford/Rosemont Road intersection	Roundabout	Road Capacity	Rural	5 Year	Built	$1,486,842	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U063	166	Eckert Lane	Extend Eckert Lane to Andregg Parkway	New two lane collector	Reconstruction	Urban	20 Year	Complete	$247,963	
U064	209	SE 282nd Avenue	282nd/Stone intersection	Add turn lanes	Reconstruction	Rural	5 Year	Complete	$242,445	Realign two legs of Stone Road and add turn lanes on 282nd. Multnomah Co is lead and funds coming through HEP grant with match from Multnomah Co and Clackamas Co.
U096	26	Fuller Road	King Road to Harmony Road	Add bike lanes and sidewalks	Bike / Ped	Urban	5 Year	Complete	$182,934	
U100	30	Monterey Avenue	82nd Avenue to Fuller Road	New (2) lane extension	Connectivity	Urban	20 Year	Programmed		
U101	32	Monterey Overpass	Extend Monterey over I-205	Construct overpass to Frontage Road		Urban				
U153	96	Roots Road/McKinley Road	I-205 to Webster Road	Reconstruct and widen (3 lanes)	Bike / Ped	Urban	20 Year	Complete	$336,657	
U158		Lawnfield Rd	98th Ct to 97th Ave	Design roadway improvements	Project Design	Urban	5 Year	Programmed	$900,000	See RTP 10042 and 2001 TSP 101. Supports Sunrise JTA Project
U362	101	Lawnfield realignment	Lawnfield Rd to Sunnybrook Blvd	Realign existing Lawnfield Rd from 98th to 97th					$37,968,266	See U158
U371		US-26	East Wildwood Avenue/Highway-26 intersection	Install continuous two-way center turn lane from m.p. 38.75 to 40.01						
U525	61	Sunnyside Road Phase 3	152nd Avenue to 172nd Avenue	Widen to (5) lanes, with bridge , Install traffic signal and left-turn lanes	Road Capacity	Urban	5 Year	Complete	$23,266,050	
U538	S51	I-205/Hwy 213 Interchange Phase 1	Redland Rd O'Xing, I-205	Construct jug handle at Hwy 213/Washington St with roundabout at Clackams Dr; Hwy 213/Redland Rd lane imporvements. Improve access to regional center and enhance freeway operations and safety.				Programmed	$48,848,061	
U556		Hwy-212/224 improvements	82nd to 98th	Construct 3rd WB lane on Hwy. 212/224 Relieve congestion and provide better access to the Milwaukie and Clackamas Industrial Areas.	Freight			Built	$29,604,886	
U676		Sager	162nd to Foster	Improve to collector standards (3 lanes), and signalize Sager @172nd.	Roads/bridges	Urban			$23,380,044	Check with 172nd plan
U676		Wilsonville Rd/1-5 Interchange Improvements - Setback Abutments and Widen	Town Center Loop W to Boones Ferry Rd	Provide additional left-turn lanes, setback abutments, improves signal synchronization, fixes sight distance problems, and provides for enhanced bike/pad safety.					$16,282,687	
U677		Wilsonville Rd/I-5 Interchange Improvements - On/Off Ramps	N and S of interchange	Widen and lengthen on/off ramps					$17,762,931	

Note:

Traffic signals may not be installed on the state system without the State Traffic Engineer's approval (OAR 734-020-0410). It must be demonstrated that a proposed signal: meets traffic signal warrants; satisfies highway design and spacing standards; and that the proposed signal improves the overall safety and operation of the intersection (OAR 734-020-0440). In cases where the proposed signal is less than the one-half mile minimum spacing standard, a progression analysis is also required (OAR 734-020-0470).

Installation of roundabout on ODOT facility will require ODOT approval including analysis of impacts on truck movement.

The full build transportation projects planned for Clackamas County are presented below, organized into 3 tables:

1. Capacity related projects modeled in the roadway and intersection operations analysis;
2. Comprehensive list of all projects, including multi-modal and safety related projects; and
3. Bicycle and Pedestrian projects

The following table list and describes all capacity projects included in the Full Build Scenario modeling. The first section of projects noted in gray are also included in the Low Build Scenario modeling.

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U556		Hwy-212/224 improvements	82nd to 98th	Construct 3rd WB lane on Hwy. 212/224 Relieve congestion and provide better access to the Milwaukie and Clackamas Industrial Areas.	Freight			Built	$29,604,886	
U676		Sager	162nd to Foster	Improve to collector standards (3 lanes), and signalize Sager @172nd.	Roads/bridges	Urban			$23,380,044	Check with 172nd plan
U676		Wilsonville Rd/1-5 Interchange Improvements - Setback Abutments and Widen	Town Center Loop W to Boones Ferry Rd	Provide additional left-turn lanes, setback abutments, improves signal synchronization, fixes sight distance problems, and provides for enhanced bike/pad safety.					$16,282,687	
U677		Wilsonville Rd/I-5 Interchange Improvements - On/Off Ramps	N and S of interchange	Widen and lengthen on/off ramps					$17,762,931	
U004	94	Webster Road	Webster/Jennings and Roots intersection	Construct traffic signals, turn lanes		Urban				See U039
U045	63	Sunnyside Road	Sunnyside Road/SE 172nd Ave Intersection	Install traffic signals and left-turn lanes	Intersection	Urban				
U057	71	SE 122nd Avenue	Sunnyside Road to Hubbard Road	Reconstruct and widen (3 lanes), add turn lanes	Bike / Ped	Urban	5 Year	Programmed	$598,000	Sidewalk connections on 122nd and 132nd between Sunnyside & Hubbard. Safe Routes to School project.
U058	72	SE 132nd Avenue	Sunnyside Road to Hubbard Road	Upgrade to standards (3 lanes), add sidewalks	Bike / Ped	Urban		Programmed	$598,000	Sidewalk connections on 122nd and 132nd between Sunnyside & Hubbard. Safe Routes to School project.
U066	15	79th Ave Extension	Johnson Creek - King Rd	Build N-S collector (3 lanes) west of 82nd Ave					$18,917,522	See U85, project planning
U071	1	Johnson Creek Blvd.	36th to 45th	Widen to minor arterial standards (4 lanes)		Urban				
U072	2	Johnson Creek Blvd.	55th Avenue to Bell Avenue	Widen to (3) lanes		Urban	20 Year			See U74

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U074	4	Johnson Creek Blvd.	Bell Avenue to 82nd Avenue	Widen to (5) lanes plus bike lanes and sidewalks		Urban	20 Year			
U075	5	Clatsop Street/Luther Road	Luther - 72nd Ave. to 82nd: Clatsop, 82nd Ave. east to Fuller	Upgrade to collector standard (3 lanes) and signalize 82nd Avenue intersection		Urban	20 Year			
U076	6	West Collector	Luther Street to Johnson Creek Blvd.	Construct new collector (3 lanes)		Urban	20 Year			
U078	8	82nd Avenue	82nd Avenue/Johnson Creek Blvd. intersection	Add second southbound left-turn lane	Capacity	Urban	20 Year		$329,000	Dev Agency
U079	9	Fuller Road extension	Johnson Creek Blvd. to Hinkley Street	Extend street (2 lanes)		Urban	20 Year			
U080	10	King Road	Harrison/King/42nd intersection	Realign intersection, traffic signal		Urban				
U081	11	King Road	King/Stanley intersection	Add turn lanes to Stanley		Urban	20 Year			
U082	12	Linwood Avenue	Linwood/Monroe intersection	Add curbs/sidewalks, improve horizontal alignments		Urban	20 Year		$8,557,277	
U087	17	Johnson Creek Blvd.	1-205 - Johnson Creek interchange	Connect southbound off-ramp with Fuller, remove signal, upgrade with new ramps	Capacity	Urban	20 Year		$9,800,000	Dev Agency: Add loop ramp and northbound on-ramp, realign southbound offramp
U088	18	Fuller Road	Otty Street to Johnson Creek Blvd.	Widen to (3) lanes. Widen street, add turn lanes, sidewalks, on-street parking, central median and landscaping.	Connectivity	Urban	5 Year		$5,920,977	Dev Agency
U089	19	Otty Street Realignment	Otty Street/82nd Avenue/Otty Road	Realign Otty Street with Otty Road at 82nd Avenue	Capacity	Urban	20 Year		$1,600,000	Dev Agency
U090	20	Otty Road	82nd Avenue to 92nd Avenue	Improve to minor arterial standard (4 lanes). Widen street, add turn lanes, on-street parking, central median, landscaping, add bike lanes and sidewalks	Connectivity	Urban	5 Year		$11,000,000	Dev Agency
U091	21	Fuller Road	Otty to King/82nd Avenue	New (2) lane extension	Connectivity	Urban	20 Year		$22,490,275	Dev Agency
U092	22	Fuller Road disconnect	Fuller Road/King Road intersection	Disconnect Fuller auto access to King Road	Capacity	Urban	20 Year		$150,000	Dev Agency: convert to right-in/right-out, remove westbound travel lane, install bike lanes, modify traffic signal
U093	23	Monroe Street	72nd Avenue to Fuller Road	Improve to collector standard (3 lanes)		Urban	20 Year			
U094	24	Boyer Drive	82nd Avenue to Fuller Road	New (2) lane extension	Connectivity	Urban	20 Year		$3,700,000	Dev Agency
U095	25	Fuller Road	King Road to Harmony Road	Reconstruct and widen road to collector standards (3lanes)		Urban	20 Year			
U097	27	Causey Avenue	Fuller Road to I-205	Widen (3 lanes) and add bike lanes	Safety	Urban	20 Year		$6,900,000	Dev Agency.
U099	29	SE 85th Avenue	Causey Avenue to Monterey Avenue	Improve to collector standard (3 lanes) with bike lanes and sidewalks		Urban	20 Year		$250,000	Dev Agency: sidewalks and sharrows
U102	33	Lake Road	Highway 224 west to Milwaukie city limits	Reconstruct, widen (4 lanes), turn lanes		Urban	20 Year			See RTP 10094
U104	35	Harmony Road	82nd Avenue - Highway 224	Widen to (5) lanes	Project Planning	Urban	5 Year	Planning	$1,823,376	Planning only to determine best design for this corridor. Phase added to complement Sunnybrook Extension West project. See RTP 10003
U109	40	82nd Avenue	Sunnyside Road to Sunnybrook Road	Widen to (7) lanes with boulevard	Capacity	Urban	20 Year		$2,700,000	Dev Agency
U116	47	Johnson Creek extension	Altamont to Idleman Road	New (2) lane extension		Urban	20 Year			
U117	48	Idleman Road	Johnson Creek extension to Mt. Scott Blvd.	Reconstruct and widen to urban minor arterial standards (4 lanes), smooth curves		Urban	20 Year			

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U118	49	Mt. Scott Blvd.	Idleman/Mt. Scott intersection	Realign and add left-turn lanes		Urban	20 Year			
U119	50	Mt. Scott Blvd./King Road	Idleman Road to 132nd Avenue	Reconstruct and widen (urban) (3 lanes). Improve grade.		Urban	20 Year			See U592
U120	51	King Road	King Road/129th intersection	Add turn lanes, realign		Urban	20 Year			
U121	52	SE 132nd Avenue	King Road to Clatsop Street	Widen to (3) lanes		Urban	20 Year		$9,138,548	
U122	53	King Road	132nd Avenue to 147th Avenue	Reconstruct, widen (3 lanes), turn lanes		Urban	20 Year			See U592
U123	54	SE 122nd/129th Avenue	Sunnyside to King Road	Widen to (3) lanes		Urban	20 Year		$19,776,064	
U124	55	Causey extension	I-205 Frontage Road to W. Otty Road	Collector (3 lanes) with bike lanes and sidewalks		Urban	5 Year		$20,174,249	
U125	56	William Otty Road extension	Stevens Road to Valley View Terrace	New (2) lane collector		Urban	20 Year			
U126	57	Valley View Terrace	Sunnyside Road to William Otty Road	Upgrade to collector (3 lanes) with bike lanes and sidewalks		Urban	20 Year			
U128	66	Foster Road	Tillstrom Road to Multnomah County Line	Four lane widening with left-turn lanes		Urban	20 Year			See RTP 10035
U129	67	Foster Road	Foster Road/Tillstrom Road intersection	Install traffic signal, install southbound left-turn lane		Urban	20 Year			See RTP 10035
U130	68	Mather Road	97th Avenue to 122nd Avenue	Reconstruct and widen (urban) (3 lanes).		Urban	20 Year			
U132	70	Mather Road	122nd Avenue to 132nd Avenue	New (2) lane extension		Urban	20 Year			
U133	73	Summers Lane Ext. Phase 2	122nd Avenue to 132nd Avenue	New (2) lane extension		Urban				
U135	75	SE 142nd Avenue	Sunnyside Road to Highway 212	Widen to (3) lanes		Urban	20 Year		$31,108,569	
U136	77	SE 152nd Avenue Phase 2	Sunnyside Road to Highway 212	Reconstruct and widen (urban) (3 lanes)		Urban	20 Year			
U137	78	River Road	Milwaukie to Gladstone	Reconstruct and widen (urban) (3 lanes)		Urban	20 Year			
U139	80	River Road	River Road/Concord Road intersection	Install traffic signal and left-turn lanes		Urban	20 Year			
U140	81	Concord Road	River Road to Oatfield Road	Reconstruct and widen (urban) (3 lanes)		Urban	20 Year			
U141	82	Oatfield Road	Oatfield Road/Park Road intersection	Install traffic signal and left-turn lanes			20 Year		$2,010,394	
U143	84	Oatfield Road	Oatfield Road/Hill Road intersection	Install left-turn lanes, install signal if warranted		Urban	20 Year		$2,447,880	
U144	85	Oatfield Road	Oatfield Road/Concord Road intersection	Widen, add turn lanes		Urban	20 Year			
U145	87	Oatfield Road	Oatfield Road/McNary Road intersection	Add turn lanes		Urban	20 Year			
U146	88	Aldercrest Drive	Thiessen Road to Oatfield Road	Reconstruct and widen (urban) (3 lanes)		Urban	20 Year			
U148	90	Thiessen Road	Thiessen Road/Hill Road intersection	Widen, add left-turn lane on Thiessen Road		Urban	20 Year		$2,528,644	
U149	91	Jennings Road	Oatfield Road to Webster Road	Reconstruct and widen (3 lanes)		Urban	20 Year			
U150	92	Webster Road	Highway 224 to Gladstone City limits	Widen to (3) lanes and conduct Highway 224 corridor study		Urban	20 Year			
U151	93	Webster Road	Webster Road/Lake Road intersection	Add left-turn lanes		Urban	20 Year			
U152	95	Webster Road	Webster/Strawberry Lane intersection	Install traffic signal, left-turn lanes	Roads/bridges & Pedestrian	Urban	20 Year			See RTP 10065

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U154	97	Johnson Road/McKinley Road	Lake Road to I-205	Reconstruct and widen (urban) (3 lanes)		Urban	20 Year		$23,989,627	
U156	99	SE 82nd Drive	Highway 212 to Gladstone Phase 2	Widen to (5) lanes		Urban	20 Year		$52,860,545	
U159	103	Mather Road	SE 82nd Drive to Industrial Way	Extend Mather Road across railroad to SE 82nd Drive		Urban	20 Year			
U160	104	Mather Road	Industrial Way to 98th	Widen to (3) lanes		Urban	20 Year			
U161	107	Bangy Road	Bangy/Meadows intersection	Install traffic signal, turn lanes		Urban				
U162	108	Bangy Road	Bangy/Bonita intersection	Install traffic signal, turn lanes		Urban				
U163	109	Carman Drive	I-5 to Quarry Road	Reconstruct and widen (3 lanes), add turn lanes		Urban	20 Year			RTP (add bike lanes)
U164	110	Carman Drive	Carman/Meadows Road intersection	Install traffic signal, turn lanes		Urban				
U167	113	Borland Road	65th Avenue to Stafford Road	Four lane widening with left-turn lanes		Urban	20 Year		$40,516,330	
U168	115	Stafford Road	Childs Rd to Rosemont Rd	Four lane widening with SB turn land and NB turn lane	Reconstruction	Rural	20 Year			
U169	116	Stafford Road	Stafford/Childs Road intersection	Install traffic signal, southbound turn lane and northbound turn lane		Urban	20 Year			
U170	117	Stafford Road	Johnson Road to Childs Road	Four lane widening with left-turn lanes		Urban	20 Year			
U171	118	Stafford Road	Borland Rd to Johnson Rd	Four lane widening with left-turn lanes		Rural	20 Year			
U172	121	Stafford Road	I-205 to Borland Rd	Four lane widening with left-turn lanes		Rural	20 Year			
U173	122	Rosemont Road	Stafford Road to Parker Road	Reconstruct and widen (3 lanes)		Urban	20 Year			
U174	123	Rosemont Road	Rosemont/Parker/Day intersection	Realign intersection, add turn lanes		Urban				
U177	126	Stafford Road	Mountain Rd to I-205	Four lane widening with left-turn lanes		Rural	20 Year			
U178	128	Stafford Road	Newland Rd to Mountain Rd	Four lane widening with left-turn lanes		Rural	20 Year			
U179	129	Stafford Road	Boeckman Rd (Advance Rd) to Newland Rd	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U180	130	65th Ave/Elligsen/Stafford Rd.	Elligsen Road to Stafford Road	Realign Elligsen Road to south, install north bound right-turn and southbound left-turn lane at new Stafford Road/Elligsen Road intersection		Urban	20 Year		$4,440,733	
U184	134	Springwater Road	Highway 224 to Hattan Road	Four lane widening with left-turn lanes, widen bridge over Clack. River		Urban	20 Year			
U186	137	Forsythe Road	Clackamas River Drive to Bradley Road	Reconstruct and widen (rural) (3 lanes)		Urban	20 Year			
U187	138	Forsythe Road	Forsythe Road/Victory Road intersection	Realignment, widening of Victory Road and removal or decrease ofcurves along Forsythe Road, relocation of intersection		Urban	20 Year			
U188	139	Gronlund Road/Hattan Road	Bradley to Springwater	Reconstruct and widen (rural) (3 lanes)		Urban	20 Year			
U189	140	Hattan Road	Hattan Road/Gronlund Road intersection	Install southbound right-turn lane		Urban	20 Year			
U190	141	Hattan Road	Fischers Mill Road to Gronlund Road	Reconstruct and widen (rural) (3 lanes)		Urban	20 Year			
U191	142	Abernethy Road	Redland Road to Main Street	Realign 17th Street intersection, widen to (5) lanes		Urban	20 Year			

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U193	144	Holcomb Blvd.	Holcomb Blvd./Bradley Road intersection	Realignment of Holcomb Road to form one intersection at Bradley Road		Urban	20 Year			
U194	145	Bradley Road	Redland Road to Holcomb Blvd.	Widen lanes and shoulders to County standards (3 lanes)		Urban	20 Year			
U198	149	Redland Road	Henrici Road to Abernethy Road	Reconstruct and widen (4 lanes)		Urban				
U199	150	Redland Road	Redland/Ferguson Road intersection	Install eastbound right-turn lanes and westbound left-turn lanes		Urban				
U200	151	Ferguson Road	Redland Road to Maplelane Road	Remove or decrease horizontal curve along Redland Road, relocate intersection, install eastbound right-turn lanes and westbound left-turn lanes		Urban	20 Year			
U201	152	Redland Road	Redland/Bradley Road intersection	Install eastbound left turn and westbound right-turn lanes		Urban				
U202	153	Redland Road	Redland/Grassle Road intersection	Remove bank and remove or decrease horizontal curve, relocate intersection		Urban				
U203	154	Fischers Mill Road	Fischers Mill/Hattan Road intersection	Install eastbound left-turn lane		Urban	20 Year			
U204	155	Redland Road	Redland/Fischers Mill/Henrici Road intersection	Install eastbound left-turn lane and east and westbound right-turn lane at Henrici Road		Urban				
U208	159	Highway 213	Beavercreek/Highway 213 intersection	Add dual left-turn lanes and ramps		Urban				
U210	161	Henrici Road	Highway 213 to Beavercreek Road	Widen lanes (3 lanes) and shoulders to County standards		Urban	20 Year			
U211	162	Beavercreek Road - goes into rural area	Leland Road to Henrici Road	Three lane widening		Urban				
U214	165	Sound End Road	Warner Parrott Road to 99E	Widen (2) lanes and smooth curves		Urban	20 Year			
U219	201	Foster Road	Highway 212 to Troge Road	Four lane widening with left-turn lanes		Rural	20 Year			See RTP 10035
U220	202	Tillstrom Road	SE 190th Drive to Foster Road	Remove or decrease horizontal curve along Foster Road, relocate intersection, install southbound left-turn lane		Rural	20 Year			
U223	205	SE 242nd Avenue	242nd/Sunshine Valley Road intersection	Install northbound right-turn lane		Rural	20 Year			
U224	206	SE 242nd Avenue	242nd/Tillstrom Road intersection	Install northbound left-turn lane and southbound right-turn lane		Rural	20 Year			
U228	211	SE 232nd Avenue	Highway 212 to Highway 224	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U229	212	Richey Road	Kelso Road to Highway 212	Reconstruct and widen (rural) (3 lanes), add turn lanes		Rural	20 Year			
U231	214	Amisigger Road	Highway 224 to Kelso/Richey Road	Reconstruct and widen (rural) (3 lanes), smooth curves		Rural	20 Year			
U232	215	Kelso Road	Richey Road to Orient Drive	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U237	220	Ten Eyck Road	Lusted Road to US 26	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U246	229	Multorpor Overpass	Highway 26/Multopor Drive intersection	Add eastbound right-turn lane		Rural				
U247	230	Bakers Ferry Road	Springwater Road to Highway 224	Reconstruct and widen (rural) (3 lanes)		Rural				
U249	232	Springwater Road	Hattan Road to Hayden Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U250	233	Springwater Road	Springwater/Bakers Ferry Road intersection	Install southbound left-turn lane		Rural	20 Year			
U251	234	Springwater Road	Springwater/Fischers Mill Road intersection	Perform special study, install southbound right-turn lane		Rural	20 Year			
U252	235	Springwater Road	Springwater/Redland Road intersection	Install northbound left-turn lane		Rural	20 Year			
U253	236	Springwater Road	Springwater/Hayden Road intersection	Install southbound left-turn lane		Rural	20 Year			
U254	237	Hayden Road	Springwater Road to Highway 211	Reconstruct and widen (rural) (3 lanes), intersection improvements		Rural	20 Year			
U256	239	Eagle Creek Road	Keegan Road to Currin Road	Perform additional safety analysis at Wildcat Mountain Drive, widen lanes (3 lanes) and shoulders to County standards		Rural	20 Year			
U257	240	Eagle Creek Road	Currin Road to Duus Road	Remove or decrease horizontal curve along Eagle Creek Road, relocate intersection, widen lanes (3 lanes) and shoulders to County standards, investigate speed zone south of Currin Road		Rural	20 Year			
U258	241	Coupland Road	Eagle Creek Road to Divers Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U260	243	Fellows Road	Redland Road to Lower Highland Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U261	244	Ridge Road	Lower Highland Road to Redland Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U262	245	Redland Road	Henrici Road to Springwater Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U263	246	Lower Highland Road	Beavercreek Road to Fellows Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U264	247	Unger Road	Beavercreek Road to Highway 211	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U265	249	Beavercreek Road	Beavercreek/Leland Road intersection	Add turn lanes		Rural	20 Year			
U269	253	Casto Road	Spangler Road to Central Point Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U270	254	Spangler Road	Casto Road to Beavercreek Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U272	256	Ladd Hill Road	Wilsonville Road to Washington County Line	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U276	261	Airport Road	Airport/Miley Road intersection	Realign, add turn lanes, install traffic signal		Rural	20 Year			
U277	262	Airport Road	Arndt Road to Miley Road	Reconstruct and widen (rural) (4 lanes)		Rural	20 Year			
U279	264	Arndt Road	Canby-Hubbard Highway to Knights Bridge Road	Four lane widening with median, left-turn lanes		Rural	20 Year			
U290	275	Township Road	Central Point Road to Canby City limit	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U292	277	Mulino Road	Mulino Road to 13th Avenue, intersection 23	Relocate intersection to south away from railroad trestle, change of stop control to 13th Avenue		Rural	20 Year			
U294	279	Lone Elder Road	Lone Elder/Barlow intersection	Add left-turn lanes		Rural	20 Year			

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U295	280	Canby-Marquam Highway	Canby-Marquam Hwy/Lone Elder Rd intersection	Install northbound left-turn lane and southbound right-turn lane		Rural	20 Year			
U298	283	Canby-Marquam Highway	Canby-Marquam Hwy/Macksburg Rd intersection	Install southbound left-turn lane and northbound right-turn lane		Rural	20 Year			
U299	284	Dryland Road	Macksburg Road (S) to Macksburg Road (N)	Realignment of Macksburg Road to form one intersection at Dryland Road		Rural	20 Year			
U300	285	Macksburg Road	Canby Marquam Hwy to Highway 213	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U302	287	Union Mills Road	Highway 213 to Highway 211	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U311	295	Molalla Avenue/Vaughan (City of Molalla)	Highway 213 to Highway 211	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U314	299	Wright Road	Feyrer Park Road to Callahan Road	Widen lane and shoulder widths to County standards		Rural	20 Year			
U316	301	Fernwood Road	Dhooghe Road to Callahan Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U317	302	Dhooghe Road	Highway 211 to Fernwood Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U320	305	Sawtell Road	Maple Grove Road to Wilhoit Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U321	306	Wildcat Road	Wilhoit Road to Highway 213	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U322	307	Nowlens Bridge Road	Highway 213 to Maple Grove Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U323	308	Blair Road	Groshong Road to Maple Grove Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U325	310	Bird Road	Groshong Road to Wilhoit Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U326	311	Maple Grove Road	Nowlens Bridge Road to Sawtell Road	Reconstruct and widen (rural) (3 lanes)		Rural	20 Year			
U338	100	SE 82nd Drive	Highway 212 to Lawnfield Road	Widen to (5) lanes		Urban		Partial		See RTP 10022
U423		Hwy.-212 intersections	SE 162nd to Anderson Rd.	Existing Highway 212 remains two lanes with turn pockets from 162nd Ave. to Anderson Road south of limited access parkway. Design elements to be included are sidewalks, bike lanes, and a landscaped buffer.	Roads/bridges & Bike				$8,837,058	
U443	S37	Highway 224	Springwater Road/Hwy-224 intersection	Install traffic signal and turn lanes				Programmed		Signal only
U462	112	Childs Road	Stafford Road to 65th Avenue	Reconstruct and widen - 2/3 lanes		Urban				
U464		162nd Ave. Extension South Phase 1	Rock Creek Blvd. to Goose Hollow Dr.	Construct a new 2 - 3 lane roadway with intersection improvements at Hwy-212/162nd on all 4 approaches. The second phase is Project #11346.	Roads/bridges & Pedestrian				$7,401,221	
U466	131	Petes Mountain Road	Willamette Falls Road to Hoffman Road	Reconstruct and widen (rural) (3 lanes)		Urban		Partial		see U181
U469	133	Clackamas River Drive	Highway 213 to Springwater Road	Reconstruct and widen (rural) (3 lanes)		Urban				
U473	143	Holcomb Blvd	Abernethy Rd - Bradley Rd	Reconstruct and widen (3 lanes)					$30,774,279	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U475	156	Henrici Road	Beavercreek Rd to Redland Rd	Widen lanes (3 lanes) and shoulder to County standars, remove or decrease horizontal and vertical curves, investigate 40 mph speed zone extension to east of Ferguson Rd		Urban				See U205
U476	158	Beavercreek Rd	Hwy 213 to Molalla	Widen to (5) lanes		Urban				RTP 10025 partial
U477	160	Beavercreek Road	Highway 213 to Henrici Road	Widen to (5) lanes		Urban		Partial		
U484	204	SE 242nd Avenue	Highway 212 to Multnomah County Line	Reconstruct and widen (rural) (3 lanes), add turn lanes		Rural		Partial		See U222. Curve modification at 242nd/Borges
U485		162nd Ave. Extension South Phase 2	157th Ave. to Rock Creek Blvd.	Construct a new 3 lane roadway with traffic signals and bridge over Rock Creek. The first phase is Project #10041. Improve north-south connectivity and provide congestion relief to 172nd Ave.	Roads/bridges & Pedestrian				$23,091,811	
U489		65th	Nyberg to Childs Rd	Extension across the Tualatin River from Nyberg to Childs Road.	Roads/bridges & Pedestrian				$44,980,550	
U490		65th	Sagert to Nyberg	Widen to 5 lanes from Sagert to Nyberg.	Roads/bridges &				$56,975,363	
U495	219	Bull Run Road	Ten Eyck Road to Multnomah County Line	Reconstruct and widen (rural) (3 lanes)		Rural		Partial		
U501		Boeckman Rd./I-5 Overcrossing Improvements	Boberg Rd. to Parkway Ave.	Widen Boeckman Road bridge over I-5 to 3 lanes. Add bike/pedestrian connections to regional trail system. Boeckman Road is designated as an arterial street in the City's TSP.	Roads/bridges & Bike				$20,131,322	
U502	223	Firwood Road	Wildcat Mountain Drive to US 26	Reconstruct and widen (rural) (3 lanes)		Rural		Partial		See U240
U503	242	Mattoon Road	Fischers Mill Road to Redland Road	Widen lanes (3 lanes) and shoulders to County standards, remove or decrease vertical curves, remove or decrease horizontal curves north of Redland Road		Rural				
U504	278	Mulino Road (13th St segment)	Ivy Street to Highway 213	Widen to (3) lanes		Rural		Partial		
U505	298	Toliver Road	Between Highway 213 and Molalla Avenue	Install traffic signal, curb and sidewalk, widen and pave		Rural				see U65
U555		Hwy. 43 Improvements	Holly St. to Arbor Dr.	Improve roadway with widening, installation of medians, turn lanes, street trees, signal interconnections, and bike lanes.	Roads/bridges &				$31,677,228	
U580		Hwy 212 widening to 5 lane blvd	Sunrise Unit 1 Terminus - East Damascus limits	Widen Hwy 212 to a 5 lane blvd section through Damascus					$118,510,266	U537 - lane difference (center lane only) from Foster to Rust (2000 TSP) Assume RTP within Cities
U592		Mt. Scott Blvd./King Rd. Improvements	Happy Valley City Limits to 145th Ave.	Widen to three lanes. Improve access to Happy Valley Town Center.	Roads/bridges & Pedestrian				$62,433,003	See U119, U122
U595		New Connection, Damascus	177th to 190th	new arterial from the Rock Creek Blvd interchange. This portion within Damascus.	Roads/bridges & Transit capital				$40,111,167	
U608		Rock Creek Blvd. improvements	Hwy. 212/224 (planned Sunrise Corridor Rock Creek Interchange) to 177th Ave.	Construct a new 5 lane roadway with sidewalks, bike lanes and traffic signals	Roads/bridges				$50,842,171	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U610		SE Sunnyside Rd East Extension	SE 172nd Ave. to SE 242nd Ave.	Extend Sunnyside Road east from 172nd Ave to 242nd Ave. Evaluate alignment options between Bohna Park Road and Tillstrom Road for the connection from Foster Road to 242nd Ave.	Roads/bridges & Transit capital				$205,620,376	Impact on 172/190 project?
U673		162nd Ave. Extension North	Hagen Rd. to Clatsop St	Construct a new 3 lane roadway with traffic signals.	Roads/Bridges	Urban			$56,662,088	
U674		Rugg Rd	252nd Ave to 242nd Ave	Construction of new roadway that adds e/w capacity in vicinity Rugg Rd and connects Springwater Industrial area to Hwy 26	Roads/Bridges	Urban			$18,902,996	
U675		Cheldelin: 172nd to 190th	172nd to 190th	Improve existing road to minor arterial (4 lanes) standards, signalize Cheldelin at 172nd, 182nd, and Foster.	Roads/bridges	Urban			$29,302,195	
U677		162nd	Foster to southern boundary of Pleasant Valley	Improve 162nd to collector standards (3 lanes), add signal at Foster @ 162nd.	Roads/bridges	Urban			$21,236,546	
U678		172nd: Cheldelin south to Pleasant Valley boundary	Cheldelin to So. Boundary of Pleasant Valley	Improve 172nd Ave. to major arterial standards (3 lanes).	Roads/bridges	Urban			$12,806,179	Check with 172nd plan - 3 lanes
U679		Brookman Rd	99W to Ladd Hill Rd	Reconstruct road to collector standards.	Roads/bridges	Urban			$41,549,497	
U680		Ladd Hill Rd.	Sunset Blvd to UGB	Upgrade street to arterial standards (4 lanes).	Roads/bridges	Urban			$19,011,779	See U272 (3 lanes)
U681		Sunrise Project: Acquire right-of-way: Webster Rd. to SE 172nd Ave	Webster Rd./Hwy. 224 to 172nd Ave./Hwy. 212	Acquire right-of-way: Webster Rd. to SE 172nd Ave. to accommodate six-through lane expressway, plus auxiliary lanes.	Throughways	Urban			$214,635,421	
U682		Sunrise Hwy. PE: Webster Rd. to SE 172nd Ave	Webster Rd./Hwy. 224 to 172nd Ave./Hwy. 212	Preliminary engineering and EIS fromWebster Rd. to SE 172nd.	Throughways	Urban			$29,604,886	

Note:

Traffic signals may not be installed on the state system without the State Traffic Engineer's approval (OAR 734-020-0410). It must be demonstrated that a proposed signal: meets traffic signal warrants; satisfies highway design and spacing standards; and that the proposed signal improves the overall safety and operation of the intersection (OAR 734-020-0440). In cases where the proposed signal is less than the one-half mile minimum spacing standard, a progression analysis is also required (OAR 734-020-0470).

Installation of roundabout on ODOT facility will require ODOT approval including analysis of impacts on truck movement.

ODOT Rail Division approval required for new rail crossings.

The following table is a comprehensive list of all transportation projects planned in Clackamas County, including capacity-related, multi-modal, and safety projects.

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U010		Springwater Road	Springwater Rd/Hwy 224 intersection	Temporary signal	Other	Urban	5 Year	Partial	$398,774	TSP calls for signal and turn lanes. This project addresses the signal.
U011	248	Highway 213	Highway 213 to Leland intersection	Install traffic signal		Rural		Complete		
U013		Johnson Creek Boulevard	JCB/Bell Avenue intersection	Bike crossing signal	Bike / Ped	Urban		Programmed	$84,000	
U015		I-5/Wilsonville Interchange	I-5/Wilsonville	Reconstruct all interchange ramps and improve Wilsonville Road				Programmed		RTP 11071 calls for an aux lane but the current IAMP plan does not call for this.

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U017		Evelyn Street	Evelyn St/Jennifer St intersection	Intersection realignment, traffic signal	Reconstruction	Urban		Programmed	$938,447	Traffic signal, intersection realighnment. Remaining work limited to RR sidewalk crossing; working with ODOT to eliminate requirements
U022		Wilsonville Rd/Boeckman Rd	Wilsonville Rd/Boeckman Rd	Signalize intersection				Programmed		
U023	S55	Highway 213	Spangler Road/Hwy-213 intersection	Installation of southbound right-turn lane				Complete		
U024	S57	Highway 213	Union Mills Road/Hwy-213 intersection	Install northbound right-turn lane				Complete		
U025	S29	Highway 99E	South End Road/99E intersection	Realignment of South End Road approach, install southbound left-turn lane				Partial		TSP
U026	S14	US-26	Salmon River Road/Hwy-26 intersection	Install eastbound right-turn lane				Complete		TSP
U027		132nd Avenue/SE Hubbard Road		Eastbound left turn lane				Complete		
U028		172nd Ave/Hemrick Road		Southbound left turn lane				Complete		
U029		Harmony Road /Linwood Road/Railroad Ave		Northbound right turn overlap (not yet designed or constructed)				Programmed		
U030		Highway 213/Henrici Road	Highway 213/Henrici Road	Westbound right turn lane				Complete		
U031		Highway 224/Eckert	Highway 224/Eckert	Southbound right turn lane				Complete		
U032		Highway 224/Goosehollow	Highway 224/Goosehollow	Southbound right turn lane				Complete		
U033		Highway 224/Johnson Road	Highway 224/Johnson Road	Southbound queue storage increased				Complete		
U034		Highway 224/Springwater	Highway 224/Springwater	Traffic signal (not yet designed or constructed)				Programmed		Clackamas installed a temporary signal.
U035		I-205/Stafford North		Eastbound right turn lane, traffic signal				Complete		
U036		I-205/Stafford South		Westbound right turn lane, southbound right turn lane, traffic signal				Complete		
U037		Lawnfield Road/97th Avenue		Eastbound right turn lane				Complete		
U038		Monterey Ave/85th Ave		Traffic signal				Complete		
U040		Otty Road/Fuller Road		Eastbound & westbound left turn lanes, traffic signal				Complete		
U041		Stafford Road/Ek Road		Westbound right turn lane, traffic signal, southbound queue storage increased				Complete		
U042	S03	Sunnybrook Split Diamond	I-205 at Sunnyside and Sunnybrook	New overcrossing at Sunnybrook with collector/distributor roads				Complete		
U043		Sunnyside Road/8600 Block	Sunnyside Road/8600 Block	Westbound right turn lane				Complete		
U045		Sunnyside Road/9000 Block	Sunnyside Road/9000 Block	Westbound right turn lane				Complete		
U046	119	Stafford Road (2567)	Bridge	Reconstruct and widen to 50 feet	Bridge / Culvert	Rural	5 Year	Programmed	$10,248,931	2 travel lanes, bike lanes and sidewalks, no capacity change
U047		Springwater Road (1446)	Bridge	2 travel lanes. Traffic counts do not warrant more than two travel lanes at this time. No capacity change	Bridge / Culvert	Urban	5 Year	Partial	$13,927,077	Part of 135
U048	257	Wilsonville Road	Wilsonville/Ladd Hill Road intersection	Improve sight distance.	Other	Rural	5 Year	Complete	$101,366	Original TSP project is to construct new railroad crossing but there is no rail at this location

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U049		95th/Boones Ferry/Commerce Circle intersection Improvements	95th Ave. to Southbound off-ramp of I-5/Stafford Interchange	Construct dual left-turn and right-turn lanes; improve signal synchronization, access manaagement & sight-distance Reduce congestion & improve feight access into regionally signficant industrial lands	Freight & Roads/bridges			Programmed	$3,700,611	In WA Co
U050		King Road	King Rd/Bell Ave intersection	Signal repair	Other	Urban		Programmed	$155,806	Repair signal damaged by uninsured motorist
U055	3	Johnson Creek Bridge (6135)	Bridge	Reconstruct and widen bridge to (5) lanes (74 ft)		Urban		Partial		see U73
U056	64	SE 147th Avenue	Sunnyside Road to Monner Road	Realign road to improve grade	Road Capacity	Urban	5 Year	Complete		
U059	76	SE 152nd Avenue Phase 1	Right angle curves	Realign curves to collector standards	Reconstruction	Urban	5 Year	Complete	$514,496	
U065		Toliver Road	Between Highway 213 and Molalla Avenue	Street, drainage, & pedestrian improvements. No signal installed.	Reconstruction	Rural		Partial	$1,173,469	Part of 298
U067	S21	US-26	Govt. Camp Loop (E.)/Hwy-26 intersection	Improve safety, operation and access of Government Camp Loop Road with Highway 26, reduce traffic impacts of existing rest area at this location				Complete		
U068	S31	Highway 99E	Territorial Road/99E intersection	Install traffic signal				Complete		
U069		139th Avenue	S of Sunnyside Avenue	Park access	Road Capacity	Urban		Complete	$515,279	Extend 139th Avenue for approx. 900 feet including curbs and sidewalks.
U070	S61	Highway 213	Barnards Road/Hwy-213 intersection	Install southbound right-turn lane				Complete		
U073		Johnson Creek Bridge (6135)	Bridge (6135)	New structure accommodates 2 travel lanes, sidewalks and bike lanes. Old bridge replaced due to structural and functional deficiencies.	Bridge / Culvert	Urban	5 Year	Partial	$3,184,566	Part of 3
U077	7	82nd Avenue	Clatsop Street to Johnson Creek Blvd.	Widen to (5) lanes with bike lanes and sidewalks		Urban				
U083	13	Stanley Road (6455)	Bridge	Reconstruct and widen to 32 feet		Urban	20 Year			
U084	14	Wichita Road	Bridge	Reconstruct and widen to 32 feet		Urban	20 Year			
U085		West Collector (79th)	Johnson Creek Blvd. to King Road	Construct new collector	Project Planning	Urban	5 Year	Study	$16,615	Alignment study only. RTP #10008 Calls for new collector: 2008-2017, $18917522
U086	16	82nd Avenue	Johnson Creek Blvd. to Causey Avenue	Widen to (5) lanes + bike lanes		Urban	20 Year			
U098		Causey Avenue	Extend Causey over I-205 to Frontage Road	Construct (3) lane overpass to Frontage Road	Project Planning	Urban	20 Year	Study	$35,755	Feasibility study. Construction beyond the County's funding capabilities. Project permanently on hold. See U645
U103	34	Harmony Road	Lake Rd/Linwood Ave/Harmony Rd intersection	To be determined after additional planning work		Urban				

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U105	35	Harmony Road	Linwood Avenue to 82nd Avenue	ITS and pedestrian improvements	ITS	Urban	5 Year	Programmed	$1,685,170	Construct various signal improvements at 82nd Avenue/Harmony Road/Sunnyside Road, Harmony Road/ Fuller Road, Harmony Road/ NCPRD Access, and Harmony Road/ Linwood Avenue/ Railroad Avenue. Install sidewalk on the west side of 82nd Avenue from Harmony Road to Sunnybrook Boulevard on Sunnyside Road from Clackamas Town Center to 82nd Avenue, on Harmony Road from 82nd Avenue to Clackamas Community College and connect multiuse path from Clackamas Town Center to 82nd Avenue. Install fiber optic communication from 82nd Avenue to Linwood Avenue. Install ADA improvements at various locations.
U106	37	82nd Avenue	Causey Avenue to Sunnyside Road	Boulevard treatment	Boulevard	Urban	20 Year		$5,450,000	Dev Agency
U107	38	Phillips Creek multi-use path	Causey Avenue to North Clackamas Trail	Construct multi-use path	Multiuse Path	Urban			$3,360,155	Dev Agency
U108	39	North Clackamas Trail	84th Avenue to Park Complex	Construct trail		Urban	20 Year			
U110		Sunnyside Road	82nd Avenue to I-205	Paving and video detection upgrade		Urban		Complete	$1,588,841	
U111	42	I-205 multi-use path	Clatsop Street to Mt. Scott Creek	Multiple local connections to path	Trail	Urban	20 Year		$1,000,000	Dev Agency
U112	43	I-205 Frontage Road	Sunnyside Road to 92nd Avenue	New Frontage Road east of I-205		Urban		Complete		Bob Schumacher
U113		Stevens Road	Hillcrest Road to Monterey Avenue	Overlay paving and 36" stormline replacement	Reconstruction	Urban		Complete	$265,395	
U114	45	Hillcrest Street	92nd Avenue to Stevens Road	Add sidewalks		Urban				
U115	46	Idleman Road redesignation	92nd Avenue to Johnson Creek Blvd. extension	Downgrade to collector + provide bike lanes and sidewalks		Urban	20 Year			
U127	65	SE 172nd Avenue	Sunnyside Road to Multnomah County Line	Four lane widening with left-turn lanes, ext. of 172nd Ave to Hwy 214	Project Planning	Urban	5 Year	Planning	$2,322,090	Enhanced Planning only. RTP calls for 5 lanes
U131	69	Mather Road	Mather Road/122nd Avenue intersection	Install traffic signal		Urban	20 Year			
U134	74	Summers Lane Ext. Phase 3	132nd Avenue to 142nd Avenue	New (2) lane extension	Road Capacity	Urban		Cancelled	$9,280	Project killed
U138	79	River Road	River Road/Courtney Road intersection	Improve sight distance		Urban	20 Year			
U142	83	Oatfield Road	Oatfield Road/Courtney Road intersection	Install traffic signal		Urban	20 Year			
U147	89	Kuehn Road (6262)	Bridge	Reconstruct and widen to 32 feet		Urban	20 Year			
U155	98	Strawberry Lane	Strawberry Lane/82nd Drive intersection	Install traffic signal		Urban	20 Year			
U157		82nd Drive	Hwy 212 to Lawnfield	Paving overlay	Reconstruction	Urban	20 Year	Complete	$505,989	
U165	111	Carman Drive	Carman Drive/Parkview/Fosberg Rd. intersection	Install traffic signal, channelization		Urban	20 Year			
U166		Childs Road	Stafford Rd to Lake Oswego limits	Paving overlay	Reconstruction	Rural	20 Year	Complete	$626,200	
U175	124	Parker Road	Rosemont Road to Sunset Road	Reconstruct and widen (urban)		Urban				Not Clackamas Jurisdiction. West Linn's?
U176	125	Willamette Falls Drive	Highway 43 to 10th Avenue	Reconstruct and widen (urban)		Urban				Not Clackamas Jurisdiction. West Linn's?
U181		Petes Mountain Road	Willamette Falls Road to Schaeffer Road	Guardrail installation	Other	Rural	20 Year	Partial	$27,584	Part of 131

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U182	132	Forsythe Road	Railroad crossing between Clackamas and Boardwalk	Add/upgrade railroad crossing		Urban	20 Year			
U183		Clackamas River Drive	Clackamas River Drive	Slide repair	Reconstruction	Rural	20 Year	Complete	$198,460	
U185	136	Springwater Road (6512)	Bridge	Reconstruct and widen to 36 feet		Urban	20 Year			
U192	143	Holcomb Blvd.	Abernethy Road to Bradley Road	Completed widening to accommodate bike lanes and sidewalk on Holcomb between Front Avenue and Winston Drive. Partially funded by City of Oregon City.	Bike / Ped	Urban	20 Year	Partial	$780,976	Part of 2001 TSP 143
U195	146	Redland Road (1214)	Bridge	Reconstruct and widen to 36 feet		Urban	20 Year			
U196	147	Redland Road (1215)	Bridge	Reconstruct and widen to 36 feet		Urban	20 Year			
U197	148	Redland Road	Redland Road/Holly Road intersection	Install traffic signal		Urban	20 Year			
U205		Henrici Road	500' W of Athens Drive	Stormwater redesign	Project Design	Rural		Programmed	$440,932	Part of 156
U206	157	Henrici Road (6228)	Bridge	Reconstruct and widen to 36 feet		Urban	20 Year			
U207		Beavercreek Rd. Improvements Phase 2	Hwy 213 to Clackamas Community College	Widen to 5 lanes with sidewalks and bike lanes. Address safety, relieve congestion and improve multi modal access to the Beavercreek Industrial Area.	Roads/bridges & Pedestrian	Urban	20 Year			2001 TSP 158 extends to Molalla Ave from CCC
U209		Beavercreek Road	Marjorie Road to Henrici Road	Paving overlay	Reconstruction	Urban	5 Year	Complete	$1,603,290	
U212	163	Maple Lane (6218)	Bridge	Reconstruct and widen to 32 feet		Urban	20 Year			
U213	164	Leland Road (6091)	Bridge	Reconstruct and widen to 36 feet		Urban	20 Year			
U215	41	Sunnyside Road	82nd Avenue to 97th Avenue	Restripe to add bike lanes		Urban				
U216	186	Tualatin River (Borland Rd.) Bridge	Bridge 6507	Replace existing bridge			5 Year			
U217	190	Kellogg Creek Drive	Kellogg Creek Drive/Rusk Road intersection	Improve sight distance at intersection and improve ped/bike access	Reconstruction	Urban	5 Year	Complete	$299,465	
U218	200	Sunnyside Road	172nd Avenue and Highway 212	Realign curves, widen to add shoulders, install traffic signal at Highway 212		Rural	20 Year			
U221	203	Tillstrom Road	SE 222nd Drive to Borges Road	Remove or decrease vertical curve along 222nd Drive, relocate intersection		Rural	20 Year			
U222		242nd Ave/Borges	242nd Ave/Borges	Widen and modify curve	Reconstruction	Rural	5 Year	Partial	$717,835	Part of 2001 TSP 204, Part of RTP 10038
U225	207	Hoffmeister Rd/SE 257th Ave	Highway 212 to 242nd Avenue	Remove or decrease vertical curve along 242nd Ave., relocate intersection		Rural	20 Year			
U226	208	SE 282nd Avenue	Highway 212 to Multnomah County Line	Widen shoulders to County standard		Rural	20 Year			
U227	210	Compton Road	US 26 to 352nd Avenue	Remove or decrease vertical curve along Orient Drive, relocate intersection, widen to standards		Rural	20 Year			
U230	213	Richey Road	Kelso/Richey Road intersection	Perform special study		Rural	20 Year			
U233	216	Kelso Road	Orient Drive to Sandy UGB	Remove or decrease vertical curve along Orient Drive, relocate intersection, widen shoulders to County standard, investigate speed zone		Rural	20 Year			

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U234	217	SE 362nd Drive	Colorado Road to Dubarko Road	Remove or decrease horizontal and vertical curves		Rural	20 Year			
U235	218	SE 362nd Drive	362nd/Deming Road intersection	Remove or decrease vertical curve along SE 362nd Drive, relocate intersection		Rural	20 Year			
U236		Bull Run Road	Bridge (Bull Run River)	Bridge rehabilitation	Bridge / Culvert	Rural	20 Year	Complete	$386,285	
U238	221	Ten Eyck Bridge (6570)	Bridge	Reconstruct and widen to 32 feet	Bridge / Culvert	Rural	5 Year	Complete	$4,357,056	New structure accommodates 2 travel lanes and shoulders. Old bridge replaced due to structural and functional deficiencies.
U239	222	Firwood Road	Firwood/Trubel Road intersection	Realign Trubel Road to remove or decrease downgrade		Rural	20 Year			
U240		Firwood Road	Deep Creek	Curve Improvement. Widen and add guardrail	Other	Rural	20 Year	Partial	$123,274	Part of 223
U241	224	Welches Road	Highway 26 to Salmon River Road	Reconstruct and widen		Rural	20 Year			
U242	225	Arrah Wanna (6572)	Bridge	Reconstruct and widen to 32 feet	Bridge / Culvert	Rural	5 Year	Programmed	$2,471,853	
U243	226	Elk Park Road (6574)	Bridge	Reconstruct and widen to 32 feet	Bridge / Culvert	Rural	20 Year	Programmed	$2,661,738	Replace existing one-lane bridge with new two-lane bridge
U244	227	East Bridge South (6605)	Bridge	Reconstruct and widen to 32 feet		Rural				
U245	228	Lolo Pass Road	Highway 26 to Barlow Trail Road	Perform addtl. safety analysis, widening of shoulders to County standards		Rural	20 Year			
U248	231	Bakers Ferry Road	Eaden Road to Highway 224	Remove or decrease horizontal curve along Bakers Ferry Road, relocate intersection		Rural	20 Year			
U255	238	Springwater Road	Hayden Road to Highway 211	Widen shoulders to County standard		Rural	20 Year			
U259		Mattoon Road	Bridge (Spring Creek)	Replace culvert with 30' bridge	Bridge / Culvert	Rural	20 Year	Complete	$670,368	
U266	250	Beavercreek Road	Beavercreek/Williams Road intersection	Remove or decrease vertical curve along Beavercreek Road, relocate intersection		Rural	20 Year			
U267	251	Central Point Road	Partlow Road to Mulino Road	Widen 2/3 lanes, smooth curves		Rural	20 Year			
U268	252	New Era Road	Central Point Road to Penman Road	Perform additional safety analysis		Rural	20 Year			
U271	255	Kamrath Road	Carus Road to Spangler Road	Perform additional safety analysis at Carus Road, widen lanes and shoulders to County standards, remove or decrease horizontal curves north of Spangler Road		Rural	20 Year			
U273	258	Wilsonville Road	Wilsonville/Edminston Road intersection	Remove bank, remove or decrease horizontal curve along Wilsonville Road, relocate intersection		Rural	5 Year			
U274	259	Denbrook Road	Railroad crossing west of Boones Ferry Road	Add/upgrade railroad crossing		Rural	20 Year			
U275	260	Boones Ferry Road	Boones Ferry/Butteville Road intersection	Remove bank, remove/decrease horizontal curve		Rural	20 Year			
U278	263	Arndt Road	Arndt/Airport Road intersection	Install traffic signal		Rural	20 Year			
U280	265	Arndt Road	Barlow Road to Knights Bridge Road	Remove or decrease horizontal curves, widen lanes and shoulders to County standards	Reconstruction	Rural		Complete	$324,996	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U281	266	Barlow Road	Arndt/Barlow Road intersection	Widen intersection		Rural	20 Year			
U282	267	Arndt Road	Knights Bridge to 99E	New (5) lane road	Project Design	Rural	20 Year	Cancelled	$76,993	prelim design only. Project killed, price tag was too high.
U283	268	Knights Bridge Road	Arndt Road to Barlow Road	Remove or decrease horizontal curves at Arndt Road and 0.47 miles west of Barlow Road		Rural	20 Year			
U284	269	Knights Bridge Road	Knights Bridge/Barlow Road intersection	Install traffic signal and westbound left-turn lane		Rural	20 Year			
U285	270	Holly/Territorial Road	Logging Road to Canby Ferry	Bike lanes		Rural	20 Year			
U286	271	Territorial Road	99E to Holly Road	Reconstruct and widen (rural)		Rural	20 Year			Not Clackamas Jurisdiction. Canby's?
U287	272	Territorial Road	Territorial Road/Highway99E intersection	Install traffic signal, realign grade		Rural	5 Year, 20 Year			Built?
U288	273	Township Road	Township/Ivy Road intersection	Install traffic signal		Rural	20 Year			
U289	274	Township Road	Railroad crossing between Redwood and Walnut	Construct new railroad crossing		Rural	20 Year			
U291	276	Berg Parkway	Highway 99E to Ivy Street	New two lane extension		Rural	20 Year			Proposed road within Canby and doesn't connect to Clackamas road.
U293		13th Avenue (Canby)	Teakwood to Molalla Forest Road	Bike lanes	Bike / Ped	Rural	20 Year	Complete	$318,575	
U296	281	Graves Road (6562)	Bridge	Reconstruct and widen to 32 feet	Bridge / Culvert	Rural		Complete	$214,789	Completed with reimbursements from ODOT for design & construction totaling $576,170.
U297	282	Gard Road (6322)	Bridge	Reconstruct and widen to 32 feet		Rural	20 Year			
U301	286	Oak Grove Road	Railroad crossing southwest of Macksburg Road	Construct new railroad crossing		Rural	20 Year			
U303	288	Meridian Road	Elliott Prairie Road to Barlow Road	Widen shoulders to County standard, remove or decrease horizontal and vertical curves, investigate speed zone		Rural	20 Year			
U304	289	Meridian Road	Meridian/Whiskey Hill Road intersection	Limitation of access/egress points to and from school on NE corner of intersection		Rural	20 Year			
U305	290	Whiskey Hill Road (1559)	Bridge	Reconstruct and widen to 32 feet	Bridge / Culvert	Rural	20 Year	Design	$1,000,000	Currently Design Only
U306	291	Barnards Road (6191)	Bridge	Reconstruct and widen to 36 feet		Rural	20 Year			
U307	292	Sconce Road (6115)	Bridge	Reconstruct and widen to 32 feet		Rural	20 Year			
U308	293	Barlow Road	Bridge (Rock Creek)	Scour protection	Bridge / Culvert	Rural	20 Year	Complete	$825,000	Provide scour counter-measures in the stream channel and repair the approach roadway and guardrail
U309	293	Barlow Road	Bridge (Rock Creek)	streambank stabilization	Bridge / Culvert	Rural	20 Year	Complete	$48,340	825000 project cost estimate, CIP #22190
U310	294	Canby Marquam (6027)	Bridge	Reconstruct and widen to 36 feet		Rural	20 Year			
U312	296	Vick Road	Between Molalla Avenue and Highway 213	Widen and bring to County standards		Rural	20 Year			
U313	297	Vick Road	Railroad crossing between Molalla Avenue and Appaloosa	Construct new railroad crossing		Rural	20 Year			

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U315	300	Callahan Road (S) (Beginning on Ramsby Road)	Dickie Prairie Road to Fernwood Road	Reconstruct and widen (rural)		Rural	20 Year			
U318	303	Klang's Mill Bridge	Bridge	Reconstruct and widen to 32 feet		Rural	20 Year			
U319		Dhooghe Road (6541)	Bridge	New structure accommodates one travel lane (dead-end bridge). Old bridge replaced due to structural and functional deficiencies.	Bridge / Culvert	Rural	5 Year	Partial	$1,034,575	2000 TSP: 304 calls for bridge widening.
U324	309	Groshong Road	Blair Road to Bird Road	Reconstruct and widen (rural)		Rural	20 Year			
U327	312	Government Camp Core area	US 26 through Government Camp to US 26	Overlay, consruct sidewalks						Built?
U328	313	Zigzag River (Lolo Pass Road) Bridge	Bridge 6401	Replace existing bridge with simple-span steel bridge with 2 travel lanes and shoulders.		Rural	5 Year	Complete	$2,836,196	
U329	318	Milk Creek (Mulino Rd) Bridge	Bridge 6511	Replace existing bridge with structure with 2 travel lanes, sidewalks, and bike lanes			5 Year			
U330	319	Molalla River (Feyrer Park Rd.) Bridge	Bridge 605	replace existing birdge with structure with 2 travel lanes, widen shoulders			5 Year			
U331	320	Buckner Creek (Beavercreek Road) Bridge								
U332	321	Rock Creek (Kropf Rd) Bridge								
U333	44	Stevens Road redesignation	Frontage Road to Idleman Road	Downgrade to collector + optional traffic calming, sidewalks		Urban				
U334	323	North Fork Molalla (Dickey Prairie Rd.) Bridge								
U335	341	Milk Creek Bridge	Graves Rd	Bridge #6562 replacement						Built?
U336		SE 82nd Dr Improvements	Clackamas Rd - 1st Fred Meyer Signal	Widen to 4 through lanes and signalized turn lanes to accommodate truck movement, upgrade and improve intersection flow and operation					$50,328,306	See 2001 TSP 100
U337	810	ITS projects	Various locations around the County	This project will result in improvements to traffic flow and efficiency of the County transportation system			5 Year			
U339	S58	Highway 213	Macksburg Road to Liberal Way	Widen shoulders to ODOT standards						
U340	S62	Highway 213	Wright Creek	Replace bridge structure				Complete		
U341		Addie Street	Hull Ave to Jennings Ave	Street & drainage improvements	Reconstruction	Urban		Complete	$331,000	
U342		Chestnut Street	Woodland Way to Linden Lane	Street & drainage improvements	Reconstruction	Urban		Complete	$222,295	
U343		Eagle Creek Road	Bridge (Eagle Creek)	Emergency bridge repair	Bridge / Culvert	Rural		Complete	$196,212	
U344		Lolo Pass Road	Bridge (Bear Creek)	Replace 2 failing culverts with single span bridge	Bridge / Culvert	Rural		Complete	$1,295,610	
U345		Schroeder Avenue	Courtney Ave to end	Street & drainage improvements	Reconstruction	Urban		Complete	$194,752	
U346		27th Avenue	Park Ave to end	Street & drainage improvements	Reconstruction	Urban		Complete	$169,000	
U347		Cherryville Road	Cherryville Rd & Brightwood Loop	Guardrail replacement	Other	Rural		Complete	$89,892	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U348	S59	Highway 213	Liberal Way to Molalla Avenue	Install two-way center turn lane between Liberal Way and Molalla Avenue, widen turn radius on northwest corner of Hwy-213/Liberal Way				Partial		2005: widened turn radius on northwest corner of Hwy-213/Liberal Way
U349		Mather Road	Cranberry Lp to Lawnfield	Complete sidewalk on north side	Bike / Ped	Urban		Complete	$52,158	
U350		Welches Road	Culvert (Wee Burn Creek)	Replace culvert	Bridge / Culvert	Rural		Complete	$235,283	Replaced due to functional deficiencies and for fish passage requirements. Funding for fish passage secured by Resort at the Mountain.
U351		Amherst Street	98th to 102nd (N of OR212)	Pave shoulder, add curbs, adjust storm drainage	Reconstruction	Urban		Complete	$613,911	Rototill and pave shoulder rock on Amherst Street, Brandeis Street, Citadel Street, and Christensen Avenue. Construct curbs and make major adjustments to existing storm drainage system.
U352		Beavercreek Road	Culvert (Buckner Creek)	Replace 2 failing culverts with bridge	Bridge / Culvert	Rural		Complete	$713,121	
U353		CCTV Camera Project	Johnson Creek Blvd	Install CCTV Cameras	ITS	Urban		Discontinued	$64,219	Discontinued
U354		Gronlund Road	Gronlund Road	Slide repair	Reconstruction	Rural		Complete	$58,363	
U355		Harmony Road/Lake Road Paving	SE Milwaukie	Overlay paving Harmony Rd/Lake Rd/Pheasant Ct/Frontage Rd/Rusk Rd	Reconstruction	Urban		Complete	$559,445	
U356		Park Avenue	River Road to Hwy 99E	Pave road and add drainage improvements	Reconstruction	Urban		Complete	$1,208,546	Construct road and drainage improvements, including 250 feet of storm sewer with catch basins and manholes.
U357		92nd Avenue	Johnson Creek Blvd to County Line	Bike lanes	Bike / Ped	Urban	5 Year	Complete	$586,693	Complete missing bink lane links between JCB and County line. Travel lanes to be 11' and bike lanes 5' to match City of Portland.
U358		Anglesley Road	Bridge (Clear Creek)		Bridge / Culvert	Rural		Complete	$43,866	
U359		Cramer Road	Culvert (Creamery Creek)	Replace culvert	Bridge / Culvert	Rural		Complete	$79,712	
U360		ITS - Weather Stations	Johnson Creek Blvd, Idleman, Wally Rd	Install weather stations	ITS	Urban		Complete	$195,399	
U361		Leroy Avenue	Leroy Avenue	Sidewalk construction	Bike / Ped	Rural		Transferred	$486,632	Transferred road to City of Molalla
U363		Marmot Road	Culvert (West Creek)	Replace culvert	Bridge / Culvert	Rural		Complete	$254,585	Replaced due to functional deficiencies and for fish passage requirements. BLM funded 57% of project
U364		McCabe/Music Camp Paving	Sandy area		Reconstruction	Rural		Complete	$1,567,215	
U365		Mulino Road (6511)	Bridge (Milk Creek)	Reconstruct and widen	Bridge / Culvert	Rural		Complete	$1,958,153	New structure accommodates 2 travel lanes, sidewalks and bike lanes. Old bridge replaced due to structural and functional deficiencies.
U366		Thomas Road	Bridge (Rock Creek Trib)	Bridge replacement	Bridge / Culvert	Rural		Cancelled	$71,800	$5,122 Project Cost, Discontinued, CIP #22110
U367		Linwood Avenue	Linwood/King intersection	Replace unstable traffic pole/mast arm	Reconstruction	Urban		Complete	$217,496	
U368		Feyrer Park Road (605)	Bridge (Molalla River)	Reconstruct and widen	Bridge / Culvert	Rural		Complete	$3,250,625	New structure accommodates 2 travel lanes and shoulders. Old bridge replaced due to structural and functional deficiencies.
U369		Holcomb Blvd.	Redland Rd to Front Ave	Construct 6' pedestrian and bike paths	Bike / Ped	Urban		Complete	$111,493	

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U370		Wright Road	Bridge (Woodcock Creek)	Flood study	Project Planning	Rural		Complete	$37,845	
U372		Bakers Ferry Road	Bridge (Clackamas River)	Bridge painting	Other	Rural		Complete	$492,812	
U373		Clackamette Cove	Clackamette Cove	Clackamette Cove Dredging	Other	Urban		Complete	$56,135	Partnership with Oregon City
U374		DSB Fiber Connection	DSB & TOC Design	Fiber connection to DSB	ITS	Urban		Complete	$378,048	Funding contributions from CC Tech Services
U375		Intelligent Transportation System	ITS Implementation	CCTV, Fiber Optic connections, weather stations	ITS	Urban		Complete	$1,696,383	$503k from Raod Fund
U376		Monterey Avenue	Causey/William Otty to Stevens	Reconstruction and final paving	Reconstruction	Urban		Complete	$338,049	
U377		Schneider Road	Culvert (MP 1.69)	Replace culvert	Bridge / Culvert	Rural		Complete	$247,752	
U378		South Corridor Transit ways	Gateway to Clackamas Town Center	Light Rail Local Match	LRT	Urban		Complete	$36,477,895	
U379		Advance Road	Culvert (Newland Creek)	Replace culvert	Bridge / Culvert	Rural		Design	$228,335	Design only - Replacing failing twin culverts with a new bridge or double arch culvert.
U380		Holly Lane	Bridge	Bridge painting	Other	Urban		Complete	$319,945	
U381		King Road	82nd Avenue to Wichita	Paving	Reconstruction	Urban		Complete	$965,831	
U382		King Road	Wichita Ave to Hollywood Ave	Paving overlay	Reconstruction	Urban		Complete	$73,522	
U383		Kleinsmith Road	Culvert (Bear Creek)	Replace culvert	Bridge / Culvert	Rural		Complete	$355,710	
U384		Portland-LO Trail Alignment	Bike/Ped	Study for trail alignment						
U385		Sunrise Corridor EIS & Implementation	Sunrise Corridor in Clackamas Industrial Area	Environmental Impact Statement and traffic analysis	Project Planning	Urban		Complete	$7,624,604	
U386		Sunrise Phase 1	I-205-SE 122nd	PE, ROW, utility relocation				Complete		See U19
U387		Wilhoit Road	Bridge (Rock Creek)	Bridge replacement	Bridge / Culvert	Rural		Programmed	$800,000	Scour at south abutment threatening catastrophic failure
U388		Zimmerman Road	Culvert (Gut Creek)	Replace culvert	Bridge / Culvert	Rural		Complete	$251,394	
U389		OR 212 x SE 162nd Ave. intersection - PE only	OR 212 x SE 162nd Ave. (Happy Valley)	Conduct PE for intersection improvements (left-turn pockets; traffic signal)				Design		
U390		Borland Road (6507)	Bridge (Tualatin River)	Bridge replacement	Bridge / Culvert	Rural		Programmed	$6,280,594	2 travel lanes, bike lanes and sidewalks.
U391		Dickey Prairie Road (6554)	Bridge (N Fork Molalla River)	Bridge replacement	Bridge / Culvert	Rural		Programmed	$2,900,310	
U392		Elisha Road	Culvert (Dove Creek MP 2.74)	Design and acquire right of way for the replacement of culvert.	Bridge / Culvert	Rural		Programmed	$304,024	
U393		I-205 m.p. 13.45-17.8	Safety	Install median cable barrier in missing sections						
U394		OR 213, Harmony, Sunnyside,	Bike-Ped	Traffic signals, lightting and ped improvements						
U395		OR 99E: MP14.9-Territorial Road	Preservation R1	R1 grind & inlay						

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U396		OR 99E: Roethe Rd-Clackamas Rvr Bridge	Preservation R1	R1 grind & inlay						
U397		Porter Road	Culvert (Delph Creek)	Replace culvert	Bridge / Culvert	Rural		Programmed	$444,643	
U398		Salmon River/Elk Park Road Bridge	bridge	Replacement						
U399		Salmon Rver/Arrah Wanna	bridge	Replacement						
U400		Springwater Trail: Rugg Rd-Dee St (Boring	Enhancement	Path, pavement, signs, etc.						
U401		Sunrise-Industrial Way Extension	Mod	Design, acquire ROW				Programmed		
U402		Ten Eyck Road	Bridge (Cedar Creek MP 2.58)	Replace bridge	Bridge / Culvert	Rural		Programmed	$1,572,617	Replace existing 22' 2-span bridge with new 72' single-span. Critical scour and posted for 13 tons.
U403		US 26: 49.2-62.15	Pres, Safety	Overlay						
U404		US 26:@ Zig Zag Ranger Station	Enhancement	Design only for Turn lane						
U405		Barlow Road	Barlow Road/Zimmerman Rd intersection	Remove or decrease horizontal curves, widen lanes and shoulders to County standards	Reconstruction	Rural		Programmed	$1,414,035	
U406		OR 212 @ 135th	Safety/Pres	intersection improvements incl protected left turns						
U407	S05	McLoughlin Blvd.	Milwaukie City Line to Gladstone City Line	Multi-modal corridor enhancements				Programmed	$7,401,221	
U408		OR 213 (82nd Avenue): Causey	Safety	Improve traffic separator, provide alternative left turns						
U409		OR 213 (82nd Avenue): King Road-Lake Road	Pres/Bike-Ped	1R-2" grind & inlay travel lanes.						
U410		OR 213 (82nd Avenue): Sunnybrook	Safety	Install traffic separators to allow u-turns						
U411		US 26: MP 49.20-MP 51	Safety	Install Center Median & barrier; signing and passing lane transitions						
U412		US26: Mt Hood Hwy	MP 49.60 - MP 50.00	Operations, Rockfaill mitigation						
U413		Tolbert Road	Tolbert Rd/Industrial Way intersection	Overpass and connection of Tolbert/82nd Drive	Project Design	Urban		Design	$2,000,000	Design only
U414		OR 99E: Vinyeard Rd	Safety/Bike-Ped	intersection and ped improvements						
U415		US 26: Jarl Rd.	Safey	Improve signal visibility and warning, add right turn lane						
U416		OR 224: 197th Avenue	Safety	Flatten curve, widen shoulders, add guardrail						
U417		OR 224: SE 232nd Dr.	Safety	Add left and right turn lanes						
U418		Tolbert St. O'Xing - PE only	Tolbert St. O'Xing; 82nd Dr. to/from Industrial Way	Conduct PE for Tolbert St. O'Xing				Programmed		See RTP 10052
U419		92nd/Johnson Creek Blvd. intersection	92nd/JCB intersection	Add turn lanes on 92nd (northbound left at JCB, and northbound right at Idleman). Address safety, provide congestion relief, improve freight access to I-205 and access to the Fuller Park and ride station.	Roads/bridges & Pedestrian	Urban			$2,998,703	(Dev Agency: $100,000 Add turn lanes on 92nd (northbound left at JCB, and northbound right at Idleman)) See U648

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U420		29th/40th/42nd Bike Boulevard intersection Improvements	Monroe to Springwater Trail	Construct street improvement from Springwater Trail to 28th; signage & striping improvements at minor intersections; major intersection improvements, such as bulbouts/medians at Harvey/32nd, Olsen/42nd, Harrison/40th; traffic calming along full corridor. Address gap in bicycle transportation system.	Roads/bridges				$4,058,830	
U421		Molalla Ave. roundabout	Taylor to Division	Reconfigure intersection for safety and LOS into roundabout Improve LOS	Roads/bridges				$4,440,733	
U422		Warner Milne Road/Molalla intersection Imp.	Beavercreek Rd. to Molalla Ave.	Realign intersection per TSP, pavement preservation, integrate with utility upgrades Realign intersection	Roads/bridges				$2,072,342	
U424	S77	Highway 211	Dhooghe Road/Hwy-211 intersection	Remove or decrease horizontal curve along Hwy-211, relocate intersection						
U425	S85	Highway 211	Tickle Creek Road/Hwy-211 intersection	Remove or decrease horizontal curve along Hwy-211, relocate intersection						
U426	S50	Highway 213	Abernethy/Hwy-213 intersection	intersection improvements						
U427	S44	Highway 224	Eaglecreek-Sandy Hwy/Hwy-224 intersection	Install roundabout						
U428	S07	US-26	Kelso Road to Highway 26 intersection	Require two-movement crossing on Kelso Road with vehicles crossing one direction of Highway 26 first into the middle of the intersection, followed by crossing of second direction						
U429	S89	Highway 173	Hwy-26/Hwy-173 intersection	Remove or decrease horizontal and vertical curves along Hwy-26						See US 26 Road Safety Audit
U430	S70	Highway 211	Meridian Road/Hwy-211 intersection	Construct eastbound and westbound right-turn lanes and eastbound left-turn lane						
U431	S73	Highway 211	So. Canby-Marquam Hwy/Hwy-211 intersection	Install eastbound and westbound left-turn lanes, eastbound right-turn lane, remove or decrease horizontal curve						
U432	S75	Highway 211	Wright Road/Hwy-211 intersection	Install eastbound right-turn lane						
U433	S78	Highway 211	Schieffer Road/Hwy-211 intersection	Install eastbound right-turn lane						
U434	S80	Highway 211	Hayden Road/Hwy-211 intersection	Install westbound right-turn lane						
U435	S82	Highway 211	Eagle Creek Road/Hwy-211 intersection	Install eastbound right-turn lane						
U436	S87	Highway 211	SE 367th Avenue/Hwy-211 intersection	Install eastbound right-turn lane						
U437	S66	Highway 212	Foster Road/Hwy-212 intersection	Add southbound left lane on Foster Road approach						
U438	S72	Highway 212	Hwy-211/Leroy Street intersection	Widen, add curb and sidewalk						
U439	S67	Highway 212	SE 282nd Avenue/Hwy-212 intersection	Install traffic signal				Partial		TSP
U440	S52	Highway 213	Beavercreek/Hwy-213 intersection	Phase 2 - Construct urban interchange						

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U441	S53	Highway 213	Leland/Union Road intersection	Add passing lanes						
U442	S54	Highway 213	Carus Road/Hwy-213 intersection	Install southbound left-turn and right-turn lanes						
U444	S42	Highway 224	Bakers Ferry Road/Hwy-224 intersection	Install eastbound right-turn lane						
U445	S43	Highway 224	Amisigger Road/Hwy-224 intersection	Install traffic signal, southbound and eastbound left turn lane and west bound right-turn lane						
U446	S45	Highway 224	Heiple Road/Hwy-224 intersection	Install southbound right-turn lane						
U447	S30	Highway 99E	New Era Road/99E intersection	Install northbound right-turn lane						
U448	S34	Highway 99E	Lone Elder Road/99E intersection	Install north bound right-turn lane						
U449	S33	Highway 99E	Barlow Road/99E intersection	Add turn lanes at Barlow Road						?
U450	S86	Highway 211	SE 362nd Drive/Hwy-211 intersection	Remove or decrease vertical curve along Hwy-211 and remove vegetation						
U451		Hwy 43 / Terwilliger Tryon Creek Bridge	G Ave to 500-feet North of Terwilliger intersection	Replace existing box culvert with potential new bridge over Tryon Creek Improve bike/ped and vehicular access and safety	Roads/bridges				$17,762,931	
U452		King Rd.	King Rd./145th Ave. intersection	Traffic signal, realign, turn lanes. Address safety and provide congestion relief.	Roads/bridges & Pedestrian				$3,448,509	
U453	S08	US-26	Orient Drive to Highway 26 intersection	Install westbound right-turn lane						
U454	S09	US-26	Firwood Road/Highway 26 intersection	Install eastbound right-turn lane						
U455	S10	US-26	East Fernwood Circle/Hwy-26 intersection	Install westbound left-turn lane						
U456	S11	US-26	Brightwood Loop (W.)/Hwy-26 intersection	Install westbound right-turn lane						
U457	S12	US-26	Brightwood Loop (E.)/Hwy-26 intersection	Install westbound right-turn lane						
U458	S13	US-26	East Wildwood Avenue/Highway-26 intersection	Install continuous two-way center turn lane from m.p. 38.75 to 40.01						
U459	S19	US-26	Govt. Camp Loop (W.)/Hwy-26 intersection	Improve safety, operation and access of Government Camp Loop Road with Highway 26						
U460		US-26	Govt. Camp Loop (W.)/Hwy-26 intersection	Improve safety, operation and access of Government Camp Loop Road with Highway 26				Cancelled		
U461		US-26	Orient Drive to Highway 26 intersection	Install westbound right-turn lane						DONE?
U463		105th Ave/Avery Street	Blake to 105th	Realign curves, signalize intersection of Avery/105th, sidewalks on 105th from Avery to 108th. Address safety issue and complete gap in pedestrian system.	Roads/bridges & Freight				$7,401,221	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U465		224 Thruway/Local Access Preservation	Harrison to 37th	Convert some intersections to R in/R out; add turn pockets; improve ped crossing comfort through median islands and other measures as possible. Design option alternatives phase to consider interactions of 99-E/224 connections, and function of 99-E/17th/Harrison intersection.	Roads/bridges & Pedestrian				$29,987,033	
U467	S71	Highway 211	South Needy Road to .6 miles west	Remove or decrease vertical curve to allow passing zone, add passing lane in one or both directions, possible relocation of intersection						
U468	S64	Highway 212	Armstrong Circle (E&W) to 172nd Avenue	Extension of 172nd Avenue to Hwy-212 with installation of signal, turn lanes at new Hwy-212/172nd Avenue intersection						See U423
U470		Holly Lane	Redland Rd. to Maple Lane	Turn lanes, bike lanes, sidewalks, intersection improvements, bridge replacement. Address safety and address gap in UGB expansion area.	Roads/bridges & Pedestrian				$42,015,435	
U471		Hwy 224	Sunrise End to Carver Bridge	Widen Highway 224 to four lanes with turn pockets at intersections to Carver bridge. The Damascus/Boring Concept Plan identifies Highway 224 as a community bus transit classification.	Roads/bridges & Transit capital				$24,613,671	
U472	135	Springwater Road (1446)	Bridge	Reconstruct and widen bridge to (5) lanes (74 feet)		Urban		Partial	$34,933,765	see U47
U474		OR 213 King Road	Safety	Traffic separator, improve intersection, remove bus lane, improve bike lane & turn lanes						
U478		108th Ave.	Tualatin River	Pedestrian bridge over Tualatin River and connecting paths. Complete gap in system.	Pedestrian & Bike				$5,997,407	
U479		108th Ave.	Leveton Dr to Herman Rd	Widen 108th Ave from one travel lane in each direction to two travel lanes in each direction with a continuous left turn lane. Freight.	Roads/bridges & Freight				$11,344,572	
U480		122nd/Hubbard/135th Improvement	Sunnyside Rd. to Hwy. 212	Add bike lanes and sidewalk - complete gap. Congestion relief and complete a gap in the pedestrian system.	Roads/bridges & Pedestrian				$2,228,398	see 2001 TSP 71, 72
U481		124th Ave	Tualatin-Sherwood to Tonquin	Construct new street from Tualatin-Sherwood to Tonquin Rd - 5 lanes. Economic development and freight movement.	Roads/bridges & Freight				$122,120,154	
U482		145th Ave.	Clatsop St. to Monner Rd.	Widen to 3 lanes with sidewalks and bike lanes, add traffic signals. Address safety, provide congestion relief, and improve north-south connectivity	Roads/bridges & Pedestrian				$15,598,787	
U483		162nd Ave.	Hagen Rd. to Palermo Ave.	Widen to 3 lanes with sidewalks and bike lanes, add traffic signals. Improve north-south connectivity and provide congestion relief to 172nd Ave.	Roads/bridges & Pedestrian				$5,267,123	Clatsop to Sager in Clackamas Co

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U486		17th Ave. Trolley Trail Connector	McLoughlin to Ochoco	Construct sidewalks; improve bus stops; and correct gaps in bike lanes on 17th Ave. to provide connection between Trolley Trail and Springwater Corridor. Alternative alignment: multi-use path along Johnson Creek from Lava Drive to Ochoco. Address gaps in regional bike and pedestrian system.	Regional Trail & Bike/Pedestrian				$5,550,916	
U487		19th St. Improvements	Blankenship Rd. to Willamette Falls Dr.	Improvements to include curb, gutter, pavement widening and sidewalks. Provide an alternate route around I-205 to relieve traffic in 10th St. corridor.	Roads/bridges & Bike				$1,776,293	
U488		37th Ave. Bike/Ped Improvement	Hwy. 224 to Harrison St.	Construct sidewalks and bike lanes. Key connection between Highway 224 and Harrison Street (Arterial). Address gap in bike and pedestrian system.	Pedestrian & Bike				$5,672,286	
U491		65th Ave.	Borland to Childs Rd	Add bikelanes on 65th Ave from Sagert to Nyberg. Construct a pedestrian bridge over the River from Tualatin to Childs Rd.	Roads/bridges & Bike				$23,989,627	
U492		82nd Ave. Multi-Modal Improvements	Clatsop Ave. to Monterey Ave.	Widen to add sidewalks, lighting, central median, planting strips and landscaping. Complete gaps in the bike/ped network.	Pedestrian & Bike	Urban				Dev Agency
U493		90th	Tualatin to Tualatin-Sherwood	Widen to 5 lanes from 90th to Tualatin-Sherwood. Provide congestion relief.	Roads/bridges &				$108,702,995	
U494		95th Ave.	Avery to Tualatin-Sherwood	Add bikelanes from Avery to Tualatin-Sherwood Rd. Complete gap in system.	Roads/bridges & Bike				$7,196,888	
U496		Abernethy Road Sidewalk Infill	Redland Rd. to Washington Street	Sidewalk infill improvements Address gaps in pedestrian system	Pedestrian				$7,090,358	
U497		Barlow Rd. Trail	Abernethy Rd. to Oregon City limits	Regional trail would follow the perceptive alignment of the historic Barlow Road from Abernethy Green to the Oregon City UGB. The trail would primarily utilize existing and proposed roadways. Regional connections; improve bicycle and pedestrian safety and access.	Regional Trail & Pedestrian				$1,480,244	
U498		Beaver Lake Trail	Clackamas Community College to Oregon City UGB	Regional trail would travel from Clackamas Community College through the Oregon City High School campus to the airstrip area. The trail would skirt the golf course area and continue to Beaver Lake. Regional connections; improve bicycle and pedestrian safety and access.	Regional Trail & Pedestrian				$740,122	
U499		Beavercreek Rd. Improvements Phase 3	Clackamas Community College to Urban Growth Boundary	Widen to 4 lanes with sidewalks and bike lanes. Address gap and need for UGB expansion area.	Roads/bridges & Pedestrian				$19,124,756	CIP?

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U500		Boeckman Rd. at Boeckman Creek	Canyon Creek Rd. N to Stafford Rd.	Widen Boeckman Road to 3 lanes with bike lanes, sidewalks and connections to regional trail system, remove culvert and install bridge. Boeckman Road is designated as an arterial street in the City's TSP. It provides an east-west connection in Wilsonville between Tooze Road/Graham's Ferry Road on the west and Stafford Road on the east, serving as an important non-interstate alternate.	Roads/bridges & Bike				$8,585,417	
U506		Boones Ferry Rd bike lanes	Country Club to North City Limits	Add bike lanes Enhanced pedestrian and bike opportunity and safety, Improves connectivity to Lake Grove Town Center.	Roads/bridges & Bike					Lake Oswego
U507		Bryant Rd bike lanes/pathway	Childs Rd to Boones Ferry Rd	Add bike lanes Enhance bicycling options	Bike				$6,357,649	
U508		Carman Dr. sidewalks & bike lanes	Meadows Rd to I-5	Add bike lanes and pedestrian pathway Enhance pedestrian options and improve safety	Pedestrian & Bike				$1,124,986	
U510	304	Dhooghe Road (6541)	Bridge	Reconstruct and widen to 32 feet		Rural				
U511		Clackamas County ITS Plan	Countywide	Deploy traffic responsive signal timing, ramp metering, traffic management equipment for better routing of traffic during incidents along the three key ODOT corridors - I-205, I-5, 99E. Install signal controller upgrades and update county ITS plan. Improve flow and reduces delay on existing route throughout the urban area.	ITS & Roads/bridges, Transit Capital				$6,500,000	Dev Agency
U512		Clackamas Industrial area muli-modal improvements	area wide improvements	Complete bike and pedestrian connections within the Clackamas Industrial area. Address mulit- modal needs and to address gaps	Bike				$7,401,221	
U513		Clackamas Regional Center Bike/Pedestrian Corridors	Clackamas Regional Center area	Provide bike and pedestrian connections in the Regional Center. Complete a gap in the bike/ped network.	Bike & Pedestrian & Safety	Urban			$11,699,090	
U514		Clatsop St.	132nd Ave. to 162nd Ave.	Widen to 3 lanes with sidewalks and bike lanes, add traffic signals. Improve east-west connectivity and provide congestion relief.	Roads/bridges & Pedestrian				$15,801,369	
U515		Clatsop, SE (162nd - City Limits): Street Extension	SE 162nd to City Limits	Extend street east into PV based on PV Implementation Plan.	Roads/bridge				$16,281,790	
U516		Day Street	Grahams Ferry Rd. to Boones Ferry Rd.	Reconstruct road to accommodate increasing volumes of heavy trucks Improve structural integrity of road to accommodate increased freight traffic to industrial areas	Roads/bridges				$4,736,782	
U517		Milwaukie Downtown Parking Structure		Provide public contribution to private and/or wholly-owned public structured parking in downtown. Address downtown parking needs for commuters/visitors.	Other				$11,994,813	
U518		Oregon City Downtown Pedestrian Improvements	5th Street to 15th Street	Sidewalk, ramp, and streetscape improvements Address gap and ADA	Pedestrian				$3,700,611	

TSP Update ID	2000 TSP Map ID	Project	Section	Description	Project Type	Rural/Urban	CIP	Status	Cost Estimate (YOE$)	Comments
U519		Milwaukie Downtown Station Area Streetscaping (21st & Main)		Reconstruct streetscape, including street trees, rain gardens, ADA ramps, street furniture, parking meters, and pedestrian-scale lighting. Improve Town Center pedestrian environment in support of downtown LRT Station and planned redevelopment.	Pedestrian & Bike				$9,917,637	
U520	S15	US-26	Lolo Pass Road to Govt. Camp Loop Rd. (W.)	Four lane widening with left-turn lanes, add passing/climbing lanes and westbound right-turn lane at Lolo Pass						
U521		Foster Rd. Improvements	Hwy 212 to 172nd Ave.	Widen to three lanes Improve access to and within Damascus, and add bike lanes and sidewalks	Roads/bridges & Pedestrian				$71,968,880	See 2001 TSP 66, 67, 201
U522		French Prairie Bicycle/Pedestrian Bridge	Boones Ferry Rd. to Butteville Rd..	New bicycle/pedestrian/emergency vehicle only bridge crossing the Willamette River. A new bicycle and pedestrian bridge crossing the Willamette River would connect the regional Tonquin Trail to the North Willamette Valley parks and recreation areas. A new bridge would provide safe and convenient passage across the Willamette River for emergency access vehicles, cyclists, and pedestrians.	Regional Trail & Bike				$22,203,664	
U523		Harmony Road/Lake Rd/International Way		Flashing Yellow Arrow on Harmony				Complete		
U524		Harrison/UPRR grade separation	Hwy. 224 to 32nd Ave.	Grade separate UP mainline from principal E-W arterial. Address conflict between rail and auto traffic.	Roads/bridges & Freight				$74,967,583	
U526	S48	I-205/Hwy. 213 Interchange	Washington St. to I-205	Improve and widen OR 213, including reconstruction of intersection of OR 213 and Washington Street. Address safety and provide congestion relief.	Throughways			Programmed	$32,565,374	Same as U014, two 2001 TSP projects bundled into one RTP project
U527	S56	Highway 213	Mulino Road/Hwy-213 intersection	Install northbound left-turn lane and southbound right-turn lane						
U528	S88	Highway 173	Timberline Lodge to Hwy-26	Provision of pull-offs, perform additional safety analysis to identify other improvements						
U529	S69	Highway 211	Marion County Line to Canby-Marquam Highway	Add passing lanes at several locations						
U530	S74	Highway 211	Mathias Road to Wright Road	Add passing lanes						
U531	S76	Highway 211	Beavercreek Rd, Union Hall Rd to Dhooghe Rd	Add passing lanes from mile post 17.77						
U532	S79	Highway 211	Hayden Road to Hwy-224	Four lane widening with left-turn lanes						
U533	S81	Highway 211	Eagle Creek Road to Tickle Creek Road	Add passing/climbing lanes						
U534	S83	Highway 211	0.14 miles east of Coop Road to Jacknife Road	Realignment to remove or decrease horizontal and vertical curves, widen shoulders to ODOT standards						
U535	S84	Highway 211	Tickle Creek Road to 362nd Drive	Add passing/climbing lanes to mile post 2.78						
U536	S68	Highway 212	Rock Creek Junction to Damascus	Construct climbing lane						

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U537	S65	Highway 212	Foster Road to Rust Way	Extension of continuous two-way center turn lane between Foster Road and SE 222nd Avenue with installation of signal at Royer Road						See U580
U539		242nd	Mult. Co line - Hwy 212	Reconstruct 242nd and widen to three lanes. The Damascus/Boring Concept Plan identifies 242nd as a community bus transit classification.	Rural Arterial	Rural			$60,774,495	
U540	S60	Highway 213	Molalla Avenue to Toliver Road	Add passing lanes to mile post 15.34						
U541	S63	Highway 213	Butte Creek	Construct scour protection						
U542	S49	Highway 213	Molalla Ave/Clack. Comm. College to Leland Rd.	Access management, widen to (4) lanes with left turn lanes						*OR 213 Corridor Study calls for 2 lanes south of Henrici
U543	S35	Highway 224	Metro UGB to Springwater Road	Four lane widening with left-turn lanes						
U544	S36	Highway 224	Springwater Road to 232nd Drive	Shoulder widening, horizontal realignment to ODOT standards						
U545	S38	Highway 224	SE 232nd Drive to Bakers Ferry Road (short term)	Add passing lanes, realign of curves						
U546	S39	Highway 224	SE 232nd Drive to Bakers Ferry Road (long term)	Four lane widening with median, add left turn lanes						
U547	S41	Highway 224	Bakers Ferry Road to Estacada N. UGB	Add passing lanes						
U548	S46	Highway 224	Fall Creek Road to Ripple Creek Road	Add passing/climbing lanes from m.p. 29.03						
U549	S91	Highway 35	Warm Springs Hwy to Hood River County Line	Add passing/climbing lanes from mile post 57.59 to 58.26						
U550	S90	Highway 51	I-5 to Marion County Line	Add passing lanes from mile post 0.,41 to 1.47						
U551	S32	Highway 99E	Barlow Road to Marion County Line	Four lane widening with median, left-turn lanes from m.p. 24.05						
U552	S06	Highway 99E/Highway 224	Ross Island Bridge to I-205	Access management, reversible lanes and (6) lanes, Harold to I-205						
U553		Holly Lane	Redland Rd. to Holcomb Rd.	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area. Address safety and address gap in UGB expansion area.	Roads/bridges & Pedestrian				$42,542,147	
U554		Hwy 43 Bike Connection	Terwilliger Blvd to McVey Ave	Add bike facility for safety improvement Bike Lanes north and south bound.	Roads/bridges				$3,700,611	
U557	S24	I-205	I-205 at Sunnybrook	Complete interchange, add southbound auxiliary lanes on I-205				Complete		
U558	S25	I-205	I-205 bridge in Oregon City	To be determined - I-205 South Corridor Study						
U559	S26	I-205	Willamette River to West Linn	New southbound truck climbing lane						
U560	S27	I-205	Hwy-213 to I-84	To be determined - I-205 South Corridor Study						
U561	S28	I-205	West Linn to I-5	To be determined - I-205 South Corridor Study				Programmed		
U562		I-205 / 10th Street Improvements	Willamette Falls Drive to Blankenship Rd / Salamo Road	Construct a long-term interchange improvement (SPUI or Split Diamond) Interchange improvement	Throughways				$40,516,330	

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U563		I-205 Bike/Ped Path Improvements	Bike-Ped	Improve path, add ilumination, north of Gladstone						
U564		I-205 to Elligsen Road	SB I-205 to SB I-5 interchange ramp and extend acceleration lane and add auxiliary lane on SB I-5 to Elligsen Road.	Add lane to SB I-205 to SB I-5 interchange ramp and extend acceleration lane and add auxiliary lane on SB I-5 to Elligsen Road. Significant localized congestion occurs at the merge point of the I-205 SB ramp connection to SB I-5. This has prompted concerns that the anticipated benefits of scheduled construction of a permanent auxiliary lane in each direction on I-205, between I-5.	Throughways & Freight					
U565		Iron Mountain / Upper Drive	10th St. to Bryant Rd.	Add bike lanes Enhance bicycling options	Bike & Roads/bridges				$5,772,953	
U566		Johnson Road/Deer Creek Lane		Northbound & southbound left turn lanes, traffic signal				Complete		
U567		Kellogg Creek (Oatfield Rd.) Bridge Replacement	Kellogg Creek	Construct two lane bridge with sidewalks and bike lanes. Replace a deficient bridge.	Roads/bridges & Bike				$9,527,173	
U568		Kellogg Creek Dam Removal/Bridge Replacement/Milwaukie TC River Access Improvements	Washington to Adams	Remove dam and bridge; replace bridge with full bike and pedestrian facilities and a multi-use path undercrossing. Remove fish passage barrier; provide E-W and N-S multi-modal connections; support downtown revitalization.	Pedestrian & Bike				$18,355,029	
U569		Kellogg Creek Pedestrian Bridge/ Trail	99-E to Miramonte Lodge	Construct low-impact trail-type sidewalk & ped bridge. Connect area east of 99-E to downtown Milwaukie/ Lake Road Station.	Pedestrian & Bike				$4,525,107	
U570		Kerr Parkway bike lanes	Stephenson to Boones Ferry Rd	Add bike lanes and reconstruct roadway Enhance bicycling options	Bike				$4,440,733	
U571		Kinsman Rd. Extension	Ridder Rd. to Day St.	Construct three lane road extension with sidewalks & bike lanes Improve freight access to Coffee Creek regionally significant industrial area	Freight & Roads/bridges				$9,621,588	
U572		Lake Oswego to Milwaukie Trail	Willamette Shoreline to Trolley Trail	Build trail linking Lake Oswego to Milwaukie. Provide east/west connection and overcome river barrier.	Regional Trail & Regional Trail				$6,661,099	
U573		Lake Oswego to Portland Trail	Downtown Lake Oswego Hwy 43 to Portland	Build trail connecting Lake Oswego and Portland. Provide north/south Bike and Pedestrian connection between Lake Oswego and Portland and improve safety as an alternative to the current dangerous on-street corridor.	Regional Trail & Regional Trail				$103,617,100	
U574		Lake Oswego Transit center	Lake Oswego downtown to Near street car	Move existing transit center closer to the street car for better connectivity. Improve access to transit.	Transit capital & Pedestrian				$11,531,103	
U575		Leland Road Sidewalk and Bike Infill (active transportation project)	Warner Milne to Meyers Road	Construct sidewalks and bike lanes or multi-use path for safety and to connect pedestrian generators. Address gap.	Roads/bridges				$7,401,221	
U576		Harmony Rd Improvements	Hwy 224 - SE 84th Ave	Widen to three lanes, add bike lanes and sidewalks where needed.					$29,604,886	
U577		Highway 224/Springwater	Highway 224/Springwater	Install traffic signal and turn lanes				Partial		see U10

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U578		Lower Boones Ferry Rd.	Madrona Street to Kruse Way	Widen to include bike lanes, sidewalks, and turn lanes. Enhanced pedestrian and bike opportunity and safety. Improve connectivity to Town Center.	Bike & Pedestrian				$30,670,662	
U579		Main Street Extension Ped and Bike Imp.	15th Street to Dunes Drive	Construct separated multi-use path or sidewalks and bike lanes on both sides Address gap	Bike & Ped				$7,401,221	
U581		McLoughlin Blvd. Improvements - Phase 1	10th St. to I-205	Complete boulevard design improvements. Upgrade to boulevard within Regional Center.	Pedestrian & Roads/bridges				$8,881,466	CIP?
U582		McLoughlin Blvd. Improvements - Phase 2	Dunes Dr. to Clackamas River Bridge	Complete boulevard and gateway improvements. Boulevard multimodal gap in Regional Center.	Pedestrian & Roads/bridges				$5,920,977	CIP?
U583		McLoughlin Blvd. Improvements - Phase 3	Railroad Tunnel to 10th St.	Complete boulevard design improvements and viaduct improvements. Multimodal gap in Regional Center.	Pedestrian & Roads/bridges				$28,969,176	CIP?
U584		McLoughlin Blvd. Ped and Bike Improvements	S. 2nd Street to UGB	Provide pedestrian and bike access through Canemah Address gap and safety	Pedestrian				$20,258,165	CIP?
U585		McLoughlin Promenade Historic Restoration	Singer Hill to Tumwater	Rehabilitate rails, sidewalk portions, basalt columns, Grand Staircase, tunnel walls Historic preservation	Roads/bridges				$1,628,269	
U586		Milwaukie Town Center: Main/Harrison/21st	SE Scott and SE Main to SE Jackson and SE Main	Improvements include renovated block faces, two travel lanes, bike lanes, 15 foot sidewalks, planter strips, lighting, benches and ADA-compliant sidewalks. Economic development.	Pedestrian & Bike				$742,350	
U587		Misty Drive	162nd Ave. to 177th Ave.	Construct a new 3 lane roadway with sidewalks, bike lanes, traffic signals and a bridge over Rock Creek Improve east-west connectivity and provide congestion relief to Sunnyside Rd. and 172nd Ave. Provides access to current and planned commercial and employment areas	Roads/bridges				$56,418,680	
U588		Molalla Ave. Frequent Bus	Oregon City Transit Center to Clackamas Community College	Improve sidewalks, lighting, crossings, bus shelters and benches. Relieve congestion.	Transit capital & Pedestrian				$2,998,703	
U589		Molalla Ave. Streetscape Improvements Phase 3	Holmes to Warner Milne	Streetscape improvements including widening sidewalks, sidewalk infill, ADA accessibility, bike lanes, reconfigure travel lanes, add bus stop amenities. Address gap.	Pedestrian & Bike				$4,456,796	
U590		Molalla Ave. Streetscape Improvements Phase 4	Beavercreek to Hwy. 213	Streetscape improvements including widening sidewalks, sidewalk infill, ADA accessibility, bike lanes, reconfigure travel lanes, add bus stop amenities. Address gap.	Pedestrian & Bike				$11,841,954	
U591		Monroe Bike Boulevard	21st Ave. to Linwood Ave.	Minor widening to allow shared lanes, improve signage, striping. Bicycle Boulevard treatment. Address gaps in bike and pedestrian system.	Bike & Pedestrian				$3,552,586	
U593		Multi-Use Local/Regional Trail and PRT Study	Damascus	Study for a multi-use path for bikes, pedestrians, horses that provides local access and connects with Happy Valley and Gresham. Study will also evaluate potential for personal rapid transit. Study for a multi-use path that provides local access and connects with Happy Valley and Gresham. Study will also evaluate potential for personal rapid transit.	Regional Trail & Pedestrian				$2,960,489	

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U594		US 26	Rhododendron to MP 49.2	MP 44.1-49.2 repaving; MP 47.6-48.8 WB passing lane, EB/WB chain-up area; 48.7 realign Kiwanis Rd; MP 47.1 access closed, guardrail installation; improve signing.		Rural				MP 44.1-49.2 repaving; MP 47.6-48.8 WB passing lane, EB/WB chain-up area; 48.7 realign Kiwanis Rd; MP 47.1 access closed, guardrail installation; improve signing.
U596		Newell Creek Canyon Trail (East)	Hwy 213 and Redland Rd. to Beavercreek Rd.	Project development and right-of-way acquisition for regional trail to follow the Oregon City-Molalla interurban railroad bench on the east side of Newell Creek Canyon. Regional connections; improve bicycle and pedestrian safety and access.	Regional Trail & Pedestrian				$6,077,450	
U597		I-205 BRT	Clackamas to Tualatin	Non/exclusive/in-lane BRT on I-205 between Clackamas and Tualatin	Transit				$54,130,449	
U598		Ochoco Sidewalks	19th Ave. to 17th Ave.	Construct sidewalks, reconstruct bridge over Johnson Creek. Address gap in sidewalks between bus stops on 17th Ave. and 99-E and industrial area.	Pedestrian & Freight				$4,498,055	
U599		OR 213-Sunnyside Road	Safety	Install traffic separators to allow u-turns						
U600		OR 99-E Blvd.	Kellogg Creek Bridge to River Rd.	Construct sidewalks and bike lanes, median strips, planter strips, and pedestrian scale lighting. Reconfigure or construct new signal for entrance to Riverfront Park. Address gaps in regional bike and pedestrian system.	Pedestrian & Bike				$5,772,953	
U601		Oregon City Loop Trail	Beavercreek Rd. to Hwy 213	Regional trail would generally follow the Oregon City UGB on a collection of local roads, through new development, along Power line right-of-way, and down the bluff to link up with the Promenade in downtown Oregon City Regional connections; improve bicycle and pedestrian safety and access.	Regional Trail & Pedestrian				$4,440,733	
U602		Oregon City TMA Startup Program	Oregon City Regional Center	Implements a transportation management association program with employers. Relieve congestion.	TDM & Pedestrian/bike				$1,418,072	
U603		I-205 operational improvements	I-205 corridor	Construct improvements to address recurring bottlenecks on I-205. Specific improvements as identified in operational analysis, mobility corridor analysis and refinement planning					$251,641,528	
U604		Pilkington Rd bike lanes/ sidewalk	Boones Ferry Rd to Childs Rd	Widen and improve to provide bike//ped facility Enhance bicycling options	Bike				$2,235,169	
U605		Pudding River Bridge	PE only					Design		
U606		Railroad Ave. Bike/Ped Improvement	37th Ave. to Linwood Ave.	Construct sidewalks and bike lanes. Key E-W connection parallel route for Highway 224 mobility corridor. Address gap in bike and pedestrian system.	Pedestrian & Bike				$17,610,466	
U607		River Rd. Sidewalks	99-E to City Limit	Construct sidewalks. Address pedestrian safety issue.	Pedestrian				$2,309,995	
U609		SB 99E/I-205 Interchange Access	Dunes Dr. to I-205 SB Ramp Terminus	Dual left turn lanes on 99E approach to SB I-205 ramp, ramp widening to accommodate approach. Address safety and provide congestion relief.	Roads/bridges & Throughways				$4,440,733	

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U611		Lake Rd Improvements (Phase 2)	21st Ave to Hwy 224	Construct sidewalks, planter strips, medians, and bus stops. Add signal at Oatfield Rd					$16,206,532	See U102
U612	S04	South/North High Capacity Transit	Clackamas Town Center to Rose Quarter	High capacity transit improvements				Complete		
U613		Springwater Corridor trail	Rugg Road to Dee St	Construct an unimproved section of the Springwater Corridor trail within Boring, with a 10 to 12 foot wide multi-use pathway for use by bicyclists, pedestrians, and equestrians Address gaps in regional bike and pedestrian system.	Pedestrian				$2,805,063	
U614		Stafford Rd Improvements	I-205 to Rosemont Rd.	Widen to three lanes including bike lanes and sidewalks. Relieve congestion, address safety and improve access to Lake Oswego and West Linn.	Roads/bridges & Pedestrian				$91,769,488	See 2001 TSP 117, 118, 121, 126, 128, 129
U615		Stafford Rd. Improvements	I-205 to Boeckman Rd.	Reconstruct, widen and add turn lanes. Address safety, provide congestion relief and improve access to Wilsonville.	Roads/bridges & Pedestrian				$54,209,963	See 2001 TSP 117, 118, 121, 126, 128, 130
U616		Stanley N/S bike/ped route	Johnson Creek Blvd. to Railroad Ave.	Construct sidewalks and bike lanes. Key connection between Johnson Creek Boulevard, Harrison Street, and Harmony Road (Arterials). Address gap in bike and pedestrian system.	Pedestrian & Bike				$9,744,541	
U617		Sunnybrook Blvd/24 Hour Fitness		Flashing Yellow Arrow on Sunnybrook				Complete		
U618		Sunnyside Rd. Frequent Bus	Clackamas TC to Damascus TC	Construct improvements that enhance Frequent bus service. Construct improvements that enhance Frequent bus service.	Transit capital				$1,480,244	
U619	S01	Sunrise Corridor Phase 2	Rock Creek Junction to US-26	New (4) lane facility with interchange(s)						
U620		Sunrise Hwy. PE: Webster Rd. to SE 172nd Ave	Webster Rd./Hwy. 224 to 172nd Ave./Hwy. 212	Preliminary engineering and EIS fromWebster Rd. to SE 172nd. Address existing congestion and safety problems in Sunrise corridor; serve planned growth in Damascus TC; and provide improved access to I-205 for Clackamas Industrial Area.	Throughways & Freight				$29,604,886	
U621		Sunrise Multi- use path	I-205 to Rock Creek Junction	Construct new mullti use path to/from I-205 paralleling the Sunrise project. Address gaps in regional bike and pedestrian system.	Pedestrian				$8,881,466	
U622		Sunrise Parkway	Rock Creek Junction to US 26	Preliminary engineering and EIS. Would study the Sunrise Parkway, as a new route through Damascus that would provide a direct connection between I-205 and U.S. 26, the Mount Hood Highway.	Throughways & Freight				$8,881,466	
U623		Sunrise Project Phase 2 Construction	I-205 to 172nd Ave.	Construct improvements in the Sunrise corridor consistent with the supplemental EIS Address existing congestion and safety problems in Sunrise corridor; serve planned growth in Damascus TC; and provide improved access to I-205 for Clackamas Industrial Area.	Throughways				$162,826,871	CIP?
U624		Sunrise Project: Acquire right-of-way: Webster Rd. to SE 172nd Ave	Webster Rd./Hwy. 224 to 172nd Ave./Hwy. 212	Acquire right-of-way: Webster Rd. to SE 172nd Ave. to accommodate six-through lane expressway, plus auxiliary lanes. Preserve right-of-way for Phase 1 of Sunrise Project.	Throughways & Freight				$214,635,421	

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U625		Swan Extension	Livesay to UGB	Through lanes, sidewalks, bike lanes, turn lanes to serve UGB expansion area. Address need in UGB expansion area.	Roads/bridges & Pedestrian				$83,058,477	
U626		Linwood/Harmony Rd/Lake Rd Overcrossing/intersection	Linwood/Harmony/Lake	Add NB right turn lane, add EB right turn land, add WB left turn land and grade separate UPRR					$29,604,886	
U627		Tonquin Trail	Washington/Clackamas County line to Boones Ferry Landing	Shared use path with some on-street portions. Regional trail would connect Tualatin/Sherwood with west Wilsonville, Coffee Lake Natural Area, Villebois, and the Grahams Oak Natural Area. Connections to the trail will be provided at Wilsonville road, through Villebois, Boeckman Road, Cahalin Road,	Regional Trail & Bike				$4,440,733	
U628		Tooze Rd. Improvements	110th Ave. to Grahams Ferry Rd.	Widen Tooze Rd to 3 lanes, add bike/pedestrian connections to regional trail system. Continuation of the Boeckman Road Extension Project along the Tooze Road right-of-way to Grahams Ferry Road which provides a major east-west suburban to suburban connector.	Roads/bridges & Regional Trail				$5,624,928	
U629		Trolley Trail Bridge	Portland Ave. to Oregon City Clackamas R. Trail	Regional trail would connect the proposed regional Trolley Trail to the Clackamas River Trail via an old railroad bridge spanning the Clackamas River. Regional connections; improve bicycle and pedestrian safety and access.	Regional Trail & Roads/bridges				$10,129,083	
U630		Tryon Creek Bridge - Willamette River Shoreline regional trail	Mouth of Tryon Creek to Mouth of Tryon Creek	Construct new bridge over the mouth of Tryon Creek Bike/ped connection between Foothills Park and Tryon Cove Park. Also connects to future Portland or Milwaukie bike/ped projects	Regional Trail				$2,516,415	
U631		Tualatin River Pathway			Regional Trail & Bike/Pedestrian				$17,422,022	
U632		Turf to Surf Rail with Trail	downtown Lake Oswego to Tualatin River Trail	Build trail linking Tualatin and Lake Oswego. Provide pedestrian/bike access between Tualatin and Lake Oswego.	Regional Trail & Regional Trail				$10,065,661	
U633	S16	US-26	0.74 miles east of Camp Creek Road	Perform additional safety analysis						
U634	S18	US-26	Govt. Camp Loop (W.) to Warm Springs Highway	Four lane widening with median, add left-turn lanes						
U635	S22	US-26	Hwy-35 Junction to Wasco County Line	Add passing/climbing lanes (short term project)						
U636	S23	US-26	Hwy-35 Junction to Wasco County Line	Four lane widening with median						
U637		US-26	0.74 miles east of Camp Creek Road	Perform additional safety analysis				Complete		
U638	S20	US-26	Multorpor Road Overpass	Phase 2 - Widen overpass to accommodate all travel modes, investigate feasibility of Highway 26 ramp connections to provide direct access	Bridge / Culvert	Rural	20 Year	Complete	$6,151,094	

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U639	S17	US-26	0.27 west of four lane section	Realign to remove/decrease horizontal curves				Complete		TSP
U640		Washington St. Improvements	Abernethy Rd. to Hwy. 213	Complete LID boulevard design improvements. Address gaps in roadway, bicycle, and pedestrian system.	Pedestrian & Roads/bridges				$7,401,221	
U641		Milwaukie Expressway Improvements	I-205 to Webster Rd	3rd WB lane on Milwaukie Expressway (Hwy 224)					$7,401,221	
U642		Willamette River Greenway Trail	Willamette Park to Lake Oswego - Willamette River trail	Paved trail running parallel to the Willamette River from Willamette Park at the mount of the Tualatin River eventually to the Lake Oswego City Limits facilitating connection to the Willamette River Trail with neighboring cities as part of the Metro Region. Improve bicycle and pedestrian safety.	Regional Trail & Regional Program				$4,051,633	
U643		Willamette River Shared-Use Path	10th St. to Blue Heron	Construct shared use path. Address gap.	Regional Trail & Pedestrian				$2,960,489	
U644		Stafford Road	Advance Rd to Rosemont Rd	Paving overlay	Reconstruction	Rural			$1,690,000	Same area as projects 115, 118, 121, 126, 126, 129
U645	28	Causey Avenue	Extend Causey over I-205 to Frontage Road	Extend Causey over I-205 to Bob Schumacher Road with 3 lane overpass	Connectivity	Urban	20 Year	Hold	$14,800,000	Dev Agency
U646		Harmony Road Improvements	Hwy 224 to Fuller	Widen to three lanes, add bike lanes and sidewalks where needed	Capacity/Safety	Urban			$40,000,000	Dev Agency
U647		Southgate/Sunnyside	Southgate/Sunnyside	Road closures to help reduce traffic impacts	Safety	Urban				Dev Agency
U648		92nd/Johnson Creek Blvd. intersection	92nd/Johnson Creek Blvd. intersection	Add turn lanes on 92nd (northbound left at JCB, and northbound right at Idleman)	Capacity	Urban			$100,000	Dev Agency See U419
U649		Sunnyside Road	82nd to 97th	Study to evaluate traffic operations, median beautifications, bike lanes, parking in strategic sections, assess lane design, modify Comp Plan standard section	Bikeways	Urban			$30,000	Dev Agency
U650		Sunnyside Road		Modified boulevard treatment including lane redesign, medians, beautification, curb extensions, reconstructed sidewalks, landscaping, south side bike lanes	Bikeways	Urban			$3,000,000	Dev Agency
U651		New Service to Clackamas TC	Wilsonville to CTC	Additional Service hours for new services and related bus stop and ROW improvements	Transit				$6,077,450	
U652		Sunnyside Ped-Bike Overpass		Ped-Bike overpass	Safety/Conn.	Urban				Dev Agency
U653		I-205 Ped-Bike Overpass		Ped-Bike overpass	Safety/Conn.	Urban			$2,250,000	Dev Agency
U654		Clackamas Regional Park Trail		Multi use trail within proposed regional park	Trail	Urban				Dev Agency
U655		Transit/Transportation Demand Support		Assisting CRCA business on maximizing transit/rideshare/other opportunities (staff support)	Capacity	Urban				Dev Agency
U656		Area Signal Improvements (Small Projects)		Flashing yellow arrows, Controller upgrades (2070s), coundowns pedestrians crossing signals, upgrade pushbuttons, communications, APS at high volume ped locations especially w/transit, LED illumination	Capacity/Safety	Urban			$1,275,000	Dev Agency

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U657		Sunnyside Road Adaptive Signal Timing		Sunnyside Road Adaptive Signal Timing	Capacity	Urban			$1,225,000	Dev Agency
U658		Harmony Road	OR 224 to 82nd Ave	Install video monitoring cameras and vehicle detection equipment	Capacity/Safety	Urban			$287,000	Dev Agency
U659		82nd Ave/JCB	82nd Ave/JCB	Extend west bound left turn queue storage, rebuild median, increase storage from 200' to 350' minimum		Urban			$50,000	Dev Agency
U660		82nd Ave	Johnson Creek Blvd to Causey Ave	Widen to 5 lanes with bike lanes	Capacity	Urban			$17,500,000	Dev Agency
U661		Fuller/King Realignment	Fuller/King	Realign Fuller to west at King	Safety	Urban				Dev Agency
U662		West 82nd Parallel Road or Alternative	Harmony to Clatsop	82nd parallel road	Capacity	Urban			$50,000,000	Dev Agency
U663		82nd Ave	Sunnyside to Monterey	Restripe for bike lanes		Urban			$25,000	Dev Agency
U664		82nd Ave	Sunnyside north to County lines	bike lanes	Bikeways	Urban				Dev Agency
U665		82nd Ave	I-205 North to Sunnyside Road	bike lanes	Bikeways	Urban			$25,000	Dev Agency
U666		82nd Ave	I-205 North to Sunnyside Road	Sidewalks	Pedestrian	Urban				Dev Agency
U667		Redland Rd	Abernethy Rd to UGB	Turn lanes, bike lanes, sidewalks, intersection improvements, bridge replacements (2).					$22,292,479	
U668		82nd Ave - sidewalk gaps	King to King (west side)	Sidewalk/landscaping		Urban			$215,000	Dev Agency
U669		82nd Ave - sidewalk gaps	King to Orchard (west side)	Sidewalk/landscaping		Urban			$200,000	Dev Agency
U670		82nd Ave - sidewalk gaps	Glencoe to Overland (west side)	Sidewalk/landscaping		Urban			$800,000	Dev Agency
U671		82nd Ave ITS	Sunnyside to Portland City Limits	Extend fiberoptic communications, CCTV at key intersections		Urban			$1,326,000	Dev Agency
U672		82nd Ave/Sunnyside Rd	82nd Ave/Sunnyside Rd	Provide priority at traffic signals for buses		Urban				Dev Agency
U673		River Rd	River Rd/Courtney intersection	Add turn lanes to four legs of the intersection					$2,309,995	
U674		Scouter's Mt. Trail	Springwater/Powell Butte to Springwater Corridor	Build trail to/on Scouter's Mt					$13,425,816	
U675		Webster Rd.	Webster/Strawberry Ln. intersection	Traffic Signal					$2,234,172	See U152
U683		Barnes Rd.: Orient to south city limits	Orient to South city limit	Widen road and add improvements.	Roads/bridges	Urban			$14,454,665	

Note:

Traffic signals may not be installed on the state system without the State Traffic Engineer's approval (OAR 734-020-0410). It must be demonstrated that a proposed signal: meets traffic signal warrants; satisfies highway design and spacing standards; and that the proposed signal improves the overall safety and operation of the intersection (OAR 734-020-0440). In cases where the proposed signal is less than the one-half mile minimum spacing standard, a progression analysis is also required (OAR 734-020-0470).

Installation of roundabout on ODOT facility will require ODOT approval including analysis of impacts on truck movement.

ODOT Rail Division approval required for new rail crossings.

The following is a list of all pedestrian and bicycle projects planned for Clackamas County

Number	Street Name	Section Description	Funding Source	Project Elements	Point Total	List source	comments	Traffic Comments
B1	122ND / 129TH	Happy Valley -Sunnyside North to Happy Valley	CIP-HV	Bikelanes, Reconstruction and Widening	**51**	Urban Bikeway		No
B2	132ND	Happy Valley - King to County Line	CIP-HV	Bikelanes, Reconstruction and Widening	**44**	Urban Bikeway		No
B3	13TH	Ivy St. to Molalla Forest Road	City, Grant or 1% Set Aside	Widen, Bikelanes	**42**	Urban Bikeway		
B4	142ND	Sunnyside south to Hwy 212	CIP - Inter	Bikelanes, Reconstruction and Widening	**46**	Urban Bikeway		No
B5	145TH / 147TH	Happy Valley - 147th to County Line	*Scheduled for Summer 2003*	Bikelanes	**41**	Urban Bikeway		Some
B6	152ND	Curve in road to Hwy 212	CIP-Long	Bikelanes	**66**	Urban Bikeway		No
B7	162ND	Sunnyside to Monner Rd	CIP-Long Development	Urban Fringe. Bikelanes, Reconstruction and Widening.	**30**	Urban Bikeway		No, About 60% in Southernly Portion
B8	1ST	Sequioa Parkway to Mulino Rd Canby	City, Grant or 1% Set Aside	Bikelanes	**38**	Urban Bikeway		No
B9	90TH	Monterey Ave to Causey Ave.	Grant or 1% Set Aside	Bikelanes	**35**	Urban Bikeway		No
B10	92ND	Johnson Creek Blvd to City of Portland	Grant or 1% Set Aside	Bikelanes	**69**	Urban Bikeway		Yes
B11	92ND	Stevens to Idleman	Grant or 1% Set Aside	Bikelanes	**62**	Urban Bikeway		No
B12	93RD	Sunnyside to Sunnybrook Blvd	Grant or 1% Set Aside	Restripe for Bikelanes	**42**	Urban Bikeway		No
B13	98TH / Ext of 98TH	Lawnfield to Mather Rd	CIP-Long	Sunrise Corridor / Employment. Bikelanes, Reconstruction and Widening.	38	Urban Bikeway		Yes, no widening. 40' wide S/W both sides
B14	ALBERTA	Linwood to 72nd Ave	Grant or 1% Set Aside	Bikelanes	**39**	Urban Bikeway		No
B15	ALDERCREST	Thiessen to Oatfield	CIP-Long	Bikelanes, Reconstruction and Widening	**33**	Urban Bikeway		No
B16	ARISTA TROLLEY TRAIL (On Street)	On Street Portions	Grant or 1% Set Aside	Bikelanes / Sidewalks	**34**	Urban Bikeway		Sharrows
B17	BELL	King Rd to Johnson Creek	Grant or 1% Set Aside	Bikelanes	**74**	Urban Bikeway		No
B18	BONITA	Carman Drive to I-5	Grant or 1% Set Aside	Bikelanes	**38**	Urban Bikeway		No
B19	BOONES FERRY	Portions maintained by County	Grant or 1% Set Aside	Bikelanes. Striping possibly in Tualatin / Lake Oswego Jurisdiction.	**74**	Urban Bikeway		
B20	CARMAN	Kruse Way to I-5	CIP-Near	Bikelanes, Reconstruction and Widening	**31**	Urban Bikeway		No
B21	CAUSEY	Fuller Rd to I-205	Grant or 1% Set Aside	Restripe for Bikelanes	**55**	Urban Bikeway		No
B22	CHILDS	65th to Stafford Road	CIP - Intermediate	Bikelanes	**61**	Urban Bikeway		No
B23	EVELYN	82nd to Managan	Grant or 1% Set Aside	Bikelanes	**44**	Urban Bikeway		No
B24	GLEN ECHO	Portland Ave to 99E	Grant or 1% Set Aside	Bikelanes	**58**	Urban Bikeway		No
B25	HILL	View Acres to Oatfield Rd	Grant or 1% Set Aside	Bikelanes	**66**	Urban Bikeway		No
B26	HOLCOMB	Washington Street to Bradley	CIP-Inter	Bikelanes	**58**	Urban Bikeway		No
B27	IDLEMAN	Stevens to Mt. Scott Blvd.	CIP - Intermediate	Bikelanes, Reconstruction and Widening	**69**	Urban Bikeway		No
B28	JENNIFER	106th to Capps	Grant or 1% Set Aside	Bikelanes	**68**	Urban Bikeway		No. 130th instead of Capps?
B29	JENNINGS	Oatfield to Webster	CIP - Intermediate	Bikelanes, Reconstruction and Widening	**71**	Urban Bikeway		No
B30	JENNINGS	River to Oatfield	Grant or 1% Set Aside	Bikelanes	**62**	Urban Bikeway		No
B31	JOHNSON CREEK	Bell Ave to 82nd	CIP-Near	Bikelanes, Reconstruction and Widening	**80**	Urban Bikeway		No
B32	JOHNSON CREEK	Extension to Idelman	CIP-Long	New Road with Bikelanes and Sidewalks	**35**	Urban Bikeway		No
B33	LINWOOD	Harmony north to County Line	Grant, 1% Set Aside, Regional	Bikelanes	**68**	Urban Bikeway		No
B34	LUTHER	72nd Ave to 82nd Ave	Grant or 1% Set Aside	Bikelanes	**35**	Urban Bikeway		No
B35	MATHER	Cranberry Loop to 97th	CIP-Near	Bikelanes, Reconstruction and Widening	**68**	Urban Bikeway		No
B36	MATHER	122nd to Summers Lane	CIP-Near	Bikelanes, Reconstruction and Widening	**39**	Urban Bikeway		No
B37	MATHER	97th to Industrial Area	Grant or 1% Set Aside	Bikelanes, Reconstruction and Widening	**37**	Urban Bikeway		No
B38	MONROE	Linwood to Thompson	CIP-Long	Bikelanes	**68**	Urban Bikeway		No
B39	MT SCOTT	Happy Valley King to County Line	City, Grant, 1% Set Aside	Bikelanes, Reconstruction and Widening	**37**	Urban Bikeway		Some, bike lane one side next to Cemetary
B40	PARK	99E to River Rd	Grant or 1% Set Aside	Bikelanes	**69**	Urban Bikeway		S/W north side

Number	Street Name	Section Description	Funding Source	Project Elements	Point Total	List source	comments	Traffic Comments
B41	PILKINGTON	Boones Ferry to Childs Road	Grant or 1% Set Aside	Bikelanes	**45**	Urban Bikeway		
B42	RUSK	Hwy 224 South to Aldercrest	Grant or 1% Set Aside	Bikelanes	**33**	Urban Bikeway		No
B43	SUMMER EXT	132nd to 142nd Ave	CIP	New Road with Bikelanes and Sidewalk Need for connection.	**33**	Urban Bikeway		No
B44	SUNNYSIDE	82nd Ave to 97th	Stand Alone (CIP -Near)	Restipe for Bikelanes	**53**	Urban Bikeway		No
B45	THIESSEN	Aldercrest Rd to Oatfield Rd	Grant or 1% Set Aside	Bikelanes	**68**	Urban Bikeway		No
B46	WILLAM OTTY EXT	Extension of Willam Otty Rd	Development (Eagle Landing)	New Road with Bikelanes and Sidewalk. Need for connection.	**41**	Urban Bikeway		
B 47	Bicycle Parking and Promotion Project					Urban Bikeway		
B 48	Education and promotional brochures and Slide Shows					Urban Bikeway		
SB 101	82ND	Sunnyside north to County Line		Restipe for Bikelanes	**103**	Urban Bikeway		Partial
SB 102	82ND	I-205 North to Sunnyside Road		Restipe for Bikelanes	**74**	Urban Bikeway		Partial
SB 103	MCLOUGHLIN	Milwaukie to Gladstone		Restipe for Bikelanes	**90**	Urban Bikeway		Mostly
RB 401	13TH	Redwood to Molalla Forest Road	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**40**	Rural Bikeway		
RB 402	242ND	County Line to Hwy 212	CIP-Near	Widen / Shoulder Bikeways	**49**	Rural Bikeway		No
RB 403	282ND	Hwy 212 to County Line	CIP-Inter	Widen / Shoulder Bikeways	**43**	Rural Bikeway		No
RB 404	65TH	Stafford Rd to Tualatin	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**40**	Rural Bikeway		
RB 405	BARLOW	Knight Bridge to 99E	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**38**	Rural Bikeway		No
RB 406	BEAVERCREEK	Oregon City to Hwy 211	CIP-Long	Widen / Shoulder Bikeways	**36**	Rural Bikeway		No
RB 407	BORLAND	Tualatin to Stafford	CIP-Inter	Widen / Shoulder Bikeways	**69**	Rural Bikeway		No
RB 408	BORLAND	Stafford to West Linn	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**35**	Rural Bikeway		No
RB 409	BRADLEY	Gronlund to Redland	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**35**	Rural Bikeway		No
RB 410	CLACKAMAS RIVER	Hwy 213 to Springwater	CIP-Inter	Widen / Shoulder Bikeways	**35**	Rural Bikeway		No
RB 411	COMPTON	Hwy 26 to 352nd Ave	CIP-Long	Widen / Shoulder Bikeways	**41**	Rural Bikeway		No
RB 412	EAGLE CREEK	Hwy 211 to Rivermill Rd	CIP-Long	Widen / Shoulder Bikeways	**57**	Rural Bikeway		No
RB 413	FISCHERS MILL		Grant, 1% Set Aside	Widen / Shoulder Bikeways	**43**	Rural Bikeway		No
RB 414	GRAYS HILL	Green Mountain Road to Hwy 211	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**45**	Rural Bikeway		No
RB 415	HATTAN	Springwater to Fischers Mill	CIP-Inter	Widen / Shoulder Bikeways	**34**	Rural Bikeway		No
RB 416	HENRICI	Hwy 213 to Redland Rd	CIP-Inter/Long	Widen / Shoulder Bikeways	**42**	Rural Bikeway		No
RB 417	HOLLY	Maplelane Rd to Redland Rd	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**35**	Rural Bikeway		No
RB 418	HOLLY/37th	Territorial to 37th Canby	CIP-Long	Widen / Shoulder Bikeways	**41**	Rural Bikeway		
RB 419	JOHNSON	Stafford Rd to West Linn	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**48**	Rural Bikeway		No
RB 420	KELSO	Amisigger Rd to Sandy City Limits	CIP-Long	Widen / Shoulder Bikeways	**34**	Rural Bikeway		No
RB 421	MAPLELANE	Beavercreek Rd to Ferguson Rd	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**55**	Rural Bikeway		No
RB 422	MILEY	Airport Rd to Eilers Rd	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**38**	Rural Bikeway		No
RB 423	MOLALLA	Hwy 213 thru Molalla	CIP-Long	Widen / Shoulder Bikeways	**35**	Rural Bikeway		No
RB 425	MULINO	SE 1st St to Hwy 213	CIP-Long	Widen / Shoulder Bikeways	**34**	Rural Bikeway		No
RB 426	REDLAND	Oregon City to Fischer Mill	CIP-Long	Widen / Shoulder Bikeways	**35**	Rural Bikeway		Bike lanes, 11' travel, 5' bike
RB 427	RICHEY	Kelso Rd to 282nd Rd	CIP-Inter	Widen / Shoulder Bikeways	**37**	Rural Bikeway		No
RB 428	ROSEMONT	Stafford Road to Summit	CIP-Near	Widen / Shoulder Bikeways	**37**	Rural Bikeway		No
RB 429	SALMON RIVER	Hwy 26 to Welches Rd	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**43**	Rural Bikeway		No
RB 430	SOUTH END	Oregon City limits to 99E	CIP-Long	Widen / Shoulder Bikeways	**45**	Rural Bikeway		No
RB 431	SPRINGWATER	Hattan to Hwy 211	CIP-Long	Widen / Shoulder Bikeways	**36**	Rural Bikeway		No
RB 432	STAFFORD	Lake Oswego to Borland	CIP-Near	Widen / Shoulder Bikeways	**47**	Rural Bikeway		No

Number	Street Name	Section Description	Funding Source	Project Elements	Point Total	List source	comments	Traffic Comments
RB 433	STAFFORD	Borland to Mountain	CIP-Near/Inter	Widen / Shoulder Bikeways	**44**	Rural Bikeway		No
RB 434	STAFFORD	Mountain to Boeckman	CIP-Long	Widen / Shoulder Bikeways	**36**	Rural Bikeway		No
RB 435	SUNNYSIDE	172nd to Hwy 212	CIP-Near	Widen / Shoulder Bikeways	**33**	Rural Bikeway		No
RB 436	TEN EYCK	Lusted Rd to Sandy City Limits	CIP-Long	Widen / Shoulder Bikeways	**36**	Rural Bikeway		No
RB 437	TOLIVER	Dryland to Hwy 213	Grant, 1% Set Aside	Widen / Shoulder Bikeways	**45**	Rural Bikeway		Yes
RB 438	TOWNSHIP	Canby to Central Point Rd	CIP-Long	Widen / Shoulder Bikeways	**38**	Rural Bikeway		No
RB 439	WELCHES	Hwy 26 to Salmon River Rd	CIP-Long	Widen / Shoulder Bikeways	**46**	Rural Bikeway		No
SRB 501	HWY 211	Mollala to Estacada		Widen/Shoulder Bikeways	**43**	Rural Bikeway		No
SRB 502	HWY 212	135th Ave to Hwy 26		Widen/Shoulder Bikeways	**50**	Rural Bikeway		No
SRB 503	HWY 213	Oregon City to Marion County		Widen/Shoulder Bikeways	**59**	Rural Bikeway		No
SRB 504	HWY 224	Hwy 212 to Estacada		Widen/Shoulder Bikeways	**63**	Rural Bikeway		No
901	TROLLEY TRAIL			Trolley Trail Multi Use Path		Multi-Use Path	See Trolley Trail Master Plan for Trail description	Under construction
902	PHILLIPS CREEK GREENWAY			Regional Center Path		Multi-Use Path	Very difficult because north of 82nd there is no/little space between sewer pipe and bridge. See Clackamas Regional Center Plan for location	
903	N CLACKAMAS PARK TRAIL			Trail in North Clackamas Park		Multi-Use Path	See Pedestrian project Map for Location	
904	INDUSTRIAL AREA			Pedestrian Connector		Multi-Use Path	Connects Industrial Way to Regional Center (see Pedestrian Project Map)	No
905	CLACKAMAS REGIONAL CENTER PED LINKAGE			Various Ped Linkage in Clackamas Regional Center		Multi-Use Path	See Clackamas Regional Center Plan for Locations	Yes
906	CAZADERO MULTI USE TRAIL			MultiUse Trail from County Line through Boring to Estacada		Multi-Use Path	Portion from County Line to Boring part of Springwater Corridor. Remainder owned by Oregon State Parks and Rec	No
907	OC TO MULINO TRAIL			OC to Mulino on Old RR ROW		Multi-Use Path	ROW in private ownership. Will be difficult	
908	MOLLALA RIVER BIKE PATH			13th Street to Macksburg		Multi-Use Path	Could potentially get ROW for $1. 3/1/2 miles	
909	CANBY - MOLLALA RR TRAIL			Canby to Mollala Rails with Trails / Union Pacific		Multi-Use Path		
1	106TH	Hwy 212 to Jennifer	Redevelopment, Grant Funding	Sidewalks		Pedestrian		S/W
2	122ND / 129TH	HAPPY VALLEY - Sunnyside to King	Near Term CIP, Grant Funding	Sidewalks		Pedestrian		No
3	132ND	Sunnyside Rd South to Hubbard	Long Term CIP, Grant Funding	Sidewalks		Pedestrian		No
4	142ND	Sunnyside south to Charjan	Intermediate CIP, Grant Funding	Sidewalks		Pedestrian		No
5	152ND	Bend in Road to Hwy 212	Long Term CIP, Redevelopment, Grant Funding	Sidewalks		Pedestrian		No
6	92ND	Stevens to Idleman	Grant Funding	Sidewalks		Pedestrian		No
7	ARISTA - TROLLEY TRAIL	On Street Portions:Courtney Ave to Creighton - Jennings to Boardman	Grant Funding, Recreation, MTIP	Sidewalks		Pedestrian		
8	BELL	King Rd to Alberta	Grant Funding	Sidewalks		Pedestrian		No
9	CONCORD	Harold to Oatfield Rd	Grant Funding	Sidewalks		Pedestrian		No
10	CORNWELL	82nd to Garden Lane	Grant Funding	Sidewalks		Pedestrian		No
11	COURTNEY	River Rd to McLoughlin	Grant Funding, Safe Routes to Schools	Sidewalks		Pedestrian		No
12	EVELYN	82nd Dr to Jennifer Ave	Grant Funding	Sidewalks		Pedestrian		No
13	FULLER	82nd Ave North to County Line	Redevelopment, Grant Funding, TIF Funds	Sidewalks		Pedestrian		No

Number	Street Name	Section Description	Funding Source	Project Elements	Point Total	List source	comments	Traffic Comments
14	GREENVIEW	Thiessen Rd to Clackamas Rd	Grant Funding	Sidewalks		Pedestrian		No
15	HAROLD	Concord Road to Roethe Road	Grant Funding	Sidewalks		Pedestrian		No
16	HILL	View Acres to Oatfield Rd	Grant Funding	Sidewalks		Pedestrian		No
17	HILL	Thiessen Rd to View Acres Rd.	Grant Funding	Sidewalks		Pedestrian		No
18	HILLCREST	92nd to Stevens	Grant Funding	Sidewalks		Pedestrian		No
19	HUBBARD	132nd Ave to Hwy 212	Grant Funding	Sidewalks		Pedestrian		Partial
20	IDLEMAN	Stevens to Mt. Scott Blvd.	Intermediate CIP, Grant Funding	Sidewalks		Pedestrian		No
21	JENNIFER	82nd Dr to 135th	Grant Funding	Sidewalks		Pedestrian		No
22	JENNINGS	99E to Webster	Intermediate CIP, Grant Funding	Sidewalks		Pedestrian		No
23	JOHNSON	Roots Rd to Lake	Near Term CIP, Grant Funding	Sidewalks		Pedestrian		No
24	JOHNSON CREEK	Bell Ave to 92nd	Near Term CIP, Grant Funding	Sidewalks		Pedestrian		No
25	LAKE	Johnson Rd / Webster	Grant Funding	Sidewalks		Pedestrian		No
26	LAWNFIELD	82nd Dr to 97th	Grant Funding	Sidewalks		Pedestrian		No
27	LINWOOD	Harmony north to County Line	MTIP, Grant Funding	Sidewalks		Pedestrian		No
28	MATHER	Cranberry Loop to 97th	Near Term CIP, Grant Funding	Sidewalks		Pedestrian		No
29	NAEF	Oatfield Rd to River Rd	Grant Funding	Sidewalks		Pedestrian		No
30	OATFIELD	Milwaukie to Gladstone	Grant Funding	Sidewalks		Pedestrian		No
31	PARK	River Rd to Oatfield Rd	Grant Funding	Sidewalks		Pedestrian		99E - River north side S/W
32	RISLEY	Arista to Concord Road	Grant Funding	Sidewalks		Pedestrian		Arista to River?
33	RIVER	99E Gladstone to 99E Milwaukie	Long Term CIP, Grant Funding	Sidewalks		Pedestrian		No
34	ROETHE	River Road to 99E	Grant Funding			Pedestrian		No
35	ROOTS	Webster to McKinley Rd.	Grant Funding	Sidewalks		Pedestrian		No
36	RUSK	Hwy 224 to Aldercrest	Long Term CIP, Grant Funding	Sidewalks		Pedestrian		No
37	STANLEY	Willow to Johnson Creek Blvd.	Grant Funding	Sidewalks		Pedestrian		No
38	STEVENS	Otty to Sunnyside Rd	Redevelopment, Grant Funding	Sidewalks		Pedestrian		No
39	THIESSEN	Webster Rd to Aldercrest Rd	Grant Funding	Sidewalks		Pedestrian		No
40	THIESSEN	Oatfield to Hill	Grant Funding	Sidewalks		Pedestrian		No
41	THOMPSON / 72nd / MONROE	Linwood to Thompson	Redevelopment, Grant Funding	Sidewalks		Pedestrian		No
42	WEBSTER	Hwy 224 South to Gladstone	Long Term CIP, Regional Funding, Grant Funding	Sidewalks		Pedestrian		No
101	82ND	I-205 North to Sunnyside Road		STATE PROJECT		Pedestrian		No
102	MCLOUGHLIN	Milwaukie to Gladstone		STATE PROJECT		Pedestrian		Mostly
51	IVY	South of Canby to Hwy 170		Has Bikelanes		Pedestrian	Projects a priority in 1996, but not on 2003 list	No
52	CONCORD	Oatfield to La Bonita		Low Traffic Volume		Pedestrian	Projects a priority in 1996, but not on 2003 list	No
53	SALMON RIVER	Hwy 26 to Welches Rd		Has Bikelanes		Pedestrian	Projects a priority in 1996, but not on 2003 list	No
54	JENNINGS	River to 99E				Pedestrian	Projects a priority in 1996, but not on 2003 list	No
55	MAPLE	Laurie Ave to Rupert Dr.		Low Traffic Volume, Speed		Pedestrian	Projects a priority in 1996, but not on 2003 list	No
	Mather	Along Park District Property		Gap in system. 600' Sidewalk on North Side of road		Small Project List		Yes
	Mather	Adjacent to Water tower		Gap in system. Sidewalk on North side of road		Small Project List		
	122nd	Property adjacent to Clackamas High school		Gap in system. Property acquisition and sidewalk construction		Small Project List		
	Bell					Small Project List		

Number	Street Name	Section Description	Funding Source	Project Elements	Point Total	List source	comments	Traffic Comments
	View Acres					Small Project List		
	92nd Ave	Portland City limits to Johnson Creek Blvd		Bikelanes to connect Portland to Johnson Creek Blvd		Small Project List		No
	13th Ave	Redwood to Molalla River Path		Bikelanes to connect existing bikelanes to multi use path		Small Project List		
	Monroe Ave	school to Linwood		Widen, bikelanes. Connets to Linwood		Small Project List		
	Lawnfield	97th to 82nd Dr		Complete sidewalk on south side		Small Project List		

Appendix 8
Detailed Traffic Operations Analysis Results

HCM Signalized Intersection Capacity Analysis
101: SE Johnson Creek Blvd. & SE Flavel Dr.

5/25/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	7	526	85	132	487	81	62	167	121	61	139	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.98		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1780	1814		1805	1809		1767	1754		1752	1864	
Flt Permitted	0.95	1.00		0.95	1.00		0.60	1.00		0.29	1.00	
Satd. Flow (perm)	1780	1814		1805	1809		1108	1754		537	1864	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	7	554	89	139	513	85	65	176	127	64	146	11
RTOR Reduction (vph)	0	5	0	0	3	0	0	22	0	0	2	0
Lane Group Flow (vph)	7	638	0	139	595	0	65	281	0	64	155	0
Confl. Peds. (#/hr)	15					15	1					1
Confl. Bikes (#/hr)		20	1		17			3	1			
Heavy Vehicles (%)	0%	2%	4%	0%	2%	2%	2%	1%	0%	3%	0%	10%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.8	38.6		12.1	49.9		17.0	17.0		17.0	17.0	
Effective Green, g (s)	0.8	38.6		12.1	49.9		17.0	17.0		17.0	17.0	
Actuated g/C Ratio	0.01	0.48		0.15	0.62		0.21	0.21		0.21	0.21	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		0.5	0.5		2.5	2.5	
Lane Grp Cap (vph)	18	868		271	1119		233	369		113	393	
v/s Ratio Prot	0.00	c0.35		c0.08	0.33			c0.16			0.08	
v/s Ratio Perm							0.06			0.12		
v/c Ratio	0.39	0.74		0.51	0.53		0.28	0.76		0.57	0.39	
Uniform Delay, d1	39.7	16.9		31.6	8.8		26.7	29.9		28.5	27.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	9.8	3.3		1.2	0.5		0.2	8.1		5.2	0.5	
Delay (s)	49.5	20.2		32.8	9.2		26.9	38.0		33.7	27.9	
Level of Service	D	C		C	A		C	D		C	C	
Approach Delay (s)		20.5			13.7			36.1			29.6	
Approach LOS		C			B			D			C	

Intersection Summary			
HCM Average Control Delay	21.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	665	54	85	628	81	49	100	74	45	90	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.98			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Frt	1.00	0.99		1.00	0.98			0.96			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1687	1836		1770	1817			1714			1710	
Flt Permitted	0.95	1.00		0.95	1.00			0.89			0.83	
Satd. Flow (perm)	1687	1836		1770	1817			1551			1447	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	47	693	56	89	654	84	51	104	77	47	94	36
RTOR Reduction (vph)	0	2	0	0	3	0	0	14	0	0	7	0
Lane Group Flow (vph)	47	747	0	89	735	0	0	218	0	0	170	0
Confl. Peds. (#/hr)	22		19	19		22	3		15	15		3
Confl. Bikes (#/hr)		5			1			2				
Heavy Vehicles (%)	7%	2%	0%	2%	2%	2%	4%	4%	0%	4%	6%	6%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.7	43.3		8.1	46.7			19.4			19.4	
Effective Green, g (s)	4.7	43.3		8.1	46.7			19.4			19.4	
Actuated g/C Ratio	0.06	0.52		0.10	0.56			0.23			0.23	
Clearance Time (s)	4.0	4.5		4.0	4.5			4.5			4.5	
Vehicle Extension (s)	2.5	3.0		2.5	4.0			2.5			2.5	
Lane Grp Cap (vph)	95	949		171	1013			359			335	
v/s Ratio Prot	0.03	c0.41		c0.05	c0.40							
v/s Ratio Perm								c0.14			0.12	
v/c Ratio	0.49	0.79		0.52	0.73			0.61			0.51	
Uniform Delay, d1	38.4	16.5		36.0	13.8			28.8			28.0	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	2.9	4.4		2.2	2.8			2.5			0.9	
Delay (s)	41.3	20.9		38.2	16.6			31.2			28.9	
Level of Service	D	C		D	B			C			C	
Approach Delay (s)		22.1			18.9			31.2			28.9	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	83.8	Sum of lost time (s)	17.5
Intersection Capacity Utilization	70.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	63	739	15	36	622	43	35	13	115	101	11	103
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	68	795	16	39	669	46	38	14	124	109	12	111
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									3			
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)					503							
pX, platoon unblocked												
vC, conflicting volume	715			811			1467	1731	803	1706	1716	358
vC1, stage 1 conf vol							938	938		769	769	
vC2, stage 2 conf vol							528	792		937	946	
vCu, unblocked vol	715			811			1467	1731	803	1706	1716	358
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			95			82	94	62	3	95	83
cM capacity (veh/h)	895			786			209	232	327	112	233	645

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	68	811	39	446	269	175	120	111
Volume Left	68	0	39	0	0	38	109	0
Volume Right	0	16	0	0	46	124	0	111
cSH	895	1700	786	1700	1700	463	118	645
Volume to Capacity	0.08	0.48	0.05	0.26	0.16	0.38	1.02	0.17
Queue Length 95th (ft)	6	0	4	0	0	44	172	15
Control Delay (s)	9.4	0.0	9.8	0.0	0.0	23.9	158.3	11.7
Lane LOS	A		A			C	F	B
Approach Delay (s)	0.7		0.5			23.9	88.1	
Approach LOS						C	F	

Intersection Summary			
Average Delay	12.5		
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	623	151	406	535	196	238	755	395	307	781	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1577	3467	3368		1770	3505	1553	1770	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1577	3467	3368		1770	3505	1553	1770	3539	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	133	663	161	432	569	209	253	803	420	327	831	84
RTOR Reduction (vph)	0	0	77	0	26	0	0	0	270	0	0	39
Lane Group Flow (vph)	133	663	84	432	752	0	253	803	150	327	831	45
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)					1			2				
Heavy Vehicles (%)	2%	2%	1%	1%	3%	1%	2%	3%	2%	2%	2%	0%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	14.4	44.0	44.0	20.0	49.6		12.5	27.5	27.5	20.0	35.5	35.5
Effective Green, g (s)	14.4	44.0	44.0	20.0	49.6		12.5	27.5	27.5	20.0	35.5	35.5
Actuated g/C Ratio	0.11	0.34	0.34	0.15	0.38		0.10	0.21	0.21	0.15	0.27	0.27
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Vehicle Extension (s)	2.3	4.3	4.3	2.3	4.3		2.3	4.3	4.3	2.3	2.3	2.3
Lane Grp Cap (vph)	196	1198	534	533	1285		170	741	329	272	966	441
v/s Ratio Prot	0.08	0.19		c0.12	c0.22		c0.14	c0.23		c0.18	0.23	
v/s Ratio Perm			0.05						0.10			0.03
v/c Ratio	0.68	0.55	0.16	0.81	0.59		1.49	1.08	0.46	1.20	0.86	0.10
Uniform Delay, d1	55.6	35.0	30.1	53.2	32.0		58.8	51.2	44.7	55.0	44.9	35.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.28	0.50	0.85	1.00	1.00	1.00
Incremental Delay, d2	7.8	1.8	0.6	8.8	2.0		245.4	56.4	4.0	120.7	9.9	0.5
Delay (s)	63.3	36.8	30.7	61.9	34.0		320.5	81.8	42.1	175.7	54.8	35.8
Level of Service	E	D	C	E	C		F	F	D	F	D	D
Approach Delay (s)		39.5			44.0			111.4			85.3	
Approach LOS		D			D			F			F	

Intersection Summary			
HCM Average Control Delay	74.0	HCM Level of Service	E
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1353	26	0	1368	58	0	0	69	51	0	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5				5.5		3.0	
Lane Util. Factor		0.91			0.95				1.00		1.00	
Frpb, ped/bikes		1.00			1.00				1.00		1.00	
Flpb, ped/bikes		1.00			1.00				1.00		1.00	
Frt		1.00			0.99				0.86		0.96	
Flt Protected		1.00			1.00				1.00		0.97	
Satd. Flow (prot)		5066			3514				1644		1641	
Flt Permitted		1.00			1.00				1.00		0.97	
Satd. Flow (perm)		5066			3514				1644		1641	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1395	27	0	1410	60	0	0	71	53	0	25
RTOR Reduction (vph)	0	1	0	0	1	0	0	0	67	0	13	0
Lane Group Flow (vph)	0	1421	0	0	1469	0	0	0	4	0	65	0
Confl. Peds. (#/hr)	2		4	4		2	3					3
Confl. Bikes (#/hr)		3			2							
Heavy Vehicles (%)	0%	2%	4%	0%	2%	2%	0%	0%	0%	6%	0%	8%
Turn Type									custom	Split		
Protected Phases		2			6					4	4	
Permitted Phases									8			
Actuated Green, G (s)		60.6			60.6				4.4		6.9	
Effective Green, g (s)		60.6			60.6				4.4		6.9	
Actuated g/C Ratio		0.81			0.81				0.06		0.09	
Clearance Time (s)		4.5			4.5				5.5		3.0	
Vehicle Extension (s)		4.0			4.0				2.5		0.2	
Lane Grp Cap (vph)		4093			2839				96		151	
v/s Ratio Prot		0.28			c0.42						c0.04	
v/s Ratio Perm									0.00			
v/c Ratio		0.35			0.52				0.04		0.43	
Uniform Delay, d1		1.9			2.4				33.3		32.2	
Progression Factor		1.00			1.00				1.00		1.00	
Incremental Delay, d2		0.2			0.7				0.1		0.7	
Delay (s)		2.2			3.1				33.4		32.9	
Level of Service		A			A				C		C	
Approach Delay (s)		2.2			3.1			33.4			32.9	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM Average Control Delay	4.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	990	494	135	593	0	0	0	0	273	0	788
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.0	4.0	4.5					5.0		5.0
Lane Util. Factor		0.95	1.00	1.00	0.95					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		3539	1583	1787	3574					1805		1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		3539	1583	1787	3574					1805		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1031	515	141	618	0	0	0	0	284	0	821
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	426
Lane Group Flow (vph)	0	1031	515	141	618	0	0	0	0	284	0	395
Heavy Vehicles (%)	0%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type			Free	Prot						Prot		custom
Protected Phases		2		1	6					4		5
Permitted Phases			Free									
Actuated Green, G (s)		53.7	100.0	12.5	39.1					20.3		26.1
Effective Green, g (s)		53.7	100.0	12.5	39.1					20.3		26.1
Actuated g/C Ratio		0.54	1.00	0.12	0.39					0.20		0.26
Clearance Time (s)		4.5		4.0	4.5					5.0		5.0
Vehicle Extension (s)		5.5		2.3	5.5					2.3		2.3
Lane Grp Cap (vph)		1900	1583	223	1397					366		413
v/s Ratio Prot		c0.29		c0.08	0.17					c0.16		c0.25
v/s Ratio Perm			0.33									
v/c Ratio		0.54	0.33	0.63	0.44					0.78		0.96
Uniform Delay, d1		15.1	0.0	41.6	22.4					37.7		36.4
Progression Factor		1.00	1.00	1.50	0.79					1.00		1.00
Incremental Delay, d2		1.1	0.5	4.6	1.0					9.3		32.9
Delay (s)		16.2	0.5	67.2	18.7					47.0		69.3
Level of Service		B	A	E	B					D		E
Approach Delay (s)		11.0			27.7			0.0			63.6	
Approach LOS		B			C			A			E	

Intersection Summary			
HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	73.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	582	712	163	360	438	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.0	4.5	5.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1583	1770	3574	3502	1561
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1583	1770	3574	3502	1561
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	619	757	173	383	466	201
RTOR Reduction (vph)	0	391	0	0	0	164
Lane Group Flow (vph)	619	366	173	383	466	37
Confl. Peds. (#/hr)						2
Heavy Vehicles (%)	0%	2%	2%	1%	0%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	48.3	48.3	20.0	72.3	18.2	18.2
Effective Green, g (s)	48.3	48.3	20.0	72.3	18.2	18.2
Actuated g/C Ratio	0.48	0.48	0.20	0.72	0.18	0.18
Clearance Time (s)	4.5	4.5	4.0	4.5	5.0	5.0
Vehicle Extension (s)	5.5	5.5	2.3	5.5	2.3	2.3
Lane Grp Cap (vph)	1744	765	354	2584	637	284
v/s Ratio Prot	0.17		c0.10	0.11	c0.13	
v/s Ratio Perm		c0.23				0.02
v/c Ratio	0.35	0.48	0.49	0.15	0.73	0.13
Uniform Delay, d1	16.1	17.4	35.5	4.3	38.6	34.3
Progression Factor	0.65	2.41	1.22	1.66	1.00	1.00
Incremental Delay, d2	0.5	1.8	0.6	0.1	3.9	0.1
Delay (s)	11.0	43.8	43.7	7.3	42.5	34.4
Level of Service	B	D	D	A	D	C
Approach Delay (s)	29.0			18.6	40.1	
Approach LOS	C			B	D	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	283	211	315	27	83	16	172	304	44	29	267	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.2		4.0	4.5		4.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.91		1.00	0.98		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3286		1805	3510		1787	1848		1805	1881	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	3286		1805	3510		1787	1848		1805	1881	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	308	229	342	29	90	17	187	330	48	32	290	186
RTOR Reduction (vph)	0	187	0	0	15	0	0	5	0	0	0	128
Lane Group Flow (vph)	308	384	0	29	92	0	187	373	0	32	290	58
Confl. Peds. (#/hr)	3					3	1					1
Confl. Bikes (#/hr)								2				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	1%	1%	0%	0%	1%	2%
Turn Type	Prot			Prot			Prot			Prot		Prot
Protected Phases	5	2		1	6		3	8		7	4	4
Permitted Phases												
Actuated Green, G (s)	38.1	45.3		4.8	12.3		14.2	27.9		5.0	18.7	18.7
Effective Green, g (s)	38.1	45.3		4.8	12.3		14.2	27.9		5.0	18.7	18.7
Actuated g/C Ratio	0.38	0.45		0.05	0.12		0.14	0.28		0.05	0.19	0.19
Clearance Time (s)	4.0	4.5		4.0	4.2		4.0	4.5		4.0	4.5	4.5
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	681	1489		87	432		254	516		90	352	296
v/s Ratio Prot	c0.17	c0.12		0.02	0.03		c0.10	0.20		0.02	c0.15	0.04
v/s Ratio Perm												
v/c Ratio	0.45	0.26		0.33	0.21		0.74	0.72		0.36	0.82	0.19
Uniform Delay, d1	23.1	16.9		46.1	39.5		41.1	32.6		45.9	39.1	34.3
Progression Factor	0.53	0.12		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.1	0.4		2.3	1.1		10.6	5.0		2.4	14.4	0.3
Delay (s)	14.4	2.4		48.3	40.6		51.7	37.5		48.3	53.5	34.6
Level of Service	B	A		D	D		D	D		D	D	C
Approach Delay (s)		6.6			42.3			42.2			46.2	
Approach LOS		A			D			D			D	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	58.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	22	31	131	23	80	56	1123	54	99	1103	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.97			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1719			1802	1545	1805	3539	1528	1787	3526	
Flt Permitted		0.57			0.66	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1013			1234	1545	1805	3539	1528	1787	3526	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	80	23	33	138	24	84	59	1182	57	104	1161	22
RTOR Reduction (vph)	0	9	0	0	0	68	0	0	12	0	1	0
Lane Group Flow (vph)	0	127	0	0	162	16	59	1182	45	104	1182	0
Confl. Peds. (#/hr)	13		3	3		13	15		9	9		15
Heavy Vehicles (%)	3%	0%	3%	1%	0%	1%	0%	2%	0%	1%	2%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Actuated Green, G (s)		25.5			25.5	25.5	7.7	80.0	80.0	11.5	83.8	
Effective Green, g (s)		25.5			25.5	25.5	7.7	80.0	80.0	11.5	83.8	
Actuated g/C Ratio		0.20			0.20	0.20	0.06	0.62	0.62	0.09	0.64	
Clearance Time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)		4.2			4.2	4.2	2.3	4.2	4.2	2.3	4.2	
Lane Grp Cap (vph)		199			242	303	107	2178	940	158	2273	
v/s Ratio Prot							0.03	c0.33		c0.06	c0.34	
v/s Ratio Perm		0.13			c0.13	0.01			0.03			
v/c Ratio		0.64			0.67	0.05	0.55	0.54	0.05	0.66	0.52	
Uniform Delay, d1		48.0			48.3	42.5	59.5	14.4	9.9	57.3	12.3	
Progression Factor		1.00			1.00	1.00	0.81	1.97	2.00	0.63	1.62	
Incremental Delay, d2		14.7			13.8	0.3	3.6	0.8	0.1	5.2	0.5	
Delay (s)		62.7			62.1	42.8	52.0	29.2	19.9	41.5	20.6	
Level of Service		E			E	D	D	C	B	D	C	
Approach Delay (s)		62.7			55.5			29.9			22.3	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM Average Control Delay	30.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	3	11	233	3	92	5	1175	108	147	1059	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.98			1.00	0.97	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes		1.00			0.98	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.90			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1660			1756	1553	1805	3539	1529	1770	3532	
Flt Permitted		0.99			0.72	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1643			1322	1553	1805	3539	1529	1770	3532	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	1	3	12	245	3	97	5	1237	114	155	1115	13
RTOR Reduction (vph)	0	10	0	0	0	79	0	0	23	0	1	0
Lane Group Flow (vph)	0	6	0	0	248	18	5	1237	91	155	1127	0
Confl. Peds. (#/hr)	8		13	13		8	9		10	10		9
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	2%	2%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Actuated Green, G (s)		24.5			24.5	24.5	1.2	77.1	77.1	15.4	91.3	
Effective Green, g (s)		24.5			24.5	24.5	1.2	77.1	77.1	15.4	91.3	
Actuated g/C Ratio		0.19			0.19	0.19	0.01	0.59	0.59	0.12	0.70	
Clearance Time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.2	4.2	2.3	4.2	
Lane Grp Cap (vph)		310			249	293	17	2099	907	210	2481	
v/s Ratio Prot							0.00	c0.35		c0.09	0.32	
v/s Ratio Perm		0.00			c0.19	0.01			0.06			
v/c Ratio		0.02			1.00	0.06	0.29	0.59	0.10	0.74	0.45	
Uniform Delay, d1		43.0			52.7	43.3	64.0	16.5	11.4	55.4	8.5	
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	0.96	1.79	
Incremental Delay, d2		0.0			55.6	0.1	5.6	1.2	0.2	10.1	0.5	
Delay (s)		43.0			108.3	43.4	69.5	17.8	11.7	63.3	15.7	
Level of Service		D			F	D	E	B	B	E	B	
Approach Delay (s)		43.0			90.0			17.4			21.4	
Approach LOS		D			F			B			C	

Intersection Summary			
HCM Average Control Delay	27.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	19	160	66	48	131	54	110	51	77	90	35	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.8	4.8	4.8		4.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97		0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frt	1.00	0.96		1.00	0.96		1.00	1.00	0.85		0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1621	1793		1802	1773		1785	1863	1567		1750	
Flt Permitted	0.80	1.00		0.80	1.00		0.64	1.00	1.00		0.80	
Satd. Flow (perm)	1365	1793		1517	1773		1203	1863	1567		1440	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	21	178	73	53	146	60	122	57	86	100	39	47
RTOR Reduction (vph)	0	30	0	0	30	0	0	0	53	0	26	0
Lane Group Flow (vph)	21	221	0	53	176	0	122	57	33	0	160	0
Confl. Peds. (#/hr)	7		4	4		7	3		17	17		3
Confl. Bikes (#/hr)		1						1			1	
Heavy Vehicles (%)	11%	1%	0%	0%	2%	0%	1%	2%	0%	1%	0%	2%
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	5.0	5.0		5.0	5.0		8.7	8.7	8.7		8.7	
Effective Green, g (s)	5.0	5.0		5.0	5.0		8.7	8.7	8.7		8.7	
Actuated g/C Ratio	0.22	0.22		0.22	0.22		0.39	0.39	0.39		0.39	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.8	4.8	4.8		4.8	
Vehicle Extension (s)	0.7	0.7		0.7	0.7		1.0	1.0	1.0		1.0	
Lane Grp Cap (vph)	303	398		337	394		465	720	606		557	
v/s Ratio Prot		c0.12			0.10			0.03				
v/s Ratio Perm	0.02			0.03			0.10		0.02		c0.11	
v/c Ratio	0.07	0.56		0.16	0.45		0.26	0.08	0.05		0.29	
Uniform Delay, d1	6.9	7.8		7.1	7.6		4.7	4.4	4.3		4.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.0	1.0		0.1	0.3		0.1	0.0	0.0		0.1	
Delay (s)	6.9	8.7		7.1	7.9		4.8	4.4	4.3		4.9	
Level of Service	A	A		A	A		A	A	A		A	
Approach Delay (s)		8.6			7.7			4.6			4.9	
Approach LOS		A			A			A			A	

Intersection Summary			
HCM Average Control Delay	6.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	22.5	Sum of lost time (s)	8.8
Intersection Capacity Utilization	45.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	67	164	119	41	74	70	112	378	46	168	342	81
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.7		4.0	4.8		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.93		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1615	1770	1669		1787	1845		1787	1827	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	1881	1615	1770	1669		1787	1845		1787	1827	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	72	176	128	44	80	75	120	406	49	181	368	87
RTOR Reduction (vph)	0	0	103	0	29	0	0	3	0	0	5	0
Lane Group Flow (vph)	72	176	25	44	126	0	120	452	0	181	450	0
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Heavy Vehicles (%)	0%	1%	0%	2%	3%	6%	1%	1%	2%	1%	1%	1%
Turn Type	Prot		Prot	Prot			Prot			Prot		
Protected Phases	3	8	8	7	4		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	7.0	15.9	15.9	4.4	13.4		11.2	27.8		14.2	31.1	
Effective Green, g (s)	7.0	15.9	15.9	4.4	13.4		11.2	27.8		14.2	31.1	
Actuated g/C Ratio	0.09	0.20	0.20	0.06	0.17		0.14	0.35		0.18	0.39	
Clearance Time (s)	4.0	4.8	4.8	4.0	4.7		4.0	4.8		4.0	4.5	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	158	374	321	97	280		250	642		318	711	
v/s Ratio Prot	c0.04	c0.09	0.02	0.02	0.08		0.07	c0.25		c0.10	c0.25	
v/s Ratio Perm												
v/c Ratio	0.46	0.47	0.08	0.45	0.45		0.48	0.70		0.57	0.63	
Uniform Delay, d1	34.6	28.3	26.0	36.6	29.9		31.7	22.5		30.1	19.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	0.7	0.1	2.4	0.8		1.1	3.8		1.9	2.1	
Delay (s)	36.2	29.0	26.1	39.0	30.8		32.7	26.3		31.9	21.8	
Level of Service	D	C	C	D	C		C	C		C	C	
Approach Delay (s)		29.4			32.6			27.6			24.7	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	27.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	79.9	Sum of lost time (s)	22.1
Intersection Capacity Utilization	59.3%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	261	51	183	28	25	34	209	1072	11	39	947	349
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.0	4.5	4.5	4.0	4.5	4.5
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.98			0.99		1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94			0.94		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.98		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3146			3290		1752	3539	1566	1805	3539	1599
Flt Permitted		0.76			0.69		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		2468			2313		1752	3539	1566	1805	3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	275	54	193	29	26	36	220	1128	12	41	997	367
RTOR Reduction (vph)	0	70	0	0	28	0	0	0	3	0	0	76
Lane Group Flow (vph)	0	452	0	0	63	0	220	1128	9	41	997	291
Confl. Peds. (#/hr)	14		21	21		14	14		9	9		14
Confl. Bikes (#/hr)								1				
Heavy Vehicles (%)	2%	0%	5%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm			Perm			Prot		Perm	Prot		Prot
Protected Phases		8			4		1	6		5	2	2
Permitted Phases	8			4					6			
Actuated Green, G (s)		28.2			28.2		20.2	82.1	82.1	6.7	68.6	68.6
Effective Green, g (s)		28.2			28.2		20.2	82.1	82.1	6.7	68.6	68.6
Actuated g/C Ratio		0.22			0.22		0.16	0.63	0.63	0.05	0.53	0.53
Clearance Time (s)		4.5			4.5		4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)		2.5			2.5		2.3	4.2	4.2	2.3	4.2	4.2
Lane Grp Cap (vph)		535			502		272	2235	989	93	1868	844
v/s Ratio Prot							c0.13	0.32		0.02	c0.28	0.18
v/s Ratio Perm		c0.18			0.03				0.01			
v/c Ratio		0.85			0.13		0.81	0.50	0.01	0.44	0.53	0.35
Uniform Delay, d1		48.8			41.0		53.0	13.0	8.9	59.8	20.2	17.7
Progression Factor		1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		11.6			0.1		15.5	0.8	0.0	1.9	1.1	1.1
Delay (s)		60.4			41.1		68.5	13.8	8.9	61.8	21.3	18.9
Level of Service		E			D		E	B	A	E	C	B
Approach Delay (s)		60.4			41.1			22.6			21.8	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	74.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	454	93	79	415	16	38	2	41	17	8	24
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	504	103	88	461	18	42	2	46	19	9	27
Pedestrians		1			2						7	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		0			0						1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					191							
pX, platoon unblocked												
vC, conflicting volume	486			608			1001	1224	306	960	1267	247
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	486			608			1001	1224	306	960	1267	247
tC, single (s)	4.1			4.1			7.6	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			91			75	99	93	90	94	96
cM capacity (veh/h)	1081			980			167	163	695	182	154	754

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	256	356	318	248	90	54
Volume Left	3	0	88	0	42	19
Volume Right	0	103	0	18	46	27
cSH	1081	1700	980	1700	271	276
Volume to Capacity	0.00	0.21	0.09	0.15	0.33	0.20
Queue Length 95th (ft)	0	0	7	0	35	18
Control Delay (s)	0.1	0.0	3.2	0.0	24.8	21.2
Lane LOS	A		A		C	C
Approach Delay (s)	0.1		1.8		24.8	21.2
Approach LOS					C	C

Intersection Summary			
Average Delay	3.3		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	140	458	339	75	79	111
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0		4.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.98		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1787	1845	1801		1677	
Flt Permitted	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	1787	1845	1801		1677	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	152	498	368	82	86	121
RTOR Reduction (vph)	0	0	7	0	46	0
Lane Group Flow (vph)	152	498	443	0	161	0
Confl. Peds. (#/hr)	5			5	12	
Confl. Bikes (#/hr)	1					
Heavy Vehicles (%)	1%	3%	2%	4%	4%	1%
Turn Type	Prot					
Protected Phases	5	2	6		4	
Permitted Phases						
Actuated Green, G (s)	11.0	37.0	22.0		11.5	
Effective Green, g (s)	11.0	37.0	22.0		11.5	
Actuated g/C Ratio	0.19	0.64	0.38		0.20	
Clearance Time (s)	4.0	5.0	5.0		4.5	
Vehicle Extension (s)	2.5	3.0	3.0		2.5	
Lane Grp Cap (vph)	339	1177	683		333	
v/s Ratio Prot	0.09	c0.27	c0.25		c0.10	
v/s Ratio Perm						
v/c Ratio	0.45	0.42	0.65		0.48	
Uniform Delay, d1	20.8	5.2	14.8		20.6	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.7	0.2	2.1		0.8	
Delay (s)	21.5	5.5	17.0		21.4	
Level of Service	C	A	B		C	
Approach Delay (s)		9.2	17.0		21.4	
Approach LOS		A	B		C	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	58.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	52.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	132	115	93	137	95	108	88	992	84	125	824	48
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.92	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1704		1752	1881	1528	1805	3539	1486	1770	3473	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	1704		1752	1881	1528	1805	3539	1486	1770	3473	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	138	120	97	143	99	112	92	1033	88	130	858	50
RTOR Reduction (vph)	0	24	0	0	0	95	0	0	35	0	3	0
Lane Group Flow (vph)	138	193	0	143	99	17	92	1033	53	130	905	0
Confl. Peds. (#/hr)	3		19	19		3	7		17	17		7
Confl. Bikes (#/hr)								1			1	
Heavy Vehicles (%)	3%	3%	1%	3%	1%	4%	0%	2%	0%	2%	3%	0%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			6			
Actuated Green, G (s)	14.1	19.2		14.3	19.4	19.4	11.0	64.0	64.0	16.0	69.0	
Effective Green, g (s)	14.1	19.2		14.3	19.4	19.4	11.0	64.0	64.0	16.0	69.0	
Actuated g/C Ratio	0.11	0.15		0.11	0.15	0.15	0.08	0.49	0.49	0.12	0.53	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	5.1	5.1	2.3	5.1	
Lane Grp Cap (vph)	190	252		193	281	228	153	1742	732	218	1843	
v/s Ratio Prot	0.08	c0.11		c0.08	0.05		0.05	c0.29		c0.07	0.26	
v/s Ratio Perm						0.01			0.04			
v/c Ratio	0.73	0.77		0.74	0.35	0.07	0.60	0.59	0.07	0.60	0.49	
Uniform Delay, d1	56.1	53.2		56.1	49.7	47.6	57.4	23.7	17.4	53.9	19.4	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.31	0.91	1.46	1.00	1.00	
Incremental Delay, d2	11.7	12.2		13.1	0.4	0.1	4.7	1.4	0.2	3.3	0.9	
Delay (s)	67.8	65.5		69.2	50.1	47.6	80.0	22.9	25.5	57.3	20.3	
Level of Service	E	E		E	D	D	F	C	C	E	C	
Approach Delay (s)		66.4			57.0			27.4			24.9	
Approach LOS		E			E			C			C	

Intersection Summary			
HCM Average Control Delay	34.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	72.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	1	0	16	165	0	175	0	1020	168	142	896	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0		4.0		4.0		6.0	6.0	4.0	5.0	
Lane Util. Factor		1.00		1.00		1.00		0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.98		1.00		1.00		1.00	0.96	1.00	1.00	
Flpb, ped/bikes		1.00		1.00		1.00		1.00	1.00	1.00	1.00	
Frt		0.87		1.00		0.85		1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1618		1770		1599		3539	1538	1752	3505	
Flt Permitted		1.00		0.95		1.00		1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1618		1770		1599		3539	1538	1752	3505	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	1	0	16	170	0	180	0	1052	173	146	924	0
RTOR Reduction (vph)	0	14	0	0	0	156	0	0	30	0	0	0
Lane Group Flow (vph)	0	3	0	170	0	24	0	1052	143	146	924	0
Confl. Peds. (#/hr)	2		8	8		2	5		6	6		5
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	0%	0%	0%	2%	0%	1%	0%	2%	1%	3%	3%	0%
Turn Type	Perm			Prot		custom			Perm	Prot		
Protected Phases		4!		4!		4		6		5	2	
Permitted Phases	4					4			6			
Actuated Green, G (s)		17.1		17.1		17.1		83.5	83.5	15.4	103.9	
Effective Green, g (s)		17.1		17.1		17.1		83.5	83.5	15.4	103.9	
Actuated g/C Ratio		0.13		0.13		0.13		0.64	0.64	0.12	0.80	
Clearance Time (s)		4.0		4.0		4.0		6.0	6.0	4.0	5.0	
Vehicle Extension (s)		2.3		2.3		2.3		4.5	4.5	2.3	4.5	
Lane Grp Cap (vph)		213		233		210		2273	988	208	2801	
v/s Ratio Prot				c0.10		0.01		c0.30		c0.08	0.26	
v/s Ratio Perm		0.00							0.09			
v/c Ratio		0.01		0.73		0.11		0.46	0.15	0.70	0.33	
Uniform Delay, d1		49.1		54.2		49.8		11.8	9.2	55.1	3.6	
Progression Factor		1.00		1.00		1.00		0.22	0.08	0.90	1.07	
Incremental Delay, d2		0.0		9.9		0.1		0.5	0.2	7.9	0.3	
Delay (s)		49.1		64.1		49.9		3.2	1.0	57.3	4.1	
Level of Service		D		E		D		A	A	E	A	
Approach Delay (s)		49.1			56.8			2.9			11.3	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM Average Control Delay	13.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	196	531	343	182	417	163	262	862	189	210	799	148
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	1559	1787	3610	1575	1805	3539	1570	1805	3505	1570
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	1559	1787	3610	1575	1805	3539	1570	1805	3505	1570
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	209	565	365	194	444	173	279	917	201	223	850	157
RTOR Reduction (vph)	0	0	252	0	0	140	0	0	47	0	0	52
Lane Group Flow (vph)	209	565	113	194	444	33	279	917	154	223	850	105
Confl. Peds. (#/hr)	2		12	12		2	3		4	4		3
Confl. Bikes (#/hr)		1			1			1				
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%	0%	2%	1%	0%	3%	0%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	17.2	25.5	25.5	16.7	25.0	25.0	27.7	48.9	48.9	20.7	41.9	41.9
Effective Green, g (s)	17.2	25.5	25.5	16.7	25.0	25.0	27.7	48.9	48.9	20.7	41.9	41.9
Actuated g/C Ratio	0.13	0.20	0.20	0.13	0.19	0.19	0.21	0.38	0.38	0.16	0.32	0.32
Clearance Time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Vehicle Extension (s)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	4.9	4.9	2.3	4.9	4.9
Lane Grp Cap (vph)	239	708	306	230	694	303	385	1331	591	287	1130	506
v/s Ratio Prot	c0.12	c0.16		0.11	0.12		c0.15	0.26		0.12	c0.24	
v/s Ratio Perm			0.07			0.02			0.10			0.07
v/c Ratio	0.87	0.80	0.37	0.84	0.64	0.11	0.72	0.69	0.26	0.78	0.75	0.21
Uniform Delay, d1	55.3	49.8	45.3	55.4	48.4	43.3	47.6	34.1	28.1	52.4	39.4	32.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.47	0.62	0.50	1.38	0.93	0.91
Incremental Delay, d2	27.5	6.0	0.4	23.0	1.6	0.1	4.9	2.4	0.9	11.4	4.5	0.9
Delay (s)	82.8	55.8	45.7	78.4	49.9	43.4	74.8	23.5	15.0	83.8	41.0	29.9
Level of Service	F	E	D	E	D	D	E	C	B	F	D	C
Approach Delay (s)		57.5			55.4			32.6			47.4	
Approach LOS		E			E			C			D	

Intersection Summary			
HCM Average Control Delay	46.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.4
Intersection Capacity Utilization	81.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	126	806	615	89	154	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1881	1844		1805	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1881	1844		1805	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	135	867	661	96	166	134
RTOR Reduction (vph)	0	0	5	0	0	115
Lane Group Flow (vph)	135	867	752	0	166	19
Confl. Peds. (#/hr)				6	3	
Confl. Bikes (#/hr)	1		2			
Heavy Vehicles (%)	2%	1%	1%	0%	0%	2%
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	11.4	68.6	53.2		12.6	12.6
Effective Green, g (s)	11.4	68.6	53.2		12.6	12.6
Actuated g/C Ratio	0.13	0.76	0.59		0.14	0.14
Clearance Time (s)	4.0	4.8	4.8		4.0	4.0
Vehicle Extension (s)	2.5	3.0	3.0		2.5	2.5
Lane Grp Cap (vph)	224	1434	1090		253	222
v/s Ratio Prot	0.08	c0.46	c0.41		c0.09	
v/s Ratio Perm						0.01
v/c Ratio	0.60	0.60	0.69		0.66	0.08
Uniform Delay, d1	37.2	4.7	12.7		36.6	33.7
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.8	1.9	3.6		5.4	0.1
Delay (s)	41.0	6.6	16.3		42.0	33.8
Level of Service	D	A	B		D	C
Approach Delay (s)		11.2	16.3		38.4	
Approach LOS		B	B		D	

Intersection Summary			
HCM Average Control Delay	17.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	13.6
Intersection Capacity Utilization	64.0%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	321	35	296	268	126	39	259	507	100	191	24
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		5.0	5.0			6.0	6.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.95			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1736	1810		1770	1764			1848	1599	1752	1765	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1736	1810		1770	1764			1848	1599	1752	1765	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Adj. Flow (vph)	55	365	40	336	305	143	44	294	576	114	217	27
RTOR Reduction (vph)	0	2	0	0	8	0	0	0	251	0	2	0
Lane Group Flow (vph)	55	403	0	336	440	0	0	338	325	114	242	0
Confl. Peds. (#/hr)	4		1	1		4	5		4	4		5
Confl. Bikes (#/hr)								3	1			
Heavy Vehicles (%)	4%	2%	14%	2%	2%	0%	3%	2%	1%	3%	6%	0%
Turn Type	Prot			Prot			Split		Prot	Split		
Protected Phases	5	2		1	6		8	8	8	4	4	
Permitted Phases												
Actuated Green, G (s)	8.5	37.5		35.0	64.5			37.0	37.0	27.2	27.2	
Effective Green, g (s)	8.5	37.5		35.0	64.5			37.0	37.0	27.2	27.2	
Actuated g/C Ratio	0.05	0.24		0.22	0.41			0.23	0.23	0.17	0.17	
Clearance Time (s)	4.5	5.0		5.0	5.0			6.0	6.0	5.0	5.0	
Vehicle Extension (s)	2.5	4.0		2.5	4.0			2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	94	430		393	721			434	375	302	304	
v/s Ratio Prot	0.03	c0.22		c0.19	0.25			0.18	c0.20	0.07	c0.14	
v/s Ratio Perm												
v/c Ratio	0.59	0.94		0.85	0.61			0.78	0.87	0.38	0.79	
Uniform Delay, d1	72.9	59.0		58.9	36.7			56.5	58.0	57.8	62.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	7.5	28.4		16.2	1.8			8.3	18.3	0.6	12.9	
Delay (s)	80.4	87.4		75.1	38.5			64.8	76.3	58.3	75.5	
Level of Service	F	F		E	D			E	E	E	E	
Approach Delay (s)		86.5			54.2			72.0			70.0	
Approach LOS		F			D			E			E	

Intersection Summary			
HCM Average Control Delay	68.8	HCM Level of Service	E
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	157.7	Sum of lost time (s)	21.0
Intersection Capacity Utilization	80.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	412	25	172	353	35	40	24	204	187	99	47
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99			0.90		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1719	1833		1656	1837			1614		1787	1749	
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (perm)	1719	1833		1656	1837			1614		1787	1749	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	24	463	28	193	397	39	45	27	229	210	111	53
RTOR Reduction (vph)	0	1	0	0	2	0	0	73	0	0	11	0
Lane Group Flow (vph)	24	490	0	193	434	0	0	228	0	210	153	0
Confl. Peds. (#/hr)	2		3	3		2			1	1		
Confl. Bikes (#/hr)		1								1		
Heavy Vehicles (%)	5%	2%	12%	9%	2%	0%	8%	12%	1%	1%	5%	0%
Turn Type	Prot			Prot			Split			Split		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	4.2	40.9		19.5	56.2			22.4		20.1	20.1	
Effective Green, g (s)	4.2	40.9		19.5	56.2			22.4		20.1	20.1	
Actuated g/C Ratio	0.03	0.34		0.16	0.46			0.18		0.16	0.16	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0			2.5		2.5	2.5	
Lane Grp Cap (vph)	59	615		265	847			297		295	288	
v/s Ratio Prot	0.01	c0.27		c0.12	0.24			c0.14		c0.12	0.09	
v/s Ratio Perm												
v/c Ratio	0.41	0.80		0.73	0.51			0.77		0.71	0.53	
Uniform Delay, d1	57.6	36.7		48.7	23.2			47.3		48.2	46.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	3.3	7.1		9.0	0.5			10.9		7.4	1.5	
Delay (s)	60.9	43.8		57.7	23.7			58.2		55.5	48.1	
Level of Service	E	D		E	C			E		E	D	
Approach Delay (s)		44.6			34.1			58.2			52.2	
Approach LOS		D			C			E			D	

Intersection Summary			
HCM Average Control Delay	44.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	121.9	Sum of lost time (s)	19.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	18	1960	129	82	1225	12	80	34	40	20	58	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	1.00
Satd. Flow (prot)	1703	3539	1599	1805	3539	1380		1822	1495		1876	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.73	1.00		0.90	1.00
Satd. Flow (perm)	1703	3539	1599	1805	3539	1380		1380	1495		1702	1547
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	20	2130	140	89	1332	13	87	37	43	22	63	37
RTOR Reduction (vph)	0	0	14	0	0	2	0	0	22	0	0	32
Lane Group Flow (vph)	20	2130	126	89	1332	11	0	124	21	0	85	5
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	6%	2%	1%	0%	2%	17%	1%	0%	8%	0%	0%	3%
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	4.4	78.4	78.4	10.8	84.8	84.8		16.3	16.3		16.3	16.3
Effective Green, g (s)	4.4	78.4	78.4	10.8	84.8	84.8		16.3	16.3		16.3	16.3
Actuated g/C Ratio	0.04	0.65	0.65	0.09	0.71	0.71		0.14	0.14		0.14	0.14
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0		4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	62	2312	1045	162	2501	975		187	203		231	210
v/s Ratio Prot	0.01	c0.60		0.05	c0.38							
v/s Ratio Perm			0.08			0.01		c0.09	0.01		0.05	0.00
v/c Ratio	0.32	0.92	0.12	0.55	0.53	0.01		0.66	0.11		0.37	0.02
Uniform Delay, d1	56.3	18.1	7.8	52.3	8.3	5.2		49.2	45.5		47.2	45.0
Progression Factor	1.00	1.00	1.00	0.93	0.68	0.32		1.00	1.00		1.00	1.00
Incremental Delay, d2	2.2	7.5	0.2	2.5	0.7	0.0		9.4	0.3		1.4	0.1
Delay (s)	58.5	25.6	8.1	51.4	6.3	1.7		58.6	45.8		48.5	45.0
Level of Service	E	C	A	D	A	A		E	D		D	D
Approach Delay (s)		24.8			9.1			55.3			47.5	
Approach LOS		C			A			E			D	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	6	1585	408	213	1169	77	130	111	119	171	218	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.92		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3505	1583	1736	3505	1465	1787	1724		1734	1763	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.42	1.00		0.42	1.00	
Satd. Flow (perm)	1805	3505	1583	1736	3505	1465	797	1724		760	1763	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	6	1686	434	227	1244	82	138	118	127	182	232	9
RTOR Reduction (vph)	0	0	102	0	0	23	0	32	0	0	2	0
Lane Group Flow (vph)	6	1686	332	227	1244	59	138	213	0	182	239	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)						1		1			2	
Heavy Vehicles (%)	0%	3%	2%	4%	3%	8%	1%	2%	0%	4%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	1.3	58.6	58.6	17.4	74.7	74.7	29.5	29.5		29.5	29.5	
Effective Green, g (s)	1.3	58.6	58.6	17.4	74.7	74.7	29.5	29.5		29.5	29.5	
Actuated g/C Ratio	0.01	0.49	0.49	0.14	0.62	0.62	0.25	0.25		0.25	0.25	
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.3	5.0	5.0	2.3	5.0	5.0	3.0	3.0		3.5	3.5	
Lane Grp Cap (vph)	20	1712	773	252	2182	912	196	424		187	433	
v/s Ratio Prot	0.00	c0.48		c0.13	0.35			0.12			0.14	
v/s Ratio Perm			0.21			0.04	0.17			c0.24		
v/c Ratio	0.30	0.98	0.43	0.90	0.57	0.07	0.70	0.50		0.97	0.55	
Uniform Delay, d1	58.9	30.3	19.9	50.5	13.3	8.9	41.3	38.9		44.9	39.5	
Progression Factor	1.02	0.64	0.57	1.01	1.22	2.15	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.1	11.0	0.7	26.8	0.9	0.1	10.9	0.9		57.8	1.7	
Delay (s)	62.3	30.3	12.1	78.0	17.0	19.2	52.2	39.9		102.7	41.2	
Level of Service	E	C	B	E	B	B	D	D		F	D	
Approach Delay (s)		26.7			26.1			44.3			67.6	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	31.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	95.0%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	31	12	47	30	38	48	35	308	26	136	646	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		0.99			1.00	1.00		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.92			1.00	0.85		0.99			0.99	
Flt Protected		0.98			0.98	1.00		1.00			0.99	
Satd. Flow (prot)		3181			1216	1583		3414			3389	
Flt Permitted		0.88			0.88	1.00		0.84			0.81	
Satd. Flow (perm)		2844			1094	1583		2882			2751	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	35	13	53	34	43	54	39	346	29	153	726	60
RTOR Reduction (vph)	0	32	0	0	0	32	0	14	0	0	13	0
Lane Group Flow (vph)	0	69	0	0	77	22	0	400	0	0	926	0
Confl. Peds. (#/hr)			1	1			1					1
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	8%	2%	7%	89%	2%	34%	1%	0%	3%	1%	51%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		16.0			16.0	16.0		16.0			16.0	
Effective Green, g (s)		16.0			16.0	16.0		16.0			16.0	
Actuated g/C Ratio		0.40			0.40	0.40		0.40			0.40	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		1138			438	633		1153			1100	
v/s Ratio Prot												
v/s Ratio Perm		0.02			c0.07	0.01		0.14			c0.34	
v/c Ratio		0.06			0.18	0.03		0.35			0.84	
Uniform Delay, d1		7.4			7.7	7.3		8.4			10.9	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.1			0.9	0.1		0.8			7.9	
Delay (s)		7.5			8.6	7.4		9.2			18.7	
Level of Service		A			A	A		A			B	
Approach Delay (s)		7.5			8.1			9.2			18.7	
Approach LOS		A			A			A			B	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	43	1842	24	263	1320	103	53	17	308	197	29	56
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	3505	1615	1626	3471	1428	1805	1696	1583	3335	1776	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	3505	1615	1626	3471	1428	1805	1696	1583	3335	1776	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	46	1960	26	280	1404	110	56	18	328	210	31	60
RTOR Reduction (vph)	0	0	4	0	0	43	0	0	301	0	0	55
Lane Group Flow (vph)	46	1960	22	280	1404	67	56	18	27	210	31	5
Confl. Peds. (#/hr)	4					4	6					6
Heavy Vehicles (%)	7%	3%	0%	11%	4%	10%	0%	12%	2%	5%	7%	2%
Turn Type	Prot		Perm	Prot		Perm	Split		Prot	Split		Prot
Protected Phases	5	2		1	6		8	8	8	4	4	4
Permitted Phases			2			6						
Actuated Green, G (s)	7.6	59.6	59.6	21.3	73.3	73.3	9.8	9.8	9.8	10.8	10.8	10.8
Effective Green, g (s)	7.6	59.6	59.6	21.3	73.3	73.3	9.8	9.8	9.8	10.8	10.8	10.8
Actuated g/C Ratio	0.06	0.50	0.50	0.18	0.61	0.61	0.08	0.08	0.08	0.09	0.09	0.09
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	5.0	5.0	2.5	5.0	5.0	2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	107	1741	802	289	2120	872	147	139	129	300	160	142
v/s Ratio Prot	0.03	c0.56		c0.17	0.40		c0.03	0.01	0.02	c0.06	0.02	0.00
v/s Ratio Perm			0.01			0.05						
v/c Ratio	0.43	1.13	0.03	0.97	0.66	0.08	0.38	0.13	0.21	0.70	0.19	0.04
Uniform Delay, d1	54.1	30.2	15.4	49.0	15.3	9.5	52.2	51.1	51.5	53.0	50.6	49.9
Progression Factor	1.16	0.56	0.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.0	59.6	0.0	43.9	1.6	0.2	1.2	0.3	0.6	6.4	0.4	0.1
Delay (s)	63.7	76.5	5.2	92.9	16.9	9.7	53.4	51.4	52.1	59.5	51.0	49.9
Level of Service	E	E	A	F	B	A	D	D	D	E	D	D
Approach Delay (s)		75.3			28.3			52.2			56.7	
Approach LOS		E			C			D			E	

Intersection Summary			
HCM Average Control Delay	53.4	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	289	282	1121	465	312	1019
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	5.4	5.4	4.0	5.4
Lane Util. Factor	0.97	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	3467	1615	3539	1615	1787	3505
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	3467	1615	3539	1615	1787	3505
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	304	297	1180	489	328	1073
RTOR Reduction (vph)	0	262	0	216	0	0
Lane Group Flow (vph)	304	35	1180	273	328	1073
Heavy Vehicles (%)	1%	0%	2%	0%	1%	3%
Turn Type		custom		Perm	Prot	
Protected Phases	7	4	6		5	2
Permitted Phases				6		
Actuated Green, G (s)	16.0	15.2	72.5	72.5	28.1	104.6
Effective Green, g (s)	16.0	15.2	72.5	72.5	28.1	104.6
Actuated g/C Ratio	0.12	0.12	0.56	0.56	0.22	0.80
Clearance Time (s)	4.0	4.8	5.4	5.4	4.0	5.4
Vehicle Extension (s)	2.3	2.3	4.8	4.8	2.3	4.8
Lane Grp Cap (vph)	427	189	1974	901	386	2820
v/s Ratio Prot	c0.09	0.02	c0.33		c0.18	0.31
v/s Ratio Perm				0.17		
v/c Ratio	0.71	0.18	0.60	0.30	0.85	0.38
Uniform Delay, d1	54.8	51.8	19.1	15.3	48.9	3.6
Progression Factor	1.00	1.00	1.00	1.00	0.87	1.22
Incremental Delay, d2	5.0	0.3	1.3	0.9	11.3	0.3
Delay (s)	59.7	52.1	20.4	16.2	53.8	4.6
Level of Service	E	D	C	B	D	A
Approach Delay (s)	56.0		19.2			16.1
Approach LOS	E		B			B

Intersection Summary			
HCM Average Control Delay	24.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.4
Intersection Capacity Utilization	67.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	99	666	175	65	651	56	146	38	55	129	23	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	0.86		1.00	0.91	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.97		1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	6281		1805	5136	1615	1795	1716		3480	1900	1557
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.20	1.00		0.69	1.00	1.00
Satd. Flow (perm)	1805	6281		1805	5136	1615	378	1716		2536	1900	1557
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	106	716	188	70	700	60	157	41	59	139	25	84
RTOR Reduction (vph)	0	33	0	0	0	32	0	47	0	0	0	77
Lane Group Flow (vph)	106	871	0	70	700	28	157	53	0	139	25	7
Confl. Peds. (#/hr)			7	7			7		2	2		7
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			3			4	
Permitted Phases						6	3			4		4
Actuated Green, G (s)	10.2	54.7		6.9	51.4	51.4	20.0	20.0		9.4	9.4	9.4
Effective Green, g (s)	10.2	54.7		6.9	51.4	51.4	20.0	20.0		9.4	9.4	9.4
Actuated g/C Ratio	0.09	0.50		0.06	0.47	0.47	0.18	0.18		0.09	0.09	0.09
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	1.0	2.0		1.0	2.0	2.0	1.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	167	3123		113	2400	755	69	312		217	162	133
v/s Ratio Prot	c0.06	c0.14		0.04	0.14			0.03			0.01	
v/s Ratio Perm						0.02	c0.42			c0.05		0.00
v/c Ratio	0.63	0.28		0.62	0.29	0.04	2.28	0.17		0.64	0.15	0.05
Uniform Delay, d1	48.1	16.1		50.3	18.1	15.9	45.0	38.0		48.7	46.6	46.2
Progression Factor	1.00	1.00		1.26	0.45	0.07	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.7	0.2		6.7	0.3	0.1	617.2	0.1		4.8	0.2	0.1
Delay (s)	53.8	16.4		69.8	8.5	1.2	662.2	38.1		53.4	46.8	46.3
Level of Service	D	B		E	A	A	F	D		D	D	D
Approach Delay (s)		20.3			13.1			419.3			50.3	
Approach LOS		C			B			F			D	

Intersection Summary			
HCM Average Control Delay	64.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	46.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	803	52	124	651	203	33	20	122	415	62	122
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5		5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.86		0.97	0.91	1.00		0.95		0.97	0.95	0.95
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	0.99	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.90		1.00	0.95	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	3502	6477		3502	5136	1615		3166		3502	1687	1476
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.65		0.63	1.00	1.00
Satd. Flow (perm)	3502	6477		3502	5136	1615		2071		2317	1687	1476
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	113	902	58	139	731	228	37	22	137	466	70	137
RTOR Reduction (vph)	0	8	0	0	0	122	0	127	0	0	17	77
Lane Group Flow (vph)	113	952	0	139	731	106	0	69	0	466	91	23
Confl. Peds. (#/hr)							12					12
Confl. Bikes (#/hr)											1	1
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			3			4	
Permitted Phases						6	3			4		4
Actuated Green, G (s)	7.0	50.2		7.8	51.0	51.0		8.0		25.0	25.0	25.0
Effective Green, g (s)	7.0	50.2		7.8	51.0	51.0		8.0		25.0	25.0	25.0
Actuated g/C Ratio	0.06	0.46		0.07	0.46	0.46		0.07		0.23	0.23	0.23
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5		5.0		5.0	5.0	5.0
Vehicle Extension (s)	1.0	2.0		1.0	2.0	2.0		1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	223	2956		248	2381	749		151		527	383	335
v/s Ratio Prot	0.03	c0.15		c0.04	0.14						0.05	
v/s Ratio Perm						0.07		c0.03		c0.20		0.02
v/c Ratio	0.51	0.32		0.56	0.31	0.14		0.46		0.88	0.24	0.07
Uniform Delay, d1	49.8	19.1		49.4	18.4	16.9		48.9		41.1	34.7	33.3
Progression Factor	1.24	0.57		1.52	0.28	0.07		1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.3		1.7	0.3	0.4		0.8		15.7	0.1	0.0
Delay (s)	62.2	11.2		77.0	5.5	1.6		49.7		56.8	34.8	33.4
Level of Service	E	B		E	A	A		D		E	C	C
Approach Delay (s)		16.6			13.7			49.7			49.8	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	25.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1308	75	137	939	109	121
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	5.0	5.0
Lane Util. Factor	0.86		0.97	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	6476		3502	5136	1787	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	6476		3502	5136	1787	1583
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1391	80	146	999	116	129
RTOR Reduction (vph)	6	0	0	0	0	99
Lane Group Flow (vph)	1465	0	146	999	116	30
Confl. Peds. (#/hr)		4	4		2	9
Heavy Vehicles (%)	0%	0%	0%	1%	1%	2%
Turn Type			Prot			Prot
Protected Phases	2		1	6	8	8
Permitted Phases						
Actuated Green, G (s)	62.5		7.5	74.5	26.0	26.0
Effective Green, g (s)	62.5		7.5	74.5	26.0	26.0
Actuated g/C Ratio	0.57		0.07	0.68	0.24	0.24
Clearance Time (s)	4.5		4.5	4.5	5.0	5.0
Vehicle Extension (s)	2.0		0.5	2.0	0.5	0.5
Lane Grp Cap (vph)	3680		239	3478	422	374
v/s Ratio Prot	c0.23		c0.04	0.19	c0.06	0.02
v/s Ratio Perm						
v/c Ratio	0.40		0.61	0.29	0.27	0.08
Uniform Delay, d1	13.3		49.8	7.1	34.3	32.7
Progression Factor	0.61		1.15	0.50	1.00	1.00
Incremental Delay, d2	0.3		3.0	0.2	1.6	0.4
Delay (s)	8.4		60.2	3.7	35.9	33.1
Level of Service	A		E	A	D	C
Approach Delay (s)	8.4			10.9	34.4	
Approach LOS	A			B	C	

Intersection Summary			
HCM Average Control Delay	11.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1189	299	360	794	0	0	0	0	660	270	307
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Lane Util. Factor		0.91	1.00	1.00	0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.96	1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		5136	1554	1770	3610					1626	3347	1615
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		5136	1554	1770	3610					1626	3347	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	1265	318	383	845	0	0	0	0	702	287	327
RTOR Reduction (vph)	0	0	104	0	0	0	0	0	0	0	0	179
Lane Group Flow (vph)	0	1265	214	383	845	0	0	0	0	351	638	148
Confl. Peds. (#/hr)	7		16	16		7	12					12
Confl. Bikes (#/hr)								7			1	
Heavy Vehicles (%)	0%	1%	0%	2%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type			Perm	Prot						Split		Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		44.5	44.5	27.5	77.5					21.5	21.5	21.5
Effective Green, g (s)		44.5	44.5	27.5	77.5					21.5	21.5	21.5
Actuated g/C Ratio		0.40	0.40	0.25	0.70					0.20	0.20	0.20
Clearance Time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Vehicle Extension (s)		4.8	4.8	2.3	4.0					2.3	2.3	2.3
Lane Grp Cap (vph)		2078	629	443	2543					318	654	316
v/s Ratio Prot		c0.25		c0.22	0.23					c0.22	0.19	0.09
v/s Ratio Perm			0.14									
v/c Ratio		0.61	0.34	0.86	0.33					1.10	1.06dl	0.47
Uniform Delay, d1		25.9	22.6	39.5	6.3					44.2	44.0	39.2
Progression Factor		0.50	0.30	0.66	1.34					1.00	1.00	1.00
Incremental Delay, d2		1.3	1.4	13.7	0.3					81.3	28.8	0.6
Delay (s)		14.3	8.2	39.7	8.7					125.5	72.8	39.8
Level of Service		B	A	D	A					F	E	D
Approach Delay (s)		13.0			18.4			0.0			78.7	
Approach LOS		B			B			A			E	

Intersection Summary			
HCM Average Control Delay	35.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	454	1494	0	0	1053	564	133	4	292	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Lane Util. Factor	0.97	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	0.98	0.98	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3502	3574			3574	1555	1676	1687	1568			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3502	3574			3574	1555	1676	1687	1568			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	478	1573	0	0	1108	594	140	4	307	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	211	0	0	56	0	0	0
Lane Group Flow (vph)	478	1573	0	0	1108	383	71	73	252	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	11					11
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	0%	0%	3%	0%	0%	0%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	19.9	83.0			59.1	59.1	17.5	17.5	17.5			
Effective Green, g (s)	19.9	83.0			59.1	59.1	17.5	17.5	17.5			
Actuated g/C Ratio	0.18	0.75			0.54	0.54	0.16	0.16	0.16			
Clearance Time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Vehicle Extension (s)	2.3	4.0			4.8	4.8	2.3	2.3	2.3			
Lane Grp Cap (vph)	634	2697			1920	835	267	268	249			
v/s Ratio Prot	c0.14	c0.44			0.31							
v/s Ratio Perm						0.25	0.04	0.04	c0.16			
v/c Ratio	0.75	0.58			0.58	0.46	0.27	0.27	1.01			
Uniform Delay, d1	42.7	5.9			17.1	15.6	40.6	40.7	46.2			
Progression Factor	0.99	0.23			0.50	0.33	1.00	1.00	1.00			
Incremental Delay, d2	3.2	0.6			1.1	1.5	0.3	0.3	59.6			
Delay (s)	45.5	2.0			9.5	6.7	40.9	41.0	105.9			
Level of Service	D	A			A	A	D	D	F			
Approach Delay (s)		12.1			8.5			85.1			0.0	
Approach LOS		B			A			F			A	

Intersection Summary			
HCM Average Control Delay	18.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	272	1136	103	38	962	236	264	73	67	415	72	255
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99		0.95	0.97	1.00
Satd. Flow (prot)	3400	3574	1569	1805	3574	1572	1715	1640		1698	1716	1538
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99		0.95	0.97	1.00
Satd. Flow (perm)	3400	3574	1569	1805	3574	1572	1715	1640		1698	1716	1538
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	278	1159	105	39	982	241	269	74	68	423	73	260
RTOR Reduction (vph)	0	0	32	0	0	132	0	16	0	0	0	217
Lane Group Flow (vph)	278	1159	73	39	982	109	207	188	0	245	251	43
Confl. Peds. (#/hr)	3		3	3		3	4		1	1		4
Confl. Bikes (#/hr)					1			1				
Heavy Vehicles (%)	3%	1%	0%	0%	1%	1%	0%	7%	0%	1%	3%	3%
Turn Type	Prot		Perm	Prot		Perm	Split			Split		Perm
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2			6						7
Actuated Green, G (s)	12.0	55.3	55.3	4.0	46.8	46.8	15.2	15.2		18.0	18.0	18.0
Effective Green, g (s)	12.0	55.3	55.3	4.0	46.8	46.8	15.2	15.2		18.0	18.0	18.0
Actuated g/C Ratio	0.11	0.50	0.50	0.04	0.43	0.43	0.14	0.14		0.16	0.16	0.16
Clearance Time (s)	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	0.5	2.7	2.7	0.5	2.7	2.7	0.5	0.5		0.5	0.5	0.5
Lane Grp Cap (vph)	371	1797	789	66	1521	669	237	227		278	281	252
v/s Ratio Prot	c0.08	c0.32		0.02	0.27		c0.12	0.11		0.14	c0.15	
v/s Ratio Perm			0.05			0.07						0.03
v/c Ratio	0.75	0.64	0.09	0.59	0.65	0.16	0.87	0.83		0.88	0.89	0.17
Uniform Delay, d1	47.5	20.1	14.3	52.2	25.0	19.5	46.5	46.1		45.0	45.1	39.6
Progression Factor	1.23	0.98	0.99	1.09	0.61	0.55	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.4	1.4	0.2	7.9	1.9	0.5	27.2	20.3		25.5	27.4	0.1
Delay (s)	63.8	21.1	14.3	64.8	17.1	11.2	73.6	66.4		70.5	72.4	39.7
Level of Service	E	C	B	E	B	B	E	E		E	E	D
Approach Delay (s)		28.3			17.4			70.0			60.5	
Approach LOS		C			B			E			E	

Intersection Summary			
HCM Average Control Delay	35.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	74.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	51	1491	30	23	1010	57	191	17	33	125	9	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.90		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3554		1597	3572		1773	1692		1778	1599	
Flt Permitted	0.95	1.00		0.95	1.00		0.67	1.00		0.72	1.00	
Satd. Flow (perm)	1805	3554		1597	3572		1255	1692		1352	1599	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	55	1603	32	25	1086	61	205	18	35	134	10	88
RTOR Reduction (vph)	0	1	0	0	3	0	0	28	0	0	71	0
Lane Group Flow (vph)	55	1634	0	25	1144	0	205	25	0	134	27	0
Confl. Peds. (#/hr)	2		2	2		2	6		4	4		6
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	13%	13%	0%	2%	1%	0%	0%	1%	0%	1%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.7	72.2		3.5	70.5		20.8	20.8		20.8	20.8	
Effective Green, g (s)	5.7	72.2		3.5	70.5		20.8	20.8		20.8	20.8	
Actuated g/C Ratio	0.05	0.66		0.03	0.64		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	0.5	2.7		0.5	3.2		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	94	2333		51	2289		237	320		256	302	
v/s Ratio Prot	c0.03	c0.46		0.02	0.32			0.01			0.02	
v/s Ratio Perm							c0.16			0.10		
v/c Ratio	0.59	0.70		0.49	0.50		0.86	0.08		0.52	0.09	
Uniform Delay, d1	51.0	12.0		52.4	10.4		43.2	36.7		40.1	36.8	
Progression Factor	1.26	0.62		1.02	1.76		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.4	1.3		2.5	0.7		25.6	0.0		0.9	0.0	
Delay (s)	68.5	8.8		56.0	19.1		68.8	36.7		41.0	36.8	
Level of Service	E	A		E	B		E	D		D	D	
Approach Delay (s)		10.7			19.9			62.2			39.3	
Approach LOS		B			B			E			D	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1714	63	321	970	28	817
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		4.5	5.0	4.5	4.5
Lane Util. Factor	0.91		0.97	0.95	1.00	0.88
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5107		3400	3574	1736	2842
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5107		3400	3574	1736	2842
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	1823	67	341	1032	30	869
RTOR Reduction (vph)	3	0	0	0	0	381
Lane Group Flow (vph)	1887	0	341	1032	30	488
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)	1		1			
Heavy Vehicles (%)	1%	2%	3%	1%	4%	0%
Turn Type			Prot			Prot
Protected Phases	2		1	6	8	8
Permitted Phases						
Actuated Green, G (s)	56.7		13.8	77.0	23.5	23.5
Effective Green, g (s)	56.7		13.8	77.0	23.5	23.5
Actuated g/C Ratio	0.52		0.13	0.70	0.21	0.21
Clearance Time (s)	7.0		4.5	5.0	4.5	4.5
Vehicle Extension (s)	2.9		0.5	2.9	0.5	0.5
Lane Grp Cap (vph)	2632		427	2502	371	607
v/s Ratio Prot	c0.37		c0.10	0.29	0.02	c0.17
v/s Ratio Perm						
v/c Ratio	0.72		0.80	0.41	0.08	0.80
Uniform Delay, d1	20.5		46.7	7.0	34.6	41.1
Progression Factor	0.80		1.00	1.51	1.00	1.00
Incremental Delay, d2	1.4		8.9	0.5	0.4	10.9
Delay (s)	17.6		55.9	11.0	35.0	51.9
Level of Service	B		E	B	D	D
Approach Delay (s)	17.6			22.1	51.4	
Approach LOS	B			C	D	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	97	2359	36	22	1228	68	30	0	10	43	1	68
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5		4.5	5.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	5173		1805	5091		1801	1594		1803	1580	
Flt Permitted	0.95	1.00		0.95	1.00		0.71	1.00		0.75	1.00	
Satd. Flow (perm)	1805	5173		1805	5091		1342	1594		1424	1580	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	2564	39	24	1335	74	33	0	11	47	1	74
RTOR Reduction (vph)	0	1	0	0	3	0	0	10	0	0	69	0
Lane Group Flow (vph)	105	2602	0	24	1406	0	33	1	0	47	6	0
Confl. Peds. (#/hr)	2		3	3		2	2		1	1		2
Confl. Bikes (#/hr)		1			1					1		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	9.3	85.0		3.3	79.0		7.2	7.2		7.2	7.2	
Effective Green, g (s)	9.3	85.0		3.3	79.0		7.2	7.2		7.2	7.2	
Actuated g/C Ratio	0.08	0.77		0.03	0.72		0.07	0.07		0.07	0.07	
Clearance Time (s)	4.5	5.5		4.5	5.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	153	3997		54	3656		88	104		93	103	
v/s Ratio Prot	c0.06	c0.50		0.01	0.28			0.00			0.00	
v/s Ratio Perm							0.02			c0.03		
v/c Ratio	0.69	0.65		0.44	0.38		0.38	0.01		0.51	0.06	
Uniform Delay, d1	48.9	5.7		52.4	6.0		49.2	48.1		49.7	48.2	
Progression Factor	0.93	0.50		0.74	0.95		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.5		1.8	0.3		1.0	0.0		1.6	0.1	
Delay (s)	51.6	3.4		40.7	6.0		50.2	48.1		51.2	48.3	
Level of Service	D	A		D	A		D	D		D	D	
Approach Delay (s)		5.2			6.6			49.7			49.4	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	71.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	446	1650	241	120	775	85	231	156	76	100	183	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91		1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5060		1787	3490		3467	1900	1615	1805	1881	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5060		1787	3490		3467	1900	1615	1805	1881	1599
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	480	1774	259	129	833	91	248	168	82	108	197	144
RTOR Reduction (vph)	0	15	0	0	6	0	0	0	70	0	0	125
Lane Group Flow (vph)	480	2018	0	129	918	0	248	168	12	108	197	19
Confl. Peds. (#/hr)			1	1			2		1	1		2
Heavy Vehicles (%)	0%	0%	2%	1%	2%	1%	1%	0%	0%	0%	1%	1%
Turn Type	Prot			Prot			Prot		Prot	Prot		Prot
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases												
Actuated Green, G (s)	18.0	52.8		12.0	46.8		10.1	16.1	16.1	9.1	14.6	14.6
Effective Green, g (s)	18.0	52.8		12.0	46.8		10.1	16.1	16.1	9.1	14.6	14.6
Actuated g/C Ratio	0.16	0.48		0.11	0.43		0.09	0.15	0.15	0.08	0.13	0.13
Clearance Time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	0.5	2.9		0.5	2.9		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	573	2429		195	1485		318	278	236	149	250	212
v/s Ratio Prot	c0.14	c0.40		0.07	0.26		c0.07	0.09	0.01	0.06	c0.10	0.01
v/s Ratio Perm												
v/c Ratio	0.84	0.83		0.66	0.62		0.78	0.60	0.05	0.72	0.79	0.09
Uniform Delay, d1	44.6	24.7		47.1	24.6		48.9	44.0	40.4	49.2	46.2	41.9
Progression Factor	1.07	1.10		1.11	0.58		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.0	2.8		6.1	1.8		10.5	2.5	0.0	13.7	14.0	0.1
Delay (s)	55.6	30.0		58.5	16.2		59.4	46.5	40.4	63.0	60.2	41.9
Level of Service	E	C		E	B		E	D	D	E	E	D
Approach Delay (s)		34.9			21.4			51.9			55.0	
Approach LOS		C			C			D			E	

Intersection Summary			
HCM Average Control Delay	35.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	78.2%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	1495	129	68	906	15	90	28	101	27	10	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	4.8		4.2	4.2	4.2	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3564		1787	3563		1785	1900	1583	1796	1645	
Flt Permitted	0.95	1.00		0.95	1.00		0.71	1.00	1.00	0.74	1.00	
Satd. Flow (perm)	1805	3564		1787	3563		1343	1900	1583	1394	1645	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	89	1590	137	72	964	16	96	30	107	29	11	54
RTOR Reduction (vph)	0	3	0	0	1	0	0	0	95	0	48	0
Lane Group Flow (vph)	89	1724	0	72	979	0	96	30	12	29	17	0
Confl. Peds. (#/hr)	10					10	1		5	5		1
Confl. Bikes (#/hr)		2										
Heavy Vehicles (%)	0%	0%	1%	1%	1%	0%	1%	0%	2%	0%	0%	0%
Turn Type	Prot			Prot			Perm		Prot	Perm		
Protected Phases	5	2		1	6			8	8		4	
Permitted Phases							8			4		
Actuated Green, G (s)	7.6	78.0		6.7	77.1		12.3	12.3	12.3	12.5	12.5	
Effective Green, g (s)	7.6	78.0		6.7	77.1		12.3	12.3	12.3	12.5	12.5	
Actuated g/C Ratio	0.07	0.71		0.06	0.70		0.11	0.11	0.11	0.11	0.11	
Clearance Time (s)	4.0	4.8		4.0	4.8		4.2	4.2	4.2	4.0	4.0	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	125	2527		109	2497		150	212	177	158	187	
v/s Ratio Prot	c0.05	c0.48		0.04	0.27			0.02	0.01		0.01	
v/s Ratio Perm							c0.07			0.02		
v/c Ratio	0.71	0.68		0.66	0.39		0.64	0.14	0.07	0.18	0.09	
Uniform Delay, d1	50.1	9.0		50.5	6.8		46.7	44.1	43.7	44.1	43.7	
Progression Factor	1.51	0.31		1.27	0.68		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.0	0.9		10.5	0.4		6.8	0.1	0.1	0.2	0.1	
Delay (s)	84.7	3.7		74.5	5.1		53.5	44.2	43.8	44.3	43.7	
Level of Service	F	A		E	A		D	D	D	D	D	
Approach Delay (s)		7.7			9.8			47.8			43.9	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	12.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.2
Intersection Capacity Utilization	73.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	40	1237	120	41	786	7	167	1	45	6	4	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3520		1805	3569		1780	1532		1534	1635	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	1770	3520		1805	3569		1386	1532		1171	1635	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	43	1330	129	44	845	8	180	1	48	6	4	23
RTOR Reduction (vph)	0	5	0	0	0	0	0	40	0	0	19	0
Lane Group Flow (vph)	43	1454	0	44	853	0	180	9	0	6	8	0
Confl. Peds. (#/hr)	3		4	4		3	4		5	5		4
Confl. Bikes (#/hr)		2										
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%	1%	0%	4%	17%	0%	0%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	4.2	71.7		5.1	73.1		18.8	18.8		19.6	19.6	
Effective Green, g (s)	4.2	71.7		5.1	73.1		18.8	18.8		19.6	19.6	
Actuated g/C Ratio	0.04	0.65		0.05	0.66		0.17	0.17		0.18	0.18	
Clearance Time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	68	2294		84	2372		237	262		209	291	
v/s Ratio Prot	0.02	c0.41		c0.02	0.24			0.01			0.00	
v/s Ratio Perm							c0.13			0.01		
v/c Ratio	0.63	0.63		0.52	0.36		0.76	0.04		0.03	0.03	
Uniform Delay, d1	52.1	11.4		51.3	8.1		43.4	38.0		37.3	37.3	
Progression Factor	1.18	0.29		0.83	1.07		1.00	1.00		1.00	1.00	
Incremental Delay, d2	10.4	1.0		2.7	0.4		11.7	0.0		0.0	0.0	
Delay (s)	71.9	4.4		45.1	9.1		55.1	38.1		37.4	37.3	
Level of Service	E	A		D	A		E	D		D	D	
Approach Delay (s)		6.3			10.9			51.5			37.3	
Approach LOS		A			B			D			D	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.4
Intersection Capacity Utilization	63.0%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	829	127	48	593	15	84	52	98	32	38	52
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.8		4.0	4.5		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3610	1599	1805	3560		1787	1714		1805	1717	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3610	1599	1805	3560		1787	1714		1805	1717	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	64	882	135	51	631	16	89	55	104	34	40	55
RTOR Reduction (vph)	0	0	34	0	1	0	0	81	0	0	51	0
Lane Group Flow (vph)	64	882	101	51	646	0	89	78	0	34	44	0
Confl. Peds. (#/hr)	1		5	5		1	6					6
Confl. Bikes (#/hr)		1			2							
Heavy Vehicles (%)	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%
Turn Type	Prot		Prot	Prot			Prot			Prot		
Protected Phases	5	2	2	1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	6.6	71.5	71.5	5.9	70.8		7.9	11.3		4.0	7.9	
Effective Green, g (s)	6.6	71.5	71.5	5.9	70.8		7.9	11.3		4.0	7.9	
Actuated g/C Ratio	0.06	0.65	0.65	0.05	0.64		0.07	0.10		0.04	0.07	
Clearance Time (s)	4.0	4.8	4.8	4.0	4.8		4.0	4.5		4.0	4.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	108	2347	1039	97	2291		128	176		66	123	
v/s Ratio Prot	c0.04	c0.24	0.06	0.03	0.18		c0.05	c0.05		0.02	0.03	
v/s Ratio Perm												
v/c Ratio	0.59	0.38	0.10	0.53	0.28		0.70	0.44		0.52	0.36	
Uniform Delay, d1	50.4	8.9	7.2	50.7	8.5		49.9	46.4		52.0	48.6	
Progression Factor	0.75	1.34	2.12	1.38	0.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	0.4	0.1	2.3	0.3		12.4	0.7		2.8	0.6	
Delay (s)	42.6	12.3	15.4	72.1	5.9		62.3	47.1		54.9	49.3	
Level of Service	D	B	B	E	A		E	D		D	D	
Approach Delay (s)		14.5			10.7			52.5			50.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	19.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	54.4%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	71	737	45	13	486	29	30	6	12	77	5	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.8		4.5	4.5		4.8	4.8	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.99		1.00	0.90		1.00	0.87	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	3579		1805	3540		1801	1605		1750	1598	
Flt Permitted	0.95	1.00		0.95	1.00		0.73	1.00		0.74	1.00	
Satd. Flow (perm)	1752	3579		1805	3540		1387	1605		1371	1598	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	80	828	51	15	546	33	34	7	13	87	6	33
RTOR Reduction (vph)	0	2	0	0	3	0	0	12	0	0	30	0
Lane Group Flow (vph)	80	877	0	15	576	0	34	8	0	87	9	0
Confl. Peds. (#/hr)	3					3	2		1	1		2
Heavy Vehicles (%)	3%	0%	0%	0%	1%	0%	0%	17%	0%	3%	0%	3%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	7.2	84.1		2.0	79.0		10.5	10.5		10.2	10.2	
Effective Green, g (s)	7.2	84.1		2.0	79.0		10.5	10.5		10.2	10.2	
Actuated g/C Ratio	0.07	0.76		0.02	0.72		0.10	0.10		0.09	0.09	
Clearance Time (s)	4.0	4.9		4.0	4.8		4.5	4.5		4.8	4.8	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	115	2736		33	2542		132	153		127	148	
v/s Ratio Prot	c0.05	c0.25		0.01	0.16			0.01			0.01	
v/s Ratio Perm							0.02			c0.06		
v/c Ratio	0.70	0.32		0.45	0.23		0.26	0.05		0.69	0.06	
Uniform Delay, d1	50.3	4.0		53.5	5.2		46.1	45.2		48.3	45.5	
Progression Factor	0.97	1.03		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	13.1	0.3		3.6	0.2		0.4	0.1		11.5	0.1	
Delay (s)	62.0	4.5		57.0	5.4		46.5	45.3		59.9	45.6	
Level of Service	E	A		E	A		D	D		E	D	
Approach Delay (s)		9.3			6.7			46.1			55.4	
Approach LOS		A			A			D			E	

Intersection Summary			
HCM Average Control Delay	12.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	48.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	372	262	160	7	225	15	101	150	6	10	130	210
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	5.0		4.0	5.4	5.4	4.0	5.4	5.4
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.94		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	3371		3502	3573		1787	3610	1615	1805	3610	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	3371		3502	3573		1787	3610	1615	1805	3610	1615
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	413	291	178	8	250	17	112	167	7	11	144	233
RTOR Reduction (vph)	0	87	0	0	6	0	0	0	4	0	0	156
Lane Group Flow (vph)	413	382	0	8	261	0	112	167	3	11	144	77
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Turn Type	Prot			Prot			Prot		Prot	Prot		Prot
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases												
Actuated Green, G (s)	12.9	40.9		0.7	28.5		7.9	40.6	40.6	0.9	33.6	33.6
Effective Green, g (s)	12.9	40.9		0.7	28.5		7.9	40.6	40.6	0.9	33.6	33.6
Actuated g/C Ratio	0.13	0.40		0.01	0.28		0.08	0.40	0.40	0.01	0.33	0.33
Clearance Time (s)	4.0	4.8		4.0	5.0		4.0	5.4	5.4	4.0	5.4	5.4
Vehicle Extension (s)	0.5	2.9		0.5	2.9		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	442	1361		24	1005		139	1447	647	16	1197	536
v/s Ratio Prot	c0.12	c0.11		0.00	0.07		c0.06	0.05	0.00	0.01	0.04	c0.05
v/s Ratio Perm												
v/c Ratio	0.93	0.28		0.33	0.26		0.81	0.12	0.00	0.69	0.12	0.14
Uniform Delay, d1	43.8	20.3		50.1	28.2		45.9	19.1	18.2	50.1	23.6	23.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	26.6	0.5		3.0	0.6		26.4	0.0	0.0	67.5	0.2	0.6
Delay (s)	70.4	20.8		53.0	28.9		72.3	19.1	18.2	117.6	23.8	24.3
Level of Service	E	C		D	C		E	B	B	F	C	C
Approach Delay (s)		44.0			29.6			39.9			26.8	
Approach LOS		D			C			D			C	

Intersection Summary			
HCM Average Control Delay	37.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	101.3	Sum of lost time (s)	13.4
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	4	26	44	8	6	39	419	81	15	426	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	3	4	29	49	9	7	43	466	90	17	473	8
Pedestrians		5						11			4	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1128	1158	493	1150	1117	515	486			556		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1128	1158	493	1150	1117	515	486			556		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	98	98	95	69	95	99	96			98		
cM capacity (veh/h)	165	186	564	156	197	562	1083			990		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	37	64	599	498
Volume Left	3	49	43	17
Volume Right	29	7	90	8
cSH	385	174	1083	990
Volume to Capacity	0.10	0.37	0.04	0.02
Queue Length 95th (ft)	8	40	3	1
Control Delay (s)	15.3	37.4	1.1	0.5
Lane LOS	C	E	A	A
Approach Delay (s)	15.3	37.4	1.1	0.5
Approach LOS	C	E		

Intersection Summary			
Average Delay	3.2		
Intersection Capacity Utilization	61.0%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	435	25	10	391	151	21	14	18	122	14	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.91		1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3547		1805	3416		1805	1737		1703	1584	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.73	1.00	
Satd. Flow (perm)	1805	3547		1805	3416		1407	1737		1316	1584	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	13	478	27	11	430	166	23	15	20	134	15	11
RTOR Reduction (vph)	0	3	0	0	36	0	0	16	0	0	9	0
Lane Group Flow (vph)	13	502	0	11	560	0	23	19	0	134	17	0
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	0%	0%	0%	6%	14%	10%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	0.8	17.2		0.8	17.2		7.7	7.7		7.7	7.7	
Effective Green, g (s)	0.8	17.2		0.8	17.2		7.7	7.7		7.7	7.7	
Actuated g/C Ratio	0.02	0.44		0.02	0.44		0.20	0.20		0.20	0.20	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	37	1576		37	1518		280	346		262	315	
v/s Ratio Prot	c0.01	0.14		0.01	c0.16			0.01			0.01	
v/s Ratio Perm							0.02			c0.10		
v/c Ratio	0.35	0.32		0.30	0.37		0.08	0.05		0.51	0.05	
Uniform Delay, d1	18.7	7.0		18.7	7.1		12.6	12.6		13.8	12.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.2	0.1		3.3	0.2		0.1	0.0		1.3	0.1	
Delay (s)	22.9	7.1		21.9	7.3		12.7	12.6		15.1	12.6	
Level of Service	C	A		C	A		B	B		B	B	
Approach Delay (s)		7.5			7.6			12.6			14.7	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM Average Control Delay	8.6	HCM Level of Service	A
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	38.7	Sum of lost time (s)	13.0
Intersection Capacity Utilization	36.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	245	7	223	1	4	2	141	277	0	1	229	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.5		4.0	4.8	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.93	
Flt Protected		0.95	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1793	1615		1881	1615	1770	3574		1799	3305	
Flt Permitted		0.73	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1371	1615		1817	1615	1770	3574		1799	3305	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	266	8	242	1	4	2	153	301	0	1	249	221
RTOR Reduction (vph)	0	0	163	0	0	1	0	0	0	0	164	0
Lane Group Flow (vph)	0	274	79	0	5	1	153	301	0	1	306	0
Confl. Peds. (#/hr)	1		5	5		1	1		4	4		1
Confl. Bikes (#/hr)								1				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Perm		Prot	Perm		Prot	Prot			Prot		
Protected Phases		8	8		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		16.1	16.1		16.1	16.1	7.8	20.2		0.8	12.9	
Effective Green, g (s)		16.1	16.1		16.1	16.1	7.8	20.2		0.8	12.9	
Actuated g/C Ratio		0.32	0.32		0.32	0.32	0.16	0.41		0.02	0.26	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.5		4.0	4.8	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)		445	524		590	524	278	1456		29	860	
v/s Ratio Prot			0.05			0.00	c0.09	0.08		0.00	c0.09	
v/s Ratio Perm		c0.20			0.00							
v/c Ratio		0.62	0.15		0.01	0.00	0.55	0.21		0.03	0.36	
Uniform Delay, d1		14.1	11.9		11.3	11.3	19.3	9.5		24.0	15.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.2	0.1		0.0	0.0	1.9	0.1		0.4	0.3	
Delay (s)		16.3	12.0		11.3	11.3	21.2	9.6		24.4	15.2	
Level of Service		B	B		B	B	C	A		C	B	
Approach Delay (s)		14.3			11.3			13.5			15.2	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	12.8
Intersection Capacity Utilization	52.5%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	619	211	391	451	0	0	0	0	184	9	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5					5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	0.97	0.95					0.95	0.95	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5187	1599	3367	3574					1698	1694	1615
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5187	1599	3367	3574					1698	1694	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	680	232	430	496	0	0	0	0	202	10	188
RTOR Reduction (vph)	0	0	110	0	0	0	0	0	0	0	0	165
Lane Group Flow (vph)	0	680	122	430	496	0	0	0	0	105	107	23
Confl. Peds. (#/hr)	2		4	4		2	12					12
Confl. Bikes (#/hr)				1	1							
Heavy Vehicles (%)	0%	0%	1%	4%	1%	0%	0%	0%	0%	1%	11%	0%
Turn Type			Prot	Prot						Perm		Prot
Protected Phases		2	2	1	6						4	4
Permitted Phases										4		
Actuated Green, G (s)		41.9	41.9	14.7	60.6					9.9	9.9	9.9
Effective Green, g (s)		41.9	41.9	14.7	60.6					9.9	9.9	9.9
Actuated g/C Ratio		0.52	0.52	0.18	0.76					0.12	0.12	0.12
Clearance Time (s)		4.5	4.5	4.0	4.5					5.0	5.0	5.0
Vehicle Extension (s)		4.2	4.2	2.3	4.2					2.3	2.3	2.3
Lane Grp Cap (vph)		2717	837	619	2707					210	210	200
v/s Ratio Prot		c0.13	0.08	c0.13	0.14							0.01
v/s Ratio Perm										0.06	0.06	
v/c Ratio		0.25	0.15	0.69	0.18					0.50	0.51	0.12
Uniform Delay, d1		10.4	9.8	30.6	2.7					32.7	32.8	31.2
Progression Factor		1.00	1.00	0.63	0.25					1.00	1.00	1.00
Incremental Delay, d2		0.2	0.4	2.8	0.1					1.1	1.1	0.2
Delay (s)		10.7	10.2	22.2	0.8					33.8	33.9	31.3
Level of Service		B	B	C	A					C	C	C
Approach Delay (s)		10.5			10.7			0.0			32.7	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	14.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	213	584	0	0	720	306	120	339	512	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Lane Util. Factor	0.97	0.95			0.91	1.00	0.91	0.91	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3467	3610			5036	1599	1609	3384	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	3467	3610			5036	1599	1609	3384	1583			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	229	628	0	0	774	329	129	365	551	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	199	0	0	102	0	0	0
Lane Group Flow (vph)	229	628	0	0	774	130	116	378	449	0	0	0
Confl. Peds. (#/hr)			6	6			1					1
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	1%	0%	0%	0%	3%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot					Prot	Perm		Prot			
Protected Phases	5	2			6	6		8	8			
Permitted Phases							8					
Actuated Green, G (s)	9.1	43.3			30.2	30.2	27.2	27.2	27.2			
Effective Green, g (s)	9.1	43.3			30.2	30.2	27.2	27.2	27.2			
Actuated g/C Ratio	0.11	0.54			0.38	0.38	0.34	0.34	0.34			
Clearance Time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Vehicle Extension (s)	2.3	4.2			4.2	4.2	2.3	2.3	2.3			
Lane Grp Cap (vph)	394	1954			1901	604	547	1151	538			
v/s Ratio Prot	c0.07	0.17			c0.15	0.08			c0.28			
v/s Ratio Perm							0.07	0.11				
v/c Ratio	0.58	0.32			0.41	0.21	0.21	0.33	0.83			
Uniform Delay, d1	33.6	10.2			18.3	16.9	18.8	19.6	24.3			
Progression Factor	0.94	1.70			1.17	2.88	1.00	1.00	1.00			
Incremental Delay, d2	1.6	0.4			0.6	0.8	0.1	0.1	10.4			
Delay (s)	33.2	17.7			22.0	49.3	18.9	19.7	34.7			
Level of Service	C	B			C	D	B	B	C			
Approach Delay (s)		21.9			30.2			27.5			0.0	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	738	358	36	405	0	389	0	119	25	77	238
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.0	4.8		4.0		4.0	4.1	4.1	4.1
Lane Util. Factor		0.91		1.00	0.91		0.97		1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.99		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		0.95		1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		4849		1752	5036		3433		1599	1736	1845	1599
Flt Permitted		1.00		0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		4849		1752	5036		3433		1599	1736	1845	1599
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	820	398	40	450	0	432	0	132	28	86	264
RTOR Reduction (vph)	0	87	0	0	0	0	0	0	108	0	0	212
Lane Group Flow (vph)	0	1131	0	40	450	0	432	0	24	28	86	52
Confl. Peds. (#/hr)	3		1	1		3			11	11		
Confl. Bikes (#/hr)					1							1
Heavy Vehicles (%)	0%	1%	1%	3%	3%	0%	2%	0%	1%	4%	3%	1%
Turn Type				Prot			Prot		custom	Split		Prot
Protected Phases		2		1	6		8		8	4	4	4
Permitted Phases												
Actuated Green, G (s)		35.7		4.7	44.1		14.6		14.6	8.4	8.4	8.4
Effective Green, g (s)		35.7		4.7	44.1		14.6		14.6	8.4	8.4	8.4
Actuated g/C Ratio		0.45		0.06	0.55		0.18		0.18	0.11	0.11	0.11
Clearance Time (s)		4.5		4.0	4.8		4.0		4.0	4.1	4.1	4.1
Vehicle Extension (s)		4.0		2.5	4.0		2.5		2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		2164		103	2776		627		292	182	194	168
v/s Ratio Prot		c0.23		c0.02	0.09		c0.13		0.02	0.02	c0.05	0.03
v/s Ratio Perm												
v/c Ratio		0.52		0.39	0.16		0.69		0.08	0.15	0.44	0.31
Uniform Delay, d1		16.0		36.3	8.8		30.6		27.1	32.6	33.6	33.1
Progression Factor		0.44		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		0.8		1.8	0.1		2.9		0.1	0.3	1.2	0.8
Delay (s)		7.9		38.0	9.0		33.5		27.2	32.9	34.8	33.9
Level of Service		A		D	A		C		C	C	C	C
Approach Delay (s)		7.9			11.3			32.0			34.0	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	17.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

HCM Unsignalized Intersection Capacity Analysis
201: SE Park Ave & SE River Rd

5/25/2012

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	45	18	234	40	14	424
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	49	20	257	44	15	466
Pedestrians	12					5
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	1					0
Right turn flare (veh)		1				
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	788	296			313	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	788	296			313	
tC, single (s)	6.4	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.3	
p0 queue free %	86	97			99	
cM capacity (veh/h)	352	712			1207	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	69	301	481
Volume Left	49	0	15
Volume Right	20	44	0
cSH	493	1700	1207
Volume to Capacity	0.14	0.18	0.01
Queue Length 95th (ft)	12	0	1
Control Delay (s)	15.0	0.0	0.4
Lane LOS	B		A
Approach Delay (s)	15.0	0.0	0.4
Approach LOS	B		

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	45.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	13	39	43	40	51	82	39	899	71	72	1739	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0		4.0	4.8	4.8	4.0	4.8	
Lane Util. Factor		1.00			1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.99			0.99		1.00	1.00	0.93	1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00	1.00	1.00	1.00	
Frt		0.94			0.94		1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.99			0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1669			1733		1752	3505	1496	1805	3570	
Flt Permitted		0.90			0.87		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1508			1528		1752	3505	1496	1805	3570	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	14	41	45	42	54	86	41	946	75	76	1831	14
RTOR Reduction (vph)	0	36	0	0	40	0	0	0	13	0	0	0
Lane Group Flow (vph)	0	64	0	0	142	0	41	946	62	76	1845	0
Confl. Peds. (#/hr)	3		5	5		3			17			
Confl. Bikes (#/hr)	1							4			1	
Heavy Vehicles (%)	8%	8%	2%	0%	2%	0%	3%	3%	0%	0%	1%	0%
Turn Type	Perm			Perm			Prot		Perm	Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			
Actuated Green, G (s)		14.6			14.6		5.2	74.4	74.4	8.2	77.4	
Effective Green, g (s)		14.6			14.6		5.2	74.4	74.4	8.2	77.4	
Actuated g/C Ratio		0.13			0.13		0.05	0.68	0.68	0.07	0.70	
Clearance Time (s)		4.0			4.0		4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)		2.5			2.5		2.3	4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		200			203		83	2371	1012	135	2512	
v/s Ratio Prot							0.02	0.27		c0.04	c0.52	
v/s Ratio Perm		0.04			c0.09				0.04			
v/c Ratio		0.32			0.70		0.49	0.40	0.06	0.56	0.73	
Uniform Delay, d1		43.2			45.6		51.1	7.9	6.0	49.2	10.0	
Progression Factor		1.00			1.00		1.43	0.15	0.01	1.00	1.00	
Incremental Delay, d2		0.7			9.7		2.5	0.5	0.1	3.9	1.9	
Delay (s)		43.9			55.3		75.6	1.6	0.2	53.0	11.9	
Level of Service		D			E		E	A	A	D	B	
Approach Delay (s)		43.9			55.3			4.4			13.6	
Approach LOS		D			E			A			B	

Intersection Summary			
HCM Average Control Delay	13.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	79.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	101	7	73	2	6	2	60	278	1	3	375	114
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	115	8	83	2	7	2	68	316	1	3	426	130
Pedestrians		1			1			1				
Lane Width (ft)		12.0			12.0			12.0				
Walking Speed (ft/s)		4.0			4.0			4.0				
Percent Blockage		0			0			0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	957	953	493	1040	1017	317	557			318		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	957	953	493	1040	1017	317	557			318		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	47	97	86	99	97	100	93			100		
cM capacity (veh/h)	216	242	573	166	222	727	1013			1252		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	206	11	385	559
Volume Left	115	2	68	3
Volume Right	83	2	1	130
cSH	290	239	1013	1252
Volume to Capacity	0.71	0.05	0.07	0.00
Queue Length 95th (ft)	125	4	5	0
Control Delay (s)	42.9	20.8	2.2	0.1
Lane LOS	E	C	A	A
Approach Delay (s)	42.9	20.8	2.2	0.1
Approach LOS	E	C		

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	72.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	19	9	22	22	55	7	182	22	63	394	37
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	23	20	10	24	24	59	8	196	24	68	424	40
Pedestrians		2			2			7			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	877	817	453	831	826	212	465			221		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	877	817	453	831	826	212	465			221		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	90	93	98	91	92	93	99			95		
cM capacity (veh/h)	220	289	584	257	291	818	1034			1345		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	53	106	227	531
Volume Left	23	24	8	68
Volume Right	10	59	24	40
cSH	277	433	1034	1345
Volume to Capacity	0.19	0.25	0.01	0.05
Queue Length 95th (ft)	17	24	1	4
Control Delay (s)	21.0	16.0	0.4	1.5
Lane LOS	C	C	A	A
Approach Delay (s)	21.0	16.0	0.4	1.5
Approach LOS	C	C		

Intersection Summary			
Average Delay	4.0		
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	53	62	23	81	17	70	1002	35	12	1647	87
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1677		1805	1734		1805	3539	1572	1671	3539	1517
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1677		1805	1734		1805	3539	1572	1671	3539	1517
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	29	55	65	24	84	18	73	1044	36	12	1716	91
RTOR Reduction (vph)	0	43	0	0	8	0	0	0	6	0	0	12
Lane Group Flow (vph)	29	77	0	24	94	0	73	1044	30	12	1716	79
Confl. Peds. (#/hr)			7			8			2			12
Confl. Bikes (#/hr)								4			1	
Heavy Vehicles (%)	4%	4%	2%	0%	5%	12%	0%	2%	0%	8%	2%	0%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	4.6	10.9		4.3	10.6		8.4	75.6	75.6	2.4	69.6	69.6
Effective Green, g (s)	4.6	10.9		4.3	10.6		8.4	75.6	75.6	2.4	69.6	69.6
Actuated g/C Ratio	0.04	0.10		0.04	0.10		0.08	0.69	0.69	0.02	0.63	0.63
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	73	166		71	167		138	2432	1080	36	2239	960
v/s Ratio Prot	c0.02	0.05		0.01	c0.05		c0.04	0.29		0.01	c0.48	
v/s Ratio Perm									0.02			0.05
v/c Ratio	0.40	0.46		0.34	0.56		0.53	0.43	0.03	0.33	0.77	0.08
Uniform Delay, d1	51.3	46.8		51.5	47.5		48.9	7.6	5.5	53.0	14.4	7.8
Progression Factor	1.00	1.00		1.00	1.00		1.11	0.37	0.07	0.68	0.41	0.12
Incremental Delay, d2	2.1	1.2		1.6	3.1		2.0	0.5	0.0	2.2	1.8	0.1
Delay (s)	53.4	48.0		53.1	50.6		56.3	3.3	0.4	38.1	7.7	1.1
Level of Service	D	D		D	D		E	A	A	D	A	A
Approach Delay (s)		49.0			51.1			6.6			7.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM Average Control Delay	10.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.8
Intersection Capacity Utilization	71.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	59	45	51	325	482	50
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	63	48	55	349	518	54
Pedestrians				2	1	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1005	547	572			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1005	547	572			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	91	95			
cM capacity (veh/h)	255	532	1011			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	63	48	404	572
Volume Left	63	0	55	0
Volume Right	0	48	0	54
cSH	255	532	1011	1700
Volume to Capacity	0.25	0.09	0.05	0.34
Queue Length 95th (ft)	24	7	4	0
Control Delay (s)	23.7	12.4	1.7	0.0
Lane LOS	C	B	A	
Approach Delay (s)	18.8		1.7	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	62.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	27	19	42	54	41	18	150	26	69	300	33
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	27	29	20	45	58	44	19	161	28	74	323	35

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	76	147	209	432
Volume Left (vph)	27	45	19	74
Volume Right (vph)	20	44	28	35
Hadj (s)	-0.07	-0.08	-0.02	0.01
Departure Headway (s)	5.7	5.6	5.1	4.9
Degree Utilization, x	0.12	0.23	0.30	0.58
Capacity (veh/h)	534	575	659	715
Control Delay (s)	9.5	10.2	10.3	14.5
Approach Delay (s)	9.5	10.2	10.3	14.5
Approach LOS	A	B	B	B

Intersection Summary			
Delay	12.3		
HCM Level of Service	B		
Intersection Capacity Utilization	52.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	145	82	164	136	64	68	934	140	74	1388	65
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.96	1.00	1.00	0.91
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.95		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1759		1787	1787		1787	3505	1538	1752	3539	1467
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	1759		1787	1787		1787	3505	1538	1752	3539	1467
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	80	153	86	173	143	67	72	983	147	78	1461	68
RTOR Reduction (vph)	0	20	0	0	15	0	0	0	56	0	0	12
Lane Group Flow (vph)	80	219	0	173	195	0	72	983	91	78	1461	56
Confl. Peds. (#/hr)			12			23			6			24
Confl. Bikes (#/hr)	1											
Heavy Vehicles (%)	0%	2%	0%	1%	0%	0%	1%	3%	1%	3%	2%	0%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	8.4	19.0		15.2	25.8		7.7	51.2	51.2	7.8	51.3	51.3
Effective Green, g (s)	8.4	19.0		15.2	25.8		7.7	51.2	51.2	7.8	51.3	51.3
Actuated g/C Ratio	0.08	0.17		0.14	0.23		0.07	0.47	0.47	0.07	0.47	0.47
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	138	304		247	419		125	1631	716	124	1650	684
v/s Ratio Prot	0.04	c0.12		c0.10	0.11		0.04	0.28		c0.04	c0.41	
v/s Ratio Perm									0.06			0.04
v/c Ratio	0.58	0.72		0.70	0.46		0.58	0.60	0.13	0.63	0.89	0.08
Uniform Delay, d1	49.1	43.0		45.2	36.2		49.6	21.8	16.7	49.7	26.7	16.3
Progression Factor	1.00	1.00		1.00	1.00		1.33	0.58	0.53	0.97	1.12	1.57
Incremental Delay, d2	4.3	7.4		7.7	0.5		3.9	1.4	0.3	5.4	5.2	0.2
Delay (s)	53.4	50.4		52.9	36.6		69.7	14.1	9.1	53.3	35.0	25.7
Level of Service	D	D		D	D		E	B	A	D	C	C
Approach Delay (s)		51.1			44.0			16.8			35.5	
Approach LOS		D			D			B			D	

Intersection Summary			
HCM Average Control Delay	31.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	44	56	375	74	90	501
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	47	60	399	79	96	533
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1164	438			478	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1164	438			478	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	76	90			91	
cM capacity (veh/h)	193	623			1074	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	106	478	629
Volume Left	47	0	96
Volume Right	60	79	0
cSH	315	1700	1074
Volume to Capacity	0.34	0.28	0.09
Queue Length 95th (ft)	36	0	7
Control Delay (s)	22.2	0.0	2.3
Lane LOS	C		A
Approach Delay (s)	22.2	0.0	2.3
Approach LOS	C		

Intersection Summary			
Average Delay	3.1		
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	49	2	42	0	177	68	51	296	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Hourly flow rate (vph)	0	0	0	58	2	50	0	211	81	61	352	0
Pedestrians								1				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								4.0				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	776	765	353	726	725	251	352			292		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	776	765	353	726	725	251	352			292		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	82	99	94	100			95		
cM capacity (veh/h)	285	320	694	322	337	787	1218			1282		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	111	292	413
Volume Left	58	0	61
Volume Right	50	81	0
cSH	440	1700	1282
Volume to Capacity	0.25	0.17	0.05
Queue Length 95th (ft)	25	0	4
Control Delay (s)	15.9	0.0	1.6
Lane LOS	C		A
Approach Delay (s)	15.9	0.0	1.6
Approach LOS	C		

Intersection Summary			
Average Delay	3.0		
Intersection Capacity Utilization	47.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	89	48	137	105	97	46	1165	97	122	1561	42
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.95	1.00	1.00	0.94
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	1739		1769	1727		1736	3539	1492	1805	3539	1491
Flt Permitted	0.34	1.00		0.54	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	631	1739		1008	1727		1736	3539	1492	1805	3539	1491
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	50	93	50	143	109	101	48	1214	101	127	1626	44
RTOR Reduction (vph)	0	18	0	0	32	0	0	0	20	0	0	7
Lane Group Flow (vph)	50	125	0	143	178	0	48	1214	81	127	1626	37
Confl. Peds. (#/hr)	16		10	10		16			9			12
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	2%	3%	2%	1%	0%	1%	4%	2%	3%	0%	2%	2%
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	17.9	17.9		18.4	18.4		6.5	66.4	66.4	12.4	72.3	72.3
Effective Green, g (s)	17.9	17.9		18.4	18.4		6.5	66.4	66.4	12.4	72.3	72.3
Actuated g/C Ratio	0.16	0.16		0.17	0.17		0.06	0.60	0.60	0.11	0.66	0.66
Clearance Time (s)	4.5	4.5		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	3.5	3.5		2.5	2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	103	283		169	289		103	2136	901	203	2326	980
v/s Ratio Prot		0.07			0.10		0.03	0.34		c0.07	c0.46	
v/s Ratio Perm	0.08			c0.14					0.05			0.02
v/c Ratio	0.49	0.44		0.85	0.62		0.47	0.57	0.09	0.63	0.70	0.04
Uniform Delay, d1	41.9	41.5		44.4	42.5		50.1	13.2	9.1	46.6	12.0	6.6
Progression Factor	1.00	1.00		1.00	1.00		0.76	1.92	2.51	1.21	0.59	0.28
Incremental Delay, d2	4.2	1.3		29.9	3.3		1.7	1.0	0.2	3.0	1.1	0.0
Delay (s)	46.1	42.8		74.4	45.9		39.8	26.2	23.1	59.6	8.1	1.9
Level of Service	D	D		E	D		D	C	C	E	A	A
Approach Delay (s)		43.7			57.4			26.5			11.6	
Approach LOS		D			E			C			B	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	81.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	31	217	8	18	21	185	327	5	24	515	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.90			0.94		1.00	1.00		1.00	0.98	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1654			1731		1805	1877		1671	1846	
Flt Permitted		0.93			0.94		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1551			1637		1805	1877		1671	1846	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	61	32	226	8	19	22	193	341	5	25	536	83
RTOR Reduction (vph)	0	82	0	0	17	0	0	0	0	0	4	0
Lane Group Flow (vph)	0	237	0	0	32	0	193	346	0	25	615	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	2%	0%	1%	0%	0%	5%	0%	1%	0%	8%	1%	0%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		18.3			18.3		15.1	49.3		2.6	36.8	
Effective Green, g (s)		18.3			18.3		15.1	49.3		2.6	36.8	
Actuated g/C Ratio		0.22			0.22		0.18	0.59		0.03	0.44	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		339			358		326	1106		52	812	
v/s Ratio Prot							c0.11	0.18		0.01	c0.33	
v/s Ratio Perm		c0.15			0.02							
v/c Ratio		0.70			0.09		0.59	0.31		0.48	0.76	
Uniform Delay, d1		30.2			26.1		31.5	8.7		39.9	19.7	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		6.2			0.1		2.9	0.2		6.9	4.1	
Delay (s)		36.3			26.2		34.3	8.8		46.7	23.7	
Level of Service		D			C		C	A		D	C	
Approach Delay (s)		36.3			26.2			18.0			24.6	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM Average Control Delay	24.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	83.7	Sum of lost time (s)	13.5
Intersection Capacity Utilization	78.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	25	46	42	85	39	116	22	1169	96	83	1667	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.96
Flpb, ped/bikes		1.00			0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1686			1768	1528	1805	3539	1511	1770	3574	1469
Flt Permitted		0.91			0.61	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1552			1111	1528	1805	3539	1511	1770	3574	1469
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	26	47	43	88	40	120	23	1205	99	86	1719	19
RTOR Reduction (vph)	0	22	0	0	0	103	0	0	18	0	0	2
Lane Group Flow (vph)	0	94	0	0	128	17	23	1205	81	86	1719	17
Confl. Peds. (#/hr)	3		17	17		3			5			5
Confl. Bikes (#/hr)		1	1					1	1			
Heavy Vehicles (%)	4%	4%	5%	4%	0%	4%	0%	2%	3%	2%	1%	6%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)		15.4			15.4	15.4	3.0	73.0	73.0	8.8	78.8	78.8
Effective Green, g (s)		15.4			15.4	15.4	3.0	73.0	73.0	8.8	78.8	78.8
Actuated g/C Ratio		0.14			0.14	0.14	0.03	0.66	0.66	0.08	0.72	0.72
Clearance Time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		217			156	214	49	2349	1003	142	2560	1052
v/s Ratio Prot							0.01	0.34		c0.05	c0.48	
v/s Ratio Perm		0.06			c0.12	0.01			0.05			0.01
v/c Ratio		0.43			0.82	0.08	0.47	0.51	0.08	0.61	0.67	0.02
Uniform Delay, d1		43.3			46.0	41.1	52.7	9.4	6.6	48.9	8.5	4.5
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	0.97	0.70	1.12
Incremental Delay, d2		1.0			27.4	0.1	4.1	0.8	0.2	4.1	1.0	0.0
Delay (s)		44.3			73.4	41.2	56.8	10.2	6.7	51.6	7.0	5.0
Level of Service		D			E	D	E	B	A	D	A	A
Approach Delay (s)		44.3			57.8			10.8			9.1	
Approach LOS		D			E			B			A	

Intersection Summary			
HCM Average Control Delay	14.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	76.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	10	5	31	11	41	3	125	31	63	254	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	11	5	34	12	45	3	136	34	68	276	10

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	17	90	173	354
Volume Left (vph)	1	34	3	68
Volume Right (vph)	5	45	34	10
Hadj (s)	-0.18	-0.22	-0.10	0.04
Departure Headway (s)	5.1	4.9	4.5	4.4
Degree Utilization, x	0.02	0.12	0.21	0.43
Capacity (veh/h)	626	660	772	791
Control Delay (s)	8.2	8.6	8.7	10.7
Approach Delay (s)	8.2	8.6	8.7	10.7
Approach LOS	A	A	A	B

Intersection Summary			
Delay	9.8		
HCM Level of Service	A		
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	30	55	25	92	68	132	21	1122	98	134	1494	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1858	1582		1828	1531	1805	3539	1547	1787	3574	1548
Flt Permitted		0.66	1.00		0.68	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1247	1582		1277	1531	1805	3539	1547	1787	3574	1548
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	32	59	27	99	73	142	23	1206	105	144	1606	42
RTOR Reduction (vph)	0	0	23	0	0	87	0	0	22	0	0	5
Lane Group Flow (vph)	0	91	4	0	172	55	23	1206	83	144	1606	37
Confl. Peds. (#/hr)	12		5	5		12			3			5
Confl. Bikes (#/hr)		1						2				
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	2%	1%	1%	1%	0%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		22.4	22.4		22.4	22.4	2.4	106.0	106.0	6.6	110.2	110.2
Effective Green, g (s)		22.4	22.4		22.4	22.4	2.4	106.0	106.0	6.6	110.2	110.2
Actuated g/C Ratio		0.15	0.15		0.15	0.15	0.02	0.72	0.72	0.04	0.75	0.75
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		189	240		194	232	29	2538	1109	80	2665	1154
v/s Ratio Prot							0.01	0.34		c0.08	c0.45	
v/s Ratio Perm		0.07	0.00		c0.13	0.04			0.05			0.02
v/c Ratio		0.48	0.02		0.89	0.24	0.79	0.48	0.08	1.80	0.60	0.03
Uniform Delay, d1		57.4	53.3		61.5	55.2	72.5	9.0	6.2	70.6	8.7	4.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		1.4	0.0		34.7	0.4	80.8	0.6	0.1	405.0	1.0	0.1
Delay (s)		58.8	53.4		96.2	55.6	153.3	9.6	6.4	475.6	9.7	4.9
Level of Service		E	D		F	E	F	A	A	F	A	A
Approach Delay (s)		57.5			77.8			11.8			47.0	
Approach LOS		E			E			B			D	

Intersection Summary			
HCM Average Control Delay	36.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	147.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	119.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	256	60	28	266	130	89	296	33	138	313	62
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.98			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1833			1891	1599	1787	1855		1805	1822	
Flt Permitted		0.93			0.95	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1710			1805	1599	1787	1855		1805	1822	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	47	267	62	29	277	135	93	308	34	144	326	65
RTOR Reduction (vph)	0	5	0	0	0	57	0	3	0	0	6	0
Lane Group Flow (vph)	0	371	0	0	306	78	93	339	0	144	385	0
Confl. Peds. (#/hr)	1					1						
Confl. Bikes (#/hr)		1										
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	1%	1%	0%	0%	2%	0%
Turn Type	Perm			Perm		Prot	Prot			Prot		
Protected Phases		4			8	8	5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		25.9			25.9	25.9	7.9	24.1		12.0	28.2	
Effective Green, g (s)		25.9			25.9	25.9	7.9	24.1		12.0	28.2	
Actuated g/C Ratio		0.35			0.35	0.35	0.11	0.33		0.16	0.38	
Clearance Time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0	2.5	5.0		2.5	5.0	
Lane Grp Cap (vph)		599			632	560	191	604		293	694	
v/s Ratio Prot						0.05	0.05	0.18		c0.08	c0.21	
v/s Ratio Perm		c0.22			0.17							
v/c Ratio		0.62			0.48	0.14	0.49	0.56		0.49	0.56	
Uniform Delay, d1		20.0			18.8	16.4	31.1	20.6		28.2	18.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		1.9			0.6	0.1	1.4	2.0		0.9	1.6	
Delay (s)		21.9			19.4	16.5	32.6	22.5		29.2	19.6	
Level of Service		C			B	B	C	C		C	B	
Approach Delay (s)		21.9			18.5			24.7			22.2	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	21.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	74.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	101	81	82	43	92	197
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	107	86	87	46	98	210
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			233			
pX, platoon unblocked						
vC, conflicting volume	133				411	110
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	133				411	110
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	93				82	78
cM capacity (veh/h)	1464				550	949

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	194	133	307
Volume Left	107	0	98
Volume Right	0	46	210
cSH	1464	1700	1392
Volume to Capacity	0.07	0.08	0.22
Queue Length 95th (ft)	6	0	21
Control Delay (s)	4.5	0.0	10.9
Lane LOS	A		B
Approach Delay (s)	4.5	0.0	10.9
Approach LOS			B

Intersection Summary			
Average Delay	6.6		
Intersection Capacity Utilization	31.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	54	28	64	57	31	75	30	1156	63	24	1384	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	3.5	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1788	1587		1816	1591	1805	3505	1578	1805	3539	1517
Flt Permitted		0.66	1.00		0.69	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1218	1587		1301	1591	1805	3505	1578	1805	3539	1517
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	57	29	67	60	33	79	32	1217	66	25	1457	58
RTOR Reduction (vph)	0	0	60	0	0	71	0	0	12	0	0	6
Lane Group Flow (vph)	0	86	7	0	93	8	32	1217	54	25	1457	52
Confl. Peds. (#/hr)	2		4	4		2			1			1
Confl. Bikes (#/hr)					1			1			1	
Heavy Vehicles (%)	2%	4%	0%	0%	3%	0%	0%	3%	0%	0%	2%	4%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		11.8	11.8		11.8	11.8	9.1	81.6	81.6	4.3	76.3	76.3
Effective Green, g (s)		11.8	11.8		11.8	11.8	9.1	81.6	81.6	4.3	76.3	76.3
Actuated g/C Ratio		0.11	0.11		0.11	0.11	0.08	0.74	0.74	0.04	0.69	0.69
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	3.5	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		131	170		140	171	149	2600	1171	71	2455	1052
v/s Ratio Prot							0.02	c0.35		0.01	c0.41	
v/s Ratio Perm		0.07	0.00		c0.07	0.01			0.03			0.03
v/c Ratio		0.66	0.04		0.66	0.05	0.21	0.47	0.05	0.35	0.59	0.05
Uniform Delay, d1		47.2	44.0		47.2	44.1	47.1	5.6	3.8	51.5	8.8	5.3
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		10.1	0.1		10.2	0.1	0.4	0.6	0.1	1.8	1.1	0.1
Delay (s)		57.3	44.1		57.4	44.2	47.5	6.2	3.9	53.2	9.8	5.4
Level of Service		E	D		E	D	D	A	A	D	A	A
Approach Delay (s)		51.5			51.3			7.1			10.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	61.9%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	14	318	395	160	119	9
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	15	338	420	170	127	10

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	353	590	136
Volume Left (vph)	15	0	127
Volume Right (vph)	0	170	10
Hadj (s)	0.06	-0.14	0.19
Departure Headway (s)	5.1	4.7	6.3
Degree Utilization, x	0.50	0.77	0.24
Capacity (veh/h)	673	755	525
Control Delay (s)	13.2	21.4	11.2
Approach Delay (s)	13.2	21.4	11.2
Approach LOS	B	C	B

Intersection Summary			
Delay	17.5		
HCM Level of Service	C		
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	69	440	536	65	87	138
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	72	458	558	68	91	144

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	530	626	234
Volume Left (vph)	72	0	91
Volume Right (vph)	0	68	144
Hadj (s)	0.08	-0.05	-0.28
Departure Headway (s)	5.8	5.5	6.6
Degree Utilization, x	0.85	0.96	0.43
Capacity (veh/h)	611	626	533
Control Delay (s)	32.8	49.6	14.3
Approach Delay (s)	32.8	49.6	14.3
Approach LOS	D	E	B

Intersection Summary			
Delay	37.3		
HCM Level of Service	E		
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	272	84	49	272	40	136	202	38	126	419	194
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		0.99	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.98		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1664	1821		1765	1836		1787	1821		1777	1768	
Flt Permitted	0.33	1.00		0.26	1.00		0.13	1.00		0.58	1.00	
Satd. Flow (perm)	582	1821		492	1836		252	1821		1088	1768	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	164	299	92	54	299	44	149	222	42	138	460	213
RTOR Reduction (vph)	0	10	0	0	5	0	0	5	0	0	13	0
Lane Group Flow (vph)	164	381	0	54	338	0	149	259	0	138	660	0
Confl. Peds. (#/hr)	4		3	3		4	5		6	6		5
Heavy Vehicles (%)	8%	0%	0%	2%	1%	2%	1%	1%	3%	1%	1%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	28.8	28.8		28.8	28.8		57.9	46.1		51.5	42.9	
Effective Green, g (s)	28.8	28.8		28.8	28.8		57.9	46.1		51.5	42.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.60	0.48		0.53	0.44	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	173	541		146	545		337	865		639	782	
v/s Ratio Prot		0.21			0.18		c0.05	0.14		0.02	c0.37	
v/s Ratio Perm	c0.28			0.11			0.21			0.10		
v/c Ratio	0.95	0.70		0.37	0.62		0.44	0.30		0.22	0.84	
Uniform Delay, d1	33.4	30.3		26.9	29.4		14.7	15.6		11.6	24.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	52.7	3.9		1.2	1.9		0.7	0.2		0.1	8.3	
Delay (s)	86.1	34.2		28.1	31.3		15.4	15.8		11.7	32.4	
Level of Service	F	C		C	C		B	B		B	C	
Approach Delay (s)		49.5			30.9			15.6			28.9	
Approach LOS		D			C			B			C	

Intersection Summary			
HCM Average Control Delay	32.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	97.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	81.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	163	184	216	86	125	149
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	177	200	235	93	136	162

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	377	328	298
Volume Left (vph)	177	235	0
Volume Right (vph)	200	0	162
Hadj (s)	-0.22	0.20	-0.30
Departure Headway (s)	5.4	5.7	5.2
Degree Utilization, x	0.56	0.52	0.43
Capacity (veh/h)	635	601	645
Control Delay (s)	15.0	14.5	12.2
Approach Delay (s)	15.0	14.5	12.2
Approach LOS	B	B	B

Intersection Summary			
Delay	14.0		
HCM Level of Service	B		
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	330	44	218	288	73	327
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	379	51	251	331	84	376

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	430	251	331	460
Volume Left (vph)	379	0	0	84
Volume Right (vph)	51	0	331	0
Hadj (s)	0.12	0.03	-0.55	0.07
Departure Headway (s)	6.1	6.2	3.2	5.9
Degree Utilization, x	0.72	0.43	0.29	0.75
Capacity (veh/h)	565	537	1113	593
Control Delay (s)	23.4	13.8	7.5	24.2
Approach Delay (s)	23.4	10.2		24.2
Approach LOS	C	B		C

Intersection Summary			
Delay	18.4		
HCM Level of Service	C		
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	305	48	118	209	301	339
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	343	54	133	235	338	381

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	343	54	367	338	381
Volume Left (vph)	343	0	133	0	0
Volume Right (vph)	0	54	0	0	381
Hadj (s)	0.53	-0.70	0.09	0.03	-0.67
Departure Headway (s)	7.8	6.6	6.9	6.8	6.1
Degree Utilization, x	0.74	0.10	0.70	0.64	0.65
Capacity (veh/h)	445	527	507	516	569
Control Delay (s)	29.1	9.1	24.7	20.1	18.5
Approach Delay (s)	26.4		24.7	19.2	
Approach LOS	D		C	C	

Intersection Summary			
Delay	22.5		
HCM Level of Service	C		
Intersection Capacity Utilization	60.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	0	35	1	152	1	145	25	74	233	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	0	1	0	41	1	177	1	169	29	86	271	0
Pedestrians		1						1			1	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	808	644	273	630	629	184	272			198		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	808	644	273	630	629	184	272			198		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	89	100	80	100			94		
cM capacity (veh/h)	227	369	769	368	376	863	1302			1381		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	219	199	357
Volume Left	0	41	1	86
Volume Right	0	177	29	0
cSH	369	686	1302	1381
Volume to Capacity	0.00	0.32	0.00	0.06
Queue Length 95th (ft)	0	34	0	5
Control Delay (s)	14.8	12.7	0.1	2.3
Lane LOS	B	B	A	A
Approach Delay (s)	14.8	12.7	0.1	2.3
Approach LOS	B	B		

Intersection Summary				
Average Delay		4.7		
Intersection Capacity Utilization		53.7%	ICU Level of Service	A
Analysis Period (min)		15		

HCM Signalized Intersection Capacity Analysis
301: Hwy 212/Hwy 224 & I-205 SB Off Ramp

5/25/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	744	110	597	488	0	0	0	903	0	0	447
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	4.5				4.0			5.5
Lane Util. Factor		1.00		1.00	1.00				0.88			1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00			1.00
Flpb, ped/bikes		1.00		1.00	1.00				1.00			1.00
Frt		0.98		1.00	1.00				0.85			0.86
Flt Protected		1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)		1842		1719	1810				2538			1611
Flt Permitted		1.00		0.95	1.00				1.00			1.00
Satd. Flow (perm)		1842		1719	1810				2538			1611
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	0	791	117	635	519	0	0	0	961	0	0	476
RTOR Reduction (vph)	0	6	0	0	0	0	0	0	0	0	0	49
Lane Group Flow (vph)	0	902	0	635	519	0	0	0	961	0	0	427
Confl. Peds. (#/hr)			5	5								
Confl. Bikes (#/hr)		1	1	1	2							
Heavy Vehicles (%)	0%	1%	1%	5%	5%	0%	0%	0%	12%	0%	0%	2%
Turn Type				Prot					Free			custom
Protected Phases		2		1	6							5
Permitted Phases									Free			
Actuated Green, G (s)		20.3		24.9	26.3				56.2			19.9
Effective Green, g (s)		20.3		24.9	26.3				56.2			19.9
Actuated g/C Ratio		0.36		0.44	0.47				1.00			0.35
Clearance Time (s)		5.5		5.5	4.5							5.5
Vehicle Extension (s)		2.3		2.3	4.2							2.3
Lane Grp Cap (vph)		665		762	847				2538			570
v/s Ratio Prot		c0.49		c0.37	0.29							0.26
v/s Ratio Perm									c0.38			
v/c Ratio		1.36		0.83	0.61				0.38			0.75
Uniform Delay, d1		18.0		13.8	11.2				0.0			16.0
Progression Factor		1.00		1.00	1.00				1.00			1.00
Incremental Delay, d2		170.3		7.6	1.6				0.4			4.9
Delay (s)		188.2		21.4	12.7				0.4			20.9
Level of Service		F		C	B				A			C
Approach Delay (s)		188.2			17.5			0.4			20.9	
Approach LOS		F			B			A			C	

Intersection Summary			
HCM Average Control Delay	57.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	56.2	Sum of lost time (s)	11.0
Intersection Capacity Utilization	87.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	1432	0	0	1010	837	128	2	540	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.5	4.5		5.5	4.0			
Lane Util. Factor	1.00	0.91			0.95	1.00		1.00	0.88			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1787	4759			3471	1482		1776	2682			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1787	4759			3471	1482		1776	2682			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	283	1540	0	0	1086	900	138	2	581	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	227	0	0	77	0	0	0
Lane Group Flow (vph)	283	1540	0	0	1086	673	0	140	504	0	0	0
Confl. Peds. (#/hr)	2		5	5		2						
Confl. Bikes (#/hr)		3			1							
Heavy Vehicles (%)	1%	9%	0%	0%	4%	9%	2%	0%	6%	0%	0%	0%
Turn Type	Prot					Prot	Split		custom			
Protected Phases	5	2			6	6	4	4	1 4			
Permitted Phases									4			
Actuated Green, G (s)	27.0	84.2			65.5	65.5		13.5	27.3			
Effective Green, g (s)	27.0	84.2			65.5	65.5		13.5	21.8			
Actuated g/C Ratio	0.22	0.70			0.55	0.55		0.11	0.18			
Clearance Time (s)	4.0	4.5			4.5	4.5		5.5				
Vehicle Extension (s)	0.5	0.5			0.5	0.5		2.3				
Lane Grp Cap (vph)	402	3339			1895	809		200	487			
v/s Ratio Prot	c0.16	0.32			0.31	c0.45		0.08	c0.19			
v/s Ratio Perm												
v/c Ratio	0.70	0.46			0.57	0.83		0.70	1.04			
Uniform Delay, d1	42.8	7.9			18.0	22.7		51.3	49.1			
Progression Factor	1.00	1.00			1.04	1.25		1.00	1.00			
Incremental Delay, d2	4.5	0.5			0.4	3.2		9.0	50.1			
Delay (s)	47.4	8.4			19.2	31.6		60.3	99.2			
Level of Service	D	A			B	C		E	F			
Approach Delay (s)		14.4			24.8			91.7			0.0	
Approach LOS		B			C			F			A	

Intersection Summary			
HCM Average Control Delay	31.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	1686	97	74	1317	36	167	18	102	106	51	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.5	4.5		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1433	3406	1161	1656	3374	1382	1556	1477		1641	1515	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1433	3406	1161	1656	3374	1382	1556	1477		1641	1515	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	38	1833	105	80	1432	39	182	20	111	115	55	49
RTOR Reduction (vph)	0	0	26	0	0	6	0	95	0	0	27	0
Lane Group Flow (vph)	38	1833	79	80	1432	33	182	36	0	115	77	0
Confl. Peds. (#/hr)	2		3	3		2	2		5	5		2
Confl. Bikes (#/hr)					2							
Heavy Vehicles (%)	26%	6%	35%	9%	7%	14%	16%	11%	10%	10%	12%	20%
Turn Type	Prot		Perm	Prot		Perm	Split			Split		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2			6						
Actuated Green, G (s)	5.8	66.4	66.4	9.3	69.9	69.9	17.3	17.3		9.5	9.5	
Effective Green, g (s)	5.8	66.4	66.4	9.3	69.9	69.9	17.3	17.3		9.5	9.5	
Actuated g/C Ratio	0.05	0.55	0.55	0.08	0.58	0.58	0.14	0.14		0.08	0.08	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.5	4.5		4.0	4.0	
Vehicle Extension (s)	2.3	4.3	4.3	2.3	4.3	4.3	2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	69	1885	642	128	1965	805	224	213		130	120	
v/s Ratio Prot	0.03	c0.54		c0.05	c0.42		c0.12	0.02		c0.07	0.05	
v/s Ratio Perm			0.07			0.02						
v/c Ratio	0.55	0.97	0.12	0.62	0.73	0.04	0.81	0.17		0.88	0.64	
Uniform Delay, d1	55.8	25.9	12.8	53.7	18.2	10.7	49.8	45.0		54.7	53.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.6	15.2	0.4	7.5	2.4	0.1	19.0	0.2		45.2	9.4	
Delay (s)	62.4	41.1	13.2	61.1	20.6	10.8	68.8	45.3		99.9	63.0	
Level of Service	E	D	B	E	C	B	E	D		F	E	
Approach Delay (s)		40.0			22.4			59.0			82.4	
Approach LOS		D			C			E			F	

Intersection Summary			
HCM Average Control Delay	37.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	390	30	10	484	49	70	59	23	30	29	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1583	1734		1504	1750		1656	1450		1081	1226	1530
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	1734		1504	1750		1656	1450		1081	1226	1530
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	68	419	32	11	520	53	75	63	25	32	31	147
RTOR Reduction (vph)	0	1	0	0	2	0	0	9	0	0	0	128
Lane Group Flow (vph)	68	450	0	11	571	0	75	79	0	32	31	19
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)							1				1	1
Heavy Vehicles (%)	14%	7%	27%	20%	5%	27%	9%	32%	9%	67%	55%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	6.0	46.4		0.8	41.2		6.0	12.9		3.9	10.8	10.8
Effective Green, g (s)	6.0	46.4		0.8	41.2		6.0	12.9		3.9	10.8	10.8
Actuated g/C Ratio	0.07	0.55		0.01	0.48		0.07	0.15		0.05	0.13	0.13
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	0.5	2.0		0.5	2.0		0.2	3.0		0.5	1.5	1.5
Lane Grp Cap (vph)	112	947		14	848		117	220		50	156	194
v/s Ratio Prot	c0.04	0.26		0.01	c0.33		c0.05	c0.05		0.03	0.03	
v/s Ratio Perm												0.01
v/c Ratio	0.61	0.47		0.79	0.67		0.64	0.36		0.64	0.20	0.10
Uniform Delay, d1	38.4	11.8		42.0	16.8		38.5	32.3		39.9	33.2	32.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.2	0.1		123.8	1.7		8.7	1.0		19.0	0.2	0.1
Delay (s)	44.6	12.0		165.8	18.4		47.1	33.3		58.9	33.5	32.9
Level of Service	D	B		F	B		D	C		E	C	C
Approach Delay (s)		16.2			21.2			39.7			36.9	
Approach LOS		B			C			D			D	

Intersection Summary			
HCM Average Control Delay	23.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	85.0	Sum of lost time (s)	15.5
Intersection Capacity Utilization	55.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	55	358	200	400	616	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1736	1568	1752	1743	1827	1553
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1736	1568	1752	1743	1827	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	59	385	215	430	662	147
RTOR Reduction (vph)	0	67	0	0	0	39
Lane Group Flow (vph)	59	318	215	430	662	108
Confl. Peds. (#/hr)		3				
Confl. Bikes (#/hr)		1			1	
Heavy Vehicles (%)	4%	3%	3%	9%	4%	4%
Turn Type		pt+ov	Prot			Prot
Protected Phases	8	8 1	1	6	2	2
Permitted Phases						
Actuated Green, G (s)	15.0	35.0	15.5	57.9	37.9	37.9
Effective Green, g (s)	15.0	35.0	15.5	57.9	37.9	37.9
Actuated g/C Ratio	0.18	0.42	0.19	0.70	0.46	0.46
Clearance Time (s)	4.5		4.5	5.0	5.0	5.0
Vehicle Extension (s)	2.5		2.5	4.0	4.0	4.0
Lane Grp Cap (vph)	316	666	330	1225	840	714
v/s Ratio Prot	0.03	c0.20	c0.12	0.25	c0.36	0.07
v/s Ratio Perm						
v/c Ratio	0.19	0.48	0.65	0.35	0.79	0.15
Uniform Delay, d1	28.5	17.1	31.0	4.8	18.8	12.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	0.4	4.1	0.2	5.2	0.1
Delay (s)	28.7	17.5	35.0	5.1	24.1	13.1
Level of Service	C	B	D	A	C	B
Approach Delay (s)	19.0			15.1	22.1	
Approach LOS	B			B	C	

Intersection Summary			
HCM Average Control Delay	19.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	82.4	Sum of lost time (s)	14.0
Intersection Capacity Utilization	62.8%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	65	25	52	536	704	220
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	68	26	54	558	733	229
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1515	848	962			
vC1, stage 1 conf vol	848					
vC2, stage 2 conf vol	667					
vCu, unblocked vol	1515	848	962			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	79	93	93			
cM capacity (veh/h)	327	358	723			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	94	54	558	962
Volume Left	68	54	0	0
Volume Right	26	0	0	229
cSH	335	723	1700	1700
Volume to Capacity	0.28	0.07	0.33	0.57
Queue Length 95th (ft)	28	6	0	0
Control Delay (s)	19.9	10.4	0.0	0.0
Lane LOS	C	B		
Approach Delay (s)	19.9	0.9		0.0
Approach LOS	C			

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	70	129	5	33	34	111	338	8	47	295	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.90		1.00	0.92		1.00	1.00		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1803	1678		1494	1711		1752	1874		1736	1835	
Flt Permitted	0.74	1.00		0.74	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1406	1678		1165	1711		1752	1874		1736	1835	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	68	76	140	5	36	37	121	367	9	51	321	42
RTOR Reduction (vph)	0	85	0	0	32	0	0	1	0	0	5	0
Lane Group Flow (vph)	68	132	0	5	41	0	121	375	0	51	358	0
Confl. Peds. (#/hr)	1		8	8		1			5	5		
Heavy Vehicles (%)	0%	1%	0%	20%	3%	0%	3%	1%	0%	4%	2%	0%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	5.4	5.4		5.4	5.4		5.0	19.0		1.8	15.8	
Effective Green, g (s)	5.4	5.4		5.4	5.4		5.0	19.0		1.8	15.8	
Actuated g/C Ratio	0.14	0.14		0.14	0.14		0.13	0.48		0.05	0.40	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	2.0		0.5	2.0	
Lane Grp Cap (vph)	194	231		160	236		223	908		80	740	
v/s Ratio Prot		c0.08			0.02		c0.07	c0.20		0.03	c0.20	
v/s Ratio Perm	0.05			0.00								
v/c Ratio	0.35	0.57		0.03	0.17		0.54	0.41		0.64	0.48	
Uniform Delay, d1	15.3	15.8		14.6	14.9		16.0	6.5		18.4	8.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.4	1.9		0.0	0.1		1.4	0.1		11.6	0.2	
Delay (s)	15.7	17.7		14.7	15.1		17.5	6.6		30.0	8.9	
Level of Service	B	B		B	B		B	A		C	A	
Approach Delay (s)		17.2			15.0			9.3			11.5	
Approach LOS		B			B			A			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	39.2	Sum of lost time (s)	17.5
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	10	290	452	82	39	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	11	333	520	94	45	20
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	614				923	567
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	614				923	567
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	99				85	96
cM capacity (veh/h)	975				298	516

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	11	333	614	64
Volume Left	11	0	0	45
Volume Right	0	0	94	20
cSH	975	1700	1700	342
Volume to Capacity	0.01	0.20	0.36	0.19
Queue Length 95th (ft)	1	0	0	17
Control Delay (s)	8.7	0.0	0.0	17.9
Lane LOS	A			C
Approach Delay (s)	0.3		0.0	17.9
Approach LOS				C

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	38.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	227	1608	24	125	815	155	26	177	424	193	64	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.89		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1400	1703	3340		1671	1653		1770	1677	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.58	1.00		0.11	1.00	
Satd. Flow (perm)	1770	3539	1400	1703	3340		1017	1653		213	1677	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	239	1693	25	132	858	163	27	186	446	203	67	97
RTOR Reduction (vph)	0	0	2	0	13	0	0	72	0	0	43	0
Lane Group Flow (vph)	239	1693	23	132	1008	0	27	560	0	203	121	0
Confl. Peds. (#/hr)	3		3	3		3			2	2		
Heavy Vehicles (%)	2%	2%	12%	6%	5%	5%	8%	1%	2%	2%	5%	2%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	20.1	61.0	61.0	10.5	51.4		35.0	35.0		35.0	35.0	
Effective Green, g (s)	20.1	61.0	61.0	10.5	51.4		35.0	35.0		35.0	35.0	
Actuated g/C Ratio	0.17	0.51	0.51	0.09	0.43		0.29	0.29		0.29	0.29	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	296	1799	712	149	1431		297	482		62	489	
v/s Ratio Prot	c0.14	c0.48		0.08	0.30			0.34			0.07	
v/s Ratio Perm			0.02				0.03			c0.95		
v/c Ratio	0.81	0.94	0.03	0.89	0.70		0.09	1.16		3.27	0.25	
Uniform Delay, d1	48.1	27.8	14.7	54.2	28.1		30.9	42.5		42.5	32.4	
Progression Factor	1.00	1.00	1.00	1.34	0.69		1.00	1.00		1.00	1.00	
Incremental Delay, d2	14.8	11.2	0.1	39.1	2.7		0.1	93.5		1063.6	0.3	
Delay (s)	62.9	39.0	14.8	111.6	22.1		31.1	136.0		1106.1	32.7	
Level of Service	E	D	B	F	C		C	F		F	C	
Approach Delay (s)		41.6			32.4			131.7			626.4	
Approach LOS		D			C			F			F	

Intersection Summary			
HCM Average Control Delay	105.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	112.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	86	2127	20	7	1019	38	11	11	9	82	18	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	0.99		0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.98	1.00		0.97	
Satd. Flow (prot)	1805	3539	1538	1583	3438	1568		1773	1593		1722	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.86	1.00		0.82	
Satd. Flow (perm)	1805	3539	1538	1583	3438	1568		1558	1593		1454	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	90	2216	21	7	1061	40	11	11	9	85	19	57
RTOR Reduction (vph)	0	0	2	0	0	7	0	0	8	0	18	0
Lane Group Flow (vph)	90	2216	19	7	1061	33	0	22	1	0	143	0
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Heavy Vehicles (%)	0%	2%	5%	14%	5%	3%	0%	9%	0%	0%	0%	5%
Turn Type	Prot		Prot	Prot		Prot	Perm		Perm	Perm		
Protected Phases	5	2	2	1	6	6		8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	10.6	89.3	89.3	1.3	80.0	80.0		16.4	16.4		16.4	
Effective Green, g (s)	10.6	89.3	89.3	1.3	80.0	80.0		16.4	16.4		16.4	
Actuated g/C Ratio	0.09	0.74	0.74	0.01	0.67	0.67		0.14	0.14		0.14	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0		4.0	4.0		4.0	
Vehicle Extension (s)	2.3	5.4	5.4	2.3	5.4	5.4		2.5	2.5		2.5	
Lane Grp Cap (vph)	159	2634	1145	17	2292	1045		213	218		199	
v/s Ratio Prot	c0.05	c0.63	0.01	0.00	0.31	0.02						
v/s Ratio Perm								0.01	0.00		c0.10	
v/c Ratio	0.57	0.84	0.02	0.41	0.46	0.03		0.10	0.01		0.72	
Uniform Delay, d1	52.5	10.5	4.0	59.0	9.6	6.8		45.4	44.8		49.6	
Progression Factor	1.01	1.59	0.97	1.00	1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	0.3	0.3	0.0	9.2	0.7	0.1		0.2	0.0		10.9	
Delay (s)	53.2	17.0	3.8	68.1	10.3	6.9		45.5	44.8		60.5	
Level of Service	D	B	A	E	B	A		D	D		E	
Approach Delay (s)		18.3			10.6			45.3			60.5	
Approach LOS		B			B			D			E	

Intersection Summary			
HCM Average Control Delay	18.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1055	1128	127	637	459	63
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	6.0	4.0	6.0	5.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.98	
Flt Protected	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (prot)	3471	1532	1736	3505	3359	
Flt Permitted	1.00	1.00	0.95	1.00	0.96	
Satd. Flow (perm)	3471	1532	1736	3505	3359	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1099	1175	132	664	478	66
RTOR Reduction (vph)	0	373	0	0	9	0
Lane Group Flow (vph)	1099	802	132	664	535	0
Confl. Peds. (#/hr)		1	1		2	1
Heavy Vehicles (%)	4%	3%	4%	3%	3%	2%
Turn Type		Perm	Prot			
Protected Phases	2		1	6	8	
Permitted Phases		2				
Actuated Green, G (s)	65.4	65.4	13.7	83.1	23.4	
Effective Green, g (s)	65.4	65.4	13.7	83.1	23.4	
Actuated g/C Ratio	0.56	0.56	0.12	0.71	0.20	
Clearance Time (s)	6.0	6.0	4.0	6.0	5.0	
Vehicle Extension (s)	4.8	4.8	2.3	5.5	2.3	
Lane Grp Cap (vph)	1932	853	202	2479	669	
v/s Ratio Prot	0.32		c0.08	0.19	c0.16	
v/s Ratio Perm		c0.52				
v/c Ratio	0.57	0.94	0.65	0.27	0.80	
Uniform Delay, d1	16.9	24.2	49.6	6.2	44.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	18.4	6.2	0.1	6.4	
Delay (s)	17.5	42.7	55.9	6.4	51.2	
Level of Service	B	D	E	A	D	
Approach Delay (s)	30.5			14.6	51.2	
Approach LOS	C			B	D	

Intersection Summary			
HCM Average Control Delay	30.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	117.5	Sum of lost time (s)	15.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1188	0	1	782	0	1	0	2	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	1305	0	1	859	0	1	0	2	0	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	859			1305			2168	2167	1305	2169	2167	859
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	859			1305			2168	2167	1305	2169	2167	859
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	4.2
p0 queue free %	100			100			94	100	99	100	100	100
cM capacity (veh/h)	790			537			18	47	198	34	47	243

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1305	860	3	1
Volume Left	0	1	1	0
Volume Right	0	0	2	1
cSH	790	537	45	243
Volume to Capacity	0.00	0.00	0.07	0.00
Queue Length 95th (ft)	0	0	6	0
Control Delay (s)	0.0	0.1	91.4	19.9
Lane LOS		A	F	C
Approach Delay (s)	0.0	0.1	91.4	19.9
Approach LOS			F	C

Intersection Summary			
Average Delay	0.2		
Intersection Capacity Utilization	72.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	185	892	67	11	596	36	19	25	7	110	33	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.4		4.0	5.4	5.4	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3507		1805	1810	1568	1626	1834		1768	1792	1442
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.73	1.00		0.74	1.00	1.00
Satd. Flow (perm)	1770	3507		1805	1810	1568	1258	1834		1369	1792	1442
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	193	929	70	11	621	38	20	26	7	115	34	45
RTOR Reduction (vph)	0	3	0	0	0	19	0	6	0	0	0	40
Lane Group Flow (vph)	193	996	0	11	621	19	20	27	0	115	34	5
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	2%	2%	0%	0%	5%	3%	11%	0%	0%	2%	6%	12%
Turn Type	Prot			Prot		Prot	Perm			Perm		Prot
Protected Phases	5	2		1	6	6		8			4	4
Permitted Phases							8			4		
Actuated Green, G (s)	14.3	52.4		1.0	39.1	39.1	9.3	9.3		9.3	9.3	9.3
Effective Green, g (s)	14.3	52.4		1.0	39.1	39.1	9.3	9.3		9.3	9.3	9.3
Actuated g/C Ratio	0.19	0.68		0.01	0.51	0.51	0.12	0.12		0.12	0.12	0.12
Clearance Time (s)	4.0	5.4		4.0	5.4	5.4	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.3	5.4		2.3	5.4	5.4	2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	330	2399		24	924	800	153	223		166	218	175
v/s Ratio Prot	c0.11	0.28		0.01	c0.34	0.01		0.01			0.02	0.00
v/s Ratio Perm							0.02			c0.08		
v/c Ratio	0.58	0.41		0.46	0.67	0.02	0.13	0.12		0.69	0.16	0.03
Uniform Delay, d1	28.4	5.3		37.5	14.0	9.3	30.0	30.0		32.3	30.1	29.7
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.0	0.3		7.9	2.7	0.0	0.3	0.2		10.9	0.2	0.1
Delay (s)	30.4	5.6		45.4	16.7	9.3	30.3	30.2		43.2	30.4	29.7
Level of Service	C	A		D	B	A	C	C		D	C	C
Approach Delay (s)		9.6			16.7			30.2			37.8	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	76.6	Sum of lost time (s)	13.9
Intersection Capacity Utilization	66.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	58	0	0	38	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	62	0	0	41	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			62		103	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			62		103	62
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1553		900	1008

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	62	41	0
Volume Left	0	0	0
Volume Right	0	0	0
cSH	1700	1553	1700
Volume to Capacity	0.04	0.00	0.00
Queue Length 95th (ft)	0	0	0
Control Delay (s)	0.0	0.0	0.0
Lane LOS			A
Approach Delay (s)	0.0	0.0	0.0
Approach LOS			A

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	6.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	66	58	36	191	446	57
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	72	63	39	208	485	62
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1228	1001	970	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1228	1001	970	0	0	
tC, single (s)	7.1	6.5	6.6	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.1	3.3	2.2	
p0 queue free %	10	62	78	81	70	
cM capacity (veh/h)	80	168	175	1076	1617	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	135	247	547
Volume Left	72	0	485
Volume Right	0	208	62
cSH	106	592	1617
Volume to Capacity	1.27	0.42	0.30
Queue Length 95th (ft)	229	51	32
Control Delay (s)	252.8	15.4	7.5
Lane LOS	F	C	A
Approach Delay (s)	252.8	15.4	7.5
Approach LOS	F	C	

Intersection Summary			
Average Delay	45.2		
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	446	157	12	193	73	20
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89
Hourly flow rate (vph)	501	176	13	217	82	22
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			678		833	589
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			678		833	589
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		76	96
cM capacity (veh/h)			924		335	502

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	678	230	104
Volume Left	0	13	82
Volume Right	176	0	22
cSH	1700	924	361
Volume to Capacity	0.40	0.01	0.29
Queue Length 95th (ft)	0	1	29
Control Delay (s)	0.0	0.7	19.0
Lane LOS		A	C
Approach Delay (s)	0.0	0.7	19.0
Approach LOS			C

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	45.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	379	806	94	17	487	83	229	77	45	80	51	218
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3546		1805	3501		1787	1784		1805	1863	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	3546		1805	3501		1787	1784		1805	1863	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	391	831	97	18	502	86	236	79	46	82	53	225
RTOR Reduction (vph)	0	4	0	0	9	0	0	13	0	0	0	204
Lane Group Flow (vph)	391	924	0	18	579	0	236	112	0	82	53	21
Confl. Peds. (#/hr)							3					3
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	1%	1%	0%	0%	2%	1%
Turn Type	Prot			Prot			Split			Split		Prot
Protected Phases	5	2		1	6		4	4		8	8	8
Permitted Phases												
Actuated Green, G (s)	30.5	57.2		2.6	29.3		19.2	19.2		10.0	10.0	10.0
Effective Green, g (s)	30.5	57.2		2.6	29.3		19.2	19.2		10.0	10.0	10.0
Actuated g/C Ratio	0.29	0.54		0.02	0.27		0.18	0.18		0.09	0.09	0.09
Clearance Time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	511	1901		44	961		322	321		169	175	150
v/s Ratio Prot	c0.22	0.26		0.01	c0.17		c0.13	0.06		c0.05	0.03	0.01
v/s Ratio Perm												
v/c Ratio	0.77	0.49		0.41	0.60		0.73	0.35		0.49	0.30	0.14
Uniform Delay, d1	34.8	15.5		51.3	33.6		41.3	38.3		45.9	45.1	44.4
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	6.4	0.4		4.5	1.6		7.9	0.5		1.6	0.7	0.3
Delay (s)	41.3	16.0		55.7	35.3		49.2	38.8		47.5	45.8	44.7
Level of Service	D	B		E	D		D	D		D	D	D
Approach Delay (s)		23.5			35.9			45.6			45.5	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM Average Control Delay	32.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	106.7	Sum of lost time (s)	17.7
Intersection Capacity Utilization	69.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	222	1319	431	134	1106	286	293	287	72	271	228	448
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	4715	1558	1736	3252	1511	1770	1863	1539	1736	1845	1540
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	4715	1558	1736	3252	1511	1770	1863	1539	1736	1845	1540
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	234	1388	454	141	1164	301	308	302	76	285	240	472
RTOR Reduction (vph)	0	0	163	0	0	171	0	0	35	0	0	185
Lane Group Flow (vph)	234	1388	291	141	1164	130	308	302	42	285	240	287
Confl. Peds. (#/hr)	4		3	3		4	31		19	19		31
Heavy Vehicles (%)	5%	10%	1%	4%	11%	4%	2%	2%	2%	4%	3%	1%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	17.6	56.8	56.8	12.7	51.9	51.9	17.0	16.5	16.5	17.0	16.5	16.5
Effective Green, g (s)	17.6	56.8	56.8	12.7	51.9	51.9	17.0	16.5	16.5	17.0	16.5	16.5
Actuated g/C Ratio	0.15	0.47	0.47	0.11	0.43	0.43	0.14	0.14	0.14	0.14	0.14	0.14
Clearance Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	2.3	4.4	4.4	2.3	4.4	4.4	2.3	2.3	2.3	2.3	2.3	2.3
Lane Grp Cap (vph)	252	2232	737	184	1406	654	251	256	212	246	254	212
v/s Ratio Prot	c0.14	0.29		0.08	c0.36		c0.17	0.16		0.16	0.13	
v/s Ratio Perm			0.19			0.09			0.03			c0.19
v/c Ratio	0.93	0.62	0.40	0.77	0.83	0.20	1.23	1.18	0.20	1.16	0.94	1.36
Uniform Delay, d1	50.6	23.6	20.5	52.2	30.1	21.1	51.5	51.8	45.9	51.5	51.3	51.8
Progression Factor	1.15	0.90	0.58	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	33.2	1.1	1.3	16.2	5.7	0.7	132.2	113.7	0.3	107.0	41.1	187.7
Delay (s)	91.3	22.3	13.2	68.4	35.8	21.8	183.7	165.4	46.1	158.5	92.4	239.4
Level of Service	F	C	B	E	D	C	F	F	D	F	F	F
Approach Delay (s)		28.1			36.1			160.4			180.9	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM Average Control Delay	75.8	HCM Level of Service	E
HCM Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
401: SW Childs Rd & SW Stafford Rd

5/25/2012

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	145	182	78	480	422	85
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	153	192	82	505	444	89
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)		1				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1115	445	445			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1115	445	445			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	28	69	93			
cM capacity (veh/h)	213	612	1109			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	344	587	444	89
Volume Left	153	82	0	0
Volume Right	192	0	0	89
cSH	383	1109	1700	1700
Volume to Capacity	0.90	0.07	0.26	0.05
Queue Length 95th (ft)	230	6	0	0
Control Delay (s)	57.4	2.0	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	57.4	2.0	0.0	
Approach LOS	F			

Intersection Summary			
Average Delay	14.3		
Intersection Capacity Utilization	74.9%	ICU Level of Service	D
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 402_Borland&Stafford

402_Borland&Stafford

Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB SW Stafford Rd.											
3	L	187	2.0	0.512	14.2	LOS B	2.6	67.0	0.68	1.00	23.6
8	T	396	1.0	0.512	14.2	LOS B	2.7	67.2	0.68	0.87	25.4
18	R	60	2.0	0.512	14.2	LOS B	2.7	67.2	0.68	0.92	25.3
Approach		642	1.4	0.512	14.2	LOS B	2.7	67.2	0.68	0.91	24.8
East: WB SW Borland Rd.											
1	L	32	7.0	0.235	8.6	LOS A	0.6	16.5	0.50	0.95	25.9
6	T	71	0.0	0.235	8.6	LOS A	0.6	16.5	0.50	0.70	28.3
16	R	47	2.0	0.235	8.6	LOS A	0.6	16.5	0.50	0.76	28.0
Approach		149	2.1	0.235	8.6	LOS A	0.6	16.5	0.50	0.77	27.7
North: SB SW Stafford Rd.											
7	L	83	0.0	0.315	8.0	LOS A	1.3	33.4	0.46	0.88	26.2
4	T	292	5.0	0.315	8.0	LOS A	1.3	33.5	0.46	0.61	28.7
14	R	139	1.0	0.315	8.0	LOS A	1.3	33.5	0.46	0.69	28.3
Approach		514	3.1	0.315	8.0	LOS A	1.3	33.5	0.46	0.68	28.1
West: EB SW Borland Rd.											
5	L	207	0.0	0.587	13.2	LOS B	2.9	73.7	0.56	0.98	24.0
2	T	284	1.0	0.587	13.2	LOS B	2.9	73.7	0.56	0.77	25.8
12	R	208	1.0	0.255	7.2	LOS A	0.8	20.0	0.41	0.70	28.6
Approach		698	0.7	0.587	11.4	LOS B	2.9	73.7	0.52	0.81	25.9
All Vehicles		2003	1.6	0.587	11.2	LOS B	2.9	73.7	0.56	0.81	26.2

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Model used.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	15	52	480	67	69	291
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.96	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.98		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1662	1403	1691		1614	1733
Flt Permitted	0.95	1.00	1.00		0.40	1.00
Satd. Flow (perm)	1662	1403	1691		686	1733
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	17	58	539	75	78	327
RTOR Reduction (vph)	0	53	5	0	0	0
Lane Group Flow (vph)	17	5	609	0	78	327
Confl. Bikes (#/hr)		4				1
Heavy Vehicles (%)	0%	2%	2%	0%	3%	1%
Turn Type		Perm			Perm	
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	3.4	3.4	29.2		29.2	29.2
Effective Green, g (s)	3.4	3.4	29.2		29.2	29.2
Actuated g/C Ratio	0.08	0.08	0.72		0.72	0.72
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	139	117	1216		493	1246
v/s Ratio Prot	c0.01		c0.36			0.19
v/s Ratio Perm		0.00			0.11	
v/c Ratio	0.12	0.04	0.50		0.16	0.26
Uniform Delay, d1	17.2	17.1	2.5		1.8	2.0
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	0.4	0.1	0.3		0.2	0.1
Delay (s)	17.6	17.2	2.8		2.0	2.1
Level of Service	B	B	A		A	A
Approach Delay (s)	17.3		2.8			2.1
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	3.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	40.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	216	138	108	290	180	95
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	237	152	119	319	198	104
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		1				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	806	250	302			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	806	250	302			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	26	81	91			
cM capacity (veh/h)	320	791	1253			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	389	119	319	302
Volume Left	237	119	0	0
Volume Right	152	0	0	104
cSH	444	1253	1700	1700
Volume to Capacity	0.88	0.09	0.19	0.18
Queue Length 95th (ft)	228	8	0	0
Control Delay (s)	48.2	8.2	0.0	0.0
Lane LOS	E	A		
Approach Delay (s)	48.2	2.2		0.0
Approach LOS	E			

Intersection Summary			
Average Delay	17.5		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	63	235	119	84	117	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88
Hourly flow rate (vph)	72	267	135	95	133	95
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	547	181	228			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	547	181	228			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	84	69	90			
cM capacity (veh/h)	450	867	1311			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	339	231	228
Volume Left	72	135	0
Volume Right	267	0	95
cSH	725	1311	1700
Volume to Capacity	0.47	0.10	0.13
Queue Length 95th (ft)	62	9	0
Control Delay (s)	14.2	5.1	0.0
Lane LOS	B	A	
Approach Delay (s)	14.2	5.1	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	7.5		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	269	282	51	179	160	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	292	307	55	195	174	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						1
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			292		751	446
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			292		751	446
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			96		52	93
cM capacity (veh/h)			1258		363	613

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	599	55	195	217
Volume Left	0	55	0	174
Volume Right	307	0	0	43
cSH	1700	1258	1700	425
Volume to Capacity	0.35	0.04	0.11	0.51
Queue Length 95th (ft)	0	3	0	71
Control Delay (s)	0.0	8.0	0.0	22.0
Lane LOS		A		C
Approach Delay (s)	0.0	1.8		22.0
Approach LOS				C

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	57.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	21	606	66	8	365	89	110	64	61	273	54	26
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.93		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3209		1662	1641		1624	1622		1646	1610	
Flt Permitted	0.95	1.00		0.95	1.00		0.70	1.00		0.67	1.00	
Satd. Flow (perm)	1662	3209		1662	1641		1195	1622		1156	1610	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	24	681	74	9	410	100	124	72	69	307	61	29
RTOR Reduction (vph)	0	6	0	0	6	0	0	27	0	0	13	0
Lane Group Flow (vph)	24	749	0	9	504	0	124	114	0	307	77	0
Confl. Peds. (#/hr)	2					2	2					2
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	0%	2%	3%	0%	3%	3%	2%	0%	0%	1%	2%	4%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	3	8		7	4			6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	2.4	37.2		1.0	35.8		30.7	30.7		30.7	30.7	
Effective Green, g (s)	2.4	37.2		1.0	35.8		30.7	30.7		30.7	30.7	
Actuated g/C Ratio	0.03	0.44		0.01	0.42		0.36	0.36		0.36	0.36	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	47	1406		20	692		432	587		418	582	
v/s Ratio Prot	c0.01	0.23		0.01	c0.31			0.07			0.05	
v/s Ratio Perm							0.10			c0.27		
v/c Ratio	0.51	0.53		0.45	0.73		0.29	0.19		0.73	0.13	
Uniform Delay, d1	40.7	17.5		41.7	20.5		19.3	18.6		23.6	18.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	0.7		11.3	4.6		0.3	0.1		6.2	0.1	
Delay (s)	47.5	18.2		52.9	25.0		19.6	18.7		29.8	18.2	
Level of Service	D	B		D	C		B	B		C	B	
Approach Delay (s)		19.1			25.5			19.1			27.1	
Approach LOS		B			C			B			C	

Intersection Summary			
HCM Average Control Delay	22.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	84.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	249	4	483	482	1	213
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5		5.5	5.5		5.5
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	1.00		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	1.00		1.00	0.85		1.00
Flt Protected	0.95		1.00	1.00		1.00
Satd. Flow (prot)	1601		1733	1458		1715
Flt Permitted	0.95		1.00	1.00		1.00
Satd. Flow (perm)	1601		1733	1458		1713
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	265	4	514	513	1	227
RTOR Reduction (vph)	1	0	0	223	0	0
Lane Group Flow (vph)	268	0	514	290	0	228
Confl. Bikes (#/hr)			1			
Heavy Vehicles (%)	4%	0%	1%	2%	0%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	13.8		22.2	22.2		22.2
Effective Green, g (s)	13.8		22.2	22.2		22.2
Actuated g/C Ratio	0.30		0.48	0.48		0.48
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	480		836	704		827
v/s Ratio Prot	c0.17		c0.30			
v/s Ratio Perm				0.20		0.13
v/c Ratio	0.56		0.61	0.41		0.28
Uniform Delay, d1	13.5		8.8	7.7		7.1
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	1.1		1.4	0.4		0.2
Delay (s)	14.7		10.1	8.1		7.3
Level of Service	B		B	A		A
Approach Delay (s)	14.7		9.1			7.3
Approach LOS	B		A			A

Intersection Summary			
HCM Average Control Delay	9.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	46.0	Sum of lost time (s)	10.0
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	1	473	2	26	212	2	1	0	36	1	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	493	2	27	221	2	1	0	38	1	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	223			495			773	773	494	809	773	222
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	223			495			773	773	494	809	773	222
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	4.2
p0 queue free %	100			97			100	100	93	100	100	100
cM capacity (veh/h)	1358			1039			312	323	573	276	323	624

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	496	250	39	2
Volume Left	1	27	1	1
Volume Right	2	2	38	1
cSH	1358	1039	561	382
Volume to Capacity	0.00	0.03	0.07	0.01
Queue Length 95th (ft)	0	2	6	0
Control Delay (s)	0.0	1.2	11.9	14.5
Lane LOS	A	A	B	B
Approach Delay (s)	0.0	1.2	11.9	14.5
Approach LOS			B	B

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	5	478	262	34	19	3
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	5	503	276	36	20	3
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		6				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	609	22	23			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	609	22	23			
tC, single (s)	6.6	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.2			
p0 queue free %	99	52	83			
cM capacity (veh/h)	355	1053	1585			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	508	312	23
Volume Left	5	276	0
Volume Right	503	0	3
cSH	1064	1585	1700
Volume to Capacity	0.48	0.17	0.01
Queue Length 95th (ft)	66	16	0
Control Delay (s)	11.5	7.0	0.0
Lane LOS	B	A	
Approach Delay (s)	11.5	7.0	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	9.6		
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	8	652	4	130	585	281	3	58	83	383	122	20
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.92			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.96	
Satd. Flow (prot)	1662	3260	1488	1646	3292	1458		1549			1660	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.99			0.70	
Satd. Flow (perm)	1662	3260	1488	1646	3292	1458		1537			1197	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	8	679	4	135	609	293	3	60	86	399	127	21
RTOR Reduction (vph)	0	0	2	0	0	168	0	30	0	0	1	0
Lane Group Flow (vph)	8	679	2	135	609	125	0	119	0	0	546	0
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	1%	1%	2%	0%	3%	5%	1%	2%	0%
Turn Type	Prot		Prot	Prot		Prot	Perm			Perm		
Protected Phases	1	6	6	5	2	2		4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.1	34.0	34.0	13.3	46.2	46.2		44.4			45.4	
Effective Green, g (s)	1.1	34.0	34.0	13.3	46.2	46.2		44.4			45.4	
Actuated g/C Ratio	0.01	0.31	0.31	0.12	0.43	0.43		0.41			0.42	
Clearance Time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Vehicle Extension (s)	2.3	4.8	4.8	2.3	4.8	4.8		2.5			2.5	
Lane Grp Cap (vph)	17	1020	465	201	1399	620		628			500	
v/s Ratio Prot	0.00	c0.21	0.00	c0.08	0.18	0.09						
v/s Ratio Perm								0.08			c0.46	
v/c Ratio	0.47	0.67	0.00	0.67	0.44	0.20		0.19			1.09	
Uniform Delay, d1	53.5	32.4	25.7	45.6	22.0	19.6		20.6			31.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	11.5	2.1	0.0	7.4	0.4	0.3		0.1			67.9	
Delay (s)	65.0	34.5	25.7	53.0	22.5	20.0		20.7			99.5	
Level of Service	E	C	C	D	C	B		C			F	
Approach Delay (s)		34.8			25.7			20.7			99.5	
Approach LOS		C			C			C			F	

Intersection Summary			
HCM Average Control Delay	44.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	108.7	Sum of lost time (s)	16.0
Intersection Capacity Utilization	86.1%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	33	161	43	163	60	6	26	69	139	14	52	13
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	36	177	47	179	66	7	29	76	153	15	57	14

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	260	252	257	87
Volume Left (vph)	36	179	29	15
Volume Right (vph)	47	7	153	14
Hadj (s)	-0.04	0.17	-0.30	-0.02
Departure Headway (s)	5.2	5.4	5.1	5.7
Degree Utilization, x	0.38	0.38	0.37	0.14
Capacity (veh/h)	642	620	639	548
Control Delay (s)	11.3	11.7	11.1	9.6
Approach Delay (s)	11.3	11.7	11.1	9.6
Approach LOS	B	B	B	A

Intersection Summary			
Delay	11.2		
HCM Level of Service	B		
Intersection Capacity Utilization	55.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	297	12	11	227	23	5	23	11	45	50	57
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	16	326	13	12	249	25	5	25	12	49	55	63
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									1			1
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	249			326			711	640	333	671	646	262
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	249			326			711	640	333	671	646	262
tC, single (s)	4.1			4.2			7.1	6.5	6.3	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.4	3.6	4.0	3.3
p0 queue free %	99			99			98	93	98	85	86	92
cM capacity (veh/h)	1328			1195			282	382	693	331	382	781

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	356	287	43	167
Volume Left	16	12	5	49
Volume Right	13	25	12	63
cSH	1328	1195	508	510
Volume to Capacity	0.01	0.01	0.08	0.33
Queue Length 95th (ft)	1	1	7	35
Control Delay (s)	0.5	0.4	14.2	15.5
Lane LOS	A	A	B	C
Approach Delay (s)	0.5	0.4	14.2	15.5
Approach LOS			B	C

Intersection Summary			
Average Delay	4.1		
Intersection Capacity Utilization	42.7%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 414_Mulino&13th

414_Mulino&13th

Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB S. Mulino Rd.											
3	L	23	0.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.98	31.5
8	T	47	0.0	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		70	0.0	0.041	0.0	NA	0.0	0.0	0.00	0.33	36.7
North: SB S Mulino Rd.											
4	T	108	6.0	0.098	7.5	LOS A	0.5	12.2	0.09	0.91	26.0
14	R	51	5.0	0.098	7.5	LOS A	0.5	12.2	0.09	0.93	25.9
Approach		158	5.7	0.098	7.5	LOS A	0.5	12.2	0.09	0.92	26.0
West: EB SE 13th Ave.											
5	L	26	5.0	0.085	9.5	LOS A	0.4	10.8	0.33	0.85	25.2
12	R	48	0.0	0.085	9.5	LOS A	0.4	10.8	0.33	0.84	25.1
Approach		74	1.8	0.085	9.5	LOS A	0.4	10.8	0.33	0.85	25.1
All Vehicles		303	3.4	0.098	6.3	NA	0.5	12.2	0.13	0.76	27.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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MOVEMENT SUMMARY

Site: 415_99E&SouthEnd

99E&SouthEnd
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB 99E											
8	T	697	2.0	0.406	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
18	R	206	1.0	0.140	0.0	LOS A	0.0	0.0	0.00	0.69	31.7
Approach		903	1.8	0.406	0.0	NA	0.0	0.0	0.00	0.16	37.7
East: WB South End Rd.											
1	L	140	0.0	0.523	32.3	LOS D	3.1	77.5	0.86	1.14	17.9
16	R	9	0.0	0.029	16.4	LOS C	0.1	2.8	0.71	0.93	22.6
Approach		149	0.0	0.523	31.3	LOS D	3.1	77.5	0.85	1.12	18.1
North: SB 99E											
7	L	11	10.0	0.017	5.8	LOS A	0.1	1.7	0.59	0.76	27.9
4	T	928	3.0	0.546	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		939	3.1	0.546	0.1	NA	0.1	1.7	0.01	0.01	39.8
All Vehicles		1992	2.3	0.546	2.4	NA	3.1	77.5	0.07	0.16	35.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	7	50	578	16	79	1126
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	7	53	615	17	84	1198
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1981	615			615	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1981	615			615	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	87	89			91	
cM capacity (veh/h)	57	491			975	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	7	53	615	17	84	1198
Volume Left	7	0	0	0	84	0
Volume Right	0	53	0	17	0	0
cSH	57	491	1700	1700	975	1700
Volume to Capacity	0.13	0.11	0.36	0.01	0.09	0.70
Queue Length 95th (ft)	10	9	0	0	7	0
Control Delay (s)	77.0	13.2	0.0	0.0	9.0	0.0
Lane LOS	F	B			A	
Approach Delay (s)	21.0		0.0		0.6	
Approach LOS	C					

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	46	43	14	27	95	20	212	7	139	431	33
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.99	
Flt Protected		0.99	1.00		0.98	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1705	1488		1676	1417	1662	1693		1646	1713	
Flt Permitted		0.92	1.00		0.86	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1583	1488		1467	1417	1662	1693		1646	1713	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	12	48	45	15	28	99	21	221	7	145	449	34
RTOR Reduction (vph)	0	0	32	0	0	58	0	1	0	0	2	0
Lane Group Flow (vph)	0	60	13	0	43	41	21	227	0	145	481	0
Confl. Bikes (#/hr)	1							1				1
Heavy Vehicles (%)	0%	2%	0%	0%	4%	5%	0%	3%	0%	1%	1%	0%
Turn Type	Perm		pt+ov	Perm		pt+ov	Prot			Prot		
Protected Phases		4	4 5		8	8 1	5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		5.9	14.3		5.9	20.7	3.4	18.9		9.8	25.3	
Effective Green, g (s)		5.9	14.3		5.9	20.7	3.4	18.9		9.8	25.3	
Actuated g/C Ratio		0.12	0.29		0.12	0.42	0.07	0.38		0.20	0.51	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		2.5			2.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)		188	429		175	591	114	645		325	874	
v/s Ratio Prot			0.01			0.03	0.01	0.13		c0.09	c0.28	
v/s Ratio Perm		c0.04			0.03							
v/c Ratio		0.32	0.03		0.25	0.07	0.18	0.35		0.45	0.55	
Uniform Delay, d1		20.0	12.7		19.8	8.7	21.8	11.0		17.5	8.3	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.7	0.0		0.5	0.0	0.6	0.3		0.7	0.7	
Delay (s)		20.7	12.7		20.4	8.7	22.4	11.3		18.2	9.0	
Level of Service		C	B		C	A	C	B		B	A	
Approach Delay (s)		17.3			12.2			12.2			11.1	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	12.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.44		
Actuated Cycle Length (s)	49.6	Sum of lost time (s)	9.0
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	32	14	28	22	25	20	457	11	47	932	96
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.98			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1652			1666	1488	1662	1683	1365	1662	1699	1488
Flt Permitted		0.79			0.79	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1337			1350	1488	1662	1683	1365	1662	1699	1488
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	73	35	15	31	24	27	22	502	12	52	1024	105
RTOR Reduction (vph)	0	3	0	0	0	23	0	0	3	0	0	10
Lane Group Flow (vph)	0	120	0	0	55	4	22	502	9	52	1024	95
Heavy Vehicles (%)	2%	0%	0%	0%	5%	0%	0%	4%	9%	0%	3%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)		16.4			16.4	16.4	3.9	77.3	77.3	7.4	80.8	80.8
Effective Green, g (s)		16.4			16.4	16.4	3.9	77.3	77.3	7.4	80.8	80.8
Actuated g/C Ratio		0.14			0.14	0.14	0.03	0.66	0.66	0.06	0.69	0.69
Clearance Time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		188			190	209	55	1114	903	105	1175	1029
v/s Ratio Prot							0.01	0.30		c0.03	c0.60	
v/s Ratio Perm		c0.09			0.04	0.00			0.01			0.06
v/c Ratio		0.64			0.29	0.02	0.40	0.45	0.01	0.50	0.87	0.09
Uniform Delay, d1		47.4			45.0	43.3	55.3	9.5	6.7	52.9	14.0	5.9
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		6.0			0.6	0.0	2.8	0.6	0.0	2.1	7.8	0.1
Delay (s)		53.4			45.6	43.3	58.1	10.1	6.7	55.0	21.8	6.0
Level of Service		D			D	D	E	B	A	E	C	A
Approach Delay (s)		53.4			44.8			12.0			21.9	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	116.8	Sum of lost time (s)	15.7
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: 419_Leland and Beavercreek Rd.

Beavercreek/Leland

Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB S.Karmath Rd.											
3	L	13	8.0	0.132	12.9	LOS B	0.5	13.8	0.55	0.97	23.9
8	T	34	3.0	0.132	12.9	LOS B	0.5	13.8	0.55	0.95	24.0
18	R	23	0.0	0.132	12.9	LOS B	0.5	13.8	0.55	0.90	23.8
Approach		69	2.9	0.132	12.9	LOS B	0.5	13.8	0.55	0.94	23.9
East: WB S. Beavercreek Rd.											
1	L	8	12.0	0.154	8.1	LOS A	0.7	18.5	0.10	1.01	25.6
6	T	39	3.0	0.154	8.1	LOS A	0.7	18.5	0.10	0.98	25.7
16	R	166	4.0	0.154	8.1	LOS A	0.7	18.5	0.10	0.93	25.6
Approach		214	4.1	0.154	8.1	LOS A	0.7	18.5	0.10	0.94	25.6
North: SB S. Beavercreek Rd.											
7	L	301	2.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.76	31.5
4	T	66	2.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
14	R	52	2.0	0.258	0.0	LOS A	0.0	0.0	0.00	0.71	31.7
Approach		419	2.0	0.258	0.0	NA	0.0	0.0	0.00	0.64	32.6
West: EB S. Leland Rd.											
5	L	22	5.0	0.082	8.4	LOS A	0.3	8.9	0.32	0.92	25.7
2	T	63	3.0	0.082	8.4	LOS A	0.3	8.9	0.32	0.90	25.8
12	R	11	10.0	0.082	8.4	LOS A	0.3	8.9	0.32	0.79	25.6
Approach		96	4.2	0.082	8.4	LOS A	0.3	8.9	0.32	0.89	25.8
All Vehicles		798	2.9	0.258	4.3	NA	0.7	18.5	0.11	0.77	28.7

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	4	15	0	13	6	9	3	438	9	30	869	3
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	4	16	0	14	6	10	3	466	10	32	924	3
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1464	1461	924	1469	1461	466	924			466		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1464	1461	924	1469	1461	466	924			466		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	87	100	85	95	98	100			97		
cM capacity (veh/h)	87	126	329	94	126	601	747			1106		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	20	30	3	466	10	32	924	3
Volume Left	4	14	3	0	0	32	0	0
Volume Right	0	10	0	0	10	0	0	3
cSH	115	139	747	1700	1700	1106	1700	1700
Volume to Capacity	0.18	0.21	0.00	0.27	0.01	0.03	0.54	0.00
Queue Length 95th (ft)	15	19	0	0	0	2	0	0
Control Delay (s)	42.8	37.7	9.8	0.0	0.0	8.4	0.0	0.0
Lane LOS	E	E	A			A		
Approach Delay (s)	42.8	37.7	0.1			0.3		
Approach LOS	E	E						

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	59.7%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	19	0	109	4	0	1	48	418	5	1	827	31
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	21	0	118	4	0	1	52	454	5	1	899	34
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1480	1482	916	1479	1496	457	933			460		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1480	1482	916	1479	1496	457	933			460		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	100	64	93	100	100	93			100		
cM capacity (veh/h)	99	117	330	64	115	608	734			1112		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	139	5	512	934
Volume Left	21	4	52	1
Volume Right	118	1	5	34
cSH	245	77	734	1112
Volume to Capacity	0.57	0.07	0.07	0.00
Queue Length 95th (ft)	79	6	6	0
Control Delay (s)	37.4	55.0	1.9	0.0
Lane LOS	E	F	A	A
Approach Delay (s)	37.4	55.0	1.9	0.0
Approach LOS	E	F		

Intersection Summary				
Average Delay		4.1		
Intersection Capacity Utilization		81.3%	ICU Level of Service	D
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	27	93	376	74	196	718
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	29	101	409	80	213	780
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1615	409			409	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1615	409			409	
tC, single (s)	6.5	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.4			2.3	
p0 queue free %	67	84			81	
cM capacity (veh/h)	88	630			1129	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	130	409	80	213	780
Volume Left	29	0	0	213	0
Volume Right	101	0	80	0	0
cSH	264	1700	1700	1129	1700
Volume to Capacity	0.49	0.24	0.05	0.19	0.46
Queue Length 95th (ft)	63	0	0	17	0
Control Delay (s)	31.2	0.0	0.0	8.9	0.0
Lane LOS	D			A	
Approach Delay (s)	31.2	0.0		1.9	
Approach LOS	D				

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	16	0	115	0	0	0	40	300	0	0	506	16
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	17	0	124	0	0	0	43	323	0	0	544	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	953	953	544	953	953	323	544			323		
vC1, stage 1 conf vol	544	544		409	409							
vC2, stage 2 conf vol	409	409		544	544							
vCu, unblocked vol	953	953	544	953	953	323	544			323		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	96	100	77	100	100	100	96			100		
cM capacity (veh/h)	439	436	543	334	417	723	1035			1249		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	141	0	43	323	544	17
Volume Left	17	0	43	0	0	0
Volume Right	124	0	0	0	0	17
cSH	527	1700	1035	1700	1249	1700
Volume to Capacity	0.27	0.00	0.04	0.19	0.00	0.01
Queue Length 95th (ft)	27	0	3	0	0	0
Control Delay (s)	14.3	0.0	8.6	0.0	0.0	0.0
Lane LOS	B	A	A			
Approach Delay (s)	14.3	0.0	1.0		0.0	
Approach LOS	B	A				

Intersection Summary				
Average Delay	2.2			
Intersection Capacity Utilization	51.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	25	257	32	11	273	15	21	27	6	33	85	53
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	27	282	35	12	300	16	23	30	7	36	93	58

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	345	329	59	188
Volume Left (vph)	27	12	23	36
Volume Right (vph)	35	16	7	58
Hadj (s)	0.03	0.11	0.07	-0.12
Departure Headway (s)	5.2	5.3	6.1	5.7
Degree Utilization, x	0.49	0.48	0.10	0.30
Capacity (veh/h)	662	652	492	571
Control Delay (s)	13.1	13.0	9.8	11.0
Approach Delay (s)	13.1	13.0	9.8	11.0
Approach LOS	B	B	A	B

Intersection Summary			
Delay	12.4		
HCM Level of Service	B		
Intersection Capacity Utilization	46.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	351	44	85	177	12	138
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	386	48	93	195	13	152
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			434		791	411
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			434		791	411
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			92		96	76
cM capacity (veh/h)			1126		331	642

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	434	288	165
Volume Left	0	93	13
Volume Right	48	0	152
cSH	1700	1126	598
Volume to Capacity	0.26	0.08	0.28
Queue Length 95th (ft)	0	7	28
Control Delay (s)	0.0	3.3	13.3
Lane LOS		A	B
Approach Delay (s)	0.0	3.3	13.3
Approach LOS			B

Intersection Summary			
Average Delay	3.5		
Intersection Capacity Utilization	58.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	44	432	237	8	16	28
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	46	450	247	8	17	29
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	255				793	251
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	255				793	251
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	97				95	96
cM capacity (veh/h)	1322				340	783

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	496	255	46
Volume Left	46	0	17
Volume Right	0	8	29
cSH	1322	1700	531
Volume to Capacity	0.03	0.15	0.09
Queue Length 95th (ft)	3	0	7
Control Delay (s)	1.1	0.0	12.4
Lane LOS	A		B
Approach Delay (s)	1.1	0.0	12.4
Approach LOS			B

Intersection Summary			
Average Delay	1.4		
Intersection Capacity Utilization	54.7%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
501: Hwy 212 & SE 282nd Ave

5/25/2012

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	287	792	633	64	57	266
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1630	1716	1716	1458	1662	1458
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1630	1716	1716	1458	1662	1458
Peak-hour factor, PHF	0.82	0.82	0.82	0.82	0.82	0.82
Adj. Flow (vph)	350	966	772	78	70	324
RTOR Reduction (vph)	0	0	0	19	0	52
Lane Group Flow (vph)	350	966	772	59	70	272
Confl. Peds. (#/hr)						3
Heavy Vehicles (%)	2%	2%	2%	2%	0%	2%
Turn Type	Prot			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	20.8	62.4	37.6	37.6	9.6	34.4
Effective Green, g (s)	20.8	62.4	37.6	37.6	9.6	34.4
Actuated g/C Ratio	0.26	0.78	0.47	0.47	0.12	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	6.0	4.2	4.2	2.3	
Lane Grp Cap (vph)	424	1338	807	685	199	627
v/s Ratio Prot	c0.21	0.56	c0.45		0.04	c0.19
v/s Ratio Perm				0.04		
v/c Ratio	0.83	0.72	0.96	0.09	0.35	0.43
Uniform Delay, d1	27.9	4.4	20.4	11.7	32.3	16.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	12.0	3.4	22.7	0.2	0.6	0.3
Delay (s)	39.9	7.8	43.1	12.0	33.0	16.3
Level of Service	D	A	D	B	C	B
Approach Delay (s)		16.4	40.3		19.2	
Approach LOS		B	D		B	

Intersection Summary			
HCM Average Control Delay	24.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	13	456	212	88	156	4
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	14	507	236	98	173	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	333				820	284
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	333				820	284
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				49	99
cM capacity (veh/h)	1237				342	759

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	521	333	178
Volume Left	14	0	173
Volume Right	0	98	4
cSH	1237	1700	347
Volume to Capacity	0.01	0.20	0.51
Queue Length 95th (ft)	1	0	70
Control Delay (s)	0.3	0.0	25.8
Lane LOS	A		D
Approach Delay (s)	0.3	0.0	25.8
Approach LOS			D

Intersection Summary			
Average Delay	4.6		
Intersection Capacity Utilization	53.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	2	96	1	113	7	273	116	190	553	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Hourly flow rate (vph)	0	1	2	113	1	133	8	321	136	224	651	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1			1						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1502	1435	651	1437	1435	321	651			321		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1502	1435	651	1437	1435	321	651			321		
tC, single (s)	7.1	6.5	6.7	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.8	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	99	99	0	99	81	99			82		
cM capacity (veh/h)	69	109	394	94	109	699	945			1227		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	4	247	8	321	136	224	651	1
Volume Left	0	113	8	0	0	224	0	0
Volume Right	2	133	0	0	136	0	0	1
cSH	328	179	945	1700	1700	1227	1700	1700
Volume to Capacity	0.01	1.38	0.01	0.19	0.08	0.18	0.38	0.00
Queue Length 95th (ft)	1	369	1	0	0	17	0	0
Control Delay (s)	22.2	250.3	8.8	0.0	0.0	8.6	0.0	0.0
Lane LOS	C	F	A			A		
Approach Delay (s)	22.2	250.3	0.2			2.2		
Approach LOS	C	F						

Intersection Summary			
Average Delay	40.1		
Intersection Capacity Utilization	57.4%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	402	23	9	648	13	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	428	24	10	689	14	13
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			452		791	214
vC1, stage 1 conf vol					428	
vC2, stage 2 conf vol					364	
vCu, unblocked vol			452		791	214
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	98
cM capacity (veh/h)			1119		530	797

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	214	214	24	10	345	345	27
Volume Left	0	0	0	10	0	0	14
Volume Right	0	0	24	0	0	0	13
cSH	1700	1700	1700	1119	1700	1700	632
Volume to Capacity	0.13	0.13	0.01	0.01	0.20	0.20	0.04
Queue Length 95th (ft)	0	0	0	1	0	0	3
Control Delay (s)	0.0	0.0	0.0	8.2	0.0	0.0	10.9
Lane LOS				A			B
Approach Delay (s)	0.0			0.1			10.9
Approach LOS							B

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	29.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	193	0	0	462	8	0	0	0	1	0	83
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	210	0	0	502	9	0	0	0	1	0	90
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	511			210			857	775	105	666	771	507
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	511			210			857	775	105	666	771	507
tC, single (s)	4.3			4.1			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	100	100	100	100	82
cM capacity (veh/h)	1010			1373			205	322	936	342	324	506

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	27	140	70	0	511	0	0	91
Volume Left	27	0	0	0	0	0	0	1
Volume Right	0	0	0	0	9	0	0	90
cSH	1010	1700	1700	1700	1700	1700	1700	503
Volume to Capacity	0.03	0.08	0.04	0.00	0.30	0.00	0.00	0.18
Queue Length 95th (ft)	2	0	0	0	0	0	0	16
Control Delay (s)	8.7	0.0	0.0	0.0	0.0	0.0	0.0	13.7
Lane LOS	A					A	A	B
Approach Delay (s)	1.0			0.0		0.0		13.7
Approach LOS						A		B

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	39.2%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	13	178	431	89	23	38
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	15	205	495	102	26	44
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	495				628	495
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	495				628	495
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				93	92
cM capacity (veh/h)	1079				405	517

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	15	102	102	495	102	26	44
Volume Left	15	0	0	0	0	26	0
Volume Right	0	0	0	0	102	0	44
cSH	1079	1700	1700	1700	1700	405	517
Volume to Capacity	0.01	0.06	0.06	0.29	0.06	0.07	0.08
Queue Length 95th (ft)	1	0	0	0	0	5	7
Control Delay (s)	8.4	0.0	0.0	0.0	0.0	14.5	12.6
Lane LOS	A					B	B
Approach Delay (s)	0.6			0.0		13.3	
Approach LOS						B	

Intersection Summary			
Average Delay	1.2		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
101: SE Johnson Creek Blvd. & SE Flavel Dr.

5/25/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	711	96	141	620	127	66	218	128	108	206	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.98		1.00	0.97		1.00	0.94		1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1821		1805	1794		1766	1769		1752	1859	
Flt Permitted	0.95	1.00		0.95	1.00		0.44	1.00		0.24	1.00	
Satd. Flow (perm)	1805	1821		1805	1794		822	1769		435	1859	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	13	748	101	148	653	134	69	229	135	114	217	19
RTOR Reduction (vph)	0	4	0	0	5	0	0	17	0	0	2	0
Lane Group Flow (vph)	13	845	0	148	782	0	69	347	0	114	234	0
Confl. Peds. (#/hr)	15					15	1					1
Confl. Bikes (#/hr)		20	1		17			3	1			
Heavy Vehicles (%)	0%	2%	4%	0%	2%	2%	2%	1%	0%	3%	0%	10%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.6	58.4		14.1	69.9		30.3	30.3		30.3	30.3	
Effective Green, g (s)	2.6	58.4		14.1	69.9		30.3	30.3		30.3	30.3	
Actuated g/C Ratio	0.02	0.50		0.12	0.60		0.26	0.26		0.26	0.26	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		0.5	0.5		2.5	2.5	
Lane Grp Cap (vph)	41	918		220	1083		215	463		114	486	
v/s Ratio Prot	0.01	c0.46		c0.08	0.44			0.20			0.13	
v/s Ratio Perm							0.08			c0.26		
v/c Ratio	0.32	0.92		0.67	0.72		0.32	0.75		1.00	0.48	
Uniform Delay, d1	55.7	26.6		48.6	16.1		34.5	39.3		42.8	36.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.2	14.2		7.2	2.4		0.3	5.8		84.3	0.5	
Delay (s)	59.0	40.7		55.8	18.5		34.8	45.0		127.0	36.7	
Level of Service	E	D		E	B		C	D		F	D	
Approach Delay (s)		41.0			24.4			43.4			66.1	
Approach LOS		D			C			D			E	

Intersection Summary			
HCM Average Control Delay	38.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	115.8	Sum of lost time (s)	13.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	98	828	59	117	837	221	27	115	49	67	118	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5			4.5			4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.98			0.98			0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00			0.99	
Frt	1.00	0.99		1.00	0.97			0.97			0.97	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.99	
Satd. Flow (prot)	1687	1837		1770	1772			1736			1706	
Flt Permitted	0.95	1.00		0.95	1.00			0.90			0.72	
Satd. Flow (perm)	1687	1837		1770	1772			1582			1253	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	102	862	61	122	872	230	28	120	51	70	123	47
RTOR Reduction (vph)	0	2	0	0	6	0	0	10	0	0	7	0
Lane Group Flow (vph)	102	921	0	122	1096	0	0	189	0	0	233	0
Confl. Peds. (#/hr)	22		19	19		22	3		15	15		3
Confl. Bikes (#/hr)		5			1			2				
Heavy Vehicles (%)	7%	2%	0%	2%	2%	2%	4%	4%	0%	4%	6%	6%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	11.5	65.6		12.9	67.0			24.2			24.2	
Effective Green, g (s)	11.5	65.6		12.9	67.0			24.2			24.2	
Actuated g/C Ratio	0.10	0.57		0.11	0.58			0.21			0.21	
Clearance Time (s)	4.0	4.5		4.0	4.5			4.5			4.5	
Vehicle Extension (s)	2.5	3.0		2.5	4.0			2.5			2.5	
Lane Grp Cap (vph)	168	1042		197	1026			331			262	
v/s Ratio Prot	0.06	0.50		c0.07	c0.62							
v/s Ratio Perm								0.12			c0.19	
v/c Ratio	0.61	0.88		0.62	1.07			0.57			0.89	
Uniform Delay, d1	49.9	21.8		49.1	24.4			41.1			44.4	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	5.1	9.1		4.9	48.1			1.9			28.2	
Delay (s)	55.1	30.8		53.9	72.4			43.0			72.7	
Level of Service	E	C		D	E			D			E	
Approach Delay (s)		33.2			70.6			43.0			72.7	
Approach LOS		C			E			D			E	

Intersection Summary			
HCM Average Control Delay	54.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	115.7	Sum of lost time (s)	8.5
Intersection Capacity Utilization	97.4%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	61	908	14	39	954	48	38	10	116	100	8	109
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	66	976	15	42	1026	52	41	11	125	108	9	117
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									3			
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)					503							
pX, platoon unblocked	0.78						0.78	0.78		0.78	0.78	0.78
vC, conflicting volume	1077			991			1833	2276	984	2248	2258	539
vC1, stage 1 conf vol							1115	1115		1135	1135	
vC2, stage 2 conf vol							718	1161		1113	1123	
vCu, unblocked vol	527			991			1499	2069	984	2033	2046	0
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			94			78	94	50	0	95	86
cM capacity (veh/h)	817			669			190	189	248	55	184	848

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	66	991	42	684	394	176	116	117
Volume Left	66	0	42	0	0	41	108	0
Volume Right	0	15	0	0	52	125	0	117
cSH	817	1700	669	1700	1700	350	58	848
Volume to Capacity	0.08	0.58	0.06	0.40	0.23	0.50	2.01	0.14
Queue Length 95th (ft)	7	0	5	0	0	68	280	12
Control Delay (s)	9.8	0.0	10.7	0.0	0.0	32.7	624.1	9.9
Lane LOS	A		B			D	F	A
Approach Delay (s)	0.6		0.4			32.7	315.6	
Approach LOS						D	F	

Intersection Summary			
Average Delay	31.1		
Intersection Capacity Utilization	71.8%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	187	861	198	358	717	198	364	869	419	403	970	149
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1577	3467	3394		1770	3505	1553	1770	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1577	3467	3394		1770	3505	1553	1770	3539	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	199	916	211	381	763	211	387	924	446	429	1032	159
RTOR Reduction (vph)	0	0	75	0	20	0	0	0	180	0	0	60
Lane Group Flow (vph)	199	916	136	381	954	0	387	924	266	429	1032	99
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)					1			2				
Heavy Vehicles (%)	2%	2%	1%	1%	3%	1%	2%	3%	2%	2%	2%	0%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	14.5	35.3	35.3	14.5	35.3		26.7	32.7	32.7	29.0	35.5	35.5
Effective Green, g (s)	14.5	35.3	35.3	14.5	35.3		26.7	32.7	32.7	29.0	35.5	35.5
Actuated g/C Ratio	0.11	0.27	0.27	0.11	0.27		0.21	0.25	0.25	0.22	0.27	0.27
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Vehicle Extension (s)	2.3	4.3	4.3	2.3	4.3		2.3	4.3	4.3	2.3	2.3	2.3
Lane Grp Cap (vph)	197	961	428	387	922		364	882	391	395	966	441
v/s Ratio Prot	c0.11	0.26		0.11	c0.28		0.22	0.26		c0.24	c0.29	
v/s Ratio Perm			0.09						0.17			0.06
v/c Ratio	1.01	0.95	0.32	0.98	1.04		1.06	1.05	0.68	1.09	1.07	0.22
Uniform Delay, d1	57.8	46.5	37.7	57.6	47.4		51.6	48.6	43.9	50.5	47.2	36.6
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.17	0.53	0.48	1.00	1.00	1.00
Incremental Delay, d2	66.8	19.7	1.9	41.3	39.1		57.3	38.8	6.5	70.4	49.0	1.2
Delay (s)	124.5	66.2	39.7	98.9	86.4		117.9	64.5	27.6	120.9	96.3	37.8
Level of Service	F	E	D	F	F		F	E	C	F	F	D
Approach Delay (s)		70.8			89.9			66.9			97.0	
Approach LOS		E			F			E			F	

Intersection Summary			
HCM Average Control Delay	81.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.08		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	98.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1660	86	0	1576	77	0	0	136	39	0	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5				5.5		3.0	
Lane Util. Factor		0.91			0.95				1.00		1.00	
Frpb, ped/bikes		1.00			1.00				1.00		0.99	
Flpb, ped/bikes		1.00			1.00				1.00		1.00	
Frt		0.99			0.99				0.86		0.89	
Flt Protected		1.00			1.00				1.00		0.99	
Satd. Flow (prot)		5036			3511				1644		1539	
Flt Permitted		1.00			1.00				1.00		0.99	
Satd. Flow (perm)		5036			3511				1644		1539	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	0	1711	89	0	1625	79	0	0	140	40	0	171
RTOR Reduction (vph)	0	5	0	0	3	0	0	0	122	0	5	0
Lane Group Flow (vph)	0	1795	0	0	1701	0	0	0	18	0	206	0
Confl. Peds. (#/hr)	2		4	4		2	3					3
Confl. Bikes (#/hr)		3			2							
Heavy Vehicles (%)	0%	2%	4%	0%	2%	2%	0%	0%	0%	6%	0%	8%
Turn Type									custom	Split		
Protected Phases		2			6					4	4	
Permitted Phases									8			
Actuated Green, G (s)		48.6			48.6				9.9		18.9	
Effective Green, g (s)		48.6			48.6				9.9		18.9	
Actuated g/C Ratio		0.65			0.65				0.13		0.25	
Clearance Time (s)		4.5			4.5				5.5		3.0	
Vehicle Extension (s)		4.0			4.0				2.5		0.2	
Lane Grp Cap (vph)		3263			2275				217		388	
v/s Ratio Prot		0.36			c0.48						c0.13	
v/s Ratio Perm									0.01			
v/c Ratio		0.55			0.75				0.09		0.53	
Uniform Delay, d1		7.2			9.0				28.6		24.2	
Progression Factor		1.00			1.00				1.00		1.00	
Incremental Delay, d2		0.7			2.3				0.1		0.7	
Delay (s)		7.9			11.3				28.7		24.9	
Level of Service		A			B				C		C	
Approach Delay (s)		7.9			11.3			28.7			24.9	
Approach LOS		A			B			C			C	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	75.0	Sum of lost time (s)	7.5
Intersection Capacity Utilization	67.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1112	524	152	827	0	0	0	0	232	0	782
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.0	4.0	4.5					5.0		5.0
Lane Util. Factor		0.95	1.00	1.00	0.95					1.00		1.00
Frt		1.00	0.85	1.00	1.00					1.00		0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (prot)		3539	1583	1787	3574					1805		1583
Flt Permitted		1.00	1.00	0.95	1.00					0.95		1.00
Satd. Flow (perm)		3539	1583	1787	3574					1805		1583
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1158	546	158	861	0	0	0	0	242	0	815
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	259
Lane Group Flow (vph)	0	1158	546	158	861	0	0	0	0	242	0	556
Heavy Vehicles (%)	0%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	2%
Turn Type			Free	Prot						Prot		custom
Protected Phases		2		1	6					4		5
Permitted Phases			Free									
Actuated Green, G (s)		58.2	100.0	12.9	31.0					15.4		39.1
Effective Green, g (s)		58.2	100.0	12.9	31.0					15.4		39.1
Actuated g/C Ratio		0.58	1.00	0.13	0.31					0.15		0.39
Clearance Time (s)		4.5		4.0	4.5					5.0		5.0
Vehicle Extension (s)		5.5		2.3	5.5					2.3		2.3
Lane Grp Cap (vph)		2060	1583	231	1108					278		619
v/s Ratio Prot		0.33		0.09	c0.24					c0.13		c0.35
v/s Ratio Perm			0.34									
v/c Ratio		0.56	0.34	0.68	0.78					0.87		0.90
Uniform Delay, d1		13.0	0.0	41.6	31.4					41.3		28.6
Progression Factor		1.00	1.00	1.52	0.85					1.00		1.00
Incremental Delay, d2		1.1	0.6	6.7	5.1					24.0		15.6
Delay (s)		14.1	0.6	69.9	31.6					65.3		44.2
Level of Service		B	A	E	C					E		D
Approach Delay (s)		9.8			37.5			0.0			49.0	
Approach LOS		A			D			A			D	

Intersection Summary			
HCM Average Control Delay	28.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	79.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	638	738	152	464	597	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.0	4.5	5.0	5.0
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3610	1583	1770	3574	3502	1561
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3610	1583	1770	3574	3502	1561
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	679	785	162	494	635	210
RTOR Reduction (vph)	0	444	0	0	0	161
Lane Group Flow (vph)	679	341	162	494	635	49
Confl. Peds. (#/hr)						2
Heavy Vehicles (%)	0%	2%	2%	1%	0%	2%
Turn Type		Perm	Prot			Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	43.4	43.4	20.0	67.4	23.1	23.1
Effective Green, g (s)	43.4	43.4	20.0	67.4	23.1	23.1
Actuated g/C Ratio	0.43	0.43	0.20	0.67	0.23	0.23
Clearance Time (s)	4.5	4.5	4.0	4.5	5.0	5.0
Vehicle Extension (s)	5.5	5.5	2.3	5.5	2.3	2.3
Lane Grp Cap (vph)	1567	687	354	2409	809	361
v/s Ratio Prot	0.19		c0.09	0.14	c0.18	
v/s Ratio Perm		c0.22				0.03
v/c Ratio	0.43	0.50	0.46	0.21	0.78	0.13
Uniform Delay, d1	19.7	20.4	35.2	6.2	36.1	30.5
Progression Factor	0.67	1.64	1.40	2.24	1.00	1.00
Incremental Delay, d2	0.7	2.1	0.4	0.1	4.8	0.1
Delay (s)	13.9	35.6	49.8	14.0	40.9	30.6
Level of Service	B	D	D	B	D	C
Approach Delay (s)	25.6			22.8	38.3	
Approach LOS	C			C	D	

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	61.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	302	206	374	38	87	20	205	443	59	41	458	216
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.2		4.0	4.5		4.0	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.90		1.00	0.97		1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3261		1805	3492		1787	1850		1805	1881	1583
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	3261		1805	3492		1787	1850		1805	1881	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	224	407	41	95	22	223	482	64	45	498	235
RTOR Reduction (vph)	0	174	0	0	15	0	0	5	0	0	0	104
Lane Group Flow (vph)	328	457	0	41	102	0	223	541	0	45	498	131
Confl. Peds. (#/hr)	3					3	1					1
Confl. Bikes (#/hr)								2				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	1%	1%	0%	0%	1%	2%
Turn Type	Prot			Prot			Prot			Prot		Prot
Protected Phases	5	2		1	6		3	8		7	4	4
Permitted Phases												
Actuated Green, G (s)	14.0	39.4		3.9	29.6		8.0	36.5		3.2	31.7	31.7
Effective Green, g (s)	14.0	39.4		3.9	29.6		8.0	36.5		3.2	31.7	31.7
Actuated g/C Ratio	0.14	0.39		0.04	0.30		0.08	0.36		0.03	0.32	0.32
Clearance Time (s)	4.0	4.5		4.0	4.2		4.0	4.5		4.0	4.5	4.5
Vehicle Extension (s)	3.0	4.0		3.0	4.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	250	1285		70	1034		143	675		58	596	502
v/s Ratio Prot	c0.18	c0.14		0.02	0.03		c0.12	c0.29		0.02	0.26	0.08
v/s Ratio Perm												
v/c Ratio	1.31	0.36		0.59	0.10		1.56	0.80		0.78	0.84	0.26
Uniform Delay, d1	43.0	21.4		47.3	25.5		46.0	28.5		48.0	31.7	25.4
Progression Factor	1.18	0.07		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	164.8	0.7		11.9	0.2		283.0	6.8		46.8	9.9	0.3
Delay (s)	215.6	2.2		59.1	25.7		329.0	35.3		94.9	41.6	25.7
Level of Service	F	A		E	C		F	D		F	D	C
Approach Delay (s)		75.2			34.4			120.5			39.9	
Approach LOS		E			C			F			D	

Intersection Summary			
HCM Average Control Delay	75.5	HCM Level of Service	E
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	94	26	37	143	26	91	72	1432	66	115	1287	26
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00			1.00	0.97	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes		0.99			1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt		0.97			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.97			0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1720			1802	1545	1805	3539	1528	1787	3525	
Flt Permitted		0.59			0.65	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1042			1217	1545	1805	3539	1528	1787	3525	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	99	27	39	151	27	96	76	1507	69	121	1355	27
RTOR Reduction (vph)	0	8	0	0	0	72	0	0	12	0	1	0
Lane Group Flow (vph)	0	157	0	0	178	24	76	1507	57	121	1381	0
Confl. Peds. (#/hr)	13		3	3		13	15		9	9		15
Heavy Vehicles (%)	3%	0%	3%	1%	0%	1%	0%	2%	0%	1%	2%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Actuated Green, G (s)		32.5			32.5	32.5	8.5	72.3	72.3	12.2	76.0	
Effective Green, g (s)		32.5			32.5	32.5	8.5	72.3	72.3	12.2	76.0	
Actuated g/C Ratio		0.25			0.25	0.25	0.07	0.56	0.56	0.09	0.58	
Clearance Time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)		4.2			4.2	4.2	2.3	4.2	4.2	2.3	4.2	
Lane Grp Cap (vph)		261			304	386	118	1968	850	168	2061	
v/s Ratio Prot							0.04	c0.43		c0.07	c0.39	
v/s Ratio Perm		c0.15			0.15	0.02			0.04			
v/c Ratio		0.60			0.59	0.06	0.64	0.77	0.07	0.72	0.67	
Uniform Delay, d1		43.0			42.8	37.1	59.3	22.3	13.3	57.2	18.4	
Progression Factor		1.00			1.00	1.00	0.94	1.52	1.13	0.58	2.42	
Incremental Delay, d2		9.8			8.0	0.3	5.7	1.7	0.1	4.0	0.5	
Delay (s)		52.9			50.9	37.4	61.7	35.6	15.1	37.0	45.2	
Level of Service		D			D	D	E	D	B	D	D	
Approach Delay (s)		52.9			46.2			36.0			44.5	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	41.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	89.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	3	12	435	4	79	8	1350	261	160	1183	9
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		0.97			1.00	0.97	1.00	1.00	0.95	1.00	1.00	
Flpb, ped/bikes		1.00			0.98	1.00	0.99	1.00	1.00	1.00	1.00	
Frt		0.89			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1647			1756	1553	1796	3539	1529	1770	3535	
Flt Permitted		1.00			0.72	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1647			1321	1553	1796	3539	1529	1770	3535	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	3	13	458	4	83	8	1421	275	168	1245	9
RTOR Reduction (vph)	0	8	0	0	0	53	0	0	50	0	0	0
Lane Group Flow (vph)	0	8	0	0	462	30	8	1421	225	168	1254	0
Confl. Peds. (#/hr)	8		13	13		8	9		10	10		9
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	0%	0%	0%	1%	0%	1%	0%	2%	0%	2%	2%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Actuated Green, G (s)		46.6			46.6	46.6	0.8	57.1	57.1	13.3	69.6	
Effective Green, g (s)		46.6			46.6	46.6	0.8	57.1	57.1	13.3	69.6	
Actuated g/C Ratio		0.36			0.36	0.36	0.01	0.44	0.44	0.10	0.54	
Clearance Time (s)		4.5			4.5	4.5	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.2	4.2	2.3	4.2	
Lane Grp Cap (vph)		590			474	557	11	1554	672	181	1893	
v/s Ratio Prot		0.00					0.00	c0.40		c0.09	0.35	
v/s Ratio Perm					c0.35	0.02			0.15			
v/c Ratio		0.01			0.97	0.05	0.73	0.91	0.33	0.93	0.66	
Uniform Delay, d1		26.9			41.1	27.3	64.5	34.2	24.0	57.9	21.7	
Progression Factor		1.00			1.00	1.00	0.96	0.84	1.04	0.64	1.30	
Incremental Delay, d2		0.0			34.5	0.0	96.9	8.0	1.0	38.3	1.4	
Delay (s)		26.9			75.6	27.3	158.5	36.8	25.9	75.5	29.7	
Level of Service		C			E	C	F	D	C	E	C	
Approach Delay (s)		26.9			68.3			35.6			35.1	
Approach LOS		C			E			D			D	

Intersection Summary			
HCM Average Control Delay	40.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	288	62	24	163	93	109	70	60	341	69	203
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.8	4.8	4.8		4.8	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00	0.96		0.99	
Flpb, ped/bikes	0.99	1.00		1.00	1.00		1.00	1.00	1.00		0.99	
Frt	1.00	0.97		1.00	0.95		1.00	1.00	0.85		0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1617	1826		1800	1753		1785	1863	1548		1712	
Flt Permitted	0.47	1.00		0.30	1.00		0.45	1.00	1.00		0.78	
Satd. Flow (perm)	798	1826		574	1753		852	1863	1548		1381	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	67	320	69	27	181	103	121	78	67	379	77	226
RTOR Reduction (vph)	0	15	0	0	39	0	0	0	30	0	28	0
Lane Group Flow (vph)	67	374	0	27	245	0	121	78	37	0	654	0
Confl. Peds. (#/hr)	7		4	4		7	3		17	17		3
Confl. Bikes (#/hr)		1						1			1	
Heavy Vehicles (%)	11%	1%	0%	0%	2%	0%	1%	2%	0%	1%	0%	2%
Turn Type	Perm			Perm			Perm		Perm	Perm		
Protected Phases		8			4			6			2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	13.2	13.2		13.2	13.2		26.6	26.6	26.6		26.6	
Effective Green, g (s)	13.2	13.2		13.2	13.2		26.6	26.6	26.6		26.6	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.55	0.55	0.55		0.55	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.8	4.8	4.8		4.8	
Vehicle Extension (s)	0.7	0.7		0.7	0.7		1.0	1.0	1.0		1.0	
Lane Grp Cap (vph)	217	496		156	476		466	1020	847		756	
v/s Ratio Prot		c0.21			0.14			0.04				
v/s Ratio Perm	0.08			0.05			0.14		0.02		c0.47	
v/c Ratio	0.31	0.75		0.17	0.52		0.26	0.08	0.04		0.86	
Uniform Delay, d1	14.1	16.2		13.5	15.0		5.8	5.2	5.1		9.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	5.7		0.2	0.4		0.1	0.0	0.0		9.8	
Delay (s)	14.4	22.0		13.7	15.4		5.9	5.2	5.1		19.3	
Level of Service	B	C		B	B		A	A	A		B	
Approach Delay (s)		20.8			15.2			5.5			19.3	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	16.8	HCM Level of Service	B
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	48.6	Sum of lost time (s)	8.8
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	125	377	192	65	111	129	107	440	66	309	441	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.7		4.0	4.8		4.0	4.5	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	1881	1615	1770	1649		1787	1837		1787	1830	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	1881	1615	1770	1649		1787	1837		1787	1830	
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	134	405	206	70	119	139	115	473	71	332	474	105
RTOR Reduction (vph)	0	0	116	0	30	0	0	4	0	0	6	0
Lane Group Flow (vph)	134	405	90	70	228	0	115	540	0	332	573	0
Confl. Peds. (#/hr)	1		2	2		1			1	1		
Heavy Vehicles (%)	0%	1%	0%	2%	3%	6%	1%	1%	2%	1%	1%	1%
Turn Type	Prot		Prot	Prot			Prot			Prot		
Protected Phases	3	8	8	7	4		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	12.5	30.3	30.3	7.1	25.0		11.8	41.0		26.4	55.9	
Effective Green, g (s)	12.5	30.3	30.3	7.1	25.0		11.8	41.0		26.4	55.9	
Actuated g/C Ratio	0.10	0.25	0.25	0.06	0.20		0.10	0.33		0.22	0.46	
Clearance Time (s)	4.0	4.8	4.8	4.0	4.7		4.0	4.8		4.0	4.5	
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.5	4.0		2.5	4.0	
Lane Grp Cap (vph)	184	466	400	103	337		172	615		385	836	
v/s Ratio Prot	c0.07	c0.22	0.06	0.04	0.14		0.06	c0.29		c0.19	0.31	
v/s Ratio Perm												
v/c Ratio	0.73	0.87	0.23	0.68	0.68		0.67	0.88		0.86	0.69	
Uniform Delay, d1	53.3	44.1	36.7	56.5	45.0		53.4	38.3		46.2	26.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.6	15.6	0.2	15.0	4.8		8.5	13.8		17.5	2.5	
Delay (s)	65.9	59.7	36.9	71.5	49.8		62.0	52.1		63.8	28.8	
Level of Service	E	E	D	E	D		E	D		E	C	
Approach Delay (s)		54.5			54.4			53.8			41.6	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM Average Control Delay	49.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	122.4	Sum of lost time (s)	12.8
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	81	76	81	1542	1355	76
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	83	88	1676	1473	83
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)				875	755	
pX, platoon unblocked	0.86	0.75	0.75			
vC, conflicting volume	2528	778	1555			
vC1, stage 1 conf vol	1514					
vC2, stage 2 conf vol	1014					
vCu, unblocked vol	1143	36	1073			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	60	89	82			
cM capacity (veh/h)	220	771	484			

Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	171	88	838	838	982	574
Volume Left	88	88	0	0	0	0
Volume Right	83	0	0	0	0	83
cSH	336	484	1700	1700	1700	1700
Volume to Capacity	0.51	0.18	0.49	0.49	0.58	0.34
Queue Length 95th (ft)	68	16	0	0	0	0
Control Delay (s)	26.2	14.1	0.0	0.0	0.0	0.0
Lane LOS	D	B				
Approach Delay (s)	26.2	0.7			0.0	
Approach LOS	D					

Intersection Summary			
Average Delay	1.6		
Intersection Capacity Utilization	63.5%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	326	45	167	25	22	41	189	1328	10	47	1183	436
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.0	4.5	4.5	4.0	4.5	4.5
Lane Util. Factor		0.95			0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99			0.99		1.00	1.00	0.97	1.00	1.00	1.00
Flpb, ped/bikes		0.99			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.95			0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.99		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		3171			3256		1752	3539	1566	1805	3539	1599
Flt Permitted		0.75			0.72		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		2436			2393		1752	3539	1566	1805	3539	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	343	47	176	26	23	43	199	1398	11	49	1245	459
RTOR Reduction (vph)	0	42	0	0	32	0	0	0	2	0	0	79
Lane Group Flow (vph)	0	524	0	0	60	0	199	1398	9	49	1245	380
Confl. Peds. (#/hr)	14		21	21		14	14		9	9		14
Confl. Bikes (#/hr)								1				
Heavy Vehicles (%)	2%	0%	5%	0%	0%	0%	3%	2%	0%	0%	2%	1%
Turn Type	Perm			Perm			Prot		Perm	Prot		Prot
Protected Phases		8			4		1	6		5	2	2
Permitted Phases	8			4					6			
Actuated Green, G (s)		31.8			31.8		18.4	78.6	78.6	6.6	66.8	66.8
Effective Green, g (s)		31.8			31.8		18.4	78.6	78.6	6.6	66.8	66.8
Actuated g/C Ratio		0.24			0.24		0.14	0.60	0.60	0.05	0.51	0.51
Clearance Time (s)		4.5			4.5		4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)		2.5			2.5		2.3	4.2	4.2	2.3	4.2	4.2
Lane Grp Cap (vph)		596			585		248	2140	947	92	1819	822
v/s Ratio Prot							c0.11	0.40		0.03	c0.35	0.24
v/s Ratio Perm		c0.21			0.02				0.01			
v/c Ratio		0.98dl			0.10		0.80	0.65	0.01	0.53	0.68	0.46
Uniform Delay, d1		47.2			38.0		54.0	16.8	10.2	60.2	23.7	20.2
Progression Factor		1.00			1.00		0.66	1.74	1.52	1.06	0.60	0.49
Incremental Delay, d2		13.7			0.1		13.7	1.3	0.0	3.1	1.7	1.5
Delay (s)		61.0			38.1		49.1	30.6	15.6	66.8	16.0	11.4
Level of Service		E			D		D	C	B	E	B	B
Approach Delay (s)		61.0			38.1			32.8			16.2	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM Average Control Delay	29.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	2	462	170	161	412	14	98	5	120	16	14	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	2	513	189	179	458	16	109	6	133	18	16	22
Pedestrians		1			2						7	
Lane Width (ft)		12.0			12.0						12.0	
Walking Speed (ft/s)		4.0			4.0						4.0	
Percent Blockage		0			0						1	
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)					191							
pX, platoon unblocked												
vC, conflicting volume	480			702			1230	1450	353	1230	1537	245
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	480			702			1230	1450	353	1230	1537	245
tC, single (s)	4.1			4.1			7.6	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			80			0	95	79	80	83	97
cM capacity (veh/h)	1086			905			95	105	648	87	93	757

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	SB 1
Volume Total	259	446	408	244	248	56
Volume Left	2	0	179	0	109	18
Volume Right	0	189	0	16	133	22
cSH	1086	1700	905	1700	176	139
Volume to Capacity	0.00	0.26	0.20	0.14	1.40	0.40
Queue Length 95th (ft)	0	0	18	0	377	43
Control Delay (s)	0.1	0.0	5.6	0.0	262.1	47.4
Lane LOS	A		A		F	E
Approach Delay (s)	0.0		3.5		262.1	47.4
Approach LOS					F	E

Intersection Summary			
Average Delay	42.1		
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	198	462	362	123	133	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0		4.5	
Lane Util. Factor	1.00	1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	0.99		1.00	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.97		0.92	
Flt Protected	0.95	1.00	1.00		0.98	
Satd. Flow (prot)	1787	1845	1776		1679	
Flt Permitted	0.95	1.00	1.00		0.98	
Satd. Flow (perm)	1787	1845	1776		1679	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	215	502	393	134	145	186
RTOR Reduction (vph)	0	0	11	0	40	0
Lane Group Flow (vph)	215	502	516	0	291	0
Confl. Peds. (#/hr)	5			5	12	
Confl. Bikes (#/hr)	1					
Heavy Vehicles (%)	1%	3%	2%	4%	4%	1%
Turn Type	Prot					
Protected Phases	5	2	6		4	
Permitted Phases						
Actuated Green, G (s)	15.4	49.8	30.4		19.9	
Effective Green, g (s)	15.4	49.8	30.4		19.9	
Actuated g/C Ratio	0.19	0.63	0.38		0.25	
Clearance Time (s)	4.0	5.0	5.0		4.5	
Vehicle Extension (s)	2.5	3.0	3.0		2.5	
Lane Grp Cap (vph)	347	1160	682		422	
v/s Ratio Prot	c0.12	0.27	c0.29		c0.17	
v/s Ratio Perm						
v/c Ratio	0.62	0.43	0.76		0.69	
Uniform Delay, d1	29.2	7.5	21.2		26.8	
Progression Factor	1.00	1.00	1.00		1.00	
Incremental Delay, d2	2.8	0.3	4.8		4.2	
Delay (s)	32.0	7.8	26.0		31.1	
Level of Service	C	A	C		C	
Approach Delay (s)		15.0	26.0		31.1	
Approach LOS		B	C		C	

Intersection Summary			
HCM Average Control Delay	22.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	79.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	9	0	9	31	0	72	6	1545	24	64	1438	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frt		0.93			1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98			0.95	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1695			1770	1583	1770	3539	1583	1770	3535	
Flt Permitted		0.84			0.74	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1456			1386	1583	1770	3539	1583	1770	3535	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	0	10	34	0	78	7	1679	26	70	1563	12
RTOR Reduction (vph)	0	9	0	0	0	74	0	0	6	0	0	0
Lane Group Flow (vph)	0	11	0	0	34	4	7	1679	20	70	1575	0
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			
Actuated Green, G (s)		7.2			7.2	7.2	1.3	101.4	101.4	8.6	108.7	
Effective Green, g (s)		7.2			7.2	7.2	1.3	101.4	101.4	8.6	108.7	
Actuated g/C Ratio		0.06			0.06	0.06	0.01	0.78	0.78	0.07	0.84	
Clearance Time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	
Vehicle Extension (s)		2.5			2.5	2.5	2.3	5.2	5.2	2.3	5.2	
Lane Grp Cap (vph)		81			77	88	18	2760	1235	117	2956	
v/s Ratio Prot							0.00	c0.47		c0.04	0.45	
v/s Ratio Perm		0.01			c0.02	0.00			0.01			
v/c Ratio		0.13			0.44	0.05	0.39	0.61	0.02	0.60	0.53	
Uniform Delay, d1		58.4			59.5	58.2	64.0	6.0	3.2	59.0	3.1	
Progression Factor		1.00			1.00	1.00	1.02	0.57	0.46	1.21	1.12	
Incremental Delay, d2		0.5			2.9	0.2	6.3	0.8	0.0	5.0	0.6	
Delay (s)		59.0			62.4	58.3	71.2	4.2	1.5	76.1	4.1	
Level of Service		E			E	E	E	A	A	E	A	
Approach Delay (s)		59.0			59.6			4.5			7.1	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	7.8	HCM Level of Service	A
HCM Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	64.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	147	144	88	190	87	175	54	1086	104	216	1079	41
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.5	4.5	4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	1.00	0.98	1.00	1.00	0.92	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.94		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	1725		1752	1881	1528	1805	3539	1486	1770	3483	
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	1725		1752	1881	1528	1805	3539	1486	1770	3483	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	153	150	92	198	91	182	56	1131	108	225	1124	43
RTOR Reduction (vph)	0	18	0	0	0	148	0	0	42	0	2	0
Lane Group Flow (vph)	153	224	0	198	91	34	56	1131	66	225	1165	0
Confl. Peds. (#/hr)	3		19	19		3	7		17	17		7
Confl. Bikes (#/hr)								1			1	
Heavy Vehicles (%)	3%	3%	1%	3%	1%	4%	0%	2%	0%	2%	3%	0%
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases						4			6			
Actuated Green, G (s)	13.9	20.5		17.4	24.0	24.0	6.9	53.7	53.7	21.9	68.7	
Effective Green, g (s)	13.9	20.5		17.4	24.0	24.0	6.9	53.7	53.7	21.9	68.7	
Actuated g/C Ratio	0.11	0.16		0.13	0.18	0.18	0.05	0.41	0.41	0.17	0.53	
Clearance Time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.5	4.5	4.0	4.5	
Vehicle Extension (s)	2.3	2.3		2.3	2.3	2.3	2.3	5.1	5.1	2.3	5.1	
Lane Grp Cap (vph)	187	272		234	347	282	96	1462	614	298	1841	
v/s Ratio Prot	0.09	c0.13		c0.11	c0.05		0.03	c0.32		c0.13	0.33	
v/s Ratio Perm						0.02			0.04			
v/c Ratio	0.82	0.82		0.85	0.26	0.12	0.58	0.77	0.11	0.76	0.63	
Uniform Delay, d1	56.8	53.0		55.0	45.4	44.2	60.1	32.9	23.4	51.5	21.7	
Progression Factor	1.00	1.00		1.00	1.00	1.00	1.18	1.26	1.82	0.73	0.45	
Incremental Delay, d2	22.7	17.5		23.0	0.2	0.1	2.3	1.4	0.1	8.6	1.5	
Delay (s)	79.5	70.5		78.0	45.6	44.3	73.5	42.8	42.9	46.0	11.2	
Level of Service	E	E		E	D	D	E	D	D	D	B	
Approach Delay (s)		74.0			58.7			44.1			16.8	
Approach LOS		E			E			D			B	

Intersection Summary			
HCM Average Control Delay	38.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	20.5
Intersection Capacity Utilization	83.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	3	0	169	237	20	67	128	1204	406	104	1205	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0			6.0	6.0	4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.98		1.00	0.99			1.00	0.96	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.85		1.00	0.89			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1798	1578		1770	1647			3528	1538	1752	3504	
Flt Permitted	0.65	1.00		0.95	1.00			0.63	1.00	0.95	1.00	
Satd. Flow (perm)	1222	1578		1770	1647			2221	1538	1752	3504	
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	3	0	174	244	21	69	132	1241	419	107	1242	2
RTOR Reduction (vph)	0	90	0	0	57	0	0	0	73	0	0	0
Lane Group Flow (vph)	3	84	0	244	33	0	0	1373	346	107	1244	0
Confl. Peds. (#/hr)	2		8	8		2	5		6	6		5
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	0%	0%	0%	2%	0%	1%	0%	2%	1%	3%	3%	0%
Turn Type	Perm			Prot			Perm		Perm	Prot		
Protected Phases		4!		4!	8			6		5	2	
Permitted Phases	4						6		6			
Actuated Green, G (s)	22.1	22.1		22.1	22.1			81.7	81.7	12.2	98.9	
Effective Green, g (s)	22.1	22.1		22.1	22.1			81.7	81.7	12.2	98.9	
Actuated g/C Ratio	0.17	0.17		0.17	0.17			0.63	0.63	0.09	0.76	
Clearance Time (s)	4.0	4.0		4.0	4.0			6.0	6.0	4.0	5.0	
Vehicle Extension (s)	2.3	2.3		2.3	3.0			4.5	4.5	2.3	4.5	
Lane Grp Cap (vph)	208	268		301	280			1396	967	164	2666	
v/s Ratio Prot		0.05		c0.14	0.02					c0.06	0.36	
v/s Ratio Perm	0.00							c0.62	0.23			
v/c Ratio	0.01	0.31		0.81	0.12			0.98	0.36	0.65	0.47	
Uniform Delay, d1	44.9	47.3		51.9	45.7			23.5	11.6	56.9	5.8	
Progression Factor	1.00	1.00		1.00	1.00			0.57	0.18	0.86	0.91	
Incremental Delay, d2	0.0	0.4		14.6	0.2			11.9	0.4	5.8	0.4	
Delay (s)	44.9	47.7		66.6	45.9			25.3	2.5	54.9	5.7	
Level of Service	D	D		E	D			C	A	D	A	
Approach Delay (s)		47.7			61.0			20.0			9.6	
Approach LOS		D			E			C			A	

Intersection Summary			
HCM Average Control Delay	21.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	113.5%	ICU Level of Service	H
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	309	664	388	226	664	282	289	1033	180	341	1176	279
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	1559	1787	3610	1575	1805	3539	1570	1805	3505	1570
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	1559	1787	3610	1575	1805	3539	1570	1805	3505	1570
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	329	706	413	240	706	300	307	1099	191	363	1251	297
RTOR Reduction (vph)	0	0	217	0	0	202	0	0	46	0	0	68
Lane Group Flow (vph)	329	706	196	240	706	98	307	1099	145	363	1251	229
Confl. Peds. (#/hr)	2		12	12		2	3		4	4		3
Confl. Bikes (#/hr)		1			1			1				
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%	0%	2%	1%	0%	3%	0%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	21.0	34.4	34.4	14.0	27.4	27.4	19.6	40.8	40.8	22.6	43.8	43.8
Effective Green, g (s)	21.0	34.4	34.4	14.0	27.4	27.4	19.6	40.8	40.8	22.6	43.8	43.8
Actuated g/C Ratio	0.16	0.26	0.26	0.11	0.21	0.21	0.15	0.31	0.31	0.17	0.34	0.34
Clearance Time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Vehicle Extension (s)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	4.9	4.9	2.3	4.9	4.9
Lane Grp Cap (vph)	292	955	413	192	761	332	272	1111	493	314	1181	529
v/s Ratio Prot	c0.18	0.20		0.13	c0.20		0.17	0.31		c0.20	c0.36	
v/s Ratio Perm			0.13			0.06			0.09			0.15
v/c Ratio	1.13	0.74	0.47	1.25	0.93	0.30	1.13	0.99	0.29	1.16	1.06	0.43
Uniform Delay, d1	54.5	43.7	40.2	58.0	50.3	43.2	55.2	44.4	33.7	53.7	43.1	33.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.13	0.92	0.86
Incremental Delay, d2	91.3	2.8	0.5	148.1	17.2	0.3	93.8	24.5	1.5	98.2	42.5	2.4
Delay (s)	145.8	46.5	40.7	206.1	67.5	43.5	149.0	68.9	35.2	159.1	81.9	31.1
Level of Service	F	D	D	F	E	D	F	E	D	F	F	C
Approach Delay (s)		67.4			88.4			80.3			88.7	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	81.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.2
Intersection Capacity Utilization	99.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	225	846	918	145	212	270
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1881	1841		1805	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1881	1841		1805	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	242	910	987	156	228	290
RTOR Reduction (vph)	0	0	6	0	0	243
Lane Group Flow (vph)	242	910	1137	0	228	47
Confl. Peds. (#/hr)				6	3	
Confl. Bikes (#/hr)	1		2			
Heavy Vehicles (%)	2%	1%	1%	0%	0%	2%
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.5	66.7	48.2		14.5	14.5
Effective Green, g (s)	14.5	66.7	48.2		14.5	14.5
Actuated g/C Ratio	0.16	0.74	0.54		0.16	0.16
Clearance Time (s)	4.0	4.8	4.8		4.0	4.0
Vehicle Extension (s)	2.5	3.0	3.0		2.5	2.5
Lane Grp Cap (vph)	285	1394	986		291	255
v/s Ratio Prot	c0.14	0.48	c0.62		c0.13	
v/s Ratio Perm						0.03
v/c Ratio	0.85	0.65	1.15		0.78	0.18
Uniform Delay, d1	36.7	5.8	20.9		36.2	32.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	20.1	2.4	80.6		12.5	0.3
Delay (s)	56.8	8.2	101.5		48.7	32.9
Level of Service	E	A	F		D	C
Approach Delay (s)		18.4	101.5		39.8	
Approach LOS		B	F		D	

Intersection Summary			
HCM Average Control Delay	56.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	81	372	95	334	267	89	79	373	498	74	331	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		5.0	5.0			6.0	6.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.88	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.96			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1736	1755		1770	1783			1843	2814	1752	1767	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1736	1755		1770	1783			1843	2814	1752	1767	
Peak-hour factor, PHF	0.88	0.88	0.88	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90
Adj. Flow (vph)	92	423	108	352	281	94	83	393	524	82	368	41
RTOR Reduction (vph)	0	4	0	0	6	0	0	0	158	0	2	0
Lane Group Flow (vph)	92	527	0	352	369	0	0	476	366	82	407	0
Confl. Peds. (#/hr)	4		1	1		4	5		4	4		5
Confl. Bikes (#/hr)								3	1			
Heavy Vehicles (%)	4%	2%	14%	2%	2%	0%	3%	2%	1%	3%	6%	0%
Turn Type	Prot			Prot			Split		Prot	Split		
Protected Phases	5	2		1	6		8	8	8	4	4	
Permitted Phases												
Actuated Green, G (s)	14.7	52.0		36.0	73.8			46.0	46.0	40.0	40.0	
Effective Green, g (s)	14.7	52.0		36.0	73.8			46.0	46.0	40.0	40.0	
Actuated g/C Ratio	0.08	0.27		0.18	0.38			0.24	0.24	0.21	0.21	
Clearance Time (s)	4.5	5.0		5.0	5.0			6.0	6.0	5.0	5.0	
Vehicle Extension (s)	2.5	4.0		2.5	4.0			2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	131	468		327	675			435	664	359	362	
v/s Ratio Prot	0.05	c0.30		c0.20	0.21			c0.26	0.13	0.05	c0.23	
v/s Ratio Perm												
v/c Ratio	0.70	1.13		1.08	0.55			1.09	0.55	0.23	1.12	
Uniform Delay, d1	88.0	71.5		79.5	47.5			74.5	65.4	64.6	77.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.6	80.5		71.6	1.1			71.1	0.8	0.2	85.0	
Delay (s)	102.6	152.0		151.1	48.6			145.6	66.2	64.9	162.5	
Level of Service	F	F		F	D			F	E	E	F	
Approach Delay (s)		144.7			98.3			104.0			146.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	118.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	195.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	105.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	63	897	31	368	815	179	29	39	239	477	146	75
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97			0.89		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (prot)	1719	1845		1656	1810			1611		1787	1746	
Flt Permitted	0.95	1.00		0.95	1.00			1.00		0.95	1.00	
Satd. Flow (perm)	1719	1845		1656	1810			1611		1787	1746	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.89	0.90	0.90	0.90
Adj. Flow (vph)	66	944	33	387	858	188	32	43	269	530	162	83
RTOR Reduction (vph)	0	1	0	0	4	0	0	82	0	0	11	0
Lane Group Flow (vph)	66	976	0	387	1042	0	0	262	0	530	234	0
Confl. Peds. (#/hr)	2		3	3		2			1	1		
Confl. Bikes (#/hr)		1								1		
Heavy Vehicles (%)	5%	2%	12%	9%	2%	0%	8%	12%	1%	1%	5%	0%
Turn Type	Prot			Prot			Split			Split		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	9.6	55.9		25.0	71.3			27.6		30.0	30.0	
Effective Green, g (s)	9.6	55.9		25.0	71.3			27.6		30.0	30.0	
Actuated g/C Ratio	0.06	0.35		0.16	0.45			0.18		0.19	0.19	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0			2.5		2.5	2.5	
Lane Grp Cap (vph)	105	655		263	819			282		340	333	
v/s Ratio Prot	0.04	c0.53		c0.23	0.58			c0.16		c0.30	0.13	
v/s Ratio Perm												
v/c Ratio	0.63	1.49		1.47	1.27			0.93		1.56	0.70	
Uniform Delay, d1	72.2	50.8		66.2	43.1			64.0		63.8	59.6	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	9.8	228.8		231.7	131.9			34.6		265.5	6.1	
Delay (s)	82.0	279.6		298.0	175.0			98.5		329.2	65.7	
Level of Service	F	F		F	F			F		F	E	
Approach Delay (s)		267.1			208.2			98.5			245.9	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	222.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.39		
Actuated Cycle Length (s)	157.5	Sum of lost time (s)	19.0
Intersection Capacity Utilization	130.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	2270	199	121	1341	20	104	68	53	29	113	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.97	1.00		0.99	1.00
Satd. Flow (prot)	1703	3539	1599	1805	3539	1380		1832	1495		1881	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.57	1.00		0.76	1.00
Satd. Flow (perm)	1703	3539	1599	1805	3539	1380		1080	1495		1448	1547
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	34	2389	209	127	1412	21	113	74	58	32	123	53
RTOR Reduction (vph)	0	0	22	0	0	4	0	0	18	0	0	31
Lane Group Flow (vph)	34	2389	187	127	1412	17	0	187	40	0	155	22
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	6%	2%	1%	0%	2%	17%	1%	0%	8%	0%	0%	3%
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	6.6	71.7	71.7	13.3	78.4	78.4		20.5	20.5		20.5	20.5
Effective Green, g (s)	6.6	71.7	71.7	13.3	78.4	78.4		20.5	20.5		20.5	20.5
Actuated g/C Ratio	0.05	0.60	0.60	0.11	0.65	0.65		0.17	0.17		0.17	0.17
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0		4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	94	2115	955	200	2312	902		185	255		247	264
v/s Ratio Prot	0.02	c0.68		0.07	c0.40							
v/s Ratio Perm			0.12			0.01		c0.17	0.03		0.11	0.01
v/c Ratio	0.36	1.13	0.20	0.64	0.61	0.02		1.01	0.16		0.63	0.08
Uniform Delay, d1	54.7	24.1	11.0	51.0	12.0	7.3		49.8	42.4		46.2	41.9
Progression Factor	1.00	1.00	1.00	1.11	0.39	0.11		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.7	65.0	0.5	4.0	0.8	0.0		69.0	0.4		5.6	0.2
Delay (s)	56.4	89.1	11.5	60.6	5.6	0.8		118.8	42.8		51.8	42.0
Level of Service	E	F	B	E	A	A		F	D		D	D
Approach Delay (s)		82.5			10.0			100.8			49.3	
Approach LOS		F			A			F			D	

Intersection Summary			
HCM Average Control Delay	57.6	HCM Level of Service	E
HCM Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	97.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	5	1917	404	212	1285	63	174	111	176	315	329	13
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.91		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3505	1583	1736	3505	1464	1787	1698		1735	1762	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00		0.43	1.00	
Satd. Flow (perm)	1805	3505	1583	1736	3505	1464	664	1698		776	1762	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	5	2018	425	223	1353	66	185	118	187	335	350	14
RTOR Reduction (vph)	0	0	84	0	0	19	0	47	0	0	1	0
Lane Group Flow (vph)	5	2018	341	223	1353	47	185	258	0	335	363	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)						1		1			2	
Heavy Vehicles (%)	0%	3%	2%	4%	3%	8%	1%	2%	0%	4%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.8	52.5	52.5	11.0	62.7	62.7	42.0	42.0		42.0	42.0	
Effective Green, g (s)	0.8	52.5	52.5	11.0	62.7	62.7	42.0	42.0		42.0	42.0	
Actuated g/C Ratio	0.01	0.44	0.44	0.09	0.52	0.52	0.35	0.35		0.35	0.35	
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.3	5.0	5.0	2.3	5.0	5.0	3.0	3.0		3.5	3.5	
Lane Grp Cap (vph)	12	1533	693	159	1831	765	232	594		272	617	
v/s Ratio Prot	0.00	c0.58		c0.13	0.39			0.15			0.21	
v/s Ratio Perm			0.22			0.03	0.28			c0.43		
v/c Ratio	0.42	1.32	0.49	1.40	0.74	0.06	0.80	0.43		1.23	0.59	
Uniform Delay, d1	59.4	33.8	24.2	54.5	22.3	14.1	35.2	29.9		39.0	31.9	
Progression Factor	1.12	0.71	0.69	0.96	1.60	2.88	1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.2	142.8	0.2	200.3	1.5	0.1	17.1	0.5		132.0	1.5	
Delay (s)	67.7	166.6	16.8	252.4	37.1	40.8	52.3	30.4		171.0	33.5	
Level of Service	E	F	B	F	D	D	D	C		F	C	
Approach Delay (s)		140.4			66.5			38.7			99.4	
Approach LOS		F			E			D			F	

Intersection Summary			
HCM Average Control Delay	102.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	115.5%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	33	13	44	34	39	64	35	394	33	172	715	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Util. Factor		0.95			1.00	1.00		0.95			0.95	
Frpb, ped/bikes		0.99			1.00	1.00		1.00			1.00	
Flpb, ped/bikes		1.00			1.00	1.00		1.00			1.00	
Frt		0.93			1.00	0.85		0.99			0.99	
Flt Protected		0.98			0.98	1.00		1.00			0.99	
Satd. Flow (prot)		3198			1233	1583		3436			3400	
Flt Permitted		0.87			0.87	1.00		0.83			0.76	
Satd. Flow (perm)		2844			1098	1583		2863			2596	
Peak-hour factor, PHF	0.89	0.89	0.89	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	37	15	49	38	43	71	39	438	37	191	794	59
RTOR Reduction (vph)	0	29	0	0	0	43	0	14	0	0	11	0
Lane Group Flow (vph)	0	72	0	0	81	28	0	500	0	0	1033	0
Confl. Peds. (#/hr)			1	1			1					1
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	0%	8%	2%	7%	89%	2%	34%	1%	0%	3%	1%	51%
Turn Type	Perm			Perm		Perm	Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8		8	2			6		
Actuated Green, G (s)		16.0			16.0	16.0		16.0			16.0	
Effective Green, g (s)		16.0			16.0	16.0		16.0			16.0	
Actuated g/C Ratio		0.40			0.40	0.40		0.40			0.40	
Clearance Time (s)		4.0			4.0	4.0		4.0			4.0	
Lane Grp Cap (vph)		1138			439	633		1145			1038	
v/s Ratio Prot												
v/s Ratio Perm		0.03			c0.07	0.02		0.17			c0.40	
v/c Ratio		0.06			0.18	0.04		0.44			1.00	
Uniform Delay, d1		7.4			7.8	7.3		8.7			12.0	
Progression Factor		1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2		0.1			0.9	0.1		1.2			26.8	
Delay (s)		7.5			8.7	7.5		9.9			38.8	
Level of Service		A			A	A		A			D	
Approach Delay (s)		7.5			8.1			9.9			38.8	
Approach LOS		A			A			A			D	

Intersection Summary			
HCM Average Control Delay	26.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	2822	36	454	1524	108	52	15	466	213	31	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	3505	1615	1626	3471	1428	1805	1696	1583	3335	1776	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	3505	1615	1626	3471	1428	1805	1696	1583	3335	1776	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	41	2971	38	478	1604	114	55	16	496	227	33	43
RTOR Reduction (vph)	0	0	4	0	0	54	0	0	274	0	0	39
Lane Group Flow (vph)	41	2971	34	478	1604	60	55	16	222	227	33	4
Confl. Peds. (#/hr)	4					4	6					6
Heavy Vehicles (%)	7%	3%	0%	11%	4%	10%	0%	12%	2%	5%	7%	2%
Turn Type	Prot		Perm	Prot		Perm	Split		Prot	Split		Prot
Protected Phases	5	2		1	6		8	8	8	4	4	4
Permitted Phases			2			6						
Actuated Green, G (s)	7.2	49.0	49.0	21.4	63.2	63.2	20.0	20.0	20.0	11.1	11.1	11.1
Effective Green, g (s)	7.2	49.0	49.0	21.4	63.2	63.2	20.0	20.0	20.0	11.1	11.1	11.1
Actuated g/C Ratio	0.06	0.41	0.41	0.18	0.53	0.53	0.17	0.17	0.17	0.09	0.09	0.09
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	5.0	5.0	2.5	5.0	5.0	2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	101	1431	659	290	1828	752	301	283	264	308	164	146
v/s Ratio Prot	0.02	c0.85		c0.29	0.46		0.03	0.01	c0.14	c0.07	0.02	0.00
v/s Ratio Perm			0.02			0.04						
v/c Ratio	0.41	2.08	0.05	1.65	0.88	0.08	0.18	0.06	0.84	0.74	0.20	0.03
Uniform Delay, d1	54.3	35.5	21.5	49.3	25.0	14.0	43.0	42.1	48.5	53.0	50.4	49.5
Progression Factor	1.00	0.66	0.55	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	484.5	0.0	306.7	6.3	0.2	0.2	0.1	20.4	8.4	0.4	0.1
Delay (s)	54.3	507.8	11.9	356.0	31.3	14.2	43.2	42.1	68.9	61.4	50.8	49.6
Level of Service	D	F	B	F	C	B	D	D	E	E	D	D
Approach Delay (s)		495.5			101.1			65.6			58.6	
Approach LOS		F			F			E			E	

Intersection Summary			
HCM Average Control Delay	292.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.60		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	18.5
Intersection Capacity Utilization	130.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	438	211	410	405	277	179	1206	334	174	1351	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.8		4.0	4.0			5.4	5.4	4.0	5.4	
Lane Util. Factor		0.95		0.97	0.95			0.95	1.00	1.00	0.95	
Frt		0.95		1.00	0.94			1.00	0.85	1.00	1.00	
Flt Protected		1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)		3367		3467	3354			3516	1615	1787	3505	
Flt Permitted		1.00		0.95	1.00			0.54	1.00	0.95	1.00	
Satd. Flow (perm)		3367		3467	3354			1896	1615	1787	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.92	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	0	476	229	432	440	292	195	1269	352	183	1422	0
RTOR Reduction (vph)	0	38	0	0	75	0	0	0	29	0	0	0
Lane Group Flow (vph)	0	667	0	432	657	0	0	1464	323	183	1422	0
Heavy Vehicles (%)	2%	2%	2%	1%	2%	0%	2%	2%	0%	1%	3%	2%
Turn Type	Perm			Prot			Perm		Perm	Prot		
Protected Phases		4!		7!	8			6		5	2	
Permitted Phases	4						6		6			
Actuated Green, G (s)		37.2		12.0	22.0			88.6	88.6	10.0	102.6	
Effective Green, g (s)		37.2		12.0	22.0			88.6	88.6	10.0	102.6	
Actuated g/C Ratio		0.25		0.08	0.15			0.59	0.59	0.07	0.68	
Clearance Time (s)		4.8		4.0	4.0			5.4	5.4	4.0	5.4	
Vehicle Extension (s)		2.3		2.3	3.0			4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)		835		277	492			1120	954	119	2397	
v/s Ratio Prot		0.20		c0.12	c0.20					c0.10	0.41	
v/s Ratio Perm								c0.77	0.20			
v/c Ratio		0.80		1.56	1.34			1.31	0.34	1.54	0.59	
Uniform Delay, d1		52.9		69.0	64.0			30.7	15.7	70.0	12.6	
Progression Factor		1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2		5.1		268.8	164.2			144.7	1.0	279.5	1.1	
Delay (s)		58.0		337.8	228.2			175.4	16.7	349.5	13.7	
Level of Service		E		F	F			F	B	F	B	
Approach Delay (s)		58.0			268.9			144.7			52.0	
Approach LOS		E			F			F			D	

Intersection Summary			
HCM Average Control Delay	132.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.35		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	122.8%	ICU Level of Service	H
Analysis Period (min)	15		

! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	711	88	99	890	99	99	11	88	88	11	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	0.86		1.00	0.91	1.00	1.00	1.00		0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	1.00	0.99		1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00	0.99	1.00		0.99	1.00	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	0.87		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1805	6400		1805	5136	1615	1795	1625		3476	1900	1548
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.20	1.00		0.69	1.00	1.00
Satd. Flow (perm)	1805	6400		1805	5136	1615	378	1625		2517	1900	1548
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	93	748	93	104	937	104	106	12	95	95	12	106
RTOR Reduction (vph)	0	16	0	0	0	53	0	78	0	0	0	99
Lane Group Flow (vph)	93	825	0	104	937	51	106	29	0	95	12	7
Confl. Peds. (#/hr)			7	7			7		2	2		7
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			3			4	
Permitted Phases						6	3			4		4
Actuated Green, G (s)	9.1	53.6		9.7	54.2	54.2	20.0	20.0		7.7	7.7	7.7
Effective Green, g (s)	9.1	53.6		9.7	54.2	54.2	20.0	20.0		7.7	7.7	7.7
Actuated g/C Ratio	0.08	0.49		0.09	0.49	0.49	0.18	0.18		0.07	0.07	0.07
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	1.0	2.0		1.0	2.0	2.0	1.0	1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	149	3119		159	2531	796	69	295		176	133	108
v/s Ratio Prot	0.05	0.13		c0.06	c0.18			0.02			0.01	
v/s Ratio Perm						0.03	c0.28			c0.04		0.00
v/c Ratio	0.62	0.26		0.65	0.37	0.06	1.54	0.10		0.54	0.09	0.07
Uniform Delay, d1	48.8	16.6		48.5	17.3	14.6	45.0	37.5		49.4	47.9	47.8
Progression Factor	1.00	1.00		1.28	0.46	0.08	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	5.7	0.2		7.0	0.4	0.2	301.2	0.1		1.6	0.1	0.1
Delay (s)	54.5	16.8		68.9	8.4	1.3	346.2	37.5		51.0	48.0	47.9
Level of Service	D	B		E	A	A	F	D		D	D	D
Approach Delay (s)		20.6			13.2			191.1			49.3	
Approach LOS		C			B			F			D	

Intersection Summary			
HCM Average Control Delay	34.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	46.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	101	935	53	129	735	206	32	18	126	426	56	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5	4.5		5.0		5.0	5.0	5.0
Lane Util. Factor	0.97	0.86		0.97	0.91	1.00		0.95		0.97	0.95	0.95
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	0.99	0.97
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	0.99		1.00	1.00	0.85		0.89		1.00	0.94	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.99		0.95	1.00	1.00
Satd. Flow (prot)	3502	6483		3502	5136	1615		3158		3502	1675	1477
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.64		0.63	1.00	1.00
Satd. Flow (perm)	3502	6483		3502	5136	1615		2051		2312	1675	1477
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	106	984	56	136	774	217	36	20	142	479	63	134
RTOR Reduction (vph)	0	6	0	0	0	119	0	132	0	0	23	71
Lane Group Flow (vph)	106	1034	0	136	774	98	0	66	0	479	80	23
Confl. Peds. (#/hr)							12					12
Confl. Bikes (#/hr)											1	1
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	1%	0%	0%	1%
Turn Type	Prot			Prot		Perm	Perm			Perm		Perm
Protected Phases	5	2		1	6			3			4	
Permitted Phases						6	3			4		4
Actuated Green, G (s)	6.6	48.4		7.7	49.5	49.5		8.1		26.8	26.8	26.8
Effective Green, g (s)	6.6	48.4		7.7	49.5	49.5		8.1		26.8	26.8	26.8
Actuated g/C Ratio	0.06	0.44		0.07	0.45	0.45		0.07		0.24	0.24	0.24
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5		5.0		5.0	5.0	5.0
Vehicle Extension (s)	1.0	2.0		1.0	2.0	2.0		1.0		1.0	1.0	1.0
Lane Grp Cap (vph)	210	2853		245	2311	727		151		563	408	360
v/s Ratio Prot	0.03	c0.16		c0.04	0.15						0.05	
v/s Ratio Perm						0.06		c0.03		c0.21		0.02
v/c Ratio	0.50	0.36		0.56	0.33	0.13		0.44		0.85	0.20	0.06
Uniform Delay, d1	50.1	20.5		49.5	19.6	17.7		48.8		39.7	33.0	32.0
Progression Factor	1.26	0.62		1.29	0.52	0.18		1.00		1.00	1.00	1.00
Incremental Delay, d2	0.7	0.4		1.5	0.4	0.4		0.7		11.4	0.1	0.0
Delay (s)	63.7	13.1		65.2	10.5	3.5		49.5		51.1	33.1	32.0
Level of Service	E	B		E	B	A		D		D	C	C
Approach Delay (s)		17.8			15.7			49.5			45.7	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	25.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	19.0
Intersection Capacity Utilization	52.0%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1642	69	114	1026	171	198
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5		4.5	4.5	5.0	5.0
Lane Util. Factor	0.86		0.97	0.91	1.00	1.00
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	6491		3502	5136	1787	1583
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	6491		3502	5136	1787	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.94	0.94
Adj. Flow (vph)	1728	73	120	1080	182	211
RTOR Reduction (vph)	5	0	0	0	0	161
Lane Group Flow (vph)	1796	0	120	1080	182	50
Confl. Peds. (#/hr)		4	4		2	9
Heavy Vehicles (%)	0%	0%	0%	1%	1%	2%
Turn Type			Prot			Prot
Protected Phases	2		1	6	8	8
Permitted Phases						
Actuated Green, G (s)	63.3		6.7	74.5	26.0	26.0
Effective Green, g (s)	63.3		6.7	74.5	26.0	26.0
Actuated g/C Ratio	0.58		0.06	0.68	0.24	0.24
Clearance Time (s)	4.5		4.5	4.5	5.0	5.0
Vehicle Extension (s)	2.0		0.5	2.0	0.5	0.5
Lane Grp Cap (vph)	3735		213	3478	422	374
v/s Ratio Prot	c0.28		c0.03	0.21	c0.10	0.03
v/s Ratio Perm						
v/c Ratio	0.48		0.56	0.31	0.43	0.13
Uniform Delay, d1	13.7		50.2	7.3	35.7	33.1
Progression Factor	0.67		1.20	0.49	1.00	1.00
Incremental Delay, d2	0.4		1.9	0.2	3.2	0.7
Delay (s)	9.5		62.1	3.8	38.9	33.9
Level of Service	A		E	A	D	C
Approach Delay (s)	9.5			9.6	36.2	
Approach LOS	A			A	D	

Intersection Summary			
HCM Average Control Delay	12.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.0
Intersection Capacity Utilization	65.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1497	394	512	900	0	0	0	0	690	295	268
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Lane Util. Factor		0.91	1.00	1.00	0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.96	1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (prot)		5136	1554	1770	3610					1626	3349	1615
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.97	1.00
Satd. Flow (perm)		5136	1554	1770	3610					1626	3349	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1576	415	539	947	0	0	0	0	726	311	282
RTOR Reduction (vph)	0	0	85	0	0	0	0	0	0	0	0	131
Lane Group Flow (vph)	0	1576	330	539	947	0	0	0	0	363	674	151
Confl. Peds. (#/hr)	7		16	16		7	12					12
Confl. Bikes (#/hr)								7			1	
Heavy Vehicles (%)	0%	1%	0%	2%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type			Perm	Prot						Split		Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		35.4	35.4	33.5	74.4					24.6	24.6	24.6
Effective Green, g (s)		35.4	35.4	33.5	74.4					24.6	24.6	24.6
Actuated g/C Ratio		0.32	0.32	0.30	0.68					0.22	0.22	0.22
Clearance Time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Vehicle Extension (s)		4.8	4.8	2.3	4.0					2.3	2.3	2.3
Lane Grp Cap (vph)		1653	500	539	2442					364	749	361
v/s Ratio Prot		c0.31		c0.30	0.26					c0.22	0.20	0.09
v/s Ratio Perm			0.21									
v/c Ratio		0.95	0.66	1.00	0.39					1.00	0.96dl	0.42
Uniform Delay, d1		36.5	32.1	38.2	7.8					42.7	41.5	36.6
Progression Factor		0.71	0.65	0.59	0.15					1.00	1.00	1.00
Incremental Delay, d2		12.6	6.1	30.5	0.3					46.1	13.5	0.5
Delay (s)		38.4	27.0	53.0	1.5					88.8	55.0	37.0
Level of Service		D	C	D	A					F	E	D
Approach Delay (s)		36.1			20.2			0.0			60.5	
Approach LOS		D			C			A			E	

Intersection Summary			
HCM Average Control Delay	37.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	518	1777	0	0	1264	598	183	5	370	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Lane Util. Factor	0.97	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	0.98	0.98	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3502	3574			3574	1555	1676	1686	1568			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3502	3574			3574	1555	1676	1686	1568			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	545	1871	0	0	1331	629	193	5	389	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	307	0	0	13	0	0	0
Lane Group Flow (vph)	545	1871	0	0	1331	322	98	100	376	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	11					11
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	0%	0%	3%	0%	0%	0%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	19.4	71.6			48.2	48.2	28.9	28.9	28.9			
Effective Green, g (s)	19.4	71.6			48.2	48.2	28.9	28.9	28.9			
Actuated g/C Ratio	0.18	0.65			0.44	0.44	0.26	0.26	0.26			
Clearance Time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Vehicle Extension (s)	2.3	4.0			4.8	4.8	2.3	2.3	2.3			
Lane Grp Cap (vph)	618	2326			1566	681	440	443	412			
v/s Ratio Prot	c0.16	0.52			c0.37							
v/s Ratio Perm						0.21	0.06	0.06	c0.24			
v/c Ratio	0.88	0.80			0.85	0.47	0.22	0.23	0.91			
Uniform Delay, d1	44.2	14.1			27.7	21.9	31.8	31.8	39.3			
Progression Factor	0.73	1.04			0.68	0.27	1.00	1.00	1.00			
Incremental Delay, d2	6.2	1.3			3.6	1.4	0.1	0.2	23.9			
Delay (s)	38.7	15.8			22.5	7.3	31.9	31.9	63.3			
Level of Service	D	B			C	A	C	C	E			
Approach Delay (s)		21.0			17.6			52.7			0.0	
Approach LOS		C			B			D			A	

Intersection Summary			
HCM Average Control Delay	23.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	90.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	385	1278	99	29	1062	263	272	76	56	589	87	450
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	0.97	0.95	1.00	1.00	0.95	1.00	0.95	0.95		0.95	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98		0.95	0.96	1.00
Satd. Flow (prot)	3400	3574	1569	1805	3574	1572	1715	1650		1698	1714	1540
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98		0.95	0.96	1.00
Satd. Flow (perm)	3400	3574	1569	1805	3574	1572	1715	1650		1698	1714	1540
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	393	1304	101	30	1084	268	278	78	57	601	89	459
RTOR Reduction (vph)	0	0	28	0	0	147	0	14	0	0	0	188
Lane Group Flow (vph)	393	1304	73	30	1084	121	208	191	0	343	347	271
Confl. Peds. (#/hr)	3		3	3		3	4		1	1		4
Confl. Bikes (#/hr)					1			1				
Heavy Vehicles (%)	3%	1%	0%	0%	1%	1%	0%	7%	0%	1%	3%	3%
Turn Type	Prot		Perm	Prot		Perm	Split			Split		Perm
Protected Phases	5	2		1	6		8	8		7	7	
Permitted Phases			2			6						7
Actuated Green, G (s)	17.1	51.1	51.1	3.5	37.0	37.0	16.4	16.4		21.5	21.5	21.5
Effective Green, g (s)	17.1	51.1	51.1	3.5	37.0	37.0	16.4	16.4		21.5	21.5	21.5
Actuated g/C Ratio	0.16	0.46	0.46	0.03	0.34	0.34	0.15	0.15		0.20	0.20	0.20
Clearance Time (s)	4.5	4.5	4.5	4.0	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	0.5	2.7	2.7	0.5	2.7	2.7	0.5	0.5		0.5	0.5	0.5
Lane Grp Cap (vph)	529	1660	729	57	1202	529	256	246		332	335	301
v/s Ratio Prot	c0.12	c0.36		0.02	c0.30		c0.12	0.12		0.20	c0.20	
v/s Ratio Perm			0.05			0.08						0.18
v/c Ratio	0.74	0.79	0.10	0.53	0.90	0.23	0.81	0.77		1.03	1.04	0.90
Uniform Delay, d1	44.4	24.8	16.5	52.4	34.8	26.2	45.3	45.0		44.2	44.2	43.2
Progression Factor	1.13	1.07	1.38	1.09	0.70	0.77	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.8	2.2	0.2	3.4	9.7	0.9	16.7	12.9		58.2	58.7	26.9
Delay (s)	53.1	28.6	22.9	60.7	34.0	21.2	62.0	58.0		102.5	103.0	70.1
Level of Service	D	C	C	E	C	C	E	E		F	F	E
Approach Delay (s)		33.7			32.1			60.0			89.7	
Approach LOS		C			C			E			F	

Intersection Summary			
HCM Average Control Delay	49.1	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	22.5
Intersection Capacity Utilization	85.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	1752	31	23	1095	56	192	16	34	127	8	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.98	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00		0.99	1.00	
Frt	1.00	1.00		1.00	0.99		1.00	0.90		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3556		1597	3576		1773	1684		1778	1596	
Flt Permitted	0.95	1.00		0.95	1.00		0.68	1.00		0.72	1.00	
Satd. Flow (perm)	1805	3556		1597	3576		1260	1684		1351	1596	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	56	1844	33	24	1153	59	206	17	37	137	9	88
RTOR Reduction (vph)	0	1	0	0	3	0	0	30	0	0	71	0
Lane Group Flow (vph)	56	1876	0	24	1209	0	206	24	0	137	26	0
Confl. Peds. (#/hr)	2		2	2		2	6		4	4		6
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	1%	13%	13%	0%	2%	1%	0%	0%	1%	0%	1%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	5.6	72.9		2.7	70.5		20.9	20.9		20.9	20.9	
Effective Green, g (s)	5.6	72.9		2.7	70.5		20.9	20.9		20.9	20.9	
Actuated g/C Ratio	0.05	0.66		0.02	0.64		0.19	0.19		0.19	0.19	
Clearance Time (s)	4.0	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	0.5	2.7		0.5	3.2		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	92	2357		39	2292		239	320		257	303	
v/s Ratio Prot	c0.03	c0.53		0.02	0.34			0.01			0.02	
v/s Ratio Perm							c0.16			0.10		
v/c Ratio	0.61	0.80		0.62	0.53		0.86	0.08		0.53	0.08	
Uniform Delay, d1	51.1	13.2		53.1	10.7		43.2	36.6		40.2	36.7	
Progression Factor	1.24	0.49		0.73	1.95		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.0	1.5		17.5	0.8		25.1	0.0		1.1	0.0	
Delay (s)	67.4	8.1		56.3	21.7		68.2	36.6		41.2	36.7	
Level of Service	E	A		E	C		E	D		D	D	
Approach Delay (s)		9.8			22.4			61.7			39.4	
Approach LOS		A			C			E			D	

Intersection Summary			
HCM Average Control Delay	19.6	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.5
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	2074	116	394	995	45	1026
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0		4.5	5.0	4.5	4.5
Lane Util. Factor	0.91		0.97	0.95	1.00	0.88
Frpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00		1.00	1.00	1.00	1.00
Frt	0.99		1.00	1.00	1.00	0.85
Flt Protected	1.00		0.95	1.00	0.95	1.00
Satd. Flow (prot)	5092		3400	3574	1736	2842
Flt Permitted	1.00		0.95	1.00	0.95	1.00
Satd. Flow (perm)	5092		3400	3574	1736	2842
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	2183	122	415	1047	47	1080
RTOR Reduction (vph)	5	0	0	0	0	317
Lane Group Flow (vph)	2300	0	415	1047	47	763
Confl. Peds. (#/hr)						1
Confl. Bikes (#/hr)	1		1			
Heavy Vehicles (%)	1%	2%	3%	1%	4%	0%
Turn Type			Prot			Prot
Protected Phases	2		1	6	8	8
Permitted Phases						
Actuated Green, G (s)	50.2		14.3	71.0	29.5	29.5
Effective Green, g (s)	50.2		14.3	71.0	29.5	29.5
Actuated g/C Ratio	0.46		0.13	0.65	0.27	0.27
Clearance Time (s)	7.0		4.5	5.0	4.5	4.5
Vehicle Extension (s)	2.9		0.5	2.9	0.5	0.5
Lane Grp Cap (vph)	2324		442	2307	466	762
v/s Ratio Prot	c0.45		c0.12	0.29	0.03	c0.27
v/s Ratio Perm						
v/c Ratio	0.99		0.94	0.45	0.10	1.00
Uniform Delay, d1	29.6		47.4	9.8	30.3	40.2
Progression Factor	0.85		0.88	1.96	1.00	1.00
Incremental Delay, d2	13.9		25.6	0.6	0.4	33.0
Delay (s)	39.2		67.6	19.8	30.7	73.2
Level of Service	D		E	B	C	E
Approach Delay (s)	39.2			33.4	71.4	
Approach LOS	D			C	E	

Intersection Summary			
HCM Average Control Delay	44.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	88	2951	23	34	1301	147	21	0	19	185	2	104
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5		4.5	5.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.91		1.00	0.91		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.85		1.00	0.85	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	5180		1805	5049		1801	1594		1803	1581	
Flt Permitted	0.95	1.00		0.95	1.00		0.63	1.00		0.74	1.00	
Satd. Flow (perm)	1805	5180		1805	5049		1186	1594		1411	1581	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	93	3106	24	36	1369	155	23	0	21	201	2	113
RTOR Reduction (vph)	0	1	0	0	10	0	0	17	0	0	93	0
Lane Group Flow (vph)	93	3129	0	36	1514	0	23	4	0	201	22	0
Confl. Peds. (#/hr)	2		3	3		2	2		1	1		2
Confl. Bikes (#/hr)		1			1					1		
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	7.7	72.6		3.2	68.1		19.7	19.7		19.7	19.7	
Effective Green, g (s)	7.7	72.6		3.2	68.1		19.7	19.7		19.7	19.7	
Actuated g/C Ratio	0.07	0.66		0.03	0.62		0.18	0.18		0.18	0.18	
Clearance Time (s)	4.5	5.5		4.5	5.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	126	3419		53	3126		212	285		253	283	
v/s Ratio Prot	c0.05	c0.60		0.02	0.30			0.00			0.01	
v/s Ratio Perm							0.02			c0.14		
v/c Ratio	0.74	0.92		0.68	0.48		0.11	0.01		0.79	0.08	
Uniform Delay, d1	50.2	16.1		52.9	11.4		37.8	37.2		43.2	37.6	
Progression Factor	0.96	0.54		0.90	0.66		1.00	1.00		1.00	1.00	
Incremental Delay, d2	4.6	1.3		16.6	0.4		0.1	0.0		14.7	0.0	
Delay (s)	52.8	9.9		64.4	7.9		37.9	37.2		57.9	37.6	
Level of Service	D	A		E	A		D	D		E	D	
Approach Delay (s)		11.2			9.2			37.5			50.5	
Approach LOS		B			A			D			D	

Intersection Summary			
HCM Average Control Delay	13.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	642	2200	252	158	926	154	196	201	91	177	254	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91		1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5085		1787	3468		3467	1900	1615	1805	1881	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5085		1787	3468		3467	1900	1615	1805	1881	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	676	2316	265	166	975	162	211	216	98	190	273	182
RTOR Reduction (vph)	0	12	0	0	11	0	0	0	83	0	0	150
Lane Group Flow (vph)	676	2569	0	166	1126	0	211	216	15	190	273	32
Confl. Peds. (#/hr)			1	1			2		1	1		2
Heavy Vehicles (%)	0%	0%	2%	1%	2%	1%	1%	0%	0%	0%	1%	1%
Turn Type	Prot			Prot			Prot		Prot	Prot		Prot
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases												
Actuated Green, G (s)	24.3	46.0		14.9	36.6		9.3	17.1	17.1	12.0	19.3	19.3
Effective Green, g (s)	24.3	46.0		14.9	36.6		9.3	17.1	17.1	12.0	19.3	19.3
Actuated g/C Ratio	0.22	0.42		0.14	0.33		0.08	0.16	0.16	0.11	0.18	0.18
Clearance Time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	0.5	2.9		0.5	2.9		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	774	2126		242	1154		293	295	251	197	330	281
v/s Ratio Prot	c0.19	c0.51		0.09	0.32		0.06	0.11	0.01	c0.11	c0.15	0.02
v/s Ratio Perm												
v/c Ratio	0.87	1.21		0.69	0.98		0.72	0.73	0.06	0.96	0.83	0.11
Uniform Delay, d1	41.4	32.0		45.3	36.3		49.1	44.3	39.6	48.8	43.7	38.2
Progression Factor	1.28	1.07		1.17	0.73		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.3	96.0		5.6	19.7		7.2	7.8	0.0	53.2	14.8	0.1
Delay (s)	58.0	130.2		58.8	46.1		56.3	52.1	39.6	102.0	58.6	38.2
Level of Service	E	F		E	D		E	D	D	F	E	D
Approach Delay (s)		115.2			47.7			51.4			65.6	
Approach LOS		F			D			D			E	

Intersection Summary			
HCM Average Control Delay	88.4	HCM Level of Service	F
HCM Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	94.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	65	2169	145	166	1202	25	93	37	247	42	12	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	4.8		4.2	4.2	4.2	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	0.99	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	1.00	0.85	1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3574		1787	3561		1785	1900	1583	1796	1674	
Flt Permitted	0.95	1.00		0.95	1.00		0.73	1.00	1.00	0.73	1.00	
Satd. Flow (perm)	1805	3574		1787	3561		1363	1900	1583	1383	1674	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	68	2283	153	175	1265	26	99	39	263	45	13	36
RTOR Reduction (vph)	0	4	0	0	1	0	0	0	133	0	31	0
Lane Group Flow (vph)	68	2432	0	175	1290	0	99	39	130	45	18	0
Confl. Peds. (#/hr)	10					10	1		5	5		1
Confl. Bikes (#/hr)		2										
Heavy Vehicles (%)	0%	0%	1%	1%	1%	0%	1%	0%	2%	0%	0%	0%
Turn Type	Prot			Prot			Perm		Prot	Perm		
Protected Phases	5	2		1	6			8	8		4	
Permitted Phases							8			4		
Actuated Green, G (s)	6.4	64.7		18.4	76.7		13.9	13.9	13.9	14.1	14.1	
Effective Green, g (s)	6.4	64.7		18.4	76.7		13.9	13.9	13.9	14.1	14.1	
Actuated g/C Ratio	0.06	0.59		0.17	0.70		0.13	0.13	0.13	0.13	0.13	
Clearance Time (s)	4.0	4.8		4.0	4.8		4.2	4.2	4.2	4.0	4.0	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0	2.0	2.0	2.0	
Lane Grp Cap (vph)	105	2102		299	2483		172	240	200	177	215	
v/s Ratio Prot	0.04	c0.68		c0.10	0.36			0.02	c0.08		0.01	
v/s Ratio Perm							0.07			0.03		
v/c Ratio	0.65	1.16		0.59	0.52		0.58	0.16	0.65	0.25	0.08	
Uniform Delay, d1	50.7	22.6		42.3	7.9		45.3	42.9	45.7	43.2	42.2	
Progression Factor	1.44	0.56		1.32	0.43		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	71.3		1.7	0.7		2.9	0.1	5.7	0.3	0.1	
Delay (s)	73.8	83.9		57.5	4.1		48.2	43.0	51.4	43.5	42.3	
Level of Service	E	F		E	A		D	D	D	D	D	
Approach Delay (s)		83.6			10.5			49.8			42.9	
Approach LOS		F			B			D			D	

Intersection Summary			
HCM Average Control Delay	55.7	HCM Level of Service	E
HCM Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	98.1%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	1984	173	265	1163	20	149	2	195	13	8	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.92	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3525		1805	3564		1780	1528		1537	1728	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.36	1.00	
Satd. Flow (perm)	1770	3525		1805	3564		1395	1528		582	1728	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	27	2088	182	279	1224	21	160	2	210	14	9	11
RTOR Reduction (vph)	0	6	0	0	1	0	0	126	0	0	9	0
Lane Group Flow (vph)	27	2264	0	279	1244	0	160	86	0	14	11	0
Confl. Peds. (#/hr)	3		4	4		3	4		5	5		4
Confl. Bikes (#/hr)		2										
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%	1%	0%	4%	17%	0%	0%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.4	53.2		25.3	75.6		17.1	17.1		17.9	17.9	
Effective Green, g (s)	3.4	53.2		25.3	75.6		17.1	17.1		17.9	17.9	
Actuated g/C Ratio	0.03	0.48		0.23	0.69		0.16	0.16		0.16	0.16	
Clearance Time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	55	1705		415	2449		217	238		95	281	
v/s Ratio Prot	0.02	c0.64		c0.15	0.35			0.06			0.01	
v/s Ratio Perm							c0.11			0.02		
v/c Ratio	0.49	1.33		0.67	0.51		0.74	0.36		0.15	0.04	
Uniform Delay, d1	52.4	28.4		38.6	8.3		44.3	41.6		39.5	38.8	
Progression Factor	0.87	0.67		1.28	0.29		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	148.0		3.0	0.7		10.7	0.3		0.3	0.0	
Delay (s)	46.1	167.0		52.2	3.0		55.0	41.9		39.8	38.8	
Level of Service	D	F		D	A		D	D		D	D	
Approach Delay (s)		165.6			12.1			47.5			39.2	
Approach LOS		F			B			D			D	

Intersection Summary			
HCM Average Control Delay	98.8	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.4
Intersection Capacity Utilization	103.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	160	1268	191	77	914	43	134	153	165	58	67	89
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.8		4.0	4.5		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.92		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3610	1599	1805	3548		1787	1752		1805	1719	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1805	3610	1599	1805	3548		1787	1752		1805	1719	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	168	1335	201	81	962	45	143	163	176	62	71	95
RTOR Reduction (vph)	0	0	47	0	2	0	0	40	0	0	53	0
Lane Group Flow (vph)	168	1335	154	81	1005	0	143	299	0	62	113	0
Confl. Peds. (#/hr)	1		5	5		1	6					6
Confl. Bikes (#/hr)		1			2							
Heavy Vehicles (%)	0%	0%	1%	0%	1%	0%	1%	0%	0%	0%	0%	0%
Turn Type	Prot		Prot	Prot			Prot			Prot		
Protected Phases	5	2	2	1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	16.0	55.9	55.9	7.5	47.4		11.2	22.8		6.5	18.6	
Effective Green, g (s)	16.0	55.9	55.9	7.5	47.4		11.2	22.8		6.5	18.6	
Actuated g/C Ratio	0.15	0.51	0.51	0.07	0.43		0.10	0.21		0.06	0.17	
Clearance Time (s)	4.0	4.8	4.8	4.0	4.8		4.0	4.5		4.0	4.0	
Vehicle Extension (s)	1.0	1.0	1.0	1.0	1.0		1.0	1.0		1.0	1.0	
Lane Grp Cap (vph)	263	1835	813	123	1529		182	363		107	291	
v/s Ratio Prot	c0.09	c0.37	0.10	0.04	0.28		c0.08	c0.17		0.03	0.07	
v/s Ratio Perm												
v/c Ratio	0.64	0.73	0.19	0.66	0.66		0.79	0.82		0.58	0.39	
Uniform Delay, d1	44.3	21.1	14.7	50.0	24.8		48.2	41.7		50.4	40.6	
Progression Factor	0.99	1.34	1.81	1.44	0.38		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.2	0.0	6.4	1.5		18.3	13.3		4.7	0.3	
Delay (s)	44.0	28.6	26.7	78.3	11.1		66.5	55.0		55.1	40.9	
Level of Service	D	C	C	E	B		E	D		E	D	
Approach Delay (s)		29.9			16.1			58.4			44.8	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM Average Control Delay	30.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	75.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	273	1279	38	14	865	139	24	13	12	398	13	123
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.9		4.0	4.8		4.5	4.5		4.8	4.8	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00		1.00	0.98		1.00	0.93		1.00	0.86	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1752	3594		1805	3491		1802	1610		1750	1579	
Flt Permitted	0.95	1.00		0.95	1.00		0.63	1.00		0.74	1.00	
Satd. Flow (perm)	1752	3594		1805	3491		1186	1610		1362	1579	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	287	1346	40	15	911	146	27	15	13	447	15	138
RTOR Reduction (vph)	0	2	0	0	11	0	0	9	0	0	91	0
Lane Group Flow (vph)	287	1384	0	15	1046	0	27	19	0	447	62	0
Confl. Peds. (#/hr)	3					3	2		1	1		2
Heavy Vehicles (%)	3%	0%	0%	0%	1%	0%	0%	17%	0%	3%	0%	3%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	19.1	57.4		1.6	40.0		37.6	37.6		37.3	37.3	
Effective Green, g (s)	19.1	57.4		1.6	40.0		37.6	37.6		37.3	37.3	
Actuated g/C Ratio	0.17	0.52		0.01	0.36		0.34	0.34		0.34	0.34	
Clearance Time (s)	4.0	4.9		4.0	4.8		4.5	4.5		4.8	4.8	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	304	1875		26	1269		405	550		462	535	
v/s Ratio Prot	c0.16	0.39		0.01	c0.30			0.01			0.04	
v/s Ratio Perm							0.02			c0.33		
v/c Ratio	0.94	0.74		0.58	0.82		0.07	0.04		0.97	0.12	
Uniform Delay, d1	44.9	20.5		53.9	31.8		24.4	24.1		35.8	25.0	
Progression Factor	1.07	1.30		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	30.8	2.0		17.8	6.2		0.0	0.0		33.0	0.0	
Delay (s)	78.9	28.6		71.6	38.0		24.4	24.1		68.8	25.0	
Level of Service	E	C		E	D		C	C		E	C	
Approach Delay (s)		37.2			38.4			24.3			57.6	
Approach LOS		D			D			C			E	

Intersection Summary			
HCM Average Control Delay	41.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.6
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	842	359	412	7	220	13	293	395	10	15	357	557
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.0	5.0		4.0	5.4	5.4	4.0	5.4	5.4
Lane Util. Factor	0.97	0.95		0.97	0.95		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.92		1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3467	3288		3502	3576		1787	3610	1615	1805	3610	1615
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3467	3288		3502	3576		1787	3610	1615	1805	3610	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	886	378	434	7	232	14	326	439	11	17	397	619
RTOR Reduction (vph)	0	201	0	0	5	0	0	0	6	0	0	343
Lane Group Flow (vph)	886	611	0	7	241	0	326	439	5	17	397	276
Confl. Peds. (#/hr)	1					1						
Heavy Vehicles (%)	1%	1%	1%	0%	0%	0%	1%	0%	0%	0%	0%	0%
Turn Type	Prot			Prot			Prot		Prot	Prot		Prot
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases												
Actuated Green, G (s)	15.0	42.6		0.8	28.2		15.5	46.8	46.8	2.1	33.4	33.4
Effective Green, g (s)	15.0	42.6		0.8	28.2		15.5	46.8	46.8	2.1	33.4	33.4
Actuated g/C Ratio	0.14	0.39		0.01	0.26		0.14	0.42	0.42	0.02	0.30	0.30
Clearance Time (s)	4.0	4.8		4.0	5.0		4.0	5.4	5.4	4.0	5.4	5.4
Vehicle Extension (s)	0.5	2.9		0.5	2.9		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	471	1268		25	913		251	1529	684	34	1091	488
v/s Ratio Prot	c0.26	c0.19		0.00	0.07		c0.18	0.12	0.00	0.01	0.11	c0.17
v/s Ratio Perm												
v/c Ratio	1.88	0.48		0.28	0.26		1.30	0.29	0.01	0.50	0.36	0.57
Uniform Delay, d1	47.8	25.6		54.6	32.9		47.5	20.9	18.4	53.7	30.2	32.5
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	404.5	1.3		2.2	0.7		160.6	0.0	0.0	4.2	0.9	4.7
Delay (s)	452.2	26.9		56.8	33.6		208.1	20.9	18.4	57.8	31.2	37.2
Level of Service	F	C		E	C		F	C	B	E	C	D
Approach Delay (s)		248.9			34.2			99.5			35.2	
Approach LOS		F			C			F			D	

Intersection Summary			
HCM Average Control Delay	144.9	HCM Level of Service	F
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	110.5	Sum of lost time (s)	13.4
Intersection Capacity Utilization	86.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	21	16	47	29	15	15	28	412	45	39	503	23
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	23	18	52	32	17	17	31	458	50	43	559	26
Pedestrians		5						11			4	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1237	1233	588	1275	1221	487	589			508		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1237	1233	588	1275	1221	487	589			508		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.2		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.3		
p0 queue free %	82	89	90	71	90	97	97			96		
cM capacity (veh/h)	129	165	499	111	168	583	992			1032		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	93	66	539	628
Volume Left	23	32	31	43
Volume Right	52	17	50	26
cSH	238	157	992	1032
Volume to Capacity	0.39	0.42	0.03	0.04
Queue Length 95th (ft)	44	46	2	3
Control Delay (s)	29.6	43.4	0.9	1.1
Lane LOS	D	E	A	A
Approach Delay (s)	29.6	43.4	0.9	1.1
Approach LOS	D	E		

Intersection Summary			
Average Delay	5.1		
Intersection Capacity Utilization	55.1%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	26	412	251	50	340	162	99	81	46	120	146	18
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.95		1.00	0.95		1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3384		1805	3391		1805	1796		1703	1645	
Flt Permitted	0.95	1.00		0.95	1.00		0.64	1.00		0.67	1.00	
Satd. Flow (perm)	1805	3384		1805	3391		1223	1796		1197	1645	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	29	453	276	55	374	178	109	89	51	132	160	20
RTOR Reduction (vph)	0	98	0	0	52	0	0	22	0	0	5	0
Lane Group Flow (vph)	29	631	0	55	500	0	109	118	0	132	175	0
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	0%	0%	0%	6%	14%	10%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	2.1	16.2		3.7	17.8		11.1	11.1		11.1	11.1	
Effective Green, g (s)	2.1	16.2		3.7	17.8		11.1	11.1		11.1	11.1	
Actuated g/C Ratio	0.05	0.37		0.08	0.40		0.25	0.25		0.25	0.25	
Clearance Time (s)	4.0	4.5		4.0	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	3.0		2.5	3.0		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	86	1246		152	1372		309	453		302	415	
v/s Ratio Prot	0.02	c0.19		c0.03	0.15			0.07			0.11	
v/s Ratio Perm							0.09			c0.11		
v/c Ratio	0.34	0.51		0.36	0.36		0.35	0.26		0.44	0.42	
Uniform Delay, d1	20.3	10.8		19.0	9.1		13.5	13.2		13.8	13.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.7	0.3		1.1	0.2		0.5	0.2		0.7	0.5	
Delay (s)	22.0	11.1		20.1	9.3		14.0	13.4		14.6	14.3	
Level of Service	C	B		C	A		B	B		B	B	
Approach Delay (s)		11.5			10.3			13.7			14.4	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	11.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	44.0	Sum of lost time (s)	13.0
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	483	7	395	1	4	2	166	284	0	1	291	329
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.5		4.0	4.8	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95		1.00	0.95	
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	0.99	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		0.99	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00		1.00	0.92	
Flt Protected		0.95	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1791	1615		1881	1615	1770	3574		1794	3269	
Flt Permitted		0.73	1.00		0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1365	1615		1824	1615	1770	3574		1794	3269	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	525	8	429	1	4	2	180	309	0	1	316	358
RTOR Reduction (vph)	0	0	239	0	0	1	0	0	0	0	187	0
Lane Group Flow (vph)	0	533	190	0	5	1	180	309	0	1	487	0
Confl. Peds. (#/hr)	1		5	5		1	1		4	4		1
Confl. Bikes (#/hr)								1				
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Perm		Prot	Perm		Prot	Prot			Prot		
Protected Phases		8	8		4	4	1	6		5	2	
Permitted Phases	8			4								
Actuated Green, G (s)		38.0	38.0		38.0	38.0	13.1	34.5		0.6	21.7	
Effective Green, g (s)		38.0	38.0		38.0	38.0	13.1	34.5		0.6	21.7	
Actuated g/C Ratio		0.44	0.44		0.44	0.44	0.15	0.40		0.01	0.25	
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.5		4.0	4.8	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)		606	717		810	717	271	1440		13	829	
v/s Ratio Prot			0.12			0.00	c0.10	0.09		0.00	c0.15	
v/s Ratio Perm		c0.39			0.00							
v/c Ratio		0.88	0.27		0.01	0.00	0.66	0.21		0.08	0.59	
Uniform Delay, d1		21.7	15.0		13.3	13.2	34.2	16.7		42.2	28.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		13.6	0.1		0.0	0.0	5.4	0.1		1.8	1.1	
Delay (s)		35.3	15.1		13.3	13.2	39.6	16.8		44.1	29.1	
Level of Service		D	B		B	B	D	B		D	C	
Approach Delay (s)		26.3			13.3			25.2			29.1	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM Average Control Delay	26.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	85.6	Sum of lost time (s)	12.8
Intersection Capacity Utilization	72.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	939	242	479	736	0	0	0	0	163	6	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5					5.0	5.0	5.0
Lane Util. Factor		0.91	1.00	0.97	0.95					0.95	0.95	1.00
Frpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.96	1.00
Satd. Flow (prot)		5187	1599	3367	3574					1698	1696	1615
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.96	1.00
Satd. Flow (perm)		5187	1599	3367	3574					1698	1696	1615
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	0	1032	266	526	809	0	0	0	0	179	7	167
RTOR Reduction (vph)	0	0	132	0	0	0	0	0	0	0	0	134
Lane Group Flow (vph)	0	1032	134	526	809	0	0	0	0	93	93	33
Confl. Peds. (#/hr)	2		4	4		2	12					12
Confl. Bikes (#/hr)				1	1							
Heavy Vehicles (%)	0%	0%	1%	4%	1%	0%	0%	0%	0%	1%	11%	0%
Turn Type			Prot	Prot						Perm		Prot
Protected Phases		2	2	1	6						4	4
Permitted Phases										4		
Actuated Green, G (s)		40.3	40.3	16.9	61.2					9.3	9.3	9.3
Effective Green, g (s)		40.3	40.3	16.9	61.2					9.3	9.3	9.3
Actuated g/C Ratio		0.50	0.50	0.21	0.77					0.12	0.12	0.12
Clearance Time (s)		4.5	4.5	4.0	4.5					5.0	5.0	5.0
Vehicle Extension (s)		4.2	4.2	2.3	4.2					2.3	2.3	2.3
Lane Grp Cap (vph)		2613	805	711	2734					197	197	188
v/s Ratio Prot		c0.20	0.08	c0.16	0.23							0.02
v/s Ratio Perm										0.05	0.05	
v/c Ratio		0.39	0.17	0.74	0.30					0.47	0.47	0.17
Uniform Delay, d1		12.3	10.8	29.5	2.9					33.1	33.1	31.9
Progression Factor		1.00	1.00	0.99	0.11					1.00	1.00	1.00
Incremental Delay, d2		0.4	0.4	2.8	0.2					1.0	1.0	0.3
Delay (s)		12.7	11.2	32.1	0.5					34.1	34.1	32.1
Level of Service		B	B	C	A					C	C	C
Approach Delay (s)		12.4			13.0			0.0			33.2	
Approach LOS		B			B			A			C	

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.49		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	270	815	0	0	1004	298	208	412	684	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Lane Util. Factor	0.97	0.95			0.91	1.00	0.91	0.91	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3467	3610			5036	1599	1609	3382	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	3467	3610			5036	1599	1609	3382	1583			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	290	876	0	0	1080	320	224	443	735	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	192	0	0	35	0	0	0
Lane Group Flow (vph)	290	876	0	0	1080	128	202	465	700	0	0	0
Confl. Peds. (#/hr)			6	6			1					1
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	1%	0%	0%	0%	3%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot					Prot	Perm		Prot			
Protected Phases	5	2			6	6		8	8			
Permitted Phases							8					
Actuated Green, G (s)	7.6	34.1			22.5	22.5	36.4	36.4	36.4			
Effective Green, g (s)	7.6	34.1			22.5	22.5	36.4	36.4	36.4			
Actuated g/C Ratio	0.09	0.43			0.28	0.28	0.45	0.45	0.45			
Clearance Time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Vehicle Extension (s)	2.3	4.2			4.2	4.2	2.3	2.3	2.3			
Lane Grp Cap (vph)	329	1539			1416	450	732	1539	720			
v/s Ratio Prot	c0.08	0.24			c0.21	0.08			c0.44			
v/s Ratio Perm							0.13	0.14				
v/c Ratio	0.88	0.57			0.76	0.28	0.28	0.30	0.97			
Uniform Delay, d1	35.8	17.4			26.3	22.5	13.6	13.8	21.3			
Progression Factor	0.90	1.63			1.22	2.10	1.00	1.00	1.00			
Incremental Delay, d2	21.8	1.5			3.2	1.3	0.1	0.1	26.6			
Delay (s)	54.0	29.8			35.2	48.4	13.7	13.8	47.9			
Level of Service	D	C			D	D	B	B	D			
Approach Delay (s)		35.8			38.2			31.7			0.0	
Approach LOS		D			D			C			A	

Intersection Summary			
HCM Average Control Delay	35.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	72.8%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	956	543	52	524	0	415	0	120	37	133	369
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5		4.0	4.8		4.0		4.0	4.1	4.1	4.1
Lane Util. Factor		0.91		1.00	0.91		0.97		1.00	1.00	1.00	1.00
Frpb, ped/bikes		0.99		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Flpb, ped/bikes		1.00		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Frt		0.95		1.00	1.00		1.00		0.85	1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (prot)		4819		1752	5036		3433		1599	1736	1845	1599
Flt Permitted		1.00		0.95	1.00		0.95		1.00	0.95	1.00	1.00
Satd. Flow (perm)		4819		1752	5036		3433		1599	1736	1845	1599
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1062	603	58	582	0	461	0	133	41	148	410
RTOR Reduction (vph)	0	110	0	0	0	0	0	0	108	0	0	145
Lane Group Flow (vph)	0	1555	0	58	582	0	461	0	25	41	148	265
Confl. Peds. (#/hr)	3		1	1		3			11	11		
Confl. Bikes (#/hr)					1							1
Heavy Vehicles (%)	0%	1%	1%	3%	3%	0%	2%	0%	1%	4%	3%	1%
Turn Type				Prot			Prot		custom	Split		Prot
Protected Phases		2		1	6		8		8	4	4	4
Permitted Phases												
Actuated Green, G (s)		32.2		5.2	41.1		15.1		15.1	10.9	10.9	10.9
Effective Green, g (s)		32.2		5.2	41.1		15.1		15.1	10.9	10.9	10.9
Actuated g/C Ratio		0.40		0.07	0.51		0.19		0.19	0.14	0.14	0.14
Clearance Time (s)		4.5		4.0	4.8		4.0		4.0	4.1	4.1	4.1
Vehicle Extension (s)		4.0		2.5	4.0		2.5		2.5	2.5	2.5	2.5
Lane Grp Cap (vph)		1940		114	2587		648		302	237	251	218
v/s Ratio Prot		c0.32		c0.03	0.12		c0.13		0.02	0.02	0.08	c0.17
v/s Ratio Perm												
v/c Ratio		0.80		0.51	0.22		0.71		0.08	0.17	0.59	1.22
Uniform Delay, d1		21.1		36.2	10.7		30.4		26.7	30.6	32.4	34.5
Progression Factor		0.74		1.00	1.00		1.00		1.00	1.00	1.00	1.00
Incremental Delay, d2		2.5		2.6	0.2		3.4		0.1	0.3	2.9	131.2
Delay (s)		18.1		38.8	10.9		33.9		26.8	30.8	35.4	165.8
Level of Service		B		D	B		C		C	C	D	F
Approach Delay (s)		18.1			13.4			32.3			124.3	
Approach LOS		B			B			C			F	

Intersection Summary			
HCM Average Control Delay	37.9	HCM Level of Service	D
HCM Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	16.6
Intersection Capacity Utilization	66.7%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	15	1123	985	152	149	17
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	1221	1071	165	162	18
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		TWLTL	TWLTL			
Median storage veh)		2	2			
Upstream signal (ft)			752			
pX, platoon unblocked	0.82				0.82	0.82
vC, conflicting volume	1236				2407	618
vC1, stage 1 conf vol					1153	
vC2, stage 2 conf vol					1253	
vCu, unblocked vol	836				2272	77
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)	2.2				3.5	3.3
p0 queue free %	98				14	98
cM capacity (veh/h)	658				188	794

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	16	1221	714	522	180
Volume Left	16	0	0	0	162
Volume Right	0	0	0	165	18
cSH	658	1700	1700	1700	204
Volume to Capacity	0.02	0.72	0.42	0.31	0.89
Queue Length 95th (ft)	2	0	0	0	173
Control Delay (s)	10.6	0.0	0.0	0.0	84.9
Lane LOS	B				F
Approach Delay (s)	0.1		0.0		84.9
Approach LOS					F

Intersection Summary			
Average Delay	5.8		
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
201: SE Park Ave & SE River Rd

5/25/2012

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	57	24	203	68	33	485
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	63	26	223	75	36	533
Pedestrians	12					5
Lane Width (ft)	12.0					12.0
Walking Speed (ft/s)	4.0					4.0
Percent Blockage	1					0
Right turn flare (veh)		1				
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	878	277			310	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	878	277			310	
tC, single (s)	6.4	6.3			4.2	
tC, 2 stage (s)						
tF (s)	3.5	3.4			2.3	
p0 queue free %	80	96			97	
cM capacity (veh/h)	306	730			1211	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	89	298	569
Volume Left	63	0	36
Volume Right	26	75	0
cSH	435	1700	1211
Volume to Capacity	0.20	0.18	0.03
Queue Length 95th (ft)	19	0	2
Control Delay (s)	16.9	0.0	0.8
Lane LOS	C		A
Approach Delay (s)	16.9	0.0	0.8
Approach LOS	C		

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	57.3%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
202: SE Park Ave & 99E (SE McLoughlin Blvd)

7/5/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	60	67	88	67	92	46	909	137	75	1859	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00	0.93	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1666	1759	1554	1795	1705		1752	3505	1496	1805	3574	1615
Flt Permitted	0.34	1.00	1.00	0.72	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	590	1759	1554	1352	1705		1752	3505	1496	1805	3574	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	11	63	71	93	71	97	48	957	144	79	1957	8
RTOR Reduction (vph)	0	0	63	0	52	0	0	0	31	0	0	2
Lane Group Flow (vph)	11	63	8	93	116	0	48	957	113	79	1957	6
Confl. Peds. (#/hr)	3		5	5		3			17			
Confl. Bikes (#/hr)	1							4			1	
Heavy Vehicles (%)	8%	8%	2%	0%	2%	0%	3%	3%	0%	0%	1%	0%
Turn Type	Perm		Perm	Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)	12.5	12.5	12.5	12.5	12.5		7.0	76.3	76.3	8.4	77.7	77.7
Effective Green, g (s)	12.5	12.5	12.5	12.5	12.5		7.0	76.3	76.3	8.4	77.7	77.7
Actuated g/C Ratio	0.11	0.11	0.11	0.11	0.11		0.06	0.69	0.69	0.08	0.71	0.71
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.5	2.5	2.5	2.5	2.5		2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)	67	200	177	154	194		111	2431	1038	138	2525	1141
v/s Ratio Prot		0.04			0.07		0.03	0.27		c0.04	c0.55	
v/s Ratio Perm	0.02		0.01	c0.07					0.08			0.00
v/c Ratio	0.16	0.32	0.05	0.60	0.60		0.43	0.39	0.11	0.57	0.78	0.01
Uniform Delay, d1	44.0	44.8	43.4	46.4	46.4		49.6	7.1	5.6	49.1	10.5	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.41	0.13	0.03	1.00	1.00	1.00
Incremental Delay, d2	0.8	0.7	0.1	5.5	4.1		1.4	0.4	0.2	4.2	2.4	0.0
Delay (s)	44.9	45.5	43.5	51.9	50.4		71.3	1.4	0.4	53.3	12.9	4.8
Level of Service	D	D	D	D	D		E	A	A	D	B	A
Approach Delay (s)		44.5			51.0			4.2			14.4	
Approach LOS		D			D			A			B	

Intersection Summary			
HCM Average Control Delay	15.0	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis
203: SE Park Ave & SE Oatfield Rd

7/5/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	45	127	105	69	96	21	101	314	46	41	407	57
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	0.98		1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Frt		1.00	0.85		0.98		1.00	0.98		1.00	0.98	
Flt Protected		0.99	1.00		0.98		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1851	1535		1836		1769	1843		1804	1846	
Flt Permitted		0.87	1.00		0.82		0.38	1.00		0.49	1.00	
Satd. Flow (perm)		1637	1535		1531		703	1843		922	1846	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	51	144	119	78	109	24	112	349	51	46	452	63
RTOR Reduction (vph)	0	0	84	0	6	0	0	8	0	0	8	0
Lane Group Flow (vph)	0	195	35	0	205	0	112	392	0	46	507	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	5%	0%	3%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Perm		Perm	Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		10.7	10.7		10.7		17.2	17.2		17.2	17.2	
Effective Green, g (s)		10.7	10.7		10.7		17.2	17.2		17.2	17.2	
Actuated g/C Ratio		0.30	0.30		0.30		0.48	0.48		0.48	0.48	
Clearance Time (s)		4.0	4.0		4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		488	458		456		337	883		442	884	
v/s Ratio Prot								0.21			c0.27	
v/s Ratio Perm		0.12	0.02		c0.13		0.16			0.05		
v/c Ratio		0.40	0.08		0.45		0.33	0.44		0.10	0.57	
Uniform Delay, d1		10.0	9.1		10.2		5.8	6.2		5.1	6.7	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.1		0.7		0.6	0.4		0.1	0.9	
Delay (s)		10.6	9.1		10.9		6.4	6.5		5.2	7.6	
Level of Service		B	A		B		A	A		A	A	
Approach Delay (s)		10.0			10.9			6.5			7.4	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	8.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.53		
Actuated Cycle Length (s)	35.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	18	20	11	27	21	46	9	194	28	65	482	36
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	19	22	12	29	23	49	10	209	30	70	518	39
Pedestrians		2			2			7			2	
Lane Width (ft)		12.0			12.0			12.0			12.0	
Walking Speed (ft/s)		4.0			4.0			4.0			4.0	
Percent Blockage		0			0			1			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	985	939	547	952	944	228	559			241		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	985	939	547	952	944	228	559			241		
tC, single (s)	7.1	6.5	6.3	7.1	6.5	6.2	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.4	3.5	4.0	3.3	2.3			2.2		
p0 queue free %	90	91	98	86	91	94	99			95		
cM capacity (veh/h)	185	244	516	207	247	802	953			1324		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	53	101	248	627
Volume Left	19	29	10	70
Volume Right	12	49	30	39
cSH	244	345	953	1324
Volume to Capacity	0.22	0.29	0.01	0.05
Queue Length 95th (ft)	20	30	1	4
Control Delay (s)	23.7	19.7	0.4	1.4
Lane LOS	C	C	A	A
Approach Delay (s)	23.7	19.7	0.4	1.4
Approach LOS	C	C		

Intersection Summary				
Average Delay		4.1		
Intersection Capacity Utilization		60.7%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	32	76	43	21	80	26	47	1052	46	29	1915	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.97	1.00	1.00	0.94
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1736	1727		1805	1706		1805	3539	1572	1671	3539	1517
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1736	1727		1805	1706		1805	3539	1572	1671	3539	1517
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	33	79	45	22	83	27	49	1096	48	30	1995	111
RTOR Reduction (vph)	0	21	0	0	12	0	0	0	9	0	0	13
Lane Group Flow (vph)	33	103	0	22	98	0	49	1096	39	30	1995	98
Confl. Peds. (#/hr)			7			8			2			12
Confl. Bikes (#/hr)								4			1	
Heavy Vehicles (%)	4%	4%	2%	0%	5%	12%	0%	2%	0%	8%	2%	0%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	2.4	12.7		1.6	11.9		7.1	75.3	75.3	3.6	71.8	71.8
Effective Green, g (s)	2.4	12.7		1.6	11.9		7.1	75.3	75.3	3.6	71.8	71.8
Actuated g/C Ratio	0.02	0.12		0.01	0.11		0.06	0.68	0.68	0.03	0.65	0.65
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	38	199		26	185		117	2423	1076	55	2310	990
v/s Ratio Prot	c0.02	c0.06		0.01	0.06		0.03	c0.31		0.02	c0.56	
v/s Ratio Perm									0.02			0.06
v/c Ratio	0.87	0.52		0.85	0.53		0.42	0.45	0.04	0.55	0.86	0.10
Uniform Delay, d1	53.6	45.8		54.1	46.4		49.5	7.9	5.6	52.4	15.2	7.1
Progression Factor	1.00	1.00		1.00	1.00		1.58	0.15	0.01	0.73	0.40	0.53
Incremental Delay, d2	92.6	1.4		107.8	1.7		1.1	0.5	0.0	4.0	2.5	0.1
Delay (s)	146.3	47.2		161.9	48.1		79.1	1.7	0.1	42.3	8.6	3.9
Level of Service	F	D		F	D		E	A	A	D	A	A
Approach Delay (s)		68.0			67.1			4.8			8.9	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM Average Control Delay	12.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.6
Intersection Capacity Utilization	71.5%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	57	106	73	331	615	37
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	61	114	78	356	661	40
Pedestrians				2	1	
Lane Width (ft)				12.0	12.0	
Walking Speed (ft/s)				4.0	4.0	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1195	683	701			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1195	683	701			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	68	74	91			
cM capacity (veh/h)	190	445	905			

Direction, Lane #	EB 1	EB 2	NB 1	SB 1
Volume Total	61	114	434	701
Volume Left	61	0	78	0
Volume Right	0	114	0	40
cSH	190	445	905	1700
Volume to Capacity	0.32	0.26	0.09	0.41
Queue Length 95th (ft)	33	25	7	0
Control Delay (s)	32.8	15.9	2.5	0.0
Lane LOS	D	C	A	
Approach Delay (s)	21.8		2.5	0.0
Approach LOS	C			

Intersection Summary			
Average Delay	3.8		
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	27	27	17	54	56	65	14	174	28	108	412	36
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	29	29	18	58	60	70	15	187	30	116	443	39

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	76	188	232	598
Volume Left (vph)	29	58	15	116
Volume Right (vph)	18	70	30	39
Hadj (s)	-0.04	-0.13	-0.02	0.03
Departure Headway (s)	6.5	6.1	5.6	5.2
Degree Utilization, x	0.14	0.32	0.36	0.86
Capacity (veh/h)	497	542	600	598
Control Delay (s)	10.6	12.0	11.8	31.1
Approach Delay (s)	10.6	12.0	11.8	31.1
Approach LOS	B	B	B	D

Intersection Summary			
Delay	22.3		
HCM Level of Service	C		
Intersection Capacity Utilization	64.1%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	84	196	97	190	167	69	79	958	176	97	1600	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.96	1.00	1.00	0.91
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	1767		1787	1796		1787	3505	1538	1752	3539	1467
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	1767		1787	1796		1787	3505	1538	1752	3539	1467
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	88	206	102	200	176	73	83	1008	185	102	1684	83
RTOR Reduction (vph)	0	17	0	0	13	0	0	0	76	0	0	13
Lane Group Flow (vph)	88	291	0	200	236	0	83	1008	109	102	1684	70
Confl. Peds. (#/hr)			12			23			6			24
Confl. Bikes (#/hr)	1											
Heavy Vehicles (%)	0%	2%	0%	1%	0%	0%	1%	3%	1%	3%	2%	0%
Turn Type	Prot			Prot			Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases									2			6
Actuated Green, G (s)	8.8	22.4		16.7	30.3		7.7	44.3	44.3	9.8	46.4	46.4
Effective Green, g (s)	8.8	22.4		16.7	30.3		7.7	44.3	44.3	9.8	46.4	46.4
Actuated g/C Ratio	0.08	0.20		0.15	0.28		0.07	0.40	0.40	0.09	0.42	0.42
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	2.3	2.3		2.3	2.3		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	144	360		271	495		125	1412	619	156	1493	619
v/s Ratio Prot	0.05	c0.16		c0.11	0.13		0.05	0.29		c0.06	c0.48	
v/s Ratio Perm									0.07			0.05
v/c Ratio	0.61	0.81		0.74	0.48		0.66	0.71	0.18	0.65	1.13	0.11
Uniform Delay, d1	48.9	41.8		44.6	33.2		49.9	27.5	21.1	48.5	31.8	19.3
Progression Factor	1.00	1.00		1.00	1.00		1.37	0.60	0.58	1.16	1.02	1.27
Incremental Delay, d2	6.0	12.1		9.2	0.4		8.7	2.5	0.5	4.6	63.0	0.2
Delay (s)	54.9	53.9		53.7	33.7		77.1	19.2	12.8	60.9	95.5	24.8
Level of Service	D	D		D	C		E	B	B	E	F	C
Approach Delay (s)		54.1			42.6			22.0			90.5	
Approach LOS		D			D			C			F	

Intersection Summary			
HCM Average Control Delay	59.6	HCM Level of Service	E
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	82	74	407	144	146	635
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	87	79	433	153	155	676
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1497	510			586	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1497	510			586	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	22	86			84	
cM capacity (veh/h)	112	568			979	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	166	586	831
Volume Left	87	0	155
Volume Right	79	153	0
cSH	180	1700	979
Volume to Capacity	0.92	0.34	0.16
Queue Length 95th (ft)	176	0	14
Control Delay (s)	99.5	0.0	3.8
Lane LOS	F		A
Approach Delay (s)	99.5	0.0	3.8
Approach LOS	F		

Intersection Summary			
Average Delay	12.4		
Intersection Capacity Utilization	90.8%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	47	2	38	0	207	75	58	379	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	0	0	55	2	45	0	230	83	64	421	0
Pedestrians								1				
Lane Width (ft)								12.0				
Walking Speed (ft/s)								4.0				
Percent Blockage								0				
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	868	863	422	823	822	272	421			313		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	868	863	422	823	822	272	421			313		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	80	99	94	100			95		
cM capacity (veh/h)	247	279	635	277	295	767	1149			1258		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	102	313	486
Volume Left	55	0	64
Volume Right	45	83	0
cSH	385	1700	1258
Volume to Capacity	0.27	0.18	0.05
Queue Length 95th (ft)	26	0	4
Control Delay (s)	17.7	0.0	1.5
Lane LOS	C		A
Approach Delay (s)	17.7	0.0	1.5
Approach LOS	C		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	53.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	95	55	161	101	99	46	1227	110	133	1813	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	0.99		1.00	0.98		1.00	1.00	0.95	1.00	1.00	0.94
Flpb, ped/bikes	0.99	1.00		0.99	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1746	1734		1770	1722		1736	3539	1492	1805	3539	1491
Flt Permitted	0.40	1.00		0.53	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	727	1734		994	1722		1736	3539	1492	1805	3539	1491
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	50	99	57	168	105	103	48	1278	115	139	1889	42
RTOR Reduction (vph)	0	20	0	0	34	0	0	0	24	0	0	6
Lane Group Flow (vph)	50	136	0	168	174	0	48	1278	91	139	1889	36
Confl. Peds. (#/hr)	16		10	10		16			9			12
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	2%	3%	2%	1%	0%	1%	4%	2%	3%	0%	2%	2%
Turn Type	Perm			Perm			Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8					2			6
Actuated Green, G (s)	20.6	20.6		21.1	21.1		4.9	63.7	63.7	12.4	71.2	71.2
Effective Green, g (s)	20.6	20.6		21.1	21.1		4.9	63.7	63.7	12.4	71.2	71.2
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.04	0.58	0.58	0.11	0.65	0.65
Clearance Time (s)	4.5	4.5		4.0	4.0		4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)	3.5	3.5		2.5	2.5		2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)	136	325		191	330		77	2049	864	203	2291	965
v/s Ratio Prot		0.08			0.10		0.03	0.36		c0.08	c0.53	
v/s Ratio Perm	0.07			c0.17					0.06			0.02
v/c Ratio	0.37	0.42		0.88	0.53		0.62	0.62	0.10	0.68	0.82	0.04
Uniform Delay, d1	39.0	39.4		43.2	40.0		51.6	15.3	10.4	46.9	14.7	7.0
Progression Factor	1.00	1.00		1.00	1.00		0.80	1.91	2.50	1.20	0.83	0.27
Incremental Delay, d2	2.0	1.0		33.5	1.2		10.4	1.2	0.2	2.2	1.0	0.0
Delay (s)	41.0	40.5		76.7	41.1		51.7	30.3	26.1	58.7	13.2	1.9
Level of Service	D	D		E	D		D	C	C	E	B	A
Approach Delay (s)		40.6			57.0			30.7			16.0	
Approach LOS		D			E			C			B	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	41	29	278	13	17	18	236	374	8	23	657	61
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes		0.98			1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.95		1.00	1.00		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1634			1747		1805	1876		1671	1859	
Flt Permitted		0.96			0.72		0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1572			1283		1805	1876		1671	1859	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	43	30	290	14	18	19	246	390	8	24	684	64
RTOR Reduction (vph)	0	130	0	0	15	0	0	1	0	0	3	0
Lane Group Flow (vph)	0	233	0	0	36	0	246	397	0	24	745	0
Confl. Peds. (#/hr)			2	2								
Heavy Vehicles (%)	2%	0%	1%	0%	0%	5%	0%	1%	0%	8%	1%	0%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		18.3			18.3		17.5	61.8		2.0	46.3	
Effective Green, g (s)		18.3			18.3		17.5	61.8		2.0	46.3	
Actuated g/C Ratio		0.19			0.19		0.18	0.65		0.02	0.48	
Clearance Time (s)		4.5			4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)		3.0			3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		301			246		330	1213		35	900	
v/s Ratio Prot							c0.14	0.21		0.01	c0.40	
v/s Ratio Perm		c0.15			0.03							
v/c Ratio		0.77			0.14		0.75	0.33		0.69	0.83	
Uniform Delay, d1		36.7			32.1		36.9	7.6		46.5	21.2	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		11.7			0.3		8.8	0.2		43.6	6.3	
Delay (s)		48.4			32.4		45.8	7.7		90.1	27.5	
Level of Service		D			C		D	A		F	C	
Approach Delay (s)		48.4			32.4			22.3			29.5	
Approach LOS		D			C			C			C	

Intersection Summary			
HCM Average Control Delay	30.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	95.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.0%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	47	49	117	28	127	15	1237	113	85	1942	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00			1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		0.99			1.00	0.98	1.00	1.00	0.96	1.00	1.00	0.96
Flpb, ped/bikes		1.00			0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.94			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.99			0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1675			1746	1528	1805	3539	1511	1770	3574	1469
Flt Permitted		0.92			0.58	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1562			1062	1528	1805	3539	1511	1770	3574	1469
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	24	48	51	121	29	131	15	1275	116	88	2002	11
RTOR Reduction (vph)	0	26	0	0	0	108	0	0	22	0	0	1
Lane Group Flow (vph)	0	97	0	0	150	23	15	1275	94	88	2002	10
Confl. Peds. (#/hr)	3		17	17		3			5			5
Confl. Bikes (#/hr)		1	1					1	1			
Heavy Vehicles (%)	4%	4%	5%	4%	0%	4%	0%	2%	3%	2%	1%	6%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8			2			6
Actuated Green, G (s)		19.0			19.0	19.0	2.7	69.7	69.7	8.5	75.5	75.5
Effective Green, g (s)		19.0			19.0	19.0	2.7	69.7	69.7	8.5	75.5	75.5
Actuated g/C Ratio		0.17			0.17	0.17	0.02	0.63	0.63	0.08	0.69	0.69
Clearance Time (s)		4.0			4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		270			183	264	44	2242	957	137	2453	1008
v/s Ratio Prot							0.01	0.36		c0.05	c0.56	
v/s Ratio Perm		0.06			c0.14	0.01			0.06			0.01
v/c Ratio		0.36			0.82	0.09	0.34	0.57	0.10	0.64	0.82	0.01
Uniform Delay, d1		40.1			43.8	38.2	52.8	11.5	7.9	49.3	12.3	5.4
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.02	0.69	1.01
Incremental Delay, d2		0.6			23.5	0.1	2.7	1.1	0.2	4.9	1.8	0.0
Delay (s)		40.7			67.4	38.3	55.5	12.6	8.1	55.2	10.4	5.5
Level of Service		D			E	D	E	B	A	E	B	A
Approach Delay (s)		40.7			53.8			12.7			12.2	
Approach LOS		D			D			B			B	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	84.7%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	1	10	6	76	14	53	3	146	56	69	340	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1	11	7	83	15	58	3	159	61	75	370	7

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	18	155	223	451
Volume Left (vph)	1	83	3	75
Volume Right (vph)	7	58	61	7
Hadj (s)	-0.20	-0.12	-0.15	0.04
Departure Headway (s)	5.6	5.4	4.8	4.7
Degree Utilization, x	0.03	0.23	0.30	0.59
Capacity (veh/h)	539	596	709	740
Control Delay (s)	8.8	10.1	9.8	14.3
Approach Delay (s)	8.8	10.1	9.8	14.3
Approach LOS	A	B	A	B

Intersection Summary			
Delay	12.3		
HCM Level of Service	B		
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	37	70	33	96	101	126	35	1202	109	153	1781	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1860	1582		1840	1531	1805	3539	1547	1787	3574	1548
Flt Permitted		0.55	1.00		0.65	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1045	1582		1225	1531	1805	3539	1547	1787	3574	1548
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	40	75	35	103	109	135	37	1265	115	161	1875	69
RTOR Reduction (vph)	0	0	29	0	0	65	0	0	21	0	0	8
Lane Group Flow (vph)	0	115	6	0	212	70	37	1265	94	161	1875	61
Confl. Peds. (#/hr)	12		5	5		12			3			5
Confl. Bikes (#/hr)		1						2				
Heavy Vehicles (%)	0%	0%	0%	1%	0%	2%	0%	2%	1%	1%	1%	0%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		25.0	25.0		25.0	25.0	3.2	92.4	92.4	17.6	106.8	106.8
Effective Green, g (s)		25.0	25.0		25.0	25.0	3.2	92.4	92.4	17.6	106.8	106.8
Actuated g/C Ratio		0.17	0.17		0.17	0.17	0.02	0.63	0.63	0.12	0.72	0.72
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	4.0	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		177	268		207	259	39	2212	967	213	2583	1119
v/s Ratio Prot							0.02	0.36		c0.09	c0.52	
v/s Ratio Perm		0.11	0.00		c0.17	0.05			0.06			0.04
v/c Ratio		0.65	0.02		1.02	0.27	0.95	0.57	0.10	0.76	0.73	0.05
Uniform Delay, d1		57.3	51.2		61.4	53.5	72.2	16.2	11.1	63.0	12.0	5.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		7.1	0.0		69.0	0.4	122.1	1.1	0.2	13.2	1.8	0.1
Delay (s)		64.4	51.2		130.4	53.9	194.3	17.2	11.3	76.2	13.8	6.0
Level of Service		E	D		F	D	F	B	B	E	B	A
Approach Delay (s)		61.3			100.6			21.4			18.3	
Approach LOS		E			F			C			B	

Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	147.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	120.8%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	49	276	68	37	309	165	97	355	39	192	461	80
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Frt		0.98			1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99			0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1831			1890	1599	1787	1855		1805	1827	
Flt Permitted		0.81			0.92	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1494			1747	1599	1787	1855		1805	1827	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	51	288	71	39	322	172	101	370	41	200	480	83
RTOR Reduction (vph)	0	7	0	0	0	68	0	3	0	0	5	0
Lane Group Flow (vph)	0	403	0	0	361	104	101	408	0	200	558	0
Confl. Peds. (#/hr)	1					1						
Confl. Bikes (#/hr)		1										
Heavy Vehicles (%)	0%	1%	0%	0%	0%	1%	1%	1%	0%	0%	2%	0%
Turn Type	Perm			Perm		Prot	Prot			Prot		
Protected Phases		4			8	8	5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		31.5			31.5	31.5	8.2	32.5		15.8	40.1	
Effective Green, g (s)		31.5			31.5	31.5	8.2	32.5		15.8	40.1	
Actuated g/C Ratio		0.34			0.34	0.34	0.09	0.35		0.17	0.44	
Clearance Time (s)		4.0			4.0	4.0	4.0	4.0		4.0	4.0	
Vehicle Extension (s)		3.0			3.0	3.0	2.5	5.0		2.5	5.0	
Lane Grp Cap (vph)		513			599	549	160	657		311	798	
v/s Ratio Prot						0.06	0.06	0.22		c0.11	c0.31	
v/s Ratio Perm		c0.27			0.21							
v/c Ratio		0.79			0.60	0.19	0.63	0.62		0.64	0.70	
Uniform Delay, d1		27.1			25.0	21.2	40.3	24.5		35.4	21.0	
Progression Factor		1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		7.8			1.7	0.2	6.9	2.6		4.0	3.4	
Delay (s)		34.9			26.7	21.3	47.3	27.1		39.4	24.4	
Level of Service		C			C	C	D	C		D	C	
Approach Delay (s)		34.9			25.0			31.1			28.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	29.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	91.8	Sum of lost time (s)	8.0
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	131	122	233	106	133	281
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	139	130	248	113	141	299
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			233			
pX, platoon unblocked						
vC, conflicting volume	361				713	304
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	361				713	304
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	88				60	60
cM capacity (veh/h)	1209				350	740

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	269	361	440
Volume Left	139	0	141
Volume Right	0	113	299
cSH	1209	1700	1089
Volume to Capacity	0.12	0.21	0.40
Queue Length 95th (ft)	10	0	50
Control Delay (s)	4.8	0.0	16.0
Lane LOS	A		C
Approach Delay (s)	4.8	0.0	16.0
Approach LOS			C

Intersection Summary			
Average Delay	7.8		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	116	68	145	57	98	71	104	1202	74	29	1558	197
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	3.5	4.8	4.8
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes		1.00	0.98		1.00	0.99	1.00	1.00	0.98	1.00	1.00	0.98
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00		0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1791	1587		1829	1591	1805	3505	1578	1805	3539	1517
Flt Permitted		0.57	1.00		0.67	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1046	1587		1254	1591	1805	3505	1578	1805	3539	1517
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	122	72	153	60	103	75	109	1265	78	31	1640	207
RTOR Reduction (vph)	0	0	107	0	0	60	0	0	17	0	0	27
Lane Group Flow (vph)	0	194	46	0	163	15	109	1265	61	31	1640	180
Confl. Peds. (#/hr)	2		4	4		2			1			1
Confl. Bikes (#/hr)					1			1			1	
Heavy Vehicles (%)	2%	4%	0%	0%	3%	0%	0%	3%	0%	0%	2%	4%
Turn Type	Perm		Perm	Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)		22.6	22.6		22.6	22.6	10.5	71.3	71.3	3.8	64.1	64.1
Effective Green, g (s)		22.6	22.6		22.6	22.6	10.5	71.3	71.3	3.8	64.1	64.1
Actuated g/C Ratio		0.21	0.21		0.21	0.21	0.10	0.65	0.65	0.03	0.58	0.58
Clearance Time (s)		4.0	4.0		4.0	4.0	4.0	4.8	4.8	3.5	4.8	4.8
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.3	4.7	4.7	2.3	4.7	4.7
Lane Grp Cap (vph)		215	326		258	327	172	2272	1023	62	2062	884
v/s Ratio Prot							0.06	c0.36		0.02	c0.46	
v/s Ratio Perm		c0.19	0.03		0.13	0.01			0.04			0.12
v/c Ratio		0.90	0.14		0.63	0.05	0.63	0.56	0.06	0.50	0.80	0.20
Uniform Delay, d1		42.6	35.8		39.9	35.1	47.9	10.7	7.1	52.2	17.8	10.9
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		35.8	0.1		4.4	0.0	6.1	1.0	0.1	3.7	3.3	0.5
Delay (s)		78.4	35.9		44.3	35.1	54.0	11.6	7.2	55.8	21.1	11.4
Level of Service		E	D		D	D	D	B	A	E	C	B
Approach Delay (s)		59.7			41.4			14.6			20.6	
Approach LOS		E			D			B			C	

Intersection Summary			
HCM Average Control Delay	23.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	8.8
Intersection Capacity Utilization	76.7%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	13	438	565	234	226	12
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	14	466	601	249	240	13

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	480	850	253
Volume Left (vph)	14	0	240
Volume Right (vph)	0	249	13
Hadj (s)	0.06	-0.15	0.21
Departure Headway (s)	5.9	5.5	6.9
Degree Utilization, x	0.78	1.30	0.49
Capacity (veh/h)	603	657	495
Control Delay (s)	26.8	165.8	16.4
Approach Delay (s)	26.8	165.8	16.4
Approach LOS	D	F	C

Intersection Summary			
Delay	99.7		
HCM Level of Service	F		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	75	567	604	44	106	233
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	78	591	629	46	110	243

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total (vph)	669	675	353
Volume Left (vph)	78	0	110
Volume Right (vph)	0	46	243
Hadj (s)	0.07	-0.02	-0.34
Departure Headway (s)	6.3	6.2	6.6
Degree Utilization, x	1.17	1.16	0.65
Capacity (veh/h)	569	587	530
Control Delay (s)	115.3	112.1	21.2
Approach Delay (s)	115.3	112.1	21.2
Approach LOS	F	F	C

Intersection Summary			
Delay	94.4		
HCM Level of Service	F		
Intersection Capacity Utilization	98.7%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	178	340	130	122	382	77	128	260	51	132	546	142
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.97		1.00	0.98		1.00	0.97	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1671	1807		1770	1821		1787	1818		1782	1806	
Flt Permitted	0.26	1.00		0.25	1.00		0.09	1.00		0.41	1.00	
Satd. Flow (perm)	459	1807		465	1821		161	1818		763	1806	
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Adj. Flow (vph)	196	374	143	134	420	85	141	286	56	145	600	156
RTOR Reduction (vph)	0	12	0	0	6	0	0	6	0	0	8	0
Lane Group Flow (vph)	196	505	0	134	499	0	141	336	0	145	748	0
Confl. Peds. (#/hr)	4		3	3		4	5		6	6		5
Heavy Vehicles (%)	8%	0%	0%	2%	1%	2%	1%	1%	3%	1%	1%	2%
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	48.5	48.5		48.5	48.5		53.7	46.6		55.3	47.4	
Effective Green, g (s)	48.5	48.5		48.5	48.5		53.7	46.6		55.3	47.4	
Actuated g/C Ratio	0.42	0.42		0.42	0.42		0.46	0.40		0.47	0.41	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)	191	752		194	758		173	727		431	735	
v/s Ratio Prot		0.28			0.27		c0.05	0.18		0.02	c0.41	
v/s Ratio Perm	c0.43			0.29			0.32			0.14		
v/c Ratio	1.03	0.67		0.69	0.66		0.82	0.46		0.34	1.02	
Uniform Delay, d1	34.0	27.6		27.9	27.3		26.8	25.7		18.3	34.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	72.1	2.2		9.4	1.8		24.1	0.5		0.3	37.6	
Delay (s)	106.1	29.7		37.2	29.2		50.9	26.2		18.6	72.1	
Level of Service	F	C		D	C		D	C		B	E	
Approach Delay (s)		50.7			30.9			33.4			63.5	
Approach LOS		D			C			C			E	

Intersection Summary			
HCM Average Control Delay	47.2	HCM Level of Service	D
HCM Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	116.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	94.3%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	236	168	236	143	230	285
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	257	183	257	155	250	310

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total (vph)	439	412	560
Volume Left (vph)	257	257	0
Volume Right (vph)	183	0	310
Hadj (s)	-0.12	0.20	-0.31
Departure Headway (s)	6.6	6.8	6.1
Degree Utilization, x	0.81	0.78	0.94
Capacity (veh/h)	537	515	560
Control Delay (s)	31.4	29.5	48.6
Approach Delay (s)	31.4	29.5	48.6
Approach LOS	D	D	E

Intersection Summary			
Delay	37.7		
HCM Level of Service	E		
Intersection Capacity Utilization	83.7%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Sign Control	Stop		Stop			Stop
Volume (vph)	377	39	303	410	92	523
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	419	43	337	456	102	581

Direction, Lane #	WB 1	NB 1	NB 2	SB 1
Volume Total (vph)	462	337	456	683
Volume Left (vph)	419	0	0	102
Volume Right (vph)	43	0	456	0
Hadj (s)	0.14	0.03	-0.55	0.06
Departure Headway (s)	6.7	6.7	3.2	6.4
Degree Utilization, x	0.86	0.63	0.40	1.21
Capacity (veh/h)	532	518	1115	570
Control Delay (s)	37.7	20.3	8.4	133.7
Approach Delay (s)	37.7	13.5		133.7
Approach LOS	E	B		F

Intersection Summary			
Delay	61.6		
HCM Level of Service	F		
Intersection Capacity Utilization	81.8%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	394	25	76	327	415	473
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	438	28	84	363	461	526

Direction, Lane #	EB 1	EB 2	NB 1	SB 1	SB 2
Volume Total (vph)	438	28	448	461	526
Volume Left (vph)	438	0	84	0	0
Volume Right (vph)	0	28	0	0	526
Hadj (s)	0.53	-0.70	0.07	0.03	-0.67
Departure Headway (s)	8.3	7.0	7.4	7.5	6.8
Degree Utilization, x	1.00	0.05	0.92	0.97	1.00
Capacity (veh/h)	438	504	477	461	526
Control Delay (s)	72.2	9.2	50.7	59.3	63.6
Approach Delay (s)	68.5		50.7	61.6	
Approach LOS	F		F	F	

Intersection Summary			
Delay	60.7		
HCM Level of Service	F		
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	0	90	1	138	1	239	51	48	346	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	0	1	0	105	1	160	1	266	57	53	384	0
Pedestrians		1						1			1	
Lane Width (ft)		12.0						12.0			12.0	
Walking Speed (ft/s)		4.0						4.0			4.0	
Percent Blockage		0						0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	950	817	386	789	788	295	385			322		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	950	817	386	789	788	295	385			322		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	100	64	100	79	100			96		
cM capacity (veh/h)	183	299	665	292	311	749	1183			1243		

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1	266	323	438
Volume Left	0	105	1	53
Volume Right	0	160	57	0
cSH	299	462	1183	1243
Volume to Capacity	0.00	0.58	0.00	0.04
Queue Length 95th (ft)	0	89	0	3
Control Delay (s)	17.1	22.9	0.0	1.4
Lane LOS	C	C	A	A
Approach Delay (s)	17.1	22.9	0.0	1.4
Approach LOS	C	C		

Intersection Summary			
Average Delay	6.5		
Intersection Capacity Utilization	66.8%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
301: Hwy 212/Hwy 224 & I-205 SB Off Ramp

5/25/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	872	188	611	649	0	0	0	903	0	0	392
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	4.5				4.0			5.5
Lane Util. Factor		1.00		1.00	1.00				0.88			1.00
Frpb, ped/bikes		0.99		1.00	1.00				1.00			1.00
Flpb, ped/bikes		1.00		1.00	1.00				1.00			1.00
Frt		0.98		1.00	1.00				0.85			0.86
Flt Protected		1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)		1827		1719	1810				2538			1611
Flt Permitted		1.00		0.95	1.00				1.00			1.00
Satd. Flow (perm)		1827		1719	1810				2538			1611
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	918	198	643	683	0	0	0	951	0	0	413
RTOR Reduction (vph)	0	9	0	0	0	0	0	0	0	0	0	218
Lane Group Flow (vph)	0	1107	0	643	683	0	0	0	951	0	0	195
Confl. Peds. (#/hr)			5	5								
Confl. Bikes (#/hr)		1	1	1	2							
Heavy Vehicles (%)	0%	1%	1%	5%	5%	0%	0%	0%	12%	0%	0%	2%
Turn Type				Prot					Free			custom
Protected Phases		2		1	6							5
Permitted Phases									Free			
Actuated Green, G (s)		44.5		25.5	57.7				81.0			13.3
Effective Green, g (s)		44.5		25.5	57.7				81.0			13.3
Actuated g/C Ratio		0.55		0.31	0.71				1.00			0.16
Clearance Time (s)		5.5		5.5	4.5							5.5
Vehicle Extension (s)		2.3		2.3	4.2							2.3
Lane Grp Cap (vph)		1004		541	1289				2538			265
v/s Ratio Prot		c0.61		c0.37	0.38							0.12
v/s Ratio Perm									0.37			
v/c Ratio		1.10		1.19	0.53				0.37			0.74
Uniform Delay, d1		18.2		27.8	5.4				0.0			32.2
Progression Factor		1.00		1.00	1.00				1.00			1.00
Incremental Delay, d2		60.6		102.2	0.6				0.4			9.3
Delay (s)		78.9		130.0	5.9				0.4			41.4
Level of Service		E		F	A				A			D
Approach Delay (s)		78.9			66.1			0.4			41.4	
Approach LOS		E			E			A			D	

Intersection Summary			
HCM Average Control Delay	50.8	HCM Level of Service	D
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	81.0	Sum of lost time (s)	11.0
Intersection Capacity Utilization	99.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	263	1342	0	0	1122	696	195	2	579	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.5	4.5		5.5	4.0			
Lane Util. Factor	1.00	0.91			0.91	0.88		1.00	0.88			
Frpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		1.00	1.00			
Frt	1.00	1.00			1.00	0.85		1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (prot)	1787	4759			4988	2608		1775	2682			
Flt Permitted	0.95	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	1787	4759			4988	2608		1775	2682			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	277	1413	0	0	1181	733	205	2	609	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	388	0	0	19	0	0	0
Lane Group Flow (vph)	277	1413	0	0	1181	345	0	207	590	0	0	0
Confl. Peds. (#/hr)	2		5	5		2						
Confl. Bikes (#/hr)		3			1							
Heavy Vehicles (%)	1%	9%	0%	0%	4%	9%	2%	0%	6%	0%	0%	0%
Turn Type	Prot					Prot	Split		custom			
Protected Phases	5	2			6	6	4	4	1 4			
Permitted Phases									4			
Actuated Green, G (s)	31.0	71.9			45.1	45.1		29.9	39.6			
Effective Green, g (s)	31.0	71.9			45.1	45.1		29.9	34.1			
Actuated g/C Ratio	0.26	0.60			0.38	0.38		0.25	0.28			
Clearance Time (s)	4.0	4.5			4.5	4.5		5.5				
Vehicle Extension (s)	0.5	0.5			0.5	0.5		2.3				
Lane Grp Cap (vph)	462	2851			1875	980		442	762			
v/s Ratio Prot	c0.15	0.30			c0.24	0.13		0.12	c0.22			
v/s Ratio Perm												
v/c Ratio	0.60	0.50			0.63	0.35		0.47	0.77			
Uniform Delay, d1	39.1	13.7			30.6	26.9		38.3	39.4			
Progression Factor	1.00	1.00			1.65	4.72		1.00	1.00			
Incremental Delay, d2	1.4	0.6			0.6	0.4		0.5	4.5			
Delay (s)	40.5	14.3			51.0	127.6		38.8	43.9			
Level of Service	D	B			D	F		D	D			
Approach Delay (s)		18.6			80.3			42.6			0.0	
Approach LOS		B			F			D			A	

Intersection Summary			
HCM Average Control Delay	49.8	HCM Level of Service	D
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	61.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	42	1441	152	129	1139	48	271	45	182	127	112	49
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.5	4.5		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.88		1.00	0.95	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1433	3406	1161	1656	3374	1382	1556	1492		1641	1578	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1433	3406	1161	1656	3374	1382	1556	1492		1641	1578	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	44	1517	160	136	1199	51	295	49	198	138	122	53
RTOR Reduction (vph)	0	0	56	0	0	10	0	121	0	0	13	0
Lane Group Flow (vph)	44	1517	104	136	1199	41	295	126	0	138	162	0
Confl. Peds. (#/hr)	2		3	3		2	2		5	5		2
Confl. Bikes (#/hr)					2							
Heavy Vehicles (%)	26%	6%	35%	9%	7%	14%	16%	11%	10%	10%	12%	20%
Turn Type	Prot		Perm	Prot		Perm	Split			Split		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2			6						
Actuated Green, G (s)	7.5	58.5	58.5	14.5	65.5	65.5	20.0	20.0		9.5	9.5	
Effective Green, g (s)	7.5	58.5	58.5	14.5	65.5	65.5	20.0	20.0		9.5	9.5	
Actuated g/C Ratio	0.06	0.49	0.49	0.12	0.55	0.55	0.17	0.17		0.08	0.08	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0	5.0	4.5	4.5		4.0	4.0	
Vehicle Extension (s)	2.3	4.3	4.3	2.3	4.3	4.3	2.3	2.3		2.3	2.3	
Lane Grp Cap (vph)	90	1660	566	200	1842	754	259	249		130	125	
v/s Ratio Prot	0.03	c0.45		c0.08	0.36		c0.19	0.08		0.08	c0.10	
v/s Ratio Perm			0.09			0.03						
v/c Ratio	0.49	0.91	0.18	0.68	0.65	0.05	1.14	0.51		1.06	1.30	
Uniform Delay, d1	54.4	28.4	17.3	50.5	19.2	12.8	50.0	45.5		55.2	55.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.4	9.3	0.7	8.0	1.8	0.1	98.7	0.9		96.3	180.2	
Delay (s)	56.8	37.7	18.0	58.5	21.0	12.9	148.7	46.5		151.6	235.5	
Level of Service	E	D	B	E	C	B	F	D		F	F	
Approach Delay (s)		36.4			24.4			102.1			198.5	
Approach LOS		D			C			F			F	

Intersection Summary			
HCM Average Control Delay	54.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	66	369	60	40	421	102	113	230	81	74	153	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	5.5
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1583	1694		1504	1687		1656	1449		1081	1226	1531
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1583	1694		1504	1687		1656	1449		1081	1226	1531
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	71	397	65	43	453	110	122	247	87	80	165	168
RTOR Reduction (vph)	0	4	0	0	5	0	0	8	0	0	0	122
Lane Group Flow (vph)	71	458	0	43	558	0	122	326	0	80	165	46
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)							1				1	1
Heavy Vehicles (%)	14%	7%	27%	20%	5%	27%	9%	32%	9%	67%	55%	3%
Turn Type	Prot			Prot			Prot			Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	8.4	51.2		5.7	48.5		12.5	34.1		12.5	34.1	34.1
Effective Green, g (s)	8.4	51.2		5.7	48.5		12.5	34.1		12.5	34.1	34.1
Actuated g/C Ratio	0.07	0.41		0.05	0.39		0.10	0.27		0.10	0.27	0.27
Clearance Time (s)	5.0	5.5		5.0	5.5		5.0	5.5		5.0	5.5	5.5
Vehicle Extension (s)	0.5	2.0		0.5	2.0		0.2	3.0		0.5	1.5	1.5
Lane Grp Cap (vph)	107	697		69	657		166	397		109	336	419
v/s Ratio Prot	c0.04	c0.27		0.03	c0.33		0.07	c0.23		c0.07	0.13	
v/s Ratio Perm												0.03
v/c Ratio	0.66	0.66		0.62	0.85		0.73	0.82		0.73	0.49	0.11
Uniform Delay, d1	56.7	29.6		58.3	34.7		54.4	42.3		54.4	37.9	33.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	11.4	1.7		11.9	9.6		13.5	12.8		19.6	0.4	0.0
Delay (s)	68.0	31.3		70.3	44.2		67.9	55.1		74.0	38.3	33.9
Level of Service	E	C		E	D		E	E		E	D	C
Approach Delay (s)		36.2			46.1			58.5			43.4	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM Average Control Delay	45.7	HCM Level of Service	D
HCM Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	124.5	Sum of lost time (s)	26.5
Intersection Capacity Utilization	70.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (vph)	134	663	240	541	743	192
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1736	1568	1752	1743	1827	1553
Flt Permitted	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (perm)	1736	1568	1752	1743	1827	1553
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	144	713	258	582	799	206
RTOR Reduction (vph)	0	64	0	0	0	51
Lane Group Flow (vph)	144	649	258	582	799	155
Confl. Peds. (#/hr)		3				
Confl. Bikes (#/hr)		1			1	
Heavy Vehicles (%)	4%	3%	3%	9%	4%	4%
Turn Type		pt+ov	Prot			Prot
Protected Phases	8	8 1	1	6	2	2
Permitted Phases						
Actuated Green, G (s)	27.6	50.0	17.9	73.9	51.5	51.5
Effective Green, g (s)	27.6	50.0	17.9	73.9	51.5	51.5
Actuated g/C Ratio	0.25	0.45	0.16	0.67	0.46	0.46
Clearance Time (s)	4.5		4.5	5.0	5.0	5.0
Vehicle Extension (s)	2.5		2.5	4.0	4.0	4.0
Lane Grp Cap (vph)	432	706	283	1160	848	721
v/s Ratio Prot	0.08	c0.41	0.15	0.33	c0.44	0.10
v/s Ratio Perm						
v/c Ratio	0.33	0.92	0.91	0.50	0.94	0.21
Uniform Delay, d1	34.2	28.6	45.8	9.3	28.3	17.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	17.0	31.4	0.5	18.5	0.2
Delay (s)	34.5	45.6	77.2	9.8	46.9	17.9
Level of Service	C	D	E	A	D	B
Approach Delay (s)	43.7			30.5	40.9	
Approach LOS	D			C	D	

Intersection Summary			
HCM Average Control Delay	38.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	111.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	88.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	98	41	63	687	1053	288
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	102	43	66	716	1097	300
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				TWLTL	TWLTL	
Median storage veh)				2	2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2094	1247	1397			
vC1, stage 1 conf vol	1247					
vC2, stage 2 conf vol	847					
vCu, unblocked vol	2094	1247	1397			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)	5.4					
tF (s)	3.5	3.3	2.2			
p0 queue free %	53	80	87			
cM capacity (veh/h)	215	210	496			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	145	66	716	1397
Volume Left	102	66	0	0
Volume Right	43	0	0	300
cSH	213	496	1700	1700
Volume to Capacity	0.68	0.13	0.42	0.82
Queue Length 95th (ft)	106	11	0	0
Control Delay (s)	51.4	13.4	0.0	0.0
Lane LOS	F	B		
Approach Delay (s)	51.4	1.1		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	3.6		
Intersection Capacity Utilization	87.5%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	29	120	204	27	39	53	75	303	26	70	405	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5		4.5	4.5		4.0	4.5		4.0	4.5	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	0.99		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		0.99	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.91		1.00	0.91		1.00	0.99		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1803	1681		1496	1692		1752	1857		1736	1856	
Flt Permitted	0.69	1.00		0.39	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1314	1681		614	1692		1752	1857		1736	1856	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	32	130	222	29	42	58	82	329	28	76	440	13
RTOR Reduction (vph)	0	65	0	0	42	0	0	3	0	0	1	0
Lane Group Flow (vph)	32	287	0	29	58	0	82	354	0	76	452	0
Confl. Peds. (#/hr)	1		8	8		1			5	5		
Heavy Vehicles (%)	0%	1%	0%	20%	3%	0%	3%	1%	0%	4%	2%	0%
Turn Type	Perm			Perm			Prot			Prot		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)	13.0	13.0		13.0	13.0		3.5	17.7		3.4	17.6	
Effective Green, g (s)	13.0	13.0		13.0	13.0		3.5	17.7		3.4	17.6	
Actuated g/C Ratio	0.28	0.28		0.28	0.28		0.07	0.38		0.07	0.37	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.0	4.5		4.0	4.5	
Vehicle Extension (s)	0.5	0.5		0.5	0.5		0.5	2.0		0.5	2.0	
Lane Grp Cap (vph)	363	464		169	467		130	698		125	694	
v/s Ratio Prot		c0.17			0.03		c0.05	0.19		0.04	c0.24	
v/s Ratio Perm	0.02			0.05								
v/c Ratio	0.09	0.62		0.17	0.12		0.63	0.51		0.61	0.65	
Uniform Delay, d1	12.7	14.9		13.0	12.8		21.2	11.3		21.2	12.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	1.7		0.2	0.0		7.1	0.2		5.6	1.7	
Delay (s)	12.7	16.6		13.1	12.8		28.3	11.5		26.8	13.9	
Level of Service	B	B		B	B		C	B		C	B	
Approach Delay (s)		16.3			12.9			14.7			15.7	
Approach LOS		B			B			B			B	

Intersection Summary			
HCM Average Control Delay	15.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	47.1	Sum of lost time (s)	13.0
Intersection Capacity Utilization	59.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	4	464	476	213	115	6
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87
Hourly flow rate (vph)	5	533	547	245	132	7
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	792				1212	670
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	792				1212	670
tC, single (s)	4.1				6.4	6.3
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.4
p0 queue free %	99				35	98
cM capacity (veh/h)	838				202	450

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	5	533	792	139
Volume Left	5	0	0	132
Volume Right	0	0	245	7
cSH	838	1700	1700	208
Volume to Capacity	0.01	0.31	0.47	0.67
Queue Length 95th (ft)	0	0	0	103
Control Delay (s)	9.3	0.0	0.0	51.8
Lane LOS	A			F
Approach Delay (s)	0.1		0.0	51.8
Approach LOS				F

Intersection Summary			
Average Delay	4.9		
Intersection Capacity Utilization	51.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	315	3174	33	174	1683	219	40	185	631	349	80	171
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.88		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1400	1703	3367		1671	1632		1770	1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.52	1.00		0.07	1.00	
Satd. Flow (perm)	1770	3539	1400	1703	3367		919	1632		137	1657	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	332	3341	35	183	1772	231	42	195	664	367	84	180
RTOR Reduction (vph)	0	0	2	0	8	0	0	73	0	0	64	0
Lane Group Flow (vph)	332	3341	33	183	1995	0	42	786	0	367	200	0
Confl. Peds. (#/hr)	3		3	3		3			2	2		
Heavy Vehicles (%)	2%	2%	12%	6%	5%	5%	8%	1%	2%	2%	5%	2%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	9.0	46.0	46.0	6.0	43.0		54.5	54.5		54.5	54.5	
Effective Green, g (s)	9.0	46.0	46.0	6.0	43.0		54.5	54.5		54.5	54.5	
Actuated g/C Ratio	0.08	0.38	0.38	0.05	0.36		0.45	0.45		0.45	0.45	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	133	1357	537	85	1207		417	741		62	753	
v/s Ratio Prot	c0.19	c0.94		0.11	0.59			0.48			0.12	
v/s Ratio Perm			0.02				0.05			c2.68		
v/c Ratio	2.50	2.46	0.06	2.15	1.65		0.10	1.06		5.92	0.27	
Uniform Delay, d1	55.5	37.0	23.4	57.0	38.5		18.7	32.8		32.8	20.3	
Progression Factor	1.00	1.00	1.00	1.34	0.68		1.00	1.00		1.00	1.00	
Incremental Delay, d2	695.2	660.1	0.2	533.2	295.1		0.1	50.3		2248.1	0.2	
Delay (s)	750.7	697.1	23.6	609.7	321.1		18.8	83.0		2280.9	20.5	
Level of Service	F	F	C	F	F		B	F		F	C	
Approach Delay (s)		695.6			345.3			80.0			1335.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	572.1	HCM Level of Service	F
HCM Volume to Capacity ratio	4.26		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	180.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	269	3894	42	0	1766	3	30	1	1	12	3	336
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0		5.0	5.0		4.0	4.0		4.0	
Lane Util. Factor	1.00	0.95	1.00		0.95	1.00		1.00	1.00		1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00	0.99		0.99	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00	1.00		1.00	
Frt	1.00	1.00	0.85		1.00	0.85		1.00	0.85		0.87	
Flt Protected	0.95	1.00	1.00		1.00	1.00		0.95	1.00		1.00	
Satd. Flow (prot)	1805	3539	1538		3438	1568		1806	1593		1555	
Flt Permitted	0.95	1.00	1.00		1.00	1.00		0.32	1.00		0.99	
Satd. Flow (perm)	1805	3539	1538		3438	1568		608	1593		1544	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	280	4056	44	0	1840	3	31	1	1	12	3	350
RTOR Reduction (vph)	0	0	2	0	0	0	0	0	1	0	173	0
Lane Group Flow (vph)	280	4056	42	0	1840	3	0	32	0	0	192	0
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Heavy Vehicles (%)	0%	2%	5%	14%	5%	3%	0%	9%	0%	0%	0%	5%
Turn Type	Prot		Prot	Prot		Prot	Perm		Perm	Perm		
Protected Phases	5	2	2	1	6	6		8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	22.4	92.8	92.8		66.4	66.4		18.2	18.2		18.2	
Effective Green, g (s)	22.4	92.8	92.8		66.4	66.4		18.2	18.2		18.2	
Actuated g/C Ratio	0.19	0.77	0.77		0.55	0.55		0.15	0.15		0.15	
Clearance Time (s)	4.0	5.0	5.0		5.0	5.0		4.0	4.0		4.0	
Vehicle Extension (s)	2.3	5.4	5.4		5.4	5.4		2.5	2.5		2.5	
Lane Grp Cap (vph)	337	2737	1189		1902	868		92	242		234	
v/s Ratio Prot	0.16	c1.15	0.03		0.54	0.00						
v/s Ratio Perm								0.05	0.00		c0.12	
v/c Ratio	0.83	1.48	0.04		0.97	0.00		0.35	0.00		0.82	
Uniform Delay, d1	47.0	13.6	3.2		25.8	12.0		45.6	43.2		49.3	
Progression Factor	0.94	1.49	0.32		1.00	1.00		1.00	1.00		1.00	
Incremental Delay, d2	1.6	217.0	0.0		14.2	0.0		1.7	0.0		19.7	
Delay (s)	45.8	237.3	1.0		40.0	12.0		47.2	43.2		69.0	
Level of Service	D	F	A		D	B		D	D		E	
Approach Delay (s)		222.7			40.0			47.1			69.0	
Approach LOS		F			D			D			E	

Intersection Summary			
HCM Average Control Delay	162.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	150.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	1789	2060	78	1026	740	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0	4.0	6.0	5.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3471	1548	1736	3505	3389	
Flt Permitted	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (perm)	3471	1548	1736	3505	3389	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	1864	2146	81	1069	771	38
RTOR Reduction (vph)	0	43	0	0	2	0
Lane Group Flow (vph)	1864	2103	81	1069	807	0
Confl. Peds. (#/hr)		1	1		2	1
Heavy Vehicles (%)	4%	3%	4%	3%	3%	2%
Turn Type		pm+ov	Prot			
Protected Phases	2	8	1	6	8	
Permitted Phases		2				
Actuated Green, G (s)	57.0	124.0	10.0	71.0	67.0	
Effective Green, g (s)	57.0	124.0	10.0	71.0	67.0	
Actuated g/C Ratio	0.38	0.83	0.07	0.48	0.45	
Clearance Time (s)	6.0	5.0	4.0	6.0	5.0	
Vehicle Extension (s)	4.8	2.3	2.3	5.5	2.3	
Lane Grp Cap (vph)	1328	1288	117	1670	1524	
v/s Ratio Prot	0.54	c0.73	0.05	c0.31	0.24	
v/s Ratio Perm		0.62				
v/c Ratio	1.40	1.63	0.69	0.64	0.53	
Uniform Delay, d1	46.0	12.5	68.0	29.4	29.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	186.2	288.2	14.4	1.3	0.2	
Delay (s)	232.2	300.7	82.4	30.6	29.8	
Level of Service	F	F	F	C	C	
Approach Delay (s)	268.9			34.3	29.8	
Approach LOS	F			C	C	

Intersection Summary			
HCM Average Control Delay	191.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.58		
Actuated Cycle Length (s)	149.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	139.5%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1881	0	1	1087	0	1	0	2	0	0	1
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	0	1980	0	1	1144	0	1	0	2	0	0	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1144			1980			3127	3126	1980	3129	3126	1144
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1144			1980			3127	3126	1980	3129	3126	1144
tC, single (s)	4.1			4.1			8.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.2			4.4	4.0	3.3	3.5	4.0	4.2
p0 queue free %	100			100			61	100	97	100	100	99
cM capacity (veh/h)	618			296			3	11	78	7	11	158

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	1980	1145	3	1
Volume Left	0	1	1	0
Volume Right	0	0	2	1
cSH	618	296	8	158
Volume to Capacity	0.00	0.00	0.42	0.01
Queue Length 95th (ft)	0	0	22	1
Control Delay (s)	0.0	0.2	660.7	28.0
Lane LOS		A	F	D
Approach Delay (s)	0.0	0.2	660.7	28.0
Approach LOS			F	D

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	109.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	380	953	0	3	698	176	0	243	46	261	335	377
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.4		4.0	5.4	5.4		4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539		1805	1810	1568		1851		1768	1792	1442
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00		0.39	1.00	1.00
Satd. Flow (perm)	1770	3539		1805	1810	1568		1851		732	1792	1442
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	396	993	0	3	727	183	0	253	48	272	349	393
RTOR Reduction (vph)	0	0	0	0	0	111	0	5	0	0	0	256
Lane Group Flow (vph)	396	993	0	3	727	72	0	296	0	272	349	137
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	2%	2%	0%	0%	5%	3%	11%	0%	0%	2%	6%	12%
Turn Type	Prot			Prot		Prot	Perm			Perm		Prot
Protected Phases	5	2		1	6	6		8			4	4
Permitted Phases							8			4		
Actuated Green, G (s)	23.0	71.9		0.8	49.7	49.7		40.5		40.5	40.5	40.5
Effective Green, g (s)	23.0	71.9		0.8	49.7	49.7		40.5		40.5	40.5	40.5
Actuated g/C Ratio	0.18	0.57		0.01	0.39	0.39		0.32		0.32	0.32	0.32
Clearance Time (s)	4.0	5.4		4.0	5.4	5.4		4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.3	5.4		2.3	5.4	5.4		2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	320	2002		11	708	613		590		233	571	459
v/s Ratio Prot	c0.22	0.28		0.00	c0.40	0.05		0.16			0.19	0.10
v/s Ratio Perm										c0.37		
v/c Ratio	1.24	0.50		0.27	1.03	0.12		0.50		1.17	0.61	0.30
Uniform Delay, d1	52.0	16.7		62.9	38.7	24.7		35.1		43.3	36.6	32.6
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	130.8	0.5		7.7	40.8	0.2		0.5		111.7	1.7	0.3
Delay (s)	182.9	17.1		70.5	79.5	24.9		35.6		155.0	38.3	32.9
Level of Service	F	B		E	E	C		D		F	D	C
Approach Delay (s)		64.4			68.6			35.6			67.5	
Approach LOS		E			E			D			E	

Intersection Summary			
HCM Average Control Delay	63.9	HCM Level of Service	E
HCM Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	127.1	Sum of lost time (s)	13.9
Intersection Capacity Utilization	103.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	147	847	800	107	469	507
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	155	892	842	113	494	534
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1046		2397	601
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1046		2397	601
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			0		0	0
cM capacity (veh/h)			673		0	504

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1046	955	1027
Volume Left	0	842	494
Volume Right	892	0	534
cSH	1700	673	0
Volume to Capacity	0.62	1.25	Err
Queue Length 95th (ft)	0	782	Err
Control Delay (s)	0.0	145.9	Err
Lane LOS		F	F
Approach Delay (s)	0.0	145.9	Err
Approach LOS			F

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	177.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	227	68	30	315	848	161
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	247	74	33	342	922	175
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2290	1931	1843	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2290	1931	1843	0	0	
tC, single (s)	7.1	6.5	6.6	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.1	3.3	2.2	
p0 queue free %	0	0	0	68	43	
cM capacity (veh/h)	0	28	31	1076	1617	

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	321	375	1097
Volume Left	247	0	922
Volume Right	0	342	175
cSH	0	277	1617
Volume to Capacity	Err	1.35	0.57
Queue Length 95th (ft)	Err	487	95
Control Delay (s)	Err	216.9	9.5
Lane LOS	F	F	A
Approach Delay (s)	Err	216.9	9.5
Approach LOS	F	F	

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	112.0%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	879	397	24	339	206	49
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	977	441	27	377	229	54
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1418		1627	1197
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1418		1627	1197
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		0	76
cM capacity (veh/h)			487		107	223

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	1418	403	283
Volume Left	0	27	229
Volume Right	441	0	54
cSH	1700	487	119
Volume to Capacity	0.83	0.05	2.39
Queue Length 95th (ft)	0	4	622
Control Delay (s)	0.0	1.7	709.0
Lane LOS		A	F
Approach Delay (s)	0.0	1.7	709.0
Approach LOS			F

Intersection Summary			
Average Delay	95.8		
Intersection Capacity Utilization	91.5%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	533	1287	344	59	775	111	488	138	92	104	152	298
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3481		1805	3512		1787	1775		1805	1863	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	3481		1805	3512		1787	1775		1805	1863	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	549	1327	355	61	799	114	503	142	95	107	157	307
RTOR Reduction (vph)	0	15	0	0	7	0	0	15	0	0	0	273
Lane Group Flow (vph)	549	1667	0	61	906	0	503	222	0	107	157	34
Confl. Peds. (#/hr)							3					3
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	1%	1%	0%	0%	2%	1%
Turn Type	Prot			Prot			Split			Split		Prot
Protected Phases	5	2		1	6		4	4		8	8	8
Permitted Phases												
Actuated Green, G (s)	41.8	73.3		6.2	37.7		39.5	39.5		17.0	17.0	17.0
Effective Green, g (s)	41.8	73.3		6.2	37.7		39.5	39.5		17.0	17.0	17.0
Actuated g/C Ratio	0.27	0.48		0.04	0.25		0.26	0.26		0.11	0.11	0.11
Clearance Time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	486	1660		73	861		459	456		200	206	177
v/s Ratio Prot	c0.31	c0.48		0.03	0.26		c0.28	0.13		0.06	c0.08	0.02
v/s Ratio Perm												
v/c Ratio	1.13	1.00		0.84	1.05		1.10	0.49		0.54	0.76	0.19
Uniform Delay, d1	55.9	40.2		73.2	58.0		57.1	48.5		64.6	66.4	62.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	81.4	23.1		52.4	45.4		70.5	0.6		2.1	14.7	0.4
Delay (s)	137.4	63.3		125.6	103.4		127.6	49.1		66.7	81.1	62.5
Level of Service	F	E		F	F		F	D		E	F	E
Approach Delay (s)		81.5			104.8			102.5			68.4	
Approach LOS		F			F			F			E	

Intersection Summary			
HCM Average Control Delay	88.3	HCM Level of Service	F
HCM Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	153.7	Sum of lost time (s)	13.2
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	234	1094	593	183	953	300	322	384	76	308	430	534
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Lane Util. Factor	1.00	0.91	1.00	1.00	0.91	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.97	1.00	1.00	0.96
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1719	4715	1558	1736	4673	1511	1770	1863	1539	1736	1845	1540
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1719	4715	1558	1736	4673	1511	1770	1863	1539	1736	1845	1540
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	246	1152	624	193	1003	316	339	404	80	324	453	562
RTOR Reduction (vph)	0	0	242	0	0	226	0	0	30	0	0	125
Lane Group Flow (vph)	246	1152	382	193	1003	90	339	404	50	324	453	437
Confl. Peds. (#/hr)	4		3	3		4	31		19	19		31
Heavy Vehicles (%)	5%	10%	1%	4%	11%	4%	2%	2%	2%	4%	3%	1%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	17.6	36.0	36.0	15.6	34.0	34.0	14.0	37.4	37.4	14.0	37.4	37.4
Effective Green, g (s)	17.6	36.0	36.0	15.6	34.0	34.0	14.0	37.4	37.4	14.0	37.4	37.4
Actuated g/C Ratio	0.15	0.30	0.30	0.13	0.28	0.28	0.12	0.31	0.31	0.12	0.31	0.31
Clearance Time (s)	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5	4.0	4.5	4.5
Vehicle Extension (s)	2.3	4.4	4.4	2.3	4.4	4.4	2.3	2.3	2.3	2.3	2.3	2.3
Lane Grp Cap (vph)	252	1415	467	226	1324	428	207	581	480	203	575	480
v/s Ratio Prot	c0.14	0.24		0.11	0.21		c0.19	0.22		0.19	0.25	
v/s Ratio Perm			c0.24			0.06			0.03			c0.28
v/c Ratio	0.98	0.81	0.82	0.85	0.76	0.21	1.64	0.70	0.11	1.60	0.79	0.91
Uniform Delay, d1	51.0	38.9	39.0	51.1	39.2	32.8	53.0	36.3	29.4	53.0	37.7	39.7
Progression Factor	0.88	0.94	0.87	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	46.1	4.6	13.1	25.0	4.1	1.1	307.8	3.2	0.1	290.2	6.7	20.8
Delay (s)	90.7	41.0	47.2	76.1	43.3	33.9	360.8	39.5	29.4	343.2	44.4	60.5
Level of Service	F	D	D	E	D	C	F	D	C	F	D	E
Approach Delay (s)		49.0			45.5			170.8			123.4	
Approach LOS		D			D			F			F	

Intersection Summary			
HCM Average Control Delay	83.2	HCM Level of Service	F
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.5
Intersection Capacity Utilization	104.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

HCM Unsignalized Intersection Capacity Analysis
401: SW Childs Rd & SW Stafford Rd

5/25/2012

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	263	253	69	504	577	129
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	277	266	73	531	607	136
Pedestrians	1					
Lane Width (ft)	12.0					
Walking Speed (ft/s)	4.0					
Percent Blockage	0					
Right turn flare (veh)		1				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1284	608	608			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1284	608	608			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	46	92			
cM capacity (veh/h)	168	495	964			

Direction, Lane #	EB 1	NB 1	SB 1	SB 2
Volume Total	543	603	607	136
Volume Left	277	73	0	0
Volume Right	266	0	0	136
cSH	251	964	1700	1700
Volume to Capacity	2.16	0.08	0.36	0.08
Queue Length 95th (ft)	1035	6	0	0
Control Delay (s)	567.2	2.0	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	567.2	2.0	0.0	
Approach LOS	F			

Intersection Summary			
Average Delay	163.7		
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 402_Borland&Stafford

402_Borland&Stafford_LowBuild

Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB SW Stafford Rd.											
3	L	236	2.0	0.858	47.0	LOS E	6.7	168.6	0.91	1.29	15.5
8	T	384	1.0	0.858	46.9	LOS E	6.7	169.0	0.92	1.26	15.8
18	R	97	2.0	0.858	46.9	LOS E	6.7	169.0	0.92	1.27	15.7
Approach		717	1.5	0.858	46.9	LOS E	6.7	169.0	0.92	1.27	15.7
East: WB SW Borland Rd.											
1	L	33	7.0	0.374	11.4	LOS B	1.2	30.7	0.57	0.99	24.8
6	T	127	0.0	0.374	11.4	LOS B	1.2	30.7	0.57	0.77	26.8
16	R	65	2.0	0.374	11.4	LOS B	1.2	30.7	0.57	0.82	26.5
Approach		225	1.6	0.374	11.4	LOS B	1.2	30.7	0.57	0.82	26.4
North: SB SW Stafford Rd.											
7	L	159	0.0	0.417	10.4	LOS B	1.9	48.7	0.57	0.93	25.1
4	T	248	5.0	0.417	10.4	LOS B	1.9	48.7	0.57	0.74	27.2
14	R	207	1.0	0.417	10.4	LOS B	1.9	48.7	0.57	0.80	26.9
Approach		615	2.4	0.417	10.4	LOS B	1.9	48.7	0.57	0.81	26.5
West: EB SW Borland Rd.											
5	L	252	0.0	1.017	58.5	LOS F	24.2	608.2	1.00	1.68	13.9
2	T	579	1.0	1.017	58.5	LOS F	24.2	608.2	1.00	1.68	13.9
12	R	187	1.0	0.236	7.1	LOS A	0.7	18.1	0.42	0.71	28.7
Approach		1018	0.8	1.017	49.0	LOS E	24.2	608.2	0.89	1.50	15.3
All Vehicles		2575	1.4	1.017	35.9	LOS E	24.2	608.2	0.79	1.21	17.9

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Roundabout LOS Method: Same as Sign Control.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: US HCM 2010.
HCM Delay Model used.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	96	307	648	231	653	596
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	0.97	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.96		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1662	1414	1663		1614	1733
Flt Permitted	0.95	1.00	1.00		0.24	1.00
Satd. Flow (perm)	1662	1414	1663		400	1733
Peak-hour factor, PHF	0.90	0.90	0.95	0.95	0.95	0.95
Adj. Flow (vph)	107	341	682	243	687	627
RTOR Reduction (vph)	0	265	13	0	0	0
Lane Group Flow (vph)	107	76	912	0	687	627
Confl. Bikes (#/hr)		4				1
Heavy Vehicles (%)	0%	2%	2%	0%	3%	1%
Turn Type		Perm			Perm	
Protected Phases	8		2			6
Permitted Phases		8			6	
Actuated Green, G (s)	10.4	10.4	56.9		56.9	56.9
Effective Green, g (s)	10.4	10.4	56.9		56.9	56.9
Actuated g/C Ratio	0.14	0.14	0.76		0.76	0.76
Clearance Time (s)	4.0	4.0	4.0		4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)	230	195	1257		302	1310
v/s Ratio Prot	c0.06		0.55			0.36
v/s Ratio Perm		0.05			c1.72	
v/c Ratio	0.47	0.39	0.73		2.27	0.48
Uniform Delay, d1	29.9	29.5	5.0		9.2	3.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	1.5	1.3	2.1		584.1	0.3
Delay (s)	31.4	30.8	7.1		593.3	3.8
Level of Service	C	C	A		F	A
Approach Delay (s)	31.0		7.1			312.0
Approach LOS	C		A			F

Intersection Summary			
HCM Average Control Delay	160.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.99		
Actuated Cycle Length (s)	75.3	Sum of lost time (s)	8.0
Intersection Capacity Utilization	107.3%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	313	476	274	390	240	101
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	344	523	301	429	264	111
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		1				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1350	319	375			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1350	319	375			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	28	74			
cM capacity (veh/h)	125	724	1178			

Direction, Lane #	EB 1	NB 1	NB 2	SB 1
Volume Total	867	301	429	375
Volume Left	344	301	0	0
Volume Right	523	0	0	111
cSH	250	1178	1700	1700
Volume to Capacity	3.47	0.26	0.25	0.22
Queue Length 95th (ft)	Err	26	0	0
Control Delay (s)	Err	9.1	0.0	0.0
Lane LOS	F	A		
Approach Delay (s)	Err	3.8		0.0
Approach LOS	F			

Intersection Summary			
Average Delay	4398.9		
Intersection Capacity Utilization	65.7%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	30	378	175	217	408	49
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.88	0.88	0.88	0.88	0.95	0.95
Hourly flow rate (vph)	34	430	199	247	429	52
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1100	455	481			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1100	455	481			
tC, single (s)	6.4	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.3			
p0 queue free %	82	29	81			
cM capacity (veh/h)	192	609	1056			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	464	445	481
Volume Left	34	199	0
Volume Right	430	0	52
cSH	526	1056	1700
Volume to Capacity	0.88	0.19	0.28
Queue Length 95th (ft)	247	17	0
Control Delay (s)	43.9	5.2	0.0
Lane LOS	E	A	
Approach Delay (s)	43.9	5.2	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	16.3		
Intersection Capacity Utilization	86.6%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	306	476	75	190	172	40
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	333	517	82	207	187	43
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						1
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			333		961	591
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			333		961	591
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			93		30	91
cM capacity (veh/h)			1216		266	507

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	850	82	207	230
Volume Left	0	82	0	187
Volume Right	517	0	0	43
cSH	1700	1216	1700	305
Volume to Capacity	0.50	0.07	0.12	0.76
Queue Length 95th (ft)	0	5	0	144
Control Delay (s)	0.0	8.2	0.0	45.9
Lane LOS		A		E
Approach Delay (s)	0.0	2.3		45.9
Approach LOS				E

Intersection Summary			
Average Delay	8.2		
Intersection Capacity Utilization	74.0%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	23	809	59	8	401	105	101	63	72	477	64	35
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	6.0		5.0	6.0		5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.97		1.00	0.92		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1662	3224		1662	1637		1622	1610		1646	1598	
Flt Permitted	0.95	1.00		0.95	1.00		0.69	1.00		0.66	1.00	
Satd. Flow (perm)	1662	3224		1662	1637		1178	1610		1149	1598	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	24	852	62	8	422	111	106	66	76	502	67	37
RTOR Reduction (vph)	0	4	0	0	7	0	0	31	0	0	15	0
Lane Group Flow (vph)	24	910	0	8	526	0	106	111	0	502	89	0
Confl. Peds. (#/hr)	2					2	2					2
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	0%	2%	3%	0%	3%	3%	2%	0%	0%	1%	2%	4%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	3	8		7	4			6			2	
Permitted Phases							6			2		
Actuated Green, G (s)	4.4	45.0		0.8	41.4		55.3	55.3		55.3	55.3	
Effective Green, g (s)	4.4	45.0		0.8	41.4		55.3	55.3		55.3	55.3	
Actuated g/C Ratio	0.04	0.38		0.01	0.35		0.47	0.47		0.47	0.47	
Clearance Time (s)	5.0	6.0		5.0	6.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	62	1239		11	579		556	760		543	755	
v/s Ratio Prot	c0.01	c0.28		0.00	c0.32			0.07			0.06	
v/s Ratio Perm							0.09			c0.44		
v/c Ratio	0.39	0.73		0.73	0.91		0.19	0.15		0.92	0.12	
Uniform Delay, d1	55.0	30.9		58.0	36.0		17.9	17.5		28.9	17.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.9	2.7		118.2	18.8		0.1	0.1		21.6	0.1	
Delay (s)	57.9	33.6		176.3	54.9		18.0	17.6		50.6	17.3	
Level of Service	E	C		F	D		B	B		D	B	
Approach Delay (s)		34.3			56.7			17.8			44.9	
Approach LOS		C			E			B			D	

Intersection Summary			
HCM Average Control Delay	40.5	HCM Level of Service	D
HCM Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	117.1	Sum of lost time (s)	22.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	212	28	656	800	14	302
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5		5.5	5.5		5.5
Lane Util. Factor	1.00		1.00	1.00		1.00
Frpb, ped/bikes	1.00		1.00	1.00		1.00
Flpb, ped/bikes	1.00		1.00	1.00		1.00
Frt	0.98		1.00	0.85		1.00
Flt Protected	0.96		1.00	1.00		1.00
Satd. Flow (prot)	1593		1733	1458		1713
Flt Permitted	0.96		1.00	1.00		0.97
Satd. Flow (perm)	1593		1733	1458		1659
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	226	30	698	851	15	321
RTOR Reduction (vph)	5	0	0	309	0	0
Lane Group Flow (vph)	251	0	698	542	0	336
Confl. Bikes (#/hr)			1			
Heavy Vehicles (%)	4%	0%	1%	2%	0%	2%
Turn Type				Perm	Perm	
Protected Phases	4		6			2
Permitted Phases				6	2	
Actuated Green, G (s)	14.1		34.0	34.0		34.0
Effective Green, g (s)	14.1		34.0	34.0		34.0
Actuated g/C Ratio	0.24		0.59	0.59		0.59
Clearance Time (s)	4.5		5.5	5.5		5.5
Vehicle Extension (s)	2.5		3.0	3.0		3.0
Lane Grp Cap (vph)	387		1014	853		971
v/s Ratio Prot	c0.16		c0.40			
v/s Ratio Perm				0.37		0.20
v/c Ratio	0.65		0.69	0.64		0.35
Uniform Delay, d1	19.8		8.4	8.0		6.3
Progression Factor	1.00		1.00	1.00		1.00
Incremental Delay, d2	3.3		2.0	1.6		0.2
Delay (s)	23.1		10.3	9.5		6.5
Level of Service	C		B	A		A
Approach Delay (s)	23.1		9.9			6.5
Approach LOS	C		A			A

Intersection Summary			
HCM Average Control Delay	10.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	58.1	Sum of lost time (s)	10.0
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	3	642	26	39	276	1	32	0	138	0	0	2
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	3	669	27	41	288	1	33	0	144	0	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	289			696			1060	1058	682	1202	1071	288
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	289			696			1060	1058	682	1202	1071	288
tC, single (s)	4.1			4.2			7.1	6.5	6.2	7.1	6.5	7.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	4.2
p0 queue free %	100			95			83	100	68	100	100	100
cM capacity (veh/h)	1285			873			195	215	448	107	212	567

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	699	329	177	2
Volume Left	3	41	33	0
Volume Right	27	1	144	2
cSH	1285	873	360	567
Volume to Capacity	0.00	0.05	0.49	0.00
Queue Length 95th (ft)	0	4	65	0
Control Delay (s)	0.1	1.6	24.3	11.4
Lane LOS	A	A	C	B
Approach Delay (s)	0.1	1.6	24.3	11.4
Approach LOS			C	B

Intersection Summary				
Average Delay		4.1		
Intersection Capacity Utilization		72.2%	ICU Level of Service	C
Analysis Period (min)		15		

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	69	746	220	104	41	16
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	73	785	232	109	43	17
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)		6				
Median type				None	None	
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	624	52	60			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624	52	60			
tC, single (s)	6.6	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.7	3.3	2.2			
p0 queue free %	80	23	85			
cM capacity (veh/h)	358	1013	1537			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	858	341	60
Volume Left	73	232	0
Volume Right	785	0	17
cSH	1107	1537	1700
Volume to Capacity	0.77	0.15	0.04
Queue Length 95th (ft)	204	13	0
Control Delay (s)	19.4	5.7	0.0
Lane LOS	C	A	
Approach Delay (s)	19.4	5.7	0.0
Approach LOS	C		

Intersection Summary			
Average Delay	14.8		
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	761	6	117	697	271	6	92	102	562	218	47
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.93			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.97	
Satd. Flow (prot)	1662	3260	1488	1646	3292	1458		1566			1659	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.67	
Satd. Flow (perm)	1662	3260	1488	1646	3292	1458		1533			1154	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	12	793	6	122	726	282	6	96	106	585	227	49
RTOR Reduction (vph)	0	0	2	0	0	191	0	27	0	0	2	0
Lane Group Flow (vph)	12	793	4	122	726	91	0	181	0	0	859	0
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	1%	1%	2%	0%	3%	5%	1%	2%	0%
Turn Type	Prot		Prot	Prot		Prot	Perm			Perm		
Protected Phases	1	6	6	5	2	2		4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.6	33.0	33.0	9.0	40.4	40.4		85.0			86.0	
Effective Green, g (s)	1.6	33.0	33.0	9.0	40.4	40.4		85.0			86.0	
Actuated g/C Ratio	0.01	0.23	0.23	0.06	0.28	0.28		0.59			0.60	
Clearance Time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Vehicle Extension (s)	2.3	4.8	4.8	2.3	4.8	4.8		2.5			2.5	
Lane Grp Cap (vph)	18	747	341	103	924	409		905			689	
v/s Ratio Prot	0.01	c0.24	0.00	c0.07	0.22	0.06						
v/s Ratio Perm								0.12			c0.74	
v/c Ratio	0.67	1.06	0.01	1.18	0.79	0.22		0.20			1.25	
Uniform Delay, d1	70.9	55.5	42.9	67.5	47.8	39.7		13.7			29.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	58.2	50.5	0.0	146.6	5.1	0.5		0.1			123.2	
Delay (s)	129.1	106.0	42.9	214.1	52.9	40.3		13.8			152.2	
Level of Service	F	F	D	F	D	D		B			F	
Approach Delay (s)		105.9			67.1			13.8			152.2	
Approach LOS		F			E			B			F	

Intersection Summary			
HCM Average Control Delay	98.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.19		
Actuated Cycle Length (s)	144.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	109.9%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	39	192	51	195	72	7	31	82	166	17	62	16
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.91	0.91	0.91	0.95	0.95	0.95
Hourly flow rate (vph)	41	202	54	205	76	7	34	90	182	18	65	17

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	297	288	307	100
Volume Left (vph)	41	205	34	18
Volume Right (vph)	54	7	182	17
Hadj (s)	-0.04	0.17	-0.30	-0.02
Departure Headway (s)	5.6	5.8	5.5	6.2
Degree Utilization, x	0.46	0.46	0.47	0.17
Capacity (veh/h)	600	581	602	487
Control Delay (s)	13.2	13.7	13.1	10.4
Approach Delay (s)	13.2	13.7	13.1	10.4
Approach LOS	B	B	B	B

Intersection Summary			
Delay	13.0		
HCM Level of Service	B		
Intersection Capacity Utilization	63.9%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	14	331	7	16	319	52	5	34	20	94	55	62
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.91	0.91	0.91	0.95	0.95	0.95
Hourly flow rate (vph)	15	348	7	17	336	55	5	37	22	99	58	65
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									1			1
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	336			348			840	751	352	808	775	363
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	336			348			840	751	352	808	775	363
tC, single (s)	4.1			4.2			7.1	6.5	6.3	7.2	6.5	6.2
tC, 2 stage (s)												
tF (s)	2.2			2.3			3.5	4.0	3.4	3.6	4.0	3.3
p0 queue free %	99			99			97	89	97	61	82	90
cM capacity (veh/h)	1235			1173			219	328	676	252	320	686

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	371	407	65	222
Volume Left	15	17	5	99
Volume Right	7	55	22	65
cSH	1235	1173	476	363
Volume to Capacity	0.01	0.01	0.14	0.61
Queue Length 95th (ft)	1	1	12	97
Control Delay (s)	0.4	0.5	15.6	29.4
Lane LOS	A	A	C	D
Approach Delay (s)	0.4	0.5	15.6	29.4
Approach LOS			C	D

Intersection Summary			
Average Delay	7.4		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

MOVEMENT SUMMARY

Site: 414_Mulino&13th

414_Mulino&13th_LowBuild

Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB S. Mulino Rd.											
3	L	20	0.0	0.046	0.0	LOS A	0.0	0.0	0.00	1.03	31.5
8	T	60	0.0	0.046	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		80	0.0	0.046	0.0	NA	0.0	0.0	0.00	0.26	37.5
North: SB S Mulino Rd.											
4	T	143	6.0	0.115	7.5	LOS A	0.6	14.6	0.09	0.92	26.0
14	R	43	5.0	0.115	7.5	LOS A	0.6	14.6	0.09	0.93	25.8
Approach		187	5.8	0.115	7.5	LOS A	0.6	14.6	0.09	0.92	26.0
West: EB SE 13th Ave.											
5	L	24	5.0	0.080	9.7	LOS A	0.4	10.0	0.35	0.84	25.1
12	R	44	0.0	0.080	9.7	LOS A	0.4	10.0	0.35	0.85	25.1
Approach		67	1.8	0.080	9.7	LOS A	0.4	10.0	0.35	0.85	25.1
All Vehicles		334	3.6	0.115	6.1	NA	0.6	14.6	0.12	0.75	27.8

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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MOVEMENT SUMMARY

Site: 415_99E&SouthEnd

99E&SouthEnd_LowBuild

Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB 99E											
8	T	718	2.0	0.418	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
18	R	316	1.0	0.214	0.0	LOS A	0.0	0.0	0.00	0.69	31.7
Approach		1034	1.7	0.418	0.0	NA	0.0	0.0	0.00	0.21	37.0
East: WB South End Rd.											
1	L	249	0.0	1.068	123.2	LOS F	17.1	428.2	1.00	1.91	8.1
16	R	12	0.0	0.040	18.0	LOS C	0.2	3.8	0.74	0.97	22.0
Approach		261	0.0	1.068	118.5	LOS F	17.1	428.2	0.99	1.86	8.4
North: SB 99E											
7	L	15	10.0	0.027	6.6	LOS A	0.1	2.6	0.63	0.81	27.4
4	T	1282	3.0	0.755	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
Approach		1297	3.1	0.755	0.1	NA	0.1	2.6	0.01	0.01	39.8
All Vehicles		2592	2.2	1.068	12.0	NA	17.1	428.2	0.10	0.28	28.3

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	127	186	585	126	152	1362
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	134	196	616	133	160	1434
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	2369	616			616	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2369	616			616	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	0	60			84	
cM capacity (veh/h)	29	491			974	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	134	196	616	133	160	1434
Volume Left	134	0	0	0	160	0
Volume Right	0	196	0	133	0	0
cSH	29	491	1700	1700	974	1700
Volume to Capacity	4.54	0.40	0.36	0.08	0.16	0.84
Queue Length 95th (ft)	Err	47	0	0	15	0
Control Delay (s)	Err	17.1	0.0	0.0	9.4	0.0
Lane LOS	F	C			A	
Approach Delay (s)	4067.3		0.0		0.9	
Approach LOS	F					

Intersection Summary			
Average Delay	502.2		
Intersection Capacity Utilization	92.1%	ICU Level of Service	F
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	83	44	35	131	201	66	306	21	343	607	91
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.0	5.0		5.0	5.0	4.0	6.0		4.0	6.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	0.98	
Flt Protected		0.99	1.00		0.99	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1710	1488		1679	1417	1662	1686		1646	1696	
Flt Permitted		0.95	1.00		0.91	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)		1641	1488		1547	1417	1662	1686		1646	1696	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	11	86	46	36	136	209	69	319	22	357	632	95
RTOR Reduction (vph)	0	0	31	0	0	103	0	3	0	0	5	0
Lane Group Flow (vph)	0	97	15	0	172	106	69	338	0	357	722	0
Confl. Bikes (#/hr)	1							1				1
Heavy Vehicles (%)	0%	2%	0%	0%	4%	5%	0%	3%	0%	1%	1%	0%
Turn Type	Perm		pt+ov	Perm		pt+ov	Prot			Prot		
Protected Phases		4	4 5		8	8 1	5	2		1	6	
Permitted Phases	4			8								
Actuated Green, G (s)		13.4	25.2		13.4	39.1	6.8	28.0		20.7	41.9	
Effective Green, g (s)		13.4	25.2		13.4	39.1	6.8	28.0		20.7	41.9	
Actuated g/C Ratio		0.17	0.33		0.17	0.51	0.09	0.36		0.27	0.54	
Clearance Time (s)		5.0			5.0		4.0	6.0		4.0	6.0	
Vehicle Extension (s)		2.5			2.5		2.5	3.0		2.5	3.0	
Lane Grp Cap (vph)		285	486		269	719	147	612		442	922	
v/s Ratio Prot			0.01			0.07	0.04	0.20		c0.22	c0.43	
v/s Ratio Perm		0.06			c0.11							
v/c Ratio		0.34	0.03		0.64	0.15	0.47	0.55		0.81	0.78	
Uniform Delay, d1		28.0	17.6		29.6	10.1	33.4	19.6		26.3	14.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.0		4.3	0.1	1.7	1.1		10.1	4.4	
Delay (s)		28.5	17.7		33.9	10.2	35.2	20.6		36.4	18.4	
Level of Service		C	B		C	B	D	C		D	B	
Approach Delay (s)		25.0			20.9			23.1			24.3	
Approach LOS		C			C			C			C	

Intersection Summary			
HCM Average Control Delay	23.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	77.1	Sum of lost time (s)	9.0
Intersection Capacity Utilization	73.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	162	22	61	59	52	29	523	42	179	1093	139
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.98			0.98	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1690			1666	1488	1662	1683	1365	1662	1699	1488
Flt Permitted		0.75			0.62	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1284			1061	1488	1662	1683	1365	1662	1699	1488
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	110	178	24	67	65	57	31	551	44	188	1151	146
RTOR Reduction (vph)	0	2	0	0	0	31	0	0	10	0	0	16
Lane Group Flow (vph)	0	310	0	0	132	26	31	551	34	188	1151	130
Heavy Vehicles (%)	2%	0%	0%	0%	5%	0%	0%	4%	9%	0%	3%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)		36.7			36.7	36.7	3.2	75.3	75.3	21.0	93.1	93.1
Effective Green, g (s)		36.7			36.7	36.7	3.2	75.3	75.3	21.0	93.1	93.1
Actuated g/C Ratio		0.25			0.25	0.25	0.02	0.51	0.51	0.14	0.63	0.63
Clearance Time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		317			262	367	36	852	691	235	1064	932
v/s Ratio Prot							0.02	0.33		c0.11	c0.68	
v/s Ratio Perm		c0.24			0.12	0.02			0.03			0.09
v/c Ratio		0.98			0.50	0.07	0.86	0.65	0.05	0.80	1.08	0.14
Uniform Delay, d1		55.6			48.2	42.9	72.5	26.9	18.6	61.8	27.8	11.4
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		43.9			1.1	0.1	94.1	2.2	0.1	16.8	52.5	0.1
Delay (s)		99.5			49.3	43.0	166.6	29.2	18.6	78.6	80.3	11.5
Level of Service		F			D	D	F	C	B	E	F	B
Approach Delay (s)		99.5			47.4			35.2			73.3	
Approach LOS		F			D			D			E	

Intersection Summary			
HCM Average Control Delay	65.4	HCM Level of Service	E
HCM Volume to Capacity ratio	1.06		
Actuated Cycle Length (s)	148.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	102.3%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

MOVEMENT SUMMARY

Site: 419_Leland and Beavercreek Rd.

419_Beavercreek/Leland_LowBuild

Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance ft	Prop. Queued	Effective Stop Rate per veh	Average Speed mph
South: NB S.Karmath Rd.											
3	L	44	8.0	0.550	27.1	LOS D	3.5	89.8	0.79	1.15	19.2
8	T	78	3.0	0.550	27.1	LOS D	3.5	89.8	0.79	1.15	19.2
18	R	71	0.0	0.550	27.1	LOS D	3.5	89.8	0.79	1.17	19.2
Approach		193	3.0	0.550	27.1	LOS D	3.5	89.8	0.79	1.16	19.2
East: WB S. Beavercreek Rd.											
1	L	21	12.0	0.189	8.7	LOS A	0.9	22.6	0.20	1.01	25.5
6	T	55	3.0	0.189	8.7	LOS A	0.9	22.6	0.20	0.98	25.6
16	R	154	4.0	0.189	8.7	LOS A	0.9	22.6	0.20	0.88	25.4
Approach		229	4.5	0.189	8.7	LOS A	0.9	22.6	0.20	0.91	25.4
North: SB S. Beavercreek Rd.											
7	L	304	2.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.80	31.5
4	T	136	2.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.00	40.0
14	R	61	2.0	0.307	0.0	LOS A	0.0	0.0	0.00	0.75	31.7
Approach		501	2.0	0.307	0.0	NA	0.0	0.0	0.00	0.58	33.5
West: EB S. Leland Rd.											
5	L	60	5.0	0.328	9.8	LOS A	1.7	43.6	0.45	0.95	25.2
2	T	228	3.0	0.328	9.8	LOS A	1.7	43.6	0.45	0.93	25.2
12	R	77	10.0	0.328	9.8	LOS A	1.7	43.6	0.45	0.80	25.1
Approach		365	4.8	0.328	9.8	LOS A	1.7	43.6	0.45	0.91	25.2
All Vehicles		1288	3.4	0.550	8.4	NA	3.5	89.8	0.28	0.82	26.6

Level of Service (LOS) Method: Delay & v/c (HCM 2010).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
HCM Delay Model used.

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	13	59	0	30	50	14	19	494	12	25	933	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	14	63	0	32	53	15	20	520	13	26	982	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1621	1595	982	1626	1595	520	982			520		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1621	1595	982	1626	1595	520	982			520		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	66	39	100	22	48	97	97			98		
cM capacity (veh/h)	40	102	305	41	102	560	711			1056		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	77	100	20	520	13	26	982	13
Volume Left	14	32	20	0	0	26	0	0
Volume Right	0	15	0	0	13	0	0	13
cSH	80	75	711	1700	1700	1056	1700	1700
Volume to Capacity	0.96	1.33	0.03	0.31	0.01	0.02	0.58	0.01
Queue Length 95th (ft)	129	197	2	0	0	2	0	0
Control Delay (s)	179.8	311.5	10.2	0.0	0.0	8.5	0.0	0.0
Lane LOS	F	F	B			A		
Approach Delay (s)	179.8	311.5	0.4			0.2		
Approach LOS	F	F						

Intersection Summary				
Average Delay	25.9			
Intersection Capacity Utilization	69.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	36	0	204	4	0	1	74	520	5	1	886	41
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	39	0	222	4	0	1	78	547	5	1	933	43
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								TWLTL			TWLTL	
Median storage veh)								2			2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1639	1643	933	1641	1684	550	976			553		
vC1, stage 1 conf vol	935	935		706	706							
vC2, stage 2 conf vol	704	708		935	978							
vCu, unblocked vol	1639	1643	933	1641	1684	550	976			553		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	100	31	81	100	100	89			100		
cM capacity (veh/h)	250	268	323	23	220	539	707			1028		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	261	5	78	553	934	43
Volume Left	39	4	78	0	1	0
Volume Right	222	1	0	5	0	43
cSH	309	29	707	1700	1028	1700
Volume to Capacity	0.84	0.19	0.11	0.33	0.00	0.03
Queue Length 95th (ft)	183	15	9	0	0	0
Control Delay (s)	56.6	157.8	10.7	0.0	0.0	0.0
Lane LOS	F	F	B		A	
Approach Delay (s)	56.6	157.8	1.3		0.0	
Approach LOS	F	F				

Intersection Summary				
Average Delay		8.8		
Intersection Capacity Utilization		88.6%	ICU Level of Service	E
Analysis Period (min)		15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	73	109	483	185	198	867
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	77	115	508	195	208	913
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			TWLTL
Median storage veh)						2
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	1838	508			508	
vC1, stage 1 conf vol	508					
vC2, stage 2 conf vol	1329					
vCu, unblocked vol	1838	508			508	
tC, single (s)	6.5	6.3			4.2	
tC, 2 stage (s)	5.5					
tF (s)	3.6	3.4			2.3	
p0 queue free %	57	79			80	
cM capacity (veh/h)	179	553			1036	

Direction, Lane #	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	192	508	195	208	913
Volume Left	77	0	0	208	0
Volume Right	115	0	195	0	0
cSH	301	1700	1700	1036	1700
Volume to Capacity	0.64	0.30	0.11	0.20	0.54
Queue Length 95th (ft)	102	0	0	19	0
Control Delay (s)	35.8	0.0	0.0	9.3	0.0
Lane LOS	E			A	
Approach Delay (s)	35.8	0.0		1.7	
Approach LOS	E				

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	43	0	104	0	0	0	52	447	0	0	638	52
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	46	0	112	0	0	0	55	471	0	0	672	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1252	1252	672	1252	1252	471	672			471		
vC1, stage 1 conf vol	672	672		580	580							
vC2, stage 2 conf vol	580	580		672	672							
vCu, unblocked vol	1252	1252	672	1252	1252	471	672			471		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)	6.1	5.5		6.1	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	87	100	76	100	100	100	94			100		
cM capacity (veh/h)	347	356	460	255	335	597	929			1102		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	158	0	55	471	672	55
Volume Left	46	0	55	0	0	0
Volume Right	112	0	0	0	0	55
cSH	420	1700	929	1700	1102	1700
Volume to Capacity	0.38	0.00	0.06	0.28	0.00	0.03
Queue Length 95th (ft)	43	0	5	0	0	0
Control Delay (s)	18.7	0.0	9.1	0.0	0.0	0.0
Lane LOS	C	A	A			
Approach Delay (s)	18.7	0.0	1.0		0.0	
Approach LOS	C	A				

Intersection Summary				
Average Delay		2.4		
Intersection Capacity Utilization		63.1%	ICU Level of Service	B
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	309	22	36	340	30	45	93	60	118	170	40
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	11	340	24	40	374	33	49	102	66	130	187	44

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	375	446	218	360
Volume Left (vph)	11	40	49	130
Volume Right (vph)	24	33	66	44
Hadj (s)	0.03	0.12	-0.08	0.02
Departure Headway (s)	8.0	7.8	8.7	8.1
Degree Utilization, x	0.83	0.97	0.53	0.81
Capacity (veh/h)	439	446	384	437
Control Delay (s)	39.9	63.3	21.0	37.9
Approach Delay (s)	39.9	63.3	21.0	37.9
Approach LOS	E	F	C	E

Intersection Summary			
Delay	43.9		
HCM Level of Service	E		
Intersection Capacity Utilization	77.9%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	315	530	288	216	134	319
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	346	582	316	237	147	351
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			929		1508	638
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			929		1508	638
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			57		0	27
cM capacity (veh/h)			736		77	478

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	929	554	498
Volume Left	0	316	147
Volume Right	582	0	351
cSH	1700	736	187
Volume to Capacity	0.55	0.43	2.66
Queue Length 95th (ft)	0	54	1078
Control Delay (s)	0.0	10.6	798.9
Lane LOS		B	F
Approach Delay (s)	0.0	10.6	798.9
Approach LOS			F

Intersection Summary			
Average Delay	203.8		
Intersection Capacity Utilization	122.4%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	56	563	398	15	73	110
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	58	586	415	16	76	115
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	430				1126	422
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	430				1126	422
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	95				64	82
cM capacity (veh/h)	1140				211	627

Direction, Lane #	EB 1	WB 1	SB 1
Volume Total	645	430	191
Volume Left	58	0	76
Volume Right	0	16	115
cSH	1140	1700	351
Volume to Capacity	0.05	0.25	0.54
Queue Length 95th (ft)	4	0	77
Control Delay (s)	1.3	0.0	26.8
Lane LOS	A		D
Approach Delay (s)	1.3	0.0	26.8
Approach LOS			D

Intersection Summary			
Average Delay	4.7		
Intersection Capacity Utilization	81.0%	ICU Level of Service	D
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
501: Hwy 212 & SE 282nd Ave

5/25/2012

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	615	808	815	74	67	741
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1630	1716	1716	1458	1662	1458
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1630	1716	1716	1458	1662	1458
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.90	0.90
Adj. Flow (vph)	647	851	858	78	74	823
RTOR Reduction (vph)	0	0	0	19	0	31
Lane Group Flow (vph)	647	851	858	59	74	792
Confl. Peds. (#/hr)						3
Heavy Vehicles (%)	2%	2%	2%	2%	0%	2%
Turn Type	Prot			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	16.0	52.0	32.0	32.0	20.0	40.0
Effective Green, g (s)	16.0	52.0	32.0	32.0	20.0	40.0
Actuated g/C Ratio	0.20	0.65	0.40	0.40	0.25	0.50
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	6.0	4.2	4.2	2.3	
Lane Grp Cap (vph)	326	1115	686	583	416	729
v/s Ratio Prot	c0.40	0.50	c0.50		0.04	c0.54
v/s Ratio Perm				0.04		
v/c Ratio	1.98	0.76	1.25	0.10	0.18	1.09
Uniform Delay, d1	32.0	9.7	24.0	15.0	23.5	20.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	454.0	5.0	124.7	0.3	0.1	59.3
Delay (s)	486.0	14.7	148.7	15.4	23.7	79.3
Level of Service	F	B	F	B	C	E
Approach Delay (s)		218.2	137.6		74.7	
Approach LOS		F	F		E	

Intersection Summary			
HCM Average Control Delay	156.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.40		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	103.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	263	604	291	87	229	125
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	277	636	306	92	241	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	398				1496	306
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	398				1496	306
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	76				0	82
cM capacity (veh/h)	1172				104	738

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	277	636	306	92	373
Volume Left	277	0	0	0	241
Volume Right	0	0	0	92	132
cSH	1172	1700	1700	1700	149
Volume to Capacity	0.24	0.37	0.18	0.05	2.50
Queue Length 95th (ft)	23	0	0	0	807
Control Delay (s)	9.0	0.0	0.0	0.0	742.6
Lane LOS	A				F
Approach Delay (s)	2.7		0.0		742.6
Approach LOS					F

Intersection Summary			
Average Delay	165.9		
Intersection Capacity Utilization	64.5%	ICU Level of Service	C
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	2	122	1	132	7	349	197	302	715	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	1	2	128	1	139	7	367	207	318	753	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1			1						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1841	1771	753	1772	1771	367	753			367		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1841	1771	753	1772	1771	367	753			367		
tC, single (s)	7.1	6.5	6.7	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.8	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	98	99	0	98	79	99			73		
cM capacity (veh/h)	36	61	341	50	61	658	866			1180		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	268	7	367	207	318	753	1
Volume Left	0	128	7	0	0	318	0	0
Volume Right	2	139	0	0	207	0	0	1
cSH	183	97	866	1700	1700	1180	1700	1700
Volume to Capacity	0.02	2.78	0.01	0.22	0.12	0.27	0.44	0.00
Queue Length 95th (ft)	1	636	1	0	0	27	0	0
Control Delay (s)	32.1	895.8	9.2	0.0	0.0	9.2	0.0	0.0
Lane LOS	D	F	A			A		
Approach Delay (s)	32.1	895.8	0.1			2.7		
Approach LOS	D	F						

Intersection Summary				
Average Delay	126.5			
Intersection Capacity Utilization	68.3%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	472	29	13	712	16	18
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.94	0.94
Hourly flow rate (vph)	497	31	14	749	17	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			527		899	248
vC1, stage 1 conf vol					497	
vC2, stage 2 conf vol					402	
vCu, unblocked vol			527		899	248
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			99		97	97
cM capacity (veh/h)			1050		487	758

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	248	248	31	14	375	375	36
Volume Left	0	0	0	14	0	0	17
Volume Right	0	0	31	0	0	0	19
cSH	1700	1700	1700	1050	1700	1700	600
Volume to Capacity	0.15	0.15	0.02	0.01	0.22	0.22	0.06
Queue Length 95th (ft)	0	0	0	1	0	0	5
Control Delay (s)	0.0	0.0	0.0	8.5	0.0	0.0	11.4
Lane LOS				A			B
Approach Delay (s)	0.0			0.2			11.4
Approach LOS							B

Intersection Summary			
Average Delay	0.4		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	30	270	0	0	524	13	0	0	0	2	0	89
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	32	284	0	0	552	14	0	0	0	2	0	97
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	565			284			996	913	142	764	906	558
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	565			284			996	913	142	764	906	558
tC, single (s)	4.3			4.1			7.5	6.5	6.9	7.5	6.5	7.0
tC, 2 stage (s)												
tF (s)	2.3			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	97			100			100	100	100	99	100	79
cM capacity (veh/h)	962			1290			156	267	886	289	269	468

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1	NB 2	SB 1
Volume Total	32	189	95	0	565	0	0	99
Volume Left	32	0	0	0	0	0	0	2
Volume Right	0	0	0	0	14	0	0	97
cSH	962	1700	1700	1700	1700	1700	1700	461
Volume to Capacity	0.03	0.11	0.06	0.00	0.33	0.00	0.00	0.21
Queue Length 95th (ft)	3	0	0	0	0	0	0	20
Control Delay (s)	8.9	0.0	0.0	0.0	0.0	0.0	0.0	14.9
Lane LOS	A					A	A	B
Approach Delay (s)	0.9			0.0		0.0		14.9
Approach LOS						A		B

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	43.6%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	16	253	495	94	27	41
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.87	0.87
Hourly flow rate (vph)	17	266	521	99	31	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	521				688	521
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	521				688	521
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	98				92	91
cM capacity (veh/h)	1056				370	498

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	17	133	133	521	99	31	47
Volume Left	17	0	0	0	0	31	0
Volume Right	0	0	0	0	99	0	47
cSH	1056	1700	1700	1700	1700	370	498
Volume to Capacity	0.02	0.08	0.08	0.31	0.06	0.08	0.09
Queue Length 95th (ft)	1	0	0	0	0	7	8
Control Delay (s)	8.5	0.0	0.0	0.0	0.0	15.6	13.0
Lane LOS	A					C	B
Approach Delay (s)	0.5			0.0		14.0	
Approach LOS						B	

Intersection Summary			
Average Delay	1.3		
Intersection Capacity Utilization	38.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	55	804	2	89	1005	149	26	139	5	110	65	100
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	59	865	2	96	1081	160	28	149	5	118	70	108
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)									3			
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)					503							
pX, platoon unblocked	0.75						0.75	0.75		0.75	0.75	0.75
vC, conflicting volume	1241			867			1858	2416	433	1977	2337	620
vC1, stage 1 conf vol							984	984		1352	1352	
vC2, stage 2 conf vol							874	1432		625	985	
vCu, unblocked vol	662			867			1483	2224	433	1641	2119	0
tC, single (s)	4.1			4.2			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.3			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	92			87			85	0	99	0	56	87
cM capacity (veh/h)	704			748			182	146	571	91	158	821

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1	SB 2
Volume Total	59	576	290	96	720	520	183	188	108
Volume Left	59	0	0	96	0	0	28	118	0
Volume Right	0	0	2	0	0	160	5	0	108
cSH	704	1700	1700	748	1700	1700	155	108	821
Volume to Capacity	0.08	0.34	0.17	0.13	0.42	0.31	1.18	1.74	0.13
Queue Length 95th (ft)	7	0	0	11	0	0	255	370	11
Control Delay (s)	10.6	0.0	0.0	10.5	0.0	0.0	186.5	437.9	10.0
Lane LOS	B			B			F	F	B
Approach Delay (s)	0.7			0.8			186.5	282.3	
Approach LOS							F	F	

Intersection Summary				
Average Delay	43.5			
Intersection Capacity Utilization	67.5%	ICU Level of Service	C	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	177	896	188	325	766	178	381	766	408	407	898	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95		1.00	0.95	1.00	0.97	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	1.00	0.98	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1577	3467	3409		1770	3505	1553	3433	3539	1615
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1577	3467	3409		1770	3505	1553	3433	3539	1615
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	188	953	200	346	815	189	405	815	434	433	955	173
RTOR Reduction (vph)	0	0	68	0	15	0	0	0	149	0	0	71
Lane Group Flow (vph)	188	953	132	346	989	0	405	815	285	433	955	102
Confl. Peds. (#/hr)	2		1	1		2			4	4		
Confl. Bikes (#/hr)					1			2				
Heavy Vehicles (%)	2%	2%	1%	1%	3%	1%	2%	3%	2%	2%	2%	0%
Turn Type	Prot		Perm	Prot			Prot		Perm	Prot		Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2						8			4
Actuated Green, G (s)	13.7	36.7	36.7	13.3	36.3		28.5	43.0	43.0	18.5	33.5	33.5
Effective Green, g (s)	13.7	36.7	36.7	13.3	36.3		28.5	43.0	43.0	18.5	33.5	33.5
Actuated g/C Ratio	0.11	0.28	0.28	0.10	0.28		0.22	0.33	0.33	0.14	0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	5.0	4.5	4.5
Vehicle Extension (s)	2.3	4.3	4.3	2.3	4.3		2.3	4.3	4.3	2.3	2.3	2.3
Lane Grp Cap (vph)	187	999	445	355	952		388	1159	514	489	912	416
v/s Ratio Prot	c0.11	0.27		0.10	c0.29		c0.23	0.23		0.13	c0.27	
v/s Ratio Perm			0.08						0.18			0.06
v/c Ratio	1.01	0.95	0.30	0.97	1.04		1.04	0.70	0.56	0.89	1.05	0.25
Uniform Delay, d1	58.1	45.8	36.5	58.2	46.9		50.8	37.9	35.7	54.7	48.2	38.2
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.12	0.39	0.25	1.00	1.00	1.00
Incremental Delay, d2	67.2	19.3	1.7	40.6	39.7		49.4	2.4	2.9	17.0	42.9	1.4
Delay (s)	125.4	65.1	38.2	98.8	86.5		106.3	17.4	11.9	71.7	91.1	39.7
Level of Service	F	E	D	F	F		F	B	B	E	F	D
Approach Delay (s)		69.6			89.7			37.7			80.1	
Approach LOS		E			F			D			F	

Intersection Summary			
HCM Average Control Delay	68.0	HCM Level of Service	E
HCM Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	130.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	97.6%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	5	363	376	13	10	35
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	6	403	418	14	11	39
Pedestrians		1	2		7	
Lane Width (ft)		12.0	12.0		12.0	
Walking Speed (ft/s)		4.0	4.0		4.0	
Percent Blockage		0	0		1	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)			191			
pX, platoon unblocked						
vC, conflicting volume	439				647	433
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	439				647	433
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	100				97	93
cM capacity (veh/h)	1125				403	573

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total	140	269	432	50
Volume Left	6	0	0	11
Volume Right	0	0	14	39
cSH	1125	1700	1700	524
Volume to Capacity	0.00	0.16	0.25	0.10
Queue Length 95th (ft)	0	0	0	8
Control Delay (s)	0.4	0.0	0.0	12.6
Lane LOS	A			B
Approach Delay (s)	0.1		0.0	12.6
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	30.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	243	634	432	293	592	259	267	981	207	356	1429	233
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00	0.97
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1805	3610	1556	1787	3610	1575	1805	3539	1569	1805	3505	1568
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1805	3610	1556	1787	3610	1575	1805	3539	1569	1805	3505	1568
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	259	674	460	312	630	276	284	1044	220	379	1520	248
RTOR Reduction (vph)	0	0	187	0	0	184	0	0	48	0	0	40
Lane Group Flow (vph)	259	674	273	312	630	92	284	1044	172	379	1520	208
Confl. Peds. (#/hr)	2		12	12		2	3		4	4		3
Confl. Bikes (#/hr)		1			1			1				
Heavy Vehicles (%)	0%	0%	1%	1%	0%	1%	0%	2%	1%	0%	3%	0%
Turn Type	Prot		Perm	Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	22.0	32.0	32.0	21.0	31.0	31.0	22.0	45.8	45.8	33.0	56.8	56.8
Effective Green, g (s)	22.0	32.0	32.0	21.0	31.0	31.0	22.0	45.8	45.8	33.0	56.8	56.8
Actuated g/C Ratio	0.15	0.21	0.21	0.14	0.21	0.21	0.15	0.31	0.31	0.22	0.38	0.38
Clearance Time (s)	4.0	4.8	4.8	4.0	4.8	4.8	4.0	5.4	5.4	4.0	5.4	5.4
Vehicle Extension (s)	2.3	2.3	2.3	2.3	2.3	2.3	2.3	4.9	4.9	2.3	4.9	4.9
Lane Grp Cap (vph)	265	770	332	250	746	326	265	1081	479	397	1327	594
v/s Ratio Prot	0.14	c0.19		c0.17	0.17		c0.16	0.29		0.21	c0.43	
v/s Ratio Perm			0.18			0.06			0.11			0.13
v/c Ratio	0.98	0.88	0.82	1.25	0.84	0.28	1.07	0.97	0.36	0.95	1.15	0.35
Uniform Delay, d1	63.8	57.1	56.3	64.5	57.2	50.1	64.0	51.3	40.7	57.8	46.6	33.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.16	0.61	0.48	1.00	1.00	1.00
Incremental Delay, d2	48.4	10.7	14.5	140.4	8.5	0.3	39.7	3.5	0.2	33.3	74.8	1.6
Delay (s)	112.2	67.8	70.8	204.9	65.6	50.4	113.7	34.9	19.8	91.0	121.4	35.0
Level of Service	F	E	E	F	E	D	F	C	B	F	F	C
Approach Delay (s)		77.0			97.9			47.2			106.1	
Approach LOS		E			F			D			F	

Intersection Summary			
HCM Average Control Delay	83.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.4
Intersection Capacity Utilization	107.1%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	214	789	789	129	199	248
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8	4.8		4.0	4.0
Lane Util. Factor	1.00	1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.98		1.00	0.85
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1770	1881	1839		1805	1583
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1770	1881	1839		1805	1583
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	230	848	848	139	214	267
RTOR Reduction (vph)	0	0	6	0	0	225
Lane Group Flow (vph)	230	848	981	0	214	42
Confl. Peds. (#/hr)				6	3	
Confl. Bikes (#/hr)	1		2			
Heavy Vehicles (%)	2%	1%	1%	0%	0%	2%
Turn Type	Prot					Perm
Protected Phases	5	2	6		4	
Permitted Phases						4
Actuated Green, G (s)	14.2	67.1	48.9		14.1	14.1
Effective Green, g (s)	14.2	67.1	48.9		14.1	14.1
Actuated g/C Ratio	0.16	0.75	0.54		0.16	0.16
Clearance Time (s)	4.0	4.8	4.8		4.0	4.0
Vehicle Extension (s)	2.5	3.0	3.0		2.5	2.5
Lane Grp Cap (vph)	279	1402	999		283	248
v/s Ratio Prot	c0.13	0.45	c0.53		c0.12	
v/s Ratio Perm						0.03
v/c Ratio	0.82	0.60	0.98		0.76	0.17
Uniform Delay, d1	36.7	5.3	20.1		36.3	32.9
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	17.3	1.9	24.5		10.4	0.2
Delay (s)	54.0	7.3	44.6		46.8	33.1
Level of Service	D	A	D		D	C
Approach Delay (s)		17.2	44.6		39.2	
Approach LOS		B	D		D	

Intersection Summary			
HCM Average Control Delay	32.0	HCM Level of Service	C
HCM Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.8
Intersection Capacity Utilization	83.0%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	82	370	95	333	268	89	80	377	500	74	331	37
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.0		5.0	5.0			6.0	6.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00			1.00	0.88	1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.99			1.00	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.96			1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1736	1758		1770	1784			1843	2814	1752	1767	
Flt Permitted	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (perm)	1736	1758		1770	1784			1843	2814	1752	1767	
Peak-hour factor, PHF	0.88	0.88	0.88	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.90
Adj. Flow (vph)	93	420	108	351	282	94	84	397	526	82	368	41
RTOR Reduction (vph)	0	5	0	0	6	0	0	0	156	0	2	0
Lane Group Flow (vph)	93	523	0	351	370	0	0	481	370	82	407	0
Confl. Peds. (#/hr)	4		1	1		4	5		4	4		5
Confl. Bikes (#/hr)								3	1			
Heavy Vehicles (%)	4%	2%	14%	2%	2%	0%	3%	2%	1%	3%	6%	0%
Turn Type	Prot			Prot			Split		pt+ov	Split		
Protected Phases	5	2		1	6		8	8	8 1	4	4	
Permitted Phases												
Actuated Green, G (s)	14.8	53.0		35.0	73.7			46.0	87.0	40.0	40.0	
Effective Green, g (s)	14.8	53.0		35.0	73.7			46.0	87.0	40.0	40.0	
Actuated g/C Ratio	0.08	0.27		0.18	0.38			0.24	0.45	0.21	0.21	
Clearance Time (s)	4.5	5.0		5.0	5.0			6.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.0		2.5	4.0			2.5		2.5	2.5	
Lane Grp Cap (vph)	132	478		318	674			435	1255	359	362	
v/s Ratio Prot	0.05	c0.30		c0.20	0.21			c0.26	0.13	0.05	c0.23	
v/s Ratio Perm												
v/c Ratio	0.70	1.09		1.10	0.55			1.11	0.29	0.23	1.12	
Uniform Delay, d1	88.0	71.0		80.0	47.6			74.5	34.4	64.6	77.5	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	1.00	1.00	
Incremental Delay, d2	14.6	69.1		81.3	1.1			75.0	0.1	0.2	85.0	
Delay (s)	102.6	140.1		161.3	48.7			149.5	34.5	64.9	162.5	
Level of Service	F	F		F	D			F	C	E	F	
Approach Delay (s)		134.5			103.1			89.5			146.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM Average Control Delay	112.6	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	195.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	105.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	874	43	354	775	117	46	42	270	404	174	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00			0.98		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.98			0.90		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (prot)	1719	3494		1656	3467			1615		1787	1746	
Flt Permitted	0.95	1.00		0.95	1.00			0.99		0.95	1.00	
Satd. Flow (perm)	1719	3494		1656	3467			1615		1787	1746	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.90	0.90	0.89	0.90	0.90	0.90
Adj. Flow (vph)	62	920	45	373	816	123	51	47	303	449	193	98
RTOR Reduction (vph)	0	3	0	0	9	0	0	89	0	0	15	0
Lane Group Flow (vph)	62	962	0	373	930	0	0	312	0	449	276	0
Confl. Peds. (#/hr)	2		3	3		2			1	1		
Confl. Bikes (#/hr)		1								1		
Heavy Vehicles (%)	5%	2%	12%	9%	2%	0%	8%	12%	1%	1%	5%	0%
Turn Type	Prot			Prot			Split			Split		
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases												
Actuated Green, G (s)	7.5	33.8		26.0	52.3			20.0		27.0	27.0	
Effective Green, g (s)	7.5	33.8		26.0	52.3			20.0		27.0	27.0	
Actuated g/C Ratio	0.06	0.27		0.21	0.42			0.16		0.21	0.21	
Clearance Time (s)	4.0	5.0		4.0	5.0			5.0		5.0	5.0	
Vehicle Extension (s)	2.5	3.0		2.5	3.0			2.5		2.5	2.5	
Lane Grp Cap (vph)	102	939		342	1441			257		384	375	
v/s Ratio Prot	0.04	c0.28		c0.23	0.27			c0.19		c0.25	0.16	
v/s Ratio Perm												
v/c Ratio	0.61	1.02		1.09	0.65			1.21		1.17	0.74	
Uniform Delay, d1	57.7	46.0		49.9	29.3			52.9		49.4	46.1	
Progression Factor	1.00	1.00		1.00	1.00			1.00		1.00	1.00	
Incremental Delay, d2	8.4	35.8		75.2	1.0			126.3		100.7	6.9	
Delay (s)	66.1	81.8		125.1	30.3			179.2		150.1	53.0	
Level of Service	E	F		F	C			F		F	D	
Approach Delay (s)		80.8			57.3			179.2			111.9	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM Average Control Delay	89.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	125.8	Sum of lost time (s)	19.0
Intersection Capacity Utilization	104.8%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	11	2430	154	162	1427	12	116	43	102	39	109	38
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.99	1.00
Satd. Flow (prot)	1703	3539	1599	1805	3539	1380		1819	1495		1875	1547
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.53	1.00		0.72	1.00
Satd. Flow (perm)	1703	3539	1599	1805	3539	1380		996	1495		1374	1547
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	2558	162	171	1502	13	126	47	111	42	118	41
RTOR Reduction (vph)	0	0	16	0	0	2	0	0	38	0	0	23
Lane Group Flow (vph)	12	2558	146	171	1502	11	0	173	73	0	160	18
Confl. Peds. (#/hr)							1					1
Confl. Bikes (#/hr)											1	
Heavy Vehicles (%)	6%	2%	1%	0%	2%	17%	1%	0%	8%	0%	0%	3%
Turn Type	Prot		Perm	Prot		Perm	Perm		Perm	Perm		Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8		8	4		4
Actuated Green, G (s)	4.4	69.3	69.3	15.7	80.6	80.6		20.5	20.5		20.5	20.5
Effective Green, g (s)	4.4	69.3	69.3	15.7	80.6	80.6		20.5	20.5		20.5	20.5
Actuated g/C Ratio	0.04	0.58	0.58	0.13	0.67	0.67		0.17	0.17		0.17	0.17
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5		5.0	5.0		5.0	5.0
Vehicle Extension (s)	2.5	5.0	5.0	2.5	5.0	5.0		4.0	4.0		4.0	4.0
Lane Grp Cap (vph)	62	2044	923	236	2377	927		170	255		235	264
v/s Ratio Prot	0.01	c0.72		c0.09	0.42							
v/s Ratio Perm			0.09			0.01		c0.17	0.05		0.12	0.01
v/c Ratio	0.19	1.25	0.16	0.72	0.63	0.01		1.02	0.29		0.68	0.07
Uniform Delay, d1	56.1	25.4	11.8	50.1	11.2	6.5		49.8	43.4		46.7	41.7
Progression Factor	1.00	1.00	1.00	1.16	0.27	0.08		1.00	1.00		1.00	1.00
Incremental Delay, d2	1.1	117.4	0.4	6.3	0.8	0.0		73.7	0.8		8.5	0.1
Delay (s)	57.2	142.7	12.1	64.4	3.9	0.5		123.5	44.2		55.2	41.9
Level of Service	E	F	B	E	A	A		F	D		E	D
Approach Delay (s)		134.6			10.0			92.5			52.5	
Approach LOS		F			A			F			D	

Intersection Summary			
HCM Average Control Delay	85.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.13		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	103.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	4	2138	416	470	1444	119	133	142	288	350	337	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	0.98	1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.90		1.00	1.00	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1805	3505	1583	1736	3505	1464	1787	1683		1735	1769	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.35	1.00		0.24	1.00	
Satd. Flow (perm)	1805	3505	1583	1736	3505	1464	659	1683		444	1769	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	4	2251	438	495	1520	125	141	151	306	372	359	7
RTOR Reduction (vph)	0	0	78	0	0	31	0	61	0	0	1	0
Lane Group Flow (vph)	4	2251	360	495	1520	94	141	396	0	372	365	0
Confl. Peds. (#/hr)									1	1		
Confl. Bikes (#/hr)						1		1			2	
Heavy Vehicles (%)	0%	3%	2%	4%	3%	8%	1%	2%	0%	4%	7%	12%
Turn Type	Prot		Perm	Prot		Perm	Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2			6	8			4		
Actuated Green, G (s)	0.8	52.5	52.5	11.0	62.7	62.7	42.0	42.0		42.0	42.0	
Effective Green, g (s)	0.8	52.5	52.5	11.0	62.7	62.7	42.0	42.0		42.0	42.0	
Actuated g/C Ratio	0.01	0.44	0.44	0.09	0.52	0.52	0.35	0.35		0.35	0.35	
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5	5.5	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.3	5.0	5.0	2.3	5.0	5.0	3.0	3.0		3.5	3.5	
Lane Grp Cap (vph)	12	1533	693	159	1831	765	231	589		155	619	
v/s Ratio Prot	0.00	c0.64		c0.29	0.43			0.24			0.21	
v/s Ratio Perm			0.23			0.06	0.21			c0.84		
v/c Ratio	0.33	1.47	0.52	3.11	0.83	0.12	0.61	0.67		2.40	0.59	
Uniform Delay, d1	59.3	33.8	24.6	54.5	24.2	14.6	32.2	33.1		39.0	32.0	
Progression Factor	1.10	0.76	0.76	0.77	2.10	3.31	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	211.1	0.3	952.4	0.4	0.0	4.7	3.0		649.3	1.6	
Delay (s)	66.0	236.6	18.9	994.5	51.2	48.4	36.9	36.2		688.3	33.6	
Level of Service	E	F	B	F	D	D	D	D		F	C	
Approach Delay (s)		200.9			269.3			36.4			363.6	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	228.1	HCM Level of Service	F
HCM Volume to Capacity ratio	2.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	146.1%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	242	2773	51	184	2150	0	54	276	221	13	366	161
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.5	5.5	4.0	5.5		4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00	0.97	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1687	3505	1615	1626	3471		1805	1696	1583	3335	1776	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1687	3505	1615	1626	3471		1805	1696	1583	3335	1776	1583
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	255	2919	54	194	2263	0	57	294	235	14	389	171
RTOR Reduction (vph)	0	0	7	0	0	0	0	0	88	0	0	150
Lane Group Flow (vph)	255	2919	47	194	2263	0	57	294	147	14	389	21
Confl. Peds. (#/hr)	4					4	6					6
Heavy Vehicles (%)	7%	3%	0%	11%	4%	10%	0%	12%	2%	5%	7%	2%
Turn Type	Prot		Perm	Prot		Perm	Split		Prot	Split		Prot
Protected Phases	5	2		1	6		8	8	8	4	4	4
Permitted Phases			2			6						
Actuated Green, G (s)	17.4	44.4	44.4	20.5	47.5		25.1	25.1	25.1	11.5	11.5	11.5
Effective Green, g (s)	17.4	44.4	44.4	20.5	47.5		25.1	25.1	25.1	11.5	11.5	11.5
Actuated g/C Ratio	0.14	0.37	0.37	0.17	0.40		0.21	0.21	0.21	0.10	0.10	0.10
Clearance Time (s)	4.0	5.5	5.5	4.0	5.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	5.0	5.0	2.5	5.0		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	245	1297	598	278	1374		378	355	331	320	170	152
v/s Ratio Prot	0.15	c0.83		0.12	c0.65		0.03	c0.17	0.09	0.00	c0.22	0.01
v/s Ratio Perm			0.03									
v/c Ratio	1.04	2.25	0.08	0.70	1.65		0.15	0.83	0.44	0.04	2.29	0.14
Uniform Delay, d1	51.3	37.8	24.5	46.8	36.2		38.7	45.4	41.4	49.3	54.2	49.7
Progression Factor	0.91	0.71	0.57	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	29.0	563.0	0.0	6.9	294.5		0.1	14.3	0.7	0.0	597.9	0.3
Delay (s)	75.9	589.7	14.0	53.7	330.7		38.9	59.7	42.1	49.3	652.2	50.0
Level of Service	E	F	B	D	F		D	E	D	D	F	D
Approach Delay (s)		539.4			308.8			50.6			458.1	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM Average Control Delay	408.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	14.5
Intersection Capacity Utilization	128.0%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	375	323	514	370	254	169	1310	778	405	1826	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.8	4.8		4.0	4.0			5.4	5.4	4.0	5.4	
Lane Util. Factor	1.00	0.95		0.97	0.95			0.95	1.00	1.00	0.95	
Frt	1.00	0.93		1.00	0.94			1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00			0.99	1.00	0.95	1.00	
Satd. Flow (prot)	1770	3294		3467	3354			3519	1615	1787	3505	
Flt Permitted	0.11	1.00		0.95	1.00			0.48	1.00	0.95	1.00	
Satd. Flow (perm)	212	3294		3467	3354			1713	1615	1787	3505	
Peak-hour factor, PHF	0.92	0.92	0.92	0.95	0.92	0.95	0.92	0.95	0.95	0.95	0.95	0.92
Adj. Flow (vph)	2	408	351	541	402	267	184	1379	819	426	1922	0
RTOR Reduction (vph)	0	20	0	0	76	0	0	0	33	0	0	0
Lane Group Flow (vph)	2	739	0	541	593	0	0	1563	786	426	1922	0
Heavy Vehicles (%)	2%	2%	2%	1%	2%	0%	2%	2%	0%	1%	3%	2%
Turn Type	Perm			Prot			Perm		Perm	Prot		
Protected Phases		4!		7!	8			6		5	2	
Permitted Phases	4						6		6			
Actuated Green, G (s)	35.2	35.2		14.0	18.0			81.6	81.6	19.0	104.6	
Effective Green, g (s)	35.2	35.2		14.0	18.0			81.6	81.6	19.0	104.6	
Actuated g/C Ratio	0.23	0.23		0.09	0.12			0.54	0.54	0.13	0.70	
Clearance Time (s)	4.8	4.8		4.0	4.0			5.4	5.4	4.0	5.4	
Vehicle Extension (s)	2.3	2.3		2.3	3.0			4.8	4.8	2.3	4.8	
Lane Grp Cap (vph)	50	773		324	402			932	879	226	2444	
v/s Ratio Prot		0.22		c0.16	c0.18					c0.24	0.55	
v/s Ratio Perm	0.01							c0.91	0.49			
v/c Ratio	0.04	0.96		1.67	1.48			2.56dl	0.89	1.88	0.79	
Uniform Delay, d1	44.3	56.6		68.0	66.0			34.2	30.4	65.5	15.2	
Progression Factor	1.00	1.00		1.00	1.00			1.00	1.00	0.74	2.14	
Incremental Delay, d2	0.2	22.0		314.7	227.3			309.4	13.5	399.8	0.2	
Delay (s)	44.5	78.6		382.7	293.3			343.6	43.9	448.5	32.8	
Level of Service	D	E		F	F			F	D	F	C	
Approach Delay (s)		78.5			333.2			240.5			108.2	
Approach LOS		E			F			F			F	

Intersection Summary			
HCM Average Control Delay	192.5	HCM Level of Service	F
HCM Volume to Capacity ratio	1.68		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	17.4
Intersection Capacity Utilization	143.3%	ICU Level of Service	H
Analysis Period (min)	15		

dl Defacto Left Lane. Recode with 1 though lane as a left lane.
! Phase conflict between lane groups.
c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	1370	500	451	930	0	0	0	0	435	259	275
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Lane Util. Factor		0.91	1.00	1.00	0.95					0.91	0.91	1.00
Frpb, ped/bikes		1.00	0.96	1.00	1.00					1.00	1.00	1.00
Flpb, ped/bikes		1.00	1.00	1.00	1.00					1.00	1.00	1.00
Frt		1.00	0.85	1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00	1.00	0.95	1.00					0.95	0.98	1.00
Satd. Flow (prot)		5136	1554	1770	3610					1626	3368	1615
Flt Permitted		1.00	1.00	0.95	1.00					0.95	0.98	1.00
Satd. Flow (perm)		5136	1554	1770	3610					1626	3368	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	1442	526	475	979	0	0	0	0	458	273	289
RTOR Reduction (vph)	0	0	99	0	0	0	0	0	0	0	0	133
Lane Group Flow (vph)	0	1442	427	475	979	0	0	0	0	238	493	156
Confl. Peds. (#/hr)	7		16	16		7	12					12
Confl. Bikes (#/hr)								7			1	
Heavy Vehicles (%)	0%	1%	0%	2%	0%	0%	0%	0%	0%	1%	0%	0%
Turn Type			Perm	Prot						Split		Prot
Protected Phases		2		1	6					4	4	4
Permitted Phases			2									
Actuated Green, G (s)		40.3	40.3	32.1	77.9					21.1	21.1	21.1
Effective Green, g (s)		40.3	40.3	32.1	77.9					21.1	21.1	21.1
Actuated g/C Ratio		0.37	0.37	0.29	0.71					0.19	0.19	0.19
Clearance Time (s)		5.5	5.5	5.5	5.5					5.5	5.5	5.5
Vehicle Extension (s)		4.8	4.8	2.3	4.0					2.3	2.3	2.3
Lane Grp Cap (vph)		1882	569	517	2557					312	646	310
v/s Ratio Prot		c0.28		c0.27	0.27					0.15	c0.15	0.10
v/s Ratio Perm			0.27									
v/c Ratio		0.77	0.75	0.92	0.38					0.76	0.76	0.50
Uniform Delay, d1		30.7	30.4	37.7	6.4					42.1	42.1	39.8
Progression Factor		0.69	0.61	0.62	0.12					1.00	1.00	1.00
Incremental Delay, d2		2.7	8.0	17.0	0.3					9.9	5.0	0.7
Delay (s)		24.0	26.5	40.5	1.1					52.0	47.1	40.5
Level of Service		C	C	D	A					D	D	D
Approach Delay (s)		24.7			14.0			0.0			46.4	
Approach LOS		C			B			A			D	

Intersection Summary			
HCM Average Control Delay	26.2	HCM Level of Service	C
HCM Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	498	1393	0	0	1207	510	209	5	308	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Lane Util. Factor	0.97	0.95			0.95	1.00	0.95	0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.98	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	0.98	0.98	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (prot)	3502	3574			3574	1555	1676	1685	1568			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	0.95	1.00			
Satd. Flow (perm)	3502	3574			3574	1555	1676	1685	1568			
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	524	1466	0	0	1271	537	220	5	324	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	262	0	0	44	0	0	0
Lane Group Flow (vph)	524	1466	0	0	1271	275	112	113	281	0	0	0
Confl. Peds. (#/hr)	3		6	6		3	11					11
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	0%	1%	0%	0%	1%	2%	0%	0%	3%	0%	0%	0%
Turn Type	Prot					Perm	Perm		Perm			
Protected Phases	5	2			6			8				
Permitted Phases						6	8		8			
Actuated Green, G (s)	19.6	77.5			53.9	53.9	23.0	23.0	23.0			
Effective Green, g (s)	19.6	77.5			53.9	53.9	23.0	23.0	23.0			
Actuated g/C Ratio	0.18	0.70			0.49	0.49	0.21	0.21	0.21			
Clearance Time (s)	4.0	5.0			5.0	5.0	4.5	4.5	4.5			
Vehicle Extension (s)	2.3	4.0			4.8	4.8	2.3	2.3	2.3			
Lane Grp Cap (vph)	624	2518			1751	762	350	352	328			
v/s Ratio Prot	c0.15	0.41			c0.36							
v/s Ratio Perm						0.18	0.07	0.07	c0.18			
v/c Ratio	0.84	0.58			0.73	0.36	0.32	0.32	0.86			
Uniform Delay, d1	43.7	8.1			22.2	17.4	36.9	36.9	41.9			
Progression Factor	0.71	1.35			0.61	0.23	1.00	1.00	1.00			
Incremental Delay, d2	6.7	0.7			1.3	0.7	0.3	0.3	18.7			
Delay (s)	37.5	11.7			14.9	4.7	37.2	37.2	60.6			
Level of Service	D	B			B	A	D	D	E			
Approach Delay (s)		18.5			11.9			51.0			0.0	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM Average Control Delay	19.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	567	1676	199	164	884	178	189	234	91	185	276	169
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	0.97	0.91		1.00	0.95		0.97	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.98		1.00	0.97		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3502	5082		1787	3456		3467	1900	1615	1805	1881	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	3502	5082		1787	3456		3467	1900	1615	1805	1881	1599
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	597	1764	209	173	931	187	203	252	98	199	297	182
RTOR Reduction (vph)	0	13	0	0	14	0	0	0	82	0	0	148
Lane Group Flow (vph)	597	1960	0	173	1104	0	203	252	16	199	297	34
Confl. Peds. (#/hr)			1	1			2		1	1		2
Heavy Vehicles (%)	0%	0%	2%	1%	2%	1%	1%	0%	0%	0%	1%	1%
Turn Type	Prot			Prot			Prot		Prot	Prot		Prot
Protected Phases	5	2		1	6		3	8	8	7	4	4
Permitted Phases												
Actuated Green, G (s)	21.0	44.6		15.1	38.7		9.1	18.3	18.3	12.0	20.7	20.7
Effective Green, g (s)	21.0	44.6		15.1	38.7		9.1	18.3	18.3	12.0	20.7	20.7
Actuated g/C Ratio	0.19	0.41		0.14	0.35		0.08	0.17	0.17	0.11	0.19	0.19
Clearance Time (s)	4.5	5.5		4.5	5.5		5.5	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	0.5	2.9		0.5	2.9		0.5	0.5	0.5	0.5	0.5	0.5
Lane Grp Cap (vph)	669	2061		245	1216		287	316	269	197	354	301
v/s Ratio Prot	c0.17	c0.39		0.10	0.32		0.06	0.13	0.01	c0.11	c0.16	0.02
v/s Ratio Perm												
v/c Ratio	0.89	0.95		0.71	0.91		0.71	0.80	0.06	1.01	0.84	0.11
Uniform Delay, d1	43.4	31.6		45.3	34.0		49.2	44.1	38.6	49.0	43.0	37.0
Progression Factor	1.27	1.07		1.18	0.69		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.3	6.2		6.6	10.4		6.4	12.3	0.0	66.8	15.2	0.1
Delay (s)	62.6	39.9		60.0	33.9		55.5	56.3	38.6	115.8	58.2	37.1
Level of Service	E	D		E	C		E	E	D	F	E	D
Approach Delay (s)		45.2			37.4			52.9			69.5	
Approach LOS		D			D			D			E	

Intersection Summary			
HCM Average Control Delay	47.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	9.5
Intersection Capacity Utilization	85.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	1490	111	142	1192	18	159	2	127	12	6	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.98		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	1.00		1.00	0.85		1.00	0.89	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3532		1805	3565		1780	1530		1535	1677	
Flt Permitted	0.95	1.00		0.95	1.00		0.74	1.00		0.57	1.00	
Satd. Flow (perm)	1770	3532		1805	3565		1394	1530		913	1677	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	29	1568	117	149	1255	19	171	2	137	13	6	15
RTOR Reduction (vph)	0	4	0	0	1	0	0	107	0	0	12	0
Lane Group Flow (vph)	29	1681	0	149	1273	0	171	32	0	13	9	0
Confl. Peds. (#/hr)	3		4	4		3	4		5	5		4
Confl. Bikes (#/hr)		2										
Heavy Vehicles (%)	2%	1%	0%	0%	1%	0%	1%	0%	4%	17%	0%	0%
Turn Type	Prot			Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases							8			4		
Actuated Green, G (s)	3.5	64.3		13.3	74.6		18.0	18.0		18.8	18.8	
Effective Green, g (s)	3.5	64.3		13.3	74.6		18.0	18.0		18.8	18.8	
Actuated g/C Ratio	0.03	0.58		0.12	0.68		0.16	0.16		0.17	0.17	
Clearance Time (s)	4.0	4.8		4.8	5.1		4.8	4.8		4.0	4.0	
Vehicle Extension (s)	0.5	2.9		0.5	2.9		2.0	2.0		2.0	2.0	
Lane Grp Cap (vph)	56	2065		218	2418		228	250		156	287	
v/s Ratio Prot	0.02	c0.48		c0.08	0.36			0.02			0.01	
v/s Ratio Perm							c0.12			0.01		
v/c Ratio	0.52	0.81		0.68	0.53		0.75	0.13		0.08	0.03	
Uniform Delay, d1	52.4	18.1		46.3	8.9		43.9	39.3		38.4	38.0	
Progression Factor	0.87	0.72		1.50	0.25		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.3	0.3		6.0	0.7		11.6	0.1		0.1	0.0	
Delay (s)	45.9	13.4		75.7	2.9		55.4	39.4		38.4	38.0	
Level of Service	D	B		E	A		E	D		D	D	
Approach Delay (s)		14.0			10.5			48.2			38.2	
Approach LOS		B			B			D			D	

Intersection Summary			
HCM Average Control Delay	15.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	14.4
Intersection Capacity Utilization	81.2%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	250	613	0	0	926	237	253	429	579	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Lane Util. Factor	0.97	0.95			0.91	1.00	0.91	0.91	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Flpb, ped/bikes	1.00	1.00			1.00	1.00	1.00	1.00	1.00			
Frt	1.00	1.00			1.00	0.85	1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (prot)	3467	3610			5036	1599	1609	3378	1583			
Flt Permitted	0.95	1.00			1.00	1.00	0.95	1.00	1.00			
Satd. Flow (perm)	3467	3610			5036	1599	1609	3378	1583			
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	269	659	0	0	996	255	272	461	623	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	171	0	0	80	0	0	0
Lane Group Flow (vph)	269	659	0	0	996	84	237	496	543	0	0	0
Confl. Peds. (#/hr)			6	6			1					1
Confl. Bikes (#/hr)					1							
Heavy Vehicles (%)	1%	0%	0%	0%	3%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot					Prot	Perm		Prot			
Protected Phases	5	2			6	6		8	8			
Permitted Phases							8					
Actuated Green, G (s)	8.7	38.9			26.2	26.2	31.6	31.6	31.6			
Effective Green, g (s)	8.7	38.9			26.2	26.2	31.6	31.6	31.6			
Actuated g/C Ratio	0.11	0.49			0.33	0.33	0.40	0.40	0.40			
Clearance Time (s)	4.0	4.5			4.5	4.5	5.0	5.0	5.0			
Vehicle Extension (s)	2.3	4.2			4.2	4.2	2.3	2.3	2.3			
Lane Grp Cap (vph)	377	1755			1649	524	636	1334	625			
v/s Ratio Prot	c0.08	0.18			c0.20	0.05			c0.34			
v/s Ratio Perm							0.15	0.15				
v/c Ratio	0.71	0.38			0.60	0.16	0.37	0.37	0.87			
Uniform Delay, d1	34.4	12.9			22.6	19.1	17.2	17.2	22.3			
Progression Factor	0.89	1.64			1.22	2.56	1.00	1.00	1.00			
Incremental Delay, d2	5.4	0.6			1.3	0.5	0.2	0.1	12.1			
Delay (s)	35.9	21.7			28.9	49.4	17.4	17.3	34.4			
Level of Service	D	C			C	D	B	B	C			
Approach Delay (s)		25.8			33.1			25.1			0.0	
Approach LOS		C			C			C			A	

Intersection Summary			
HCM Average Control Delay	28.1	HCM Level of Service	C
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	205	6	68	2	5	3	54	474	1	4	541	189
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	0.98		1.00	1.00		1.00	1.00		1.00	0.99	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.86		1.00	0.95		1.00	1.00		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1719	1563		1802	1805		1769	1881		1804	1803	
Flt Permitted	0.75	1.00		0.70	1.00		0.20	1.00		0.39	1.00	
Satd. Flow (perm)	1360	1563		1332	1805		378	1881		741	1803	
Peak-hour factor, PHF	0.88	0.88	0.88	0.88	0.88	0.88	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	233	7	77	2	6	3	60	527	1	4	601	210
RTOR Reduction (vph)	0	56	0	0	2	0	0	0	0	0	15	0
Lane Group Flow (vph)	233	28	0	2	7	0	60	528	0	4	796	0
Confl. Peds. (#/hr)			1	1			1		1	1		1
Confl. Bikes (#/hr)										1		
Heavy Vehicles (%)	5%	0%	3%	0%	0%	0%	2%	1%	0%	0%	1%	0%
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.2	16.2		16.2	16.2		36.4	36.4		36.4	36.4	
Effective Green, g (s)	16.2	16.2		16.2	16.2		36.4	36.4		36.4	36.4	
Actuated g/C Ratio	0.27	0.27		0.27	0.27		0.60	0.60		0.60	0.60	
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	364	418		356	483		227	1130		445	1083	
v/s Ratio Prot		0.02			0.00			0.28			c0.44	
v/s Ratio Perm	c0.17			0.00			0.16			0.01		
v/c Ratio	0.64	0.07		0.01	0.01		0.26	0.47		0.01	0.74	
Uniform Delay, d1	19.6	16.6		16.3	16.3		5.7	6.7		4.9	8.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	3.8	0.1		0.0	0.0		0.6	0.3		0.0	2.6	
Delay (s)	23.4	16.6		16.3	16.3		6.4	7.0		4.9	11.3	
Level of Service	C	B		B	B		A	A		A	B	
Approach Delay (s)		21.6			16.3			7.0			11.2	
Approach LOS		C			B			A			B	

Intersection Summary			
HCM Average Control Delay	11.7	HCM Level of Service	B
HCM Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	60.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	69.6%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	17	487	568	204	195	13
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94
Hourly flow rate (vph)	18	518	604	217	207	14

Direction, Lane #	EB 1	EB 2	WB 1	SB 1
Volume Total (vph)	18	518	821	221
Volume Left (vph)	18	0	0	207
Volume Right (vph)	0	0	217	14
Hadj (s)	0.50	0.05	-0.13	0.20
Departure Headway (s)	6.6	6.2	5.6	7.0
Degree Utilization, x	0.03	0.89	1.28	0.43
Capacity (veh/h)	530	578	650	498
Control Delay (s)	8.6	38.4	157.4	15.3
Approach Delay (s)	37.4		157.4	15.3
Approach LOS	E		F	C

Intersection Summary			
Delay	96.7		
HCM Level of Service	F		
Intersection Capacity Utilization	60.6%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Stop	Stop		Stop	
Volume (vph)	88	580	624	60	106	206
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	92	604	650	62	110	215

Direction, Lane #	EB 1	WB 1	SB 1	SB 2
Volume Total (vph)	696	713	110	215
Volume Left (vph)	92	0	110	0
Volume Right (vph)	0	63	0	215
Hadj (s)	0.08	-0.03	0.50	-0.68
Departure Headway (s)	6.0	5.9	8.1	6.9
Degree Utilization, x	1.17	1.17	0.25	0.41
Capacity (veh/h)	587	612	440	517
Control Delay (s)	114.8	116.4	12.5	13.4
Approach Delay (s)	114.8	116.4	13.1	
Approach LOS	F	F	B	

Intersection Summary			
Delay	96.4		
HCM Level of Service	F		
Intersection Capacity Utilization	88.0%	ICU Level of Service	E
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	376	2	334	425	5	585
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1787	1583	1863	1568	1719	1881
Flt Permitted	0.95	1.00	1.00	1.00	0.49	1.00
Satd. Flow (perm)	1787	1583	1863	1568	894	1881
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	418	2	371	472	6	650
RTOR Reduction (vph)	0	1	0	186	0	0
Lane Group Flow (vph)	418	1	371	286	6	650
Heavy Vehicles (%)	1%	2%	2%	3%	5%	1%
Turn Type		Perm		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	23.5	23.5	48.4	48.4	48.4	48.4
Effective Green, g (s)	23.5	23.5	48.4	48.4	48.4	48.4
Actuated g/C Ratio	0.29	0.29	0.61	0.61	0.61	0.61
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	526	466	1129	950	542	1139
v/s Ratio Prot	c0.23		0.20			c0.35
v/s Ratio Perm		0.00		0.18	0.01	
v/c Ratio	0.79	0.00	0.33	0.30	0.01	0.57
Uniform Delay, d1	26.0	19.9	7.8	7.6	6.3	9.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.0	0.8	0.8	0.0	2.1
Delay (s)	34.1	19.9	8.5	8.4	6.3	11.6
Level of Service	C	B	A	A	A	B
Approach Delay (s)	34.0		8.5			11.5
Approach LOS	C		A			B

Intersection Summary			
HCM Average Control Delay	15.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	79.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	58.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Sign Control	Stop			Stop	Stop	
Volume (vph)	480	40	125	291	363	589
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	533	44	139	323	403	654

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	SB 1	SB 2
Volume Total (vph)	533	44	139	323	403	654
Volume Left (vph)	533	0	139	0	0	0
Volume Right (vph)	0	44	0	0	0	654
Hadj (s)	0.53	-0.70	0.50	0.03	0.03	-0.67
Departure Headway (s)	8.3	7.1	8.3	7.8	7.4	6.7
Degree Utilization, x	1.23	0.09	0.32	0.70	0.83	1.22
Capacity (veh/h)	440	493	429	451	478	544
Control Delay (s)	147.1	9.6	13.9	26.0	35.9	136.2
Approach Delay (s)	136.5		22.4		97.9	
Approach LOS	F		C		F	

Intersection Summary			
Delay	91.9		
HCM Level of Service	F		
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
301: Hwy 212/Hwy 224 & I-205 SB Off Ramp

5/25/2012

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	0	806	164	382	536	0	0	0	903	0	0	377
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.5		5.5	4.5				4.0			5.5
Lane Util. Factor		1.00		1.00	1.00				0.88			1.00
Frpb, ped/bikes		1.00		1.00	1.00				1.00			1.00
Flpb, ped/bikes		1.00		1.00	1.00				1.00			1.00
Frt		0.98		1.00	1.00				0.85			0.86
Flt Protected		1.00		0.95	1.00				1.00			1.00
Satd. Flow (prot)		1829		1719	1810				2538			1611
Flt Permitted		1.00		0.95	1.00				1.00			1.00
Satd. Flow (perm)		1829		1719	1810				2538			1611
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	0	848	173	402	564	0	0	0	951	0	0	397
RTOR Reduction (vph)	0	8	0	0	0	0	0	0	0	0	0	294
Lane Group Flow (vph)	0	1013	0	402	564	0	0	0	951	0	0	103
Confl. Peds. (#/hr)			5	5								
Confl. Bikes (#/hr)		1	1	1	2							
Heavy Vehicles (%)	0%	1%	1%	5%	5%	0%	0%	0%	12%	0%	0%	2%
Turn Type				Prot					Free			custom
Protected Phases		2		1	6							5
Permitted Phases									Free			
Actuated Green, G (s)		44.6		21.3	57.1				76.9			9.8
Effective Green, g (s)		44.6		21.3	57.1				76.9			9.8
Actuated g/C Ratio		0.58		0.28	0.74				1.00			0.13
Clearance Time (s)		5.5		5.5	4.5							5.5
Vehicle Extension (s)		2.3		2.3	4.2							2.3
Lane Grp Cap (vph)		1061		476	1344				2538			205
v/s Ratio Prot		c0.55		c0.23	0.31							0.06
v/s Ratio Perm									0.37			
v/c Ratio		0.95		0.84	0.42				0.37			0.50
Uniform Delay, d1		15.2		26.2	3.7				0.0			31.3
Progression Factor		1.00		1.00	1.00				1.00			1.00
Incremental Delay, d2		17.5		12.6	0.3				0.4			1.1
Delay (s)		32.7		38.8	4.0				0.4			32.4
Level of Service		C		D	A				A			C
Approach Delay (s)		32.7			18.5			0.4			32.4	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM Average Control Delay	19.4	HCM Level of Service	B
HCM Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	76.9	Sum of lost time (s)	11.0
Intersection Capacity Utilization	82.8%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	286	1861	31	115	723	138	26	177	390	241	90	124
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.90		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1770	3539	1400	1703	3340		1671	1658		1770	1680	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.56	1.00		0.21	1.00	
Satd. Flow (perm)	1770	3539	1400	1703	3340		988	1658		398	1680	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	301	1959	33	121	761	145	27	186	411	254	95	131
RTOR Reduction (vph)	0	0	3	0	13	0	0	66	0	0	41	0
Lane Group Flow (vph)	301	1959	30	121	893	0	27	531	0	254	185	0
Confl. Peds. (#/hr)	3		3	3		3			2	2		
Heavy Vehicles (%)	2%	2%	12%	6%	5%	5%	8%	1%	2%	2%	5%	2%
Turn Type	Prot		Perm	Prot			Perm			Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases			2				8			4		
Actuated Green, G (s)	9.0	46.0	46.0	6.0	43.0		54.5	54.5		54.5	54.5	
Effective Green, g (s)	9.0	46.0	46.0	6.0	43.0		54.5	54.5		54.5	54.5	
Actuated g/C Ratio	0.08	0.38	0.38	0.05	0.36		0.45	0.45		0.45	0.45	
Clearance Time (s)	4.0	5.0	5.0	4.0	5.0		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	133	1357	537	85	1197		449	753		181	763	
v/s Ratio Prot	c0.17	c0.55		0.07	0.27			0.32			0.11	
v/s Ratio Perm			0.02				0.03			c0.64		
v/c Ratio	2.26	1.44	0.06	1.42	0.75		0.06	0.71		1.40	0.24	
Uniform Delay, d1	55.5	37.0	23.3	57.0	33.7		18.4	26.3		32.8	20.1	
Progression Factor	1.00	1.00	1.00	0.95	0.86		1.00	1.00		1.00	1.00	
Incremental Delay, d2	591.7	203.9	0.2	243.7	4.1		0.1	3.0		211.2	0.2	
Delay (s)	647.2	240.9	23.5	298.0	33.1		18.4	29.3		244.0	20.2	
Level of Service	F	F	C	F	C		B	C		F	C	
Approach Delay (s)		291.1			64.3			28.8			138.6	
Approach LOS		F			E			C			F	

Intersection Summary			
HCM Average Control Delay	184.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.50		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	119.6%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	151	2340	43	0	776	1	30	1	0	4	2	179
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.0	5.0		5.0	5.0		4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00		0.95	1.00		1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00		1.00	0.98	
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00		1.00		1.00	1.00	
Frt	1.00	1.00	0.85		1.00	0.85		1.00		1.00	0.85	
Flt Protected	0.95	1.00	1.00		1.00	1.00		0.95		0.95	1.00	
Satd. Flow (prot)	1805	3539	1538		3438	1568		1806		1803	1517	
Flt Permitted	0.95	1.00	1.00		1.00	1.00		0.46		0.74	1.00	
Satd. Flow (perm)	1805	3539	1538		3438	1568		867		1397	1517	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	157	2438	45	0	808	1	31	1	0	4	2	186
RTOR Reduction (vph)	0	0	2	0	0	0	0	0	0	0	173	0
Lane Group Flow (vph)	157	2438	43	0	808	1	0	32	0	4	15	0
Confl. Peds. (#/hr)	1		1	1		1	1		1	1		1
Heavy Vehicles (%)	0%	2%	5%	14%	5%	3%	0%	9%	0%	0%	0%	5%
Turn Type	Prot		Prot	Prot		Prot	Perm		Perm	Perm		
Protected Phases	5	2	2	1	6	6		8			4	
Permitted Phases							8		8	4		
Actuated Green, G (s)	15.0	102.4	102.4		83.4	83.4		8.6		8.6	8.6	
Effective Green, g (s)	15.0	102.4	102.4		83.4	83.4		8.6		8.6	8.6	
Actuated g/C Ratio	0.12	0.85	0.85		0.70	0.70		0.07		0.07	0.07	
Clearance Time (s)	4.0	5.0	5.0		5.0	5.0		4.0		4.0	4.0	
Vehicle Extension (s)	2.3	5.4	5.4		5.4	5.4		2.5		2.5	2.5	
Lane Grp Cap (vph)	226	3020	1312		2389	1090		62		100	109	
v/s Ratio Prot	0.09	c0.69	0.03		0.24	0.00					0.01	
v/s Ratio Perm								c0.04		0.00		
v/c Ratio	0.69	0.81	0.03		0.34	0.00		0.52		0.04	0.14	
Uniform Delay, d1	50.3	4.1	1.3		7.3	5.6		53.7		51.9	52.2	
Progression Factor	1.26	1.64	0.09		1.00	1.00		1.00		1.00	1.00	
Incremental Delay, d2	0.7	0.2	0.0		0.4	0.0		5.3		0.1	0.4	
Delay (s)	63.9	7.0	0.1		7.7	5.6		59.0		52.0	52.7	
Level of Service	E	A	A		A	A		E		D	D	
Approach Delay (s)		10.3			7.7			59.0			52.7	
Approach LOS		B			A			E			D	

Intersection Summary			
HCM Average Control Delay	12.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.78		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	99.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	527	1221	158	203	851	31
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.0	4.0	6.0	5.0	
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	
Frpb, ped/bikes	1.00	0.99	1.00	1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	0.99	
Flt Protected	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (prot)	3471	1558	1736	3505	3394	
Flt Permitted	1.00	1.00	0.95	1.00	0.95	
Satd. Flow (perm)	3471	1558	1736	3505	3394	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	549	1272	165	211	886	32
RTOR Reduction (vph)	0	29	0	0	2	0
Lane Group Flow (vph)	549	1243	165	211	916	0
Confl. Peds. (#/hr)		1	1		2	1
Heavy Vehicles (%)	4%	3%	4%	3%	3%	2%
Turn Type		pm+ov	Prot			
Protected Phases	2	8	1	6	8	
Permitted Phases		2				
Actuated Green, G (s)	26.5	118.5	15.6	46.1	92.0	
Effective Green, g (s)	26.5	118.5	15.6	46.1	92.0	
Actuated g/C Ratio	0.18	0.79	0.10	0.31	0.62	
Clearance Time (s)	6.0	5.0	4.0	6.0	5.0	
Vehicle Extension (s)	4.8	2.3	2.3	5.5	2.3	
Lane Grp Cap (vph)	617	1238	182	1084	2094	
v/s Ratio Prot	0.16	c0.62	c0.10	0.06	0.27	
v/s Ratio Perm		0.18				
v/c Ratio	0.89	1.00	0.91	0.19	0.44	
Uniform Delay, d1	59.9	15.3	66.0	37.9	15.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	15.6	26.5	40.6	0.2	0.1	
Delay (s)	75.4	41.8	106.6	38.1	15.1	
Level of Service	E	D	F	D	B	
Approach Delay (s)	52.0			68.2	15.1	
Approach LOS	D			E	B	

Intersection Summary			
HCM Average Control Delay	43.0	HCM Level of Service	D
HCM Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	149.1	Sum of lost time (s)	14.0
Intersection Capacity Utilization	92.0%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	637	2147	0	3	1388	48	0	161	12	148	171	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	5.4		4.0	5.4	5.4		4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Frt	1.00	1.00		1.00	1.00	0.85		0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539		1805	1810	1568		1879		1768	1792	1442
Flt Permitted	0.95	1.00		0.95	1.00	1.00		1.00		0.49	1.00	1.00
Satd. Flow (perm)	1770	3539		1805	1810	1568		1879		903	1792	1442
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	664	2236	0	3	1446	50	0	168	12	154	178	382
RTOR Reduction (vph)	0	0	0	0	0	17	0	2	0	0	0	258
Lane Group Flow (vph)	664	2236	0	3	1446	33	0	178	0	154	178	124
Confl. Peds. (#/hr)									1	1		
Heavy Vehicles (%)	2%	2%	0%	0%	5%	3%	11%	0%	0%	2%	6%	12%
Turn Type	Prot			Prot		Prot	Perm			Perm		Prot
Protected Phases	5	2		1	6	6		8			4	4
Permitted Phases							8			4		
Actuated Green, G (s)	23.1	72.4		0.7	50.0	50.0		21.0		21.0	21.0	21.0
Effective Green, g (s)	23.1	72.4		0.7	50.0	50.0		21.0		21.0	21.0	21.0
Actuated g/C Ratio	0.21	0.67		0.01	0.46	0.46		0.19		0.19	0.19	0.19
Clearance Time (s)	4.0	5.4		4.0	5.4	5.4		4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.3	5.4		2.3	5.4	5.4		2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	379	2372		12	838	726		365		176	348	280
v/s Ratio Prot	c0.38	0.63		0.00	c0.80	0.02		0.09			0.10	0.09
v/s Ratio Perm										c0.17		
v/c Ratio	1.75	0.94		0.25	1.73	0.05		0.49		0.88	0.51	0.44
Uniform Delay, d1	42.5	15.9		53.4	29.0	15.9		38.7		42.2	38.9	38.3
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00		1.00	1.00	1.00
Incremental Delay, d2	349.1	8.8		6.3	331.5	0.1		0.7		34.8	0.9	0.8
Delay (s)	391.6	24.8		59.7	360.5	16.0		39.4		77.0	39.9	39.2
Level of Service	F	C		E	F	B		D		E	D	D
Approach Delay (s)		108.8			348.4			39.4			47.5	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM Average Control Delay	166.0	HCM Level of Service	F
HCM Volume to Capacity ratio	1.54		
Actuated Cycle Length (s)	108.0	Sum of lost time (s)	13.9
Intersection Capacity Utilization	141.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	52	914	719	44	457	352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0			4.0	4.0	4.0
Lane Util. Factor	1.00			1.00	1.00	1.00
Frt	0.87			1.00	1.00	0.85
Flt Protected	1.00			0.95	0.95	1.00
Satd. Flow (prot)	1655			1814	1805	1615
Flt Permitted	1.00			0.12	0.95	1.00
Satd. Flow (perm)	1655			234	1805	1615
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	55	962	757	46	481	371
RTOR Reduction (vph)	310	0	0	0	0	284
Lane Group Flow (vph)	707	0	0	803	481	87
Heavy Vehicles (%)	3%	0%	0%	0%	0%	0%
Turn Type			Perm			Perm
Protected Phases	4			8	2	
Permitted Phases			8			2
Actuated Green, G (s)	61.0			61.0	21.0	21.0
Effective Green, g (s)	61.0			61.0	21.0	21.0
Actuated g/C Ratio	0.68			0.68	0.23	0.23
Clearance Time (s)	4.0			4.0	4.0	4.0
Vehicle Extension (s)	3.0			3.0	3.0	3.0
Lane Grp Cap (vph)	1122			159	421	377
v/s Ratio Prot	0.43				c0.27	
v/s Ratio Perm				c3.43		0.05
v/c Ratio	0.63			5.05	1.14	0.23
Uniform Delay, d1	8.2			14.5	34.5	27.9
Progression Factor	1.00			1.00	1.00	1.00
Incremental Delay, d2	1.2			1836.6	88.9	0.3
Delay (s)	9.3			1851.1	123.4	28.3
Level of Service	A			F	F	C
Approach Delay (s)	9.3			1851.1	82.0	
Approach LOS	A			F	F	

Intersection Summary			
HCM Average Control Delay	586.0	HCM Level of Service	F
HCM Volume to Capacity ratio	4.06		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	136.7%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	249	0	1	680	1284	362
Sign Control		Stop	Stop		Free	
Grade		0%	0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	271	0	1	739	1396	393
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)					919	
pX, platoon unblocked						
vC, conflicting volume	3531	2791	2791	0	0	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3531	2791	2791	0	0	
tC, single (s)	7.1	6.5	6.6	6.2	4.1	
tC, 2 stage (s)						
tF (s)	3.5	4.0	4.1	3.3	2.2	
p0 queue free %	0	100	56	31	14	
cM capacity (veh/h)	0	2	2	1076	1617	

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	SB 2
Volume Total	271	0	1	739	1396	393
Volume Left	271	0	0	0	1396	0
Volume Right	0	0	0	739	0	393
cSH	0	1700	2	1076	1617	1700
Volume to Capacity	1354.66	0.00	0.44	0.69	0.86	0.23
Queue Length 95th (ft)	Err	0	14	145	323	0
Control Delay (s)	Err	0.0	1893.8	15.3	19.0	0.0
Lane LOS	F	A	F	C	C	
Approach Delay (s)	Err		18.1		14.8	
Approach LOS	F		C			

Intersection Summary			
Average Delay	980.8		
Intersection Capacity Utilization	105.5%	ICU Level of Service	G
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	884	424	13	357	174	17
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	982	471	14	397	193	19
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			1453		1445	727
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1453		1445	727
tC, single (s)			4.1		6.8	7.0
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			97		0	95
cM capacity (veh/h)			472		120	360

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	655	799	147	264	212
Volume Left	0	0	14	0	193
Volume Right	0	471	0	0	19
cSH	1700	1700	472	1700	128
Volume to Capacity	0.39	0.47	0.03	0.16	1.66
Queue Length 95th (ft)	0	0	2	0	392
Control Delay (s)	0.0	0.0	1.7	0.0	390.8
Lane LOS			A		F
Approach Delay (s)	0.0		0.6		390.8
Approach LOS					F

Intersection Summary			
Average Delay	40.1		
Intersection Capacity Utilization	55.3%	ICU Level of Service	B
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	574	1263	258	44	814	117	495	141	85	128	143	398
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	0.97		1.00	0.98		1.00	0.94		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1787	3506		1805	3511		1787	1781		1805	1863	1599
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1787	3506		1805	3511		1787	1781		1805	1863	1599
Peak-hour factor, PHF	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Adj. Flow (vph)	592	1302	266	45	839	121	510	145	88	132	147	410
RTOR Reduction (vph)	0	10	0	0	7	0	0	13	0	0	0	344
Lane Group Flow (vph)	592	1558	0	45	953	0	510	220	0	132	147	66
Confl. Peds. (#/hr)							3					3
Heavy Vehicles (%)	1%	0%	2%	0%	1%	0%	1%	1%	0%	0%	2%	1%
Turn Type	Prot			Prot			Split			Split		Prot
Protected Phases	5	2		1	6		4	4		8	8	8
Permitted Phases												
Actuated Green, G (s)	41.8	75.5		4.9	38.6		39.5	39.5		16.6	16.6	16.6
Effective Green, g (s)	41.8	75.5		4.9	38.6		39.5	39.5		16.6	16.6	16.6
Actuated g/C Ratio	0.27	0.49		0.03	0.25		0.26	0.26		0.11	0.11	0.11
Clearance Time (s)	4.2	4.5		4.2	4.5		4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	484	1717		57	879		458	456		194	201	172
v/s Ratio Prot	c0.33	0.44		0.02	c0.27		c0.29	0.12		0.07	c0.08	0.04
v/s Ratio Perm												
v/c Ratio	1.22	0.91		0.79	1.08		1.11	0.48		0.68	0.73	0.39
Uniform Delay, d1	56.2	36.1		74.1	57.8		57.3	48.7		66.2	66.6	64.1
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	117.8	7.8		49.0	55.9		76.8	0.6		8.6	12.1	1.1
Delay (s)	174.0	44.0		123.1	113.7		134.1	49.2		74.9	78.8	65.1
Level of Service	F	D		F	F		F	D		E	E	E
Approach Delay (s)		79.6			114.1			107.5			69.9	
Approach LOS		E			F			F			E	

Intersection Summary			
HCM Average Control Delay	90.2	HCM Level of Service	F
HCM Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	154.2	Sum of lost time (s)	17.7
Intersection Capacity Utilization	108.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	302	724	86	192	297	51
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.98	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	1716	1442	1599	1716	1646	1458
Flt Permitted	1.00	1.00	0.53	1.00	0.95	1.00
Satd. Flow (perm)	1716	1442	899	1716	1646	1458
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	328	787	93	209	323	55
RTOR Reduction (vph)	0	415	0	0	0	36
Lane Group Flow (vph)	328	372	93	209	323	19
Confl. Bikes (#/hr)		1				
Heavy Vehicles (%)	2%	1%	4%	2%	1%	2%
Turn Type		Perm	Perm			Perm
Protected Phases	4			8	2	
Permitted Phases		4	8			2
Actuated Green, G (s)	20.2	20.2	20.2	20.2	14.5	14.5
Effective Green, g (s)	20.2	20.2	20.2	20.2	14.5	14.5
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.34	0.34
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	812	682	425	812	559	495
v/s Ratio Prot	0.19			0.12	c0.20	
v/s Ratio Perm		c0.26	0.10			0.01
v/c Ratio	0.40	0.55	0.22	0.26	0.58	0.04
Uniform Delay, d1	7.3	8.0	6.6	6.7	11.6	9.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	0.9	0.3	0.2	1.5	0.0
Delay (s)	7.7	8.9	6.9	6.9	13.0	9.5
Level of Service	A	A	A	A	B	A
Approach Delay (s)	8.5			6.9	12.5	
Approach LOS	A			A	B	

Intersection Summary			
HCM Average Control Delay	9.1	HCM Level of Service	A
HCM Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	42.7	Sum of lost time (s)	8.0
Intersection Capacity Utilization	60.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	10	794	5	104	707	247	2	28	39	717	217	54
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00			1.00	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85		0.92			0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		1.00			0.96	
Satd. Flow (prot)	1662	3260	1488	1646	3292	1458		1550			1657	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00		0.98			0.74	
Satd. Flow (perm)	1662	3260	1488	1646	3292	1458		1526			1270	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	10	827	5	108	736	257	2	29	41	747	226	56
RTOR Reduction (vph)	0	0	2	0	0	162	0	17	0	0	2	0
Lane Group Flow (vph)	10	827	3	108	736	95	0	55	0	0	1027	0
Confl. Bikes (#/hr)				1								
Heavy Vehicles (%)	0%	2%	0%	1%	1%	2%	0%	3%	5%	1%	2%	0%
Turn Type	Prot		Prot	Prot		Prot	Perm			Perm		
Protected Phases	1	6	6	5	2	2		4			8	
Permitted Phases							4			8		
Actuated Green, G (s)	1.6	38.0	38.0	7.0	43.4	43.4		91.0			92.0	
Effective Green, g (s)	1.6	38.0	38.0	7.0	43.4	43.4		91.0			92.0	
Actuated g/C Ratio	0.01	0.25	0.25	0.05	0.28	0.28		0.59			0.60	
Clearance Time (s)	5.0	6.0	6.0	5.0	6.0	6.0		6.0			5.0	
Vehicle Extension (s)	2.3	4.8	4.8	2.3	4.8	4.8		2.5			2.5	
Lane Grp Cap (vph)	17	810	370	75	934	414		908			764	
v/s Ratio Prot	0.01	c0.25	0.00	c0.07	0.22	0.07						
v/s Ratio Perm								0.04			c0.81	
v/c Ratio	0.59	1.02	0.01	1.44	0.79	0.23		0.06			1.34	
Uniform Delay, d1	75.4	57.5	43.3	73.0	50.6	42.0		13.0			30.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00		1.00			1.00	
Incremental Delay, d2	33.6	37.0	0.0	258.2	5.1	0.6		0.0			163.8	
Delay (s)	109.0	94.5	43.3	331.2	55.6	42.5		13.1			194.3	
Level of Service	F	F	D	F	E	D		B			F	
Approach Delay (s)		94.4			79.6			13.1			194.3	
Approach LOS		F			E			B			F	

Intersection Summary			
HCM Average Control Delay	120.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.26		
Actuated Cycle Length (s)	153.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	109.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (veh/h)	102	216	748	158	284	1795
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	107	227	787	166	299	1889
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	3275	787			787	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	3275	787			787	
tC, single (s)	6.5	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.2	
p0 queue free %	0	42			64	
cM capacity (veh/h)	6	391			841	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2
Volume Total	107	227	787	166	299	1889
Volume Left	107	0	0	0	299	0
Volume Right	0	227	0	166	0	0
cSH	6	391	1700	1700	841	1700
Volume to Capacity	18.78	0.58	0.46	0.10	0.36	1.11
Queue Length 95th (ft)	Err	89	0	0	40	0
Control Delay (s)	Err	26.2	0.0	0.0	11.6	0.0
Lane LOS	F	D			B	
Approach Delay (s)	3225.0		0.0		1.6	
Approach LOS	F					

Intersection Summary			
Average Delay	311.5		
Intersection Capacity Utilization	115.4%	ICU Level of Service	H
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	53	33	4	34	28	91	11	736	23	272	1404	153
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Lane Util. Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.99			1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97			0.97	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1671			1666	1488	1662	1683	1365	1662	1699	1488
Flt Permitted		0.78			0.77	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)		1340			1314	1488	1662	1683	1365	1662	1699	1488
Peak-hour factor, PHF	0.91	0.91	0.91	0.91	0.91	0.91	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	58	36	4	37	31	100	12	775	24	286	1478	161
RTOR Reduction (vph)	0	1	0	0	0	89	0	0	3	0	0	9
Lane Group Flow (vph)	0	97	0	0	68	11	12	775	21	286	1478	152
Heavy Vehicles (%)	2%	0%	0%	0%	5%	0%	0%	4%	9%	0%	3%	0%
Turn Type	Perm			Perm		Perm	Prot		Perm	Prot		Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8			4		4			6			2
Actuated Green, G (s)		14.1			14.1	14.1	1.5	74.8	74.8	26.1	99.4	99.4
Effective Green, g (s)		14.1			14.1	14.1	1.5	74.8	74.8	26.1	99.4	99.4
Actuated g/C Ratio		0.11			0.11	0.11	0.01	0.57	0.57	0.20	0.76	0.76
Clearance Time (s)		5.2			5.2	5.2	4.5	6.0	6.0	4.5	6.0	6.0
Vehicle Extension (s)		2.5			2.5	2.5	2.3	4.8	4.8	2.3	4.8	4.8
Lane Grp Cap (vph)		145			142	161	19	963	781	332	1292	1132
v/s Ratio Prot							0.01	0.46		c0.17	c0.87	
v/s Ratio Perm		c0.07			0.05	0.01			0.02			0.10
v/c Ratio		0.67			0.48	0.07	0.63	0.80	0.03	0.86	1.14	0.13
Uniform Delay, d1		56.1			54.8	52.4	64.3	22.2	12.1	50.6	15.6	4.2
Progression Factor		1.00			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		10.1			1.8	0.1	44.8	5.6	0.0	19.5	74.4	0.1
Delay (s)		66.1			56.7	52.5	109.1	27.8	12.2	70.1	90.1	4.3
Level of Service		E			E	D	F	C	B	E	F	A
Approach Delay (s)		66.1			54.2			28.5			79.9	
Approach LOS		E			D			C			E	

Intersection Summary			
HCM Average Control Delay	64.1	HCM Level of Service	E
HCM Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	130.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	108.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	90	0	29	42	15	18	621	7	15	1111	12
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	49	96	0	31	45	16	19	654	7	16	1169	13
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1915	1893	1169	1941	1893	654	1169			654		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1915	1893	1169	1941	1893	654	1169			654		
tC, single (s)	7.3	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.7	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	34	97	97			98		
cM capacity (veh/h)	19	67	237	0	67	470	605			943		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	49	96	31	61	19	654	7	16	1169	13
Volume Left	49	0	31	0	19	0	0	16	0	0
Volume Right	0	0	0	16	0	0	7	0	0	13
cSH	19	67	0	87	605	1700	1700	943	1700	1700
Volume to Capacity	2.52	1.42	Err	0.70	0.03	0.38	0.00	0.02	0.69	0.01
Queue Length 95th (ft)	163	201	Err	85	2	0	0	1	0	0
Control Delay (s)	1103.9	361.1	Err	111.1	11.1	0.0	0.0	8.9	0.0	0.0
Lane LOS	F	F	F	F	B			A		
Approach Delay (s)	612.4		Err		0.3			0.1		
Approach LOS	F		F							

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	79.6%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	251	543	333	183	134	340
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	276	597	366	201	147	374
Pedestrians				1		
Lane Width (ft)				12.0		
Walking Speed (ft/s)				4.0		
Percent Blockage				0		
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			873		1108	139
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			873		1108	139
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			52		0	58
cM capacity (veh/h)			769		109	886

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1
Volume Total	138	138	597	366	101	101	521
Volume Left	0	0	0	366	0	0	147
Volume Right	0	0	597	0	0	0	374
cSH	1700	1700	1700	769	1700	1700	293
Volume to Capacity	0.08	0.08	0.35	0.48	0.06	0.06	1.78
Queue Length 95th (ft)	0	0	0	65	0	0	855
Control Delay (s)	0.0	0.0	0.0	13.9	0.0	0.0	393.6
Lane LOS				B			F
Approach Delay (s)	0.0			8.9			393.6
Approach LOS							F

Intersection Summary			
Average Delay	107.2		
Intersection Capacity Utilization	68.4%	ICU Level of Service	C
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
426: S Redland Rd & S Bradley Rd

5/25/2012

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	68	509	379	12	57	142
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	71	530	395	12	59	148
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	407				802	197
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	407				802	197
tC, single (s)	4.1				6.9	7.0
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	94				80	82
cM capacity (veh/h)	1162				295	804

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	SB 1	SB 2
Volume Total	71	265	265	197	197	12	59	148
Volume Left	71	0	0	0	0	0	59	0
Volume Right	0	0	0	0	0	12	0	148
cSH	1162	1700	1700	1700	1700	1700	295	804
Volume to Capacity	0.06	0.16	0.16	0.12	0.12	0.01	0.20	0.18
Queue Length 95th (ft)	5	0	0	0	0	0	18	17
Control Delay (s)	8.3	0.0	0.0	0.0	0.0	0.0	20.3	10.5
Lane LOS	A						C	B
Approach Delay (s)	1.0			0.0			13.3	
Approach LOS							B	

Intersection Summary			
Average Delay	2.7		
Intersection Capacity Utilization	28.9%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Signalized Intersection Capacity Analysis
501: Hwy 212 & SE 282nd Ave

5/25/2012

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (vph)	632	930	869	77	71	712
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	1.00	0.85	1.00	0.85
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1630	1716	1716	1458	1662	1458
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1630	1716	1716	1458	1662	1458
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.90	0.90
Adj. Flow (vph)	665	979	915	81	79	791
RTOR Reduction (vph)	0	0	0	18	0	22
Lane Group Flow (vph)	665	979	915	63	79	769
Confl. Peds. (#/hr)						3
Heavy Vehicles (%)	2%	2%	2%	2%	0%	2%
Turn Type	Prot			Perm		pt+ov
Protected Phases	5	2	6		4	4 5
Permitted Phases				6		
Actuated Green, G (s)	17.0	52.0	31.0	31.0	20.0	41.0
Effective Green, g (s)	17.0	52.0	31.0	31.0	20.0	41.0
Actuated g/C Ratio	0.21	0.65	0.39	0.39	0.25	0.51
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	2.3	6.0	4.2	4.2	2.3	
Lane Grp Cap (vph)	346	1115	665	565	416	747
v/s Ratio Prot	c0.41	0.57	c0.53		0.05	c0.53
v/s Ratio Perm				0.04		
v/c Ratio	1.92	0.88	1.38	0.11	0.19	1.03
Uniform Delay, d1	31.5	11.4	24.5	15.7	23.6	19.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	425.5	9.9	178.6	0.4	0.1	40.5
Delay (s)	457.0	21.3	203.1	16.1	23.8	60.0
Level of Service	F	C	F	B	C	E
Approach Delay (s)		197.5	187.9		56.7	
Approach LOS		F	F		E	

Intersection Summary			
HCM Average Control Delay	159.9	HCM Level of Service	F
HCM Volume to Capacity ratio	1.43		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	104.5%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

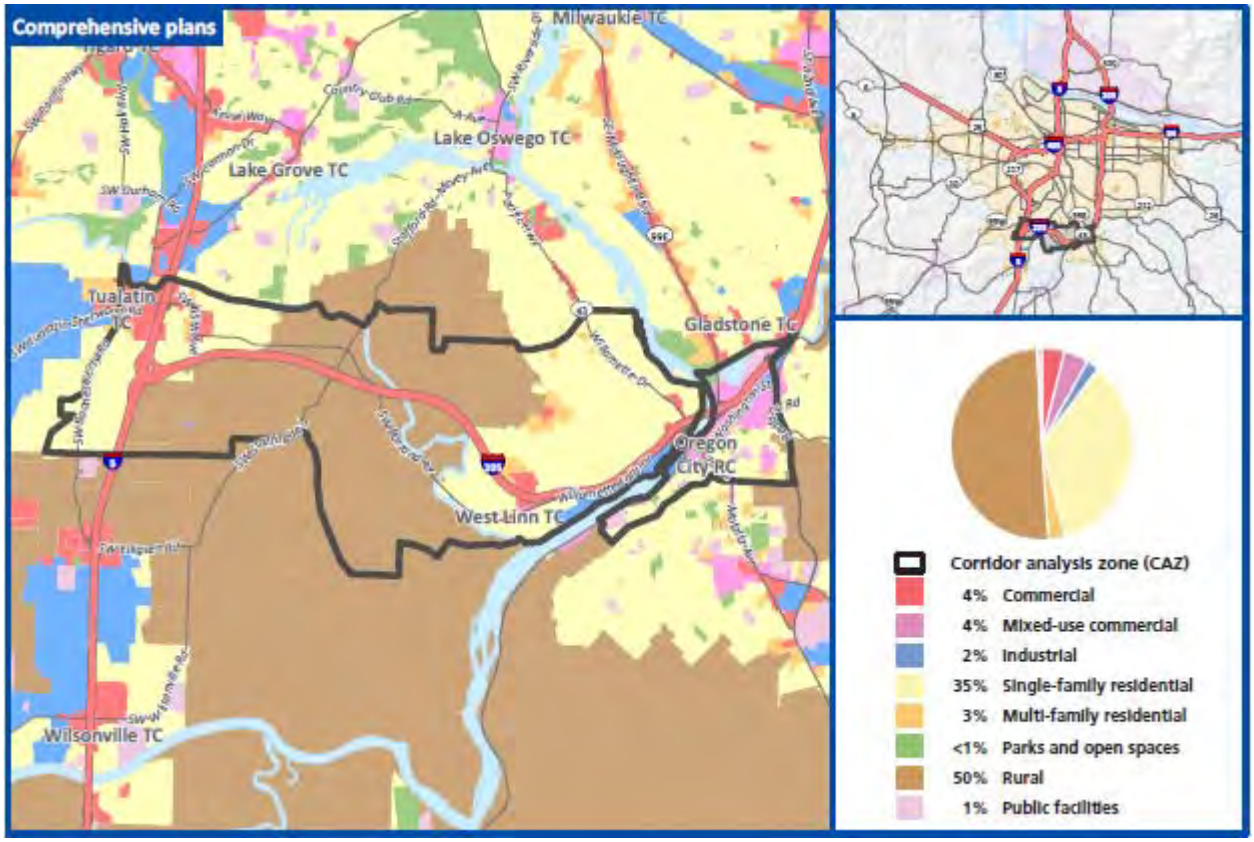
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	1	2	134	1	143	7	447	226	326	878	1
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Hourly flow rate (vph)	0	1	2	141	1	151	7	471	238	343	924	1
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)			1			1						
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2172	2096	924	2097	2096	471	924			471		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2172	2096	924	2097	2096	471	924			471		
tC, single (s)	7.1	6.5	6.7	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.8	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	97	99	0	97	74	99			68		
cM capacity (veh/h)	18	36	268	28	36	575	748			1081		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	3	293	7	471	238	343	924	1
Volume Left	0	141	7	0	0	343	0	0
Volume Right	2	151	0	0	238	0	0	1
cSH	107	55	748	1700	1700	1081	1700	1700
Volume to Capacity	0.03	5.36	0.01	0.28	0.14	0.32	0.54	0.00
Queue Length 95th (ft)	2	Err	1	0	0	34	0	0
Control Delay (s)	48.7	Err	9.9	0.0	0.0	9.9	0.0	0.0
Lane LOS	E	F	A			A		
Approach Delay (s)	48.7	Err	0.1			2.7		
Approach LOS	E	F						

Intersection Summary			
Average Delay	1284.9		
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

Appendix 9
Mobility Corridors Related to Clackamas County from the 2035 Regional Transportation Plan

4.2.8 Mobility Corridor #7 – Tualatin to Oregon City



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects southern Metro area town centers of West Linn and Tualatin to the Oregon City Regional Center.
Freight Mobility: Serves as the West Coast Trade (from Canada to Mexico) alternative to I-5 and air freight access to Portland International Airport.
Statewide Travel: Serves as an extension of the southern gateway to the region, provides statewide access to Portland International Airport, and Mt. Hood, and connects to the Willamette Greenway Trail corridor.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	41,869	101,764	3,097,402	3.3%	143.1%	57.9%
Households	15,284	31,797	1,208,686	2.6%	108.0%	57.6%
Employment	18,691	31,601	1,799,152	1.8%	69.1%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
	• Lower Tualatin River Greenway Trail		• I-205	• Borland Rd • Willamette Falls Dr.	• N/A

Regional 2040 land uses

Regional Centers	Town Centers	Employment Areas	Industrial Areas	Other Key Destinations
• Oregon City	• Tualatin Gladstone West Linn			

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Address the lack of 30 minute of better service on surrounding arterial with the exception of a circulator through West Linn TC and along Willamette Falls Dr. • Address the lack of 15 minute of better peak transit service on the surrounding arterial streets. • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy). • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy). o Oregon City RC lacks HCT connection. • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations. • Potential bus connection from Oregon City RC to WES station in Tualatin.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • HCT Plan identified a potential HCT line between Washington Square RCand Clackamas Town Center via I-205 as a "next phase" regional priority corridor. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortablebicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If

Regional Needs		Corridor Strategies
		sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail. • Ek Rd., SW 65th Ave, Stafford Rd., Borland Rd. and Willamette Rd. lack shoulders and are unsafe for bikes.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Use practical design to provide wider shoulders for bikes during pavement projects, particularly on Ek Rd., SW 65th Ave, Stafford Rd., Borland Rd. and Willamette Rd. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Address the need for a Willamette, Tualatin and Clackamas River crossings. • Direct connections between trails and on-street bicycle and pedestrian facilities.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortablebicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[14]	• 3 interchanges starting just west of	• Over $300,000,000 in unfunded

[14] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
	the Willamette River (OR 43), east of the river (OR 99E), and OR 213 are spaced less than one-mile apart. The following do not meet the performance threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • I-205 from Stafford Rd. to OR 213. • I-205 is 4 lanes from I-5 until the OR 99E interchange, when it becomes 6 lanes.	projects identified to address congestion and capacity issues on I-205 between Stafford Rd. and Oregon City. • Develop alternative mobility standards for this corridor. • Explore tolling and peak pricing for I-205 and necessary legislative actions. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[15]	Arterial Gaps • Address lack of east/west connectivity north and south of I-205. There is also a gap in north/south connections between I-205 and SW Stafford Rd., S. Salamo Rd., and Willamette Dr. • Potential need for an additional Willamette River crossing, an I-205 overcrossing west of 10th St. to relieve through trips on 10th St. in West Linn and for more Clackamas River crossings. One potential location is near the OR 213 and I-205 interchange. The following do not meet the performance threshold in Table 2.4. 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • Borland Rd. from I-5 to Stafford Rd. • Borland Rd. is 2 lanes with a few stretches with left turn lanes. • Rosemont Rd. has some traffic issues. • Nyberg St. and Borland Rd. east of I-5	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At Grade Heavy Rail Crossings		• Local TSPs evaluate at grade heavy rail crossings for deficiencies and solutions. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Bridges	• The Oregon City West Linn Arch Bridge located on OR 43 is weight-restricted and a need to keep transit on this bridge.	• Planned construction project for West Linn Arch Bridge. • Implement Regional Transportation Functional Plan and Urban Growth Management

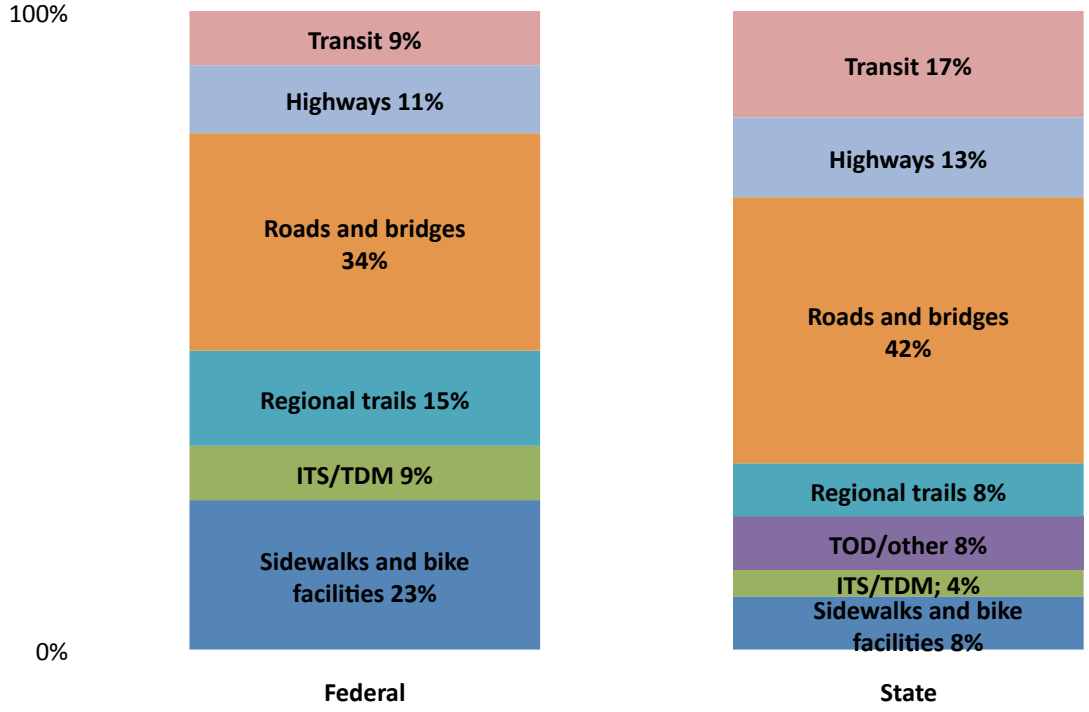
[15] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
		Functional Plan.
Safety	• I-205 from Tualatin to Oregon City ranks on the ODOT SPIS list as Category 4 and 5(Scale 1-5, 5 being highest priority). • Auxiliary lanes on the Abernethy Bridge are a safety problem. • Lack of bicycle facilities throughout corridor. • Unsafe merge length on NB I-205 on-ramp from OR43.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Truck climbing lane project on I-205 SB. • Reduce weaving between OR213 and OR99E interchanges for I-205SB. • Improve I-205NB on-ramp merge from OR 43.
Regional Freight	(Does not meet the performance threshold in Table 2.4) • 2005 and 2035 midday one-hour volumes exceed capacity on the Abernethy Bridge.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #7 has 47 projects totaling more than $500 million. Roads and bridges projects account for 34% of all of projects and 48% of the total corridor project costs ($273 million). The State RTP adds 24more projects and an additional $1 billion. Transit capital accounts for 17% of the projects and 28% of the additional costs ($300 million). This includes upgrades to WES service accessible in Tualatin, I-205 BRT and other bus improvements in the corridor. The state system consists of an additional 42% of roads and bridges projects and 34% of the additional costs ($370 million). For both the Federal and State systems investments total $1.6 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #7 Total Project Cost	State System Cost by Mode	% of MC #7 Total Project Cost
Sidewalks and bike facilities	$139,300,000	24%	$12,846,598	1%
Freight	$0	0%	$0	0%
ITS/TDM	$6,578,000	1%	$0	0%
TOD/other	$0	0%	$11,000,000	1%
Regional trails	$19,200,000	3%	$7,000,000	1%
Roads and bridges	$273,544,000	48%	$372,151,423	34%
Highways	$95,700,000	17%	$390,000,000	36%
Transit	$40,000,000	7%	$301,000,000	28%
TOTAL	**$574,322,000**	100%	**$1,093,998,021**	100%

2035 investment strategy

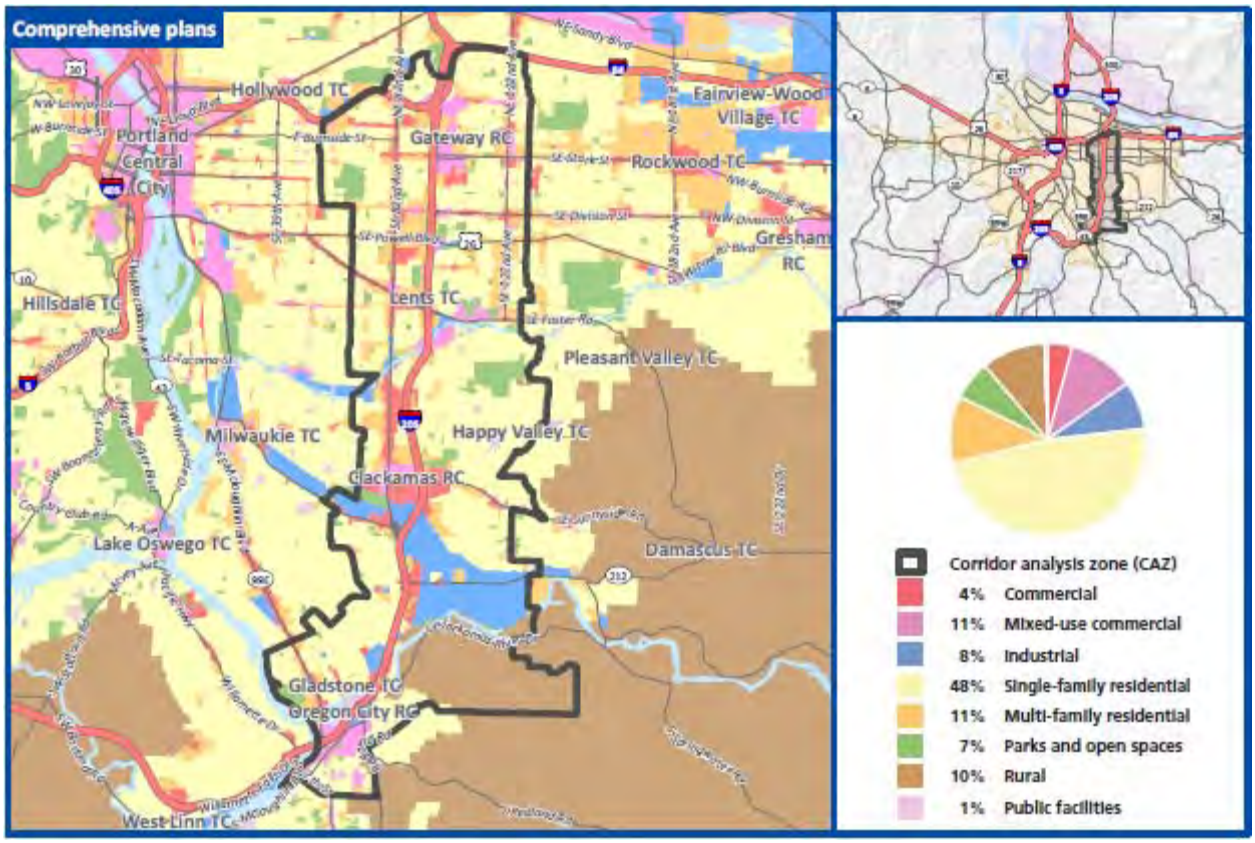
	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Practical design solutions for bike and pedestrian connections to transit.
Medium Term	• Complete gaps in the arterial network.

Strategy	
(5 – 10 years)	• Complete corridor refinement plan for MC #7, #8 and #9. • Develop tolling and congestion pricing methodologies for I-205. • Develop plan and implement SEP to connect Oregon City RC with HCT. • Identify funding solutions for alternative mode options.
Long-term (10 – 25 years)	• Construct HCT connection to Oregon City RC.

Unfunded Projects
• I-205 widening, Stafford to Willamette, $77,600,000 • Abernethy Bridge widening, $106,400,000 • I-205 climbing lanes, $56,800,000 • I-205 South aux lane improvements, $74,600,000

Regional Actions	Local Actions
• Continue work on identifying resources to complete corridor refinement plan. • Conduct corridor refinement plan. • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.9 Mobility Corridor #8 – Oregon City to Gateway



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects the Oregon City, Clackamas and Gateway regional centers and serves as the main access to the Clackamas Industrial Area and the South Metro waste transfer station.
Freight Mobility: Serves as the West Coast Trade (from Canada to Mexico) alternative to I-5, air freight access to Portland International Airport and provides Class I mainline freight rail access.
Statewide Travel: Serves as an extension of the southern gateway to the region, provides statewide access to Portland International Airport and provides statewide Amtrak service.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	144,231	190,334	3,097,402	6.1%	32.0%	57.9%
Households	55,824	87,166	1,208,686	7.2%	56.1%	57.6%
Employment	77,846	133,823	1,799,152	7.4%	71.9%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
• Green Line MAX	• I-205 Trail	•	• I-205	• 82nd Ave. • 122nd Ave. • 92nd Ave/Schumacher • McLoughlin Blvd.	• Union Pacific o Valley Sub mainline

Regional 2040 land uses

Regional Centers	Town Centers	Intermodal Facilities	Employment/ Industrial Areas	Other Key Destinations
• Gateway • Clackamas • Oregon City	• Lents • Gladstone	• Portland International Airport	• Clackamas • Johnson Creek	• Metro Transfer Station

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Address park and ride capacity constraints: Gateway @ 99% of capacity • Address potential transit center capacity issues: Oregon City Transit Center • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy). o Inadequate bus connection between Green Line MAX and Oregon City RC • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy). o Address lack of HCT connection to Oregon City RC. • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections between HCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • The HCT plan identified Clackamas Town Center to Oregon City RC (via I-205 or McLoughlin) as a "next phase" regional priority corridor, use the HCT SEP process to identify which corridor to further refine. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to

Regional Needs		Corridor Strategies
		focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail. • Insufficient pedestrian crossings between signalized intersections of OR99E. • Difficult connectivity over I-205 for bikes and pedestrians.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Over $20,000,000 in multimodal improvements to 82nd Ave. identified in RTP (projects 10014, 10291, 10018). • $48,000,000 in multimodal improvements to McLoughlin Boulevard through Oak Grove, Gladstone, and Oregon City identified in RTP (projects 10118, 10145, 10146, 11186). • Improve River Rd. ped and bike facilities. • Create more frequent pedestrian crossings.

Regional Needs		Corridor Strategies
		• Identify locations for bike boulevards between OR99E and I-205. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails		• Connect Trolley Trail to Oregon City • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[16]	• All of the I-205 interchanges are spaced less than two-miles apart, with a handful at less than one-mile, which does not meet the ODOT 2 mile spacing standard. The following do not meet the performance threshold in Table 2.4: • 2005 and the 2035 NB PM 2-hour peak volumes exceed capacity on I-205 from Gateway RC to Oregon City RC in both directions.	• Unfunded I-205 interchange improvement projects at OR 212, Johnson Creek, Powell/Division, and OR 213 totaling over $125,000,000 • Unfunded widening, auxiliary lane, and braided ramp projects totaling over $300,000,000. • $170,000,000 in operational improvements to I-205 in State RTP (project 11305) may include some of the above unfunded projects. • Develop alternative mobility standards for this corridor. • Explore tolling and peak pricing for I-205 and necessary legislative actions. • Turn lanes on southbound OR 99E to I-205 ramp interchange area. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[17]	<u>Arterial Gaps</u> • Need for better north-south connectivity east of 122nd Ave.Gaps emerge south of Clackamas RC. • Gaps east of I-205 from Oregon City to Gateway. • Potential need for additional Willamette and Clackamas River crossings.	• Evaluate gaps east of I-205 from Oregon City to Gateway. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail	• The following at-grade heavy rail crossings exist in this corridor: • SE Linwood Ave./SE Harmony Rd.	• Local TSPsevaluate at grade heavy rail crossings for deficiencies and solutions.

[16] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)
[17] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

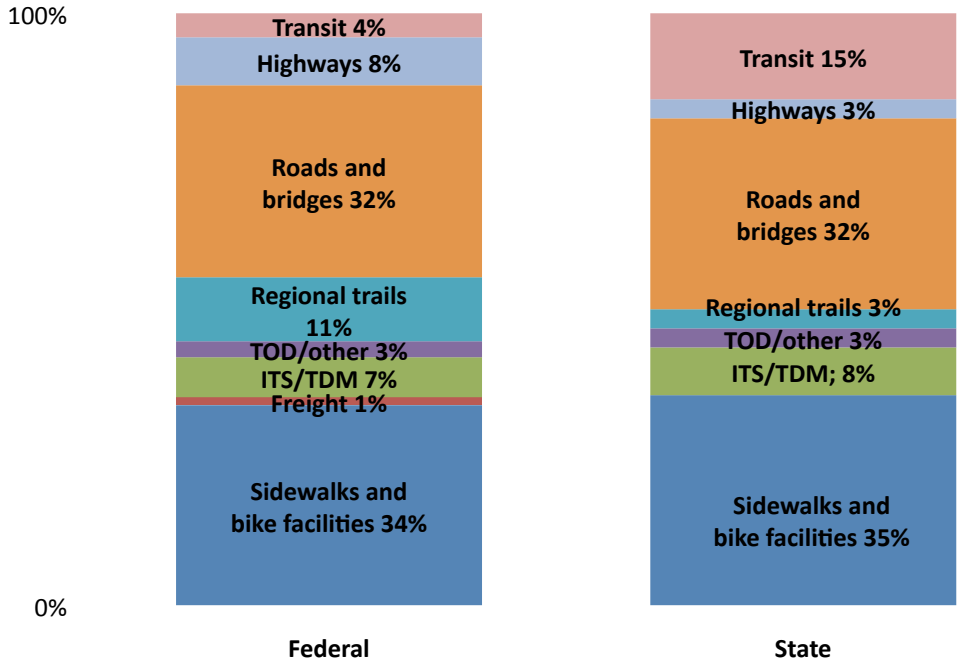
Regional Needs		Corridor Strategies
	• SE Lawnfield Rd. • SE 37th Ave. • SE Oak St. • SE Harrison St. • SE Clackamas Rd. • Edgewater Rd. • Forsythe Rd. • 17th St. • 16th St. • 10th St.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Bridges	• Ensure actual and perceived bicycle and pedestriansafety is addressedon regional bridges. • OR99E bridge over Clackamas River nearing end of service life.	• Incorporate project into TSP to help identify project for OR99E bridge into RTP. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Safety	• I-205 ranks on the ODOT SPIS list as Category 4 (Scale 1-5, 5 being highest priority). Multiple locations rank above the 90th percentile. • 82nd Ave. ranks as Category 5 with multiple intersections in the 95th percentile (Division, Powell, Holgate, Foster, and Sandy). • 122nd Ave. has multiple intersections in the 95th percentile (Halsey, Glisan, Stark, Division, and Powell).	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Develop and implement design standards for OR99E that focus on and enhance pedestrian safety.
Regional Freight		• Plan for OR224 and nearby arterials that serve Clackamas and Milwaukie industrial areas to recognize freight mobility needs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #8 has 74 projects totaling almost $1 billion. Sidewalk and bike projects account for 34% of the federal projects and 23% ($225 million) of the total corridor project costs. Roads and bridges projects account for 32% of all of projects and 31% of the total corridor project costs ($300 million). Highway projects comprise only 8% of federal projects, but account for 39% ($388 million) of the total corridor project costs, including improvements to I-205 for the Sunrise project. The State RTP adds 62 more projects and an additional $707 million. Sidewalk and bike projects account for 35% of the state projects and 19% ($130 million) of the total corridor project

costs. Roads and bridges projects account for 32% of all of projects and 17% of the total corridor project costs ($123 million).Transit capital accounts for 15% of the projects and 22% of the additional costs ($154 million). Transit projects include maintenance and operations facilities and other bus improvements in the corridor. For both the Federal and State systems investments total $1.7 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #8 Total Project Cost	State System Cost by Mode	% of MC #8 Total Project Cost
Sidewalks and bike facilities	$225,783,568	23%	$132,435,967	19%
Freight	$25,650,000	3%	$0	0%
ITS/TDM	$11,465,703	1%	$1,675,000	0%
TOD/other	$5,511,000	1%	$11,000,000	2%
Regional trails	$16,194,000	2%	$7,000,000	1%
Roads and bridges	$307,332,540	31%	$123,315,046	17%
Highways	$388,000,000	39%	$280,000,000	40%
Transit	$18,637,609	2%	$153,224,000	22%
TOTAL	**$998,574,420**	100%	**$708,650,013**	100%

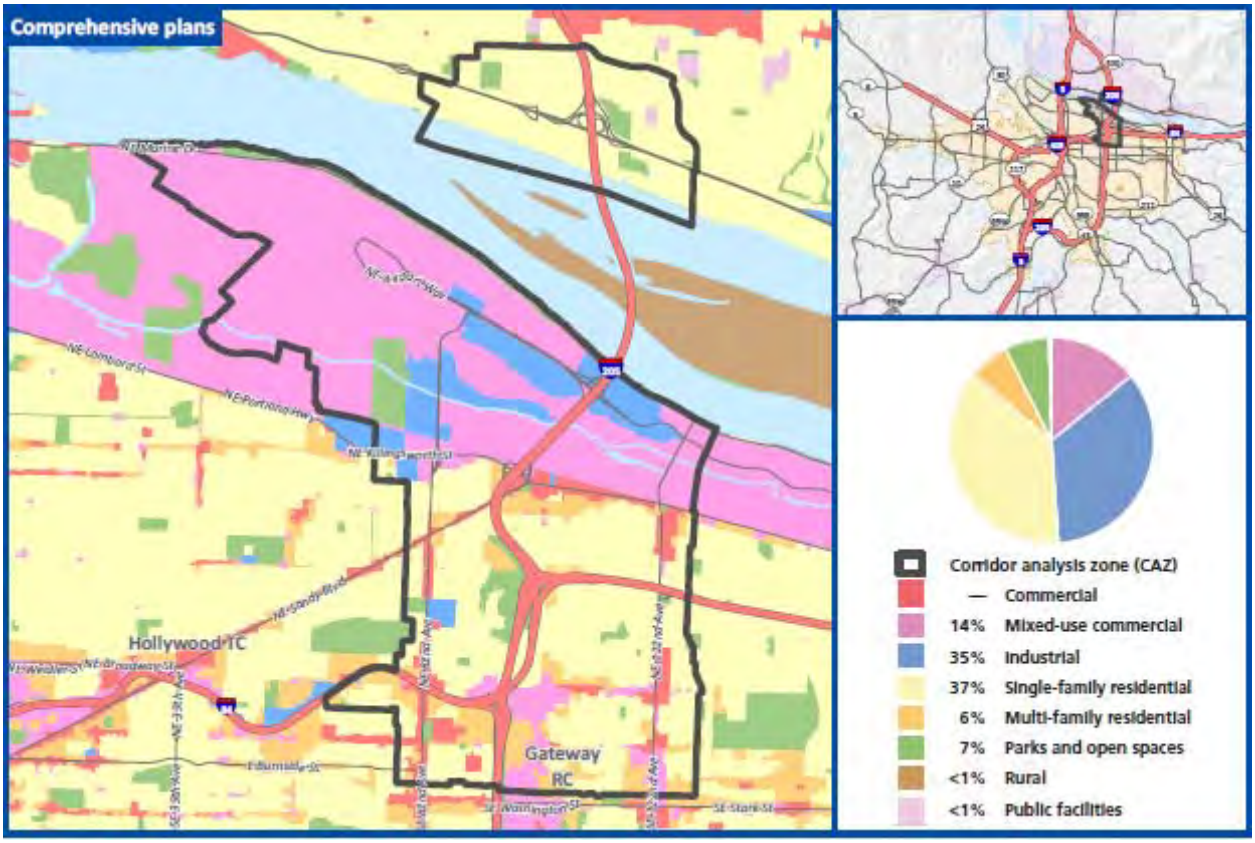
2035 investment strategy

Strategy	
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • Practical design solutions for bikes/peds for safety and to connect to transit.
Medium Term (5 – 10 years)	• Complete gaps in the arterial network. • Complete corridor refinement plan for MC #7, #8 and #9. • Develop tolling and congestion pricing methodologies for I-205. • Develop plan and implement SEP to connect Oregon City RC with HCT.
Long-term (10 – 25 years)	• Identify funding solutions for alternative mode options, including HCT to Oregon City.

Unfunded Projects
• I-205 Powell/Division interchanges, $17,700,000 • I-205/OR 213 interchange, $200,900,000 • I-205/OR 212 interchange, $21,300,000 • I-205 widening, OR 212 to I-84, $63,400,000 • I-205 aux lanes, Gladstone to OR 212, $18,500,000 • OR 213 Ped and Bike access to transit, $5,000,000 • 82nd Ave Street Improvements, $5,400,000 • Streetscape and ped/bike access to transit projects on 82nd, $6,000,000. • I-205/Johnson Creek interchange improvements, $9,800,000 • I-205 SB flyover to OR 213, $49,100,000 • I-205 East Portland aux lane improvements, $49,900,000 • I-205 north aux lane improvements, $46,000,000

Regional Actions	Local Actions
• Continue work on identifying resources to complete corridor refinement plan. • Conduct corridor refinement plan. • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.10 Mobility Corridor #9 – Gateway to Clark County



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects Gateway Regional Center to Clark County, provides primary access to the Columbia South Shore industrial area and Portland International Airport.
Freight Mobility: Serves as the West Coast Trade (from Canada to Mexico) alternative to I-5, provides air freight access to Portland International Airport and serves as the primary access to the Columbia South Shore industrial area.
Statewide Travel: Serves as one of two northern gateways to the region, provides statewide access to Portland International Airport and serves interstate bicycle travel.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	46,621	50,782	3,097,402	1.6%	8.9%	57.9%
Households	18,913	23,477	1,208,686	1.9%	24.1%	57.6%
Employment	43,613	62,504	1,799,152	3.5%	43.3%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
	• I-205 Trail	• Glenn Jackson Bridge	• I-205	• 82nd Ave. • 122nd Ave.	• Union Pacific o Graham mainline o Kenton mainline

Regional 2040 land uses

Regional Centers	Town Centers	Intermodal Facilities	Employment/ Industrial Areas	Other Key Destinations
• Gateway		• Portland International Airport	• Columbia Corridor	

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy); • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy); • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • HCT Plan identified a potential HCT line Gateway to Salmon Creek as a next phase regional priority corridor. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit

Regional Needs		Corridor Strategies
		stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Improve north/south trail connectivity. • Direct connections between trails and on-street bicycle and pedestrian facilities.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortablebicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[18]	• All of the I-205 interchanges are less than two-miles apart and do not meet the ODOT two-mile interchange spacing standard, but most are at least 1 mile apart. a. Killingsworth Ave. and Airport	• Airport Way Interchange NB on-ramp improvement in FC project list (10865). • Several unfunded braided ramp and auxiliary lane projects, totaling

[18] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
	Way interchanges are less than 1 mile apart. • Address a gap (lack of throughway crossing) to the west of I-205 where NE Fremont Street could cross I-205. The following do not meet the performance threshold in Table 2.4: 2005 and the 2035 NB PM 2-hour peakvolumes exceed capacity on: • I-84 eastbound from NE 82nd Ave. to I-205, in both directions south of Washington St. on I-205, and northbound from NE Airport Way through the CRC. 2035 NB PM 2-Hour Peak volumes exceed capacity on: • I-205 between the I-84 interchange and NE Sandy Blvd. (northbound) • I-205 south of Washington St. (southbound) • I-205 north of NE Airport Way through the CRC northbound • In the AM Peak, there is congestion on the I-205 Glenn Jackson Bridge and in the Columbia Blvd. area. • Currently, there is congestion on the mainline between Airport Way and Killingsworth St. southbound.	$73,200,000, have been identified in this section of I-205 to address performance deficiencies. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[19]	• Lack of connectivity across theNorth Willamette River	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At- Grade Heavy Rail	The following list describes the heavy rail crossings within this mobility corridor: • Columbia Blvd. east of 87th Ave. • NE 105th Ave. north of Sandy Blvd. • NE 109th Ave. north of Sandy Blvd. o NE 112th Ave. north of Sandy Blvd.	• Local TSPsevaluate at grade heavy rail crossings for deficiencies and solutions. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Bridges	• The following bridges within this mobility corridor have height or weight restrictions: o NE 102nd Ave. crossing I-205 These two roads never cross	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

[19] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

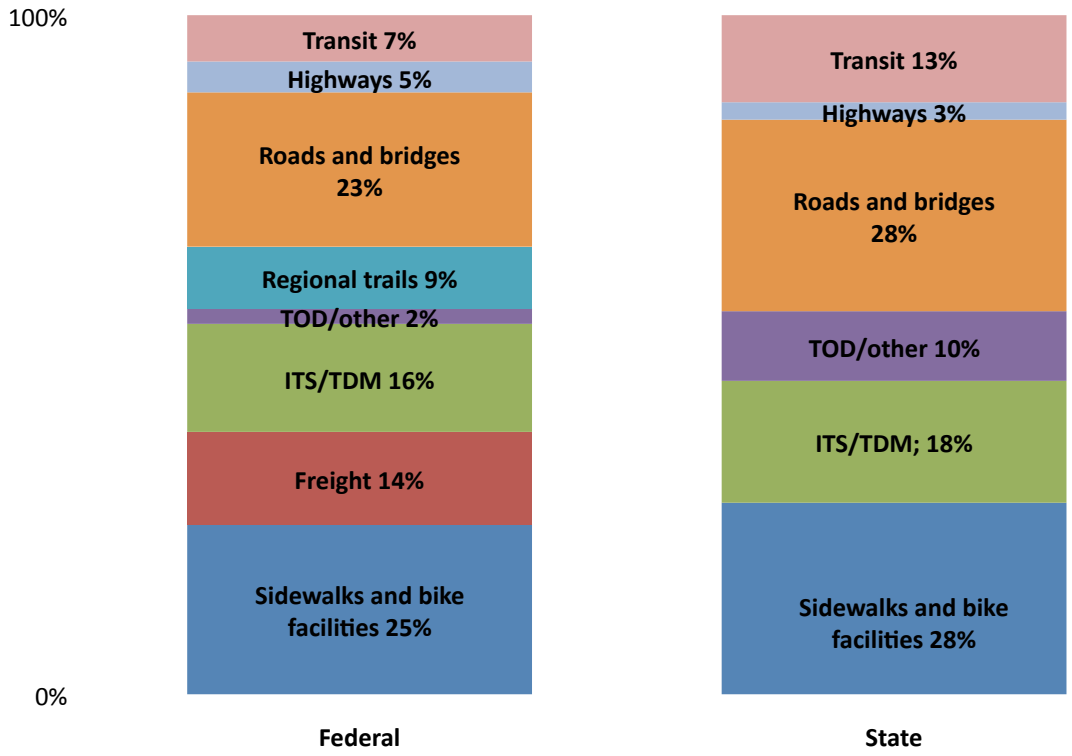
Regional Needs		Corridor Strategies
	(Surface Maintenance Only) – Clearance: 15'-00" o NE Glisan St. crossing Mt. Hood RR right-of-way at 90th (9000 NE Glisan St.) – Wt. Limits: 50,000 lbs. (single unit); 80,000 lbs. (combination unit) (combination unit)	
Safety	• I-205 between I-84 and NE Columbia Blvd. ranks on the ODOT SPIS list as Category 5 (Scale 1-5, 5 being highest priority). • The I-205/I-84 interchange and the I-205/Columbia Blvd interchange rank in the 95th percentile as SPIS intersections.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight	The following do not meet the performance thresholds in Table 2.4: • 2005 midday 1-hour volumes exceed capacity on I-84 (eastbound) between NE 20th Ave. and NE 60th Ave. and the interchange from I-84 east to I-205 south, just north of Gateway transit 2035 NB midday 1-hour volumes exceed capacity on the main freight roadway routes (I-205 and I-84): • I-205 northbound between the interchange with I-84 and NE Beech St. • I-84 eastbound and westbound at the interchange with I-205 • I-205 southbound at the intersection with Columbia Blvd • I-205 northbound and southbound between NE Airport Way and NE Marine Drive	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #9 has 44 projects totaling $468 million. Freight projects account for 14% of all of projects yet40% of the total corridor project costs ($185 million). Sidewalk and bike projects account for 25% of the federal projects and 29% ($130 million) of the total corridor project costs. The State RTP adds 39 more projects and an additional $388 million. Highway projects comprise 3% of state projects yet account for 44% ($170 million) of the total corridor project costs, including operational improvements to I-205. Transit capital accounts for 13% of the projects and 24% of the additional costs ($92 million). Transit projects include maintenance and operations

facilities and other bus improvements in the corridor. Both the Federal and State systems investments total about $856 million.

Projects by mode for federal and state systems



Projects by mode for federal and state systems

Mode	Federal System Cost by Mode	% of MC #9 Total Project Cost	State System Cost by Mode	% of MC #9 Total Project Cost
Sidewalks and bike facilities	$133,574,403	29%	$33,441,269	9%
Freight	$185,727,900	40%	$0	0%
ITS/TDM	$8,243,954	2%	$3,021,880	1%
TOD/other	$1,511,000	0%	$14,000,000	4%
Regional trails	$11,914,835	3%	$0	0%
Roads and bridges	$74,608,065	16%	$75,542,617	19%
Highways	$23,500,000	5%	$170,000,000	44%
Transit	$28,968,309	6%	$92,224,000	24%
TOTAL	$468,048,466	100%	$388,229,766	100%

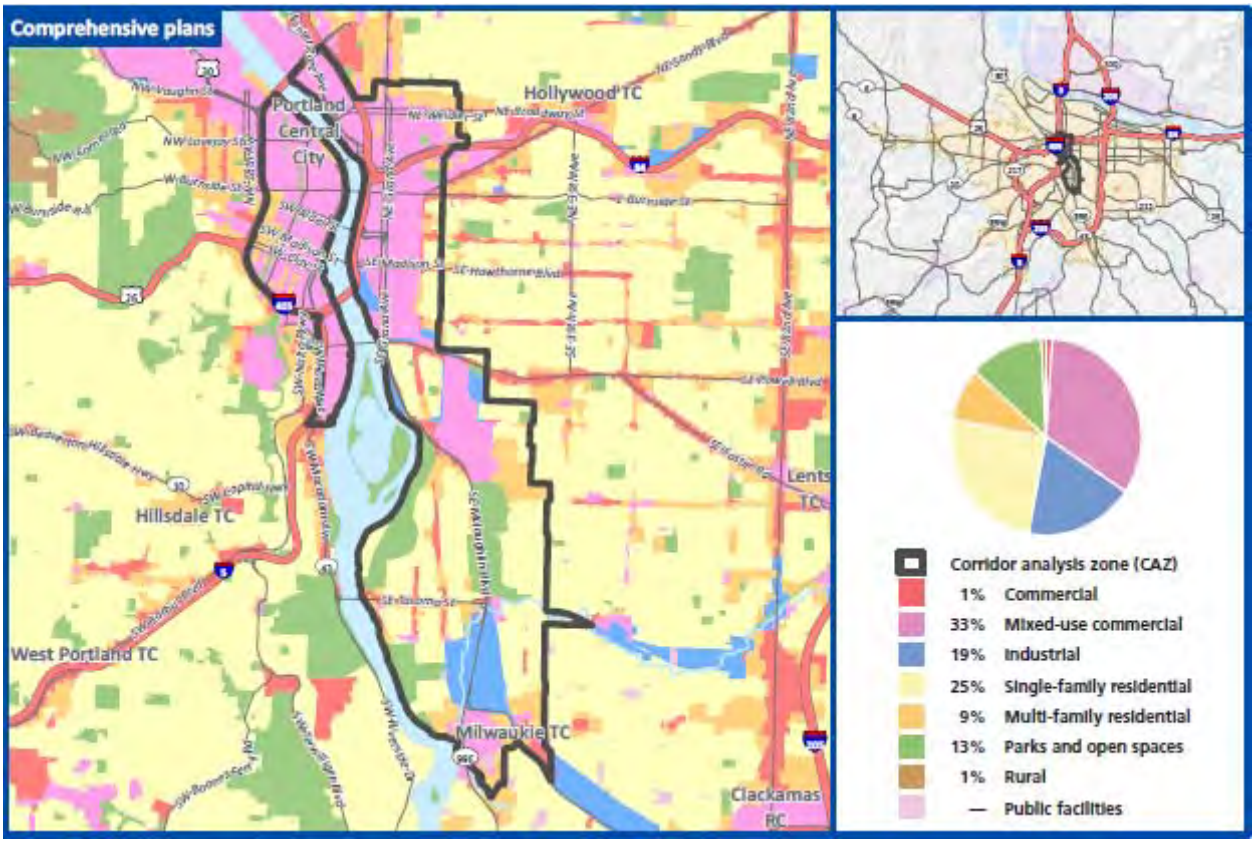
2035 investment strategy

Strategy	
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings.
Medium Term (5 – 10 years)	• Conduct corridor refinement plan
Long-term (10 – 25 years)	• Interchange improvements.

Unfunded Projects
• I-205/Airport Way SB on-ramp, $11,800,000 • I-205 auxiliary lanes/braids, Airport Way to Columbia, $27,200,000 • I-205 auxiliary lanes, Airport Way to Glisan, $46,000,000

Regional Actions	Local Actions
• Conduct corridor refinement plan. • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.11 Mobility Corridor #10 – Portland Central City to Milwaukie



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects the Central City to Clackamas regional center and provides regional access to the Milwaukie and Clackamas industrial areas, Brooklyn Yard intermodal facility and Clackamas Community College (Harmony).
Freight Mobility: Provides access to a rail intermodal facility at Brooklyn Yard and serves as a Class I Union Pacific main line corridor.
Statewide Travel: Provides a regional connection to Eastern Oregon via OR 212/224 and US 26 and serves as the Amtrak corridor to points south of the metropolitan region.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	52,960	132,444	3,097,402	4.3%	150.1%	57.9%
Households	31,072	67,664	1,208,686	5.6%	117.8%	57.6%
Employment	169,422	250,866	1,799,152	13.9%	48.1%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Freight Rail
	• Springwater Trail	• Sellwood Bridge • Ross Island Bridge	• OR 99E	• SE 17th Ave./ Milwaukie Ave. • Holgate Ave.	• Union Pacific o Brooklyn Sub mainline

Regional 2040 land uses

Regional Centers	Town Centers	Intermodal Facilities	Employment/Industrial Areas	Other Key Destinations
• Portland Central City	• Milwaukie	• Union Station	• Central Eastside • Johnson Creek • Northwest • Brooklyn Yards	• Convention Center • Rose Quarter • South Waterfront

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Increase 15 minute or better transit service along OR 224 • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy). • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy). • Direct, safe, comfortable, bike and pedestrian connections to all transit stops. • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • Long-Range HCT Plan Identifies a potential HCT line between Portland Central City and Gresham (in general vicinity of Powell Blvd.) It is listed as a "Near-term" investment priority. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater

Regional Needs		Corridor Strategies
		than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Active Transportation project in RTP to improve safety and access for pedestrians and cyclists (11198). • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

Regional Needs		Corridor Strategies
Regional Trails	• Address a gap in the Springwater Trail in the Sellwood neighborhood. • Direct connections between trails and on-street bicycle and pedestrian facilities.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[20]	The following do not meet the performance threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • OR 99E • OR 224/Harrison St. intersection	• Unfunded projects identified to increase capacity and improve access management between Ross Island Bridge and I-205 along 99E/OR 224 corridor, $280,000,000. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[21]	<u>Arterial Gaps</u> • Address gap south of Holgate between 99E and 52nd Ave. • Address a need for another south Willamette River crossing. <u>Arterial Deficiencies</u> The following do not meet the performance threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • Powell Blvd., Ross Island Bridge, Sellwood Bridge, Tacoma St., pieces of Holgate Blvd., 52nd Ave, and Johnson Creek Blvd.	• Address TSMO needs in this corridor. • Improve access to neighborhoods, rather than just the throughway facility. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail	• SE Milwaukie • SE Clinton • SE 12th • SE 8th/Division • SE 17th • SE Harrison	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Local TSPsevaluate at grade heavy rail crossings for deficiencies and solutions.
Regional Bridges	• Sellwood Bridge has weight restrictions and a low sufficiency rating which currently limits transit service in this corridor.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Implement Sellwood Bridge Study recommendations.

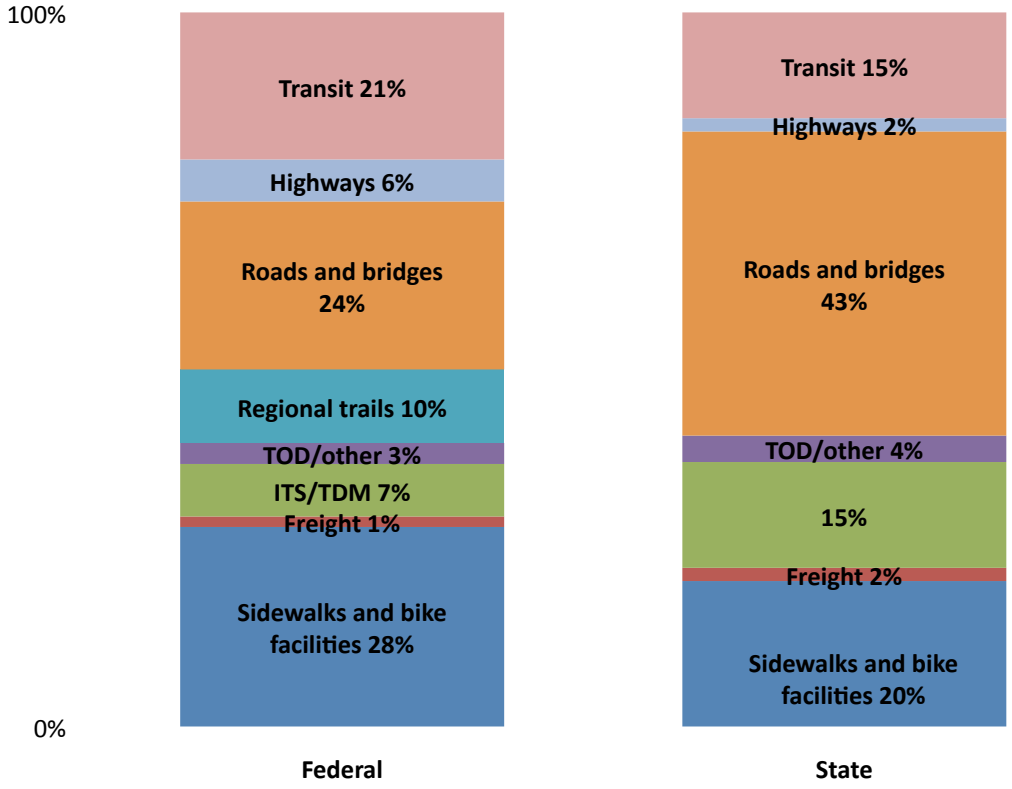
[20] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)
[21] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
Safety	• OR 99E/Powell, OR 99E near Holgate, and 17th and Tacoma St. intersections rank on the ODOT SPIS list as Category 4 and 5(Scale 1-5, 5 being highest priority).	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight	• Improve access to Brooklyn Yard.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #10 has 68 projects totaling $2.5 billion. Transit projects account for 21% of the federal projects and 72% ($1.8 billion) of the total corridor project costs. These projects include expanding the HCT system to Milwaukie, Portland to Lake Oswego Streetcar and additional expansion of the streetcar system in the City of Portland. Sidewalk and bike projects comprise 28% of all of projects and 6% of the total corridor project costs ($163 million). Roads and bridges projects account for 24% of all of projects and 14% of the total corridor project costs ($360 million). The State RTP adds 54 more projects and an additional $2.7 billion. Transit projects account for 26% of the federal projects and 84% ($2.2 billion) of the total corridor project costs. These projects include expanding the HCT system from Central City to Tigard and increases in bus service and facilities. Sidewalk and bike projects comprise 20% of all of projects but only 1% of the total corridor project costs ($31 million). Roads and bridges projects account for 43% of all of projects and 8% of the total corridor project costs ($177 million). For both the Federal and State systems investments total $4.8 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #10 Total Project Cost	State System Cost by Mode	% of MC #10 Total Project Cost
Sidewalks and bike facilities	$163,840,442	6%	$31,524,681	1%
Freight	$30,000,000	1%	$280,600	0%
ITS/TDM	$11,351,794	0%	$3,919,800	0%
TOD/other	$5,511,000	0%	$11,000,000	0%
Regional trails	$10,956,411	0%	$0	0%
Roads and bridges	$361,390,003	14%	$177,491,019	8%
Highways	$121,703,209	5%	$220,000,000	10%
Transit	$1,847,727,000	72%	$1,827,056,000	80%
TOTAL	**$2,552,479,859**	100%	**$2,271,272,100**	100%

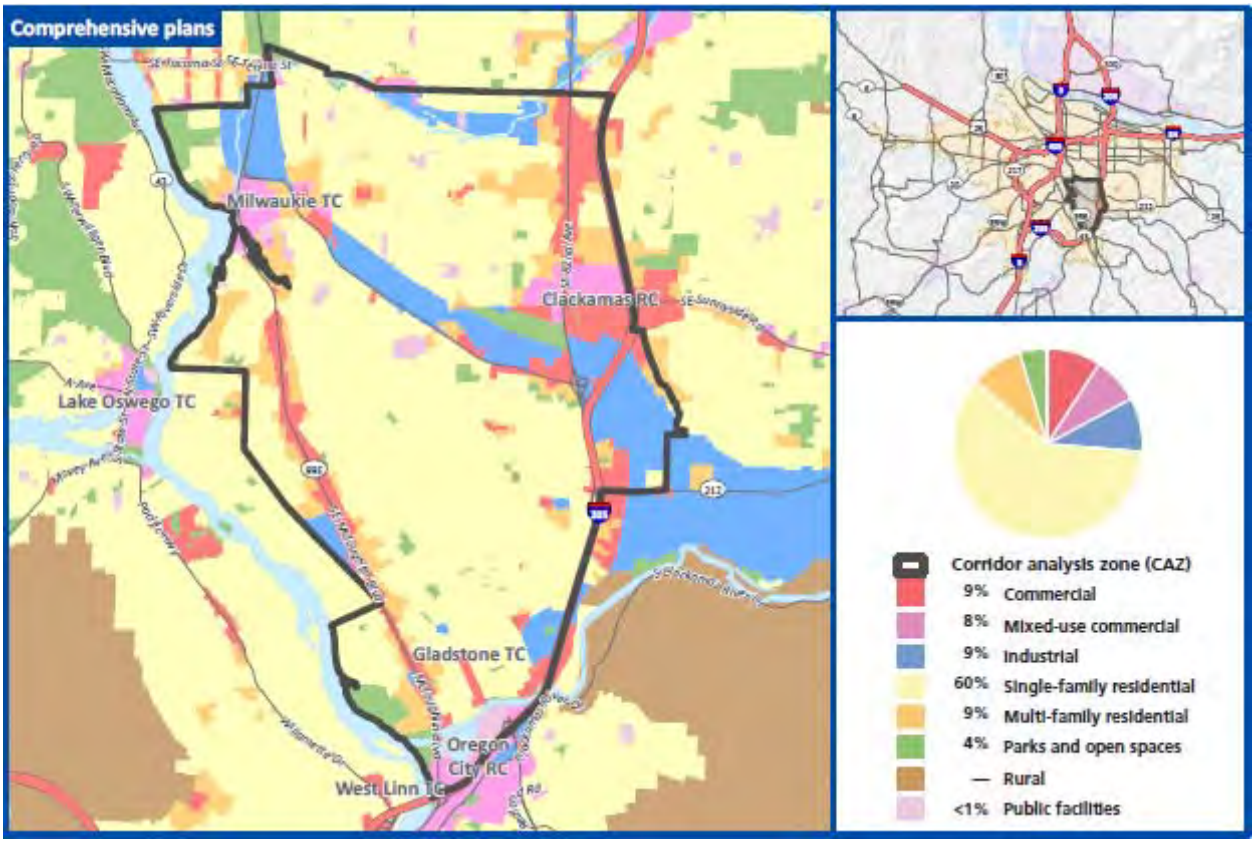
2035 investment strategy

	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • Continue work on Milwaukie HCT.
Medium Term (5 – 10 years)	• Complete gaps in the arterial network.
Long-term (10 – 25 years)	

Unfunded Projects
• Ross Island Bridge East Approach, $2,900,000 • SE McLoughlin Bikeway, $700,000 • OR 99E Improvements from Powell to OR 224, $241,600,000 • OR 99E Bike Improvements, Kellogg Cr. To Clackamas R., $4,000,000 • OR 99E Widening, Harold to Tacoma, $38,800,000

Regional Actions	Local Actions
• Continued work on Milwaukie HCT. • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update..

4.2.12 Mobility Corridor #11– Milwaukie to Clackamas



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects the Central City to Clackamas regional center and provides regional access to the Milwaukie and Clackamas industrial areas, Brooklyn Yard intermodal facility and Clackamas Community College (Harmony).
Freight Mobility: Provides access to a rail intermodal facility at Brooklyn Yard and serves as a Class I Union Pacific main line corridor.
Statewide Travel: Provides a regional connection to Eastern Oregon via OR 212/224 and US 26 and serves as the Amtrak corridor to points south of the metropolitan region.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	84,246	94,497	3,097,402	3.1%	12.2%	57.9%
Households	34,127	42,475	1,208,686	3.5%	24.5%	57.6%
Employment	46,362	72,915	1,799,152	4.1%	57.3%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
	• Springwater Trail	• Sellwood Bridge • Ross Island Bridge	• OR 99E	• 82nd Ave. • 122nd Ave. • 92nd Ave/ Schumacher • McLoughlin Blvd.	• Union Pacific o Brooklyn sub mainline o Valley sub mainline

Regional 2040 land uses

Regional Centers	Town Centers	Intermodal Facilities	Employment/Industrial Areas	Other Key Destinations
• Portland Central City	• Milwaukie	• Union Station	• Central Eastside • Johnson Creek • Northwest • Brooklyn Yards	• Lloyd District • Convention Center • Rose Quarter • South Waterfront

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Add 15 minute of better transit along OR 224 and SE Harmony Rd. • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy). • Connect all 2040 Regional Centers with high capacity transit (Oregon City RC is not served by HCT.) • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • The HCT plan identified Milwaukie to Oregon City RC (via I-205 or McLoughlin Blvd) as a "next phase" regional priority corridor. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis

Regional Needs		Corridor Strategies
		project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Direct connections between trails and on-street bicycle and pedestrian facilities. • Address a bike parkway connecting Milwaukie TC to Clackamas RC parallel to OR 224.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management

Regional Needs		Corridor Strategies
		Functional Plan.
Throughways[22]	• OR 224 is a statewide highway and it has several signalized intersections between OR 99E and Lake Road. The intersections are spaced less than a mile apart. The following do not meet the performance threshold in Table 2.4: 2005 and the 2035 NB PM 2-hour peakvolumes exceed capacity on: • OR 224 at the OR 99E intersection and approaches to I-205.	• FC Project 10106 addresses access issues to increase vehicle throughput on OR 224. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[23]	<u>Arterial Gaps</u> • Address gaps between SE Oatfield Rd. and SE Webster Rd south of OR 224 and between SE McLoughlin Blvd. and SE Linwood Ave south of Johnson Creek Blvd. The following do not meet the performance threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • Parts of SE Lake Rd. and Harmony Rd. • Address congestion in downtown Milwaukie at the intersections along OR 224. There is a need for better connectivity across the community and better access to downtown. •	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

At-Grade Heavy Rail	• There is a heavy rail crossing of a main freight railroad line at the intersection of SE Lake Rd./SE Linwood Ave./Harmony Rd.
	• There are two heavy rail crossings of both a main and branch freight railroad line on Harrison St. both west and east of the Harrison St./OR 224 Intersection:
	  • Harrison
	  • Oak
	  • 37th
	  • Harmony
	  • Lawnfield
		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
		• Local TSPsevaluate at grade heavy rail crossings for deficiencies and solutions.

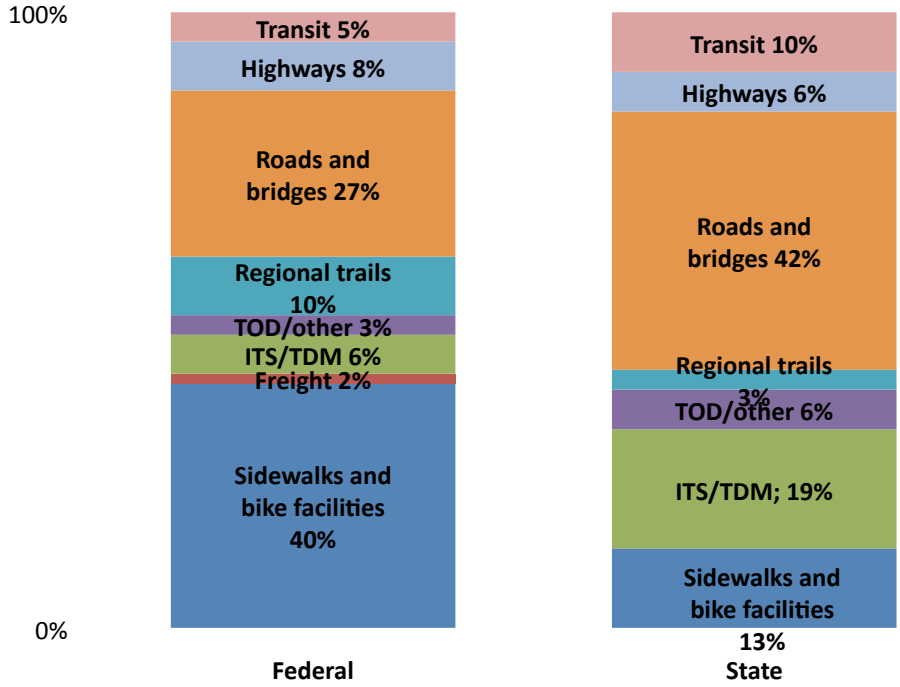
[22] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)
[23] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
Regional Bridges		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Safety	• OR 224 intersections rank on the ODOT SPIS list as Category 4 and 5(Scale 1-5, 5 being highest priority).	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight	• OR 224 in both 2005 and 2035 NB in the midday 1-hour: • OR 99E intersection and as it approaches I-205.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #11 has 63 projects totaling more than $1.9 billion. Transit projects account for 5% of the federal projects and 58% ($1.1 billion) of the total corridor project costs. This includes expanding the HCT system from Central City to Milwaukie. Sidewalk and bike projects comprise 40% of all of projects and 7% of the total corridor project costs ($147 million). Roads and bridges projects account for 27% of all of projects and 13% of the total corridor project costs ($262 million). The State RTP adds 31 more projects and an additional $960 million. Highway projects account for 6% of all of projects yet 60% of the total corridor project costs ($280 million) for improvements to the I205/OR 213 Interchange and the Sunrise project. For both the Federal and State systems investments total $2.4 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

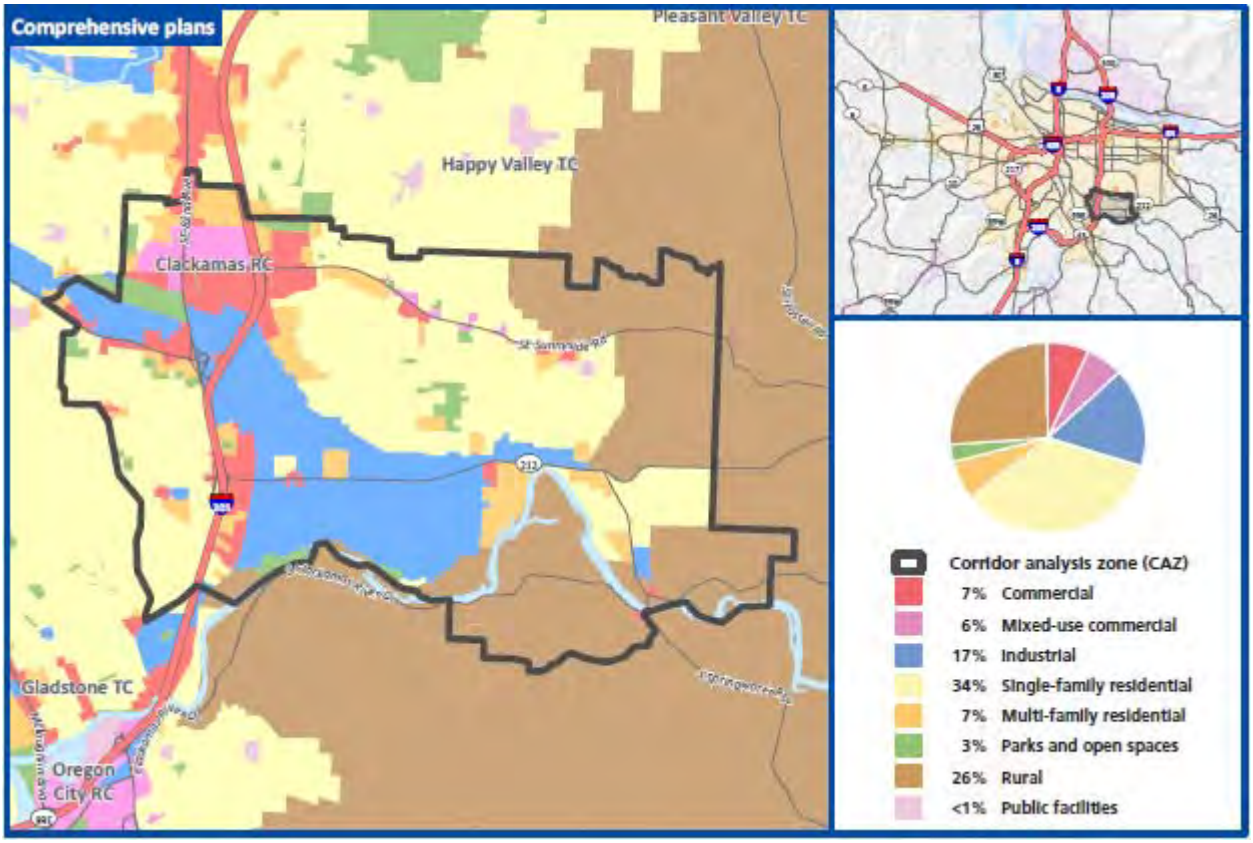
Mode	Federal System Cost by Mode	% of MC #11 Total Project Cost	State System Cost by Mode	% of MC #11 Total Project Cost
Sidewalks and bike facilities	$146,814,193	7%	$19,964,842	4%
Freight	$25,650,000	1%	$0	0%
ITS/TDM	$10,950,000	1%	$49,061,295	10%
TOD/other	$5,511,000	0%	$11,000,000	2%
Regional trails	$10,620,000	1%	$5,000,000	1%
Roads and bridges	$262,148,295	13%	$68,758,253	15%
Highways	$375,000,000	19%	$280,000,000	59%
Transit	$1,154,627,000	58%	$40,000,000	8%
TOTAL	**$1,991,320,488**	100%	**$473,784,390**	100%

2035 investment strategy

	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • Continue work on Milwaukie HCT.
Medium Term (5 – 10 years)	• Complete gaps in the arterial network.
Long-term	

(10 – 25 years)	
Unfunded Projects	
• Milwaukie to Clackamas RC Corridor Study, $1,400,000 • Projects identified to increase capacity and improve access management between Ross Island Bridge and I-205 along 99E/OR 224 corridor, $280,000,000.	
Regional Actions	**Local Actions**
• Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.13 Mobility Corridor #12 – Clackamas to Rock Creek Junction (Hwy. 224)



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects the Clackamas regional center and industrial areas to Eastern Oregon via OR 212/224 and US 26.
Freight Mobility: Connects the Clackamas industrial area distribution center to the interstate system and to Eastern Oregon via OR 212/224 and US 26.
Statewide Travel: Provides access to the metropolitan region from Eastern Oregon via OR 212/224 and US 26.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	40,808	65,900	3,097,402	2.1%	61.5%	57.9%
Households	15,530	25,008	1,208,686	2.1%	61.0%	57.6%
Employment	33,551	63,305	1,799,152	3.5%	88.7%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
	• Clackamas Bluffs Trail		• OR 212/224	• Sunnyside Rd.	• Union Pacific o Valley sub mainline

Regional 2040 land uses

Regional Centers	Town Centers	Employment Areas	Industrial Areas	Other Key Destinations
• Clackamas	• Damascus		• Clackamas Ind. District	•

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Address lack of transit service within this mobility corridor. • Increase regional transit service along Sunnyside Rd./Harmony Rd. • Add 15 minute or better transit service along OR 212/224 and SE Sunnyside Rd. Need to connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy); • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy); • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • The HCT study ranked Clackamas Transit Center to Damascus as a regional vision corridor. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists,

Regional Needs		Corridor Strategies
		add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized for all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Direct connections between trails and on-street bicycle and pedestrian facilities.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[24]	• OR 212/224 is a statewide highway and it has several signalized intersections all spaced less than a mile apart. The following do not meet the performance	• Right of way acquisition, preliminary engineering, and environmentalof Sunrise facility between I-205 and Rock Creek Junction. $320,000,000 in FC project list (10869, 10890,

[24] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
	threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • OR 212/224except as it approaches SE 142nd Ave and SE 152nd Ave in the eastbound direction. • Sunrise/I-205/Sunnyside Rd. area.	10894), $110,000,000 in State RTP (11301). • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[25]	Arterial Gaps • Address the gap on 122nd Ave. just north of OR 224. • Address lack of north/south connectivity between SE Sunnyside Rd. and Hwy. 212/224 and east/west connectivity between SE 82nd Dr. and SE 122nd Ave. The following do not meet the performance threshold in Table 2.4: 2005 and 2035 NB PM 2-hour peakvolumes exceed capacity on: • Parts of SE Sunnyside Rd. as it approaches SE 132nd Ave and SE 142nd Ave do not meet the performance thresholds in 2005 PM 2-hour peak. • In the 2035 NB PM 2-hour peak, SE Sunnyside Rd does not meet the performance thresholds throughout in the eastbound direction.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail	• There is an at-grade heavy rail crossing at Lawnfield Rd. near I-205.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Local TSPsevaluate at grade heavy rail crossings for deficiencies and solutions.
Regional Bridges		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Safety	• OR 224 intersections rank on the ODOT SPIS list as Category 4 and 5 (Scale 1-5, 5 being highest priority).	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight	The following do not meet the performance threshold in Table 2.4. • 2035 NB PM 2-hour volumes exceed	• Implement Regional Transportation Functional Plan and Urban Growth

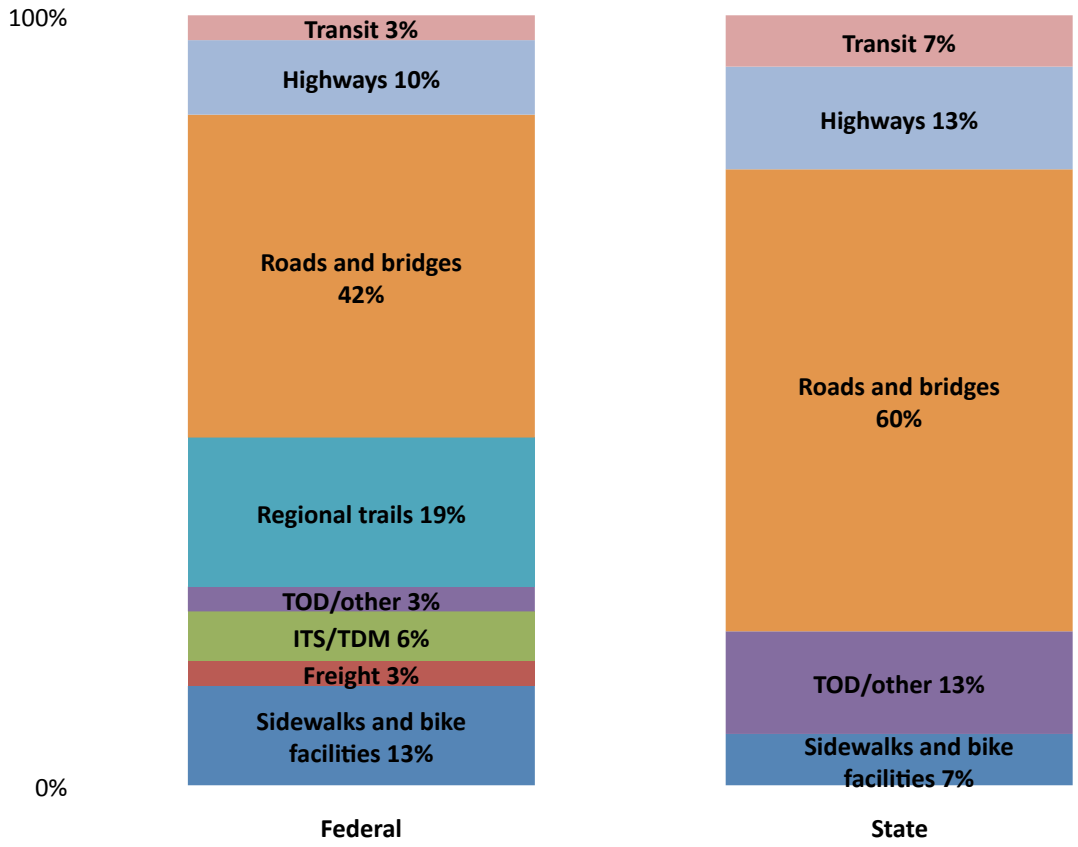
[25] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

Regional Needs		Corridor Strategies
	capacity on OR 212/224 and SE 142nd Ave and SE 152nd Ave in the eastbound direction.	Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #12 has 31 projects totaling $678 million. Roads and bridges projects account for 42% of all of projects and 30% of the total corridor project costs ($205 million). Highway projects comprise only 10% of federal projects, but account for 47% ($320 million) of the total corridor project costs, including the Sunrise project. The State RTP adds 15 more projects and an additional $429 million. Highway projects comprise only 13% of state projects, but account for 65% ($280 million) including additional Sunrise projects. Both the Federal and State systems investments total about $1.1 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #9 Total Project Cost	State System Cost by Mode	% of MC #9 Total Project Cost
Sidewalks and bike facilities	$94,775,000	14%	$6,846,598	2%
Freight	$25,650,000	4%	$0	0%
ITS/TDM	$6,500,000	1%	$0	0%
TOD/other	$4,000,000	1%	$11,000,000	3%
Regional trails	$21,440,000	3%	$0	0%
Roads and bridges	$205,027,149	30%	$101,578,517	24%
Highways	$320,000,000	47%	$280,000,000	65%
Transit	$1,000,000	0%	$30,000,000	7%
TOTAL	**$678,392,149**	100%	**$429,425,115**	100%

2035 investment strategy

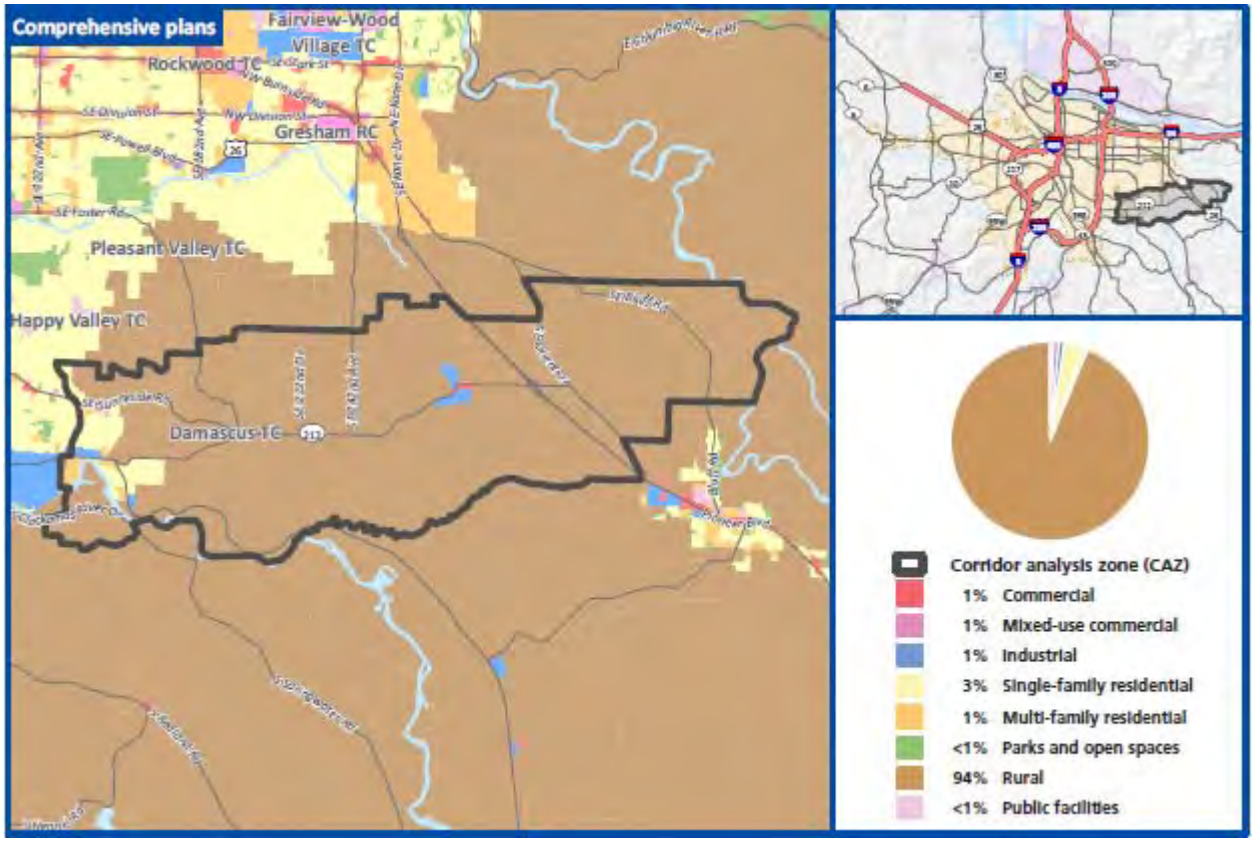
	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • Complete Sunrise study.
Medium Term (5 – 10 years)	• Complete gaps in the arterial network. • Interchange improvements and improvements consistent with Sunrise study
Long-term (10 – 25 years)	

Unfunded Projects

- Sunrise Phase 1 construction, $392,000,000
- Sunrise Phase 2 construction, $247,900,000
- OR 212/224 Improvements, $7,000,000
- Additional westbound lane on OR 212 between 102nd and I-205

Regional Actions	Local Actions
• Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.14 Mobility Corridor #13 – Rock Creek Junction (OR 224) to US 26



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects the Clackamas regional center and industrial areas to Eastern Oregon via OR 212/224 and US 26.
Freight Mobility: Connects the Clackamas industrial area distribution center to the interstate system and to Eastern Oregon via OR 212/224 and US 26.
Statewide Travel: Provides access to the metropolitan region from Eastern Oregon via OR 212/224 and US 26.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	23,616	116,508	3,097,402	3.8%	393.3%	57.9%
Households	8,195	38,324	1,208,686	3.2%	367.7%	57.6%
Employment	5,722	22,453	1,799,152	1.2%	292.4%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
			• OR 212	• Sunnyside Rd.	

Regional 2040 land uses

Regional Centers	Town Centers	Employment Areas	Industrial Areas	Other Key Destinations
	• Damascus • Happy Valley		• Clackamas	• Boring • Sandy

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Address lack of transit service within this mobility corridor. • Improve regional transit service on Sunnyside Rd. into Damascus TC and OR 212. • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy). • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy). • Direct, safe, comfortable, bike and pedestrian connections to all transit stops. • Connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • The HCT plan ranked Clackamas TC to Damascus TC as a "regional vision" corridor. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement.

Regional Needs		Corridor Strategies
		Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Need for east/west trail. • Direct connections between trails and on-street bicycle and pedestrian facilities.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[26]	The following do not meet the performance threshold in Table 2.4: 2035 NB PM 2-hour peakvolumes exceed capacity onOR 212 • OR 212 is primarily 2 lanes from Damascus to US 26.	• Sunrise Parkway EIS in State RTP (10114), $6,000,000. • OR 224 widening from Rock Creek Junction to Carver Bridge, FC project 10078. • OR 212 widening and boulevard improvements through Damascus, FC RTP project 10138. • Improvements to OR 212 intersections to meet future traffic needs, FC project 10073. • OR 212 truck climbing lanes east of Rock Creek Junction, unfunded. • Implement Regional Transportation

[26] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

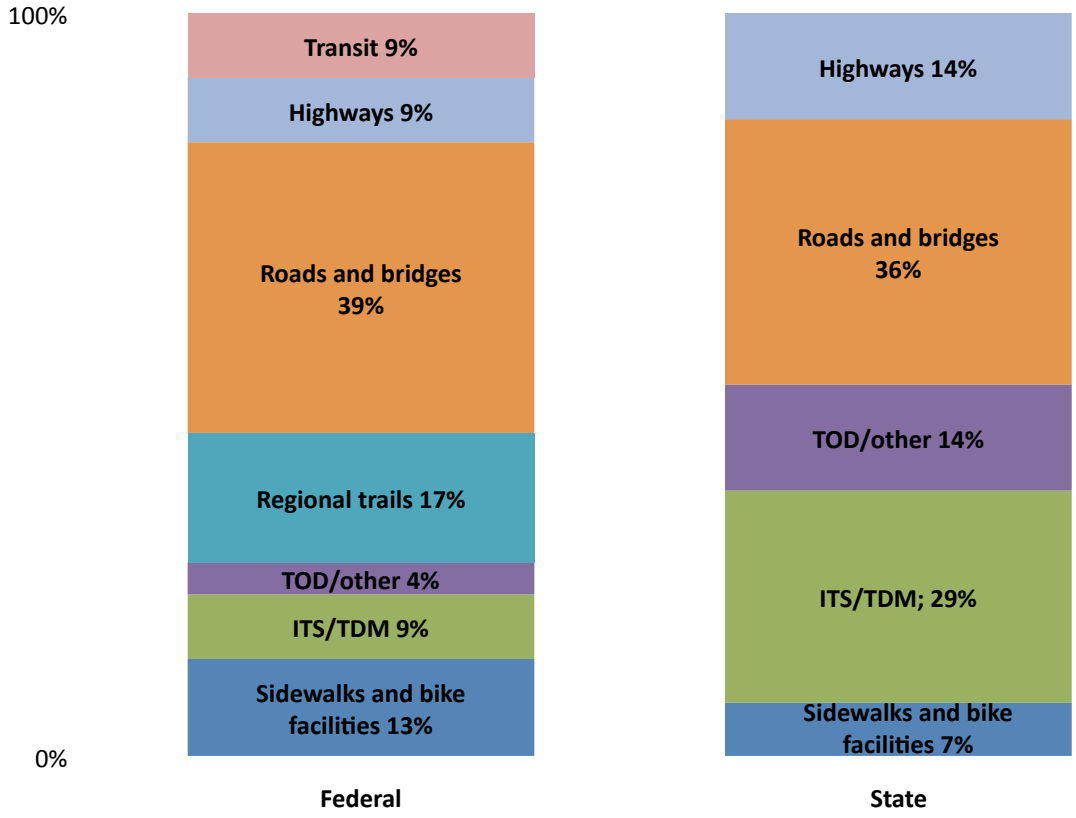
Regional Needs		Corridor Strategies
		Functional Plan and Urban Growth Management Functional Plan.
Arterials[27]	Arterial Gaps • Address north/south and east/west gaps between 142nd Ave and 172nd Ave., 172nd Ave and SE Foster Rd., SE Foster Rd. and SE 242nd Ave., and 242nd Ave. and US 26. Arterial Deficiencies • Sunnyside Rd. does not meet the performance thresholds in Table 2.4. 2035 NB PM 2-hour peak volumes exceed capacity in the eastbound direction.	• Address need for additional Clackamas River crossings. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Bridges		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Safety	• Stretches of OR 212 rank on the ODOT SPIS list as Category 3 and 4 (Scale 1-5, 5 being highest priority). • Address safety problems on SE Tong Rd. • There is a need for safety improvements to the Springwater Bridge in Carver.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, MC #13 has 23 projects totaling $660 million. Roads and bridges projects account for 39% of all of projects but over half (54%) of the total corridor project costs ($327 million). Highway projects comprise only 9% of federal projects, but account for 28% ($170 million) of the total corridor project costs, including the Sunrise project. The State RTP adds 14 more projects and an additional $223 million. Highway projects comprise only 14% of state projects, but account for 52% ($116 million) including additional Sunrise projects. Both the Federal and State systems investments total $827million.

Projects by mode for federal and state systems

[27] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)


100%
0%
Transit 9%
Highways 9%
Roads and bridges 39%
Regional trails 17%
TOD/other 4%
ITS/TDM 9%
Sidewalks and bike facilities 13%
Highways 14%
Roads and bridges 36%
TOD/other 14%
ITS/TDM; 29%
Sidewalks and bike facilities 7%
Federal
State

RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #9 Total Project Cost	State System Cost by Mode	% of MC #9 Total Project Cost
Sidewalks and bike facilities	$81,940,000	14%	$6,846,598	3%
Freight	$0	0%	$0	0%
ITS/TDM	$6,500,000	1%	$1,675,000	1%
TOD/other	$1,511,000	0%	$11,000,000	5%
Regional trails	$14,070,000	2%	$0	0%
Roads and bridges	$327,357,149	54%	$88,423,854	39%
Highways	$170,000,000	28%	$116,000,000	52%
Transit	$2,000,000	0%	$0	0%
TOTAL	**$603,378,149**	100%	**$223,945,452**	100%

2035 investment strategy

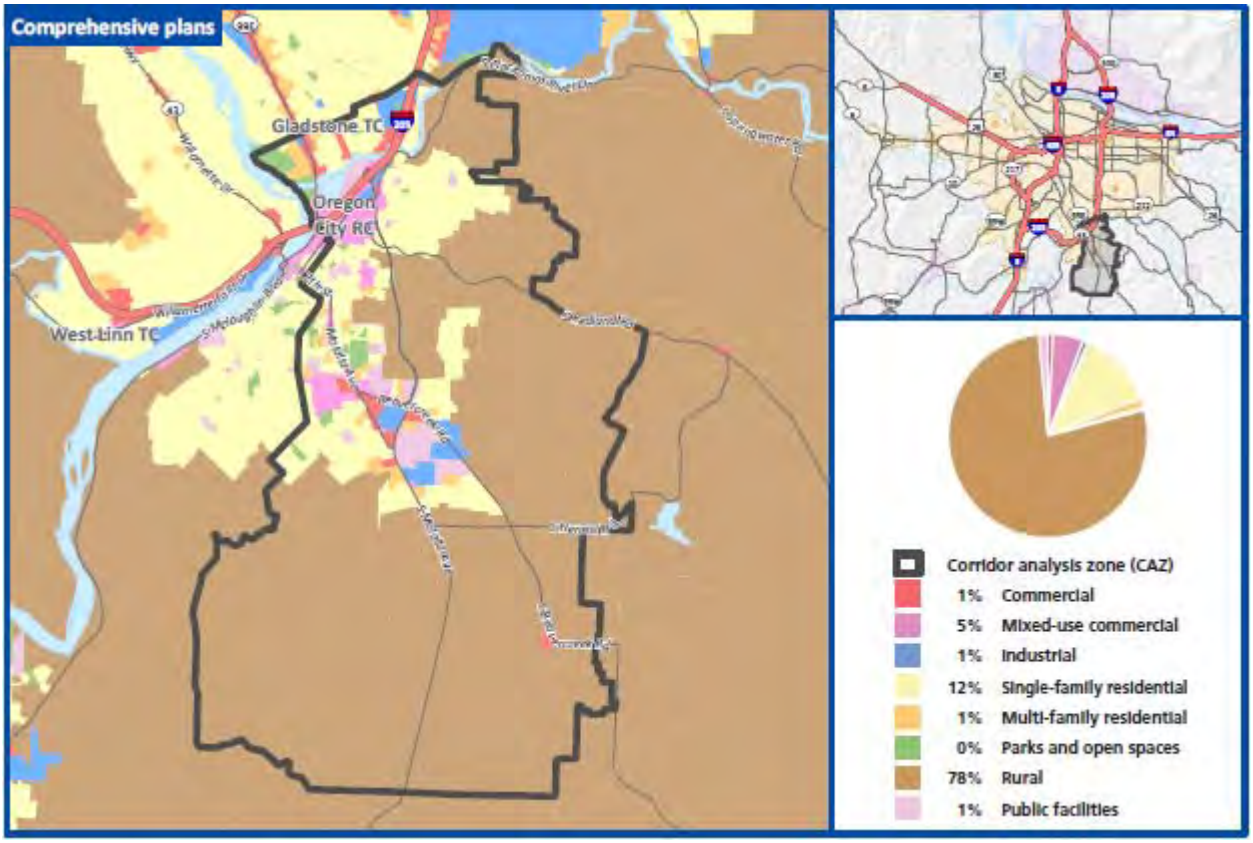
	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • Complete Sunrise study.
Medium Term (5 – 10 years)	• Complete gaps in the arterial network. • Interchange improvements and improvements consistent with Sunrise study.
Long-term (10 – 25 years)	

Unfunded Projects

- Sunrise Parkway ROW, $150,000,000
- Sunrise Parkway construction, $600,000,000
- OR 212 truck climbing lanes, $1,800,000
- Sunrise Parkway Preliminary Engineering and Environmental, $60,000,000
- Sunrise Parkway Refinement Plan, $6,000,000
- OR 224 Corridor Plan, $1,200,000

Regional Actions	Local Actions
• Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.15 Mobility Corridor #14 – Oregon City to Willamette Valley



Corridor function

What function(s) does the corridor serve?
2040 Access: Serves as southern access to the Oregon City regional center and provides access to Clackamas Community College (Beavercreek Campus).
Freight Mobility: Provides freight access from surrounding agricultural areas and Beavercreek Industrial Area to I-205.
Statewide Travel: Serves as a secondary southern gateway to the region and connects agricultural areas in the Northern Willamette Valley to I-205.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	39,115	75,742	3,097,402	2.4%	93.6%	57.9%
Households	14,376	29,128	1,208,686	2.4%	102.6%	57.6%
Employment	16,116	30,881	1,799,152	1.7%	91.6%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
	• Oregon City Loop Trail		• OR 213	• Molalla Ave.	• Union Pacific o Valley sub mainline

Regional 2040 land uses

Regional Centers	Town Centers	Intermodal Facilities	Employment/Industrial Areas	Other Key Destinations
• Oregon City	• Gladstone			• Beavercreek • Metro Transfer Station

Needs and Strategies

Regional Needs		Corridor Strategies
Transit	• Address transit service deficiencies on Abernethy Rd. and Redland Rd. • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy); o Holcomb Blvd. has limited bus service; equity issues for public housing to be addressed. o Need to connect Park Place UGB expansion concept plan area with transit. • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy); • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations. • Provide bicycle parking and options for bike sharing at all HCT stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • Analyze transit stops in relation to bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will

Regional Needs		Corridor Strategies
		implement. Also consider developing private shuttle services to serve this need. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized.For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Strategies for transit connections will be evaluated as part of the Park Place concept plan areas annexation to Oregon City.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail. • Need for pedestrian and bike safety and access improvements on OR 99E south of UPRR tunnel.	• Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas. • Use practical design to add shoulder width pavement for bike access. • Bike/ped facilities on Beavercreek Rd. between OR213 and Oregon City limits. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Trails	• Direct connections between trails and on-street bicycle and pedestrian facilities. • Oregon City Loop, Beaver Lake, and Newell Canyon system trails incomplete.	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Projects to be developed and constructed for trails identified in regional trails plan and RTP. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways	• OR 213 is a district highway from the OR 213/I-205 interchange and it has several signalized intersections. • Both the Washington St./Clackamas River Dr. and Redland Rd. intersections are spaced less than a half-mile apart.	• Improvements to OR 213 in the area of the I-205 interchange in FC projects 11180, 10141. • OR 213 widening projects from Redland road couth to UGB in State RTP, projects 10119 and 10140.

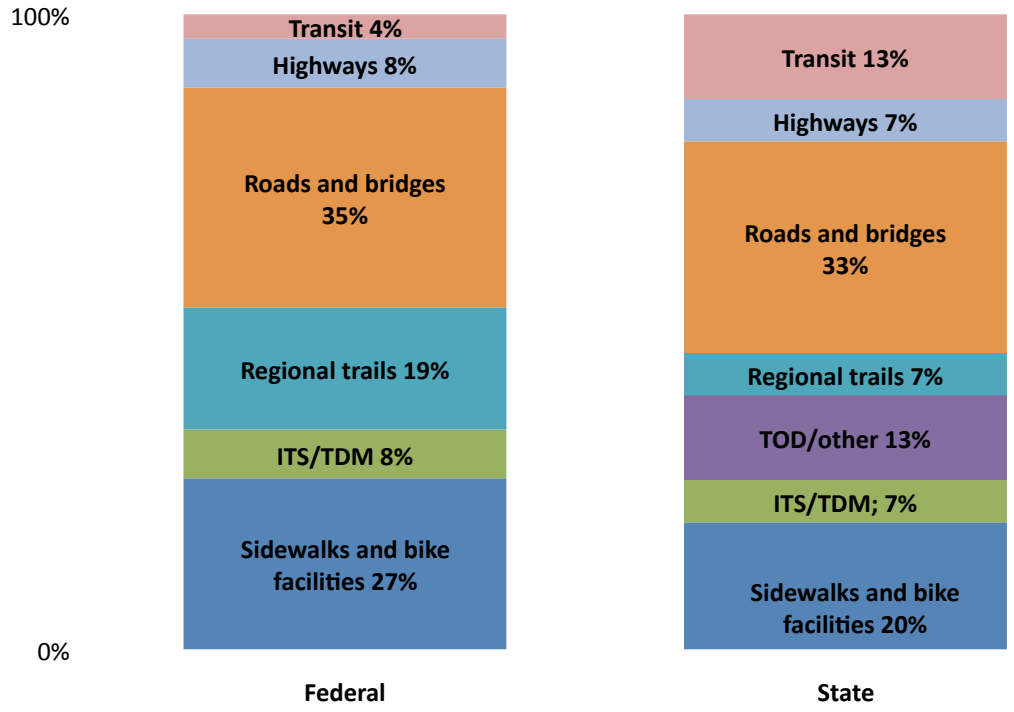
Regional Needs		Corridor Strategies
	• There is less than one-mile spacing between the Beavercreek Rd. and Molalla Ave. intersections. The following do not meet the performance threshold in Table 2.4: • In the 2005 PM 2-hour peak volumes exceed capacity on OR 213 southbound from I-205 interchange to the Redland Rd. intersections. • In the 2035 NB PM 2-hour peak volumes exceed capacity on OR 210 northbound and southbound from the I-205 interchange down to S. Henrici Rd. • Need for OR 213 crossings for bike/pedestrian connectivity.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials	<u>Arterial Gaps</u> • Address a gap in east/west connectivity between south of Warner Parrot Rd. between S. End Rd., Leland Rd., and Molalla Ave. • Address gaps in east-west connectivity between Division St. and Holly Lane The following do not meet the performance thresholds in Table 2.4: • In the 2035 NB PM 2-hour volumes exceed capacity on MollalaAve, southbound near the Beavercreek Rd. intersection and the OR 213 intersections.	• Meyers Rd. from OR 213 to High School Lane (not in RTP). • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Bridges		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Safety	• OR 213 ranks on the ODOT SPIS list as Category 4 (Scale 1-5, 5 being highest priority) through Oregon City RC, becoming Category 3 south of the City. • Two locations rank above the 85th percentile and as Category 5 at the Beavercreek Rd. and Molalla Ave. intersections, although recent safety upgrades have improved these areas.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Regional Freight		• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.

2035 RTP Investments

What are the strategies identified in the federal and state RTP?

Investment Summary: In the Federal RTP, MC #14 has 26 projects totaling $281 million. Roads and bridges projects account for 35% of all of projects and 38% of the total corridor project costs ($106 million). Sidewalk and bike projects comprise 27% of all of projects and 35% of the total corridor project costs ($100 million). The State RTP adds 15 more projects and an additional $329 million. Highway projects account for 7% of all of projects and 52% of the total corridor project costs ($170 million) for operational improvements to I-205. Roads and bridges projects account for 33% of all of projects and 28% of the total corridor project costs ($92 million). For both the Federal and State systems investments total just over $610 million.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #14 Total Project Cost	State System Cost by Mode	% of MC #14 Total Project Cost
Sidewalks and bike facilities	$99,700,000	35%	$20,846,598	6%
Freight	$0	0%	$0	0%
ITS/TDM	$6,500,000	2%	$0	0%

Mode	Federal System Cost by Mode	% of MC #14 Total Project Cost	State System Cost by Mode	% of MC #14 Total Project Cost
Regional trails	$8,600,000	3%	$5,000,000	2%
Roads and bridges	$105,710,000	38%	$91,627,801	28%
Highways	$55,000,000	20%	$170,000,000	52%
Transit	$6,000,000	2%	$31,000,000	9%
TOTAL	**$281,510,000**	100%	**$329,474,399**	100%

2035 investment strategy

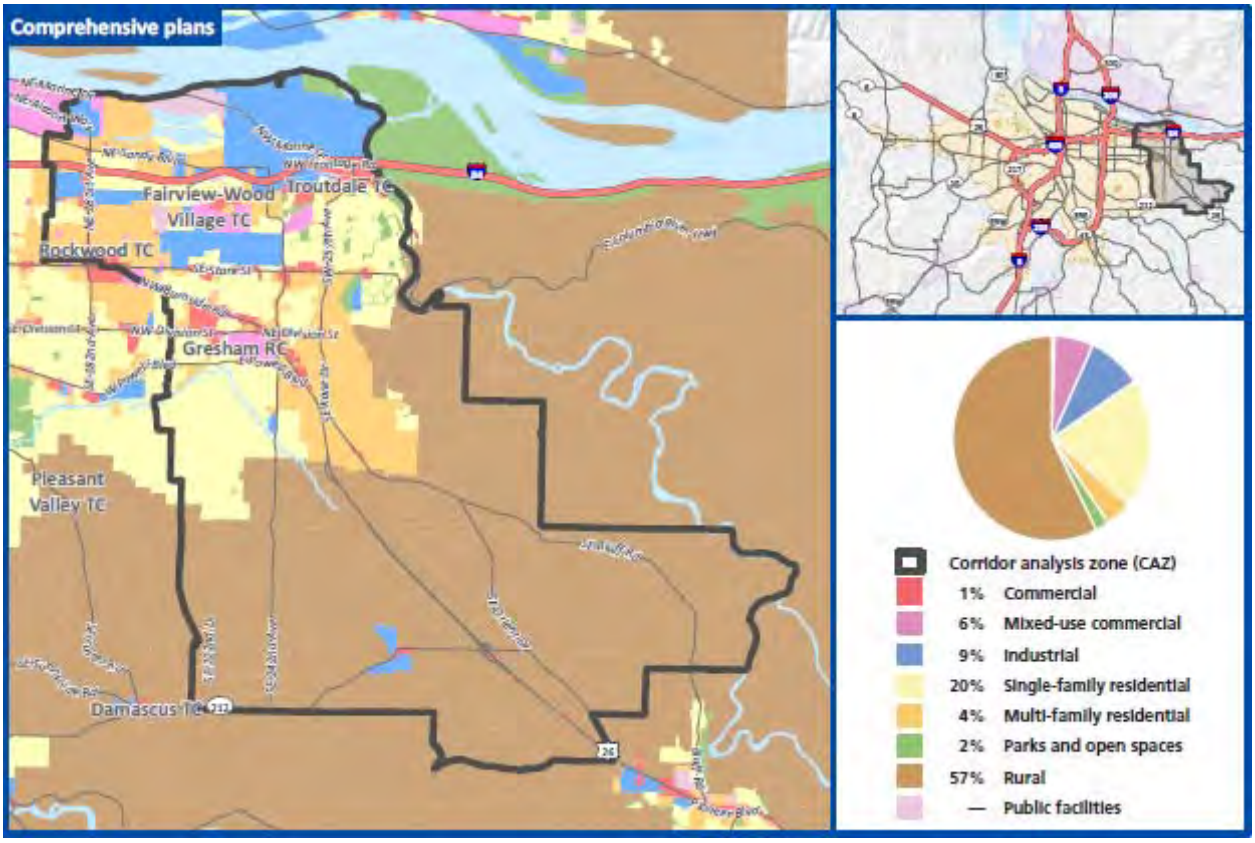
	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • Address arterial connectivity and crossings. • I-205/OR 213 Interchange. • Project development for regional trails (Oregon City Loop and Newell Canyon).
Medium Term (5 – 10 years)	• Complete gaps in the arterial network. • Project development for regional infrastructure to serve Park Place and Beavercreek Rd. concept plan UGB expansion areas.
Long-term (10 – 25 years)	• Construct regional trails and access in Newell Creek and Oregon City Loop

Unfunded Projects

- I-205/OR 213 Interchange – Grade separate at Washington St., $15,600,000
- OR 213 Redland Road interchange, $72,400,000
- OR 213 Beavercreek Road Interchange, $80,000,000
- Additional interchange improvements on OR 213 at Washington, Redland, and Beavercreek totaling $168,000,000.

Regional Actions	Local Actions
• I-205/OR 213 Interchange • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.

4.2.16 Mobility Corridor #15 – Troutdale/Wood Village/Fairview/Gresham to Damascus



Corridor function

What function(s) does the corridor serve?
2040 Access: Connects Gresham Regional Center and Springwater Industrial Area to I-84 and US 26 and provides regional access to Mount Hood Community College, Oxbow Park and Mount Hood.
Freight Mobility: Provides access from Springwater Industrial Area and surrounding agricultural areas to I-84 and US 26.
Statewide Travel: Serves as one of two gateways to the region from Central and Eastern Oregon.

Corridor characteristics

	2005	2035	2035 Regional Totals	% of Regional Total	% Change in Corridor	% Change in Region 2005- 2035
Population	109,387	183,180	3,097,402	5.9%	67.5%	57.9%
Households	40,416	70,323	1,208,686	5.8%	74.0%	57.6%
Employment	47,012	104,635	1,799,152	5.8%	122.6%	74.3%

Regional transportation facilities

HCT	Regional Trail	Regional Bridges	Throughways	Parallel Arterials	Heavy Rail
• Eastside MAX to Gresham	• Gresham/Fairview Trail • Springwater Corridor Trail • I-84 Trail (east of Gateway RC)	None	None	• 181st Ave. • 207th/223rd Ave. • 242nd/Hogan Rd. • 257th/Kane Rd.	• Kenton line • Graham line

Regional 2040 land uses

Regional Centers	Town Centers	Employment Areas	Industrial Areas	Other Key Destinations
• Gresham	• Fairview • Wood Village • Troutdale • Damascus		• Springwater Industrial Area • Columbia Cascade River District • Columbia South Shore	• Boring • Wood Village • Oxbow Park • Mt. Hood Recreational Area

Needs and Strategies

	Regional Needs	Corridor Strategies
Transit	• Improve HCT to serve the north/south movement of this mobility corridor. • Connect all 2040 Town Centers, Regional Centers, and the Central City with frequent transit service (consistent with RTP policy); • Address need for transit service to continue south of Gresham RC. • Add 30 minute of better transit service along 181st Ave south of Rockwood and 242nd Ave/Hogan Rd. • Connect all 2040 Regional Centers with high capacity transit (consistent with RTP policy); • Direct, safe, comfortable, bike and pedestrian connections to all transit stops; • Ensure transit connections betweenHCT stations and essential destinations located greater than one mile from stations.	• Incentivize high to medium density, mixed-use, pedestrian oriented development in the Central City, Regional Centers, Town Centers, Main Streets, and around HCT station areas. If sufficient demand exists, additional transit service will be added to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement service. • The HCT plan ranked Troutdale to Damascus as a "regional vision" corridor. • Analyze transit stops in relation to bicycle and pedestrian network

	Regional Needs	Corridor Strategies
	• Provide bicycle parking and options for bike sharing at all HCT stations.	and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these facilities. Refer to TriMet's Pedestrian Network Analysis project for recommended places to focus attention and for replicable analysis methodology. • Identify essential destinations greater than one mile from transit stops, estimate demand for local transit service that connects to HCT lines. If sufficient demand exists, add local transit investment to TriMet's 5-year Transit Investment Plan (TIP). When finances permit, TriMet will implement. Also consider developing private shuttle services to serve this need. • Refer to the RTP Regional Transit Network map for regional bike-transit facility locations where demand is expected to be sufficient to warrant a major bike parking facility. Bikeway connections to these stations should be prioritized. For all other stations, refer to TriMet's bike parking design guidelines. When finances permit, TriMet will implement. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Bike and Pedestrian	• Direct, continuous and comfortablebicycle and pedestrian pathways between essential destinations, transit stops, housing, jobs, and retail.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Identify where essential destinations are in relation to transit stops, housing, jobs, and retail and prioritize pedestrian pathways between these areas.

	Regional Needs	Corridor Strategies
Regional Trails	• Direct connections between trails and on-street bicycle and pedestrian facilities. • Address gaps in the Gresham-Fairview Trail north of Halsey and south of Burnside. • Address several gaps in trails serving east/west travel in this corridor: o The proposed Sullivan's Gulch trail would complete the gap from 122nd Ave. to Gateway RC along I-84. o The existing Marine Drive trail includes multiple gaps between I-205 and Troutdale, including the 40-Mile Loop. o The Columbia Slough trail includes gaps within its proposed extent of I-205 to Fairview Lake. o The Max Path includes gaps within its proposed extent of Ruby Junction to Cleveland Station	• Analyze regional trail access points in relation to on-street bicycle and pedestrian network and build direct, safe, comfortable bicycle and pedestrian facilities in areas that do not have these connections. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Throughways[28]	• There is no designated throughway for this mobility corridor.	• State RTP project 10383 will implement recommendations of refinement planning for this corridor. • Unfunded right-of-way preservation and construction of improvements, including a new I-84 interchange as determined by refinement planning, have been identified. Total: $75,000,000. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
Arterials[29]	Arterial Deficiencies The following do not meet the performance threshold in Table 2.4 2035 NB PM 2-hour peakvolumes exceed capacity on: • 223rd Ave between Glisan St. and Stark St. • 242nd Dr. • 257th Ave at I-84 and south of Division St. • Powell Blvd. from 242nd Ave to Kane Dr.	• Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan.
At-Grade Heavy Rail		• Implement Regional Transportation Functional Plan and Urban Growth
Regional		

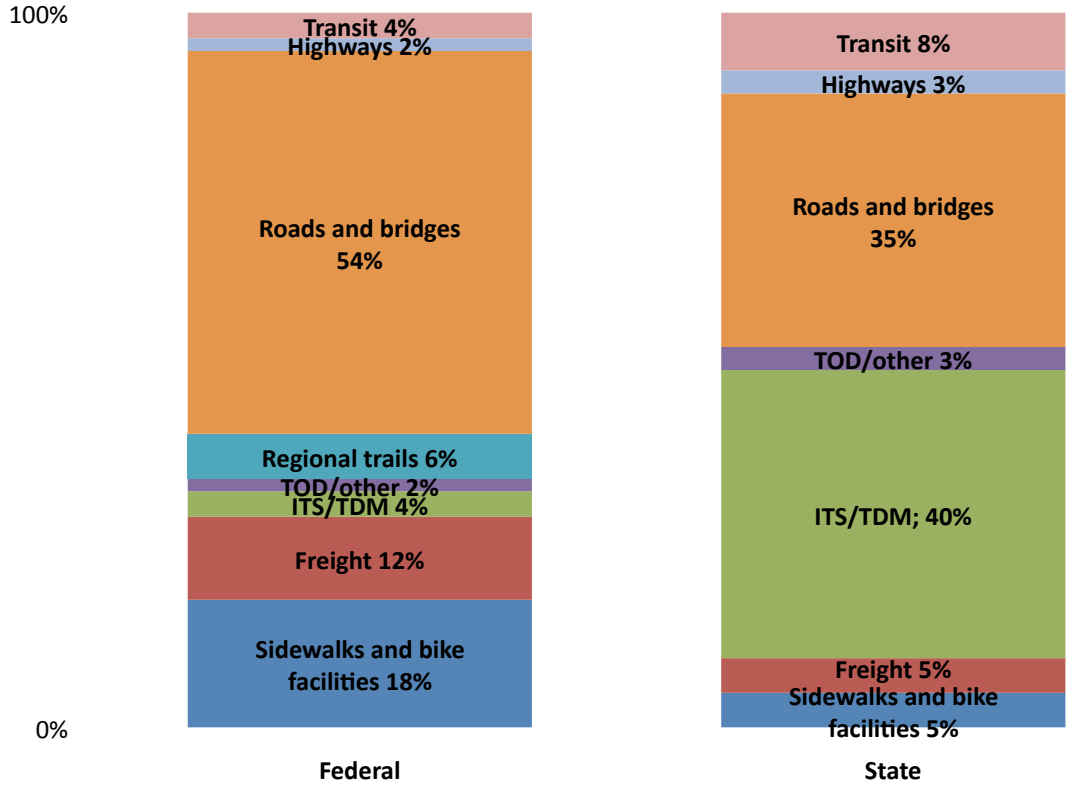
[28] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)
[29] Do not meet performance thresholds defined in RTP Table 2.4 (Interim Regional Mobility Policy)

	Regional Needs	Corridor Strategies
Bridges		Management Functional Plan.
Safety		
Regional Freight		

2035 RTP Investments

What are the strategies identified in the federal and state RTP?
Investment Summary: In the Federal RTP, this corridor has 112 projects totaling more than $1billion. Roads and bridges projects account for 54% of all of federal projects and 68% ($742million)of the total corridor project costs. The State RTP adds 62 more projects and an additional $364 million in costs. ITS/TDM projects account for the largest percentage of additional investments (40%) at a cost of $37 million. For both the Federal and State systems investments total roughly $1.4 billion.

Projects by mode for federal and state systems



RTP projects by cost and mode

Mode	Federal System Cost by Mode	% of MC #15 Total Project Cost	State System Cost by Mode	% of MC #15 Total Project Cost
Sidewalks and bike facilities	$159,552,483	15%	$17,878,151	5%
Freight	$94,521,155	9%	$22,260,850	6%
ITS/TDM	$10,950,000	1%	$37,633,510	10%
TOD/other	$7,511,000	1%	$11,000,000	3%
Regional trails	$22,806,078	2%	$0	0%
Roads and bridges	$742,914,393	68%	$188,174,411	52%
Highways	$31,500,000	3%	$41,000,000	11%
Transit	$18,704,873	2%	$46,919,615	13%
TOTAL	**$1,088,459,982**	**100%**	**$364,866,537**	**100%**

2035 investment strategy

	Strategy
Near-Term (1 – 4 years)	• System and demand management along mobility corridor and parallel facilities for all modes of travel. • US 26/Springwater interchange improvements and IAMP. • Complete corridor refinement plan to provide connection(s) from I-84 to US 26. • Complete gaps and make crossing improvements in the Gresham/Fairview Trail.
Medium Term (5 – 10 years)	• Implement the results of the corridor refinement plan.
Long-term (10 – 25 years)	• Implement the results of the corridor refinement plan.

Unfunded Projects

- I-84/US 26 ROW preservation, $20,700,000
- I-84/US 26 refinement plan, $1,400,000
- Hogan Corridor Improvements to I-84 interchange, $43,400,000
- Construct I-84/US 26 corridor improvements, $11,200,000

Regional Actions	Local Actions
• Conduct corridor refinement plan. • Update Atlas of mobility corridors. • Continue developing a data collection and performance monitoring system. • Work on furthering the Active Transportation Concept.	• Initiate actions related to the HCT System Expansion Policy. • Address connectivity needs in local TSPs. • Incorporate strategies from the Regional TSMO plan into local TSPs. • Implement Regional Transportation Functional Plan and Urban Growth Management Functional Plan. • Provide Metro with TSMO, bike and pedestrian inventory data when updated through TSP update.