TRANSPORTATION SYSTEM PLAN

VOLUME 2. APPENDICES

CITY OF BEND

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Appendix A - Methodology Memorandum

Methods and Assumptions Memo

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DATE: May 8, 2018

This memorandum documents the methodology and key assumptions to be used in generating the existing and future conditions analysis for the Bend Metropolitan Planning Organization (MPO) Metropolitan Transportation Plan (MTP) and the City of Bend Transportation System Plan (TSP). The methodologies included in this memorandum will be used to analyze the Bend area multi-modal transportation system. This memorandum summarizes the study intersections and describes the proposed methodology for volume development, traffic analysis, safety analysis, and multi-modal analysis.

Study Area

The study area for the Bend MTP/TSP Update includes the entire Bend MPO region, as shown in the Google map (https://drive.google.com/open?id=17qvfzWj5myF0XwkqSIIg7o68XJ9ZmPdz&usp=sharing). This area includes everything inside the Bend Urban Growth Boundary (adopted 2016). In addition, the Bend MPO encompasses the community of Tumalo, located along US 20 north of the City of Bend, Woodside Ranch and Deschutes River Woods, rural subdivisions located south of Bend.

Study Intersections

The following study intersections will be included, as summarized in Table 1 and the study area Google map (see previous link) in the analysis as sensors of forecasted traffic conditions around the City.

Table 1: Study Intersections and Traffic Count Information

No.	Location	Count Date	Type	Duration
1	US 20 & O.B. Riley/Cook Ave	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
2	US 20 & Old Bend-Redmond Hwy	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
3	US 20 & Cooley Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
4	US 20 & Robal Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
5	NE 18th St & Empire Blvd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
6	O.B Riley Rd & Archie Briggs Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
7	Deschutes Market Rd & Butler Market Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
8	NE 27th St & Butler Market Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)

9	NE 27th St & Well Acres Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
10	Boyd Acres Rd & Butler Market Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
11	Mt Washington Dr & Shevlin Park Rd	10/10/2017	TMC	2-Hr Weekday (4-6 PM)
12	NE 27th St & Neff Rd	8/18/2016	TMC	2-Hr Weekday (4-6 PM)
13	US 20 (NE 3rd St) & Olney Ave	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
14	NW 14th St & Newport Ave	10/10/2017	TMC	2-Hr Weekday (4-6 PM)
15	NE 8th Ave & US 20 (Greenwood Ave)	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
16	US 20 (NE 3rd St) & Greenwood Ave	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
17	Wall St & Franklin Ave	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
18	Bond St & Franklin Ave	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
19	SE 15th St & US 20 (Greenwood Ave)	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
20	Hamby Rd & US 20	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
21	NE 3rd St & Franklin Ave	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
22	SE 27th Ave & US 20 (Greenwood Ave)	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
23	Purcell Blvd & US 20 (Greenwood Ave)	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
24	NW 14th St & Galveston Ave	10/10/2017	TMC	2-Hr Weekday (4-6 PM)
25	Mt Washington Dr & Skyliners Rd	10/12/2017	TMC	2-Hr Weekday (4-6 PM)
26	Wall St & Colorado Ave	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
27	Bond St & Arizona Ave	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
28	Colorado Ave & Simpson Ave	11/16/2017	TMC	4-Hr Weekday (2-6 PM)
29	SW 14th St & Simpson Ave	11/15/2016	TMC	4-Hr Weekday (2-6 PM)
30	Mt Washington Dr & Simpson Ave	11/15/2016	TMC	4-Hr Weekday (2-6 PM)
31	NE 3rd St & Wilson Ave	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
32	Century Dr & Colorado Ave	11/17/2017	TMC	4-Hr Weekday (2-6 PM)
33	Century Dr & Reed Market Rd	11/17/2017	TMC	4-Hr Weekday (2-6 PM)
34	SE 27th St & Reed Market Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
35	SE 15th St & Reed Market Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
36	SE 9th St & Reed Market Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
37	Parrell Rd & Brosterhous Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
38	SE 27th St & Ferguson Rd	4/18/2018	TMC	2-Hr Weekday (4-6 PM)
39	SE 15th St & Knott Rd	6/6/2017	TMC	2-Hr Weekday (4-6 PM)
40	China Hat Rd & Knott Rd	4/19/2018	TMC	2-Hr Weekday (4-6 PM)
Study Intersections Also Included in the ODOT Bend US 97 Parkway Study				
101	US 97 & Cooley Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
102	US 97 & Robal Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
103	US 20 & Empire Blvd	4/11/17	TMC	2-Hr Weekday (4-6 PM)

104	US 97 SB On-ramp & Empire Blvd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
105	US 97 NB Ramps & Empire Blvd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
106	Boyd Acres Rd at Empire Blvd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
107	US 20 (NE 3rd St) & O.B. Riley Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
108	US 20 (NE 3rd St) & Butler Market Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
109	US 97 SB Off-ramp & Butler Market Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
110	US 97 NB Ramps & Butler Market Rd	4/11/17	TMC	2-Hr Weekday (4-6 PM)
111	US 20 (NE 3rd St) & Division St	4/11/17	TMC	2-Hr Weekday (4-6 PM)
112	Wall St & Revere Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
113	Division St & Revere Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
114	US 20 (NE 3rd St) & Revere Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
115	Wall St & Portland Ave	TBD[a]	TMC	2-Hr Weekday (4-6 PM)
116	US 97 & Layfayette Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
117	Wall St & Greenwood Ave	TBD[a]	TMC	2-Hr Weekday (4-6 PM)
118	US 97 & Hawthorne Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
119	US 97 SB Ramps & Colorado Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
120	US 97 NB Ramps & Colorado Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
121	US 97 & Truman Ave	4/12/17	TMC	2-Hr Weekday (4-6 PM)
122	Brookswood Blvd & Reed Market Rd	4/12/17	TMC	2-Hr Weekday (4-6 PM)
123	US 97 SB Ramps & Reed Market Rd	4/12/17	TMC	2-Hr Weekday (4-6 PM)
124	US 97 NB Ramps & Reed Market Rd	4/12/17	TMC	2-Hr Weekday (4-6 PM)
125	Division St & Reed Market Rd	4/12/17	TMC	2-Hr Weekday (4-6 PM)
126	SE 3rd St & Reed Market Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
127	US 97 & Reed Ln	4/13/17	TMC	2-Hr Weekday (4-6 PM)
128	Brookswood Blvd & Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
129	US 97 SB Ramps & Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
130	US 97 & Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
131	US 97 NB Ramps & Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
132	SE 3rd St & Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
133	Parrell Rd at Powers Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
134	US 97 & Badger Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
135	SE 3rd St & Badger Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
136	US 97 & Pinebrook Blvd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
137	SE 3rd St & Pinebrook Blvd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
138	Brookswood Blvd at Murphy Rd	TBD[a]	TMC	2-Hr Weekday (4-6 PM)
139	SE 3rd St & Murphy Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)

140	US 97 & Ponderosa St	4/13/17	TMC	2-Hr Weekday (4-6 PM)
141	Parrell Rd at China Hat Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
142	US 97 SB Ramps & Baker Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)
143	US 97 NB Ramps & China Hat Rd	4/13/17	TMC	2-Hr Weekday (4-6 PM)

TMC = Turn Movement Count

[a]Count to be collected in Phase II of the US 97 Parkway Study

Volume Development

All locations that do not have recent counts (2016 or later) were counted on April 18th or 19th of 2018. The new counts were collected over the 2-hour interval from 4PM to 6PM, as indicated in Table 1.

Base Year Volumes

Study intersection traffic operations will be analyzed using estimated 30th highest hour traffic volume (30 HV) conditions[1] and the Average Weekday PM Peak Hour volumes for ODOT facilities, and the Average Weekday (AWD) PM Peak Hour volumes for City and County facilities. AWD volumes represent typical commuter conditions but does not account for the seasonal fluctuation of traffic in Bend. The 30 HV and AWD PM Peak Hour volume development process for existing conditions includes determination of the system peak, seasonal adjustments, and factoring older counts to year 2018 conditions using historical count data. The exception will be the ODOT Bend US 97 Parkway study intersections. These intersections will use the study count year (2017) and processed 30 HV and Average Weekday volumes developed as part of the ODOT Bend US 97 Parkway Study.

Peak Hour Selection

Count data collected as part of this project will be combined with count data from previous studies within the project study area. Given the size of the study area and differing travel patterns within the region, multiple sub-system peak hour factors may be selected. All project study intersections captured within the ODOT Bend US 97 Parkway Study will use the system peak hours identified in that study. Use of system peak hours for other study intersections will be determined on a case by case basis after reviewing the data, accounting for factors such as proximity to other study intersections. All peak hours selected will be between 2 p.m. and 6 p.m. where available (mainly on the west side) and 4 p.m. and 6 p.m. at all other locations. This project will not include AM peak hour analysis.

Seasonal Adjustment Factors

The traffic count data collected in Bend in April represents a seasonal period where traffic volumes are lower than 30HV, but close to average weekday conditions. Adjustments are required to reach the desired 30HV conditions using the methodology from the ODOT Analysis Procedures Manual. All ODOT Bend US 97 Parkway Study intersections have already been seasonally factored. All remaining ODOT intersections are seasonally factored to the 30HV and the Average Weekday, while the City of Bend intersections will be factored to the Average Weekday only. A seasonal factor is a number used to factor a count up or down to reflect a typical condition (30HV or Average Weekday). A seasonal factor greater than 1.0 indicates the count was collected during a time of year with lower volumes than the targeted analysis condition, while factor less than 1.0 indicates a count from a higher volume than typical time of year. The seasonal factors are estimated for each remaining intersection based on roadway characteristics using one of the two methods listed below. The 30HV seasonal factors range

[1] Per the ODOT Analysis and Procedures Manual, Chapter 5

between 1.06 and 1.43, and the Average Weekday factors range from 1.14 to 0.90. Note that the upper range (1.43) of the seasonal factors applied indicates heavy seasonal peaking, with count volumes 43% lower than the 30HV volume. This high factor is caused by the seasonal aspect of travel around Bend, mostly related to tourism and recreational activities.

On-Site ATR Method

Of all the intersections analyzed, only one (US 20 and O.B. Riley/Cook Ave) meets the requirements for the On-Site ATR Method[2]. The seasonal factor for this intersection was determined using ATR #09-015, which is located approximately 0.5 miles northwest of Innes Market Road.

The City of Bend maintains automatic traffic recorders at several locations throughout the City. The counter on the Colorado Avenue Bridge provides the most complete data sample, with data for each day over the last year. This location gives a good indicator of the seasonal trends at City of Bend intersections on the west side of Bend, and was applied at most locations west of the Bend US 97 Parkway.

Seasonal Trend Table

The Seasonal Trend Table was used for all other ODOT intersections not included in the ODOT Bend US 97 Parkway Study. Due to the high recreational usage on Hwy 20, as reflected in the data from ATR #09-015, combined with some commuter traffic between Bend and Redmond, the Summer Recreational trend was averaged with the Commuter trend for intersections on Hwy 20 north of Empire Boulevard. All other Hwy 20 intersections (on NE 3rd Avenue and Greenwood) are in heavy commuter areas, and therefore use the Commuter trend.

City of Bend intersections not using the Colorado Avenue Bridge ATR are mostly east of the Bend Parkway and are all assumed to follow the Commuter seasonal trend.

Table 2 details the methods and factors used for each location. Note that for the ODOT intersections on Hwy 20 north of Empire Boulevard, the On-Site ATR Method or the averaged Summer Recreational and Commuter trends were only applied to the Hwy 20 through movements, and the Commuter trend was applied to the other movements, as the minor streets at these locations do not have much heavier seasonal Summer Recreational type characteristics.

Table 2: Non-Parkway Study Intersection Seasonal Factors

No.	Location	Jurisdiction	Seasonal Factors	Major Street Method	Minor Street Method
1	US 20 & O.B. Riley/Cook Ave	ODOT	30HV & Avg. Wkdy	A	C
2	US 20 & Old Bend-Redmond Hwy	ODOT	30HV & Avg. Wkdy	B	C
3	US 20 & Cooley Rd	ODOT	30HV & Avg. Wkdy	B	C
4	US 20 & Robal Rd	ODOT	30HV & Avg. Wkdy	B	C
5	NE 18th St & Empire Blvd	City of Bend	Average Weekday	C	C
6	O.B Riley Rd & Archie Briggs Rd	City of Bend	Average Weekday	C	C
7	Deschutes Market Rd & Butler Market Rd	City of Bend	Average Weekday	C	C
8	NE 27th St & Butler Market Rd	City of Bend	Average Weekday	C	C
9	NE 27th St & Well Acres Rd	City of Bend	Average Weekday	C	C

[2] ODOT Analysis and Procedures Manual, Chapter 5

10	Boyd Acres Rd & Butler Market Rd	City of Bend	Average Weekday	C	C
11	Mt Washington Dr & Shevlin Park Rd	City of Bend	Average Weekday	D	D
12	NE 27th St & Neff Rd	City of Bend	Average Weekday	C	C
13	US 20 (NE 3rd St) & Olney Ave	ODOT	30HV & Avg. Wkdy	C	C
14	NW 14th St & Newport Ave	City of Bend	Average Weekday	D	D
15	NE 8th Ave & US 20 (Greenwood Ave)	ODOT	30HV & Avg. Wkdy	C	C
16	US 20 (NE 3rd St) & Greenwood Ave	ODOT	30HV & Avg. Wkdy	C	C
17	Wall St & Franklin Ave	City of Bend	Average Weekday	D	D
18	Bond St & Franklin Ave	City of Bend	Average Weekday	D	D
19	SE 15th St & US 20 (Greenwood Ave)	ODOT	30HV & Avg. Wkdy	C	C
20	Hamby Rd & US 20	ODOT	30HV & Avg. Wkdy	C	C
21	NE 3rd St & Franklin Ave	ODOT	30HV & Avg. Wkdy	C	C
22	SE 27th Ave & US 20 (Greenwood Ave)	ODOT	30HV & Avg. Wkdy	C	C
23	Purcell Blvd & US 20 (Greenwood Ave)	ODOT	30HV & Avg. Wkdy	C	C
24	NW 14th St & Galveston Ave	City of Bend	Average Weekday	D	D
25	Mt Washington Dr & Skyliners Rd	City of Bend	Average Weekday	D	D
26	Wall St & Colorado Ave	City of Bend	Average Weekday	D	D
27	Bond St & Arizona Ave	City of Bend	Average Weekday	D	D
28	Colorado Ave & Simpson Ave	City of Bend	Average Weekday	D	D
29	SW 14th St & Simpson Ave	City of Bend	Average Weekday	D	D
30	Mt Washington Dr & Simpson Ave	City of Bend	Average Weekday	D	D
31	NE 3rd St & Wilson Ave	City of Bend	Average Weekday	D	D
32	Century Dr & Colorado Ave	City of Bend	Average Weekday	D	D
33	Century Dr & Reed Market Rd	City of Bend	Average Weekday	D	D
34	SE 27th St & Reed Market Rd	City of Bend	Average Weekday	C	C
35	SE 15th St & Reed Market Rd	City of Bend	Average Weekday	C	C
36	SE 9th St & Reed Market Rd	City of Bend	Average Weekday	C	C
37	Parrell Rd & Brosterhous Rd	City of Bend	Average Weekday	C	C
38	SE 27th St & Ferguson Rd	City of Bend	Average Weekday	C	C
39	SE 15th St & Knott Rd	City of Bend	Average Weekday	C	C
40	China Hat Rd & Knott Rd	City of Bend	Average Weekday	C	C

Method A = On-Site ATR Method using ATR #09-015

Method B = Average of Recreational Summer and Commuter Trends

Method C = Commuter Trend

Method D = Use the Colorado Avenue Bridge City of Bend ATR

Historical Growth Adjustment

All historical counts used for analysis will be from within the last two years, to be most consistent with existing conditions and counts. A review of counts from 2017 and 2016 combined with review of City of Bend ATR data indicated no need for volume growth adjustments. Note that all intersections counted and seasonally factored as part of the ODOT Bend US 97 Parkway Study will not be adjusted to the 2018 base year but will remain 2017 volumes for the existing conditions analysis for consistency between the parallel on-going planning studies.

2040 Future Year Volumes

The Bend Redmond Regional Travel Demand Model (BRM) tool (in EMME software platform) will be used as the basis to estimate year 2040 growth at all study intersections, using the calibrated base year (2010) model and applicable year 2040 scenario. Raw link level volumes from the BRM will be post-processed using methods consistent with the ODOT APM V2. This approach is derived from methodologies outlined in the National Cooperative Highway Research Program (NCHRP) Report 765 *Highway Traffic Data for Urbanized Area Project Planning and Design*.

Regional Analysis

A large portion of the project screening and evaluation will be performed at a regional level (e.g., system or link level vs. detailed intersection operations). This regional analysis will focus on high level measures performed using the BRM and other regional data tools such as HERS-ST.

VMT Analysis

The following sections describe the process for evaluating the VMT changes using the BRM . This follows the process developed with input from Department of Land Conservation and Development (DLCD) and ODOT staff as part of the Bend Urban Growth Boundary (UGB_ Expansion evaluation. This methodology is specific to the EMME software that ODOT's Transportation Planning Analysis Unit (TPAU) utilizes to assign trips as part of the BRM. The VMT analysis will include the area within the MPO boundary.

Evaluation Tool

The BRM developed by TPAU will be utilized for the evaluation. TPAU will complete full 4-step model runs for the base year, 2040 Committed, and all 2040 Financially Constrained scenarios. The trip assignment component of the model will be utilized to extract VMT information. Network changes representing project improvements will be provided by the project team to TPAU. Certain unique projects, like transportation demand management programs and City subsidized mobility hubs, will be coded through proxies such as parking pricing and short loop transit lines with short headways and no transit cost.

Model Scenarios

The average daily weekday demand scenarios[3] developed for base year (2010) and future year (2040) conditions will be utilized for this evaluation. The daily traffic volume is assigned to the roadway network utilizing a 16-hour link capacity, which approximates some congestion impacts in peak periods on the route choice for the trips.

VMT per Capita

The Transportation Planning Rule (TPR) definition[4] for VMT analysis specifies that only internal-internal, non-freight (i-i) trips (i.e., trips both starting and ending in the MPO or UGB) are

[3] These scenarios represent average weekday volumes – which are equivalent to typical spring or fall conditions, not summer peak conditions.

[4] OAR 660-012-0005 (41) and DLCD interpretation included in RE: Questions relating to the Bend Urban Growth Boundary *UGB) Vehicle Miles Traveled (VMT) Analysis, Letter from DLCD, November 10, 2011.

included in the evaluation. These trips will be isolated and analyzed to generate the trip portion of the VMT calculation.

The trip portion of VMT will be generated from the travel demand model using a select link analysis of the i-i trips within either the MPO or the UGB, depending on the performance measure required. Intrazonal trip lengths will be estimated as 0.5 times the network distance to the nearest zone.

The VMT per capita measure will be calculated by simply dividing the MPO/UGB i-i VMT by the scenario year (2010 or 2040) MPO/UGB population.

Demand to Capacity Ratios

Demand to capacity ratios represents the pm peak hour demand forecast relative to the modeled roadway capacity. Demand to capacity will be reported as an aggregated system measure for the entire MPO area and will also be reported on specific corridors to determine the relative congestion on links in the BRM. The demand to capacity ratios will be reported directly from BRM model results without additional post-processing adjustments.

Mode Split

Mode split will be reported as an aggregated measure for the entire MPO or UGB area. Mode split will include percent of single occupancy vehicle trips (SOV) compared to non-SOV trips generated over a typical day. The mode information will be reported from the BRM model.

Travel Time Analysis

Travel time analysis will be performed by the HERS-ST tool at locations where data is available. Corridor demand growth inputs to the HERS-ST tool will be obtained from the 2040 BRM model runs. Additional travel time analysis from the ODOT Bend US 97 Parkway Study will be included as well. Travel time analysis segments will be finalized during the Bend Parkway Study Phase 2 and pending availability of local data from ODOT.

Traffic Operations Analysis

This section discusses the different methods that will be used to measure traffic operations for existing and future year scenarios.

Link Level Analysis

The BRM will be used to identify locations where mobility targets are estimated to be exceeded based on segment capacity analysis. Travel model capacities will be compared to the assigned demand, and locations where the assigned demand is near or greater than the modeled link capacities will be flagged as likely deficiencies. This link level analysis will be included for all future year 2040 scenarios.

Intersection Operational Standards

All intersections under state jurisdiction must comply with the volume to capacity (v/c) ratio targets in the Oregon Highway Plan (OHP). The ODOT v/c targets are based on highway classification and posted speeds (see Table 3). All intersections under City jurisdiction much comply with the City of Bend Traffic Operations Performance Standards[5]. While approaches to some of the intersections fall under Deschutes County jurisdiction under present day conditions, the controlling standard is either ODOT if the intersection is at least partially owned by ODOT, or the intersection is expected to come within the UGB by year 2040, and therefore City of Bend

[5] City of Bend Development Code, 4.7.500 Transportation Impact Analysis, Section B.6, Revised December 2016

mobility standards would apply. None of the study intersections fall under Deschutes County jurisdiction. Table 3 give the study intersections jurisdiction, control type, and mobility standards.

Table 3. Study Intersection Mobility Targets

No.	Location	Control Type	Jurisdiction	Mobility Standard
1	US 20 & O.B. Riley/Cook Ave	Un-signalized	ODOT	v/c ≤ 0.70
2	US 20 & Old Bend-Redmond Hwy	Un-signalized	ODOT	v/c ≤ 0.70
3	US 20 & Cooley Rd	Un-signalized	ODOT	v/c ≤ 0.85
4	US 20 & Robal Rd	Signal	ODOT	v/c ≤ 0.85
5	NE 18th St & Empire Blvd	Roundabout	City of Bend	v/c ≤ 1.0
6	O.B Riley Rd & Archie Briggs Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
7	Deschutes Market Rd & Butler Market Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
8	NE 27th St & Butler Market Rd	Signal	City of Bend	v/c ≤ 1.0
9	NE 27th St & Well Acres Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
10	Boyd Acres Rd & Butler Market Rd	Signal	City of Bend	v/c ≤ 1.0
11	Mt Washington Dr & Shevlin Park Rd	Roundabout	City of Bend	v/c ≤ 1.0
12	NE 27th St & Neff Rd	Signal	City of Bend	v/c ≤ 1.0
13	US 20 (NE 3rd St) & Olney Ave	Signal	ODOT	v/c ≤ 0.85
14	NW 14th St & Newport Ave	Roundabout	City of Bend	v/c ≤ 1.0
15	NE 8th Ave & US 20 (Greenwood Ave)	Signal	ODOT	v/c ≤ 0.85
16	US 20 (NE 3rd St) & Greenwood Ave	Signal	ODOT	v/c ≤ 0.85
17	Wall St & Franklin Ave	Signal	City of Bend	v/c ≤ 1.0
18	Bond St & Franklin Ave	Signal	City of Bend	v/c ≤ 1.0
19	SE 15th St & US 20 (Greenwood Ave)	Signal	ODOT	v/c ≤ 0.85
20	Hamby Rd & US 20	Un-signalized	ODOT	v/c ≤ 0.70
21	NE 3rd St & Franklin Ave	Signal	ODOT	v/c ≤ 0.85
22	SE 27th Ave & US 20 (Greenwood Ave)	Signal	ODOT	v/c ≤ 0.85
23	Purcell Blvd & US 20 (Greenwood Ave)	Signal	ODOT	v/c ≤ 0.85
24	NW 14th St & Galveston Ave	Roundabout	City of Bend	v/c ≤ 1.0
25	Mt Washington Dr & Skyliners Rd	Roundabout	City of Bend	v/c ≤ 1.0
26	Wall St & Colorado Ave	Signal	City of Bend	v/c ≤ 1.0
27	Bond St & Arizona Ave	Signal	City of Bend	v/c ≤ 1.0
28	Colorado Ave & Simpson Ave	Roundabout	City of Bend	v/c ≤ 1.0
29	SW 14th St & Simpson Ave	Roundabout	City of Bend	v/c ≤ 1.0
30	Mt Washington Dr & Simpson Ave	Roundabout	City of Bend	v/c ≤ 1.0

31	NE 3rd St & Wilson Ave	Signal	City of Bend	v/c ≤ 1.0
32	Century Dr & Colorado Ave	Roundabout	City of Bend	v/c ≤ 1.0
33	Century Dr & Reed Market Rd	Roundabout	City of Bend	v/c ≤ 1.0
34	SE 27th St & Reed Market Rd	Signal	City of Bend	v/c ≤ 1.0
35	SE 15th St & Reed Market Rd	Roundabout	City of Bend	v/c ≤ 1.0
36	SE 9th St & Reed Market Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
37	Parrell Rd & Brosterhous Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
38	SE 27th St & Ferguson Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
39	SE 15th St & Knott Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
40	China Hat Rd & Knott Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
MTP Study Intersections from the Bend Parkway Study				
101	US 97 & Cooley Rd	Signal	ODOT	v/c ≤ 0.85
102	US 97 & Robal Rd	Signal	ODOT	v/c ≤ 0.85
103	US 20 & Empire Blvd	Signal	ODOT	v/c ≤ 0.85
104	US 97 SB On-ramp & Empire Blvd	Un-signalized	ODOT	v/c ≤ 0.85
105	US 97 NB Ramps & Empire Blvd	Signal	ODOT	v/c ≤ 0.85
106	Boyd Acres Rd at Empire Blvd	Signal	City of Bend	v/c ≤ 1.0
107	US 20 (NE 3rd St) & O.B. Riley Rd	Signal	ODOT	v/c ≤ 0.85
108	US 20 (NE 3rd St) & Butler Market Rd	Signal	ODOT	v/c ≤ 0.85
109	US 97 SB Off-ramp & Butler Market Rd	Un-signalized	ODOT	v/c ≤ 0.85
110	US 97 NB Ramps & Butler Market Rd	Un-signalized	ODOT	v/c ≤ 0.85
111	US 20 (NE 3rd St) & Division St	Signal	ODOT	v/c ≤ 0.85
112	Wall St & Revere Ave	Signal	ODOT	v/c ≤ 0.85
113	Division St & Revere Ave	Signal	ODOT	v/c ≤ 0.85
114	US 20 (NE 3rd St) & Revere Ave	Signal	ODOT	v/c ≤ 0.85
115	Wall St & Portland Ave	Signal	City of Bend	v/c ≤ 1.0
116	US 97 & Layfayette Ave	Un-signalized	ODOT	v/c ≤ 0.85
117	Wall St & Greenwood Ave	Signal	City of Bend	v/c ≤ 1.0
118	US 97 & Hawthorne Ave	Un-signalized	ODOT	v/c ≤ 0.85
119	US 97 SB Ramps & Colorado Ave	Signal	ODOT	v/c ≤ 0.85
120	US 97 NB Ramps & Colorado Ave	Un-signalized	ODOT	v/c ≤ 0.85
121	US 97 & Truman Ave	Un-signalized	ODOT	v/c ≤ 0.85
122	Brookswood Blvd & Reed Market Rd	Roundabout	City of Bend	v/c ≤ 1.0

123	US 97 SB Ramps & Reed Market Rd	Signal	ODOT	v/c ≤ 0.85
124	US 97 NB Ramps & Reed Market Rd	Un-signalized	ODOT	v/c ≤ 0.85
125	Division St & Reed Market Rd	Un-signalized	City of Bend	v/c ≤ 1.0
126	SE 3rd St & Reed Market Rd	Signal	City of Bend	v/c ≤ 1.0
127	US 97 & Reed Ln	Un-signalized	ODOT	v/c ≤ 0.85
128	Brookswood Blvd & Powers Rd	Roundabout	City of Bend	v/c ≤ 1.0
129	US 97 SB Ramps & Powers Rd	Un-signalized	ODOT	v/c ≤ 0.85
130	US 97 & Powers Rd	Signal	ODOT	v/c ≤ 0.85
131	US 97 NB Ramps & Powers Rd	Un-signalized	ODOT	v/c ≤ 0.85
132	SE 3rd St & Powers Rd	Signal	City of Bend	v/c ≤ 1.0
133	Parrell Rd at Powers Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
134	US 97 & Badger Rd	Un-signalized	ODOT	v/c ≤ 0.85
135	SE 3rd St & Badger Rd	Signal	City of Bend	v/c ≤ 1.0
136	US 97 & Pinebrook Blvd	Un-signalized	ODOT	v/c ≤ 0.85
137	SE 3rd St & Pinebrook Blvd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
138	Brookswood Blvd at Murphy Rd	Roundabout	City of Bend	v/c ≤ 1.0
139	SE 3rd St & Murphy Rd	Roundabout	City of Bend	v/c ≤ 1.0
140	US 97 & Ponderosa St	Un-signalized	ODOT	v/c ≤ 0.85
141	Parrell Rd at China Hat Rd	Un-signalized	City of Bend	Critical Lane Group (100+ veh) Delay ≤ 50 s
142	US 97 SB Ramps & Baker Rd	Un-signalized	ODOT	v/c ≤ 0.70
143	US 97 NB Ramps & Knott Rd	Un-signalized	ODOT	v/c ≤ 070

Analysis Parameters

Parameters for traffic operations analysis will be gathered using varying sources and methodologies. Data needed will be gathered via field work, collected traffic volume data, aerial photos, GIS, City and ODOT inventories, and collision reports. Table 4 lists some of the sources that will be used on specific parameters.

Table 4: Analysis Parameters

Parameter	Description	Source
Intersection/ Roadway Geometry	# of lanes, lane configuration, cross-sectional information	Field work, Highway inventory report, Digital video log, aerial photos, ODOT TransGIS
Operational Data	Posted speeds, intersection control	Field work, Digital video log, aerial photos
Peak Hour Factor	Peak Hour Factor	Calculated
Traffic Volumes	AADT, 30 HV, DHV	ODOT Transportation Volume Table; Calculated from new counts

Signal Timing Data	Phasing, coordination, clearance timing	ODOT Region 4
Traffic Operations	v/c, LOS	Calculated using 2000 HCM[6] methodology for signalized intersections, and HCM 6[7] methodology for un-signalized intersections (TWSC, AWSC, and roundabouts)
Collision Data	Intersection collisions, roadway segment collisions, SPIS	ODOT Crash Data System, ODOT TransGIS, ODOT Crash Rate Table, ODOT Crash Rate Book

Roundabout analysis will be analyzed using HCM 6th Edition methodology, applied with the Synchro Version 10 and Sidra software. Roundabout capacity parameters will be calibrated based on the City of Bend Roundabout Evaluation and Design Guidelines for single-lane roundabouts. Volume to capacity ratios will be reported for the worst-case approach at ODOT intersections and for the overall intersection at City intersections when determining whether an intersection meets mobility targets.

Analysis Scenarios

The operations analysis will use the peak hour volumes (balanced where appropriate) to evaluate existing motor vehicle operations at study intersections. All study intersections will be analyzed for existing conditions and the final future year 2040 forecast scenario.

Existing Conditions (2017/2018)

Existing conditions analysis will be performed using the 30HV balanced traffic volumes for all ODOT study intersections, and Average Weekday volumes for all other study intersections. All signalized intersections will be analyzed using the most recent signal timing information. Operations results at intersections not included in the ODOT Bend US 97 Parkway Study will be calibrated based on field observations collected on April 18-19. Existing traffic operations at intersections included in the ODOT Bend US 97 Parkway Study will reflect the calibration adjustments and results presented in that study.

Midterm Conditions

A midterm scenario will be run in the BRM to assist with prioritizing projects. The midterm scenario will use land use from the 2028 UGB analysis to represent a midterm year between existing and future 2040 conditions. This scenario will use demand-to-capacity ratios from the BRM and analyze select intersection operations results to help prioritize projects.

Future Conditions (2040)

The future conditions analysis will use 30HV post-processed forecasted turn movement volumes for ODOT study intersections, and Average Weekday volumes for all other study intersections. Cycle lengths at signalized intersections will not be changed, but phase splits will be optimized. Roadway changes pertaining to either currently funded projects or tested as part of the proposed financially constrained project list will be coded into the Synchro model based on the preliminary design information available.

Crash Analysis

The project team will obtain the most recent five years of crash data available from ODOT's Crash Analysis & Reporting Unit for the project area. The project team will assemble an

[6] 2000 Highway Capacity Manual, Transportation Research Board, Washington DC, 2000

[7] Highway Capacity Manual 6th Edition, Transportation Research Board, Washington DC, 2016

inventory and identify crash patterns (e.g. alcohol-involved, weather, surface, light conditions, etc.) in the history of collisions on the transportation system among all users (e.g. vehicles, pedestrians, bicyclists).

The data for state highways will include locations of Safety Priority Index System ("SPIS") sites.

Multi-modal Assessment

The project team will map bicycle Level of Traffic Stress (LTS) output generated from other studies within the project limits to assess regional bicycle system needs. The project team will also collect and update pedestrian facility data throughout the City. The pedestrian and bike facility data will be mapped to identify key gaps and deficiencies throughout the network.

Neighborhood-Level Planning

The neighborhood-level planning portion of this study will focus on local circulation, cut through and connectivity issues for up to five neighborhood areas in the City of Bend. This analysis may require additional study intersections and further operations analysis to help test local solutions at the neighborhood level.

Appendix B - Existing Conditions Analysis

Bend's Transportation Plan

Existing Conditions and Needs

July 25, 2018 (Draft)

Bend's Transportation Plan

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Summary

This report provides a description of existing transportation facilities and operations within the City of Bend and the Bend Metropolitan Planning Organization (MPO) area. The transportation facilities reviewed include roadway (motor vehicle travel), transit, walking, bicycling, and freight movement networks, along with intelligent transportation services and transportation demand management measures. Air, pipeline, and water transportation services are also discussed. This information will be used to provide a baseline for developing long-term actions.

The following aspects of Bend influence transportation:

- Rapid population growth has increased pressure on the transportation system;
- Tourism increases traffic volumes significantly, especially during the summer;
- Bend is a regional employment hub, with around half of employees from surrounding areas;
- There are major barriers to east-west connectivity for all modes of travel: Deschutes River, Burlington Northern Railroad, Highway 97, and the Parkway;
- Large areas are developed in a more rural pattern, generally lacking connectivity, walking and bicycling facilities, and mixed uses;
- Travel patterns can be affected by winter snow and ice and summer wildfires.

Key Findings for Roadways

- 70% of the arterials and collectors have 'Fair' to 'Very good' pavement condition;
- Out of a total of 26 bridges, 5 are 'Functionally Obsolete' and 2 are 'Very Poor' or 'Poor';
- Many arterials and collectors near the outskirts of the City are not built to urban standards;
- Of 67 study intersections have been analyzed, 25 do not meet current mobility targets;
- Although Bend has one of the lowest number of per capita annual crashes year compared to similar sized cities in Oregon, 18 high frequency crash locations were identified.

Key Findings for Transit

- Bend has a "hub and spoke" transit pattern which is less convenient for some trips;
- There is limited transit service in the outer sections of the City (except for Dial-a-Ride), a lack of transit service on Sundays, and limited inter-city and regional service;
- Majority of employment is within ¼ mile of transit service line, while only half of households are within a ¼ mile of transit service;
- Fewer than half of the arterials and collectors within ¼ mile of a transit stop have sidewalks on at least one side of the roadway (35%) and dedicated bicycle facilities (47%).

Key Findings for Walking Facilities

- Regional-level pedestrian corridor connectivity is limited by major barriers;
- 78% of arterials and collectors have sidewalks on one or both sides;
- Injury and fatal crashes involving pedestrians are clustered along higher-speed, higher-volume roadways, and multi-lane roadways lacking enhanced crossings.

Key Findings for Bicycling Facilities

- Regional-level bicycle corridor connectivity is limited by major barriers;
- Approximately 82% of arterials and collectors have dedicated bicycle facilities;
- Several major corridors in the "core area" are lacking dedicated bicycle facilities;
- Approximately 54% of arterials and collectors lack separation/buffers; and many high stress roadways serve key destinations;
- Crashes involving bicycles tend to be on multi-lane, high volume facilities without dedicated or protected bicycle facilities.

Key Findings for Freight Movement

- Off of the state highway system, few local routes are identified as freight routes;
- There are 10 at-grade rail crossings and 7 grade-separated rail crossings; at-grade rail crossings are a source of motor vehicle traffic delay in some locations;
- US 97 is a critical truck route in the Statewide Lifeline network;
- US 20 (3rd Street) queuing and signal delays impact freight movement;
- Travel Time Reliability issues impact freight movement on US 97 in the Cooley/Robal area.

Key Findings for Intelligent Transportation Services (ITS)

- There is a lack of access to real-time traffic conditions to improve incident response, emergency vehicle access, and travel time reliability;
- Traffic signal timing enhancements such as signal coordination, transit signal priority and signal transition during a railroad priority call are limited;
- Up-to-date ITS inventory is lacking.

Key Findings for Transportation Demand Management (TDM)

- TDM programs for the City are currently managed by Commute Options;
- The City has adopted code provisions that encourage implementing TDM measures;
- Juniper Ridge and COCC both have Transportation Demand Management programs.

Key Findings for Other Modes (Pipeline, Air, Marine Services)

- Major natural gas transmission lines are located along Bend's eastern boundary;
- The Bend Municipal Airport is located east of Bend in Deschutes County and provides service for private planes and airport-related businesses;
- Bend has no water-related transportation services.

Acronyms

ATR	Automated Traffic Recorders
BMPO	Bend Metropolitan Planning Organization
BNSF	Burlington Northern Santa Fe Railroad line
CCTV	closed circuit television
CET	Cascades East Transit
City	City of Bend
COCC	Central Oregon Community College
CTAC	Citywide Transportation Advisory Committee
CUFC	Critical Urban Fright Corridors
HCM	Highway Capacity Manual
ITS	Intelligent Transportation Systems
LOS	Level of Service
LTS	Bicycle Level of Traffic Stress
MTP	Bend MPO's Metropolitan Transportation Plan
ODOT	Oregon Department of Transportation
OSU	Oregon State University – Cascades Campus
PCI	pavement conditions index
s/veh	seconds per vehicle
SPIS	ODOT Safety Priority Index System
TDM	Transportation Demand Management
TSAP	Bend Transportation Safety Action Plan
TSP	Transportation System Plan
UGB	Urban Growth Boundary
v/c	Volume to capacity ratio

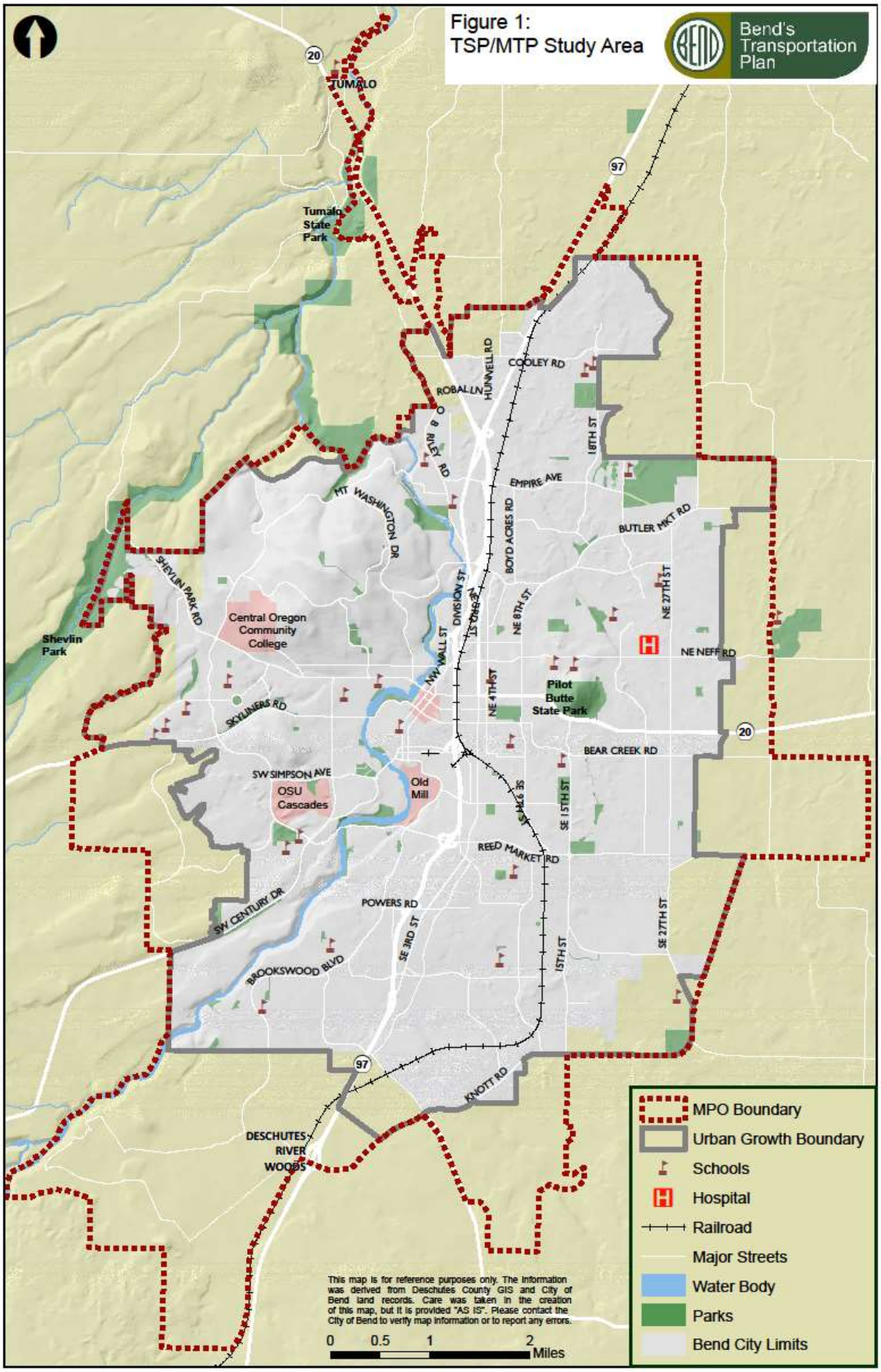
Introduction

This document summarizes existing transportation facilities and operations within the City of Bend (City) and the Bend Metropolitan Planning Organization (BMPO) area (Figure 1) as part of the updates to the City's Transportation System Plan (TSP) and the Bend MPO's Metropolitan Transportation Plan (MTP). The existing conditions needs assessment also includes input from the Citywide Transportation Advisory Committee (CTAC), the MPO Technical Advisory Committee, and the general public. The transportation facilities reviewed include street, transit, pedestrian, and bicycle networks along with freight, transportation demand management (TDM) measures, pipeline, air, and marine services. This information will be used to provide a baseline for developing long-term actions.

Field observations conducted in the spring of 2018, and inventories from the City of Bend, Deschutes County, and Oregon Department of Transportation (ODOT) were used to map existing transportation facilities to establish base year conditions.

As shown in Figure 1, the study area includes the City's Urban Growth Boundary (UGB) and the unincorporated communities of Tumalo, Deschutes River Woods, and Woodside Ranch. The Deschutes River flows through the study area. Some key destinations include Central Oregon Community College (COCC), the Oregon State University (OSU) Cascades campus, Mount Bachelor (located approximately 20 miles southwest of Bend), St. Charles Medical Center and the surrounding medical uses, downtown Bend, the Old Mill District, and the Bend Municipal Airport (located approximately 2 miles east of the Bend city limits).

Figure 1: Study Area



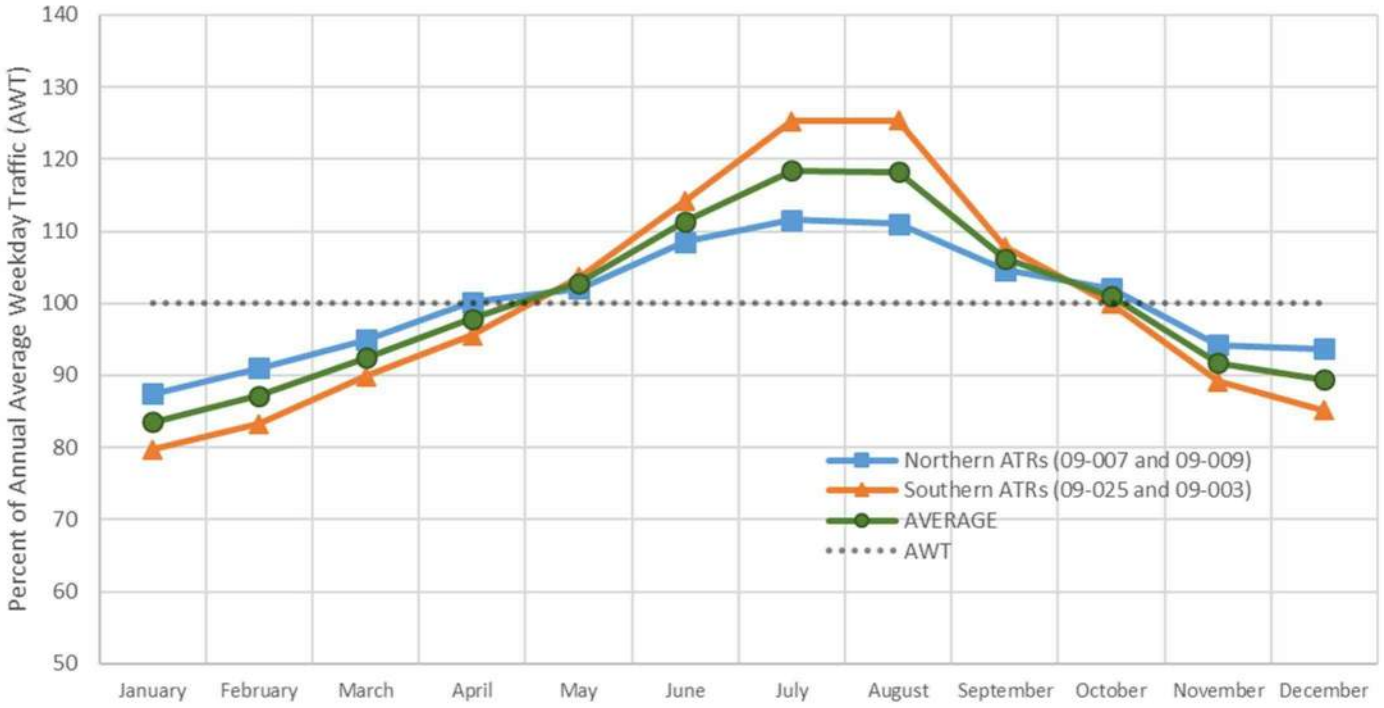
What Makes Bend Unique?

One of the first steps in planning for an effective transportation system is gaining an understanding of the current transportation network, geographic location, land use patterns, and unique characteristics of the study area (see Figure 2). The following are some key characteristics of Bend that affect transportation.

Tourism: The Bend area is a recreational/tourist hub during both the winter and summer months, generating over 5 million visitor days annually.[1] For example, Mount Bachelor (winter) and Sunriver (summer) are popular tourist destinations located southwest and south of the study area. During the summer, Bend's vibrant core area (generally bounded by Revere Avenue, Reed Market Road, 14th Street, and 3rd Street) attracts visitors. In addition, Bend has many second homes.

This regional recreation-based travel significantly increases traffic volumes throughout the study area, especially during the summer months. Data collected from ODOT Automatic Traffic Recorders (ATR) on US 97 within the City over the last five years indicates a 25% (north of Greenwood Avenue) to 45% (south of Greenwood Avenue) seasonal fluctuation in traffic volumes between summer (high) and winter (low), refer to Figure 2. Further information on Bend seasonal traffic volume trends is found the US 97 Parkway Plan.[2]

Figure 2. Corridor Volumes by Month



Barriers: US 97, the Burlington Northern Santa Fe (BNSF) Railroad line, and the Deschutes River generally extend north-south through the middle of the City, which creates barriers for east-west connectivity.

[1] Oregon Visitor-Trips and Visitor Days 2015 report – RRC Associates for Visit Bend, February 11, 2016.

[2] US 97 Parkway Plan Methodology Memorandum (pages 4-5), ODOT, March 2017.

The following irrigation major irrigation canals also create barriers throughout the City:

- Central Oregon Canal – barrier to east-west connectivity
- Main Canal – barrier to east-west connectivity
- Main – barrier to north-south connectivity
- Pilot Butte Canal – barrier to north-south connectivity
- North Unit Canal – barrier to north-south connectivity

Additionally, steep terrain can present challenges for connectivity across or around areas such as Awbrey Butte and the north side of Pilot Butte.

Growth: The City is one of Oregon's fastest-growing cities. Corresponding to this growth, over the past 5 years, vehicle travel has increased by almost 20%[3].

Regional Commute Patterns: Bend experiences a significant amount of regional travel, serving as an employment hub for residents that live in the smaller surrounding communities (e.g. Redmond, La Pine, and Prineville). Approximately 49% of the employees that work in the study area live in surrounding communities.[4] Approximately 10% of study area employees commute from Redmond, Terrebonne, Eagle Crest, Prineville, and Madras. Additionally, a large of number of people that live in Bend work in other communities (e.g. Redmond, Prineville). This regional employment-based travel can significantly increase traffic volumes throughout the study area during peak commute periods, especially along the US 97 corridor. Approximately 9.3% of workers in Bend work from home, nearly twice the national average of 5%. Carpool rates are near the national average, 8.8% in Bend versus 9% nationally.[5]

Land Use and Transportation Network Patterns: Bend has geographically grown over the past 30 years, including annexations of rural neighborhoods and roadways. These annexed areas generally lack complete urban streets (sidewalks, bike lanes, etc.) and often lack connected grid systems, which can limit route choices. In addition, the annexed areas generally lack a mixed land use pattern, which results in residents needing to travel to other areas of Bend for employment, shopping, and services.

Public Transportation Service: Bend's fixed-route public transit system was implemented approximately 10 years ago. The service today is operated by Cascades East Transit (CET) with financial support from the City. Bus services has limited frequency and requires transfers to cross Bend through a hub-spoke layout.

High Desert/Mountain Weather: Weather conditions also affect travel throughout the region, including Bend. The Bend area experiences moderately snowy winter months that can affect travel times and safety. The summers are hot and dry, creating wildfire threats throughout the region. Since wildfire locations are unpredictable, every major corridor within the study area serves an emergency access route. In particular, The City Fire Department has identified the following as evacuation routes:

- Skyliners Road
- Cascade Lakes Highway.
- Brookswood Boulevard
- OB Riley Road

[3] http://www.oregon.gov/ODOT/Data/Pages/Traffic-Counting.aspx#VMT

[4] Work Destination Analysis by Places, On the Map U.S. Census Bureau 2011-2015. Access May 2018.

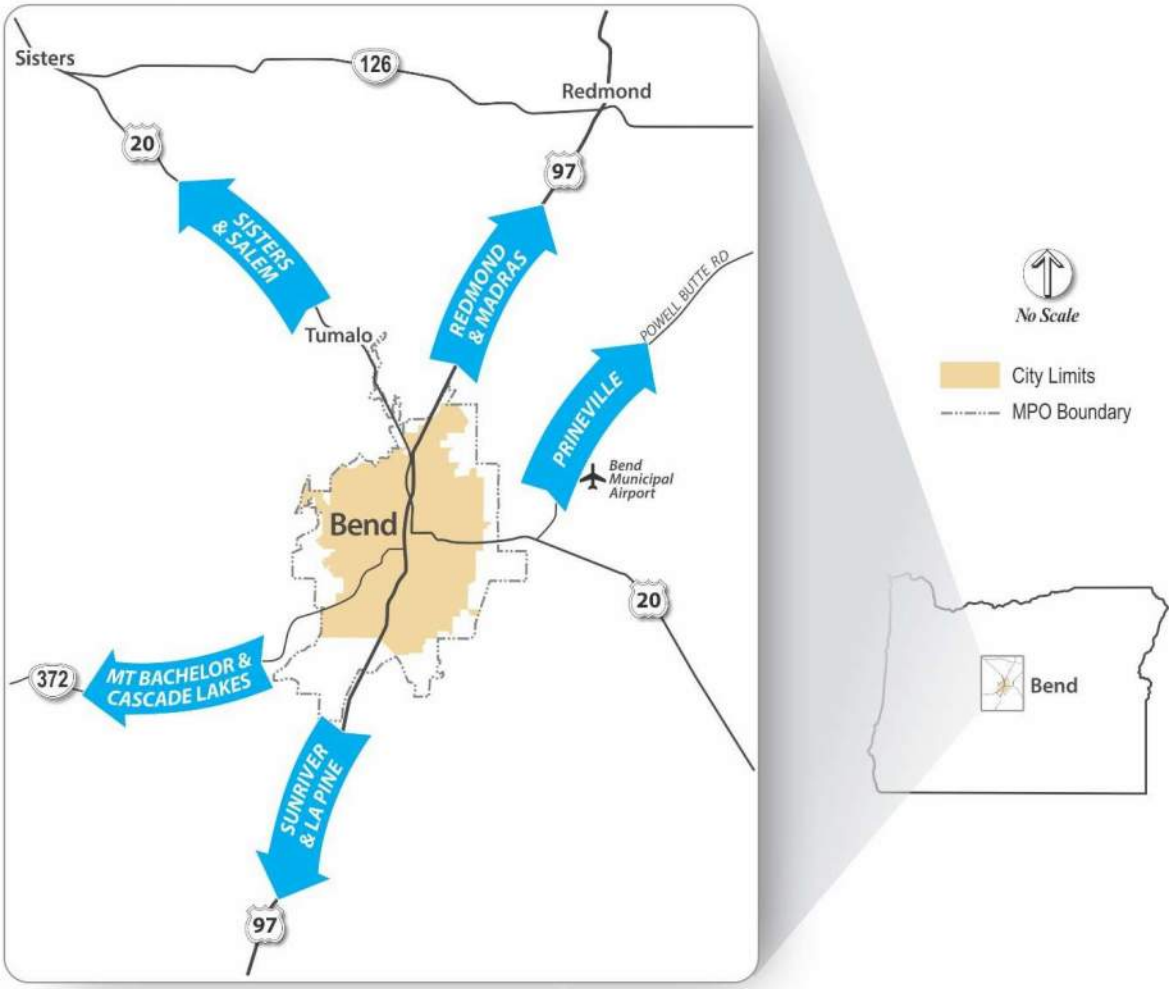
[5] U.S. Census Bureau, 2016 American Community Survey 1-Year Estimates. Access May 2018

- Shevlin Park Rd at Newport Avenue
- Knott Rd. at 27th St.
- China Hat Road

The Deschutes River Woods area currently only has one main entrance/exit point, Baker Road via US 97. During an emergency evacuation of the Deschutes River Woods area, US 97 can be temporarily closed in both directions to allow residents to evacuate quickly via an emergency access route (Frank Pennock Lane, which is gated).

Active Transportation Culture: Another fairly unique travel characteristic of Bend, is the relative popularity of walking, running, and biking in Bend, as compared to similarly-sized communities. The City of Bend has worked to provide facilities for actives through capital improvement projects and the TSP. The study area, however, has relatively low rates of walking and bicycling for work-based trips.

Figure 3. Regional Context



Environmental Justice and Title VI Populations

As part of the outreach to engage citizens and stakeholders during the TSP and MTP development process, special efforts will be made by the City and BMPO to involve disadvantaged populations such as seniors, non-English speaking communities, people with disabilities, and low-income groups (refer to Figure 4a-4d). In addition to these outreach efforts, the demographic information will be used throughout the project development and prioritization process.

According to the American Community Survey[6], the median home value in the City is approximately $300,000, while the median household income is about $55,000 annually (around $70,000 for a family). Within the City of Bend, 18% of the residents are living below the poverty level, which is above the statewide average of approximately 15%. Residents that identify as minorities represent 7% of Bend's population, which is below the statewide average of approximately 15%. About 1% of residents living in the study area have limited English proficiency and about 17% of residents living in the study area are over the age of 65 years. About 2% of households in the study area do not own a car.

[6] United States Census Bureau. American Fact Finder. 2012-2016 American Community Survey 5-Year Estimates. Accessed May 2018. https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml

Figure 4a: Demographic Analysis of Limited English Proficiency Residents

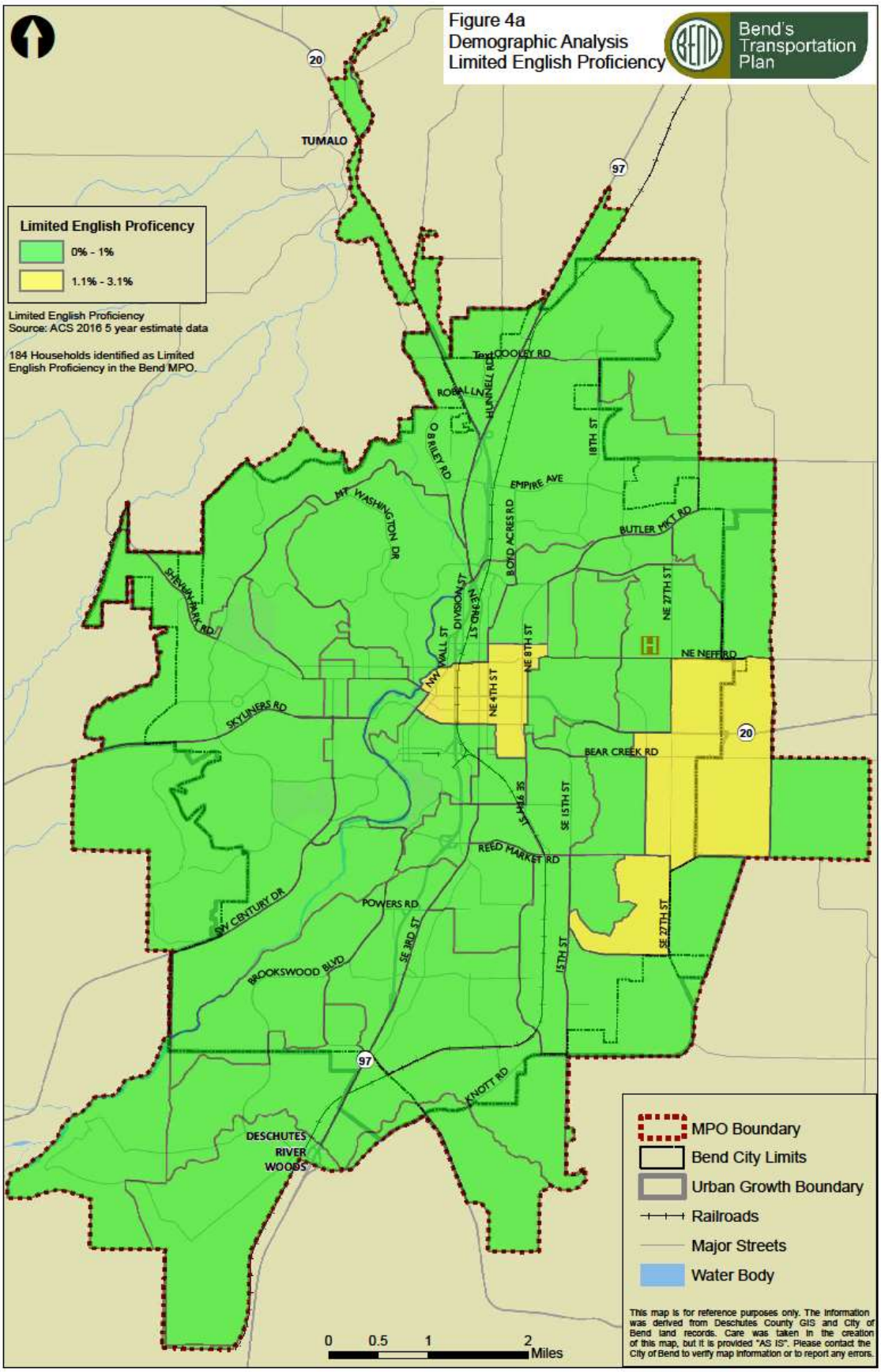


Figure 4b: Demographic Analysis of Low Income Residents

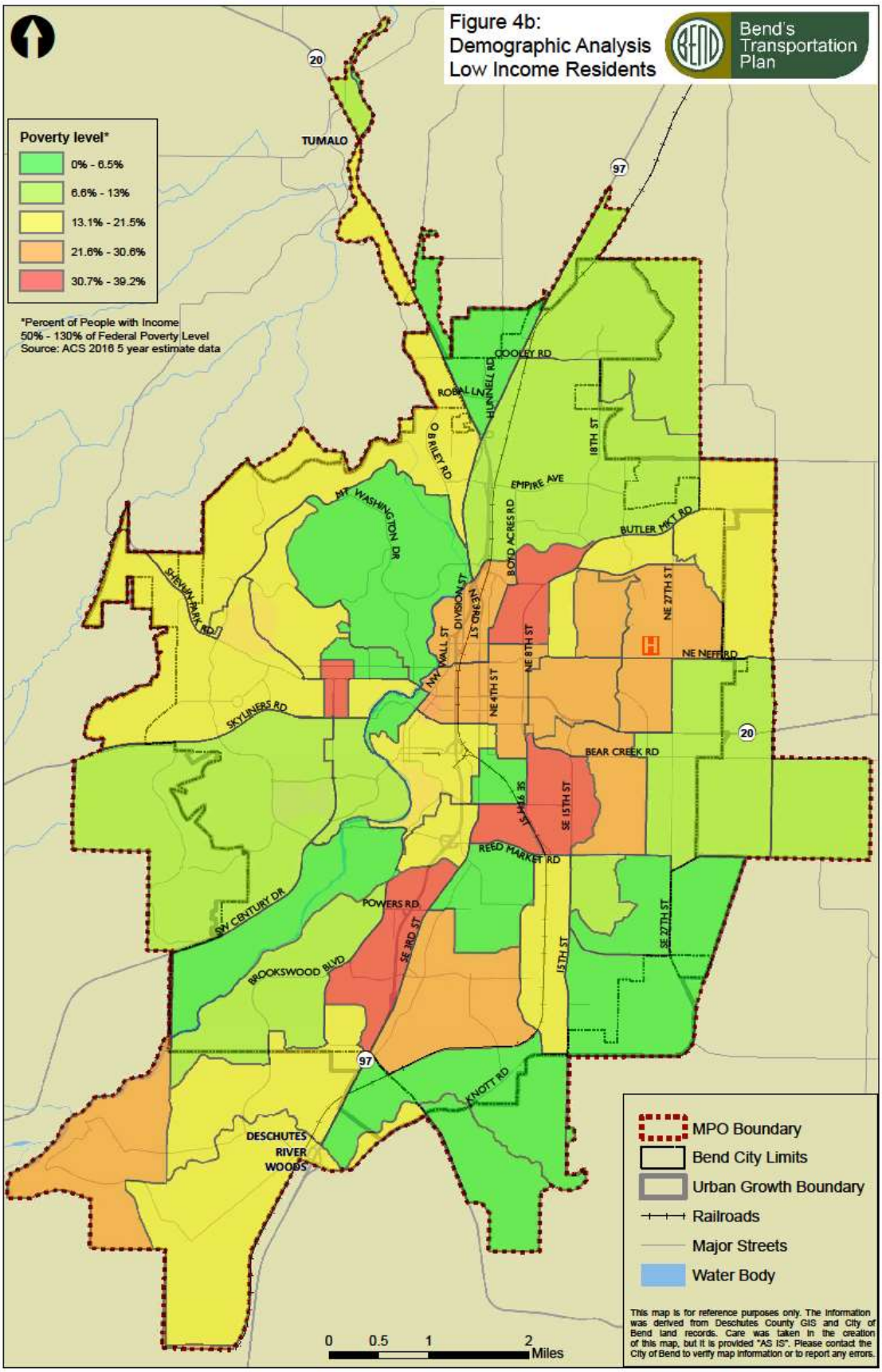


Figure 4c: Demographic Analysis of Disabled Residents

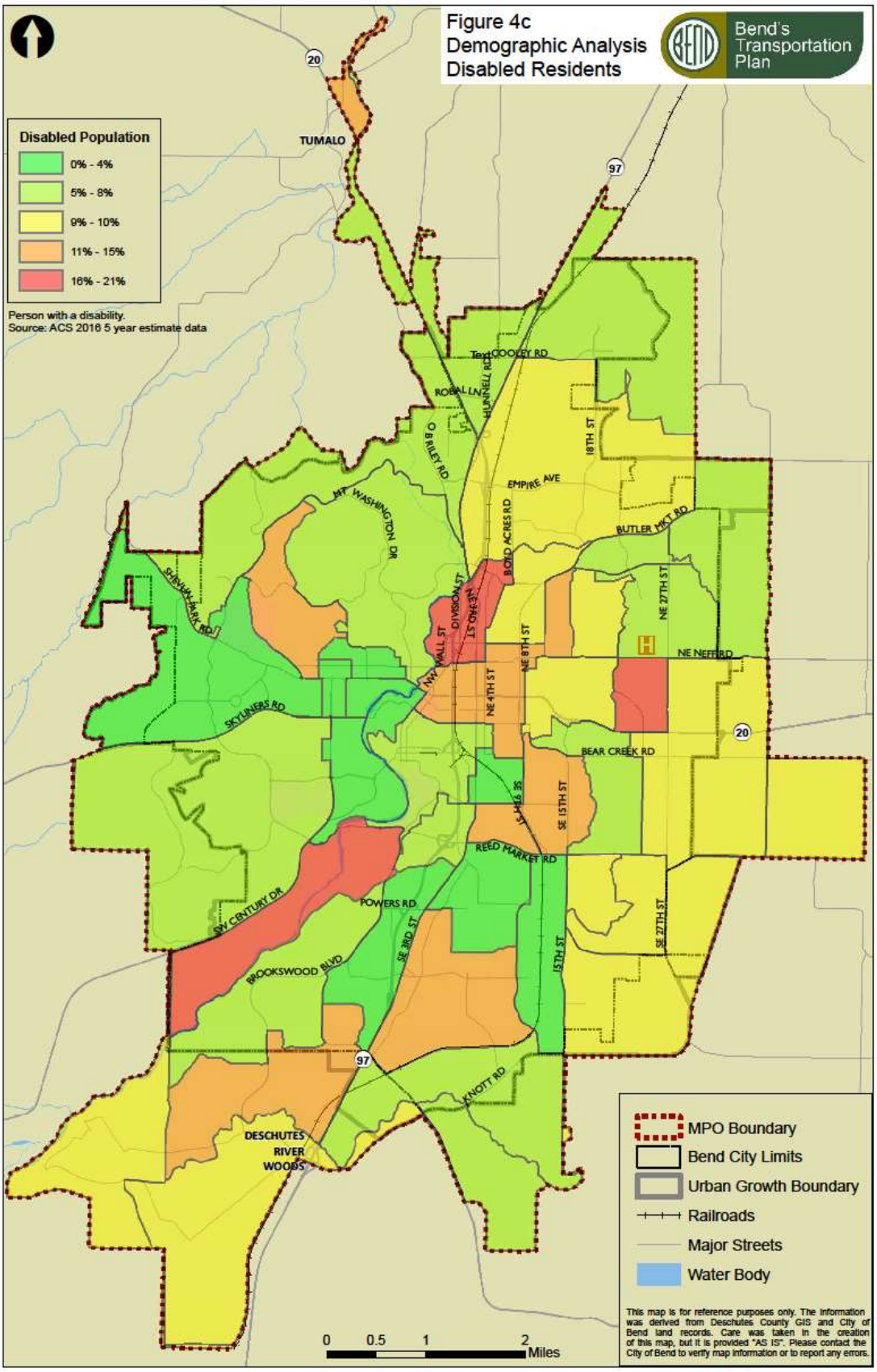
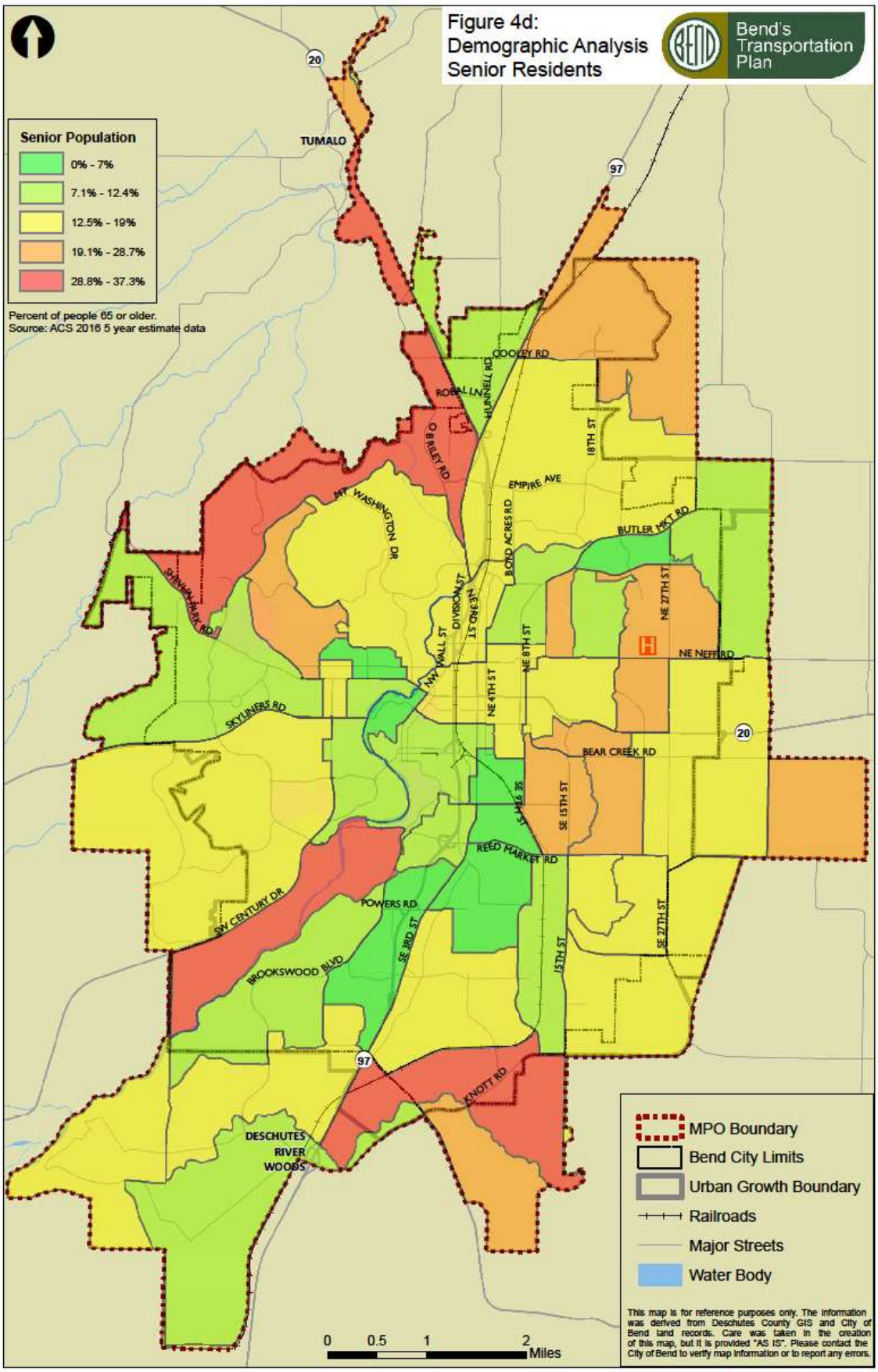


Figure 4d: Demographic Analysis of Senior Residents



Transportation Network Roadways

Roadway Characteristics

Characteristics of arterial and collector roadways were collected. Data collected includes number of lanes for each roadway segment, posted speed limit, roadway pavement conditions, bridge locations and conditions, and traffic signal locations and conditions. Each of these characteristics play a role in defining roadway capacity and operations throughout the roadway network in the study area. Overall, the city has roughly 845 total miles of arterial, collector, and local roadways. For those roads, there are roughly 838 miles (99%) of paved roads and 7 miles (1%) of gravel roads, which are mostly local in isolated segments.

Figure 6 shows the number of lanes to the roadways within the study area. Most of the roadways contain 2-3 lanes, while higher classified roadways such as US 97 and US 20 have 4-5 lanes. Overall, the collector-arterial system lacks 3-lane facilities in the areas furthest from the downtown core, reflecting the more rural nature of these parts of the City.

Figure 5: Typical 2-Lane and 3-Lane Corridors

Figure 7 illustrates posted speed limits on roadways within the study area. While US 97 and US 20 have posted speeds as high as 55 mph on the outskirts of the study area, the majority of the segments within Bend are posted at 45 mph. Other roadways on the outskirts of the study area also have posted speeds of 45 mph, including 27th Street, Butler Market Road, and Shevlin Park Road. The remaining arterial and collector streets have posted speed limits of 40 mph or less.

Figure 8 presents the existing pavement conditions on the roadways within the study area. The majority of arterial and collector roadways (70%) within the study area have ‘Fair’ to ‘Very Good’ pavement conditions. There are large portions of US 20, US 97, Cooley Road, Empire Avenue, Putnam Road, Greenwood Avenue, and Brosterhous Road that have ‘Poor’ pavement conditions and one segment along Alden Avenue with ‘Very Poor’ pavement conditions. The City has focused on improving pavement condition in recent years and has increased the Average pavement conditions index (PCI) to 71, just below the Council goal of 73.

Many of the existing roads were constructed informally and built with no subgrade or on cinders. While the surface PCI is improving with minor reconstruction, additional traffic may result in faster wear and deterioration. Full reconstruction to standard road surfacing is not typically feasible, so pavement conditions may continue to worsen over time.

Figure 9 identifies the locations and condition of the bridges in the study area, based on an inventory completed in 2013. As shown, there are six bridges in ‘Poor’ condition within the study area.

Bend has 26 bridges in the National Bridge Inventory, which are inspected every few years by ODOT. Of the 26 bridges, Archie Briggs Road over the Deschutes River is in 'Very Poor' condition and needs to be replaced. In addition, there is one bridge in 'Poor' condition, eight bridges in 'Fair' condition, and 15 bridges in 'Good' Condition. There are five bridges identified as functionally obsolete and one bridge identified as structurally deficient. Refer to the Appendix for details on the 2016/2017 bridge conditions. It should be noted that the classification 'structurally deficient' does not imply that it is unsafe, but typically that the bridge needs maintenance and repair and may be posted with weight restrictions. A functionally obsolete bridge indicates that the bridge was built to standards that do not meet minimum federal clearance requirements for a new bridge. In addition, there are many bridges over canals within the study area that are not wide enough to support people walking and biking. Again, this does not automatically mean the bridge is unsafe, but the term is also used as a priority status for federal bridge replacement and rehabilitation funding.

Figure 6: Bend and BMPO Number of Lanes

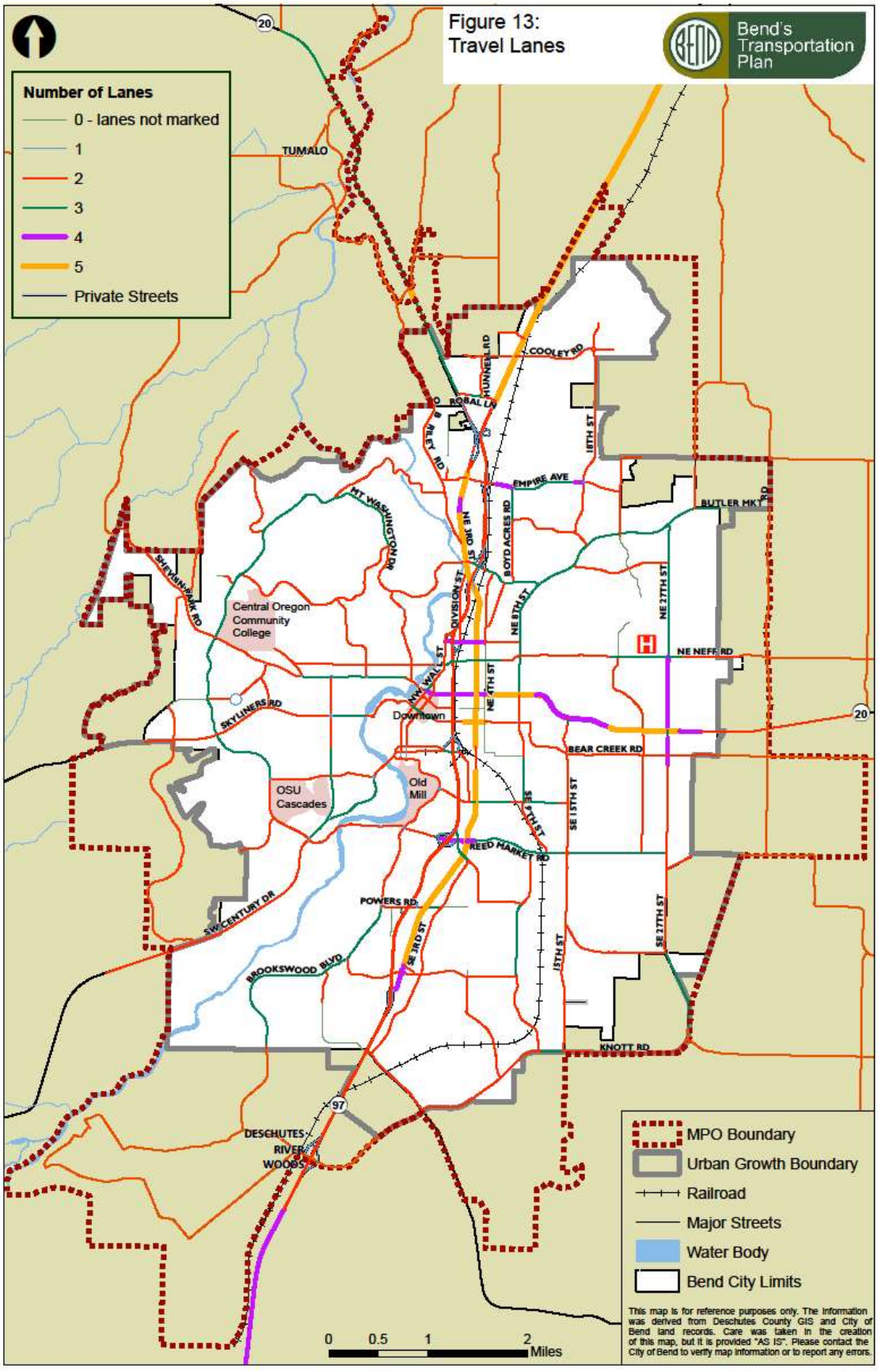


Figure 7: Bend and BMPO Posted Speed Limit

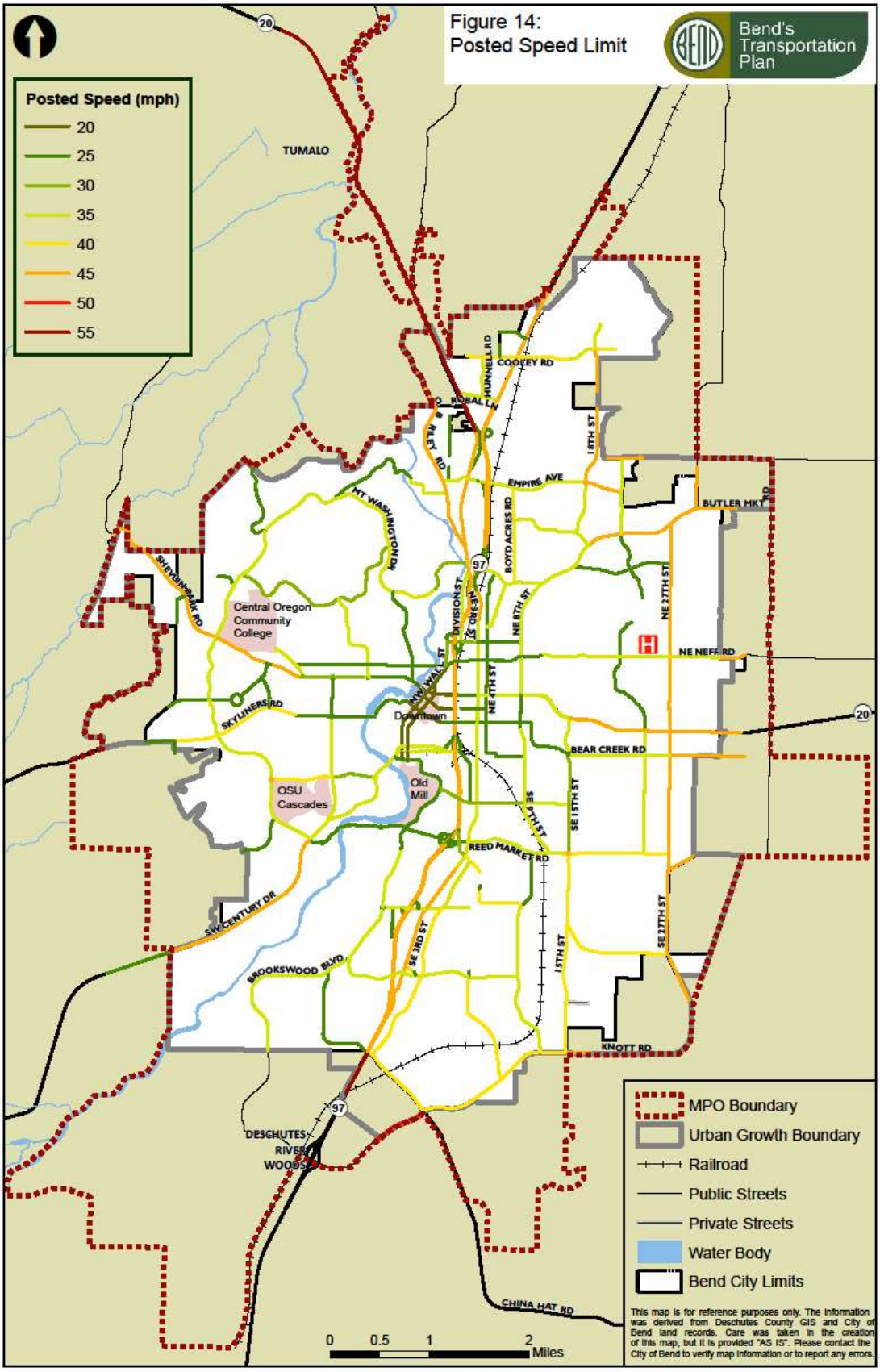


Figure 8: Bend and BMPO Pavement Conditions

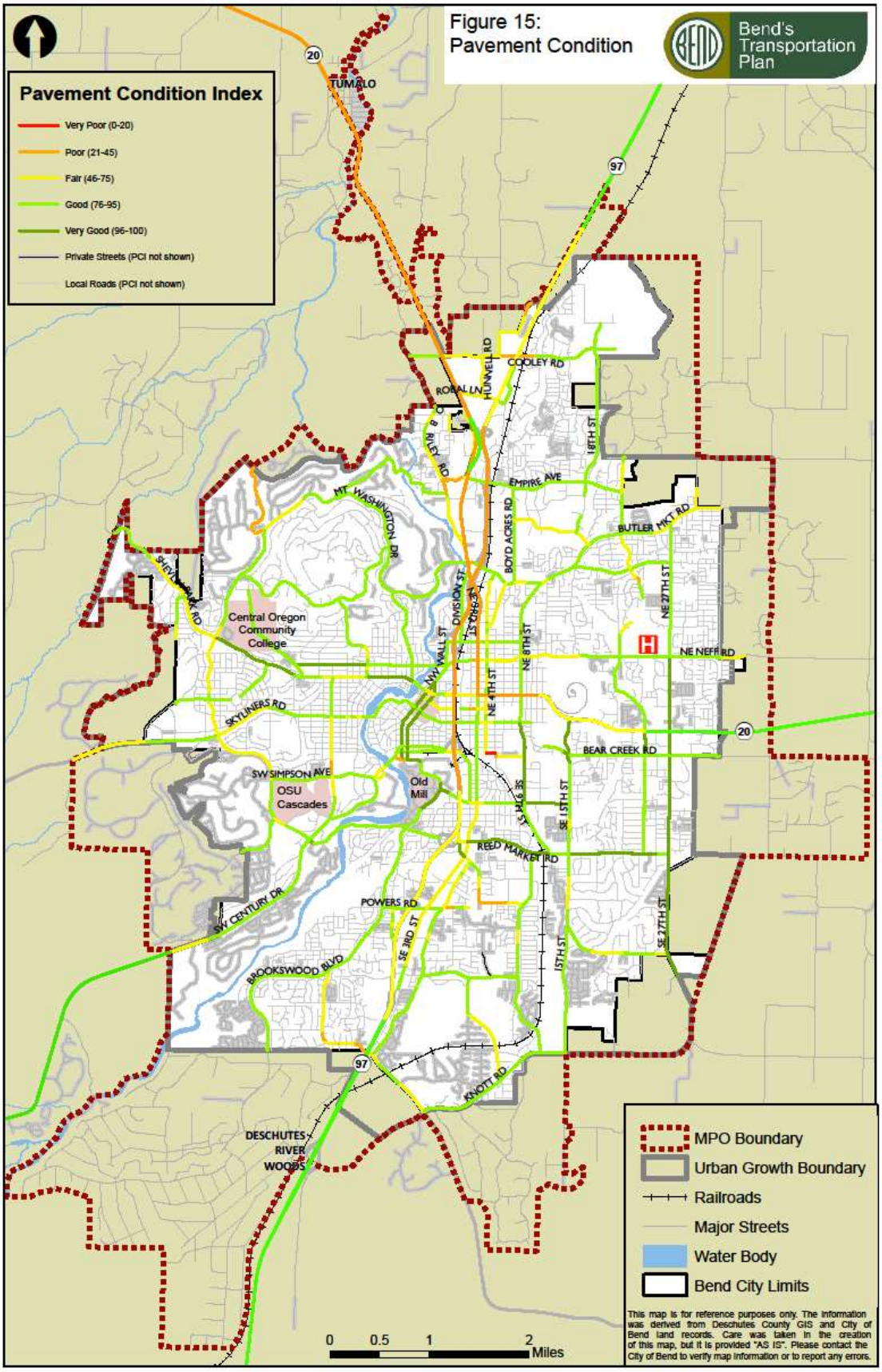
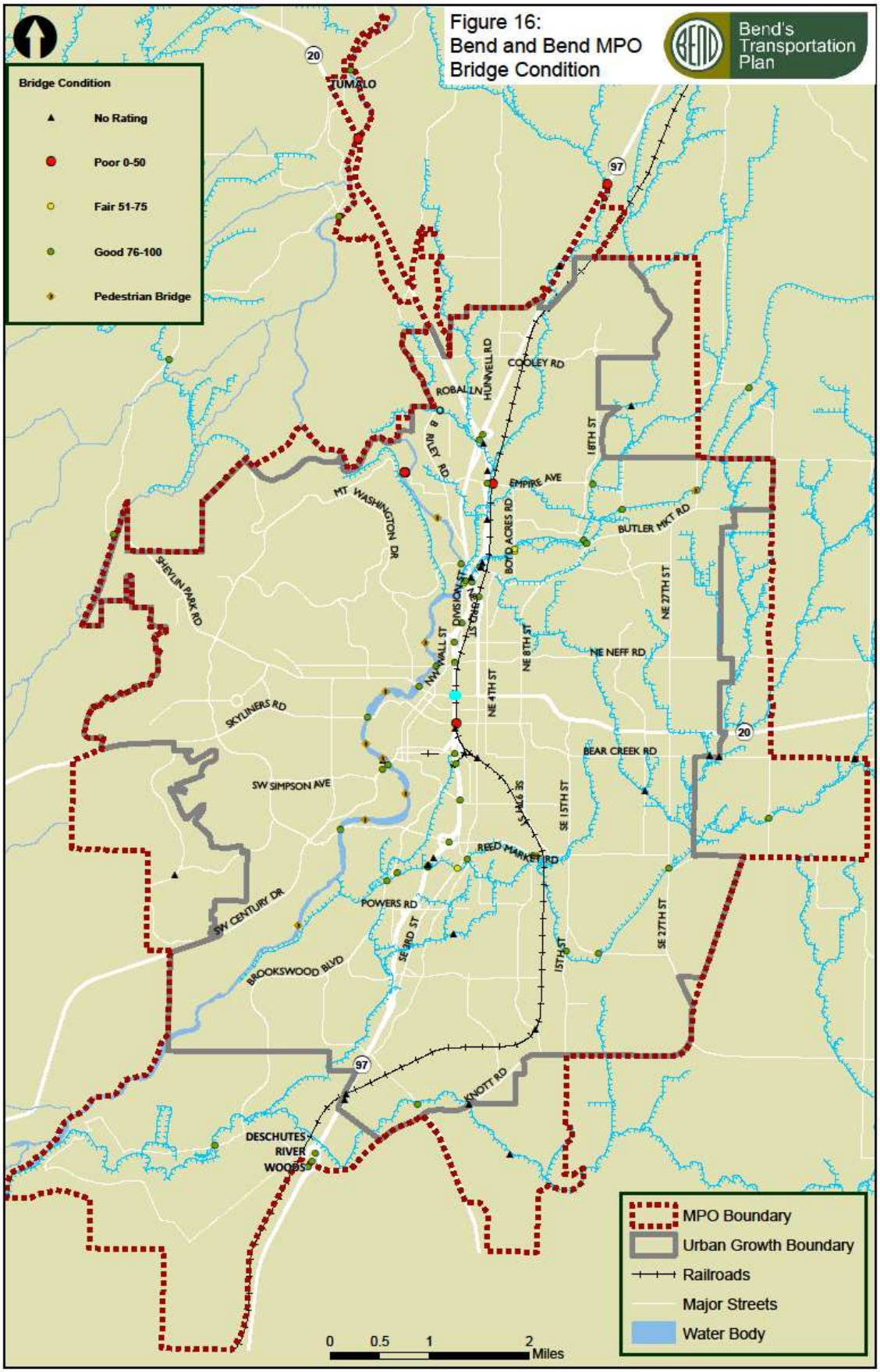


Figure 9: Bend and BMPO Bridge Condition



Roadway Functional Classification and Connectivity

To help manage the roadway network, the City of Bend and BMPO classify roadways based on a hierarchy according to the intended purpose of each road, as shown in Figure 10. Roadways intended for longer distance trips and higher volumes generally provide more design emphasis on mobility through the city; roadways that primarily provide access to local destinations, such as businesses or residences, tend to have more design emphasis on access and neighborhood livability. From highest to lowest intended mobility function, the classifications are described below.

- **Principal and Major Arterials** serve the major centers of activity, typically the highest traffic volumes, the longest trip desires, and a high proportion of the total urban area travel. They provide significant intra-area travel. In Bend, Principal Arterials include just 3rd Street and Greenwood Avenues. Because of the community pattern and lot layouts along these streets these principal arterials also perform the dual purpose of providing for direct access and egress for businesses and residences and serve transit. Major arterials include Reed Market Road (east of Bond Street), 27th Street (north of Reed Market Road), and Empire Avenue.
- **Minor Arterials** typically carry less traffic than major arterials and generally serve shorter trips in a smaller area. They often connect residential, industrial, commercial, and recreational uses. The provision of access has a greater emphasis than on principal arterials. Traffic volumes and speeds are generally still high, making physically separated walking and biking facilities a requirement to serve abutting land uses. However, many of the Minor Arterials in Bend are 25 mph in business districts and the central area.
- **Major Collectors** connect the arterial streets with minor collectors or local streets, neighborhoods, and commercial and industrial areas, providing a balance of access and travel.
- **Local Streets** provide direct access to properties in the study area and are not intended to provide efficient travel for through traffic. These roadways are often lined with businesses or residences and are designed to serve lower vehicle volumes at low speeds. People on bicycles commonly share the road with people in cars. In the many areas without sidewalks, pedestrians walk in the street or along its shoulders
- **Industrial Streets** include roads adjacent to industrial and manufacturing land uses that are designed to accommodate large vehicles such as trucks, trailers, and other delivery vehicles.

Due to the rapid growth in the Bend area and the historical evolution of the roadway system, there are a number of arterial and collector roadways that were constructed with residential homes fronting them, such as Portland Avenue and Wells Acres Road. These roadways provide direct access to residential homes, which is not typical for arterials and collectors. The likelihood of significant redevelopment along these roadways is small and thus these roadways will likely remain as constructed. On the other hand, Eagle Road is classified as a local road, but functions as a collector or arterial roadway. Eagle Road connects many local streets to Neff Road and Butler Market Road with limited residential homes directly fronting it. Additionally, a short segment of Bear Creek Road is classified as a local road but functions as a collector roadway.

Spacing and connectivity of major roadways is important for an efficient transportation system by providing direct routes, route choices that spread demand (reducing the need to have wider, higher-speed roadways), and a variety of facility types to balance mobility, access, and livability along difference roadway environments. The City's current TSP has spacing standards of one mile for arterial and a half-mile for collectors. Figure 11 identifies gaps in the arterial and collector grid system, based on these spacing guidelines. Note that some of these gaps may not be reasonable opportunities for improving connectivity due to established neighborhood development, topographic barriers, etc.

Roadway Jurisdiction

Agencies responsible for roads within the study area include ODOT, Deschutes County, the City, and private owners. Each jurisdiction sets the standard and maintenance policies associated with the transportation facilities within its jurisdiction. Figure 12 shows the study area roadway jurisdictions.

ODOT has jurisdiction over the highways within the study area. These highways accommodate freight, other long-distance travel and they are used for daily commutes and local trips. In the case of Highway 20 on 3rd Street and on Greenwood Avenues, the highway also serves abutting properties, which include commercial businesses. The City owns the majority of the other roadways within the city limits. Deschutes County has jurisdiction over the remaining roadways on the edges of the study area. There are also many private roadways throughout the study area. Private roadways in the study area tend to be residential with the exception of COCC and Old Mill District.

Key system findings for roadways include:

- **70% of the arterial and collector roadways have 'Fair' to 'Very Good' pavement conditions.**
- **Five bridges identified as 'Functionally Obsolete' during the last full bridge evaluation (five years ago)**
- **One bridge identified as 'Very Poor', another 'Poor' in recent evaluation of part of the system**
- **Several private roads provide neighborhood and, in some cases, commercial access throughout the City**
- **Many roads near the outskirts of the City do not have the cross section or access requirements pertaining to their classifications**

Figure 10: Bend and BMPO Roadway Functional Classifications

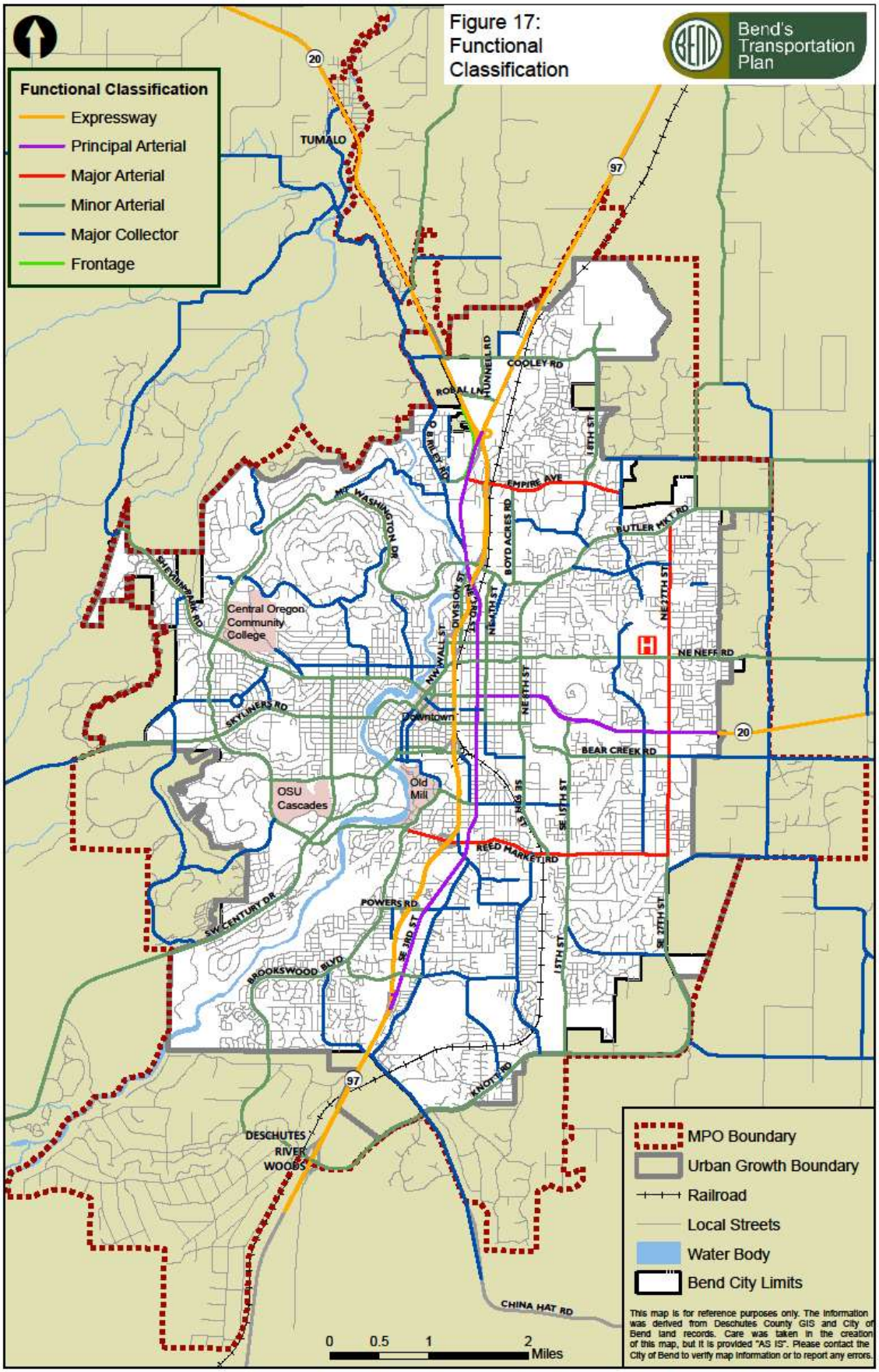


Figure 11: Potential Connectivity Opportunities in the Arterial/Collector Grid System

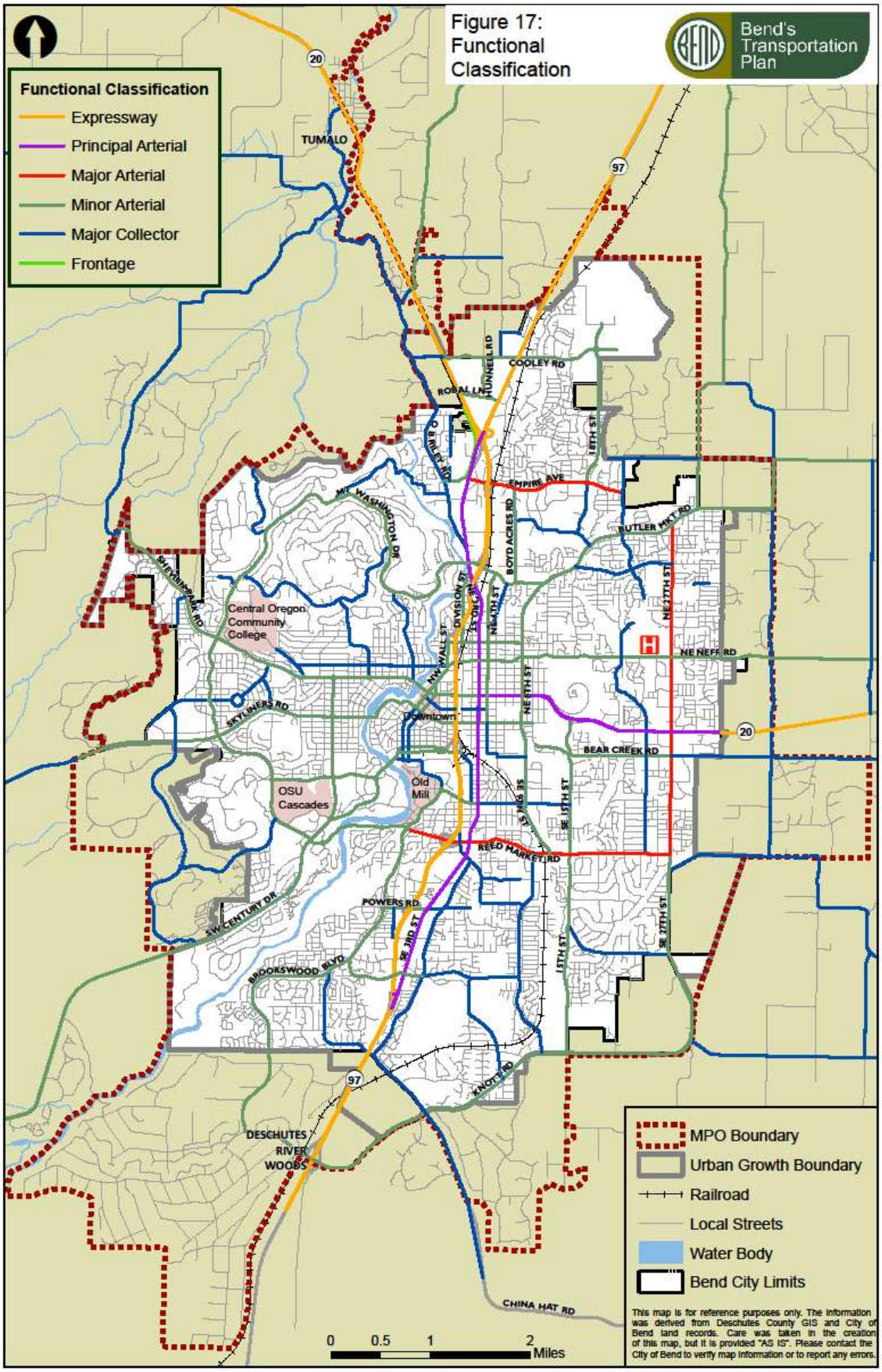
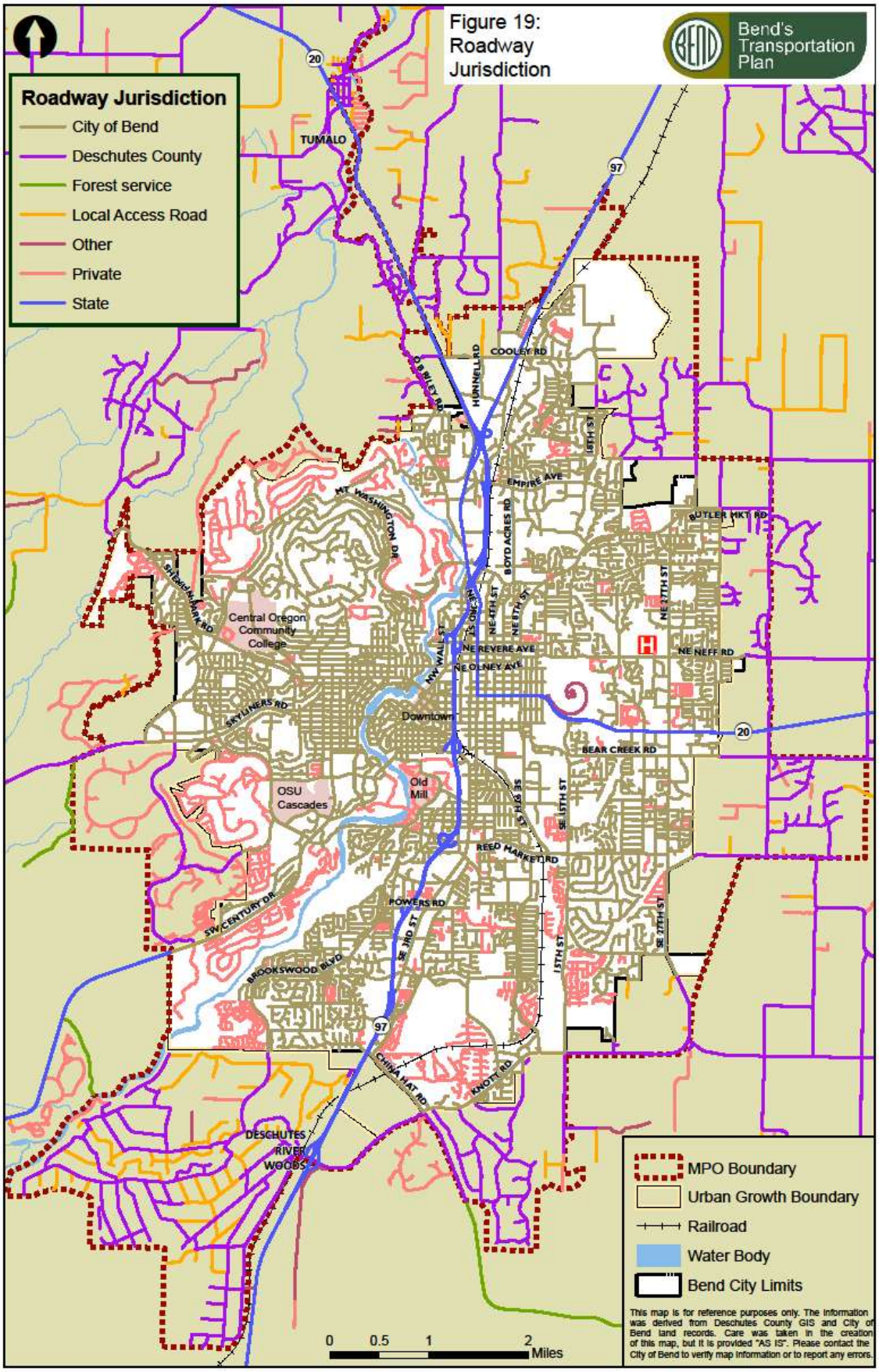


Figure 12: Bend and BMPO Roadway Jurisdiction



Traffic Operations

Intersection operations were analyzed based on the 2000 Highway Capacity Manual Edition[7] (HCM) for signalized intersections, and the HCM 6th Edition[8] for unsignalized intersections and roundabouts.

- Level of service (LOS) is a "report card" rating (A through F) based on the average delay experienced by people driving through the intersection. LOS A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand, which typically is 7-9 a.m. and 4-6 p.m. LOS D and E are progressively worse operating conditions. LOS F represents conditions where average vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays. The City of Bend does not use LOS but rather the actual average delay experienced by vehicles at an unsignalized intersection as a mobility target. Deschutes County uses level of service for its roadway system.
- A volume to capacity (v/c) ratio is decimal representation (between 0.00 and 1.00) of the proportion of capacity that is being used (i.e., the saturation) at a turn movement, approach leg, or intersection. A lower ratio indicates smooth operations and minimal delays. A ratio approaching 1.00 indicates increasing congestion and reduced performance. If the ratio is greater than 1.00, the turn movement, approach leg, or intersection is oversaturated and usually results in excessive queues and long delays. The City of Bend and ODOT utilize v/c ratios for their respective systems.

Intersection turn movement counts and operations analysis for the 83 study intersections were broken out:

- 29 intersections were analyzed using counts collected during the p.m. peak period in April 2018
- 11 intersections were analyzed using counts from other project collected over the past two years
- 43 intersections have been counted and analyzed (27 intersection) in Phase 1 of the US 97 Parkway Plan[9] or will be analyzed (16 intersections) in Phase 2 of that study

All turn movement counts used for this analysis are included in the Appendices to this document.

The intersection turn movement counts were adjusted to account for seasonal variations in travel. The methodology from the ODOT Analysis Procedures Manual was applied to determine an appropriate seasonal factor, as discussed in the Methods and Assumptions Memorandum. The Bend Parkway Study used a mix of seasonal factors for US 97, varying from a local ATR[10] based commuter trend type in the north to a recreational type factor to the south. These seasonal adjustments were carried forward into this analysis. The seasonally adjusted volumes were used in the traffic operations analysis. Table 1 summarizes the existing average weekday

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[7] 2000 *Highway Capacity Manual*, Transportation Research Board, Washington DC, 2000.

[8] *Highway Capacity Manual 6th Edition*, Transportation Research Board, Washington DC, 2016.

[9] *US 97 Parkway Plan – Technical Memorandum #2: Existing Conditions*, DKS Associates, December 2017. Traffic volumes collected in April 2017.

[10] Electronic counting site on a roadway that counts vehicles continuously. ATR's collect 24-hour bidirectional volumes yearly and 24-hour vehicle classification counts every three years.

(City intersections) p.m. peak hour or 30th highest hour [11] peak seasonal (ODOT intersections) intersection operational levels at the study intersections.

Of the 67 study intersections currently analyzed, 25 fail to meet current jurisdictional mobility targets (23 intersections under ODOT jurisdiction and 2 intersections under City of Bend jurisdiction), as shown in Figure 13 and Table 2. An additional 16 intersections are pending analysis in Phase 2 of the Bend Parkway Study.

Table 1: Existing Intersection Traffic Operations PM Peak Hour

Intersection	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Standard
Unsignalized Intersections					
US 20 & O.B. Riley/Cook Ave	11 / >300	B / F	0.08/**2.49**	ODOT	v/c ≤ 0.70
US 20 & Old Bend-Redmond Hwy	13 / >300	B / F	0.06/**>3.0**	ODOT	v/c ≤ 0.70
US 20 & Cooley Rd	16 / 22	C / C	0.18/0.36	ODOT	v/c ≤ 0.85
O.B Riley Rd & Archie Briggs Rd	8 / 15	A / C	0.04/0.38	City of Bend	Delay ≤ 50 s
Deschutes Market Rd & Butler Market Rd	10 / **98**	A / F	0.39/1.04	City of Bend	Delay ≤ 50 s
NE 27th St & Well Acres Rd	10 / 16	A / C	0.06/0.36	City of Bend	Delay ≤ 50 s
Hamby Rd & US 20	9 / 194	A / F	0.13/**1.18**	ODOT	v/c ≤ 0.70
SE 9th St & Reed Market Rd	11 / 45	B / E	0.21/0.79	City of Bend	Delay ≤ 50 s
Parrell Rd & Brosterhous Rd	9 / 27	A / D	0.12/0.61	City of Bend	Delay ≤ 50 s
SE 27th St & Ferguson Rd	9 / 21	A / C	0.06/0.36	City of Bend	Delay ≤ 50 s
SE 15th St & Knott Rd	9 / 21	A / C	0.18/0.16	City of Bend	Delay ≤ 50 s
China Hat Rd & Knott Rd	8 / 34	A / D	0.02/0.48	City of Bend	Delay ≤ 50 s
US 97 SB On-ramp & Empire Blvd	28 / >100	D / F	0.72/0.71	ODOT	v/c ≤ 0.85
US 97 SB Off-ramp & Butler Market Rd	- / 40	- / E	- /0.76	ODOT	v/c ≤ 0.85
US 97 NB Ramps & Butler Market Rd	10 / 15	B / C	0.12/0.04	ODOT	v/c ≤ 0.85
US 97 & Lafayette Ave	- / **>100**	- / F	- /**1.53**	ODOT	v/c ≤ 0.85
US 97 & Hawthorne Ave	- / **>100**	- / F	- /**>2.00**	ODOT	v/c ≤ 0.85
US 97 NB Ramps & Colorado Ave	29 /**>100**	D / F	0.88/**>2.0**	ODOT	v/c ≤ 0.85
US 97 & Truman Ave	- / **>100**	- / F	- /**1.00**	ODOT	v/c ≤ 0.85
US 97 NB Ramps & Reed Market Rd	- / **>100**	- / F	- /**1.53**	ODOT	v/c ≤ 0.85
Division St & Reed Market Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
US 97 & Reed Ln	- / 22	- / C	- /0.44	ODOT	v/c ≤ 0.85
US 97 SB Ramps & Powers Rd	9 / 38	A / E	0.07/0.83	ODOT	v/c ≤ 0.85
US 97 NB Ramps & Powers Rd	9 / 12	A / B	0.21/0.09	ODOT	v/c ≤ 0.85

[11] The 30th higest hour30 HV is commonly used for design purposes and represents the level of congestion that is typically encountered during the peak travel month.

Parrell Rd at Powers Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	Delay ≤ 50 s
US 97 & Badger Rd	- / 17	- / C	- /0.20	ODOT	v/c ≤ 0.85
US 97 & Pinebrook Blvd	- / 16	- / C	- /0.27	ODOT	v/c ≤ 0.85
SE 3rd St & Pinebrook Blvd	Pending[a]	Pending[a]	Pending[a]	City of Bend	Delay ≤ 50 s
US 97 & Ponderosa St	- / 16	- / C	- /0.27	ODOT	v/c ≤ 0.85
Parrell Rd & China Hat Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	Delay ≤ 50 s
US 97 SB Ramps & Baker Rd	28 / 36	A / E	0.34/**0.87**	ODOT	v/c ≤ 0.70
US 97 NB Ramps & Knott Rd	10 />100	B / F	0.31/**1.76**	ODOT	v/c ≤ 070
Intersection	**Delay (s/veh)**	**Level of Service**	**Volume/ Capacity**	**Jurisdiction**	**Mobility Standard**
Signalized Intersections					
US 20 & Robal Rd	24	C	**0.90**	ODOT	v/c ≤ 0.85
NE 27th St & Butler Market Rd	28	C	0.82	City of Bend	v/c ≤ 1.0
Boyd Acres Rd & Butler Market Rd	37	D	0.84	City of Bend	v/c ≤ 1.0
NE 27th St & Neff Rd	44	D	0.84	City of Bend	v/c ≤ 1.0
US 20 (NE 3rd St) & Olney Ave	48	D	0.68	ODOT	v/c ≤ 0.85
NE 8th Ave & US 20 (Greenwood Ave)	62	E	**0.96**	ODOT	v/c ≤ 0.85
US 20 (NE 3rd St) & Greenwood Ave	80	F	**0.98**	ODOT	v/c ≤ 0.85
Wall St & Franklin Ave	19	B	0.58	City of Bend	v/c ≤ 1.0
Bond St & Franklin Ave	23	C	0.66	City of Bend	v/c ≤ 1.0
SE 15th St & US 20 (Greenwood Ave)	23	C	0.84	ODOT	v/c ≤ 0.85
NE 3rd St & Franklin Ave	67	E	0.89	City of Bend	v/c ≤ 1.0
SE 27th Ave & US 20 (Greenwood Ave)	49	D	**0.87**	ODOT	v/c ≤ 0.85
Purcell Blvd & US 20 (Greenwood Ave)	51	D	**0.87**	ODOT	v/c ≤ 0.85
Wall St & Colorado Ave	14	B	0.59	City of Bend	v/c ≤ 1.0
Bond St & Arizona Ave	13	B	0.67	City of Bend	v/c ≤ 1.0
NE 3rd St & Wilson Ave	65	E	0.95	City of Bend	v/c ≤ 1.0
SE 27th St & Reed Market Rd	14	B	0.70	City of Bend	v/c ≤ 1.0
US 97 & Cooley Rd	62	E	**0.99**	ODOT	v/c ≤ 0.85
US 97 & Robal Rd	79	E	**1.02**	ODOT	v/c ≤ 0.85
US 20 & Empire Blvd	69	D	**0.96**	ODOT	v/c ≤ 0.85
US 97 NB Ramps & Empire Blvd	58	E	**0.87**	ODOT	v/c ≤ 0.85
Boyd Acres Rd at Empire Blvd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
US 20 (NE 3rd St) & O.B. Riley Rd	Pending[a]	Pending[a]	Pending[a]	ODOT	v/c ≤ 0.85
US 20 (NE 3rd St) & Butler Market Rd	41	D	**0.90**	ODOT	v/c ≤ 0.85
US 20 (NE 3rd St) & Division St	39	D	**0.97**	ODOT	v/c ≤ 0.85

Wall St & Revere Ave	22	C	0.69	ODOT	v/c ≤ 0.85
Division St & Revere Ave	11	B	0.62	ODOT	v/c ≤ 0.85
US 20 (NE 3rd St) & Revere Ave	Pending[a]	Pending[a]	Pending[a]	ODOT	v/c ≤ 0.85
Wall St & Portland Ave	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
Wall St & Greenwood Ave	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
US 97 SB Ramps & Colorado Ave	29	C	0.79	ODOT	v/c ≤ 0.85
US 97 SB Ramps & Reed Market Rd	34	C	**0.95**	ODOT	v/c ≤ 0.85
SE 3rd St & Reed Market Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
Intersection	**Delay (s/veh)**	**Level of Service**	**Volume/ Capacity**	**Jurisdiction**	**Mobility Standard**
US 97 & Powers Rd	64	E	**1.12**	ODOT	v/c ≤ 0.85
SE 3rd St & Powers Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
SE 3rd St & Badger Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
Roundabouts					
NE 18th St & Empire Blvd	12	B	0.74	City of Bend	v/c ≤ 1.0
Mt Washington Dr & Shevlin Park Rd	11	B	0.55	City of Bend	v/c ≤ 1.0
NW 14th St & Newport Ave	23	C	0.84	City of Bend	v/c ≤ 1.0
NW 14th St & Galveston Ave	25	C	0.86	City of Bend	v/c ≤ 1.0
Mt Washington Dr & Skyliners Rd	12	B	0.68	City of Bend	v/c ≤ 1.0
Colorado Ave & Simpson Ave	11	B	0.61	City of Bend	v/c ≤ 1.0
SW 14th St & Simpson Ave	16	C	0.75	City of Bend	v/c ≤ 1.0
Mt Washington Dr & Simpson Ave	10	B	0.60	City of Bend	v/c ≤ 1.0
Century Dr & Colorado Ave	9	A	0.51	City of Bend	v/c ≤ 1.0
Century Dr & Reed Market Rd	14	B	0.66	City of Bend	v/c ≤ 1.0
SE 15th St & Reed Market Rd	29	D	0.93[b]	City of Bend	v/c ≤ 1.0
Brookswood Blvd & Reed Market Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
Brookswood Blvd & Powers Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
Brookswood Blvd at Murphy Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0
SE 3rd St & Murphy Rd	Pending[a]	Pending[a]	Pending[a]	City of Bend	v/c ≤ 1.0

Delay, LOS and v/c for stop-controlled intersections reported for the major/minor approach.
[a]Intersection Analysis Pending Phase 2 of the Bend Parkway
[b]Train crossing at 9th Street observed in the field severely degraded operations at this intersection.

As shown in Table 1 and Figure 13, the intersection analysis uncovered several intersections that fail to meet mobility targets under existing traffic conditions. The congestion issues created by these failing intersections vary by location and intersection control type.

Capacity issues at signalized intersections can lead to queuing and delays for nearly all vehicles using the intersection.

The key traffic issues at **signalized** study intersections are summarized as follows:

- **US 97 and Cooley/Robal Road**: US 97 drivers experience significant queuing and delays at the Cooley Road and Robal Road signalized intersections, as observed during Phase 1 of the Bend Parkway Study. Southbound queues on US 97 frequently extend through the Cooley Road intersection, which already operates near capacity. US 97 serves both commuter travel between Bend and Redmond and recreational travel for Eastern Oregon. Under summer conditions, capacity issues on this segment of US 97 are further constrained, leading to a longer peak period.
- **US 20 (3rd Street) and Empire Boulevard:** The key issue at Empire and US 20 is the southbound left turn, which serves demand from both southbound US 97 and US 20 attempting to access land uses in northeast Bend.
- **US 20 (3rd Street) and Division/O.B. Riley/Mt Washington:** These intersections are mainly impacted by southbound queuing on US 20 (3rd Street) from the Division Street intersection.
- **East-West travel at 3rd Street:** The existing conditions analysis identified only one intersection (3rd Street and Greenwood Avenue) failing to meet mobility targets between Division Street and Wilson Avenue. However, field observations noted that all intersections that include east-west streets crossing under the Bend Parkway have significant eastbound queuing issues during the p.m. peak hour, possibly due to commuter travel from Downtown Bend and the west side of town to the residential land uses to the east. While the signalized intersections on 3rd Street at Olney Avenue, Franklin Avenue, and Wilson Avenue meet mobility standards, the delays and queuing for westbound movements cause drivers to attempt to bypass queues by using lower classification streets such as 2nd Street, making aggressive unsignalized turn movements and increasing traffic on local streets.
- **8th Street and US 20 (Greenwood Avenue):** This intersection had the longest peak period observed in the field. School traffic impacts the intersection first, followed by commuter traffic. Drivers on southbound 8th Street typically wait through a minimum one full signal cycle during the peak period, with queues extending as far north as Revere Avenue. Some queues were observed for westbound movements as well, also leading to some vehicles using neighborhood streets as bypass routes. Overall, the westbound queues generally cleared each cycle, and did to extend as far as the eastbound queues.
- **US 20 (Greenwood Avenue) and 27th Street/Purcell Boulevard:** These intersections experience a brief but intense peak during the evening commute. Signal cycle failures (vehicles stuck in queue for multiple signal timing cycles) occur at both intersections, with southbound queues extending more than 1,500 feet to the north. Traffic demand at these intersections is mostly commuters. Drivers also use alternative routes to avoid the 27th Street and US 20 signal, using Hamby Road instead of 27th Avenue.
- **Bend Parkway (US 97) and Powers Road:** This intersection was identified as failing to meet mobility targets in Phase 1 of the Bend Parkway Study. Recent improvements to the Murphy Road/US 97 interchange removed one of the southbound to eastbound movements from the Parkway. This may have increased the southbound jug-handle volume at the Parkway/Powers Road intersection. During the PM peak hour, the southbound jug-handle movement was observed to queue back around the loop ramp and occasionally back up the Parkway to Powers Road. Southbound traffic on the Parkway would then queue back to

near Reed Lane. Seasonal traffic also has a significant impact at this location, as traffic increases significantly on the Bend Parkway south of Reed Market Road during the summer months.

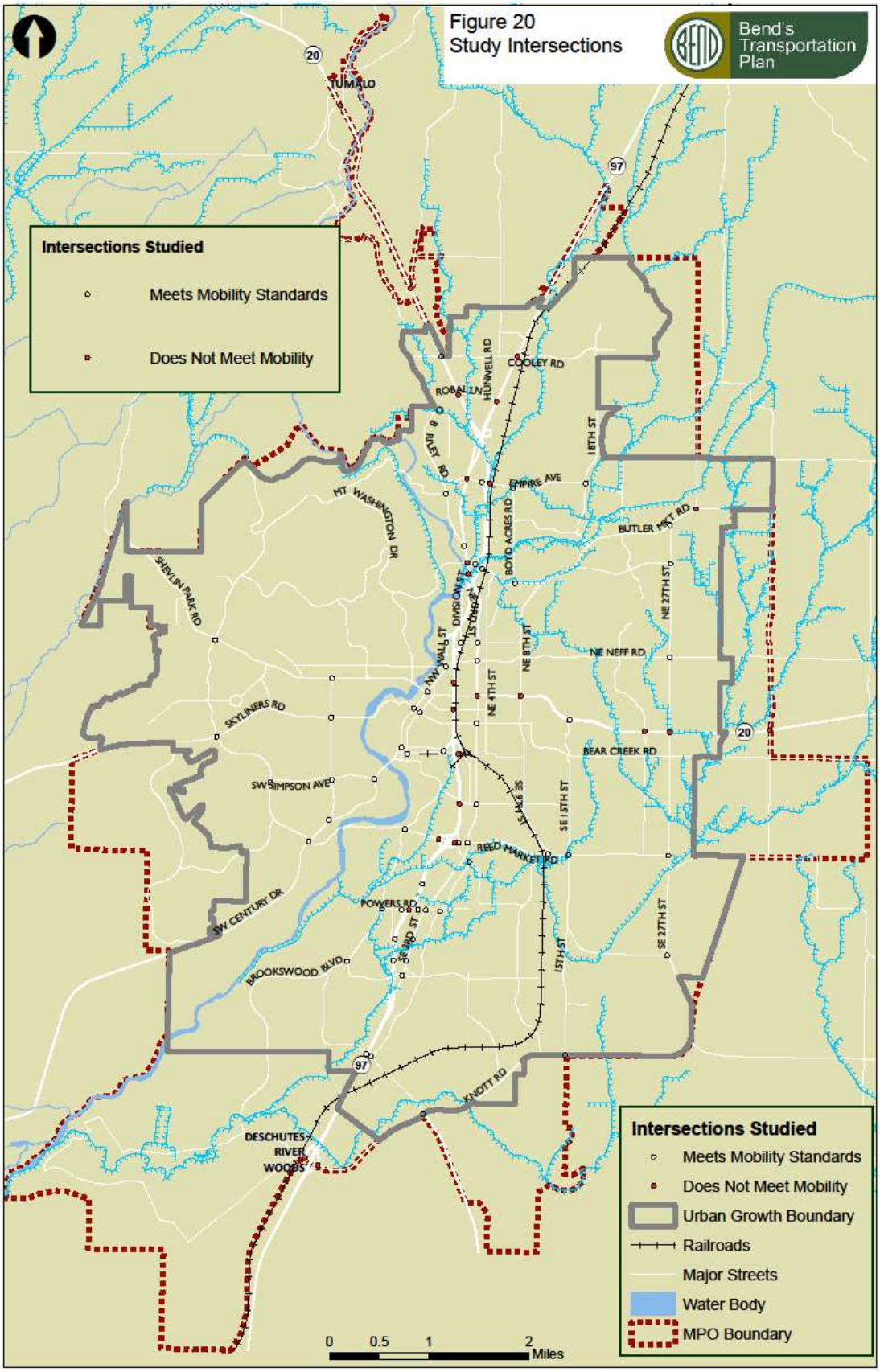
The key traffic issues at **roundabout** study intersections are summarized as follows:

- **Mt Washington Drive:** None of the roundabouts on Mt. Washington Drive fail to meet mobility targets for the PM peak hour. However, field observations noted extensive queueing caused by traffic from Summit High School. Southbound queues on Mt Washington Drive extend from Skyliners Road as far north Colter Avenue during the school peak, impacting operations at all the intersections in between.
- **Bond Street and Reed Market Road (Not yet analyzed):** This intersection experiences heavy demand during the PM peak hour, leading to queue spillback on all approaches. As typical of roundabout queues, none of the approaches are at a complete standstill, but rather operate as slow (< 5 mph) rolling queues. The queue spillback from this intersection impacts several intersections on Bond Street and Reed Market Road. Vehicles attempting to bypass the queue occasionally use neighborhood streets as an alternative route.

The key traffic issues at **unsignalized** study intersections are summarized as follows:

- **US 20 (north of Robal Road)**: US 20 north of Empire Boulevard experiences extreme seasonal variation due to the recreational characteristics of the route, which provides an east-west connection between eastern and western Oregon. The heavy seasonal traffic on US 20 conflicts with commuter demand between Bend and Redmond avoiding the US 97 corridor. This causes the Cook Avenue and Old Bend Redmond Highway intersections at US 20 to fail to meet mobility targets. Field observations of both these intersections indicated aggressive gap acceptance on the minor street approach, with drivers using major street traffic gaps lower than the HCM values to complete turn movements. Vehicles also occasionally made illegal two-stage left turns at the Cook Avenue and US 20, using the US 20 left turn lanes as median storage for the staged movement.
- **US 20 and Hamby Road**: The north-south demand at this intersection has increased in recent years due to congestion issues on 27th Street. US 20 traffic travels a high speed (speed recently lowered to 45 mph from 55 mph) at this location. However, drivers using Hamby still make aggressive gap acceptance decisions, especially for through movements. This driving behavior leads to some of the safety issues discussed in the following sections.
- **Bend Parkway (US 97) and Right In/Right Out Access Locations:** The issues at these intersections (Bend Parkway and Lafayette, Hawthorne, Truman, etc.) are discussed in Phase 1 of the Bend Parkway Study. The main issue at these locations is aggressive minor street right turn movements onto the Parkway, with gap acceptance averaging closer to 5.0 seconds than the typical 6.9 seconds assumed by the HCM methodology. Lower gap acceptance indicates aggressive driving behavior and is typically a symptom of heavy traffic on the mainline approach.

Figure 13: Study Intersections that Fail to Meet Mobility Targets in 2018



In addition to HCM intersection operations analysis, Phase 1 of the Bend Parkway Study (date) included Travel Time Reliability analysis of the US 97 Corridor through the City of Bend. Travel time reliability is a measure of the consistency in travel times over a corridor. Even in a congested corridor, if travel times can be confidently predicted drivers can plan their trips to arrive on time. However, where consistent travel times are less reliable, unexpected delays can make trip planning a frustrating experience. Travel time reliability is especially important for freight, as unreliable travel times may impact freight scheduling logistics. In addition, congestion indicated by travel time analysis leads to inefficient freight movement and increased emissions for trucks idling in traffic.

The Parkway Study found that peak period travel time (4:30 – 5:30 PM) was unreliable on the US 97 study corridor north of Empire Boulevard due to the congested nature of the peak periods at the at-grade intersections, mainly Cooley Road and Robal Road, see Appendix. US 97 south of Reed Market Road was also unreliable due to the at-grade intersection at Powers Road and the construction that has taken place over the past three years (e.g., Murphy Road interchange). The US 20/US 97 Business/SE 3rd Street corridor generally experiences worse travel time reliability than the Parkway. The worse reliability is likely due to the frequency of driveways and intersections along that corridor versus the Parkway's controlled access.

Key congestion findings for motor vehicles facilities include:

Signalized Intersections:

- **Capacity Issues for signals at Cooley Rd/Robal Rd and US 97**
- **Queuing issues on Hwy 20 (3rd Street) between Empire Blvd and Division St**
- **Significant queuing and delay due to east-west demand intersecting 3rd Street (between Revere Ave and Reed Market Rd)**
- **Heavy queuing on 8th St at US 20 (Greenwood Blvd)**
- **Queuing and heavy volume on 27th St and Purcell Blvd at US 20 (Greenwood Blvd)**
- **Unreliable travel time on US 97 in the Cooley/Robal Road and Powers Road areas**

Roundabouts:

- **Heavy demand and queuing at Brookswood Blvd/Reed Market Rd/Bond St roundabout**

Two-Way Stop Controlled (TWSC) Intersections:

- **Heavy mainline seasonal demand on US 20 north of Empire creates aggressive driving behavior at TWSC intersections**
- **Trip diversion observed from 27th Avenue to Hamby Road, combined with high mainline volumes, creates aggressive driver behavior at Hamby Rd/US 20**
- **Aggressive driver behavior observed at the Right In/Right Out locations along the Bend Parkway**

Other Issues:

- **Congestion at Powers Rd and US 97 triggered by limited connectivity in the area**
- **High intensity school-related peaking on Mt Washington Dr**

Traffic Safety

The current work program focuses on high level, regional safety issues. More detailed safety analysis will be performed as part of the upcoming Bend TSAP work program.

Crash data for the most recent six years available (2011-2016) on all roadways within the study area was obtained from ODOT. There were 4,953 reported vehicle crashes within the study area during the six-year span shown in Figure 14, yielding an average of over 826 crashes per year. For comparison to similar sized cities in Oregon (nine cities of 50,000 to 110,000 population), the number of annual crashes each year in Bend is one of the lowest on a per-capita basis.

Of the 4,953 vehicle crashes, there were 18 fatalities, 2,285 injuries, and 2,650 property-damage-only crashes. Although not part of the analysis period, it is important to note that there were two fatalities at the US 20/Hamby Road intersection between December 2017 and April 2018.

Approximately 70% of the crashes in the study period occurred at an intersection, 25% along a straight roadway segment and the remaining 5% of crashes occurred on other roadway characteristics such as on a bridge or on a curve. The majority of crashes involved an angle, rear-end or turning crash type. Other crash types include head-on, fixed object and sideswipe crashes.

Speed was a contributing factor for about 30% of the crashes, improper driving or disregarding the traffic control device accounted for about 15% of the crashes, careless or reckless driving accounted for about 12% of the crashes and failing to yield the right-of-way accounted for about 25% of the crashes.

There following 17 areas have been identified as high frequency crash locations relative to other intersections or roadways within the study area:

- US 20/Cook Avenue Intersection
- US 20/Old Bend-Redmond Highway Intersection
- US 20/Cooley Road Intersection
- US 20/Robal Road Intersection
- US 97/Cooley Road Intersection
- US 97/Robal Road Intersection
- Empire Avenue between US 20 and Boyd Acres Road
- US 20 between O.B. Riley Road and Division Street
- 3rd Street (US 20) between Revere Avenue and Murphy Road
- 8th Street between Revere Avenue and Greenwood Avenue (US 20)
- Neff Road/Purcell Boulevard Intersection
- Neff Road/27th Street Intersection
- Greenwood Avenue (US 20)/27th Street Intersection

- 15th Street/Reed Market Road Intersection[12]
- US 97 Pinebrook Boulevard Intersection[13]
- Powers Road between US 97 Southbound Ramps and 3rd Street
- Downtown Bend, along Franklin Avenue, Oregon Avenue, Bond Street, and Wall Street

ODOT Safety Priority Index System (SPIS)

ODOT maintains SPIS to identify potential safety problems on state highways. The SPIS network screening process aims to identify sites with higher crash histories for potential safety improvements. The highway is divided into one-tenth of a mile segments and those segments are ranked in terms of safety cost effectiveness. Each year ODOT develops a list of the top 10% SPIS sites. The most recent SPIS list[14] indicates that there are nine sites on state facilities within the study area that rank among the top 10% of SPIS sites. The nine sites located along US 97 and US 20 are listed in Table 2.

Table 2. Bend Area Top 10% ODOT On-State Facility SPIS Site Summary[a]

Highway	BMP[b]	EMP[c]	ADT[d]	Total Crashes	F & A Injury Crashes[e]	City/County	Connection
US 97	139.89	140.03	22,900	22	0	Bend	Powers
US 97	140.46	140.61	17,100	25	0	Bend	Pinebrook
US 20 (Central Oregon)	0.51	0.60	16.800	26	0	Bend	NE 4th Street
US 20 (Central Oregon)	0.60	0.68	16,800	22	0	Bend	NE 5th Street
US 20 (Central Oregon)	0.87	1.03	21,000	26	1	Bend	NE 8th Street
US 20 (Central Oregon)	0.96	1.05	21,000	24	0	Bend	NE 9th Street
US 20 (Central Oregon)	2.45	2.63	14,700	21	1	Bend	27th Street
US 20 (Central Oregon)	3.47	3.65	11,166	14	2	Deschutes County	Hamby Road/Ward Road
US 20 (McKenzie-Bend)	20.59	20.77	19,133	32	1	Bend	NE Olney Avenue

[a] ODOT SPIS Report 2016 (2013-2015 Data)
[b] BMP = Beginning Milepoint
[c] EMP = Ending Milepoint
[d] ADT = Average Daily Traffic
[e] F & A Injury Crashes = Fatal and Serious Injury Crashes

In addition, there are 10 sites on non-state facilities within the study area that rank among the top 10% of SPIS sites and are listed below.

- Northeast Franklin Avenue between 1st Street and 3rd Street
- Northwest Franklin Avenue near Sisemore Street

[12] Majority (about 80%) of the reported crashes at this intersection (between 2011-2016) occurred before the roundabout was constructed in the Fall of 2014.

[13] All of the reported crashes at this intersection (between 2011-2016) occurred before the median was installed in November 2015.

[14] 2016 On-State Top 10% SPIS Groups Table, ODOT, Region 4, November 2017.

- Northeast Neff Road near Purcell Boulevard
- Northeast Purcell Boulevard near Neff Road
- Northwest 9th Street between Portland Avenue and Ogden Avenue
- Powers Road near Parrell Road
- Southeast 3rd Street near Roosevelt Avenue
- Southeast 3rd Street between Miller Avenue and Woodland Boulevard
- Reed Market Road near 3rd Street
- Wilson Avenue between 2nd Street and 3rd Street

Bend Parkway Study Safety Findings

The US 97 Parkway Plan[15] analyzed crash data from 2011-2015. Critical crash rates, excess proportion of crashes, and SPIS ratings were used to flag safety-focus locations. The analysis identified the following 19 safety focus areas:

- US 97 & Cooley Road
- US 97 & Robal Road
- US 97 & Nels Anderson Place
- US 97 Southbound Ramps & Empire Boulevard
- US 20 & Butler Market Road
- US 97 Southbound Ramps & Butler Market Road
- US 97 Northbound Ramps & Revere Avenue
- US 97 Southbound Ramps & Revere Avenue
- US 97 & Lafayette Avenue
- US 97 & Hawthorne Avenue
- US 97 Southbound Ramps & Colorado Avenue
- US 97 Northbound Ramps & Reed Market Road
- US 97 Southbound Ramps & Powers Road
- US 97 & Powers Road
- US 97 Northbound Ramps & Powers Road
- US 97 & Badger Road
- US 97 & Pinebrook Boulevard
- US 97 & Ponderosa Street
- US 97 Southbound Ramps & Baker Road

[15] DRAFT Technical Memorandum #2: Existing Conditions – US 97 Parkway Plan, DKS Associates, August 11, 2017.

Other Safety Studies

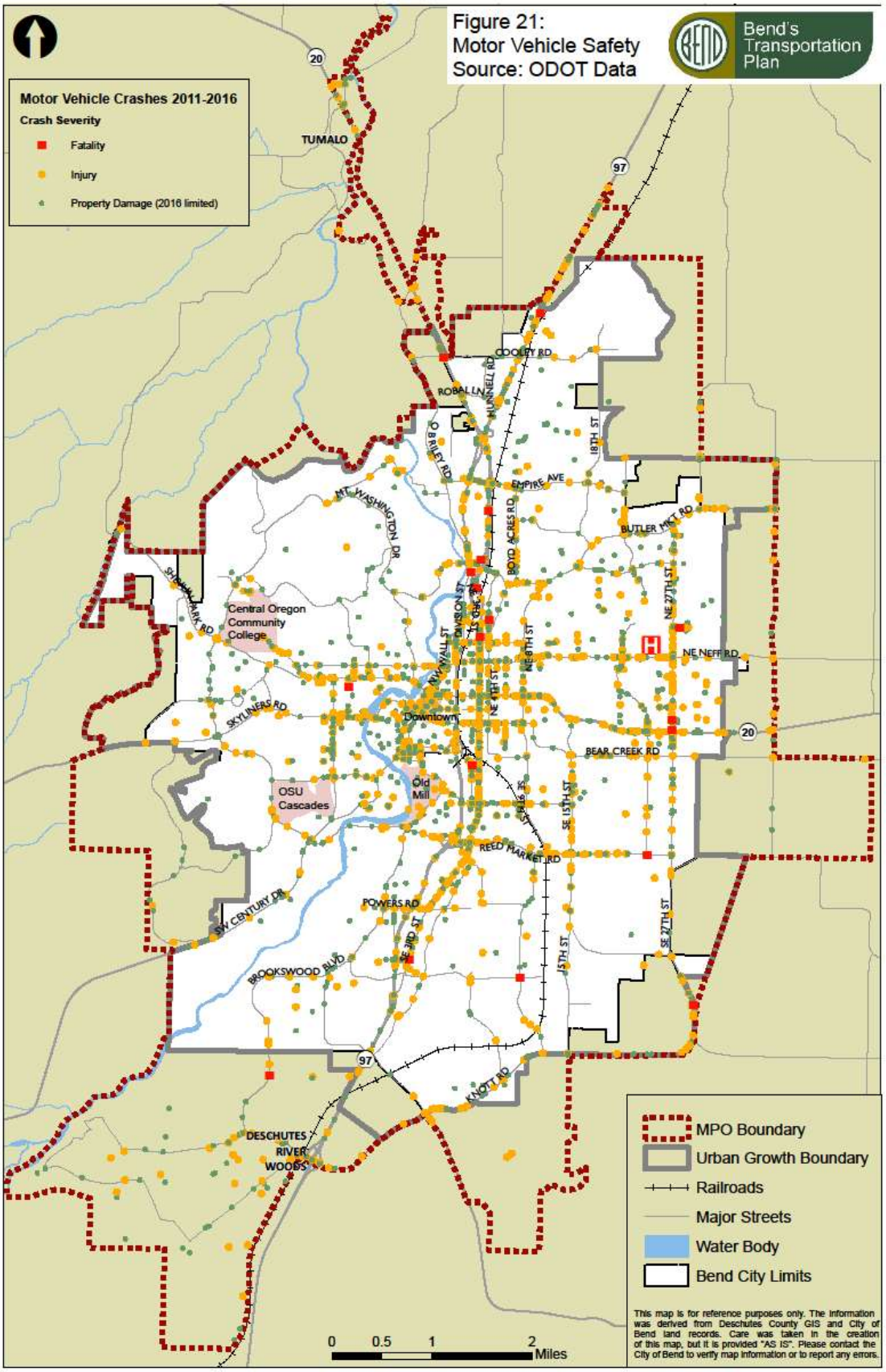
It is important to note that there are current safety analysis projects throughout the study area. For example, the ODOT All Roads Transportation Safety Program project is currently underway. Hot-spot crash locations involving fatal and serious injury crashes will be identified based on crashes between 2011 and 2015. The program uses a data-driven process that helps to prioritize safety projects for all public roadways. In addition, ODOT is performing a study on the US 20 corridor through Bend from Empire to 27th Street that will include recommendations for safety improvements.

Also, the Oregon TSAP Update was updated in 2017 and identifies transportation safety strategies for Oregon. Emphasis areas were identified based on crash frequency and injury severity, then used to help prioritize improvement programs. The TSAP identifies performance measures and sets annual targets to meet the overall safety vision of no fatalities or life-changing injuries on Oregon's transportation system by 2035. A TSAP will also be developed for the Bend area, with an expected completion date of early 2019. Results will be incorporated into the TSP and MTP.

Key safety findings for motor vehicles facilities include:

- **For comparison to similar sized cities in Oregon (nine cities of 50,000 to 110,000 population, the number of annual crashes each year in Bend is one of the lowest on a per-capita basis.**
- **18 high frequency crash locations were identified. Key areas or corridors include US 97, US 20/3rd Street, Empire Avenue, Downtown Bend, Neff Road, Reed Market Road, and 27th Street.**
- **Aggressive driving behavior (turning and crossing movements) was observed at two-way stop-controlled intersections along high speed/volume roadways (e.g., for US 20/Hamby Road and US 20/O.B. Riley/Cook Avenue.**
- **Nine segments on state facilities and 10 sites on non-state facilities were identified as top 10% ODOT SPIS locations.**
- **The Bend Parkway Plan (Phase 1), completed in August 2017 identified 19 safety focus areas on and near US 97.**
- **There are safety studies being completed concurrently with this MTP/TSP update process that will identify hot-spot crash locations and emphasis areas based on injury severity and crash frequency.**

Figure 14: Bend and BMPO Vehicle Crashes and Hot-Spots (2011-2016)



Transit Facilities

Public transportation in and around the study area is provided by CET through fixed-route service, inter-city bus service and recreational shuttle service. Transit options are available to/from the City of Bend, while there is currently no transit service from Bend to Tumalo.

Fixed Route Service

CET provides local fixed route service in Bend. There are currently 9 routes (Route 12 was eliminated on July 1, 2018) operating based on a "hub and spoke" pattern from the Hawthorne Station transit center, refer to Figure 15 for current routes. Service is provided on these routes between about 6:00 AM and 7:30 PM on weekdays and 7:30 AM and 5:30 PM on Saturday. Routes 1 (south 3rd Street), 3 (Newport Avenue), 4 (north 3rd Street), and 7 (Greenwood Avenue are the highest ridership routes in the system.

There is currently no local fixed route service on Sundays. Local fixed route service covers most of the central portions of the City of Bend. There are no transit routes covering outer northwest, northeast, and southeast quadrants of the city. The close-in communities of Tumalo and Deschutes River Woods also do not have fixed transit service.

CET also operates Dial-A-Ride, a complementary curb-to-curb, shared transit service, for low-income seniors and people with disabilities.

Highlights of access to transit service within the study area include:

- 53% of the population is within ¼ mile of transit service
- 85% of the employment is within ¼ mile of transit service
- 35% of arterial and collector roadways within ¼ mile of a CET transit stop have sidewalks.
- 47% of arterial and collector roadways within ¼ mile of a CET transit stop have dedicated bicycle facilities.
- Note that these numbers do not include the impacts to transit access due to the closure of Route 12.

Roadway Congestion Impacts to Transit Service

Traffic congestion throughout the network impacts the transit service reliability during the p.m. peak hour. Key transit corridors with significant p.m. peak hour traffic congestion include:

- 3rd Street (US 20 portion)
- Greenwood Avenue (US 20)
- 27th Street
- US 97 at Robal Road
- Brookswood Boulevard at Reed Market Road roundabout
- East-west bridge crossings of the Deschutes River (Colorado Ave, Galveston Ave and Newport Ave)
- Colorado Avenue at Simpson Avenue roundabout

The traffic congestion on these corridors degrades the quality of service and schedule reliability for transit drivers.

Inter-city Passenger Bus Service

CET provides regional connections to other cities in Central Oregon including:

- Route 24 - provides service between Redmond and Bend, with nine total round trips per weekday (no weekend service). The first bus departs Bend at 6:37 AM and the last bus arrives in Redmond at 8:27 PM.
- Route 29 - provides service between Sisters and Bend, with three total round trips per weekday (no weekend service). The first bus departs Bend at 6:40 AM and the last bus arrives in Bend at 6:17 PM.
- Route 30 - provides service between La Pine and Bend, with four total round trips per weekday (no weekend service). The first bus departs Bend at 7:35 AM and the last bus arrives in Bend at 5:12 PM.

There is also transit service available for inter-city connections outside of Central Oregon which include:

- Central Oregon Breeze – provides daily bus service between Bend and Portland with stops in Redmond, Terrebonne, Madras, Warm Springs, Government Camp, Welches, Sandy, Gresham, Portland Airport and Portland Union Station. The bus departs Bend at 7:00 AM and arrives in Portland at 11:00 AM; the return trip departs Portland at 1:30 PM and arrives in Bend at 6:00 PM. On Fridays and Sundays, a second bus departs Bend at 11:30 AM and arrives in Portland at 3:45 PM; the return trip departs Portland at 6:00 PM and arrives in Bend at 10:30 PM. During the holiday season (during Thanksgiving week and 10 days before Christmas thru a couple of days after the New Year), the second bus runs every day of the week.
- High Desert Point –an Amtrak shuttle service that provides service between Redmond Airport and Chemult Amtrak Station with stops in Bend, Sunriver and La Pine. There is one trip per day in each direction.
- Pacific Crest Bus Lines – provides daily bus service between Eugene and Bend with one stop in Sisters. There is one trip per day in each direction departing Bend
- Eastern Point – provides daily bus service between Bend and Ontario with stops in Brothers, Hampton, Riley, Burns, Buchanan, Drewsey Junction, Juntura, Harper and Vale. There is one trip per day in each direction.
- The People Mover – provides two daily bus services between Prairie City and Bend and Monument and Bend with one trip per day in each direction. The route between Prairie City and Bend stops in John Day, Mount Vernon, Dayville, Mitchell, Prineville, and Redmond. The route between Monument and Bend stops in Dayville, Mitchell, Prineville, and Redmond.

Recreational Bus Service

CET provides seasonal transit service including

- Ride the River – provides service between the Drake Park river 'get out' and the Old Mill 'put in' to help reduce the dependence of parking along Drake Park. This service is typically available between mid-June and Labor Day. This shuttle costs $3.00, which provides unlimited rides all day.
- Mountain Bus Service – provides service during the ski season between Hawthorne Station and Mt. Bachelor. There are stops at the Mt. Bachelor Park-N-Ride, Virginia Meissner Sno Park and Mt. Bachelor's West Village Lodge.
- Lava Butte Shuttle – provides service from the Lava Lands National Monument visitor's center to the summit of Lava Butte. This service is typically available between Memorial Day and Labor Day. This shuttle costs $2.00 per ride.
- Ride Bend – provides a free shuttle service between downtown Bend, Old Mill District, OSU Cascades, and Galveston Avenue. In 2018, the shuttle will operate June 29 through Labor Day, 7 days a week, Noon – 10 pm. Buses run every 15 minutes.

Other Transport Services

Other transportation services such as taxis, volunteer services and rides provided by provide door-to-door service and last-mile connections. They also typically operate during all hours of the day for trips that may fall outside of the regularly scheduled transit services. There are taxi services based in Bend that serve residents throughout the study area. TNCs such as Uber and Lyft are also currently available in Bend. These modes of travel are particularly popular for travel to/from the Redmond Airport, located in southeast Redmond.

Key transit system findings include:

Connectivity/Coverage:

- **Lack of consistent transit options for the Tumalo and Deschutes River Woods communities.**
- **Lack of transit service in the outer sections of northwest, northeast and southeast corners of City of Bend, except for Dial-a-Ride (available to qualified riders)**
- **Lack of transit service on Sundays**
- **Limited inter-city and regional service**
- **Transportation Network Companies (Lyft and Uber) are new to the area, providing additional coverage and hours of service.**

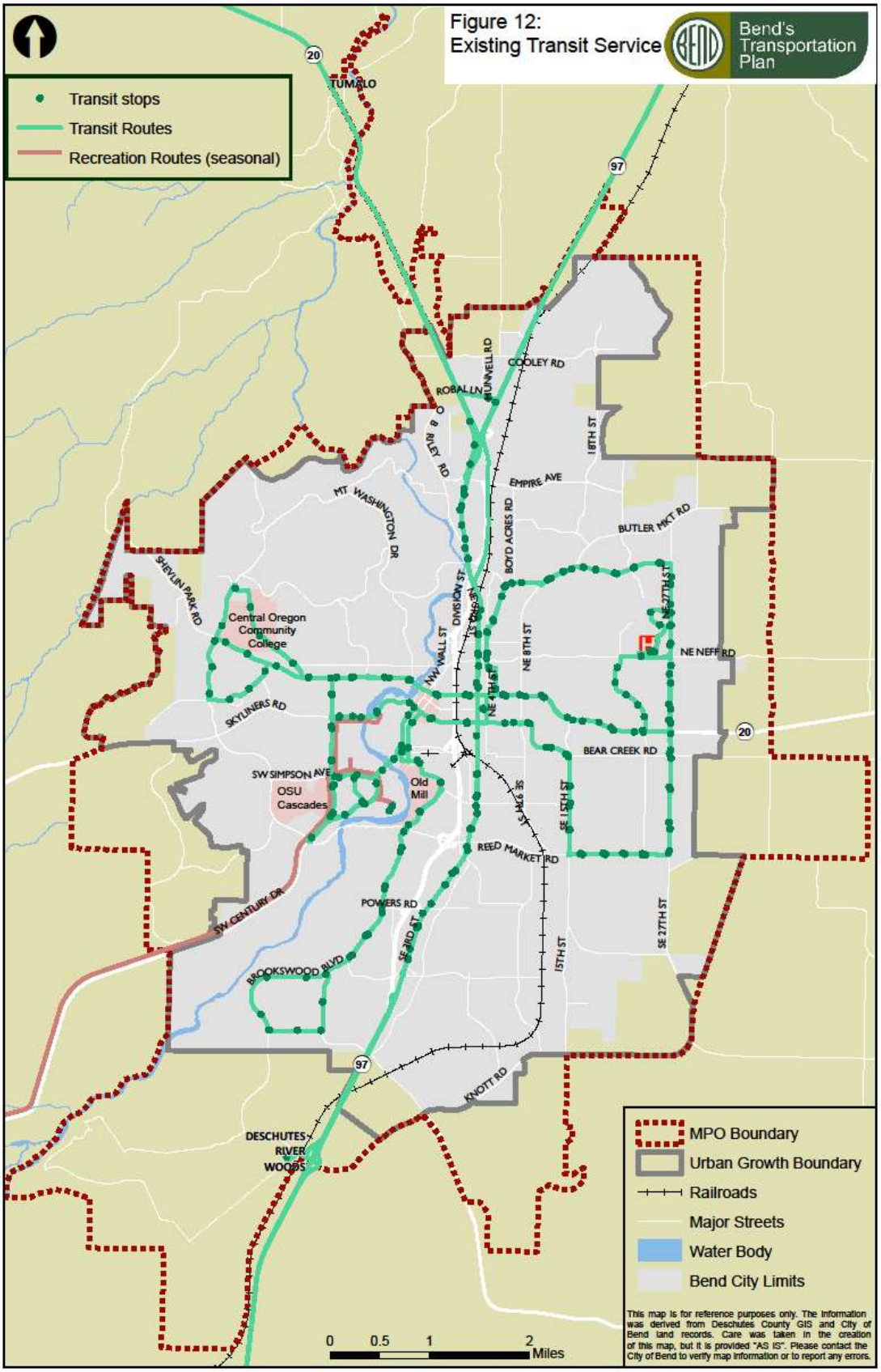
Access:

- **Majority of employment is within ¼ mile of transit service line, while only half of households are within a ¼ mile of transit service.**
- **Less than half of the arterial and collector roadways within ¼ mile of a CET transit stop have sidewalks on at least one side of the roadway (35%) and dedicated bicycle facilities (47%).**

Congestion Impacts on Operations:

- **Motor vehicle congestion at key locations on US 20, US 97, 27th Street, and east-west bridge crossings impact transit service reliability during the p.m. peak hour.**
- **Two roundabouts Colorado Avenue/Simpson Avenue and Brookswood Boulevard/Reed Market Road impact transit service reliability during the p.m. peak hour.**

Figure 15: Bend and BMPO Existing Transit Facilities



Pedestrian Facilities

This section describes the existing pedestrian facilities within the study area from a high-level regional perspective. Phase 2 of the work program will evaluate more detailed, neighborhood-level needs (including key crossing needs, connections to key destinations, continuity of facilities along corridors, etc.).

Pedestrian facilities include sidewalks, multi-use paths, trails, and crosswalks that help facilitate safe and efficient pedestrian travel. Existing pedestrian connectivity (presence of facilities) and pedestrian-related crashes were reviewed to identify gaps in the system and pinpoint major safety issues. Further pedestrian safety analysis will be included in the Bend Transportation Safety Action Plan (TSAP) future work program.

High-pedestrian activity locations include:

- Downtown
- Business Districts such as Downtown, Galveston, Newport, Medical Center area
- Recreational hubs (river and parks)
- Educational institutions

Pedestrian Facility Connectivity

Walking plays an important role in Bend's and BMPO's transportation mobility, and planning for people to walk helps provide a complete multi-modal transportation system. A complete system creates options and overall resiliency of the system to absorb social, environmental and technological changes over time. It also supports healthy lifestyles and addresses a social equity need to ensure that the young, the elderly, and those without access to a car have access to goods, services, employment, and education.

Figure 16 shows the locations of existing sidewalks along arterial and collector streets within the study area. The inventory process involved field reviews and digital mapping resources.

Overall, most of the arterial and collector roadways have sidewalks on at least one side of the roadway. There are approximately 205 miles of arterial and collector roadways within the BMPO area and about 140 miles of roadways have sidewalks on at least one side of the road. The southwest and southeast portions of the study area (much of which were developed with rural facilities at the time of development and incorporated into Bend in 1998) lack sidewalks, including Knott Road, 27th Street, and Century Drive. In addition, barriers such as high speed, wider streets, the Deschutes River, the BNSF railroad, and Bend Parkway (US 97) limit east-west pedestrian connectivity.

To evaluate significant regional facility gaps relative to barriers, the grid-system of arterial and collector corridors was reviewed to determine if through-corridors are spaced at one-mile apart for arterials and one-half mile apart for collectors, as is planned for in the City's existing TSP. Relative to crossings of major barriers that would be high-cost to cross (with grade-separated facilities), gaps are defined as locations where one-mile spacing of arterials are not provided.

In the core area of Bend where land use density lead to higher active transportation demand, a half-mile maximum spacing including collector corridors was applied. As shown in Figure 17, there are seven major locations of pedestrian connectivity gaps in the study area based on this methodology.

Figure 16. Bend and BMPO Existing Sidewalks

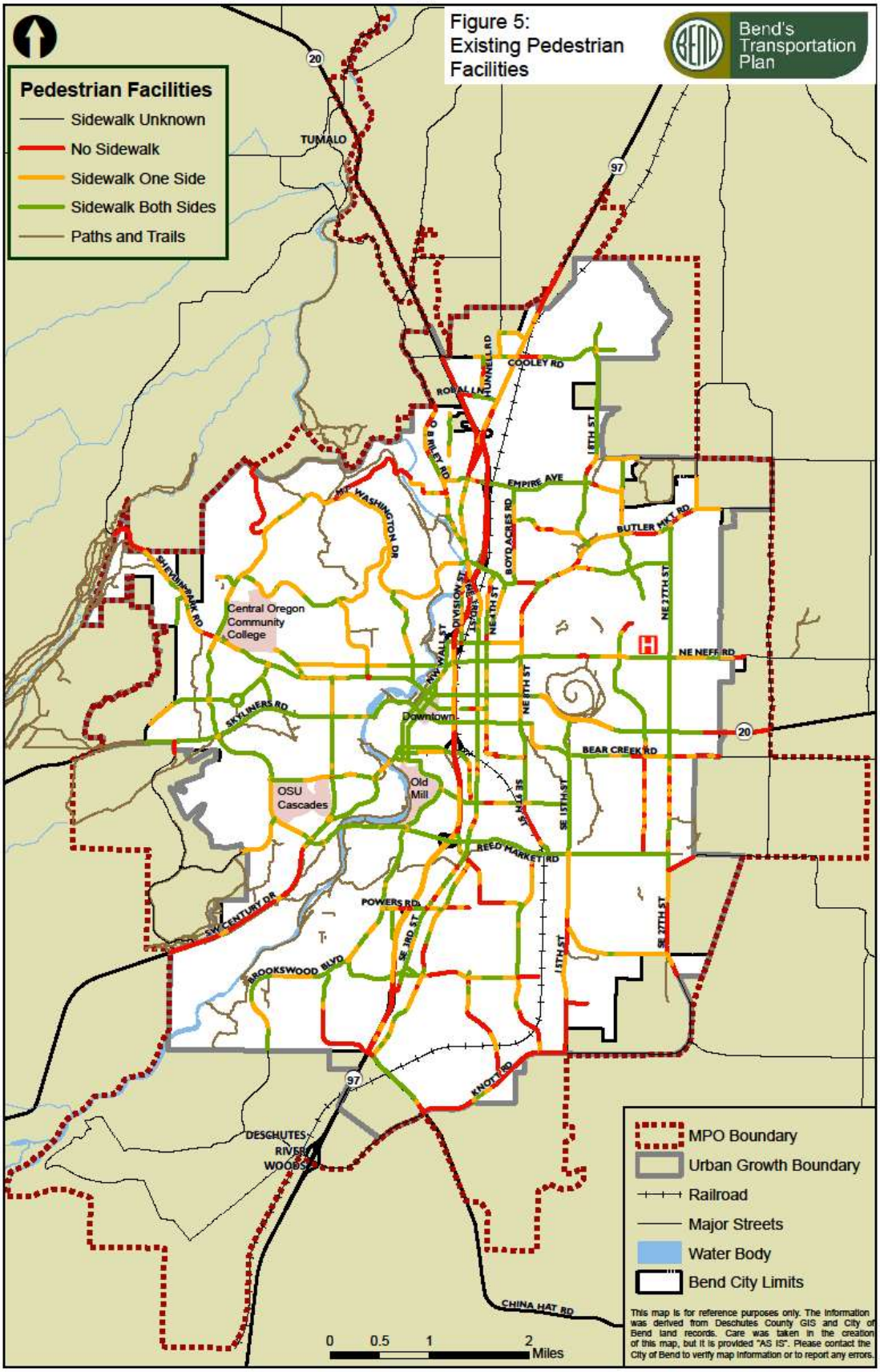
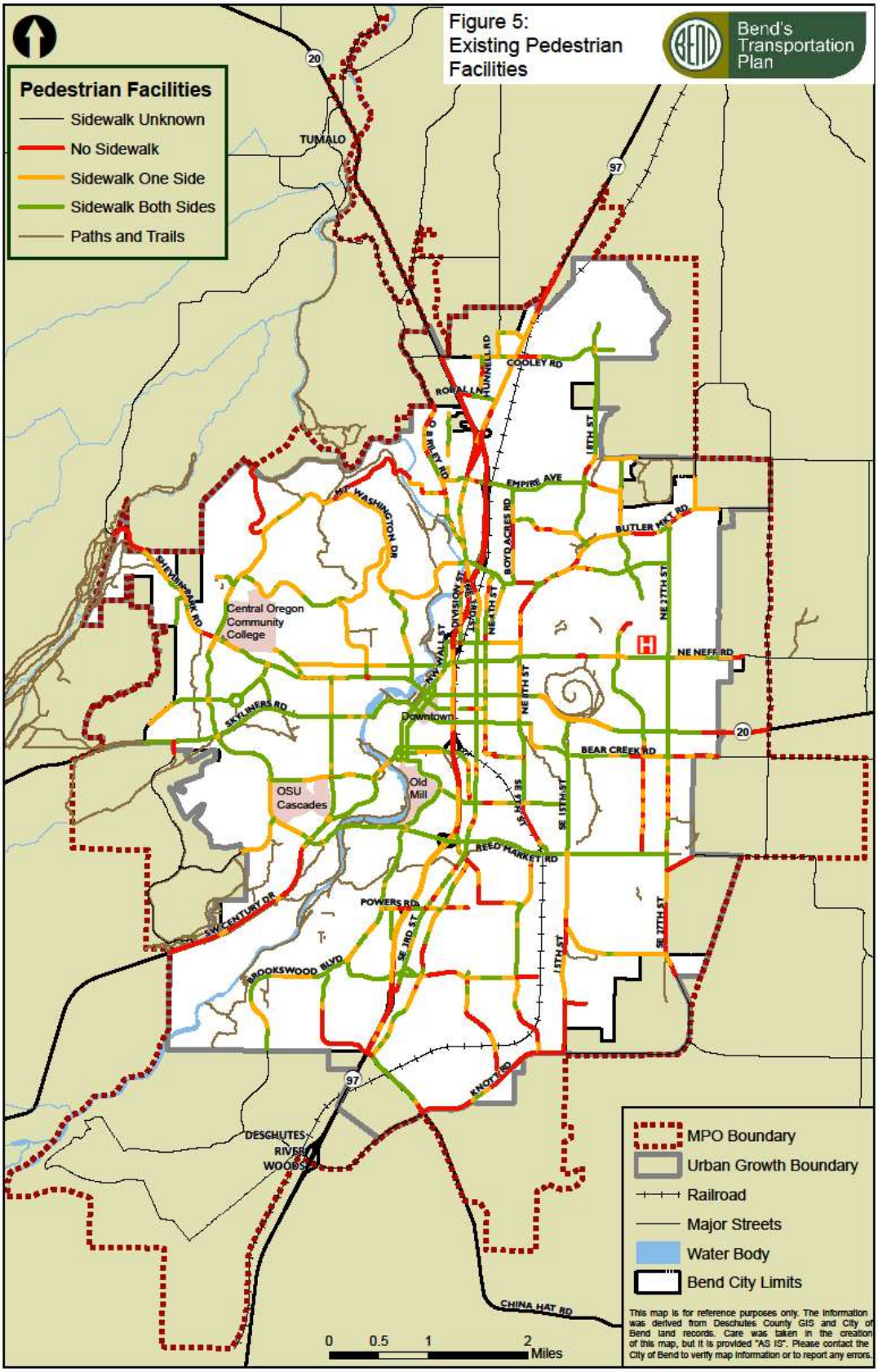


Figure 17. Bend and BMPO Existing Sidewalk Gaps



Pedestrian Safety

When looking at pedestrian travel, it is important to consider the safety aspects of the pedestrian system. Careful attention must be directed towards pedestrian crossings and locations where people walking are exposed to high vehicle speeds and volumes.

Crash data for the most recent six years available (2011-2016) on all roadways within the study area was obtained from ODOT and used to evaluate vehicle-pedestrian crash history. There were 66 vehicle-pedestrian crashes reported during the six-year span, shown in Figure 18, which is an average of 11 crashes per year. In comparison to similar sized cities in Oregon (cities of 50,000 to 110,000 population), the number of annual crashes involving pedestrians each year in Bend is the lowest on a per-capita basis.

Of the 66 vehicle-pedestrian crashes, there were seven pedestrian fatalities, 55 injuries, and three property-damage-only (PDO) crashes. Three of the fatal crashes occurred on US 20 between Butler Market Road and Revere Avenue and one fatal crash occurred on 4th Street between Butler Market Road and Revere Avenue. Most of the fatal crashes occurred under dark lighting conditions and dry road surface conditions. Of the seven fatal pedestrian crashes, the pedestrian was deemed at fault for four crashes, primarily because the pedestrian was illegally in the roadway; for example, the pedestrian disregarded the traffic signal.

There are clusters of vehicle-pedestrian crashes in the downtown area, along 3rd Street and along Galveston Avenue. Approximately 65% of the 66 vehicle-pedestrian crashes were at an intersection or alley, 34% occurred along a straight roadway segment, and the remaining crashes occurred on a hill. A majority (77%) of vehicle-pedestrian crashes occurred on dry pavement conditions, 12% occurred on icy or snowy pavement conditions, 8% occurred on wet pavement conditions, and the pavement conditions are unknown for the remaining crashes.

Key pedestrian system findings include:

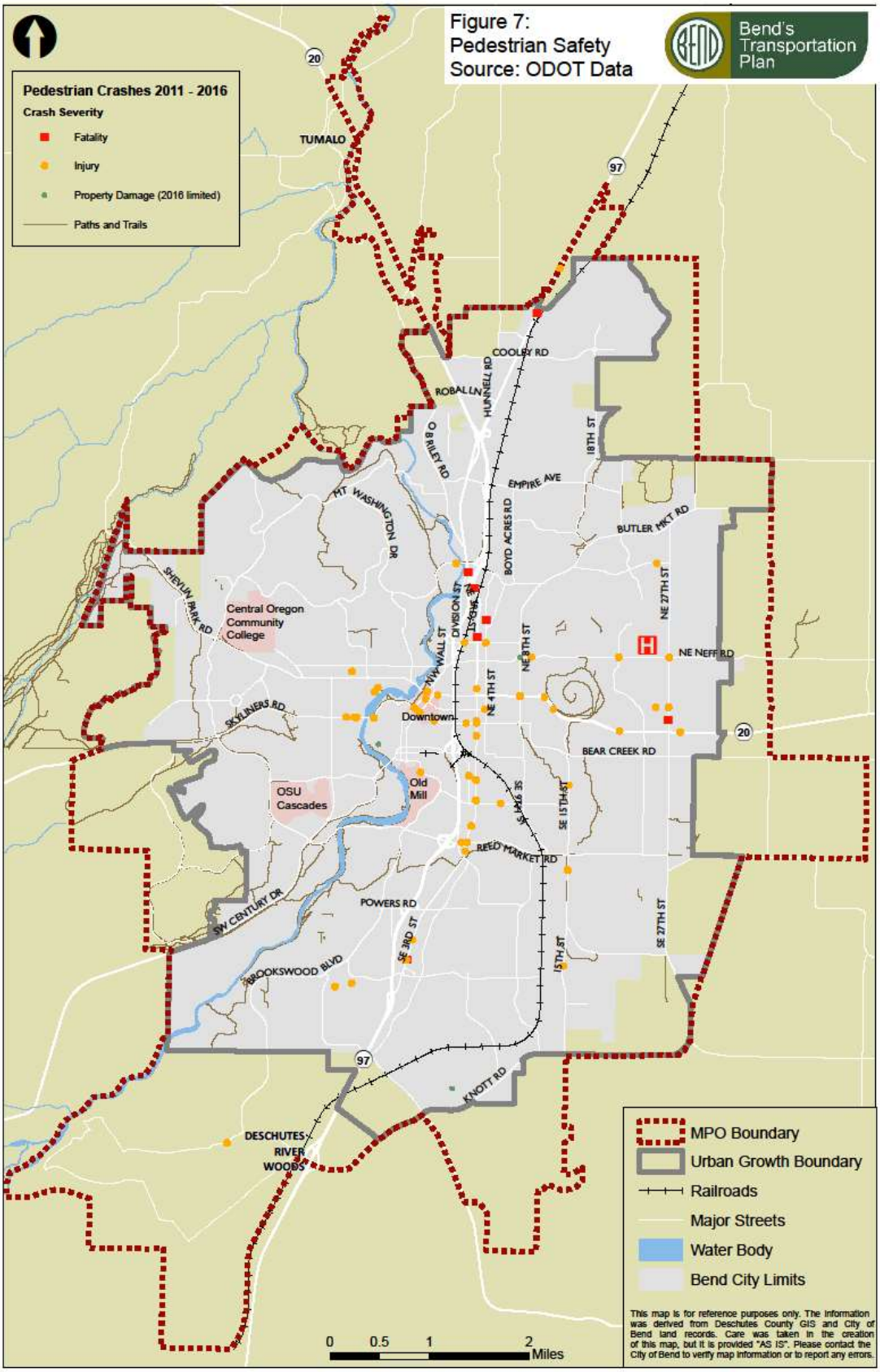
Connectivity:

- **Regional-level pedestrian corridor connectivity is limited by major barriers including US 97, US 20, the railroad tracks, and the Deschutes River. Seven gaps in the regional arterial and collector network were identified.**
- **Approximately 78% of arterial and collector roadways have sidewalks on one or both sides of the road.**
- **Some neighborhoods have a relatively high-portion of arterial and collectors without sidewalks, particularly in developed areas annexed into the City such as southwest and southeast Bend.**

Safety:

- **Injury and fatal crashes involving pedestrians are clustered along higher-speed, higher-volume roadways, and multi-lane roadways lacking enhanced crossings (e.g., 3rd Street).**

Figure 18. Bend and BMPO Vehicle-Pedestrian Crashes (2011-2016)



Bicycle Facilities

Bicycle facilities (including bicycle lanes and multi-use paths) along arterial and collector streets within the study area were reviewed to identify regional-level existing gaps in the network. Phase 2 of the work program will evaluate more detailed, neighborhood-level needs (including key crossing needs, connections to key destinations, continuity of facilities along corridors, etc.). The bicycle operations and crash history within the study area are described below.

Bicycle Facility Connectivity

Figure 19 shows the existing bicycle facilities in the study area. These facilities were compiled using Deschutes County GIS records. The majority of the collectors and arterials in the study area provide on-street paved bike lanes. The City of Bend standard bike lane width is 6 feet[16], meeting the ODOT standard.[17] Bike lanes currently connect the north, south, east, and west of Bend's city limits, providing cyclists a wide number of through-route options. For the most part, bike lanes are provided on both sides of roadways, totaling an estimated 108 miles in length.

Some key corridors in the core area of the study area lack dedicated bicycle facilities, including sections of 3rd Street, 4th Street, Greenwood Avenue, and Hawthorne Avenue. The fringes of the study area also have gaps in the bicycle network. Table 3 identifies the existing bike lane deficiency areas on arterials and collector roadways within the study area.

Barriers, including the Deschutes River, the BNSF railroad, and Bend Parkway (US 97) limit east-west bicycle connectivity in Bend. As described in the pedestrian facilities discussion, a regional facility spacing evaluation was conducted to determine bicycle system gaps relative to major barriers for the bicycle network. As show in Figure 20, there are seven major locations of bicycle through-corridor gaps in the study area. The City also has some enhanced bike facilities such as a raised bike lane on Reed Market Road, green bike lanes on Riverside Boulevard and Franklin Avenue, and a protected bike lane on Bond Street and Franklin Avenue.

In addition to on-street bike lanes, the Bend and BMPO area features many paved and unpaved trails and walkways, also displayed in Figure 19. As shown, trails are provided along almost the entire extent of the Deschutes River within the study area, providing a scenic route for walkers, runners, and bicyclists. There are approximately 95 miles of public trail facilities in the study area. These trails serve as recreational facilities for people walking, running, and biking, and also provide active transportation routes for commuters.

Overall, the existing bike lane and trail system provides connections to and from many neighborhoods, schools, parks, and retail centers. Cyclists desiring to travel through the study area can select from the many designated routes on the major roadways or can share the road with motor vehicles on the lower volume, neighborhood streets to reach appropriate destinations.

[16] City of Bend Design Standards Part II, City of Bend, 2018.

[17] Highway Design Manual Chapter 13, ODOT, 2012. Page 13-3

Figure 19: Bend and BMPO Existing Bicycle Facilities

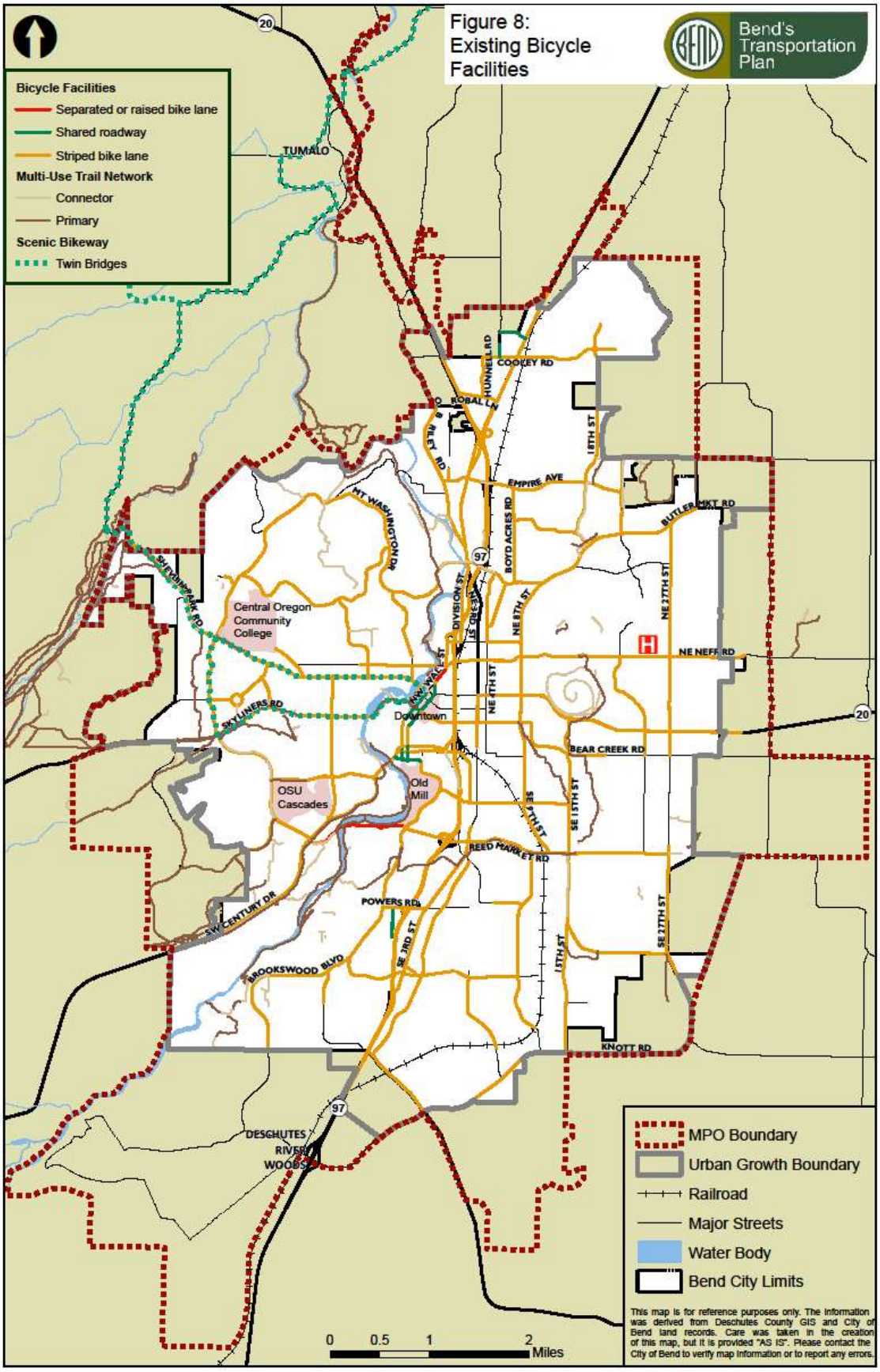


Figure 20: Bend and BMPO Existing Bicycle Facility Gaps

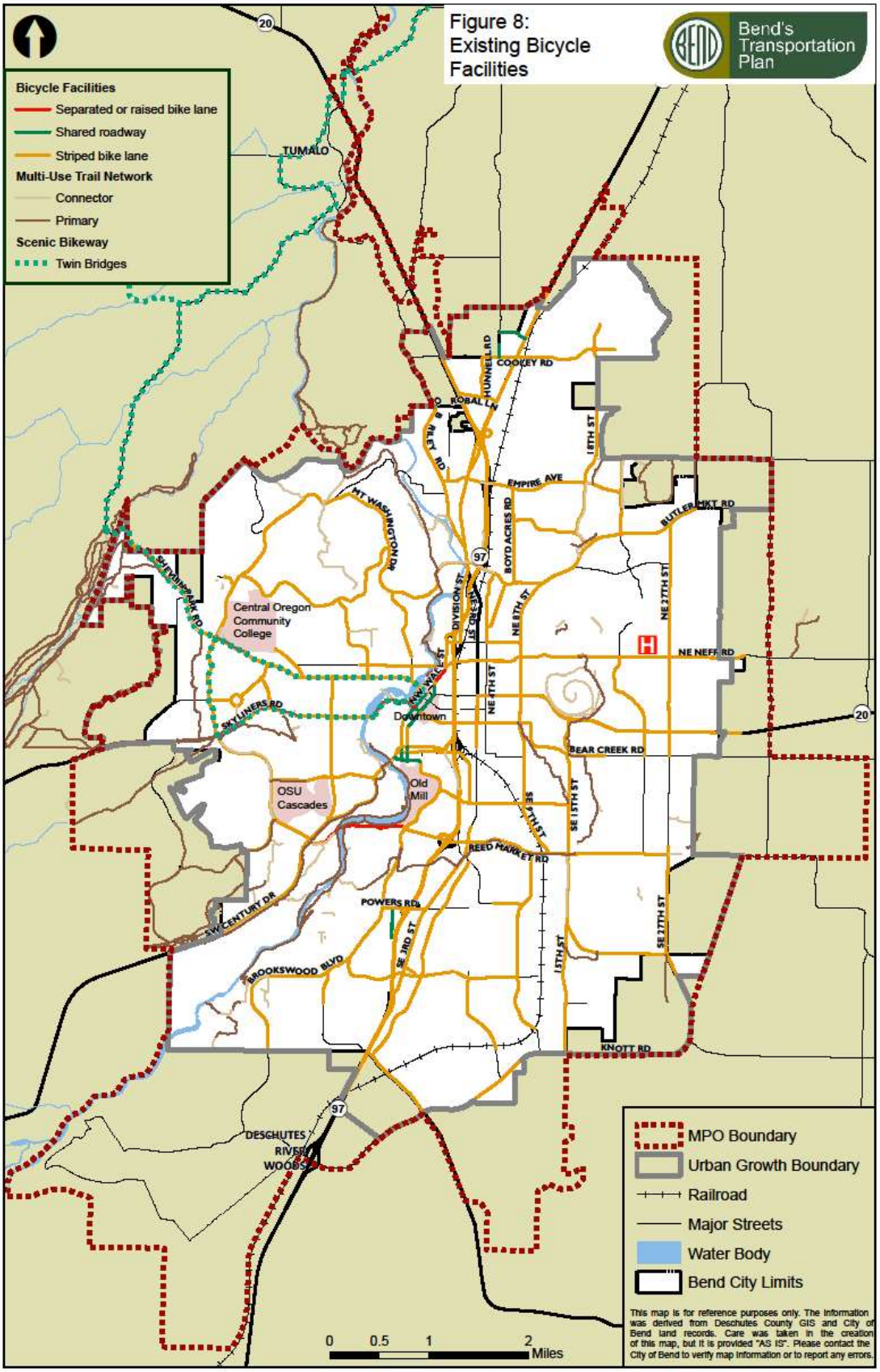


Table 3: Existing Bike Lane Deficiency Areas

Roadway	Extents	Functional Class	Area
Cooley Road	O.B. Riley Road to US 20	Major Collector	BMPO
Cooley Road	US 20 to NW Hunnell Road	Minor Arterial	Bend
Archie Briggs Road	Mt. Washington Drive to O.B. Riley	Major Collector	Bend
Britta Street	Hardy Road to Halfway Road	Major Collector	Bend
Putnam Road	Mt. Washington Drive to North UGB	Major Collector	Bend
Skyline Ranch Road	Chianti Lane to Shevlin Park Road	Major Collector	Bend
Portland Avenue	12th Street to College Way	Major Collector	Bend
Crosby Drive	NW Clearwater Drive to Skyliners Road	Major Collector	Bend
Skyline Ranch Road	Macalpine Loop to Skyliners Road	Major Collector	BMPO
Awbrey Road	Newport Avenue to Roanoke Avenue	Major Collector	Bend
Greenwood Avenue	Wall Street to 3rd Street	Minor Arterial	Bend
Hawthorne Avenue	Wall Street to US 97, US 97 to 4th Street	Major Collector	Bend
Revere Avenue	Division Street to 4th Street	Minor Arterial	Bend
3rd Street	Division Street to Irving, Cleveland Avenue north to Railroad tracks	Principal Arterial	Bend
4th Street	Revere Avenue to Franklin Avenue	Minor Arterial	Bend
4th Street	Franklin Avenue to Alden Avenue	Major Collector	Bend
Alden Avenue	4th Street to 5th Street	Major Collector	Bend
Logsden Street	Alden Avenue to Glenwood Drive	Major Collector	Bend
Glenwood Drive	Logsden Street to 9th Street	Major Collector	Bend
Wells Acres Road	Butler Market Road Street to 27th Street	Major Collector	Bend
Purcell Boulevard	Butler Market Road to South Terminus	Major Collector	Bend
Purcell Boulevard	Neff Road to North Terminus	Major Collector	Bend
Deschutes Market Road	Butler Market Road to North City Limits	Major Collector	BMPO

Roadway	Extents	Functional Class	Area
Bear Creek Road	Cessna Drive to 27th Street	Minor Arterial	Bend
Bear Creek Road	27th Street to East UGB	Major Collector	Bend
Pettigrew Road	Reed Market Road to Bear Creek Road	Major Collector	Bend
27th Street	Reed Market Road to Bear Creek Road	Major Arterial	Bend
Stevens Road	27th Street to East UGB	Minor Arterial	Bend
Brosterhous Road/Division Street	Cleveland Avenue to Kobe Street, Knott Road to Windsor Drive	Major Collector	Bend
Powers Road	3rd Street to Parrell Road	Major Collector	Bend
Chase Road	Parrell Road to East Terminus	Major Collector	Bend
Ponderosa Street/Lodgepole Drive	Mahogany Street to US 97	Major Collector	Bend
Country Club Drive	Mountain High Loop to Knott Road	Major Collector	Bend

Bicycle Facility User Environment

A "Bicycle Level of Traffic Stress" (LTS) analysis was conducted to characterize the bicycling experience on the arterial and collector system. This methodology[18] breaks road segments into four classifications for measuring the effects of traffic-based stress on bicycle riders and their effects on facility usage as well as safety. The measure of traffic stress quantifies the perceived safety issue of being in close proximity to vehicles, primarily considering the physical distance to traffic and the speed of traffic.

The results of the Bicycle LTS analysis are illustrated in Figure 21. Many of the existing high-stress locations, gaps, and barriers to safe bicycling are near key destinations that attract bicycle activity including:

- 27th Street and Neff Road near St. Charles Hospital
- 3rd Street/Hwy 20 along the retail/service corridor from US 97 to Murphy Road
- Century Drive and Colorado Avenue near OSU Cascades
- Greenwood Avenue crossing 3rd Street and US 97 near downtown Bend
- Newport Avenue near COCC

Bicycle Facility Safety

To evaluate bicycle safety within the study area, the most recent six years (2011-2016) of reported vehicle crashes made available by ODOT was reviewed and analyzed. There were 139 vehicle-bicycle crashes during the six-year span shown in Figure 22, yielding an average of 23

[18]Mineta Transportation Institute Report 11-19. *Low stress Bicycling and Network Connectivity.* May 2012. Analysis Procedures Manual Chapter 14.4, ODOT. December 2017.

serious crashes per year. For comparison to similar sized cities in Oregon (cities of 50,000 to 110,000 population, the number of annual crashes involving pedestrians each year in Bend is higher on a per-capita basis. Organized by location, 17% occurred at traffic signals, 9% occurred at roundabouts, 48% occurred at stop-controlled intersections and the remaining 26% occurred away from intersections.

The majority of vehicle-bicycle crashes (85%) involved a crossing or turning movement. About half of these involved either the bicycle or vehicle in the act of a turning maneuver while the other half of these involved either the bicycle or vehicle crossing a roadway (e.g. a vehicle traveling north to south colliding with a bicycle traveling east to west on the intersecting street).

There were 12 (9%) vehicle-bicycle crashes that occurred at single-lane roundabouts due to failing to yield right-of-way or following too closely. The remaining 6% of all vehicle-bicycle crashes involved rear-end, sideswipe, backing or parking collision types.

Of the 139 vehicle-bicycle crashes, there were two fatalities, 125 injuries, and 12 PDO crashes. One fatality occurred during the day and the crash was attributed to reckless driving, although the roadway was an unimproved arterial roadway with no bike lane, curb, or sidewalk. The second fatality occurred during dusk and the cyclists was illegally in the roadway and not visible (e.g. wearing dark or non-reflective clothing).

Figure 22 shows the majority of vehicle-bicycle crashes occurred on arterial and collector streets, most of which have dedicated bicycle facilities, but those facilities need to be modernized to prevent vehicle-bicycle crashes. Either the driver or cyclists failing to yield right of way was the crash cause in approximately 70% of these crashes. While this crash causation appears to be human error, the design of roadways, intersections, and crossings also contribute to the crash occurrence. The City is developing a Bicycle Facilities Design Guide to adjust designs to help prevent these crashes.

Figure 21: Bend and BMPO Existing Bicycle Level of Traffic Stress

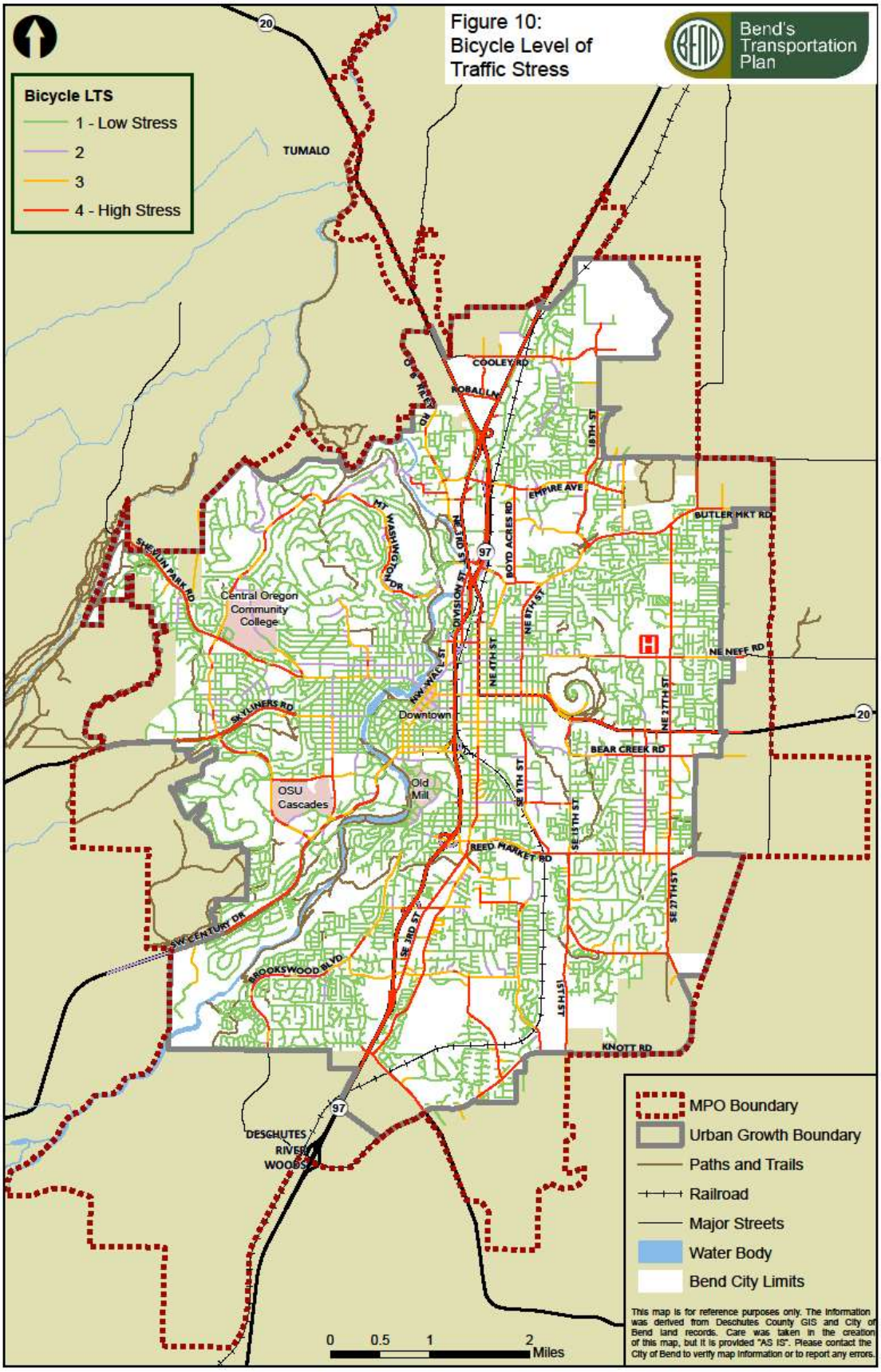
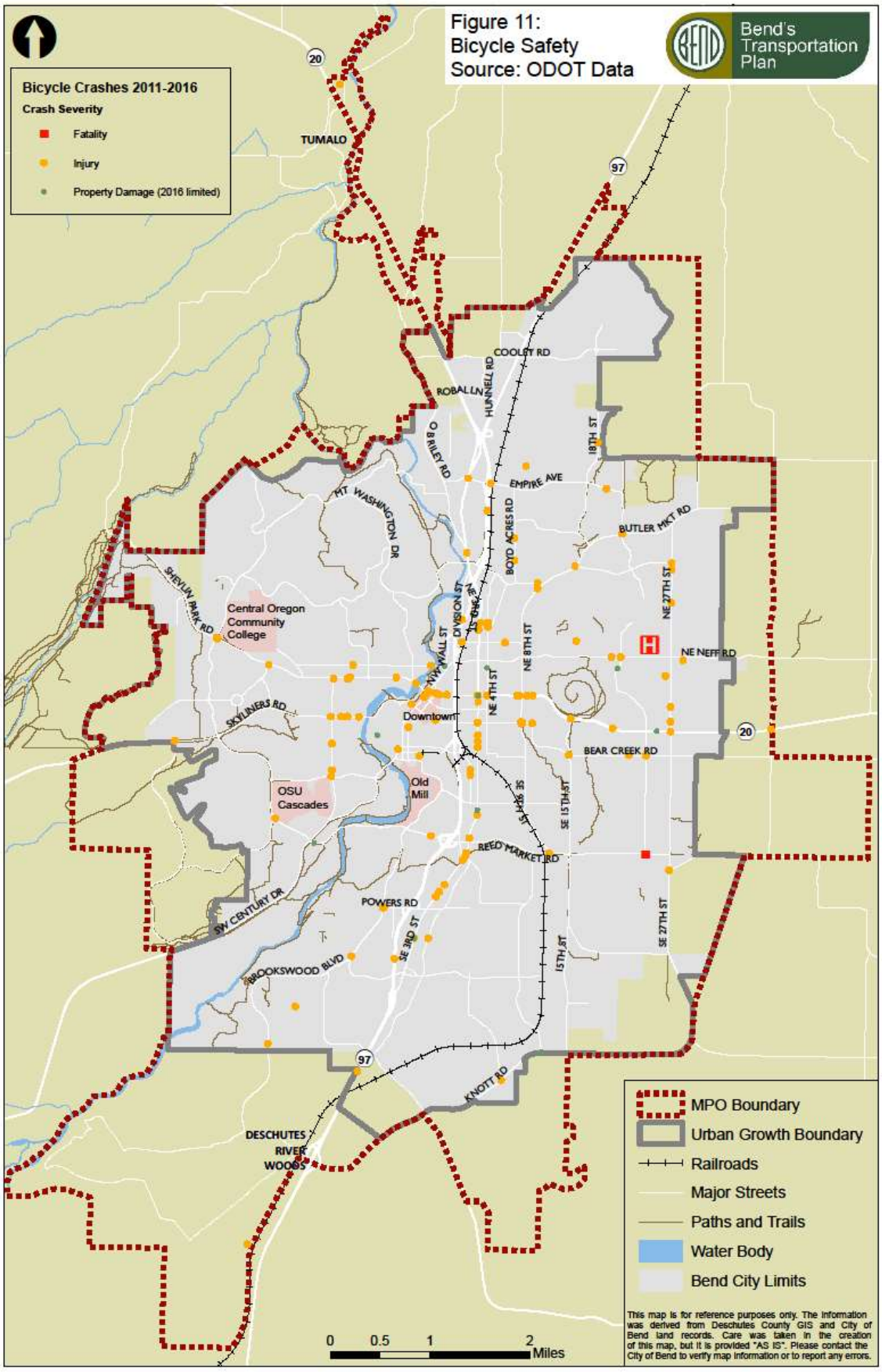


Figure 22: Bend and BMPO Vehicle-Bicycle Crashes (2011-2016)



Key bicycle system findings include:

Connectivity:

- **Regional-level bicycle corridor connectivity is limited by major barriers including US 97, US 20, 3rd Street, the railroad tracks, and the Deschutes River. Seven gaps in the regional arterial and collector network were identified.**
- **Approximately 82% of arterial and collector roadways have dedicated bicycle facilities**

Access:

- **Several major corridors in the "core area" are lacking dedicated bicycle facilities, including 3rd Street, 4th Street, Greenwood Avenue, Bond Street, Wall Street, and Hawthorne Avenue.**
- **Corridors near the fringes of the urban area are lacking dedicated bicycle facilities.**

User Environment:

- **Approximately 54% of arterial and collector roadways are highly stressful environments for cyclists (lacking separation/buffer along high-speed/high-volume roadways).**
- **Many of these highly stressful environments for people riding are near key destinations including COCC, OSU Cascades, St. Charles Medical Center, schools, and downtown Bend.**

Safety:

- **Crashes involving bicycles tend to be on multi-lane, high volume facilities without dedicated or protected bicycle facilities.**

Freight

Truck Freight

The movement of raw and finished goods plays a vital role in the economy. The majority of these goods are transported via motor carrier; therefore, efficient truck mobility is crucial to economic vitality. The designation of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. There are two designated truck routes within the study area, US 97 (Bend Parkway) and US 20.

US 97 is the key north-south connection for Central Oregon. It provides connections between California and Washington and is the primary route between regional destinations from The Dalles to Klamath Falls. US 97 is classified by ODOT[19] as a Statewide Highway and has been designated as a part of the National Highway System, a Federally Designated Truck Route, a State Freight Route, an Expressway, and a Reduction Review Route[20]. The segment from milepoint 134.67 to 141.91 (south of Robal Road to south of the Murphy Road interchange) has also been designated as a Truck Bypass.[21] Oregon Transportation Commission (OTC) designated bypasses to maintain and increase mobility of through traffic and relieve congestion in downtown areas.[23] Within the bypassed area, US 97 is known as the Bend Parkway. Once US 97 becomes the Bend Parkway, 3rd Street, which runs parallel to the Parkway, becomes US 20 (north of Greenwood Avenue)/US 97 Business Route. As a parallel route to I-5, US 97/Bend Parkway also offers critical resiliency to Oregon's freight network and is designated a Tier 1/Phase 1 Lifeline Route in case of a major seismic event.

The Bend Parkway also is designated as an Expressway, with a primary function of providing travel between communities and connections to recreation areas with minimal interruptions, recognizing Bend as a key destination for key regional and economic drivers

US 20 (McKenzie-Bend Highway) is classified by ODOT as a Statewide Highway and has been designated as a part of the National Highway System. It is also designated as a Reduction Review Route (which limits the ability to narrow the roadway in order to protect oversize load mobility). In addition, US 20 (McKenzie-Bend Highway) between Tumalo and Empire Avenue has been designated a Federally Designated Truck Route, a State Freight Route and an Expressway.

US 20 (Central Oregon), also known as Greenwood Avenue, is classified by ODOT[22] as a Statewide Highway and has been designated as a part of the National Highway System, a Federally Designated Truck Route, a State Freight Route and Reduction Review Route.

Table 4 summarizes available 2017 truck freight volumes based on data collected at permanent ODOT ATR stations within the City of Bend.

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19 *1999 Oregon Highway Plan*, ODOT, May 1999.

20 As a Reduction Review Route, these state highways are subject to review during planning, project development, development review, and maintenance for any proposed actions that would permanently reduce the vehicle-carrying capacity of the highway.

21 A short segment from Milepoint 141.12 to 141.86 does not appear to be designated as a Bypass.

22 *1999 Oregon Highway Plan*, ODOT, May 1999.

Table 4: Existing Truck Volumes on Freight Routes within the Bend and BMPO Area

Route	Automatic Traffic Recorder Location	2017 Average Daily Traffic	Truck ADT	Truck %
US 20	0.47 mile north northwest of Innes Market Road (about 5 miles north of Tumalo)	10,800	1,500	13.8
US 20	1.49 miles east of Powell Butte Road	3,000	800	26.5
US 97	0.49 mile south of Empire Avenue	52,100	4,600	8.9
US 97	0.23 mile south of Revere Avenue	49,500	4,400	8.9
US 97	0.07 mile north of Pinebrook Boulevard	19,900	1,900	9.4
US 97	0.17 mile south of China Hat Road	25,100	1,900	7.59

Truck Route Connectivity and Access

Streets designated as Freight Routes in the study area are recognized as being appropriate and commonly traveled corridors for truck passage. Decisions affecting maintenance, operation, or construction on a designated freight route must address potential impacts on the safe and efficient movement of truck traffic. However, the intent is not to compromise the safety of other street users to accommodate truck traffic, especially in areas where many conflicts with vulnerable travelers (e.g., people walking and biking) may be present. There are a few locations within the study area that may benefit from a local truck route designation such as the Juniper Ridge area, the City's largest (and mostly undeveloped) industrial and business park area, or Butler-Brinson area.

Critical Urban Freight Corridor

In addition to ODOT's truck freight classifications, the MTP identified six miles of Critical Urban Fright Corridors (CUFC). CUFCs are one component of the National Highway Freight Network that provide critical connectivity. The CUFC designation helps to prioritize and allocate limited federal funding to improve system performance and efficient movement of freight. There are several criteria that must be met for a corridor to be granted this designation. Federal Highway Administration (FHWA) encourages States to consider first and last mile connections between freight corridors and freight intensive land such as ports and rail terminals.

The following segments have been adopted by Oregon Transportation Commission (OTC) and identified in the Oregon Freight Plan[23] as CUFCs in the study area:

- US 97 between Bend City Limits (north) and Empire Avenue

[23] Oregon Freight Plan, ODOT, Adopted June 15, 2011 (Revised November 17, 2017).

- US 20 between Cooley Road and US 97 Southbound On-Ramp at Division Street
- US 20 between Webster Street and Greenwood Avenue
- US 20 between 3rd Street and 8th Street
- Empire Avenue between US 20 and US 97 Northbound Ramps
- US 20 at Old Bend Redmond Highway

Truck Route Performance

The congestion issues on 3rd Street (US 20) create issues for freight travel along this freight route, requiring trucks to stop at most signalized intersections. The southbound left turn movement at US 20 (3rd Street) and Greenwood Avenue operates at capacity during the p.m. peak hour, impacting trucks using the US 20 freight route. Oregon Freight Highway Bottlenecks Project identified this corridor as a tier 2 bottleneck, which indicates this route experiences significant freight truck delay, unreliability and increased transportation costs.

The lack of adequate bicycle facilities on 3rd Street (US 20) also increases safety issues related to truck and bicycle conflicts.

Congestion at Cooley Road/Robal Road and US 97 intersection impact corridor travel time reliability for freight using the US 97 route.

Rail Freight

BNSF and Union Pacific currently operate manifest trains, which carry a variety of boxcars, tanker cars, lumbers, etc., through the study area. The rail track, owned by BNSF, runs parallel to US 97 at the north city limits before veering east just south of Colorado Avenue towards the industrial zone. The rail track is regulated under the Federal Railroad Administrations Class 1, 2, 3 and 4 track standards. In this, there are no weight or dimensional restrictions for freight movements through the study area.

Intersections of the rail track and roadways can create operational and safety issues. Currently, there are a total of 19 crossings. Of these, 11 are at-grade crossings featuring active traffic control devices (automatic gates). Of the remaining grade-separated crossings, 4 are over grade crossings where the railway travels over the roadway and 4 are under grade crossings where the roadway spans over the railway.

For the most part, grade separated crossings are preferred as they proved a safe crossing opportunity and eliminate large traffic delays. For example, the Reed Market Road at grade crossing has been a source of motor vehicle traffic delay during the p.m. peak hour. During field observations[24], vehicle queues westbound on Reed Market Road extended back to 15th Street and beyond. This particular at-grade rail crossing on Reed Market Road is challenging because it is next to a switch yard and the switching events are random. The delays resulting from at-grade rail crossing impact emergency vehicle access and travel time reliability.

[24] Field observations completed between 4:00 and 6:00 p.m. on April 19, 2018.

Key freight system findings include:

Connectivity:

- **Off of the state highway system, few local routes are identified as freight routes. Identification of local truck freight routes could help prioritize/protect the movement of truck traffic in key areas.**
- **There are 11 at-grade rail crossings with automatic gates and 8 grade-separated rail crossings (4 over crossings and 4 under crossings).**
- **At-grade rail crossings can be a major source of motor vehicle traffic delay, such as the crossing on Reed Market Road at 9th Street.**

Resilience:

- **US 97 is a critical truck route in the statewide Lifeline network, providing an alternative route to I-5.**

Congestion:

- **US 20 (3rd Street) queuing and signal delays impact freight movement**
- **Travel Time Reliability issues impact freight movement on US 97 in the Cooley/Robal area**
- **Rail movements on Reed Market Road can create vehicle congestion**

Safety:

- **Truck/Bicycle conflicts occur along US 20 (3rd Street)**

Intelligent Transportation Systems

The existing Intelligent Transportation Systems (ITS) inventory from the Deschutes County ITS Plan[25] is shown in Figure 23.

ODOT Region 4 in Bend currently houses several ITS systems, including remote weather information systems, video detection cameras, closed circuit television (CCTV) cameras, and an oversize vehicle closure telephone system. These are all monitored and managed by the Bend Traffic Operations Center which is currently suited to successfully carry out tasks in incident management, emergency management, traffic management, traveler information, winter operations, and maintenance operations.

Seven CCTV cameras are currently installed along US 97 (Bend Parkway). These cameras are used to monitor current traffic conditions and aid with incident, emergency, and traffic management strategies. There is one variable message sign located on US 97, south of China Hat/Baker Road. Currently there are four ODOT and five City of Bend ATR recorder stations within the study area. These are located on US 97 and US 20, and on the key east-west river crossing connections. Weather stations are used in an effort to aid travelers and maintenance crews in adverse weather conditions. There are two weather stations located in Bend in the northern part of the city. Typical measurements include air and pavement temperature, precipitation, wind speed and direction, and humidity. With the addition of new traffic signals and modifications, video detection systems are becoming more common. These units take the place of inductive loop detectors to allow for actuated traffic signal operations. A large sum of information reported from these field devices is broadcasted to the public via ODOT's Trip Check website[26].

The following needs were identified in the Deschutes County ITS Plan:

- Traffic Operations and Management
  - Automate, collect and disseminate real-time traffic conditions information (e.g. congestion/incident detection)
  - Remote, continuous access to real-time data (e.g. traffic signals, detectors)
  - Traffic signal timing improvements (e.g. coordination on 27th Street and signal transition during a railroad priority call)
  - Update interconnect and available conduit inventory
- Incident Management
  - Automate vehicle height detection warning system for 3rd Street railroad undercrossing
  - Address lack of alternate routes for US 97
  - Provide advanced information, communicate alternative routes
  - Lack of shoulders on Parkway increases incident delay
  - Improve safety for incident responders

[25] Deschutes County ITS Plan, DKS Associates, June 2011.

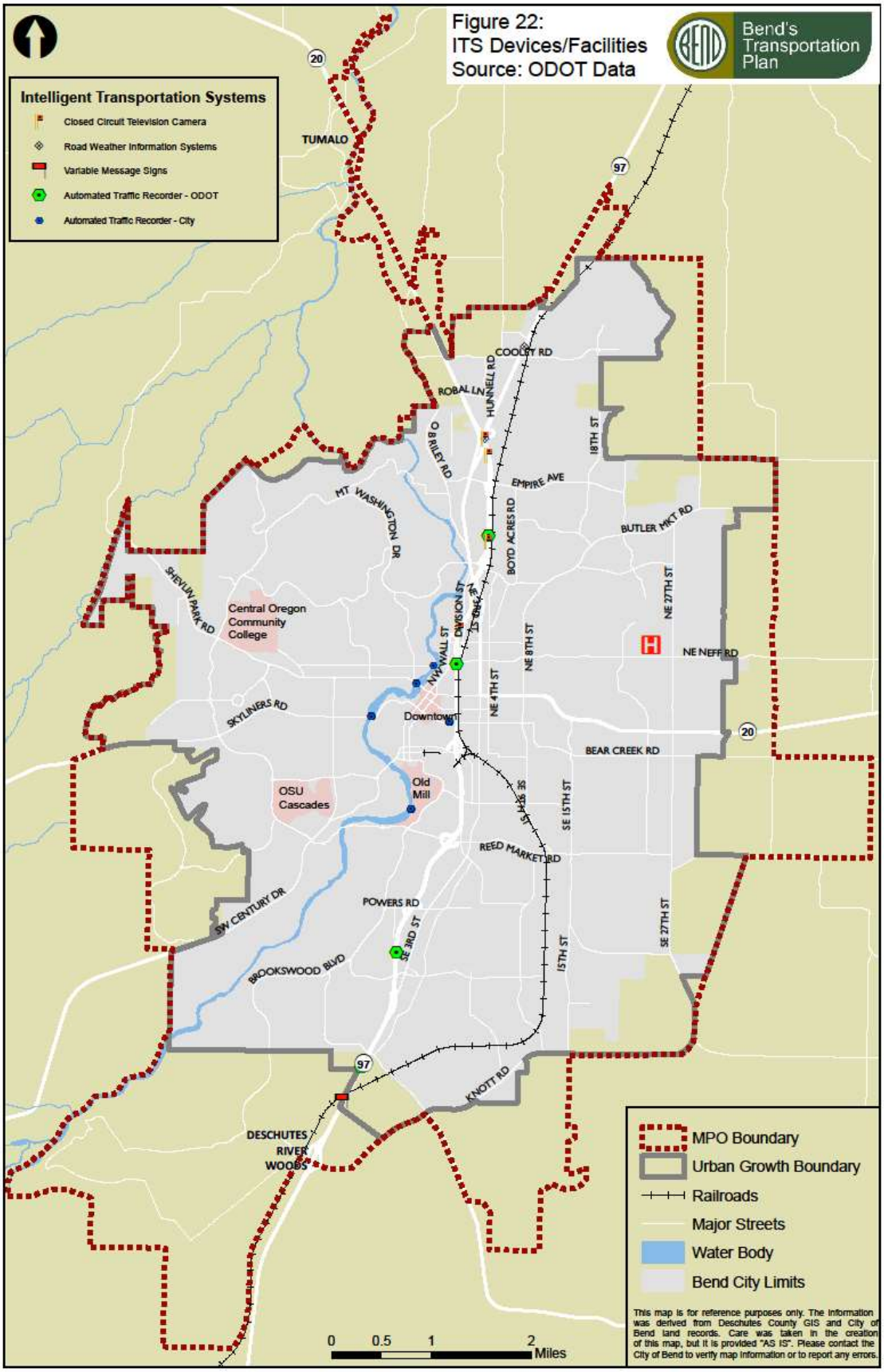
[26] ODOT, TripCheck (https://www.tripcheck.com)

- Special Events
  - Need traffic control plans and shuttles for special events
- Traveler Information
  - Provide real-time traveler information (e.g. at key decision points, weather information)
- Public Transportation Management
  - Maintain transit travel time reliability and provide transit arrival information
  - Implement transit signal priority
  - Encourage transit use to Mt. Bachelor to reduce congestion issues on Century Drive.
- Emergency Management
  - Reduce emergency response times
  - Provide advance information about rail crossings for fire response and or during an evacuation
  - Identify evacuation routes
  - Driver education at roundabouts for yielding to emergency vehicles

Key transportation system issues for ITS include:

- **Lack of access to real-time traffic conditions to improve incident response, emergency vehicle access, transit travel time reliability, and safety**
- **Lack of real-time traveler information at key decision points including travel time, weather information and special event information**
- **Limited traffic signal timing enhancements such as signal coordination, transit signal priority and signal transition during a railroad priority call (signal changes timing when a train is approaching)**
- **Lack of up-to-date ITS inventory including device types and locations and available conduit inventory**

Figure 23: Bend and BMPO Intelligent Transportation System Devices/Facilities



Transportation Demand Management

Commute Options, a local non-profit agency, contracts with several entities to coordinate travel options and transportation demand management activities in Central Oregon. Commute Options provides the following TDM-related services:

- Coordinates the Drive Less Connect on-line program
- Coordinate the Drive Less Challenge
- Works with CET to promote transit ridership, including the group pass sales program.

Provides information to the public, employers and their employees on TDM activities. The Bend Development Code (4.7.400 (3)) allows a project applicant to reduce net new trip generation for a proposed development by developing a detailed TDM program. The TDM program must show that the proposed trip reductions will reduce the proposed development's trips and demonstrate that there are adequate resources to manage and maintain the proposed TDM program. The proposed elements of the TDM program are evaluated by the City to determine trip reduction rates. A maximum trip reduction of 25% is allowed for combined TDM program elements. The TDM Trip Reductions table identifies 5% trip reductions allowed to be taken to the trip generation by providing:

- Employee showers, lockers, and secure indoor bike parking;
- No more than the minimum required parking and achieves that by providing the maximum permitted on-street parking and/or using shared parking agreements
- A minimum of 5% of the overall required parking for free priority parking for carpools/vanpools designated by signs

A project can also can get 10% trip reduction by:

- Being located within ¼ mile of a transit line if the employer participated in CET's Group Bus Program
- Charges the actual cost of providing off-street parking and provides free parking to car/vanpools
- Participating in a TDM incentive program

COCC and Juniper Ridge are both special districts within Bend that have Overlay Zones, including trip reduction programs (see Bend Development Code, Section 2.7.1000 and 2000).Other Modes

Waterways

The Deschutes River flows through the study area and serves as a scenic and recreational waterway. The river has several dams and does not play a role in the transportation of people or freight. In addition, the study area has several large irrigation canals, both covered and uncovered, that in some locations act as barriers or neighborhood definition features. There are also existing and planned trails along some of the canals.

Pipeline Facilities

Two major natural gas transmission lines, operated by Pacific Gas & Electric Transmission-Northwest, pass through Bend. These transmission pipelines extend north-south through the

state and are located approximately 1 to 2 miles east of the Bend urban area. Cascade Natural Gas provides the natural gas service to the city of Bend. No other major utility pipelines serve or pass through the Bend urban area.

Air Facilities

The Bend Municipal Airport (Airport Identifier BDN) is located at 63136 Powell Butte Highway, approximately three miles northeast of city limits. It is a non-towered airport and classified as a Category 2 – Business or High Activity General Aviation Airport with a single 5,260-foot runway. In this, there is no scheduled passenger service to/from the airport. In addition, a separate eight-acre Helicopter Operations Area was constructed in 2017.

The existing runway was reconstructed in 2007. Approximately 240 aircraft in combination with 18 aviation type businesses are currently based at the airport. The airport was established in 1942 in response to World War II training efforts.

The Bend Airport Master Plan[27] found runway extension, pavement maintenance (runway, taxiways, and airport aprons), hangar facilities, navigational aids and lighting, fuel storage, fencing and improving internal roadways to be key needs over the next twenty years. The Oregon Aviation Plan also found similar needs identified in the Bend Airport Master Plan.

Pilot Butte Airport (Airport Identifier 8OR5) is a private use airstrip located south of Pilot Butte in the City of Bend. It consists of a 20-foot wide by 2,400-foot asphalt runway.

Key Other Mode system findings include:

Connectivity:

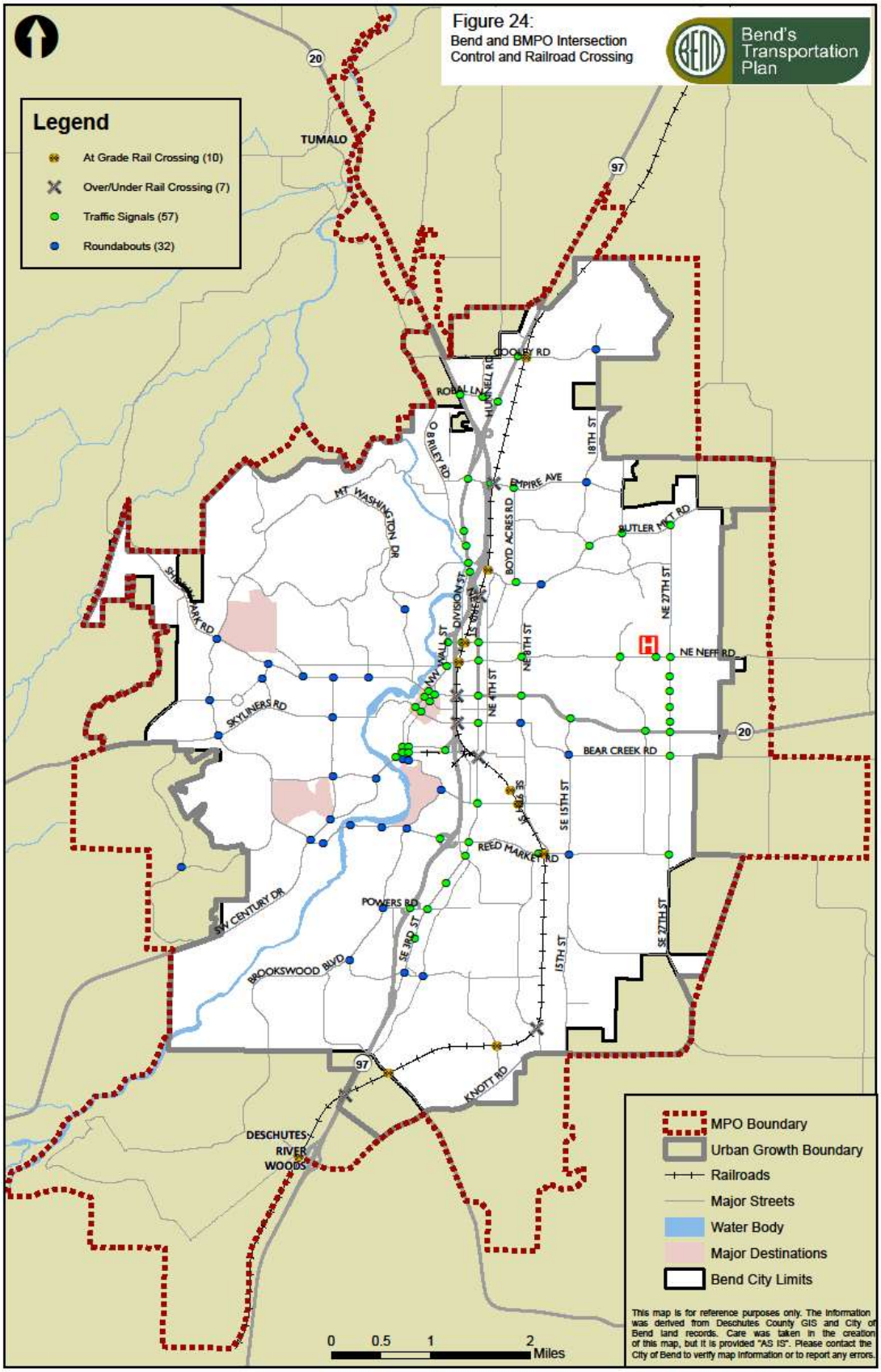
- **Butler Market Road provides a key connection between the BMPO area and the Bend Municipal Airport.**

Access:

- **There is a lack of public transit options to the airport, but there are new transportation network companies providing service (e.g. Uber and Lyft)**

[27] Bend Municipal Airport: Airport Master Plan Update, Century West Engineering Corporation, October 2013.

Figure 24: Bend and BMPO Intersection Control and Railroad Crossings



Environmental Considerations

The existing MTP includes and a detail environmental considerations chapter that includes a high-level screening of certain environmental features that may be affected by the plan (relative to the construction of new facilities). The environmental data contained in the chapter were originally collected in 2007 (https://www.bendoregon.gov/Home/ShowDocument?id=18133). The intent of the chapter is to address environmental considerations early in the transportation planning process to help ensure environmental impacts from transportation projects are minimized reducing overall project costs and impacts. However, the evaluation does not replace a full Environmental Impact Analysis that may be required for significant regional projects. The chapter addresses: Water Resources; Fish, Wildlife & Habitat Resources; Hazards; Climate Change; Air Quality; Scenic Resources; Historic and Cultural Preservation; Recreation Resources; Environmental Justice; and Noise.

While the BMPO is highly scenic and has significant environmental resources, there are relatively few identified conflicts between the proposed MTP transportation projects and environmental resources. This is primarily due to the small number of rivers, streams and wetlands; an historic absence of anadromous fish; and the nature of the transportation projects proposed. The transportation projects proposed consist primarily of improvements to existing roads. There are few new roads proposed. This could change in the future and the information in this document and the map layers gathered should provide information necessary for analysis of future planning efforts. The major environmental conflict from transportation projects is storm water runoff. Storm water runoff impacts fish and wildlife, water quality, and results in flooding of major intersections. Other potential conflicts include wildlife crossings, air quality and climate change, and restricted lands.

Wildfire evacuation and network resiliency are other important environmental factors to consider. Since the location of a wildfire is unpredictable, all routes throughout the entire study area are key emergency fire evacuation routes. It is important to provide and identify alternative routes for emergency evacuation. One critical location is the Deschutes River Woods area, which currently only has one main entrance/exit point (Baker Road via US 97). During an emergency evacuation of the Deschutes River Woods area, US 97 can be temporarily closed in both directions to allow the residents to quickly evacuate. There is an emergency access road, Frank Pennock Lane, between Cheyenne Road and US 97, near Comanche Lane, that can be opened during the evacuation. Most other locations in the study area have more than one evacuation route.

Key environmental consideration findings include:

Resilience:

- **Emergency evacuation routes include all major corridors due to the random nature of wildfire risk.**

Safety:

- **Wildlife crossing locations in the fringe areas of the study area can be vulnerable areas for both residents and animals.**

Appendix

Bridge Conditions

Intersection Volumes

Intersection Traffic Operations

US 97/Parkway Travel Time Reliability

Environmental Considerations

Bridge Conditions

City of Bend Bridge Sufficiency Rating Summary (Draft)

Bridge ID	Year Constructed	Road	Feature Crossed	Status	Condition
17C040	1973	Archie Briggs Road	Deschutes River	-	Very Poor
17C05	1973	Archie Briggs Road	Deschutes River	-	Very Poor
17C59	1986	Empire Avenue	B.N.R.R.	Functionally Obsolete	Poor
01134A	1966	Hwy 4 Spur	Central Oregon Canal	-	Fair
17B001	1940	Divisin Street	C.O.I. North Canal	-	Fair
09410	1965	Boyd Acres Road	Pilot Butte Canal North	Functionally Obsolete	Fair
20613	2006	Newport Avenue	Deschutes River	-	Fair
17B005	1962	Galveston Avenue	Deschutes River	Functionally Obsolete	Fair
17B003	1962	Portland Avenue	Deschutes River	Functionally Obsolete	Fair
09409	1965	Boyd Acres Road	North Unit Main Canal	Functionally Obsolete	Fair
17C29	1975	Yeoman Road	Pilot Butte Canal	-	Fair
17B002	1935	Division Street	North Unit Main Canal	Structurally Deficient	Good
09C47A	1976	Ferguson Road	Coi Canal	-	Good
15453A	1968	Brosterhaus Road	Coi Main Canal	-	Good
09815	1968	27th Street, SE	C.O.I. Canal	-	Good
21153	2009	Mount Washington Drive	Deschutes River	-	Good
09C60	1972	Blakely Road	Coi Main Canal	-	Good
09C74A	1974	Deschutes Market Road	North Unit Canal	-	Good
16852	1983	Colorado Ave	Deschutes River	-	Good
16853	1983	Shevlin Hixon Drive	Sw Shelvin Hixon Dr.	-	Good
16372	1980	15th Street	Dirmain C O I Canal	-	Good
19642	1972	Brookswood Boulevard	Coi Main Canal	-	Good
18718	1993	Brinson Boulevard	Pilot Butte Canal	-	Good
18719	1993	Brinson Boulevard	North Unit Main Canal	-	Good
17C52	1978	China Hat Road	Arnold Canal	-	Good
18374	1994	Empire Avenue	C.O.I. Canal	-	Good

Intersection Volumes

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97***
E/W street:	***Tumalo Pl***
City, State	Bend OR
Study ID #	
Location	44.159961 - -121.259232
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1579	128	0	0	1115	226	0	0	0	85	0	0	0	456	0	1707	1341	85	456	1200	2035	226	128
Percent Heavy Vehicles																							
0.0%	3.1%	3.9%	0.0%	0.0%	8.3%	4.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.0%	3.2%	7.7%	0.0%	3.1%	7.7%	3.1%	4.9%	3.9%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Tumalo Pl				Deschutes Pleasant Ridge				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	119	7	0	0	78	23	0	0	0	13	0	0	0	38	0		
04:35:00 PM	0	109	11	0	0	98	14	0	0	0	5	0	0	0	36	0		
04:40:00 PM	0	134	8	0	0	101	22	0	0	0	7	0	0	0	37	0	860	
04:45:00 PM	0	149	9	0	0	94	20	0	0	0	4	0	0	0	38	0	896	
04:50:00 PM	0	117	17	0	0	102	20	0	0	0	4	0	0	0	32	0	915	
04:55:00 PM	0	111	15	0	0	110	16	0	0	0	0	0	0	0	35	0	893	
05:00:00 PM	0	143	14	0	0	67	12	0	0	0	10	0	0	0	31	0	856	
05:05:00 PM	0	136	10	0	0	79	12	0	0	0	10	0	0	0	30	0	841	
05:10:00 PM	0	151	10	0	0	87	28	0	0	0	8	0	0	0	40	0	878	
05:15:00 PM	0	135	9	0	0	96	15	0	0	0	10	0	0	0	50	0	916	
05:20:00 PM	0	155	6	0	0	101	21	0	0	0	4	0	0	0	54	0	980	
05:25:00 PM	0	120	12	0	0	102	23	0	0	0	10	0	0	0	35	0	958	3589

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Tumalo Pl				Deschutes Pleasant Ridge				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Tumalo Pl				Deschutes Pleasant Ridge				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	114	7	0	0	69	22	0	0	0	13	0	0	0	36	0		
04:35:00 PM	0	105	10	0	0	88	14	0	0	0	5	0	0	0	35	0		
04:40:00 PM	0	132	8	0	0	94	21	0	0	0	7	0	0	0	35	0	815	
04:45:00 PM	0	145	8	0	0	87	19	0	0	0	4	0	0	0	36	0	853	
04:50:00 PM	0	115	17	0	0	95	20	0	0	0	4	0	0	0	32	0	879	
04:55:00 PM	0	107	14	0	0	100	16	0	0	0	0	0	0	0	33	0	852	
05:00:00 PM	0	140	14	0	0	62	12	0	0	0	10	0	0	0	30	0	821	
05:05:00 PM	0	130	8	0	0	72	10	0	0	0	10	0	0	0	27	0	795	
05:10:00 PM	0	147	10	0	0	83	25	0	0	0	8	0	0	0	40	0	838	
05:15:00 PM	0	130	9	0	0	90	15	0	0	0	10	0	0	0	49	0	873	
05:20:00 PM	0	152	6	0	0	91	20	0	0	0	4	0	0	0	54	0	943	
05:25:00 PM	0	113	12	0	0	92	21	0	0	0	10	0	0	0	35	0	913	3418

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Tumalo Pl				Deschutes Pleasant Ridge				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	5	0	0	0	9	1	0	0	0	0	0	0	0	2	0		
04:35:00 PM	0	4	1	0	0	10	0	0	0	0	0	0	0	0	1	0		
04:40:00 PM	0	2	0	0	0	7	1	0	0	0	0	0	0	0	2	0	45	
04:45:00 PM	0	4	1	0	0	7	1	0	0	0	0	0	0	0	2	0	43	
04:50:00 PM	0	2	0	0	0	7	0	0	0	0	0	0	0	0	0	0	36	
04:55:00 PM	0	4	1	0	0	10	0	0	0	0	0	0	0	0	2	0	41	
05:00:00 PM	0	3	0	0	0	5	0	0	0	0	0	0	0	0	1	0	35	
05:05:00 PM	0	6	2	0	0	7	2	0	0	0	0	0	0	0	3	0	46	
05:10:00 PM	0	4	0	0	0	4	3	0	0	0	0	0	0	0	0	0	40	
05:15:00 PM	0	5	0	0	0	6	0	0	0	0	0	0	0	0	1	0	43	
05:20:00 PM	0	3	0	0	0	10	1	0	0	0	0	0	0	0	0	0	37	
05:25:00 PM	0	7	0	0	0	10	2	0	0	0	0	0	0	0	0	0	45	171

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97***
E/W street:	***Cooley Rd***
City, State	Bend OR
Study ID #	
Location	44.109312 - -121.295092
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:55:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
40	1411	77	1	110	1229	44	0	185	143	15	0	185	69	58	0	1529	1383	343	312	1430	1654	153	330
Percent Heavy Vehicles																							
5.0%	4.4%	0.0%	0.0%	5.5%	7.5%	4.5%	0.0%	1.1%	0.0%	0.0%	0.0%	1.1%	5.8%	0.0%	0.0%	4.2%	7.2%	0.6%	1.9%	6.6%	3.9%	5.2%	1.8%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	1	132	5	0	10	128	7	0	13	13	2	0	4	4	5	0		
04:35:00 PM	3	113	8	1	7	76	3	0	23	13	2	0	16	3	3	0		
04:40:00 PM	3	138	5	0	1	100	4	0	15	11	1	0	18	3	7	0	901	
04:45:00 PM	2	116	4	0	11	107	7	0	18	11	2	0	12	6	1	0	874	
04:50:00 PM	6	100	3	0	16	87	2	0	18	10	1	0	18	5	5	0	874	
04:55:00 PM	1	136	11	0	7	119	5	0	11	5	1	0	5	4	9	0	882	
05:00:00 PM	5	128	5	0	6	102	2	0	17	14	1	0	11	11	2	0	889	
05:05:00 PM	7	127	10	0	13	103	1	0	12	11	1	0	26	5	6	0	940	
05:10:00 PM	2	93	9	0	7	107	3	0	13	8	2	0	26	10	8	0	914	
05:15:00 PM	2	115	5	0	9	95	2	0	14	16	1	0	22	8	9	0	908	
05:20:00 PM	4	108	9	0	9	106	4	0	16	16	0	0	10	7	3	0	878	
05:25:00 PM	4	105	3	0	14	99	4	0	15	15	1	0	17	3	0	0	870	3567

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	1	124	5	0	10	118	7	0	13	13	2	0	4	4	5	0		
04:35:00 PM	2	109	8	1	7	70	3	0	22	13	2	0	16	3	3	0		
04:40:00 PM	3	132	5	0	1	88	4	0	14	11	1	0	18	3	7	0	852	
04:45:00 PM	2	114	4	0	9	102	6	0	18	11	2	0	12	5	1	0	832	
04:50:00 PM	6	95	3	0	15	80	1	0	18	10	1	0	17	5	5	0	829	
04:55:00 PM	1	133	11	0	4	112	5	0	11	5	1	0	5	4	9	0	843	
05:00:00 PM	5	119	5	0	6	94	2	0	17	14	1	0	11	9	2	0	842	
05:05:00 PM	7	123	10	0	13	99	1	0	12	11	1	0	26	5	6	0	900	
05:10:00 PM	2	88	9	0	7	99	3	0	13	8	2	0	25	9	8	0	872	
05:15:00 PM	1	112	5	0	9	91	2	0	14	16	1	0	22	8	9	0	877	
05:20:00 PM	4	103	9	0	9	97	4	0	16	16	0	0	10	7	3	0	841	
05:25:00 PM	4	97	3	0	14	87	4	0	15	15	1	0	17	3	0	0	828	3395

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	1	4	0	0	0	6	0	0	1	0	0	0	0	0	0	0		
04:40:00 PM	0	6	0	0	0	12	0	0	1	0	0	0	0	0	0	0	49	
04:45:00 PM	0	2	0	0	2	5	1	0	0	0	0	0	0	1	0	0	42	
04:50:00 PM	0	5	0	0	1	7	1	0	0	0	0	0	1	0	0	0	45	
04:55:00 PM	0	3	0	0	3	7	0	0	0	0	0	0	0	0	0	0	39	
05:00:00 PM	0	9	0	0	0	8	0	0	0	0	0	0	0	2	0	0	47	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	40	
05:10:00 PM	0	5	0	0	0	8	0	0	0	0	0	0	1	1	0	0	42	
05:15:00 PM	1	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	31	
05:20:00 PM	0	5	0	0	0	9	0	0	0	0	0	0	0	0	0	0	37	
05:25:00 PM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	42	172

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	1	0	1	
05:00:00 PM	1	0	0	0	2	
05:05:00 PM	0	0	0	0	2	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97***
E/W street:	***Robal Rd***
City, State	Bend OR
Study ID #	
Location	44.10277 - -121.299136
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
229	1448	14	1	21	1508	33	2	97	12	41	0	107	35	19	0	1692	1564	150	161	1657	1566	297	47
Percent Heavy Vehicles																							
0.4%	3.2%	7.1%	0.0%	9.5%	5.6%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.9%	8.6%	10.5%	0.0%	2.9%	5.6%	1.3%	3.7%	5.2%	3.3%	1.3%	6.4%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	5

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	108	0	0	4	110	0	0	10	3	4	0	6	3	3	0		
04:35:00 PM	19	97	2	0	3	111	6	0	9	0	3	0	16	5	7	0		
04:40:00 PM	23	127	1	0	1	126	2	0	6	2	0	0	4	3	0	0	839	
04:45:00 PM	21	120	3	0	3	118	2	0	6	1	1	0	15	2	3	0	868	
04:50:00 PM	21	115	1	0	0	115	7	0	10	0	4	0	5	1	0	0	869	
04:55:00 PM	17	111	2	0	3	134	2	0	5	1	3	0	11	4	4	0	871	
05:00:00 PM	24	130	2	0	1	124	0	0	9	3	3	0	10	3	1	0	886	
05:05:00 PM	23	140	2	1	0	135	4	1	9	1	8	0	9	1	0	0	941	
05:10:00 PM	15	146	0	0	2	134	2	0	9	0	7	0	9	1	0	0	969	
05:15:00 PM	24	113	1	0	1	135	4	1	9	1	0	0	7	5	1	0	961	
05:20:00 PM	6	116	0	0	2	149	4	0	9	0	5	0	4	1	0	0	923	
05:25:00 PM	21	125	0	0	1	117	0	0	6	0	3	0	11	6	0	0	888	3567

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	106	0	0	3	103	0	0	10	3	4	0	6	3	3	0		
04:35:00 PM	19	94	2	0	3	109	6	0	9	0	3	0	16	5	6	0		
04:40:00 PM	23	123	0	0	1	113	2	0	6	2	0	0	4	3	0	0	805	
04:45:00 PM	20	116	3	0	3	111	2	0	6	1	1	0	15	1	2	0	830	
04:50:00 PM	21	113	1	0	0	110	7	0	10	0	4	0	5	1	0	0	830	
04:55:00 PM	17	105	2	0	3	128	2	0	5	1	3	0	10	4	4	0	837	
05:00:00 PM	24	125	2	0	1	116	0	0	9	3	3	0	10	3	1	0	853	
05:05:00 PM	23	136	2	1	0	131	4	1	9	1	8	0	9	1	0	0	907	
05:10:00 PM	15	140	0	0	1	128	2	0	9	0	7	0	9	1	0	0	935	
05:15:00 PM	24	109	1	0	1	129	4	1	8	1	0	0	7	4	1	0	928	
05:20:00 PM	6	111	0	0	2	143	4	0	8	0	5	0	4	0	0	0	885	
05:25:00 PM	21	123	0	0	1	102	0	0	6	0	3	0	11	6	0	0	846	3423

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	2	0	0	1	7	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	3	0	0	0	2	0	0	0	0	0	0	0	0	1	0		
04:40:00 PM	0	4	1	0	0	13	0	0	0	0	0	0	0	0	0	0	34	
04:45:00 PM	1	4	0	0	0	7	0	0	0	0	0	0	0	1	1	0	38	
04:50:00 PM	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	39	
04:55:00 PM	0	6	0	0	0	6	0	0	0	0	0	0	1	0	0	0	34	
05:00:00 PM	0	5	0	0	0	8	0	0	0	0	0	0	0	0	0	0	33	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	34	
05:10:00 PM	0	6	0	0	1	6	0	0	0	0	0	0	0	0	0	0	34	
05:15:00 PM	0	4	0	0	0	6	0	0	1	0	0	0	0	1	0	0	33	
05:20:00 PM	0	5	0	0	0	6	0	0	1	0	0	0	0	1	0	0	38	
05:25:00 PM	0	2	0	0	0	15	0	0	0	0	0	0	0	0	0	0	42	144

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	2	0	2	
04:45:00 PM	0	0	0	0	2	
04:50:00 PM	0	0	2	0	4	
04:55:00 PM	0	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	1	0	0	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	5

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Nels Anderson Pl***
City, State	Bend OR
Study ID #	
Location	44.100648 - -121.300596
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.94

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
241	1678	39	0	0	1594	66	0	0	0	213	0	0	0	11	0	1958	1660	213	11	1807	1689	307	39
Percent Heavy Vehicles																							
0.0%	3.2%	7.7%	0.0%	0.0%	5.1%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	5.0%	0.0%	0.0%	4.5%	3.1%	0.3%	7.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Nels Anderson Pl				Nels Anderson Pl				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	32	138	4	0	0	122	8	0	0	0	23	0	0	0	1	0		
04:35:00 PM	17	130	1	0	0	124	6	0	0	0	17	0	0	0	2	0		
04:40:00 PM	24	140	5	0	0	135	3	0	0	0	20	0	0	0	1	0	953	
04:45:00 PM	20	153	3	0	0	124	2	0	0	0	11	0	0	0	0	0	938	
04:50:00 PM	20	141	5	0	0	125	7	0	0	0	20	0	0	0	1	0	960	
04:55:00 PM	25	122	2	0	0	136	6	0	0	0	18	0	0	0	1	0	942	
05:00:00 PM	19	140	4	0	0	139	4	0	0	0	17	0	0	0	0	0	952	
05:05:00 PM	16	168	2	0	0	138	4	0	0	0	23	0	0	0	1	0	985	
05:10:00 PM	14	161	3	0	0	149	6	0	0	0	13	0	0	0	0	0	1021	
05:15:00 PM	15	123	4	0	0	132	6	0	0	0	14	0	0	0	2	0	994	
05:20:00 PM	20	132	3	0	0	133	10	0	0	0	21	0	0	0	0	0	961	
05:25:00 PM	19	130	3	0	0	137	4	0	0	0	16	0	0	0	2	0	926	3842

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Nels Anderson Pl				Nels Anderson Pl				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Nels Anderson Pl				Nels Anderson Pl				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	32	135	4	0	0	114	8	0	0	0	23	0	0	0	1	0		
04:35:00 PM	17	126	1	0	0	122	6	0	0	0	17	0	0	0	2	0		
04:40:00 PM	24	136	5	0	0	124	3	0	0	0	20	0	0	0	1	0	921	
04:45:00 PM	20	149	3	0	0	114	2	0	0	0	11	0	0	0	0	0	903	
04:50:00 PM	20	138	4	0	0	120	7	0	0	0	20	0	0	0	1	0	922	
04:55:00 PM	25	117	2	0	0	130	6	0	0	0	18	0	0	0	1	0	908	
05:00:00 PM	19	134	3	0	0	130	4	0	0	0	17	0	0	0	0	0	916	
05:05:00 PM	16	161	2	0	0	135	4	0	0	0	23	0	0	0	1	0	948	
05:10:00 PM	14	157	3	0	0	141	6	0	0	0	13	0	0	0	0	0	983	
05:15:00 PM	15	118	4	0	0	126	5	0	0	0	14	0	0	0	2	0	960	
05:20:00 PM	20	128	3	0	0	128	10	0	0	0	21	0	0	0	0	0	928	
05:25:00 PM	19	126	2	0	0	128	4	0	0	0	16	0	0	0	2	0	891	3703

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Nels Anderson Pl				Nels Anderson Pl				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	3	0	0	0	8	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	4	0	0	0	2	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	4	0	0	0	11	0	0	0	0	0	0	0	0	0	0	32	
04:45:00 PM	0	4	0	0	0	10	0	0	0	0	0	0	0	0	0	0	35	
04:50:00 PM	0	3	1	0	0	5	0	0	0	0	0	0	0	0	0	0	38	
04:55:00 PM	0	5	0	0	0	6	0	0	0	0	0	0	0	0	0	0	34	
05:00:00 PM	0	6	1	0	0	9	0	0	0	0	0	0	0	0	0	0	36	
05:05:00 PM	0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	0	37	
05:10:00 PM	0	4	0	0	0	8	0	0	0	0	0	0	0	0	0	0	38	
05:15:00 PM	0	5	0	0	0	6	1	0	0	0	0	0	0	0	0	0	34	
05:20:00 PM	0	4	0	0	0	5	0	0	0	0	0	0	0	0	0	0	33	
05:25:00 PM	0	4	1	0	0	9	0	0	0	0	0	0	0	0	0	0	35	139

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97 SB ramps***
E/W street:	***Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.09096 - -121.301969
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:50:00 PM
PHF (15-Min Int)	0.97

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	5	2	17	0	4	736	418	0	328	407	6	0	0	24	1158	741	748	10	424	741
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	20.0%	0.0%	11.8%	0.0%	0.0%	4.2%	2.6%	0.0%	0.3%	2.9%	0.0%	0.0%	#DIV/0!	12.5%	3.6%	1.8%	1.6%	0.0%	3.3%	4.3%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	5

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
3	0	0	0	3

All Vehicle Volumes

	Northbound US 97 SB ramps				Southbound US 97 SB ramps				Eastbound Empire Blvd				Westbound Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	1	0	2	0	0	54	36	0	32	22	2	0		
04:35:00 PM	0	0	0	0	0	0	1	0	2	65	32	0	28	29	1	0		
04:40:00 PM	0	0	0	0	1	0	3	0	0	58	39	0	27	39	2	0	476	
04:45:00 PM	0	0	0	0	1	0	0	0	0	59	29	0	36	24	0	0	476	
04:50:00 PM	0	0	0	0	0	0	1	0	0	71	20	0	30	50	1	0	491	
04:55:00 PM	0	0	0	0	0	1	1	0	0	67	24	0	31	37	0	0	483	
05:00:00 PM	0	0	0	0	0	0	2	0	0	75	34	0	24	26	0	0	495	
05:05:00 PM	0	0	0	0	2	1	7	0	0	55	44	0	20	42	0	0	493	
05:10:00 PM	0	0	0	0	0	0	0	0	1	72	45	0	11	24	0	0	485	
05:15:00 PM	0	0	0	0	0	0	0	0	1	68	41	0	18	34	0	0	486	
05:20:00 PM	0	0	0	0	0	0	0	0	0	50	47	0	39	41	0	0	492	
05:25:00 PM	0	0	0	0	0	0	0	0	0	42	27	0	32	39	0	0	479	1923

Bicycles on Road

	Northbound US 97 SB ramps				Southbound US 97 SB ramps				Eastbound Empire Blvd				Westbound Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	
05:00:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 SB ramps				US 97 SB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	1	0	2	0	0	53	35	0	32	22	2	0		
04:35:00 PM	0	0	0	0	0	0	1	0	2	62	32	0	27	27	1	0		
04:40:00 PM	0	0	0	0	1	0	3	0	0	56	36	0	27	32	2	0	456	
04:45:00 PM	0	0	0	0	1	0	0	0	0	55	26	0	36	24	0	0	451	
04:50:00 PM	0	0	0	0	0	0	1	0	0	70	19	0	30	50	1	0	470	
04:55:00 PM	0	0	0	0	0	1	1	0	0	66	24	0	31	37	0	0	473	
05:00:00 PM	0	0	0	0	0	0	2	0	0	71	34	0	24	26	0	0	488	
05:05:00 PM	0	0	0	0	1	1	5	0	0	50	44	0	20	41	0	0	479	
05:10:00 PM	0	0	0	0	0	0	0	0	1	68	44	0	11	24	0	0	467	
05:15:00 PM	0	0	0	0	0	0	0	0	1	65	40	0	18	33	0	0	467	
05:20:00 PM	0	0	0	0	0	0	0	0	0	47	46	0	39	40	0	0	477	
05:25:00 PM	0	0	0	0	0	0	0	0	0	42	27	0	32	39	0	0	469	1865

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 SB ramps				US 97 SB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	1	2	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	2	3	0	0	7	0	0	20	
04:45:00 PM	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	25	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	21	
04:55:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	10	
05:00:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7	
05:05:00 PM	0	0	0	0	1	0	2	0	0	5	0	0	0	1	0	0	14	
05:10:00 PM	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	18	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	19	
05:20:00 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	15	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	58

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	1	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	2	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	0	0	0	0	2	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97 NB ramps***
E/W street:	***Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.090827 - -121.300392
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:50:00 PM
PHF (15-Min Int)	0.93

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
164	3	356	0	0	0	0	0	153	604	0	0	0	595	224	0	523	0	757	819	0	380	759	960
Percent Heavy Vehicles																							
2.4%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	5.0%	0.0%	0.0%	0.0%	2.2%	2.7%	0.0%	2.5%	0.0%	4.1%	2.3%	#DIV/0!	1.8%	2.2%	4.1%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0		0	0	3		0	0	1	0	0	4	3	0	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	0	27	0	0	0		0	10	42		0	0	46	13	0		
04:35:00 PM	14	0	24	0	0	0		0	15	55		0	0	38	18	0		
04:40:00 PM	15	0	26	0	0	0		0	13	45		0	0	54	26	0	496	
04:45:00 PM	13	0	22	0	0	0		0	8	50		0	0	53	24	0	513	
04:50:00 PM	21	0	41	0	0	0		0	10	60		0	0	57	10	0	548	
04:55:00 PM	13	1	28	0	0	0		0	8	58		0	0	53	7	0	537	
05:00:00 PM	6	0	27	0	0	0		0	17	64		0	0	54	29	0	564	
05:05:00 PM	16	0	35	0	0	0		0	18	51		0	0	45	16	0	546	
05:10:00 PM	13	1	26	0	0	0		0	19	49		0	0	24	13	0	523	
05:15:00 PM	10	0	43	0	0	0		0	13	53		0	0	52	16	0	513	
05:20:00 PM	18	1	28	0	0	0		0	13	45		0	0	60	20	0	517	
05:25:00 PM	10	0	29	0	0	0		0	9	32		0	0	59	32	0	543	2099

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	2	
04:45:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0		0	0	0		0	0	1	0	0	1	
05:00:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0	2	
05:05:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	2	
05:10:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	4

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	0	24	0	0	0		0	10	42		0	0	46	13	0		
04:35:00 PM	13	0	24	0	0	0		0	15	51		0	0	35	16	0		
04:40:00 PM	13	0	24	0	0	0		0	13	44		0	0	50	26	0	474	
04:45:00 PM	13	0	22	0	0	0		0	8	45		0	0	53	24	0	489	
04:50:00 PM	21	0	41	0	0	0		0	10	59		0	0	56	10	0	532	
04:55:00 PM	13	1	28	0	0	0		0	8	57		0	0	53	6	0	528	
05:00:00 PM	6	0	26	0	0	0		0	17	58		0	0	54	29	0	553	
05:05:00 PM	16	0	34	0	0	0		0	17	47		0	0	43	15	0	528	
05:10:00 PM	13	1	26	0	0	0		0	19	46		0	0	23	13	0	503	
05:15:00 PM	10	0	42	0	0	0		0	13	49		0	0	51	16	0	494	
05:20:00 PM	17	1	28	0	0	0		0	13	44		0	0	60	20	0	505	
05:25:00 PM	10	0	28	0	0	0		0	9	32		0	0	58	30	0	531	2036

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	3	0	0	0		0	0	0		0	0	0	0	0		
04:35:00 PM	1	0	0	0	0	0		0	0	4		0	0	3	2	0		
04:40:00 PM	2	0	2	0	0	0		0	0	1		0	0	4	0	0	22	
04:45:00 PM	0	0	0	0	0	0		0	0	5		0	0	0	0	0	24	
04:50:00 PM	0	0	0	0	0	0		0	0	1		0	0	1	0	0	16	
04:55:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	1	0	9	
05:00:00 PM	0	0	1	0	0	0		0	0	6		0	0	0	0	0	11	
05:05:00 PM	0	0	1	0	0	0		0	1	4		0	0	2	1	0	18	
05:10:00 PM	0	0	0	0	0	0		0	0	3		0	0	1	0	0	20	
05:15:00 PM	0	0	1	0	0	0		0	0	4		0	0	1	0	0	19	
05:20:00 PM	1	0	0	0	0	0		0	0	1		0	0	0	0	0	12	
05:25:00 PM	0	0	1	0	0	0		0	0	0		0	0	1	2	0	12	63

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	1	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	1	0	0	0	2	
04:55:00 PM	1	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 20***
E/W street:	***NE Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.091497 - -121.304974
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:40:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
64	354	183	0	492	642	77	0	76	268	52	0	148	180	29	0	601	1211	396	357	842	459	321	943
Percent Heavy Vehicles																							
3.1%	1.7%	2.2%	0.0%	5.5%	4.7%	1.3%	0.0%	0.0%	1.9%	3.8%	0.0%	2.7%	2.8%	0.0%	0.0%	2.0%	4.8%	1.8%	2.5%	4.3%	1.3%	2.5%	3.8%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
3	0	0	0	3

All Vehicle Volumes

	Northbound US 20				Southbound US 20				Eastbound NE Empire Blvd				Westbound NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	8	21	9	0	43	53	7	0	5	25	5	0	7	12	2	0		
04:35:00 PM	9	36	12	0	34	54	5	0	2	22	5	0	13	9	2	0		
04:40:00 PM	6	24	12	0	57	56	9	0	4	23	9	0	9	12	1	0	622	
04:45:00 PM	4	34	21	0	26	53	9	0	9	28	2	0	14	18	3	0	646	
04:50:00 PM	5	31	19	0	50	62	6	0	5	17	5	0	11	16	2	0	672	
04:55:00 PM	3	19	12	0	37	55	2	0	4	27	3	0	21	19	4	0	656	
05:00:00 PM	4	33	15	0	42	54	8	0	9	17	4	0	9	9	1	0	640	
05:05:00 PM	7	19	21	0	40	54	6	0	6	28	4	0	15	14	1	0	626	
05:10:00 PM	5	34	27	0	42	60	4	0	11	20	3	0	19	13	4	0	662	
05:15:00 PM	8	31	12	0	42	40	7	0	7	22	4	0	11	24	4	0	669	
05:20:00 PM	3	38	13	0	42	45	6	0	6	24	4	0	9	19	2	0	665	
05:25:00 PM	2	34	10	0	37	56	8	0	8	15	4	0	10	15	3	0	625	2565

Bicycles on Road

	Northbound US 20				Southbound US 20				Eastbound NE Empire Blvd				Westbound NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Empire Blvd				NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	8	21	9	0	43	51	7	0	5	25	4	0	7	11	2	0		
04:35:00 PM	9	36	12	0	32	54	5	0	2	22	5	0	13	8	2	0		
04:40:00 PM	5	23	12	0	54	54	9	0	4	23	8	0	7	12	1	0	605	
04:45:00 PM	4	34	20	0	22	48	8	0	9	26	2	0	13	16	3	0	617	
04:50:00 PM	5	31	19	0	47	59	6	0	5	17	5	0	11	16	2	0	640	
04:55:00 PM	3	18	12	0	36	52	2	0	4	26	3	0	20	19	4	0	627	
05:00:00 PM	4	33	15	0	39	52	8	0	9	16	4	0	9	9	1	0	621	
05:05:00 PM	7	19	21	0	37	51	6	0	6	27	4	0	15	14	1	0	606	
05:10:00 PM	4	34	24	0	40	59	4	0	11	20	3	0	19	13	4	0	642	
05:15:00 PM	8	28	12	0	38	36	7	0	7	22	4	0	11	24	4	0	644	
05:20:00 PM	3	37	13	0	40	41	6	0	6	24	4	0	9	18	2	0	639	
05:25:00 PM	2	34	10	0	37	55	8	0	8	15	4	0	10	15	3	0	605	2479

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Empire Blvd				NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0		
04:35:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0		
04:40:00 PM	1	1	0	0	3	2	0	0	0	0	1	0	2	0	0	0	17	
04:45:00 PM	0	0	1	0	4	5	1	0	0	2	0	0	1	2	0	0	29	
04:50:00 PM	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	32	
04:55:00 PM	0	1	0	0	1	3	0	0	0	1	0	0	1	0	0	0	29	
05:00:00 PM	0	0	0	0	3	2	0	0	0	1	0	0	0	0	0	0	19	
05:05:00 PM	0	0	0	0	3	3	0	0	0	1	0	0	0	0	0	0	20	
05:10:00 PM	1	0	3	0	2	1	0	0	0	0	0	0	0	0	0	0	20	
05:15:00 PM	0	3	0	0	4	4	0	0	0	0	0	0	0	0	0	0	25	
05:20:00 PM	0	1	0	0	2	4	0	0	0	0	0	0	0	1	0	0	26	
05:25:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	20	86

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	1	0	0	0		
04:40:00 PM	0	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	1	0	0	0	1	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	1	0	0	0	1	
05:20:00 PM	0	0	0	0	1	
05:25:00 PM	0	0	0	0	1	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US 20*
E/W street:	*NE Butler Market*
City, State	Bend OR
Study ID #	
Location	44.079271 - -121.305022
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.88

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
114	575	113	0	150	1010	60	0	95	154	81	0	309	148	73	0	802	1220	330	530	1400	743	322	417
Percent Heavy Vehicles																							
1.8%	1.7%	0.9%	0.0%	2.0%	2.7%	1.7%	0.0%	1.1%	0.6%	1.2%	0.0%	0.6%	0.7%	1.4%	0.0%	1.6%	2.5%	0.9%	0.8%	2.1%	1.6%	1.2%	1.2%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
0	5	5	0	10

All Vehicle Volumes

	Northbound US 20				Southbound US 20				Eastbound NE Butler Market				Westbound NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	4	44	9	0	13	87	7	0	9	10	1	0	19	5	3	0		
04:35:00 PM	8	51	12	0	11	90	4	0	6	17	3	0	21	13	6	0		
04:40:00 PM	10	49	8	0	9	67	2	0	8	13	5	0	31	11	6	0	672	
04:45:00 PM	12	48	13	0	11	64	7	0	4	8	7	0	32	8	8	0	683	
04:50:00 PM	10	41	7	0	19	89	3	0	8	9	10	0	23	11	5	0	676	
04:55:00 PM	8	38	10	0	13	89	4	0	9	7	7	0	28	11	4	0	685	
05:00:00 PM	6	45	7	0	15	92	7	0	6	13	3	0	27	5	4	0	693	
05:05:00 PM	9	54	10	0	5	88	5	0	3	18	6	0	18	14	8	0	696	
05:10:00 PM	10	59	7	0	17	97	3	0	14	15	11	0	27	16	8	0	752	
05:15:00 PM	14	51	13	0	15	93	4	0	13	12	7	0	31	15	9	0	799	
05:20:00 PM	9	48	9	0	11	76	8	0	9	18	12	0	30	17	8	0	816	
05:25:00 PM	14	47	8	0	11	78	6	0	6	14	9	0	22	22	4	0	773	2882

Bicycles on Road

	Northbound US 20				Southbound US 20				Eastbound NE Butler Market				Westbound NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	4	43	9	0	13	86	6	0	9	10	1	0	19	5	3	0		
04:35:00 PM	8	50	11	0	11	89	4	0	6	16	3	0	21	13	5	0		
04:40:00 PM	10	49	8	0	9	67	2	0	8	13	5	0	31	11	6	0	664	
04:45:00 PM	12	48	13	0	10	61	7	0	4	8	7	0	32	8	8	0	674	
04:50:00 PM	10	41	7	0	19	85	3	0	8	9	9	0	23	11	5	0	667	
04:55:00 PM	7	37	10	0	13	85	4	0	9	7	7	0	28	11	4	0	670	
05:00:00 PM	6	45	7	0	14	91	7	0	6	13	3	0	26	5	4	0	679	
05:05:00 PM	8	52	10	0	5	86	5	0	3	18	6	0	18	14	8	0	682	
05:10:00 PM	10	56	7	0	17	94	3	0	14	15	11	0	26	15	8	0	736	
05:15:00 PM	14	51	13	0	15	90	4	0	13	12	7	0	31	15	9	0	783	
05:20:00 PM	9	46	9	0	10	73	8	0	8	18	12	0	30	17	8	0	798	
05:25:00 PM	14	47	8	0	11	76	6	0	6	14	9	0	22	22	4	0	761	2831

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	1	1	0	0	1	0	0	0	1	0	0	0	0	1	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	
04:45:00 PM	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	9	
04:50:00 PM	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	9	
04:55:00 PM	1	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	15	
05:00:00 PM	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	14	
05:05:00 PM	1	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	14	
05:10:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	1	1	0	0	16	
05:15:00 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	16	
05:20:00 PM	0	2	0	0	1	3	0	0	1	0	0	0	0	0	0	0	18	
05:25:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	12	51

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	2	2	0	4	
04:45:00 PM	0	0	0	0	4	
04:50:00 PM	0	0	0	0	4	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	1	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	3	2	0	5	10

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US 97 SB ramp*
E/W street:	*NE Butler Market*
City, State	Bend OR
Study ID #	
Location	44.078919 - -121.303043
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.91

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	137	0	97	0	0	458	0	0	0	556	0	0	0	234	458	556	0	0	653	595
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	2.1%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	#DIV/0!	1.7%	1.1%	0.7%	#DIV/0!	0.0%	0.9%	1.2%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
				0		0	0	0	0		0		0	0	0	0		1	0	0	1

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					13	8	0		0	32		0		47	0	0		
04:35:00 PM					12	8	0		0	41		0		48	0	0		
04:40:00 PM					8	12	0		0	39		0		50	0	0	318	
04:45:00 PM					14	8	0		0	32		0		46	0	0	318	
04:50:00 PM					13	10	0		0	43		0		37	0	0	312	
04:55:00 PM					6	9	0		0	33		0		41	0	0	292	
05:00:00 PM					13	5	0		0	42		0		37	0	0	289	
05:05:00 PM					9	6	0		0	38		0		52	0	0	291	
05:10:00 PM					13	9	0		0	40		0		49	0	0	313	
05:15:00 PM					12	8	0		0	42		0		52	0	0	330	
05:20:00 PM					15	7	0		0	44		0		50	0	0	341	
05:25:00 PM					9	7	0		0	32		0		47	0	0	325	1248

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					0	0	0		0	0		0		0	0	0		
04:35:00 PM					0	0	0		0	0		0		0	0	0		
04:40:00 PM					0	0	0		0	0		0		0	0	0	0	
04:45:00 PM					0	0	0		0	0		0		0	0	0	0	
04:50:00 PM					0	0	0		0	0		0		0	0	0	0	
04:55:00 PM					0	0	0		0	0		0		0	0	0	0	
05:00:00 PM					0	0	0		0	0		0		0	0	0	0	
05:05:00 PM					0	0	0		0	0		0		0	0	0	0	
05:10:00 PM					0	0	0		0	0		0		0	0	0	0	
05:15:00 PM					0	0	0		0	0		0		0	0	0	0	
05:20:00 PM					0	0	0		0	0		0		0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM					0		0	0	0	0		0	0	0	0	0		

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					13		8	0	0	32		0		46	0	0		
04:35:00 PM					12		8	0	0	39		0		48	0	0		
04:40:00 PM					8		12	0	0	39		0		49	0	0	314	
04:45:00 PM					14		8	0	0	31		0		46	0	0	314	
04:50:00 PM					13		10	0	0	43		0		37	0	0	310	
04:55:00 PM					6		9	0	0	33		0		41	0	0	291	
05:00:00 PM					12		4	0	0	41		0		37	0	0	286	
05:05:00 PM					9		5	0	0	38		0		50	0	0	285	
05:10:00 PM					13		9	0	0	40		0		49	0	0	307	
05:15:00 PM					11		8	0	0	42		0		52	0	0	326	
05:20:00 PM					15		7	0	0	43		0		50	0	0	339	
05:25:00 PM					9		7	0	0	32		0		47	0	0	323	1235

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					0		0	0	0	0		0		1	0	0		
04:35:00 PM					0		0	0	0	2		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		1	0	0	4	
04:45:00 PM					0		0	0	0	1		0		0	0	0	4	
04:50:00 PM					0		0	0	0	0		0		0	0	0	2	
04:55:00 PM					0		0	0	0	0		0		0	0	0	1	
05:00:00 PM					1		1	0	0	1		0		0	0	0	3	
05:05:00 PM					0		1	0	0	0		0		2	0	0	6	
05:10:00 PM					0		0	0	0	0		0		0	0	0	6	
05:15:00 PM					1		0	0	0	0		0		0	0	0	4	
05:20:00 PM					0		0	0	0	1		0		0	0	0	2	
05:25:00 PM					0		0	0	0	0		0		0	0	0	2	13

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM		0	0	0		
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0	0	
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		1	0	0	1	
05:25:00 PM		0	0	0	1	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramp***
E/W street:	***NE Butler Market***
City, State	Bend OR
Study ID #	
Location	44.078398 - -121.301693
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
1	2	11	0	0	0	0	0	74	515	6	0	7	557	178	0	14	0	595	742	13	254	558	526
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	1.2%	0.0%	0.0%	0.0%	0.5%	2.2%	0.0%	0.0%	0.0%	1.3%	0.9%	0.0%	2.4%	0.5%	1.1%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	3	40	0	0	0	44	21	0		
04:35:00 PM	0	0	1	0	0	0	0	0	9	46	0	0	1	52	20	0		
04:40:00 PM	0	0	3	0	0	0	0	0	2	43	0	0	1	47	7	0	340	
04:45:00 PM	0	0	0	0	0	0	0	0	4	43	0	0	1	45	11	0	336	
04:50:00 PM	0	0	1	0	0	0	0	0	5	50	1	0	0	39	16	0	319	
04:55:00 PM	0	0	0	0	0	0	0	0	5	35	0	0	1	42	8	0	307	
05:00:00 PM	0	0	1	0	0	0	0	0	9	44	0	0	1	35	21	0	314	
05:05:00 PM	0	2	0	0	0	0	0	0	14	31	3	0	1	55	13	0	321	
05:10:00 PM	1	0	2	0	0	0	0	0	4	50	1	0	0	47	17	0	352	
05:15:00 PM	0	0	2	0	0	0	0	0	5	48	1	0	0	52	18	0	367	
05:20:00 PM	0	0	0	0	0	0	0	0	7	51	0	0	0	50	13	0	369	
05:25:00 PM	0	0	1	0	0	0	0	0	7	34	0	0	1	49	13	0	352	1351

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

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KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	3	40	0	0	0	43	20	0		
04:35:00 PM	0	0	1	0	0	0	0	0	7	46	0	0	1	52	19	0		
04:40:00 PM	0	0	3	0	0	0	0	0	2	43	0	0	1	46	7	0	334	
04:45:00 PM	0	0	0	0	0	0	0	0	4	42	0	0	1	45	11	0	331	
04:50:00 PM	0	0	1	0	0	0	0	0	5	50	1	0	0	39	16	0	317	
04:55:00 PM	0	0	0	0	0	0	0	0	5	35	0	0	1	42	8	0	306	
05:00:00 PM	0	0	1	0	0	0	0	0	9	42	0	0	1	35	21	0	312	
05:05:00 PM	0	2	0	0	0	0	0	0	14	31	3	0	1	54	13	0	318	
05:10:00 PM	1	0	2	0	0	0	0	0	4	50	1	0	0	47	17	0	349	
05:15:00 PM	0	0	2	0	0	0	0	0	5	46	1	0	0	52	17	0	363	
05:20:00 PM	0	0	0	0	0	0	0	0	7	50	0	0	0	50	12	0	364	
05:25:00 PM	0	0	1	0	0	0	0	0	7	34	0	0	1	49	13	0	347	1336

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0		
04:35:00 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6	
04:45:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:15:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	5	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	15

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	1	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	1	0	0	0	1	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 20***
E/W street:	***NE Division St***
City, State	Bend OR
Study ID #	
Location	44.077728 - -121.304474
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	469	0	0	0	1196	238	0	363	0	8	0	0	0	0	0	469	1434	371	0	1204	832	238	0
Percent Heavy Vehicles																							
0.0%	2.1%	0.0%	0.0%	0.0%	2.5%	0.4%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.1%	2.2%	0.8%	0.0%	2.5%	1.6%	0.4%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0		0		0	0	0	1		0	0					1	0	0	0		0

All Vehicle Volumes

	Northbound US 20				Southbound US 20				Eastbound NE Division St				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	30		0		92	16	0	29		0	0						
04:35:00 PM	0	41		0		103	19	0	37		1	0						
04:40:00 PM	0	41		0		93	18	0	29		1	0					550	
04:45:00 PM	0	43		0		84	18	0	35		1	0					564	
04:50:00 PM	0	34		0		110	15	0	33		0	0					555	
04:55:00 PM	0	37		0		94	32	0	20		2	0					558	
05:00:00 PM	0	31		0		106	16	0	24		1	0					555	
05:05:00 PM	0	43		0		102	16	0	33		1	0					558	
05:10:00 PM	0	45		0		110	28	0	30		0	0					586	
05:15:00 PM	0	47		0		106	22	0	37		1	0					621	
05:20:00 PM	0	39		0		102	20	0	28		0	0					615	
05:25:00 PM	0	38		0		94	18	0	28		0	0					580	2274

Bicycles on Road

	Northbound US 20				Southbound US 20				Eastbound NE Division St				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0		0		0	0	0	0		0	0						
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	1		0	0					1	
04:45:00 PM	0	0		0		0	0	0	0		0	0					1	
04:50:00 PM	0	0		0		0	0	0	0		0	0					1	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	0		0		0	0	0	0		0	0					0	
05:10:00 PM	0	0		0		0	0	0	0		0	0					0	
05:15:00 PM	0	0		0		0	0	0	0		0	0					0	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	

05:25:00 PM	0	0		0		0	0	0	0		0	0					0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Division St								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	29		0		91	16	0	29		0	0						
04:35:00 PM	0	40		0		102	19	0	35		1	0						
04:40:00 PM	0	41		0		93	18	0	29		1	0					544	
04:45:00 PM	0	43		0		79	18	0	35		1	0					555	
04:50:00 PM	0	34		0		105	15	0	33		0	0					545	
04:55:00 PM	0	35		0		90	32	0	20		2	0					542	
05:00:00 PM	0	31		0		105	16	0	24		1	0					543	
05:05:00 PM	0	41		0		100	16	0	32		1	0					546	
05:10:00 PM	0	42		0		106	28	0	30		0	0					573	
05:15:00 PM	0	47		0		105	22	0	37		1	0					608	
05:20:00 PM	0	38		0		98	19	0	28		0	0					601	
05:25:00 PM	0	38		0		92	18	0	28		0	0					571	2230

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Division St								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	1		0		1	0	0	0		0	0						
04:35:00 PM	0	1		0		1	0	0	2		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0					6	
04:45:00 PM	0	0		0		5	0	0	0		0	0					9	
04:50:00 PM	0	0		0		5	0	0	0		0	0					10	
04:55:00 PM	0	2		0		4	0	0	0		0	0					16	
05:00:00 PM	0	0		0		1	0	0	0		0	0					12	
05:05:00 PM	0	2		0		2	0	0	1		0	0					12	
05:10:00 PM	0	3		0		4	0	0	0		0	0					13	
05:15:00 PM	0	0		0		1	0	0	0		0	0					13	
05:20:00 PM	0	1		0		4	1	0	0		0	0					14	
05:25:00 PM	0	0		0		2	0	0	0		0	0					9	44

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0			
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0		0	
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	0		0	
05:15:00 PM	0	0	0		0	
05:20:00 PM	0	0	0		0	
05:25:00 PM	0	0	0		0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***NW Revere Ave***
City, State	Bend OR
Study ID #	
Location	44.067411 - -121.309081
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
24	132	388	0	154	240	2	0	5	18	9	0	438	25	199	0	544	396	32	662	687	336	51	560
Percent Heavy Vehicles																							
0.0%	0.0%	1.3%	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.9%	1.0%	0.0%	0.3%	0.0%	0.6%	0.0%	1.6%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	1	0	6

All Vehicle Volumes

	Northbound US97 SB ramps				Southbound US97 SB ramps				Eastbound NW Revere Ave				Westbound NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	4	13	28	0	16	21	0	0	0	2	0	0	28	2	10	0		
04:40:00 PM	0	9	30	0	13	14	0	0	0	1	0	0	31	1	11	0		
04:45:00 PM	1	14	47	0	15	18	0	0	1	2	0	0	28	2	12	0	374	
04:50:00 PM	0	14	23	0	13	31	0	0	2	1	1	0	41	4	8	0	388	
04:55:00 PM	1	7	23	0	11	17	0	0	0	0	0	0	46	1	18	0	402	
05:00:00 PM	2	16	35	0	12	19	0	0	0	1	1	0	32	0	16	0	396	
05:05:00 PM	1	10	29	0	12	17	1	0	0	1	1	0	30	3	20	0	383	
05:10:00 PM	3	10	27	0	12	23	0	0	0	1	2	0	43	4	25	0	409	
05:15:00 PM	1	7	43	0	10	16	0	0	1	3	0	0	33	1	24	0	414	
05:20:00 PM	8	13	37	0	15	26	0	0	0	1	2	0	47	1	17	0	456	
05:25:00 PM	0	8	35	0	13	15	1	0	1	1	2	0	44	4	23	0	453	
05:30:00 PM	3	11	31	0	12	23	0	0	0	4	0	0	35	2	15	0	450	1634

Bicycles on Road

	Northbound US97 SB ramps				Southbound US97 SB ramps				Eastbound NW Revere Ave				Westbound NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Revere Ave				NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	4	13	28	0	14	21	0	0	0	2	0	0	28	2	10	0		
04:40:00 PM	0	9	30	0	13	14	0	0	0	1	0	0	31	1	11	0		
04:45:00 PM	1	14	44	0	15	18	0	0	1	2	0	0	28	2	12	0	369	
04:50:00 PM	0	14	23	0	13	31	0	0	2	1	1	0	41	4	8	0	385	
04:55:00 PM	1	7	23	0	11	17	0	0	0	0	0	0	46	1	18	0	399	
05:00:00 PM	2	16	35	0	12	19	0	0	0	1	1	0	32	0	16	0	396	
05:05:00 PM	1	10	28	0	12	17	1	0	0	1	1	0	30	3	19	0	381	
05:10:00 PM	3	10	27	0	12	23	0	0	0	1	2	0	43	4	25	0	407	
05:15:00 PM	1	7	42	0	10	16	0	0	1	3	0	0	33	1	23	0	410	
05:20:00 PM	8	13	37	0	15	26	0	0	0	1	2	0	47	1	17	0	454	
05:25:00 PM	0	8	35	0	12	15	1	0	1	1	2	0	44	4	23	0	450	
05:30:00 PM	3	11	31	0	11	23	0	0	0	4	0	0	35	2	15	0	448	1623

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Revere Ave				NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:15:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:25:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	
05:30:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	11

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	2	1	0	3	
05:20:00 PM	0	1	0	0	4	
05:25:00 PM	0	0	0	0	4	
05:30:00 PM	0	1	0	0	2	6

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***Revere Ave***
City, State	Bend OR
Study ID #	
Location	44.067623 - -121.305901
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.89

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
136	210	276	0	68	21	170	0	134	240	264	0	28	401	67	0	622	259	638	496	313	411	707	584
Percent Heavy Vehicles																							
0.0%	0.5%	0.7%	0.0%	0.0%	4.8%	0.0%	0.0%	1.5%	2.1%	0.0%	0.0%	3.6%	0.7%	1.5%	0.0%	0.5%	0.4%	1.1%	1.0%	0.6%	1.0%	0.4%	1.2%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
0	7	0	0	7

All Vehicle Volumes

	Northbound US97 NB ramps				Southbound US97 NB ramps				Eastbound Revere Ave				Westbound Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	12	18	22	0	16	1	15	0	14	18	16	0	5	27	6	0		
04:40:00 PM	6	14	23	0	2	1	18	0	18	15	13	0	3	18	4	0		
04:45:00 PM	9	16	23	0	4	0	10	0	12	20	19	0	3	25	5	0	451	
04:50:00 PM	18	20	43	0	2	2	7	0	7	25	17	0	0	41	3	0	466	
04:55:00 PM	7	17	14	0	2	4	21	0	11	17	23	0	2	31	5	0	485	
05:00:00 PM	11	12	18	0	8	3	14	0	12	17	25	0	1	36	7	0	503	
05:05:00 PM	11	13	26	0	9	2	12	0	11	18	26	0	3	38	5	0	492	
05:10:00 PM	9	25	16	0	2	2	14	0	8	22	23	0	2	44	6	0	511	
05:15:00 PM	10	26	24	0	7	2	13	0	13	25	26	0	4	30	6	0	533	
05:20:00 PM	11	23	33	0	9	3	20	0	10	24	32	0	0	31	6	0	561	
05:25:00 PM	19	14	16	0	4	1	13	0	9	23	20	0	1	50	10	0	568	
05:30:00 PM	13	12	18	0	3	0	13	0	9	16	24	0	4	30	4	0	528	2015

Bicycles on Road

	Northbound US97 NB ramps				Southbound US97 NB ramps				Eastbound Revere Ave				Westbound Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				Revere Ave				Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	12	18	22	0	16	1	15	0	13	17	16	0	4	27	6	0		
04:40:00 PM	6	13	23	0	2	1	18	0	18	14	13	0	3	18	4	0		
04:45:00 PM	9	16	23	0	4	0	10	0	11	19	19	0	3	25	5	0	444	
04:50:00 PM	18	20	43	0	2	2	7	0	7	25	17	0	0	41	2	0	461	
04:55:00 PM	7	17	14	0	2	4	21	0	11	17	23	0	2	31	5	0	482	
05:00:00 PM	11	12	18	0	8	3	14	0	12	17	25	0	1	35	7	0	501	
05:05:00 PM	11	13	26	0	9	2	12	0	11	18	26	0	3	38	5	0	491	
05:10:00 PM	9	25	16	0	2	2	14	0	8	22	23	0	2	43	6	0	509	
05:15:00 PM	10	26	23	0	7	2	13	0	13	25	26	0	4	30	6	0	531	
05:20:00 PM	11	23	32	0	9	2	20	0	10	24	32	0	0	31	6	0	557	
05:25:00 PM	19	14	16	0	4	1	13	0	9	22	20	0	1	49	10	0	563	
05:30:00 PM	13	12	18	0	3	0	13	0	9	15	24	0	4	30	4	0	523	1999

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				Revere Ave				Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0		
04:40:00 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	7	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:15:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:20:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4	
05:25:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	5	
05:30:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	16

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	1	0	0	2	
04:50:00 PM	0	0	0	0	2	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	1	0	0	1	
05:15:00 PM	0	2	0	0	3	
05:20:00 PM	0	0	0	0	3	
05:25:00 PM	0	1	0	0	3	
05:30:00 PM	0	1	0	0	2	7

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***NW Lafayette Ave***
City, State	Bend OR
Study ID #	
Location	44.061871 - -121.307143
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	2302	0	0	0	2573	83	0	0	0	125	0	0	0	0	0	2302	2656	125	0	2698	2302	83	0
Percent Heavy Vehicles																							
0.0%	2.9%	0.0%	0.0%	0.0%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	2.8%	0.0%	0.0%	2.8%	2.9%	0.0%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1		0		0	0	0	0		0	0					1	0	0	0		0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	192		0		238	8	0	0		5	0						
04:40:00 PM	0	191		0		198	11	0	0		4	0						
04:45:00 PM	0	215		0		215	3	0	0		6	0					1286	
04:50:00 PM	0	193		0		214	5	0	0		14	0					1269	
04:55:00 PM	0	158		0		189	12	0	0		14	0					1238	
05:00:00 PM	0	170		0		220	8	0	0		16	0					1213	
05:05:00 PM	0	217		0		215	4	0	0		19	0					1242	
05:10:00 PM	0	201		0		237	5	0	0		8	0					1320	
05:15:00 PM	0	217		0		231	7	0	0		13	0					1374	
05:20:00 PM	0	203		0		215	5	0	0		12	0					1354	
05:25:00 PM	0	198		0		198	6	0	0		7	0					1312	
05:30:00 PM	0	147		0		203	9	0	0		7	0					1210	5083

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	1		0		0	0	0	0		0	0					1	
05:10:00 PM	0	0		0		0	0	0	0		0	0					1	
05:15:00 PM	0	0		0		0	0	0	0		0	0					1	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	183		0		231	8	0	0		5	0						
04:40:00 PM	0	184		0		195	11	0	0		4	0						
04:45:00 PM	0	205		0		209	3	0	0		6	0					1244	
04:50:00 PM	0	190		0		210	5	0	0		14	0					1236	
04:55:00 PM	0	153		0		184	12	0	0		14	0					1205	
05:00:00 PM	0	166		0		212	8	0	0		16	0					1184	
05:05:00 PM	0	211		0		205	4	0	0		19	0					1204	
05:10:00 PM	0	199		0		233	5	0	0		8	0					1286	
05:15:00 PM	0	208		0		224	7	0	0		13	0					1336	
05:20:00 PM	0	200		0		210	5	0	0		12	0					1324	
05:25:00 PM	0	192		0		191	6	0	0		7	0					1275	
05:30:00 PM	0	144		0		194	9	0	0		7	0					1177	4941

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	9		0		7	0	0	0		0	0						
04:40:00 PM	0	7		0		3	0	0	0		0	0						
04:45:00 PM	0	10		0		6	0	0	0		0	0					42	
04:50:00 PM	0	3		0		4	0	0	0		0	0					33	
04:55:00 PM	0	5		0		5	0	0	0		0	0					33	
05:00:00 PM	0	4		0		8	0	0	0		0	0					29	
05:05:00 PM	0	6		0		10	0	0	0		0	0					38	
05:10:00 PM	0	2		0		4	0	0	0		0	0					34	
05:15:00 PM	0	9		0		7	0	0	0		0	0					38	
05:20:00 PM	0	3		0		5	0	0	0		0	0					30	
05:25:00 PM	0	6		0		7	0	0	0		0	0					37	
05:30:00 PM	0	3		0		9	0	0	0		0	0					33	142

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	0		0	
05:15:00 PM	0	0	0		0	
05:20:00 PM	0	0	0		0	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***NW Hawthorne Ave***
City, State	Bend OR
Study ID #	
Location	44.057959 - -121.307182
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	2309	0	0	0	2412	259	0	0	0	223	0	0	0	0	0	2309	2671	223	0	2635	2309	259	0
Percent Heavy Vehicles																							
0.0%	3.1%	0.0%	0.0%	0.0%	2.7%	0.8%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.5%	0.9%	0.0%	2.6%	3.1%	0.8%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1		0		0	0	0	0		0	0					1	0	0	1		1

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound NW Hawthorne Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	206		0		208	18	0	0		17	0						
04:40:00 PM	0	196		0		177	20	0	0		17	0						
04:45:00 PM	0	209		0		185	25	0	0		18	0					1296	
04:50:00 PM	0	183		0		205	28	0	0		18	0					1281	
04:55:00 PM	0	157		0		188	21	0	0		15	0					1252	
05:00:00 PM	0	184		0		205	24	0	0		14	0					1242	
05:05:00 PM	0	212		0		206	25	0	0		28	0					1279	
05:10:00 PM	0	207		0		230	19	0	0		17	0					1371	
05:15:00 PM	0	210		0		219	18	0	0		17	0					1408	
05:20:00 PM	0	192		0		214	18	0	0		23	0					1384	
05:25:00 PM	0	198		0		186	23	0	0		21	0					1339	
05:30:00 PM	0	155		0		189	20	0	0		18	0					1257	5203

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound NW Hawthorne Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	1		0		0	0	0	0		0	0					1	
05:10:00 PM	0	0		0		0	0	0	0		0	0					1	
05:15:00 PM	0	0		0		0	0	0	0		0	0					1	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Hawthorne Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	198		0		204	17	0	0		17	0						
04:40:00 PM	0	186		0		173	20	0	0		17	0						
04:45:00 PM	0	201		0		180	24	0	0		18	0					1255	
04:50:00 PM	0	181		0		202	28	0	0		18	0					1248	
04:55:00 PM	0	151		0		184	21	0	0		15	0					1223	
05:00:00 PM	0	180		0		198	24	0	0		13	0					1215	
05:05:00 PM	0	205		0		197	25	0	0		28	0					1241	
05:10:00 PM	0	205		0		227	19	0	0		17	0					1338	
05:15:00 PM	0	200		0		212	18	0	0		17	0					1370	
05:20:00 PM	0	189		0		209	18	0	0		22	0					1353	
05:25:00 PM	0	191		0		180	23	0	0		21	0					1300	
05:30:00 PM	0	151		0		180	20	0	0		18	0					1222	5062

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Hawthorne Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	8		0		4	1	0	0		0	0						
04:40:00 PM	0	10		0		4	0	0	0		0	0						
04:45:00 PM	0	8		0		5	1	0	0		0	0					41	
04:50:00 PM	0	2		0		3	0	0	0		0	0					33	
04:55:00 PM	0	6		0		4	0	0	0		0	0					29	
05:00:00 PM	0	4		0		7	0	0	0		1	0					27	
05:05:00 PM	0	7		0		9	0	0	0		0	0					38	
05:10:00 PM	0	2		0		3	0	0	0		0	0					33	
05:15:00 PM	0	10		0		7	0	0	0		0	0					38	
05:20:00 PM	0	3		0		5	0	0	0		1	0					31	
05:25:00 PM	0	7		0		6	0	0	0		0	0					39	
05:30:00 PM	0	4		0		9	0	0	0		0	0					35	141

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	1		1	
05:15:00 PM	0	0	0		1	
05:20:00 PM	0	0	0		1	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***NW Colorado Ave***
City, State	Bend OR
Study ID #	
Location	44.051697 - -121.30911
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.87

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
8	264	378	0	91	0	173	0	0	0	0	0	0	347	30	0	650	264	0	377	0	294	528	469
Percent Heavy Vehicles																							
0.0%	0.8%	1.3%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	1.1%	0.8%	#DIV/0!	1.1%	#DIV/0!	0.7%	0.8%	1.5%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	0	1	1	4

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	21	29	0	7	0	21	0	0	0	0	0	0	20	5	0		
04:40:00 PM	0	23	31	0	4	0	15	0	0	0	0	0	0	25	1	0		
04:45:00 PM	1	23	27	0	12	0	12	0	0	0	0	0	0	37	0	0	314	
04:50:00 PM	0	19	28	0	3	0	16	0	0	0	0	0	0	28	0	0	305	
04:55:00 PM	0	15	20	0	6	0	13	0	0	0	0	0	0	28	0	0	288	
05:00:00 PM	1	12	27	0	7	0	19	0	0	0	0	0	0	19	2	0	263	
05:05:00 PM	0	21	25	0	9	0	12	0	0	0	0	0	0	37	3	0	276	
05:10:00 PM	3	36	42	0	14	0	14	0	0	0	0	0	0	29	1	0	333	
05:15:00 PM	3	19	28	0	10	0	9	0	0	0	0	0	0	34	4	0	353	
05:20:00 PM	0	27	46	0	7	0	8	0	0	0	0	0	0	34	4	0	372	
05:25:00 PM	0	24	37	0	8	0	20	0	0	0	0	0	0	38	4	0	364	
05:30:00 PM	0	24	38	0	4	0	14	0	0	0	0	0	0	18	6	0	361	1291

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	21	27	0	7	0	21	0	0	0	0	0	0	20	5	0		
04:40:00 PM	0	23	31	0	3	0	15	0	0	0	0	0	0	24	1	0		
04:45:00 PM	1	23	25	0	12	0	12	0	0	0	0	0	0	37	0	0	308	
04:50:00 PM	0	19	28	0	3	0	16	0	0	0	0	0	0	28	0	0	301	
04:55:00 PM	0	15	20	0	6	0	13	0	0	0	0	0	0	28	0	0	286	
05:00:00 PM	1	11	27	0	7	0	19	0	0	0	0	0	0	19	2	0	262	
05:05:00 PM	0	21	25	0	9	0	12	0	0	0	0	0	0	36	3	0	274	
05:10:00 PM	3	35	41	0	14	0	14	0	0	0	0	0	0	29	1	0	329	
05:15:00 PM	3	19	28	0	10	0	9	0	0	0	0	0	0	33	4	0	349	
05:20:00 PM	0	27	46	0	7	0	8	0	0	0	0	0	0	34	4	0	369	
05:25:00 PM	0	24	37	0	7	0	20	0	0	0	0	0	0	37	4	0	361	
05:30:00 PM	0	24	38	0	4	0	14	0	0	0	0	0	0	18	6	0	359	1278

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0		
04:45:00 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:00:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:10:00 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:25:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	3	
05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	1	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	1	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	1	0	1	0	2	
05:25:00 PM	0	0	0	0	2	
05:30:00 PM	0	0	0	0	2	4

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***NW Colorado Ave***
City, State	Bend OR
Study ID #	
Location	44.051578 - -121.306089
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	17	0	199	0	644	217	0	1	0	180	381	0	0	216	862	561	0	1025	380	234
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	5.9%	0.0%	0.5%	0.0%	0.9%	2.3%	0.0%	0.0%	0.0%	1.1%	1.0%	0.0%	#DIV/0!	0.9%	1.3%	1.1%	#DIV/0!	1.0%	0.8%	2.6%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	0		0		2	0	0	2

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2		9	0	66	14		0		16	29	0		
04:40:00 PM					0		17	0	56	16		0		11	30	0		
04:45:00 PM					0		21	0	60	21		0		14	29	0	411	
04:50:00 PM					0		19	0	42	10		0		10	21	0	377	
04:55:00 PM					1		12	0	53	12		0		14	25	0	364	
05:00:00 PM					1		18	0	51	17		0		13	34	0	353	
05:05:00 PM					2		20	0	46	19		0		12	59	0	409	
05:10:00 PM					5		16	0	44	22		0		17	43	0	439	
05:15:00 PM					1		21	0	70	16		0		14	29	0	456	
05:20:00 PM					3		16	0	64	18		0		23	30	0	452	
05:25:00 PM					2		21	0	53	30		0		22	20	0	453	
05:30:00 PM					0		9	0	39	22		1		14	32	0	419	1639

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	0		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	0	
04:50:00 PM					0		0	0	0	0		0		0	0	0	0	
04:55:00 PM					0		0	0	0	0		0		0	0	0	0	
05:00:00 PM					0		0	0	0	0		0		1	0	0	1	
05:05:00 PM					0		0	0	0	0		0		0	0	0	1	
05:10:00 PM					0		0	0	0	0		0		0	0	0	1	
05:15:00 PM					0		0	0	0	0		0		0	0	0	0	
05:20:00 PM					0		0	0	0	0		0		0	0	0	0	
05:25:00 PM					0		0	0	0	0		0		0	0	0	0	

05:30:00 PM					0		0	0	0	0		0	1	0	0	1	2	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2		9	0	64	14		0		16	29	0		
04:40:00 PM					0		17	0	55	15		0		11	30	0		
04:45:00 PM					0		21	0	59	20		0		14	29	0	405	
04:50:00 PM					0		19	0	42	10		0		10	20	0	372	
04:55:00 PM					1		12	0	53	12		0		14	24	0	360	
05:00:00 PM					1		18	0	51	17		0		12	34	0	350	
05:05:00 PM					2		20	0	46	19		0		12	58	0	406	
05:10:00 PM					4		16	0	44	22		0		17	43	0	436	
05:15:00 PM					1		20	0	68	16		0		14	29	0	451	
05:20:00 PM					3		16	0	64	18		0		23	30	0	448	
05:25:00 PM					2		21	0	53	28		0		21	19	0	446	
05:30:00 PM					0		9	0	39	21		1		14	32	0	414	1620

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	2	0		0		0	0	0		
04:40:00 PM					0		0	0	1	1		0		0	0	0		
04:45:00 PM					0		0	0	1	1		0		0	0	0	6	
04:50:00 PM					0		0	0	0	0		0		0	1	0	5	
04:55:00 PM					0		0	0	0	0		0		0	1	0	4	
05:00:00 PM					0		0	0	0	0		0		1	0	0	3	
05:05:00 PM					0		0	0	0	0		0		0	1	0	3	
05:10:00 PM					1		0	0	0	0		0		0	0	0	3	
05:15:00 PM					0		1	0	2	0		0		0	0	0	5	
05:20:00 PM					0		0	0	0	0		0		0	0	0	4	
05:25:00 PM					0		0	0	0	2		0		1	1	0	7	
05:30:00 PM					0		0	0	0	1		0		0	0	0	5	19

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0		
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***SW Truman Ave***
City, State	Bend OR
Study ID #	
Location	44.044229 - -121.305958
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1504	0	0	0	2311	183	0	0	0	80	0	0	0	0	0	1504	2494	80	0	2391	1504	183	0
Percent Heavy Vehicles																							
0.0%	4.1%	0.0%	0.0%	0.0%	2.8%	2.2%	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	4.1%	2.7%	1.3%	0.0%	2.7%	4.1%	2.2%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0		0		0	0	0	0		0	0					0	0	0	0		0

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound SW Truman Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	131		0		200	18	0	0		4	0						
04:40:00 PM	0	122		0		175	17	0	0		4	0						
04:45:00 PM	0	148		0		181	16	0	0		4	0					1020	
04:50:00 PM	0	125		0		157	19	0	0		9	0					977	
04:55:00 PM	0	97		0		179	15	0	0		7	0					957	
05:00:00 PM	0	126		0		178	15	0	0		10	0					937	
05:05:00 PM	0	142		0		208	13	0	0		6	0					996	
05:10:00 PM	0	123		0		224	12	0	0		13	0					1070	
05:15:00 PM	0	144		0		222	14	0	0		8	0					1129	
05:20:00 PM	0	118		0		221	16	0	0		5	0					1120	
05:25:00 PM	0	127		0		185	15	0	0		6	0					1081	
05:30:00 PM	0	101		0		181	13	0	0		4	0					992	4078

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound SW Truman Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	0		0		0	0	0	0		0	0					0	
05:10:00 PM	0	0		0		0	0	0	0		0	0					0	
05:15:00 PM	0	0		0		0	0	0	0		0	0					0	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Truman Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	126		0		195	18	0	0		4	0						
04:40:00 PM	0	114		0		173	17	0	0		4	0						
04:45:00 PM	0	141		0		175	16	0	0		4	0					987	
04:50:00 PM	0	122		0		156	18	0	0		8	0					948	
04:55:00 PM	0	95		0		174	15	0	0		7	0					931	
05:00:00 PM	0	121		0		168	15	0	0		10	0					909	
05:05:00 PM	0	137		0		202	13	0	0		6	0					963	
05:10:00 PM	0	119		0		218	12	0	0		13	0					1034	
05:15:00 PM	0	136		0		214	14	0	0		8	0					1092	
05:20:00 PM	0	115		0		215	16	0	0		5	0					1085	
05:25:00 PM	0	124		0		181	13	0	0		6	0					1047	
05:30:00 PM	0	93		0		176	12	0	0		4	0					960	3948

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Truman Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	5		0		5	0	0	0		0	0						
04:40:00 PM	0	8		0		2	0	0	0		0	0						
04:45:00 PM	0	7		0		6	0	0	0		0	0					33	
04:50:00 PM	0	3		0		1	1	0	0		1	0					29	
04:55:00 PM	0	2		0		5	0	0	0		0	0					26	
05:00:00 PM	0	5		0		10	0	0	0		0	0					28	
05:05:00 PM	0	5		0		6	0	0	0		0	0					33	
05:10:00 PM	0	4		0		6	0	0	0		0	0					36	
05:15:00 PM	0	8		0		8	0	0	0		0	0					37	
05:20:00 PM	0	3		0		6	0	0	0		0	0					35	
05:25:00 PM	0	3		0		4	2	0	0		0	0					34	
05:30:00 PM	0	8		0		5	1	0	0		0	0					32	130

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	0		0	
05:15:00 PM	0	0	0		0	
05:20:00 PM	0	0	0		0	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US97 SB ramps*
E/W street:	*SW Reed Market*
City, State	Bend OR
Study ID #	
Location	44.039049 - -121.309913
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.91

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	679	0	150	0	0	710	52	0	0	457	62	0	0	829	762	519	52	62	607	1389
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	2.0%	0.0%	0.0%	1.8%	1.9%	0.0%	0.0%	1.8%	1.6%	0.0%	#DIV/0!	1.7%	1.8%	1.7%	1.9%	1.6%	1.8%	1.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	53	0	13	0	0	62	6	0	0	35	3	0		
04:40:00 PM	0	0	0	0	63	0	13	0	0	50	4	0	0	37	6	0		
04:45:00 PM	0	0	0	0	41	0	5	0	0	70	5	0	0	27	5	0	498	
04:50:00 PM	0	0	0	0	39	0	4	0	0	72	5	0	0	32	6	0	484	
04:55:00 PM	0	0	0	0	65	0	17	0	0	55	2	0	0	42	8	0	500	
05:00:00 PM	0	0	0	0	42	0	9	0	0	60	3	0	0	40	9	0	510	
05:05:00 PM	0	0	0	0	67	0	17	0	0	53	5	0	0	31	3	0	528	
05:10:00 PM	0	0	0	0	59	0	11	0	0	64	7	0	0	42	8	0	530	
05:15:00 PM	0	0	0	0	76	0	17	0	0	56	6	0	0	39	6	0	567	
05:20:00 PM	0	0	0	0	69	0	12	0	0	59	3	0	0	42	2	0	578	
05:25:00 PM	0	0	0	0	56	0	17	0	0	57	3	0	0	47	5	0	572	
05:30:00 PM	0	0	0	0	49	0	15	0	0	52	3	0	0	43	1	0	535	2110

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	51	0	13	0	0	60	6	0	0	34	3	0		
04:40:00 PM	0	0	0	0	62	0	12	0	0	50	4	0	0	36	6	0		
04:45:00 PM	0	0	0	0	39	0	5	0	0	68	4	0	0	27	5	0	485	
04:50:00 PM	0	0	0	0	39	0	4	0	0	71	5	0	0	31	6	0	474	
04:55:00 PM	0	0	0	0	64	0	15	0	0	54	2	0	0	40	7	0	486	
05:00:00 PM	0	0	0	0	41	0	9	0	0	59	3	0	0	40	9	0	499	
05:05:00 PM	0	0	0	0	65	0	17	0	0	53	5	0	0	30	3	0	516	
05:10:00 PM	0	0	0	0	58	0	11	0	0	64	7	0	0	42	8	0	524	
05:15:00 PM	0	0	0	0	76	0	17	0	0	53	6	0	0	37	6	0	558	
05:20:00 PM	0	0	0	0	69	0	12	0	0	57	3	0	0	42	2	0	570	
05:25:00 PM	0	0	0	0	56	0	17	0	0	57	3	0	0	47	5	0	565	
05:30:00 PM	0	0	0	0	48	0	15	0	0	51	3	0	0	43	1	0	531	2073

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	1	0	0		
04:40:00 PM	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0		
04:45:00 PM	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	0	13	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	10	
04:55:00 PM	0	0	0	0	1	0	2	0	0	1	0	0	0	2	1	0	14	
05:00:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	11	
05:05:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	12	
05:10:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	9	
05:20:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4	37

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	1	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	1	0	0	2	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	1	
05:25:00 PM	1	0	0	0	1	
05:30:00 PM	0	0	0	0	1	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***SW Reed Market Rd***
City, State	Bend OR
Study ID #	
Location	44.067623 - -121.305901
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.93

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
35	0	79	0	0	0	35	0	0	1292	97	0	0	449	27	0	114	35	1389	476	97	27	519	1371
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	0.0%	0.0%	1.7%	1.9%	0.0%	0.0%	1.7%	1.8%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	2	0	5	0	0	0	2	0	0	107	8	0	0	34	2	0		
04:40:00 PM	5	0	13	0	0	0	1	0	0	107	6	0	0	37	4	0		
04:45:00 PM	1	0	4	0	0	0	1	0	0	101	10	0	0	30	6	0	486	
04:50:00 PM	2	0	14	0	0	0	2	0	0	106	5	0	0	34	2	0	491	
04:55:00 PM	6	0	6	0	0	0	2	0	0	109	11	0	0	42	1	0	495	
05:00:00 PM	2	0	7	0	0	0	4	0	0	97	5	0	0	43	0	0	500	
05:05:00 PM	2	0	3	0	0	0	2	0	0	106	14	0	0	30	0	0	492	
05:10:00 PM	2	0	5	0	0	0	5	0	0	116	7	0	0	43	1	0	494	
05:15:00 PM	4	0	7	0	0	0	4	0	0	121	11	0	0	37	1	0	521	
05:20:00 PM	3	0	4	0	0	0	2	0	0	121	7	0	0	39	4	0	544	
05:25:00 PM	4	0	7	0	0	0	3	0	0	108	5	0	0	45	5	0	542	
05:30:00 PM	2	0	4	0	0	0	7	0	0	93	8	0	0	35	1	0	507	2014

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	2	0	5	0	0	0	2	0	0	103	8	0	0	33	2	0		
04:40:00 PM	5	0	13	0	0	0	1	0	0	106	6	0	0	36	4	0		
04:45:00 PM	1	0	4	0	0	0	1	0	0	97	10	0	0	30	6	0	475	
04:50:00 PM	2	0	14	0	0	0	2	0	0	105	5	0	0	33	2	0	483	
04:55:00 PM	6	0	6	0	0	0	2	0	0	107	11	0	0	39	1	0	484	
05:00:00 PM	2	0	7	0	0	0	4	0	0	95	5	0	0	43	0	0	491	
05:05:00 PM	2	0	3	0	0	0	2	0	0	104	14	0	0	29	0	0	482	
05:10:00 PM	2	0	5	0	0	0	5	0	0	115	7	0	0	43	1	0	488	
05:15:00 PM	4	0	7	0	0	0	4	0	0	118	11	0	0	35	1	0	512	
05:20:00 PM	3	0	4	0	0	0	2	0	0	119	7	0	0	39	4	0	536	
05:25:00 PM	4	0	7	0	0	0	3	0	0	108	5	0	0	45	5	0	535	
05:30:00 PM	2	0	4	0	0	0	7	0	0	91	8	0	0	35	1	0	503	1981

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	11	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	8	
04:55:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	11	
05:00:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	9	
05:05:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	10	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	9	
05:20:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	33

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	1	0	0	0	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	1	0	0	0	2	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Reed Lane***
City, State	Bend OR
Study ID #	
Location	44.032436 - -121.313051
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.96

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1076	55	0	0	1706	0	0	0	0	0	0	0	0	146	0	1131	1706	0	146	1706	1222	0	55
Percent Heavy Vehicles																							
0.0%	5.3%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	5.0%	3.3%	#DIV/0!	1.4%	3.3%	4.8%	#DIV/0!	0.0%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
	0	0	0	0	0		0					0		0	0	0	1	0		0	1

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound				Westbound Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		87	2	0	0	149		0					0		9	0		
04:40:00 PM		105	4	0	0	142		0					0		15	0		
04:45:00 PM		81	5	0	0	127		0					0		15	0	741	
04:50:00 PM		81	1	0	0	138		0					0		13	0	727	
04:55:00 PM		104	2	0	0	148		0					0		3	0	718	
05:00:00 PM		93	6	0	0	129		0					0		21	0	739	
05:05:00 PM		77	6	0	0	147		0					0		12	0	748	
05:10:00 PM		79	3	0	0	157		0					0		13	0	743	
05:15:00 PM		92	6	0	0	149		0					0		5	0	746	
05:20:00 PM		96	6	0	0	152		0					0		17	0	775	
05:25:00 PM		90	5	0	0	139		0					0		10	0	767	
05:30:00 PM		91	9	0	0	129		0					0		13	0	757	2983

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound				Westbound Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		0	0	0	0	0		0					0		0	0		
04:40:00 PM		0	0	0	0	0		0					0		0	0		
04:45:00 PM		0	0	0	0	0		0					0		0	0	0	
04:50:00 PM		0	0	0	0	0		0					0		0	0	0	
04:55:00 PM		0	0	0	0	0		0					0		0	0	0	
05:00:00 PM		0	0	0	0	0		0					0		0	0	0	
05:05:00 PM		0	0	0	0	0		0					0		0	0	0	
05:10:00 PM		0	0	0	0	0		0					0		0	0	0	
05:15:00 PM		0	0	0	0	0		0					0		0	0	0	
05:20:00 PM		0	0	0	0	0		0					0		0	0	0	
05:25:00 PM		0	0	0	0	0		0					0		0	0	0	

05:30:00 PM		0	0	0	0	0		0					0		0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97								Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		81	2	0	0	141		0					0		9	0		
04:40:00 PM		97	4	0	0	137		0					0		14	0		
04:45:00 PM		79	5	0	0	122		0					0		15	0	706	
04:50:00 PM		79	1	0	0	134		0					0		13	0	700	
04:55:00 PM		98	2	0	0	144		0					0		3	0	695	
05:00:00 PM		88	6	0	0	127		0					0		21	0	716	
05:05:00 PM		72	6	0	0	144		0					0		11	0	722	
05:10:00 PM		78	3	0	0	153		0					0		13	0	722	
05:15:00 PM		86	6	0	0	148		0					0		5	0	725	
05:20:00 PM		91	6	0	0	143		0					0		17	0	749	
05:25:00 PM		84	5	0	0	133		0					0		10	0	734	
05:30:00 PM		86	9	0	0	124		0					0		13	0	721	2868

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97								Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		6	0	0	0	8		0					0		0	0		
04:40:00 PM		8	0	0	0	5		0					0		1	0		
04:45:00 PM		2	0	0	0	5		0					0		0	0	35	
04:50:00 PM		2	0	0	0	4		0					0		0	0	27	
04:55:00 PM		6	0	0	0	4		0					0		0	0	23	
05:00:00 PM		5	0	0	0	2		0					0		0	0	23	
05:05:00 PM		5	0	0	0	3		0					0		1	0	26	
05:10:00 PM		1	0	0	0	4		0					0		0	0	21	
05:15:00 PM		6	0	0	0	1		0					0		0	0	21	
05:20:00 PM		5	0	0	0	9		0					0		0	0	26	
05:25:00 PM		6	0	0	0	6		0					0		0	0	33	
05:30:00 PM		5	0	0	0	5		0					0		0	0	36	115

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0		0		
04:40:00 PM	0	0		0		
04:45:00 PM	0	0		0	0	
04:50:00 PM	0	0		0	0	
04:55:00 PM	0	0		0	0	
05:00:00 PM	0	0		0	0	
05:05:00 PM	0	0		0	0	
05:10:00 PM	0	0		0	0	
05:15:00 PM	0	0		0	0	
05:20:00 PM	0	0		0	0	
05:25:00 PM	1	0		0	1	
05:30:00 PM	0	0		0	1	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramp***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028794 - -121.317252
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
3	0	355	0	0	0	0	0	0	457	33	0	27	581	0	1	358	0	490	609	60	0	584	813
Percent Heavy Vehicles																							
33.3%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	3.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.8%	0.0%	0.6%	0.2%	1.7%	0.0%	0.3%	0.5%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0		0	0						0	0	0	0	0		0	0	6		0	0	6

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		27	0						37	1	0	2	43		1		
04:40:00 PM	2		23	0						37	5	0	6	43		0		
04:45:00 PM	0		36	0						41	3	0	1	55		0	363	
04:50:00 PM	0		24	0						38	4	0	4	51		0	373	
04:55:00 PM	1		29	0						41	4	0	2	48		0	382	
05:00:00 PM	0		21	0						53	2	0	0	39		0	361	
05:05:00 PM	0		38	0						32	4	0	3	43		0	360	
05:10:00 PM	0		34	0						33	3	0	5	61		0	371	
05:15:00 PM	0		32	0						31	3	0	1	49		0	372	
05:20:00 PM	0		33	0						39	3	0	0	49		0	376	
05:25:00 PM	0		31	0						35	1	0	2	54		0	363	
05:30:00 PM	0		27	0						40	0	0	1	46		0	361	1457

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		0	0						0	0	0	0	0		0		
04:40:00 PM	0		0	0						0	0	0	0	0		0		
04:45:00 PM	0		0	0						0	0	0	0	0		0	0	
04:50:00 PM	0		0	0						0	0	0	0	0		0	0	
04:55:00 PM	0		0	0						0	0	0	0	0		0	0	
05:00:00 PM	0		0	0						0	0	0	0	0		0	0	
05:05:00 PM	0		0	0						0	0	0	0	0		0	0	
05:10:00 PM	0		0	0						0	0	0	0	0		0	0	
05:15:00 PM	0		0	0						0	0	0	0	0		0	0	
05:20:00 PM	0		0	0						0	0	0	0	0		0	0	
05:25:00 PM	0		0	0						0	0	0	0	0		0	0	

05:30:00 PM	0		0	0					0	0	0	0	0		0	0	0	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		26	0						37	1	0	2	43		1		
04:40:00 PM	1		23	0						36	5	0	6	43		0		
04:45:00 PM	0		36	0						41	3	0	1	55		0	360	
04:50:00 PM	0		23	0						38	4	0	4	51		0	370	
04:55:00 PM	1		29	0						41	4	0	2	48		0	381	
05:00:00 PM	0		21	0						53	2	0	0	39		0	360	
05:05:00 PM	0		38	0						32	4	0	3	43		0	360	
05:10:00 PM	0		34	0						33	3	0	5	60		0	370	
05:15:00 PM	0		32	0						31	2	0	1	49		0	370	
05:20:00 PM	0		33	0						38	3	0	0	49		0	373	
05:25:00 PM	0		31	0						35	1	0	2	54		0	361	
05:30:00 PM	0		27	0						40	0	0	1	46		0	360	1450

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		1	0						0	0	0	0	0		0		
04:40:00 PM	1		0	0						1	0	0	0	0		0		
04:45:00 PM	0		0	0						0	0	0	0	0		0	3	
04:50:00 PM	0		1	0						0	0	0	0	0		0	3	
04:55:00 PM	0		0	0						0	0	0	0	0		0	1	
05:00:00 PM	0		0	0						0	0	0	0	0		0	1	
05:05:00 PM	0		0	0						0	0	0	0	0		0	0	
05:10:00 PM	0		0	0						0	0	0	0	1		0	1	
05:15:00 PM	0		0	0						0	1	0	0	0		0	2	
05:20:00 PM	0		0	0						1	0	0	0	0		0	3	
05:25:00 PM	0		0	0						0	0	0	0	0		0	2	
05:30:00 PM	0		0	0						0	0	0	0	0		0	1	7

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	1		0	0		
04:40:00 PM	2		0	0		
04:45:00 PM	0		0	0	3	
04:50:00 PM	0		0	0	2	
04:55:00 PM	0		0	0	0	
05:00:00 PM	0		0	0	0	
05:05:00 PM	0		0	0	0	
05:10:00 PM	1		0	0	1	
05:15:00 PM	0		0	0	1	
05:20:00 PM	1		0	0	2	
05:25:00 PM	1		0	0	2	
05:30:00 PM	0		0	0	2	6

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028803 - -121.315826
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	812	21	0	0	1374	307	0	1	816	0	0	0	284	0	0	833	1681	817	284	1374	813	591	837
Percent Heavy Vehicles																							
0.0%	7.1%	0.0%	0.0%	0.0%	3.3%	0.3%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.0%	2.8%	0.7%	0.0%	3.3%	7.1%	0.2%	0.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	71	2	0	0	116	27	0	0	64	0	0	0	19	0	0		
04:40:00 PM	0	71	1	0	0	112	27	0	0	57	0	0	0	24	0	0		
04:45:00 PM	0	62	3	0	0	95	23	0	0	83	0	0	0	29	0	0	886	
04:50:00 PM	0	80	2	0	0	107	34	0	0	63	0	0	0	22	0	0	895	
04:55:00 PM	0	68	1	0	0	121	20	0	0	56	0	0	0	27	0	0	896	
05:00:00 PM	0	62	3	0	0	98	20	0	0	83	0	0	0	15	0	0	882	
05:05:00 PM	0	67	0	0	0	117	19	0	0	71	0	0	0	26	0	0	874	
05:10:00 PM	0	67	4	0	0	140	31	0	0	62	0	0	0	34	0	0	919	
05:15:00 PM	0	64	1	0	0	120	31	0	0	65	0	0	0	19	0	0	938	
05:20:00 PM	0	63	4	0	0	115	28	0	0	80	0	0	0	20	0	0	948	
05:25:00 PM	0	72	0	0	0	122	24	0	1	64	0	0	0	25	0	0	918	
05:30:00 PM	0	65	0	0	0	111	23	0	0	68	0	0	0	24	0	0	909	3615

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound US97				Southbound US97				Eastbound SW Powers Rd				Westbound SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	64	2	0	0	110	27	0	0	62	0	0	0	19	0	0		
04:40:00 PM	0	63	1	0	0	107	27	0	0	56	0	0	0	24	0	0		
04:45:00 PM	0	60	3	0	0	91	23	0	0	83	0	0	0	29	0	0	851	
04:50:00 PM	0	77	2	0	0	102	34	0	0	61	0	0	0	22	0	0	865	
04:55:00 PM	0	62	1	0	0	119	20	0	0	56	0	0	0	27	0	0	872	
05:00:00 PM	0	57	3	0	0	94	20	0	0	83	0	0	0	15	0	0	855	
05:05:00 PM	0	63	0	0	0	113	19	0	0	71	0	0	0	26	0	0	849	
05:10:00 PM	0	63	4	0	0	136	30	0	0	62	0	0	0	34	0	0	893	
05:15:00 PM	0	60	1	0	0	119	31	0	0	65	0	0	0	19	0	0	916	
05:20:00 PM	0	57	4	0	0	112	28	0	0	79	0	0	0	20	0	0	924	
05:25:00 PM	0	67	0	0	0	117	24	0	1	64	0	0	0	25	0	0	893	
05:30:00 PM	0	61	0	0	0	108	23	0	0	68	0	0	0	24	0	0	882	3504

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound US97				Southbound US97				Eastbound SW Powers Rd				Westbound SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	6	0	0	0	2	0	0	0	0	0	0		
04:40:00 PM	0	8	0	0	0	5	0	0	0	1	0	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	35	
04:50:00 PM	0	3	0	0	0	5	0	0	0	2	0	0	0	0	0	0	30	
04:55:00 PM	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	24	
05:00:00 PM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	27	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	25	
05:10:00 PM	0	4	0	0	0	4	1	0	0	0	0	0	0	0	0	0	26	
05:15:00 PM	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	22	
05:20:00 PM	0	6	0	0	0	3	0	0	0	1	0	0	0	0	0	0	24	
05:25:00 PM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	25	
05:30:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	27	111

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	1	0	0	0	1	
05:25:00 PM	1	0	0	0	2	
05:30:00 PM	0	0	0	0	2	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramp***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028811 - -121.313896
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	1	0	28	0	193	641	0	0	0	255	138	0	0	29	834	393	0	331	283	642
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.9%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	#DIV/0!	0.0%	1.0%	0.5%	#DIV/0!	1.2%	0.0%	0.9%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	1		0		0	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	1	0	0	1

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramp				SW Powers Rd				SW Powers Rd					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		1	0	14	50		0		26	14	0		
04:40:00 PM					0		1	0	17	41		0		19	9	0		
04:45:00 PM					0		4	0	19	65		0		20	6	0	306	
04:50:00 PM					0		6	0	12	57		0		20	9	0	305	
04:55:00 PM					1		4	0	17	40		0		25	16	0	321	
05:00:00 PM					0		0	0	21	56		0		9	12	0	305	
05:05:00 PM					0		1	0	10	67		0		26	10	0	315	
05:10:00 PM					0		2	0	14	51		0		32	7	0	318	
05:15:00 PM					0		2	0	14	50		0		18	12	0	316	
05:20:00 PM					0		1	0	16	66		0		18	15	0	318	
05:25:00 PM					0		2	0	13	46		0		23	15	0	311	
05:30:00 PM					0		4	0	26	52		0		19	13	0	329	1256

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramp				SW Powers Rd				SW Powers Rd					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	0		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	0	
04:50:00 PM					0		0	0	0	0		0		0	0	0	0	
04:55:00 PM					0		0	0	0	0		0		0	0	0	0	
05:00:00 PM					0		0	0	0	0		0		0	0	0	0	
05:05:00 PM					0		0	0	0	0		0		0	0	0	0	
05:10:00 PM					0		0	0	0	0		0		0	0	0	0	
05:15:00 PM					0		0	0	0	0		0		0	0	0	0	
05:20:00 PM					0		0	0	0	0		0		0	0	0	0	
05:25:00 PM					0		0	0	0	1		0		0	0	0	1	

05:30:00 PM					0		0	0	0	0		0	0	0	0	1	1	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramp				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		1	0	14	48		0		26	13	0		
04:40:00 PM					0		1	0	16	41		0		19	9	0		
04:45:00 PM					0		4	0	19	65		0		20	6	0	302	
04:50:00 PM					0		6	0	11	56		0		20	9	0	302	
04:55:00 PM					1		4	0	17	39		0		25	16	0	318	
05:00:00 PM					0		0	0	21	56		0		9	12	0	302	
05:05:00 PM					0		1	0	10	66		0		26	10	0	313	
05:10:00 PM					0		2	0	14	51		0		32	7	0	317	
05:15:00 PM					0		2	0	14	50		0		18	12	0	315	
05:20:00 PM					0		1	0	16	65		0		18	15	0	317	
05:25:00 PM					0		2	0	13	46		0		23	14	0	309	
05:30:00 PM					0		4	0	26	52		0		19	13	0	327	1246

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramp				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	2		0		0	1	0		
04:40:00 PM					0		0	0	1	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	4	
04:50:00 PM					0		0	0	1	1		0		0	0	0	3	
04:55:00 PM					0		0	0	0	1		0		0	0	0	3	
05:00:00 PM					0		0	0	0	0		0		0	0	0	3	
05:05:00 PM					0		0	0	0	1		0		0	0	0	2	
05:10:00 PM					0		0	0	0	0		0		0	0	0	1	
05:15:00 PM					0		0	0	0	0		0		0	0	0	1	
05:20:00 PM					0		0	0	0	1		0		0	0	0	1	
05:25:00 PM					0		0	0	0	0		0		0	1	0	2	
05:30:00 PM					0		0	0	0	0		0		0	0	0	2	10

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		1	0	0		
04:45:00 PM		0	0	0	1	
04:50:00 PM		0	0	0	1	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Badger Rd***
City, State	Bend OR
Study ID #	
Location	44.024478 - -121.318609
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.97

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	750	12	0	0	1086	23	0	0	0	5	0	0	0	90	0	762	1109	5	90	1091	840	23	12
Percent Heavy Vehicles																							
0.0%	6.3%	0.0%	0.0%	0.0%	3.7%	13.0%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%	0.0%	2.2%	0.0%	6.2%	3.9%	20.0%	2.2%	3.8%	5.8%	13.0%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound Badger Rd				Westbound Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	62	0	0	0	81	3	0	0	0	1	0	0	0	5	0		
04:40:00 PM	0	74	1	0	0	107	3	0	0	0	0	0	0	0	8	0		
04:45:00 PM	0	61	4	0	0	84	2	0	0	0	0	0	0	0	3	0	499	
04:50:00 PM	0	63	0	0	0	80	2	0	0	0	0	0	0	0	11	0	503	
04:55:00 PM	0	67	1	0	0	96	3	0	0	0	0	0	0	0	4	0	481	
05:00:00 PM	0	57	1	0	0	85	2	0	0	0	0	0	0	0	7	0	479	
05:05:00 PM	0	59	0	0	0	94	1	0	0	0	1	0	0	0	17	0	495	
05:10:00 PM	0	55	0	0	0	94	3	0	0	0	0	0	0	0	10	0	486	
05:15:00 PM	0	64	1	0	0	94	2	0	0	0	1	0	0	0	9	0	505	
05:20:00 PM	0	67	1	0	0	97	0	0	0	0	1	0	0	0	6	0	505	
05:25:00 PM	0	63	0	0	0	92	1	0	0	0	0	0	0	0	4	0	503	
05:30:00 PM	0	58	3	0	0	82	1	0	0	0	1	0	0	0	6	0	483	1966

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound Badger Rd				Westbound Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Badger Rd				Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	55	0	0	0	77	2	0	0	0	1	0	0	0	5	0		
04:40:00 PM	0	69	1	0	0	102	3	0	0	0	0	0	0	0	8	0		
04:45:00 PM	0	59	4	0	0	81	1	0	0	0	0	0	0	0	3	0	471	
04:50:00 PM	0	61	0	0	0	76	2	0	0	0	0	0	0	0	11	0	481	
04:55:00 PM	0	62	1	0	0	93	3	0	0	0	0	0	0	0	4	0	461	
05:00:00 PM	0	52	1	0	0	84	1	0	0	0	0	0	0	0	6	0	457	
05:05:00 PM	0	58	0	0	0	91	1	0	0	0	0	0	0	0	16	0	473	
05:10:00 PM	0	51	0	0	0	91	3	0	0	0	0	0	0	0	10	0	465	
05:15:00 PM	0	58	1	0	0	92	2	0	0	0	1	0	0	0	9	0	484	
05:20:00 PM	0	64	1	0	0	93	0	0	0	0	1	0	0	0	6	0	483	
05:25:00 PM	0	60	0	0	0	87	1	0	0	0	0	0	0	0	4	0	480	
05:30:00 PM	0	54	3	0	0	79	1	0	0	0	1	0	0	0	6	0	461	1873

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Badger Rd				Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	4	1	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	3	1	0	0	0	0	0	0	0	0	0	28	
04:50:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	22	
04:55:00 PM	0	5	0	0	0	3	0	0	0	0	0	0	0	0	0	0	20	
05:00:00 PM	0	5	0	0	0	1	1	0	0	0	0	0	0	0	1	0	22	
05:05:00 PM	0	1	0	0	0	3	0	0	0	0	1	0	0	0	1	0	22	
05:10:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	21	
05:15:00 PM	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	21	
05:20:00 PM	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	22	
05:25:00 PM	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	0	23	
05:30:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	22	93

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Pinebrook Blvd***
City, State	Bend OR
Study ID #	
Location	44.021384 - -121.318883
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.96

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	634	25	0	0	1015	51	0	0	0	5	0	0	0	130	0	659	1066	5	130	1020	764	51	25
Percent Heavy Vehicles																							
0.0%	6.9%	4.0%	0.0%	0.0%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.0%	6.8%	3.7%	0.0%	3.1%	3.8%	6.3%	0.0%	4.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound Pinebrook Blvd				Westbound Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	45	0	0	0	73	5	0	0	0	0	0	0	0	17	0		
04:40:00 PM	0	59	1	0	0	90	6	0	0	0	0	0	0	0	13	0		
04:45:00 PM	0	57	4	0	0	86	4	0	0	0	0	0	0	0	10	0	470	
04:50:00 PM	0	51	1	0	0	75	4	0	0	0	0	0	0	0	10	0	471	
04:55:00 PM	0	56	2	0	0	85	4	0	0	0	0	0	0	0	15	0	464	
05:00:00 PM	0	46	3	0	0	82	3	0	0	0	0	0	0	0	11	0	448	
05:05:00 PM	0	45	2	0	0	91	3	0	0	0	1	0	0	0	12	0	461	
05:10:00 PM	0	52	3	0	0	86	2	0	0	0	0	0	0	0	5	0	447	
05:15:00 PM	0	56	1	0	0	90	6	0	0	0	1	0	0	0	9	0	465	
05:20:00 PM	0	67	3	0	0	89	5	0	0	0	0	0	0	0	8	0	483	
05:25:00 PM	0	49	3	0	0	79	6	0	0	0	2	0	0	0	10	0	484	
05:30:00 PM	0	51	2	0	0	89	3	0	0	0	1	0	0	0	10	0	477	1860

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound Pinebrook Blvd				Westbound Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Pinebrook Blvd				Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	37	0	0	0	70	5	0	0	0	0	0	0	0	17	0		
04:40:00 PM	0	56	0	0	0	87	6	0	0	0	0	0	0	0	13	0		
04:45:00 PM	0	54	4	0	0	82	4	0	0	0	0	0	0	0	10	0	445	
04:50:00 PM	0	49	1	0	0	71	4	0	0	0	0	0	0	0	9	0	450	
04:55:00 PM	0	51	2	0	0	83	4	0	0	0	0	0	0	0	14	0	442	
05:00:00 PM	0	44	3	0	0	79	3	0	0	0	0	0	0	0	10	0	427	
05:05:00 PM	0	44	2	0	0	88	3	0	0	0	1	0	0	0	12	0	443	
05:10:00 PM	0	49	3	0	0	83	2	0	0	0	0	0	0	0	5	0	431	
05:15:00 PM	0	50	1	0	0	86	6	0	0	0	1	0	0	0	9	0	445	
05:20:00 PM	0	60	3	0	0	87	5	0	0	0	0	0	0	0	8	0	458	
05:25:00 PM	0	48	3	0	0	74	6	0	0	0	2	0	0	0	9	0	458	
05:30:00 PM	0	48	2	0	0	86	3	0	0	0	1	0	0	0	10	0	455	1772

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Pinebrook Blvd				Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	8	0	0	0	3	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	3	1	0	0	3	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	25	
04:50:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	1	0	21	
04:55:00 PM	0	5	0	0	0	2	0	0	0	0	0	0	0	0	1	0	22	
05:00:00 PM	0	2	0	0	0	3	0	0	0	0	0	0	0	0	1	0	21	
05:05:00 PM	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	18	
05:10:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	16	
05:15:00 PM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	20	
05:20:00 PM	0	7	0	0	0	2	0	0	0	0	0	0	0	0	0	0	25	
05:25:00 PM	0	1	0	0	0	5	0	0	0	0	0	0	0	0	1	0	26	
05:30:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	22	88

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	1	1	0	2	
04:50:00 PM	0	0	0	0	2	
04:55:00 PM	0	1	0	0	3	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Ponderosa St***
City, State	Bend OR
Study ID #	
Location	44.007819 - -121.324039
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:40:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	760	11	0	0	1350	130	0	0	0	18	0	0	0	110	0	771	1480	18	110	1368	870	130	11
Percent Heavy Vehicles																							
0.0%	6.4%	0.0%	0.0%	0.0%	3.6%	3.8%	0.0%	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	6.4%	3.6%	5.6%	0.0%	3.7%	5.6%	3.8%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	49	0	0	0	97	10	0	0	0	2	0	0	0	8	0		
04:40:00 PM	0	81	0	0	0	125	10	0	0	0	1	0	0	0	4	0		
04:45:00 PM	0	64	2	0	0	109	13	0	0	0	4	0	0	0	11	0	590	
04:50:00 PM	0	68	1	0	0	111	9	0	0	0	0	0	0	0	14	0	627	
04:55:00 PM	0	60	0	0	0	108	11	0	0	0	0	0	0	0	5	0	590	
05:00:00 PM	0	56	2	0	0	111	11	0	0	0	1	0	0	0	8	0	576	
05:05:00 PM	0	65	1	0	0	99	11	0	0	0	2	0	0	0	10	0	561	
05:10:00 PM	0	52	1	0	0	115	15	0	0	0	1	0	0	0	10	0	571	
05:15:00 PM	0	81	0	0	0	121	9	0	0	0	4	0	0	0	14	0	611	
05:20:00 PM	0	64	1	0	0	114	12	0	0	0	1	0	0	0	10	0	625	
05:25:00 PM	0	65	2	0	0	108	10	0	0	0	0	0	0	0	9	0	625	
05:30:00 PM	0	55	1	0	0	132	9	0	0	0	2	0	0	0	7	0	602	2379

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	42	0	0	0	93	8	0	0	0	2	0	0	0	8	0		
04:40:00 PM	0	77	0	0	0	118	10	0	0	0	0	0	0	0	4	0		
04:45:00 PM	0	62	2	0	0	101	12	0	0	0	4	0	0	0	11	0	554	
04:50:00 PM	0	65	1	0	0	109	9	0	0	0	0	0	0	0	14	0	599	
04:55:00 PM	0	53	0	0	0	106	10	0	0	0	0	0	0	0	5	0	564	
05:00:00 PM	0	53	2	0	0	110	11	0	0	0	1	0	0	0	8	0	557	
05:05:00 PM	0	64	1	0	0	94	10	0	0	0	2	0	0	0	10	0	540	
05:10:00 PM	0	47	1	0	0	113	15	0	0	0	1	0	0	0	10	0	553	
05:15:00 PM	0	73	0	0	0	118	9	0	0	0	4	0	0	0	14	0	586	
05:20:00 PM	0	59	1	0	0	110	12	0	0	0	1	0	0	0	10	0	598	
05:25:00 PM	0	63	2	0	0	102	10	0	0	0	0	0	0	0	9	0	597	
05:30:00 PM	0	53	1	0	0	127	9	0	0	0	2	0	0	0	7	0	578	2275

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	4	2	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	4	0	0	0	7	0	0	0	0	1	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	8	1	0	0	0	0	0	0	0	0	0	36	
04:50:00 PM	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	28	
04:55:00 PM	0	7	0	0	0	2	1	0	0	0	0	0	0	0	0	0	26	
05:00:00 PM	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	19	
05:05:00 PM	0	1	0	0	0	5	1	0	0	0	0	0	0	0	0	0	21	
05:10:00 PM	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	18	
05:15:00 PM	0	8	0	0	0	3	0	0	0	0	0	0	0	0	0	0	25	
05:20:00 PM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	27	
05:25:00 PM	0	2	0	0	0	6	0	0	0	0	0	0	0	0	0	0	28	
05:30:00 PM	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	24	104

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***Baker Rd***
City, State	Bend OR
Study ID #	
Location	43.992611 - -121.336303
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	66	0	481	0	52	340	0	0	0	297	178	0	0	547	392	475	0	230	778	406
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	4.5%	0.0%	2.1%	0.0%	5.8%	4.4%	0.0%	0.0%	0.0%	3.0%	1.1%	0.0%	#DIV/0!	2.4%	4.6%	2.3%	#DIV/0!	2.2%	2.4%	4.4%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	0		0		0	0	0	0

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2	38		0	1	29		0	23	13		0		
04:40:00 PM					10	35		0	6	27		0	22	9		0		
04:45:00 PM					3	51		0	3	26		0	21	15		0	334	
04:50:00 PM					4	40		0	4	27		0	26	9		0	338	
04:55:00 PM					6	33		0	6	22		0	20	12		0	328	
05:00:00 PM					7	37		0	7	26		0	23	13		0	322	
05:05:00 PM					6	37		0	4	40		0	28	16		0	343	
05:10:00 PM					3	52		0	7	28		0	25	8		0	367	
05:15:00 PM					7	40		0	3	32		0	24	12		0	372	
05:20:00 PM					6	48		0	3	27		0	28	23		0	376	
05:25:00 PM					6	32		0	6	23		0	30	28		0	378	
05:30:00 PM					6	38		0	2	33		0	27	20		0	386	1414

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0	0		0	0	0		0	0	0		0		
04:40:00 PM					0	0		0	0	0		0	0	0		0		
04:45:00 PM					0	0		0	0	0		0	0	0		0	0	
04:50:00 PM					0	0		0	0	0		0	0	0		0	0	
04:55:00 PM					0	0		0	0	0		0	0	0		0	0	
05:00:00 PM					0	0		0	0	0		0	0	0		0	0	
05:05:00 PM					0	0		0	0	0		0	0	0		0	0	
05:10:00 PM					0	0		0	0	0		0	0	0		0	0	
05:15:00 PM					0	0		0	0	0		0	0	0		0	0	
05:20:00 PM					0	0		0	0	0		0	0	0		0	0	
05:25:00 PM					0	0		0	0	0		0	0	0		0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM					0		0	0	0	0		0	0	0	0	0		

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					1		37	0	1	27		0		23	13	0		
04:40:00 PM					9		35	0	6	26		0		21	9	0		
04:45:00 PM					3		47	0	3	25		0		20	14	0	320	
04:50:00 PM					4		39	0	3	25		0		26	9	0	324	
04:55:00 PM					6		33	0	5	19		0		20	12	0	313	
05:00:00 PM					7		37	0	7	26		0		20	13	0	311	
05:05:00 PM					6		36	0	4	40		0		28	15	0	334	
05:10:00 PM					3		52	0	7	27		0		25	8	0	361	
05:15:00 PM					7		39	0	3	31		0		22	12	0	365	
05:20:00 PM					6		47	0	3	27		0		27	23	0	369	
05:25:00 PM					6		32	0	5	21		0		30	28	0	369	
05:30:00 PM					5		37	0	2	31		0		26	20	0	376	1372

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					1		1	0	0	2		0		0	0	0		
04:40:00 PM					1		0	0	0	1		0		1	0	0		
04:45:00 PM					0		4	0	0	1		0		1	1	0	14	
04:50:00 PM					0		1	0	1	2		0		0	0	0	14	
04:55:00 PM					0		0	0	1	3		0		0	0	0	15	
05:00:00 PM					0		0	0	0	0		0		3	0	0	11	
05:05:00 PM					0		1	0	0	0		0		0	1	0	9	
05:10:00 PM					0		0	0	0	1		0		0	0	0	6	
05:15:00 PM					0		1	0	0	1		0		2	0	0	7	
05:20:00 PM					0		1	0	0	0		0		1	0	0	7	
05:25:00 PM					0		0	0	1	2		0		0	0	0	9	
05:30:00 PM					1		1	0	0	2		0		1	0	0	10	42

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0		
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US97 SB ramps*
E/W street:	*Knott Rd*
City, State	Bend OR
Study ID #	
Location	43.991498 - -121.333495
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.89

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
44	1	95	0	0	0	0	0	247	160	0	0	0	449	17	0	140	0	407	466	0	265	493	255
Percent Heavy Vehicles																							
2.3%	100.0%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	3.1%	0.0%	0.0%	0.0%	2.4%	5.9%	0.0%	2.9%	0.0%	3.2%	2.6%	#DIV/0!	3.8%	2.4%	2.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	5	0	4	0	0	0	0	0	20	11	0	0	0	34	2	0		
04:40:00 PM	2	0	12	0	0	0	0	0	21	19	0	0	0	34	2	0		
04:45:00 PM	3	0	7	0	0	0	0	0	16	10	0	0	0	39	1	0	242	
04:50:00 PM	7	0	9	0	0	0	0	0	26	8	0	0	0	30	1	0	247	
04:55:00 PM	1	0	8	0	0	0	0	0	18	9	0	0	0	30	0	0	223	
05:00:00 PM	4	0	8	0	0	0	0	0	19	13	0	0	0	34	2	0	227	
05:05:00 PM	4	1	10	0	0	0	0	0	26	20	0	0	0	40	1	0	248	
05:10:00 PM	5	0	7	0	0	0	0	0	17	15	0	0	0	29	2	0	257	
05:15:00 PM	3	0	7	0	0	0	0	0	23	15	0	0	0	33	2	0	260	
05:20:00 PM	1	0	7	0	0	0	0	0	22	12	0	0	0	50	2	0	252	
05:25:00 PM	3	0	9	0	0	0	0	0	19	12	0	0	0	55	1	0	276	
05:30:00 PM	6	0	7	0	0	0	0	0	20	16	0	0	0	41	1	0	284	1013

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	5	0	4	0	0	0	0	0	19	11	0	0	0	34	2	0		
04:40:00 PM	2	0	12	0	0	0	0	0	20	18	0	0	0	32	2	0		
04:45:00 PM	3	0	7	0	0	0	0	0	16	10	0	0	0	37	1	0	235	
04:50:00 PM	7	0	8	0	0	0	0	0	24	8	0	0	0	30	1	0	238	
04:55:00 PM	1	0	7	0	0	0	0	0	17	9	0	0	0	30	0	0	216	
05:00:00 PM	3	0	8	0	0	0	0	0	19	13	0	0	0	33	2	0	220	
05:05:00 PM	4	0	10	0	0	0	0	0	25	20	0	0	0	39	1	0	241	
05:10:00 PM	5	0	7	0	0	0	0	0	17	14	0	0	0	29	2	0	251	
05:15:00 PM	3	0	7	0	0	0	0	0	23	15	0	0	0	31	2	0	254	
05:20:00 PM	1	0	7	0	0	0	0	0	22	12	0	0	0	48	1	0	246	
05:25:00 PM	3	0	9	0	0	0	0	0	18	11	0	0	0	55	1	0	269	
05:30:00 PM	6	0	7	0	0	0	0	0	19	14	0	0	0	40	1	0	275	984

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	7	
04:50:00 PM	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	9	
04:55:00 PM	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	7	
05:00:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7	
05:05:00 PM	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	7	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	6	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	6	
05:25:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	9	29

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

Study Name 101 and 105
Start Date 4/11/2017
Start Time 4:00 PM
Site Code

Location 44.096664 -121.303

Lights

Start Time	SB 101	SB 105
4:00 PM	73	39
4:05 PM	50	34
4:10 PM	61	34
4:15 PM	74	28
4:20 PM	65	31
4:25 PM	47	44
4:30 PM	67	44
4:35 PM	63	39
4:40 PM	69	41
4:45 PM	80	35
4:50 PM	52	36
4:55 PM	79	35
5:00 PM	58	38
5:05 PM	86	32
5:10 PM	58	29
5:15 PM	57	28
5:20 PM	64	31
5:25 PM	79	26
5:30 PM	64	31
5:35 PM	64	32
5:40 PM	63	33
5:45 PM	65	31
5:50 PM	47	35
5:55 PM	38	30

Other Vehicles

Start Time	SB	SB
4:00 PM	4	7
4:05 PM	1	2
4:10 PM	4	1
4:15 PM	3	2
4:20 PM	4	5
4:25 PM	0	2
4:30 PM	3	2
4:35 PM	2	0
4:40 PM	2	3
4:45 PM	3	3
4:50 PM	5	1
4:55 PM	3	1
5:00 PM	1	2
5:05 PM	4	2
5:10 PM	5	1
5:15 PM	2	4
5:20 PM	3	1
5:25 PM	1	1
5:30 PM	3	2
5:35 PM	1	4
5:40 PM	1	0
5:45 PM	0	3
5:50 PM	2	0
5:55 PM	2	1

Bicycles on Road

Start Time	SB	SB
4:00 PM	0	0
4:05 PM	0	0
4:10 PM	0	0
4:15 PM	0	0
4:20 PM	0	0
4:25 PM	0	0
4:30 PM	0	0
4:35 PM	0	0
4:40 PM	0	0
4:45 PM	0	0
4:50 PM	0	0
4:55 PM	0	0
5:00 PM	0	0
5:05 PM	0	0
5:10 PM	0	0
5:15 PM	0	0
5:20 PM	0	0
5:25 PM	0	0
5:30 PM	0	0
5:35 PM	0	0
5:40 PM	0	0
5:45 PM	0	0
5:50 PM	0	0
5:55 PM	0	0

Study Name	102 and 103
Start Date	4/11/2017
Start Time	4:00 PM
Site Code	

Location	44.094069	-121.303

Lights

	102	103
	NB	SB U-Turn
Start Time		
4:00 PM	49	0
4:05 PM	38	0
4:10 PM	33	1
4:15 PM	38	0
4:20 PM	34	1
4:25 PM	49	0
4:30 PM	30	0
4:35 PM	38	0
4:40 PM	27	1
4:45 PM	46	1
4:50 PM	30	0
4:55 PM	36	0
5:00 PM	43	0
5:05 PM	31	1
5:10 PM	43	0
5:15 PM	45	0
5:20 PM	46	0
5:25 PM	36	0
5:30 PM	51	1
5:35 PM	51	0
5:40 PM	28	0
5:45 PM	27	1
5:50 PM	24	0
5:55 PM	40	0

Other Vehicles

	102	103
	NB	SB U-Turn
Start Time		
4:00 PM	1	0
4:05 PM	1	0
4:10 PM	0	0
4:15 PM	3	0
4:20 PM	0	0
4:25 PM	0	0
4:30 PM	0	0
4:35 PM	0	0
4:40 PM	0	0
4:45 PM	2	0
4:50 PM	0	0
4:55 PM	1	0
5:00 PM	0	0
5:05 PM	2	0
5:10 PM	0	0
5:15 PM	3	0
5:20 PM	1	0
5:25 PM	0	0
5:30 PM	2	0
5:35 PM	0	0
5:40 PM	1	0
5:45 PM	0	0
5:50 PM	0	0
5:55 PM	0	0

Bicycles on Road

	102	103
	NB	SB U-Turn
Start Time		
4:00 PM	0	0
4:05 PM	0	0
4:10 PM	0	0
4:15 PM	0	0
4:20 PM	0	0
4:25 PM	0	0
4:30 PM	0	0
4:35 PM	0	0
4:40 PM	0	0
4:45 PM	1	0
4:50 PM	0	0
4:55 PM	0	0
5:00 PM	0	0
5:05 PM	0	0
5:10 PM	0	0
5:15 PM	0	0
5:20 PM	0	0
5:25 PM	0	0
5:30 PM	1	0
5:35 PM	0	0
5:40 PM	0	0
5:45 PM	1	0
5:50 PM	0	0
5:55 PM	0	0

Study Name 104
Start Date 04/11/2017
Start Time 4:00 PM
Site Code

Location 44.098369 -121.301548

	Light		Other Vehicles		Bicycles on Road
Channel	Direction	**Channel**	Direction	**Channel**	Direction
Direction	Northbound	**Direction**	Northbound	**Direction**	Northbound
4:00 PM	47	4:00 PM	3	4:00 PM	0
4:05 PM	64	4:05 PM	1	4:05 PM	0
4:10 PM	79	4:10 PM	3	4:10 PM	0
4:15 PM	74	4:15 PM	0	4:15 PM	0
4:20 PM	60	4:20 PM	3	4:20 PM	0
4:25 PM	48	4:25 PM	1	4:25 PM	0
4:30 PM	40	4:30 PM	1	4:30 PM	0
4:35 PM	66	4:35 PM	3	4:35 PM	0
4:40 PM	72	4:40 PM	0	4:40 PM	0
4:45 PM	52	4:45 PM	0	4:45 PM	0
4:50 PM	47	4:50 PM	0	4:50 PM	0
4:55 PM	46	4:55 PM	0	4:55 PM	0
5:00 PM	45	5:00 PM	1	5:00 PM	0
5:05 PM	55	5:05 PM	1	5:05 PM	0
5:10 PM	67	5:10 PM	0	5:10 PM	0
5:15 PM	64	5:15 PM	3	5:15 PM	0
5:20 PM	83	5:20 PM	1	5:20 PM	0
5:25 PM	67	5:25 PM	1	5:25 PM	0
5:30 PM	57	5:30 PM	3	5:30 PM	0
5:35 PM	66	5:35 PM	0	5:35 PM	0
5:40 PM	48	5:40 PM	0	5:40 PM	0
5:45 PM	46	5:45 PM	1	5:45 PM	0
5:50 PM	44	5:50 PM	1	5:50 PM	0
5:55 PM	44	5:55 PM	0	5:55 PM	0

Study Name 106 US97 at 3rd St NB On Ramp
Start Date 04/11/2017
Start Time 4:00 PM
Site Code

Location 44.078603 -121.302256

	Lights				Other Vehicles		
Channel	SB Thru	NB On Ramp	NB Thru	**Channel**	SB Thru	NB On Ramp	NB Thru
Direction	Southbound	Northbound	Northbound	**Direction**	Southbound	Northbound	Northbound
4:00 PM	147	34	145	4:00 PM	7	2	11
4:05 PM	141	50	147	4:05 PM	6	1	12
4:10 PM	166	42	140	4:10 PM	6	5	10
4:15 PM	160	42	149	4:15 PM	9	1	10
4:20 PM	143	46	139	4:20 PM	12	1	2
4:25 PM	150	41	162	4:25 PM	5	0	3
4:30 PM	161	38	140	4:30 PM	3	0	4
4:35 PM	139	53	171	4:35 PM	8	2	5
4:40 PM	137	44	165	4:40 PM	9	3	6
4:45 PM	159	44	180	4:45 PM	11	3	3
4:50 PM	128	42	156	4:50 PM	8	1	4
4:55 PM	157	43	151	4:55 PM	6	0	6
5:00 PM	168	45	139	5:00 PM	9	1	5
5:05 PM	172	58	194	5:05 PM	2	1	7
5:10 PM	161	53	178	5:10 PM	5	0	4
5:15 PM	159	36	183	5:15 PM	3	0	9
5:20 PM	175	58	174	5:20 PM	6	1	3
5:25 PM	172	56	143	5:25 PM	10	0	8
5:30 PM	134	43	144	5:30 PM	9	1	3
5:35 PM	174	43	169	5:35 PM	6	0	9
5:40 PM	154	47	153	5:40 PM	8	2	5
5:45 PM	139	47	151	5:45 PM	8	1	2
5:50 PM	135	42	126	5:50 PM	2	0	6
5:55 PM	121	45	124	5:55 PM	9	0	3
4:00 PM	172	41	115	4:00 PM	3	3	12
4:05 PM	144	39	166	4:05 PM	11	4	9
4:10 PM	177	45	147	4:10 PM	3	3	10
4:15 PM	153	43	175	4:15 PM	6	0	10
4:20 PM	144	42	159	4:20 PM	9	3	10
4:25 PM	112	49	147	4:25 PM	6	1	8
4:30 PM	179	54	142	4:30 PM	1	1	12
4:35 PM	143	42	157	4:35 PM	8	0	6
4:40 PM	162	37	151	4:40 PM	4	2	7
4:45 PM	156	36	164	4:45 PM	5	0	13
4:50 PM	161	60	143	4:50 PM	3	1	3
4:55 PM	147	30	141	4:55 PM	6	1	6
5:00 PM	159	54	153	5:00 PM	4	0	1
5:05 PM	167	45	202	5:05 PM	8	0	6
5:10 PM	175	45	182	5:10 PM	4	0	4
5:15 PM	159	46	183	5:15 PM	3	1	5
5:20 PM	168	41	176	5:20 PM	5	2	6
5:25 PM	149	60	175	5:25 PM	7	0	7
5:30 PM	165	48	121	5:30 PM	11	0	1
5:35 PM	154	40	143	5:35 PM	2	0	5
5:40 PM	133	53	135	5:40 PM	5	1	1
5:45 PM	150	38	136	5:45 PM	3	1	4
5:50 PM	116	31	120	5:50 PM	3	2	5
5:55 PM	114	40	122	5:55 PM	6	0	8

Study Name 107 US97 NB at Division St NB On-Ramp
Start Date 04/11/2017
Start Time 4:00 PM
Site Code

Location 44.040697 -121.306172

	Lights				Other Vehicles		
Channel	SB Thru	NB Ramp	NB Thru	**Channel**	SB Thru	NB Ramp	NB Thru
Direction	Southbound	Northbound	Northbound	**Direction**	Southbound	Northbound	Northbound
4:00 PM	152	34	96	4:00 PM	8	1	6
4:05 PM	161	23	97	4:05 PM	4	1	8
4:10 PM	180	27	86	4:10 PM	4	0	12
4:15 PM	181	26	80	4:15 PM	10	2	6
4:20 PM	185	29	93	4:20 PM	8	1	5
4:25 PM	132	14	96	4:25 PM	6	0	6
4:30 PM	142	32	85	4:30 PM	2	0	4
4:35 PM	173	36	107	4:35 PM	4	1	8
4:40 PM	164	33	99	4:40 PM	3	0	0
4:45 PM	131	36	102	4:45 PM	7	0	5
4:50 PM	161	32	79	4:50 PM	4	1	2
4:55 PM	174	36	97	4:55 PM	3	0	6
5:00 PM	180	30	77	5:00 PM	5	1	5
5:05 PM	238	37	102	5:05 PM	6	0	2
5:10 PM	230	33	83	5:10 PM	0	0	8
5:15 PM	239	37	109	5:15 PM	2	0	4
5:20 PM	222	30	97	5:20 PM	0	0	6
5:25 PM	206	27	81	5:25 PM	2	0	4
5:30 PM	173	25	84	5:30 PM	12	0	8
5:35 PM	216	30	84	5:35 PM	8	1	4
5:40 PM	189	27	87	5:40 PM	7	0	3
5:45 PM	176	22	79	5:45 PM	7	2	2
5:50 PM	151	28	61	5:50 PM	7	0	6
5:55 PM	141	17	72	5:55 PM	0	1	3
4:00 PM	169	25	93	4:00 PM	6	2	6
4:05 PM	158	28	101	4:05 PM	3	0	3
4:10 PM	176	39	98	4:10 PM	7	1	2
4:15 PM	202	22	99	4:15 PM	2	0	5
4:20 PM	162	34	93	4:20 PM	8	1	5
4:25 PM	156	21	99	4:25 PM	8	2	9
4:30 PM	163	28	70	4:30 PM	3	0	2
4:35 PM	207	33	92	4:35 PM	3	1	3
4:40 PM	187	30	95	4:40 PM	4	2	7
4:45 PM	179	36	92	4:45 PM	7	0	7
4:50 PM	175	33	95	4:50 PM	1	1	2
4:55 PM	195	22	73	4:55 PM	5	0	2
5:00 PM	174	32	82	5:00 PM	9	1	5
5:05 PM	210	31	104	5:05 PM	4	1	3
5:10 PM	230	30	100	5:10 PM	7	2	1
5:15 PM	230	26	110	5:15 PM	9	0	7
5:20 PM	230	28	85	5:20 PM	6	1	5
5:25 PM	201	32	89	5:25 PM	3	0	2
5:30 PM	186	19	71	5:30 PM	5	2	5
5:35 PM	185	18	77	5:35 PM	12	0	1
5:40 PM	141	33	88	5:40 PM	4	0	2
5:45 PM	154	27	72	5:45 PM	4	2	6
5:50 PM	141	32	81	5:50 PM	4	1	4
5:55 PM	122	16	65	5:55 PM	3	0	6

Study Name 108 US97 SB at Murphy Rd On-Ramp
Start Date 04/13/2017
Start Time 4:00 PM
Site Code

Location 44.013615 -121.320291

	Lights			Other Vehicles	
Channel	SB On Ramp	SB Thru	**Channel**	SB On Ramp	SB Thru
Direction	Southbound	Southbound	**Direction**	Southbound	Southbound
4:00 PM	42	53 4:00 PM		0	3
4:05 PM	34	45 4:05 PM		0	2
4:10 PM	42	44 4:10 PM		0	7
4:15 PM	40	61 4:15 PM		0	6
4:20 PM	38	60 4:20 PM		1	1
4:25 PM	32	68 4:25 PM		0	8
4:30 PM	32	69 4:30 PM		1	5
4:35 PM	29	81 4:35 PM		1	5
4:40 PM	38	81 4:40 PM		0	5
4:45 PM	45	71 4:45 PM		4	4
4:50 PM	37	78 4:50 PM		0	3
4:55 PM	29	85 4:55 PM		0	2
5:00 PM	43	81 5:00 PM		0	1
5:05 PM	36	80 5:05 PM		1	4
5:10 PM	44	101 5:10 PM		0	2
5:15 PM	36	79 5:15 PM		0	1
5:20 PM	33	84 5:20 PM		3	1
5:25 PM	39	79 5:25 PM		2	6
5:30 PM	45	101 5:30 PM		1	2
5:35 PM	43	70 5:35 PM		1	4
5:40 PM	40	65 5:40 PM		1	8
5:45 PM	38	54 5:45 PM		0	2
5:50 PM	34	62 5:50 PM		0	3
5:55 PM	28	50 5:55 PM		0	4

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97***
E/W street:	***Cooley Rd***
City, State	Bend OR
Study ID #	
Location	44.109312 - -121.295092
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:55:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
40	1411	77	1	110	1229	44	0	185	143	15	0	185	69	58	0	1529	1383	343	312	1430	1654	153	330
Percent Heavy Vehicles																							
5.0%	4.4%	0.0%	0.0%	5.5%	7.5%	4.5%	0.0%	1.1%	0.0%	0.0%	0.0%	1.1%	5.8%	0.0%	0.0%	4.2%	7.2%	0.6%	1.9%	6.6%	3.9%	5.2%	1.8%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	1	132	5	0	10	128	7	0	13	13	2	0	4	4	5	0		
04:35:00 PM	3	113	8	1	7	76	3	0	23	13	2	0	16	3	3	0		
04:40:00 PM	3	138	5	0	1	100	4	0	15	11	1	0	18	3	7	0	901	
04:45:00 PM	2	116	4	0	11	107	7	0	18	11	2	0	12	6	1	0	874	
04:50:00 PM	6	100	3	0	16	87	2	0	18	10	1	0	18	5	5	0	874	
04:55:00 PM	1	136	11	0	7	119	5	0	11	5	1	0	5	4	9	0	882	
05:00:00 PM	5	128	5	0	6	102	2	0	17	14	1	0	11	11	2	0	889	
05:05:00 PM	7	127	10	0	13	103	1	0	12	11	1	0	26	5	6	0	940	
05:10:00 PM	2	93	9	0	7	107	3	0	13	8	2	0	26	10	8	0	914	
05:15:00 PM	2	115	5	0	9	95	2	0	14	16	1	0	22	8	9	0	908	
05:20:00 PM	4	108	9	0	9	106	4	0	16	16	0	0	10	7	3	0	878	
05:25:00 PM	4	105	3	0	14	99	4	0	15	15	1	0	17	3	0	0	870	3567

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	1	124	5	0	10	118	7	0	13	13	2	0	4	4	5	0		
04:35:00 PM	2	109	8	1	7	70	3	0	22	13	2	0	16	3	3	0		
04:40:00 PM	3	132	5	0	1	88	4	0	14	11	1	0	18	3	7	0	852	
04:45:00 PM	2	114	4	0	9	102	6	0	18	11	2	0	12	5	1	0	832	
04:50:00 PM	6	95	3	0	15	80	1	0	18	10	1	0	17	5	5	0	829	
04:55:00 PM	1	133	11	0	4	112	5	0	11	5	1	0	5	4	9	0	843	
05:00:00 PM	5	119	5	0	6	94	2	0	17	14	1	0	11	9	2	0	842	
05:05:00 PM	7	123	10	0	13	99	1	0	12	11	1	0	26	5	6	0	900	
05:10:00 PM	2	88	9	0	7	99	3	0	13	8	2	0	25	9	8	0	872	
05:15:00 PM	1	112	5	0	9	91	2	0	14	16	1	0	22	8	9	0	877	
05:20:00 PM	4	103	9	0	9	97	4	0	16	16	0	0	10	7	3	0	841	
05:25:00 PM	4	97	3	0	14	87	4	0	15	15	1	0	17	3	0	0	828	3395

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Cooley Rd				Cooley Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	8	0	0	0	10	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	1	4	0	0	0	6	0	0	1	0	0	0	0	0	0	0		
04:40:00 PM	0	6	0	0	0	12	0	0	1	0	0	0	0	0	0	0	49	
04:45:00 PM	0	2	0	0	2	5	1	0	0	0	0	0	0	1	0	0	42	
04:50:00 PM	0	5	0	0	1	7	1	0	0	0	0	0	1	0	0	0	45	
04:55:00 PM	0	3	0	0	3	7	0	0	0	0	0	0	0	0	0	0	39	
05:00:00 PM	0	9	0	0	0	8	0	0	0	0	0	0	0	2	0	0	47	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	40	
05:10:00 PM	0	5	0	0	0	8	0	0	0	0	0	0	1	1	0	0	42	
05:15:00 PM	1	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	31	
05:20:00 PM	0	5	0	0	0	9	0	0	0	0	0	0	0	0	0	0	37	
05:25:00 PM	0	8	0	0	0	12	0	0	0	0	0	0	0	0	0	0	42	172

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	1	0	1	
05:00:00 PM	1	0	0	0	2	
05:05:00 PM	0	0	0	0	2	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97***
E/W street:	***Robal Rd***
City, State	Bend OR
Study ID #	
Location	44.10277 - -121.299136
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:00:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
229	1448	14	1	21	1508	33	2	97	12	41	0	107	35	19	0	1692	1564	150	161	1657	1566	297	47
Percent Heavy Vehicles																							
0.4%	3.2%	7.1%	0.0%	9.5%	5.6%	0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.9%	8.6%	10.5%	0.0%	2.9%	5.6%	1.3%	3.7%	5.2%	3.3%	1.3%	6.4%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	5

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	108	0	0	4	110	0	0	10	3	4	0	6	3	3	0		
04:35:00 PM	19	97	2	0	3	111	6	0	9	0	3	0	16	5	7	0		
04:40:00 PM	23	127	1	0	1	126	2	0	6	2	0	0	4	3	0	0	839	
04:45:00 PM	21	120	3	0	3	118	2	0	6	1	1	0	15	2	3	0	868	
04:50:00 PM	21	115	1	0	0	115	7	0	10	0	4	0	5	1	0	0	869	
04:55:00 PM	17	111	2	0	3	134	2	0	5	1	3	0	11	4	4	0	871	
05:00:00 PM	24	130	2	0	1	124	0	0	9	3	3	0	10	3	1	0	886	
05:05:00 PM	23	140	2	1	0	135	4	1	9	1	8	0	9	1	0	0	941	
05:10:00 PM	15	146	0	0	2	134	2	0	9	0	7	0	9	1	0	0	969	
05:15:00 PM	24	113	1	0	1	135	4	1	9	1	0	0	7	5	1	0	961	
05:20:00 PM	6	116	0	0	2	149	4	0	9	0	5	0	4	1	0	0	923	
05:25:00 PM	21	125	0	0	1	117	0	0	6	0	3	0	11	6	0	0	888	3567

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	106	0	0	3	103	0	0	10	3	4	0	6	3	3	0		
04:35:00 PM	19	94	2	0	3	109	6	0	9	0	3	0	16	5	6	0		
04:40:00 PM	23	123	0	0	1	113	2	0	6	2	0	0	4	3	0	0	805	
04:45:00 PM	20	116	3	0	3	111	2	0	6	1	1	0	15	1	2	0	830	
04:50:00 PM	21	113	1	0	0	110	7	0	10	0	4	0	5	1	0	0	830	
04:55:00 PM	17	105	2	0	3	128	2	0	5	1	3	0	10	4	4	0	837	
05:00:00 PM	24	125	2	0	1	116	0	0	9	3	3	0	10	3	1	0	853	
05:05:00 PM	23	136	2	1	0	131	4	1	9	1	8	0	9	1	0	0	907	
05:10:00 PM	15	140	0	0	1	128	2	0	9	0	7	0	9	1	0	0	935	
05:15:00 PM	24	109	1	0	1	129	4	1	8	1	0	0	7	4	1	0	928	
05:20:00 PM	6	111	0	0	2	143	4	0	8	0	5	0	4	0	0	0	885	
05:25:00 PM	21	123	0	0	1	102	0	0	6	0	3	0	11	6	0	0	846	3423

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97				US 97				Robal Rd				Robal Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	2	0	0	1	7	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	3	0	0	0	2	0	0	0	0	0	0	0	0	1	0		
04:40:00 PM	0	4	1	0	0	13	0	0	0	0	0	0	0	0	0	0	34	
04:45:00 PM	1	4	0	0	0	7	0	0	0	0	0	0	0	1	1	0	38	
04:50:00 PM	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	39	
04:55:00 PM	0	6	0	0	0	6	0	0	0	0	0	0	1	0	0	0	34	
05:00:00 PM	0	5	0	0	0	8	0	0	0	0	0	0	0	0	0	0	33	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	34	
05:10:00 PM	0	6	0	0	1	6	0	0	0	0	0	0	0	0	0	0	34	
05:15:00 PM	0	4	0	0	0	6	0	0	1	0	0	0	0	1	0	0	33	
05:20:00 PM	0	5	0	0	0	6	0	0	1	0	0	0	0	1	0	0	38	
05:25:00 PM	0	2	0	0	0	15	0	0	0	0	0	0	0	0	0	0	42	144

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	2	0	2	
04:45:00 PM	0	0	0	0	2	
04:50:00 PM	0	0	2	0	4	
04:55:00 PM	0	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	1	0	0	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	5

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97 SB ramps***
E/W street:	***Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.09096 - -121.301969
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:50:00 PM
PHF (15-Min Int)	0.97

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	5	2	17	0	4	736	418	0	328	407	6	0	0	24	1158	741	748	10	424	741
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	20.0%	0.0%	11.8%	0.0%	0.0%	4.2%	2.6%	0.0%	0.3%	2.9%	0.0%	0.0%	#DIV/0!	12.5%	3.6%	1.8%	1.6%	0.0%	3.3%	4.3%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	5

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
3	0	0	0	3

All Vehicle Volumes

	Northbound US 97 SB ramps				Southbound US 97 SB ramps				Eastbound Empire Blvd				Westbound Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	1	0	2	0	0	54	36	0	32	22	2	0		
04:35:00 PM	0	0	0	0	0	0	1	0	2	65	32	0	28	29	1	0		
04:40:00 PM	0	0	0	0	1	0	3	0	0	58	39	0	27	39	2	0	476	
04:45:00 PM	0	0	0	0	1	0	0	0	0	59	29	0	36	24	0	0	476	
04:50:00 PM	0	0	0	0	0	0	1	0	0	71	20	0	30	50	1	0	491	
04:55:00 PM	0	0	0	0	0	1	1	0	0	67	24	0	31	37	0	0	483	
05:00:00 PM	0	0	0	0	0	0	2	0	0	75	34	0	24	26	0	0	495	
05:05:00 PM	0	0	0	0	2	1	7	0	0	55	44	0	20	42	0	0	493	
05:10:00 PM	0	0	0	0	0	0	0	0	1	72	45	0	11	24	0	0	485	
05:15:00 PM	0	0	0	0	0	0	0	0	1	68	41	0	18	34	0	0	486	
05:20:00 PM	0	0	0	0	0	0	0	0	0	50	47	0	39	41	0	0	492	
05:25:00 PM	0	0	0	0	0	0	0	0	0	42	27	0	32	39	0	0	479	1923

Bicycles on Road

	Northbound US 97 SB ramps				Southbound US 97 SB ramps				Eastbound Empire Blvd				Westbound Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	2	
05:00:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 SB ramps				US 97 SB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	1	0	2	0	0	53	35	0	32	22	2	0		
04:35:00 PM	0	0	0	0	0	0	1	0	2	62	32	0	27	27	1	0		
04:40:00 PM	0	0	0	0	1	0	3	0	0	56	36	0	27	32	2	0	456	
04:45:00 PM	0	0	0	0	1	0	0	0	0	55	26	0	36	24	0	0	451	
04:50:00 PM	0	0	0	0	0	0	1	0	0	70	19	0	30	50	1	0	470	
04:55:00 PM	0	0	0	0	0	1	1	0	0	66	24	0	31	37	0	0	473	
05:00:00 PM	0	0	0	0	0	0	2	0	0	71	34	0	24	26	0	0	488	
05:05:00 PM	0	0	0	0	1	1	5	0	0	50	44	0	20	41	0	0	479	
05:10:00 PM	0	0	0	0	0	0	0	0	1	68	44	0	11	24	0	0	467	
05:15:00 PM	0	0	0	0	0	0	0	0	1	65	40	0	18	33	0	0	467	
05:20:00 PM	0	0	0	0	0	0	0	0	0	47	46	0	39	40	0	0	477	
05:25:00 PM	0	0	0	0	0	0	0	0	0	42	27	0	32	39	0	0	469	1865

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 SB ramps				US 97 SB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	1	2	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	2	3	0	0	7	0	0	20	
04:45:00 PM	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	25	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	21	
04:55:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	10	
05:00:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	7	
05:05:00 PM	0	0	0	0	1	0	2	0	0	5	0	0	0	1	0	0	14	
05:10:00 PM	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	18	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	19	
05:20:00 PM	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	0	15	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	58

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	1	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	2	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	0	0	0	0	2	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 97 NB ramps***
E/W street:	***Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.090827 - -121.300392
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:50:00 PM
PHF (15-Min Int)	0.93

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
164	3	356	0	0	0	0	0	153	604	0	0	0	595	224	0	523	0	757	819	0	380	759	960
Percent Heavy Vehicles																							
2.4%	0.0%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	5.0%	0.0%	0.0%	0.0%	2.2%	2.7%	0.0%	2.5%	0.0%	4.1%	2.3%	#DIV/0!	1.8%	2.2%	4.1%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0		0	0	3		0	0	1	0	0	4	3	0	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	0	27	0	0	0		0	10	42		0	0	46	13	0		
04:35:00 PM	14	0	24	0	0	0		0	15	55		0	0	38	18	0		
04:40:00 PM	15	0	26	0	0	0		0	13	45		0	0	54	26	0	496	
04:45:00 PM	13	0	22	0	0	0		0	8	50		0	0	53	24	0	513	
04:50:00 PM	21	0	41	0	0	0		0	10	60		0	0	57	10	0	548	
04:55:00 PM	13	1	28	0	0	0		0	8	58		0	0	53	7	0	537	
05:00:00 PM	6	0	27	0	0	0		0	17	64		0	0	54	29	0	564	
05:05:00 PM	16	0	35	0	0	0		0	18	51		0	0	45	16	0	546	
05:10:00 PM	13	1	26	0	0	0		0	19	49		0	0	24	13	0	523	
05:15:00 PM	10	0	43	0	0	0		0	13	53		0	0	52	16	0	513	
05:20:00 PM	18	1	28	0	0	0		0	13	45		0	0	60	20	0	517	
05:25:00 PM	10	0	29	0	0	0		0	9	32		0	0	59	32	0	543	2099

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	2	
04:45:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0		0	0	0		0	0	1	0	0	1	
05:00:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	0	0	2	
05:05:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	2	
05:10:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0		0	0	0		0	0	0	0	0	0	4

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	15	0	24	0	0	0		0	10	42		0	0	46	13	0		
04:35:00 PM	13	0	24	0	0	0		0	15	51		0	0	35	16	0		
04:40:00 PM	13	0	24	0	0	0		0	13	44		0	0	50	26	0	474	
04:45:00 PM	13	0	22	0	0	0		0	8	45		0	0	53	24	0	489	
04:50:00 PM	21	0	41	0	0	0		0	10	59		0	0	56	10	0	532	
04:55:00 PM	13	1	28	0	0	0		0	8	57		0	0	53	6	0	528	
05:00:00 PM	6	0	26	0	0	0		0	17	58		0	0	54	29	0	553	
05:05:00 PM	16	0	34	0	0	0		0	17	47		0	0	43	15	0	528	
05:10:00 PM	13	1	26	0	0	0		0	19	46		0	0	23	13	0	503	
05:15:00 PM	10	0	42	0	0	0		0	13	49		0	0	51	16	0	494	
05:20:00 PM	17	1	28	0	0	0		0	13	44		0	0	60	20	0	505	
05:25:00 PM	10	0	28	0	0	0		0	9	32		0	0	58	30	0	531	2036

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 97 NB ramps				US 97 NB ramps				Empire Blvd				Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	3	0	0	0		0	0	0		0	0	0	0	0		
04:35:00 PM	1	0	0	0	0	0		0	0	4		0	0	3	2	0		
04:40:00 PM	2	0	2	0	0	0		0	0	1		0	0	4	0	0	22	
04:45:00 PM	0	0	0	0	0	0		0	0	5		0	0	0	0	0	24	
04:50:00 PM	0	0	0	0	0	0		0	0	1		0	0	1	0	0	16	
04:55:00 PM	0	0	0	0	0	0		0	0	1		0	0	0	1	0	9	
05:00:00 PM	0	0	1	0	0	0		0	0	6		0	0	0	0	0	11	
05:05:00 PM	0	0	1	0	0	0		0	1	4		0	0	2	1	0	18	
05:10:00 PM	0	0	0	0	0	0		0	0	3		0	0	1	0	0	20	
05:15:00 PM	0	0	1	0	0	0		0	0	4		0	0	1	0	0	19	
05:20:00 PM	1	0	0	0	0	0		0	0	1		0	0	0	0	0	12	
05:25:00 PM	0	0	1	0	0	0		0	0	0		0	0	1	2	0	12	63

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	1	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	1	0	0	0	2	
04:55:00 PM	1	0	0	0	2	
05:00:00 PM	0	0	0	0	2	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US 20***
E/W street:	***NE Empire Blvd***
City, State	Bend OR
Study ID #	
Location	44.091497 - -121.304974
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	04:40:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
64	354	183	0	492	642	77	0	76	268	52	0	148	180	29	0	601	1211	396	357	842	459	321	943
Percent Heavy Vehicles																							
3.1%	1.7%	2.2%	0.0%	5.5%	4.7%	1.3%	0.0%	0.0%	1.9%	3.8%	0.0%	2.7%	2.8%	0.0%	0.0%	2.0%	4.8%	1.8%	2.5%	4.3%	1.3%	2.5%	3.8%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
3	0	0	0	3

All Vehicle Volumes

	Northbound US 20				Southbound US 20				Eastbound NE Empire Blvd				Westbound NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	8	21	9	0	43	53	7	0	5	25	5	0	7	12	2	0		
04:35:00 PM	9	36	12	0	34	54	5	0	2	22	5	0	13	9	2	0		
04:40:00 PM	6	24	12	0	57	56	9	0	4	23	9	0	9	12	1	0	622	
04:45:00 PM	4	34	21	0	26	53	9	0	9	28	2	0	14	18	3	0	646	
04:50:00 PM	5	31	19	0	50	62	6	0	5	17	5	0	11	16	2	0	672	
04:55:00 PM	3	19	12	0	37	55	2	0	4	27	3	0	21	19	4	0	656	
05:00:00 PM	4	33	15	0	42	54	8	0	9	17	4	0	9	9	1	0	640	
05:05:00 PM	7	19	21	0	40	54	6	0	6	28	4	0	15	14	1	0	626	
05:10:00 PM	5	34	27	0	42	60	4	0	11	20	3	0	19	13	4	0	662	
05:15:00 PM	8	31	12	0	42	40	7	0	7	22	4	0	11	24	4	0	669	
05:20:00 PM	3	38	13	0	42	45	6	0	6	24	4	0	9	19	2	0	665	
05:25:00 PM	2	34	10	0	37	56	8	0	8	15	4	0	10	15	3	0	625	2565

Bicycles on Road

	Northbound US 20				Southbound US 20				Eastbound NE Empire Blvd				Westbound NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Empire Blvd				NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	8	21	9	0	43	51	7	0	5	25	4	0	7	11	2	0		
04:35:00 PM	9	36	12	0	32	54	5	0	2	22	5	0	13	8	2	0		
04:40:00 PM	5	23	12	0	54	54	9	0	4	23	8	0	7	12	1	0	605	
04:45:00 PM	4	34	20	0	22	48	8	0	9	26	2	0	13	16	3	0	617	
04:50:00 PM	5	31	19	0	47	59	6	0	5	17	5	0	11	16	2	0	640	
04:55:00 PM	3	18	12	0	36	52	2	0	4	26	3	0	20	19	4	0	627	
05:00:00 PM	4	33	15	0	39	52	8	0	9	16	4	0	9	9	1	0	621	
05:05:00 PM	7	19	21	0	37	51	6	0	6	27	4	0	15	14	1	0	606	
05:10:00 PM	4	34	24	0	40	59	4	0	11	20	3	0	19	13	4	0	642	
05:15:00 PM	8	28	12	0	38	36	7	0	7	22	4	0	11	24	4	0	644	
05:20:00 PM	3	37	13	0	40	41	6	0	6	24	4	0	9	18	2	0	639	
05:25:00 PM	2	34	10	0	37	55	8	0	8	15	4	0	10	15	3	0	605	2479

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Empire Blvd				NE Empire Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0		
04:35:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0		
04:40:00 PM	1	1	0	0	3	2	0	0	0	0	1	0	2	0	0	0	17	
04:45:00 PM	0	0	1	0	4	5	1	0	0	2	0	0	1	2	0	0	29	
04:50:00 PM	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	32	
04:55:00 PM	0	1	0	0	1	3	0	0	0	1	0	0	1	0	0	0	29	
05:00:00 PM	0	0	0	0	3	2	0	0	0	1	0	0	0	0	0	0	19	
05:05:00 PM	0	0	0	0	3	3	0	0	0	1	0	0	0	0	0	0	20	
05:10:00 PM	1	0	3	0	2	1	0	0	0	0	0	0	0	0	0	0	20	
05:15:00 PM	0	3	0	0	4	4	0	0	0	0	0	0	0	0	0	0	25	
05:20:00 PM	0	1	0	0	2	4	0	0	0	0	0	0	0	1	0	0	26	
05:25:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	20	86

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	1	0	0	0		
04:40:00 PM	0	0	0	0	1	
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	1	0	0	0	1	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	1	0	0	0	1	
05:20:00 PM	0	0	0	0	1	
05:25:00 PM	0	0	0	0	1	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US 20*
E/W street:	*NE Butler Market*
City, State	Bend OR
Study ID #	
Location	44.079271 - -121.305022
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.88

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
114	575	113	0	150	1010	60	0	95	154	81	0	309	148	73	0	802	1220	330	530	1400	743	322	417
Percent Heavy Vehicles																							
1.8%	1.7%	0.9%	0.0%	2.0%	2.7%	1.7%	0.0%	1.1%	0.6%	1.2%	0.0%	0.6%	0.7%	1.4%	0.0%	1.6%	2.5%	0.9%	0.8%	2.1%	1.6%	1.2%	1.2%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
0	5	5	0	10

All Vehicle Volumes

	Northbound US 20				Southbound US 20				Eastbound NE Butler Market				Westbound NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	4	44	9	0	13	87	7	0	9	10	1	0	19	5	3	0		
04:35:00 PM	8	51	12	0	11	90	4	0	6	17	3	0	21	13	6	0		
04:40:00 PM	10	49	8	0	9	67	2	0	8	13	5	0	31	11	6	0	672	
04:45:00 PM	12	48	13	0	11	64	7	0	4	8	7	0	32	8	8	0	683	
04:50:00 PM	10	41	7	0	19	89	3	0	8	9	10	0	23	11	5	0	676	
04:55:00 PM	8	38	10	0	13	89	4	0	9	7	7	0	28	11	4	0	685	
05:00:00 PM	6	45	7	0	15	92	7	0	6	13	3	0	27	5	4	0	693	
05:05:00 PM	9	54	10	0	5	88	5	0	3	18	6	0	18	14	8	0	696	
05:10:00 PM	10	59	7	0	17	97	3	0	14	15	11	0	27	16	8	0	752	
05:15:00 PM	14	51	13	0	15	93	4	0	13	12	7	0	31	15	9	0	799	
05:20:00 PM	9	48	9	0	11	76	8	0	9	18	12	0	30	17	8	0	816	
05:25:00 PM	14	47	8	0	11	78	6	0	6	14	9	0	22	22	4	0	773	2882

Bicycles on Road

	Northbound US 20				Southbound US 20				Eastbound NE Butler Market				Westbound NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	4	43	9	0	13	86	6	0	9	10	1	0	19	5	3	0		
04:35:00 PM	8	50	11	0	11	89	4	0	6	16	3	0	21	13	5	0		
04:40:00 PM	10	49	8	0	9	67	2	0	8	13	5	0	31	11	6	0	664	
04:45:00 PM	12	48	13	0	10	61	7	0	4	8	7	0	32	8	8	0	674	
04:50:00 PM	10	41	7	0	19	85	3	0	8	9	9	0	23	11	5	0	667	
04:55:00 PM	7	37	10	0	13	85	4	0	9	7	7	0	28	11	4	0	670	
05:00:00 PM	6	45	7	0	14	91	7	0	6	13	3	0	26	5	4	0	679	
05:05:00 PM	8	52	10	0	5	86	5	0	3	18	6	0	18	14	8	0	682	
05:10:00 PM	10	56	7	0	17	94	3	0	14	15	11	0	26	15	8	0	736	
05:15:00 PM	14	51	13	0	15	90	4	0	13	12	7	0	31	15	9	0	783	
05:20:00 PM	9	46	9	0	10	73	8	0	8	18	12	0	30	17	8	0	798	
05:25:00 PM	14	47	8	0	11	76	6	0	6	14	9	0	22	22	4	0	761	2831

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US 20				US 20				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	1	1	0	0	1	0	0	0	1	0	0	0	0	1	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	
04:45:00 PM	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	9	
04:50:00 PM	0	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	9	
04:55:00 PM	1	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	15	
05:00:00 PM	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	14	
05:05:00 PM	1	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	14	
05:10:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	1	1	0	0	16	
05:15:00 PM	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	16	
05:20:00 PM	0	2	0	0	1	3	0	0	1	0	0	0	0	0	0	0	18	
05:25:00 PM	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	12	51

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	2	2	0	4	
04:45:00 PM	0	0	0	0	4	
04:50:00 PM	0	0	0	0	4	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	1	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	3	2	0	5	10

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US 97 SB ramp*
E/W street:	*NE Butler Market*
City, State	Bend OR
Study ID #	
Location	44.078919 - -121.303043
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.91

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	137	0	97	0	0	458	0	0	0	556	0	0	0	234	458	556	0	0	653	595
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	1.5%	0.0%	2.1%	0.0%	0.0%	1.1%	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	#DIV/0!	1.7%	1.1%	0.7%	#DIV/0!	0.0%	0.9%	1.2%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
				0		0	0	0	0		0		0	0	0	0		1	0	0	1

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					13	8	0		0	32		0		47	0	0		
04:35:00 PM					12	8	0		0	41		0		48	0	0		
04:40:00 PM					8	12	0		0	39		0		50	0	0	318	
04:45:00 PM					14	8	0		0	32		0		46	0	0	318	
04:50:00 PM					13	10	0		0	43		0		37	0	0	312	
04:55:00 PM					6	9	0		0	33		0		41	0	0	292	
05:00:00 PM					13	5	0		0	42		0		37	0	0	289	
05:05:00 PM					9	6	0		0	38		0		52	0	0	291	
05:10:00 PM					13	9	0		0	40		0		49	0	0	313	
05:15:00 PM					12	8	0		0	42		0		52	0	0	330	
05:20:00 PM					15	7	0		0	44		0		50	0	0	341	
05:25:00 PM					9	7	0		0	32		0		47	0	0	325	1248

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					0	0	0		0	0		0		0	0	0		
04:35:00 PM					0	0	0		0	0		0		0	0	0		
04:40:00 PM					0	0	0		0	0		0		0	0	0	0	
04:45:00 PM					0	0	0		0	0		0		0	0	0	0	
04:50:00 PM					0	0	0		0	0		0		0	0	0	0	
04:55:00 PM					0	0	0		0	0		0		0	0	0	0	
05:00:00 PM					0	0	0		0	0		0		0	0	0	0	
05:05:00 PM					0	0	0		0	0		0		0	0	0	0	
05:10:00 PM					0	0	0		0	0		0		0	0	0	0	
05:15:00 PM					0	0	0		0	0		0		0	0	0	0	
05:20:00 PM					0	0	0		0	0		0		0	0	0	0	

K-D-N
KEY DATA NETWORK

05:25:00 PM					0		0	0	0	0		0	0	0	0	0		

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					13		8	0	0	32		0		46	0	0		
04:35:00 PM					12		8	0	0	39		0		48	0	0		
04:40:00 PM					8		12	0	0	39		0		49	0	0	314	
04:45:00 PM					14		8	0	0	31		0		46	0	0	314	
04:50:00 PM					13		10	0	0	43		0		37	0	0	310	
04:55:00 PM					6		9	0	0	33		0		41	0	0	291	
05:00:00 PM					12		4	0	0	41		0		37	0	0	286	
05:05:00 PM					9		5	0	0	38		0		50	0	0	285	
05:10:00 PM					13		9	0	0	40		0		49	0	0	307	
05:15:00 PM					11		8	0	0	42		0		52	0	0	326	
05:20:00 PM					15		7	0	0	43		0		50	0	0	339	
05:25:00 PM					9		7	0	0	32		0		47	0	0	323	1235

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US 97 SB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM					0		0	0	0	0		0		1	0	0		
04:35:00 PM					0		0	0	0	2		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		1	0	0	4	
04:45:00 PM					0		0	0	0	1		0		0	0	0	4	
04:50:00 PM					0		0	0	0	0		0		0	0	0	2	
04:55:00 PM					0		0	0	0	0		0		0	0	0	1	
05:00:00 PM					1		1	0	0	1		0		0	0	0	3	
05:05:00 PM					0		1	0	0	0		0		2	0	0	6	
05:10:00 PM					0		0	0	0	0		0		0	0	0	6	
05:15:00 PM					1		0	0	0	0		0		0	0	0	4	
05:20:00 PM					0		0	0	0	1		0		0	0	0	2	
05:25:00 PM					0		0	0	0	0		0		0	0	0	2	13

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM		0	0	0		
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0	0	
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		1	0	0	1	
05:25:00 PM		0	0	0	1	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramp***
E/W street:	***NE Butler Market***
City, State	Bend OR
Study ID #	
Location	44.078398 - -121.301693
Start Date	Tuesday, April 11, 2017
Start Time	04:30:00 PM
Peak Hour Start	04:30:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
1	2	11	0	0	0	0	0	74	515	6	0	7	557	178	0	14	0	595	742	13	254	558	526
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%	1.2%	0.0%	0.0%	0.0%	0.5%	2.2%	0.0%	0.0%	0.0%	1.3%	0.9%	0.0%	2.4%	0.5%	1.1%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	3	40	0	0	0	44	21	0		
04:35:00 PM	0	0	1	0	0	0	0	0	9	46	0	0	1	52	20	0		
04:40:00 PM	0	0	3	0	0	0	0	0	2	43	0	0	1	47	7	0	340	
04:45:00 PM	0	0	0	0	0	0	0	0	4	43	0	0	1	45	11	0	336	
04:50:00 PM	0	0	1	0	0	0	0	0	5	50	1	0	0	39	16	0	319	
04:55:00 PM	0	0	0	0	0	0	0	0	5	35	0	0	1	42	8	0	307	
05:00:00 PM	0	0	1	0	0	0	0	0	9	44	0	0	1	35	21	0	314	
05:05:00 PM	0	2	0	0	0	0	0	0	14	31	3	0	1	55	13	0	321	
05:10:00 PM	1	0	2	0	0	0	0	0	4	50	1	0	0	47	17	0	352	
05:15:00 PM	0	0	2	0	0	0	0	0	5	48	1	0	0	52	18	0	367	
05:20:00 PM	0	0	0	0	0	0	0	0	7	51	0	0	0	50	13	0	369	
05:25:00 PM	0	0	1	0	0	0	0	0	7	34	0	0	1	49	13	0	352	1351

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

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KEY DATA NETWORK

05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	3	40	0	0	0	43	20	0		
04:35:00 PM	0	0	1	0	0	0	0	0	7	46	0	0	1	52	19	0		
04:40:00 PM	0	0	3	0	0	0	0	0	2	43	0	0	1	46	7	0	334	
04:45:00 PM	0	0	0	0	0	0	0	0	4	42	0	0	1	45	11	0	331	
04:50:00 PM	0	0	1	0	0	0	0	0	5	50	1	0	0	39	16	0	317	
04:55:00 PM	0	0	0	0	0	0	0	0	5	35	0	0	1	42	8	0	306	
05:00:00 PM	0	0	1	0	0	0	0	0	9	42	0	0	1	35	21	0	312	
05:05:00 PM	0	2	0	0	0	0	0	0	14	31	3	0	1	54	13	0	318	
05:10:00 PM	1	0	2	0	0	0	0	0	4	50	1	0	0	47	17	0	349	
05:15:00 PM	0	0	2	0	0	0	0	0	5	46	1	0	0	52	17	0	363	
05:20:00 PM	0	0	0	0	0	0	0	0	7	50	0	0	0	50	12	0	364	
05:25:00 PM	0	0	1	0	0	0	0	0	7	34	0	0	1	49	13	0	347	1336

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramp				US97 NB ramp				NE Butler Market				NE Butler Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0		
04:35:00 PM	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	6	
04:45:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:15:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	5	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	15

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:30:00 PM	0	0	0	0		
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0	0	
04:45:00 PM	0	1	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	1	0	0	0	1	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***NW Revere Ave***
City, State	Bend OR
Study ID #	
Location	44.067411 - -121.309081
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
24	132	388	0	154	240	2	0	5	18	9	0	438	25	199	0	544	396	32	662	687	336	51	560
Percent Heavy Vehicles																							
0.0%	0.0%	1.3%	0.0%	2.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.9%	1.0%	0.0%	0.3%	0.0%	0.6%	0.0%	1.6%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	1	0	6

All Vehicle Volumes

	Northbound US97 SB ramps				Southbound US97 SB ramps				Eastbound NW Revere Ave				Westbound NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	4	13	28	0	16	21	0	0	0	2	0	0	28	2	10	0		
04:40:00 PM	0	9	30	0	13	14	0	0	0	1	0	0	31	1	11	0		
04:45:00 PM	1	14	47	0	15	18	0	0	1	2	0	0	28	2	12	0	374	
04:50:00 PM	0	14	23	0	13	31	0	0	2	1	1	0	41	4	8	0	388	
04:55:00 PM	1	7	23	0	11	17	0	0	0	0	0	0	46	1	18	0	402	
05:00:00 PM	2	16	35	0	12	19	0	0	0	1	1	0	32	0	16	0	396	
05:05:00 PM	1	10	29	0	12	17	1	0	0	1	1	0	30	3	20	0	383	
05:10:00 PM	3	10	27	0	12	23	0	0	0	1	2	0	43	4	25	0	409	
05:15:00 PM	1	7	43	0	10	16	0	0	1	3	0	0	33	1	24	0	414	
05:20:00 PM	8	13	37	0	15	26	0	0	0	1	2	0	47	1	17	0	456	
05:25:00 PM	0	8	35	0	13	15	1	0	1	1	2	0	44	4	23	0	453	
05:30:00 PM	3	11	31	0	12	23	0	0	0	4	0	0	35	2	15	0	450	1634

Bicycles on Road

	Northbound US97 SB ramps				Southbound US97 SB ramps				Eastbound NW Revere Ave				Westbound NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Revere Ave				NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	4	13	28	0	14	21	0	0	0	2	0	0	28	2	10	0		
04:40:00 PM	0	9	30	0	13	14	0	0	0	1	0	0	31	1	11	0		
04:45:00 PM	1	14	44	0	15	18	0	0	1	2	0	0	28	2	12	0	369	
04:50:00 PM	0	14	23	0	13	31	0	0	2	1	1	0	41	4	8	0	385	
04:55:00 PM	1	7	23	0	11	17	0	0	0	0	0	0	46	1	18	0	399	
05:00:00 PM	2	16	35	0	12	19	0	0	0	1	1	0	32	0	16	0	396	
05:05:00 PM	1	10	28	0	12	17	1	0	0	1	1	0	30	3	19	0	381	
05:10:00 PM	3	10	27	0	12	23	0	0	0	1	2	0	43	4	25	0	407	
05:15:00 PM	1	7	42	0	10	16	0	0	1	3	0	0	33	1	23	0	410	
05:20:00 PM	8	13	37	0	15	26	0	0	0	1	2	0	47	1	17	0	454	
05:25:00 PM	0	8	35	0	12	15	1	0	1	1	2	0	44	4	23	0	450	
05:30:00 PM	3	11	31	0	11	23	0	0	0	4	0	0	35	2	15	0	448	1623

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Revere Ave				NE Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	5	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:15:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:25:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	
05:30:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	11

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	2	1	0	3	
05:20:00 PM	0	1	0	0	4	
05:25:00 PM	0	0	0	0	4	
05:30:00 PM	0	1	0	0	2	6

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***Revere Ave***
City, State	Bend OR
Study ID #	
Location	44.067623 - -121.305901
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.89

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
136	210	276	0	68	21	170	0	134	240	264	0	28	401	67	0	622	259	638	496	313	411	707	584
Percent Heavy Vehicles																							
0.0%	0.5%	0.7%	0.0%	0.0%	4.8%	0.0%	0.0%	1.5%	2.1%	0.0%	0.0%	3.6%	0.7%	1.5%	0.0%	0.5%	0.4%	1.1%	1.0%	0.6%	1.0%	0.4%	1.2%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
0	7	0	0	7

All Vehicle Volumes

	Northbound US97 NB ramps				Southbound US97 NB ramps				Eastbound Revere Ave				Westbound Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	12	18	22	0	16	1	15	0	14	18	16	0	5	27	6	0		
04:40:00 PM	6	14	23	0	2	1	18	0	18	15	13	0	3	18	4	0		
04:45:00 PM	9	16	23	0	4	0	10	0	12	20	19	0	3	25	5	0	451	
04:50:00 PM	18	20	43	0	2	2	7	0	7	25	17	0	0	41	3	0	466	
04:55:00 PM	7	17	14	0	2	4	21	0	11	17	23	0	2	31	5	0	485	
05:00:00 PM	11	12	18	0	8	3	14	0	12	17	25	0	1	36	7	0	503	
05:05:00 PM	11	13	26	0	9	2	12	0	11	18	26	0	3	38	5	0	492	
05:10:00 PM	9	25	16	0	2	2	14	0	8	22	23	0	2	44	6	0	511	
05:15:00 PM	10	26	24	0	7	2	13	0	13	25	26	0	4	30	6	0	533	
05:20:00 PM	11	23	33	0	9	3	20	0	10	24	32	0	0	31	6	0	561	
05:25:00 PM	19	14	16	0	4	1	13	0	9	23	20	0	1	50	10	0	568	
05:30:00 PM	13	12	18	0	3	0	13	0	9	16	24	0	4	30	4	0	528	2015

Bicycles on Road

	Northbound US97 NB ramps				Southbound US97 NB ramps				Eastbound Revere Ave				Westbound Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				Revere Ave				Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	12	18	22	0	16	1	15	0	13	17	16	0	4	27	6	0		
04:40:00 PM	6	13	23	0	2	1	18	0	18	14	13	0	3	18	4	0		
04:45:00 PM	9	16	23	0	4	0	10	0	11	19	19	0	3	25	5	0	444	
04:50:00 PM	18	20	43	0	2	2	7	0	7	25	17	0	0	41	2	0	461	
04:55:00 PM	7	17	14	0	2	4	21	0	11	17	23	0	2	31	5	0	482	
05:00:00 PM	11	12	18	0	8	3	14	0	12	17	25	0	1	35	7	0	501	
05:05:00 PM	11	13	26	0	9	2	12	0	11	18	26	0	3	38	5	0	491	
05:10:00 PM	9	25	16	0	2	2	14	0	8	22	23	0	2	43	6	0	509	
05:15:00 PM	10	26	23	0	7	2	13	0	13	25	26	0	4	30	6	0	531	
05:20:00 PM	11	23	32	0	9	2	20	0	10	24	32	0	0	31	6	0	557	
05:25:00 PM	19	14	16	0	4	1	13	0	9	22	20	0	1	49	10	0	563	
05:30:00 PM	13	12	18	0	3	0	13	0	9	15	24	0	4	30	4	0	523	1999

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				Revere Ave				Revere Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0		
04:40:00 PM	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	7	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:15:00 PM	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:20:00 PM	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	4	
05:25:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	5	
05:30:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	16

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	1	0	0	2	
04:50:00 PM	0	0	0	0	2	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	1	0	0	1	
05:15:00 PM	0	2	0	0	3	
05:20:00 PM	0	0	0	0	3	
05:25:00 PM	0	1	0	0	3	
05:30:00 PM	0	1	0	0	2	7

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***NW Lafayette Ave***
City, State	Bend OR
Study ID #	
Location	44.061871 - -121.307143
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	2302	0	0	0	2573	83	0	0	0	125	0	0	0	0	0	2302	2656	125	0	2698	2302	83	0
Percent Heavy Vehicles																							
0.0%	2.9%	0.0%	0.0%	0.0%	2.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.9%	2.8%	0.0%	0.0%	2.8%	2.9%	0.0%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1		0		0	0	0	0		0	0					1	0	0	0		0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	192		0		238	8	0	0		5	0						
04:40:00 PM	0	191		0		198	11	0	0		4	0						
04:45:00 PM	0	215		0		215	3	0	0		6	0					1286	
04:50:00 PM	0	193		0		214	5	0	0		14	0					1269	
04:55:00 PM	0	158		0		189	12	0	0		14	0					1238	
05:00:00 PM	0	170		0		220	8	0	0		16	0					1213	
05:05:00 PM	0	217		0		215	4	0	0		19	0					1242	
05:10:00 PM	0	201		0		237	5	0	0		8	0					1320	
05:15:00 PM	0	217		0		231	7	0	0		13	0					1374	
05:20:00 PM	0	203		0		215	5	0	0		12	0					1354	
05:25:00 PM	0	198		0		198	6	0	0		7	0					1312	
05:30:00 PM	0	147		0		203	9	0	0		7	0					1210	5083

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	1		0		0	0	0	0		0	0					1	
05:10:00 PM	0	0		0		0	0	0	0		0	0					1	
05:15:00 PM	0	0		0		0	0	0	0		0	0					1	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	183		0		231	8	0	0		5	0						
04:40:00 PM	0	184		0		195	11	0	0		4	0						
04:45:00 PM	0	205		0		209	3	0	0		6	0					1244	
04:50:00 PM	0	190		0		210	5	0	0		14	0					1236	
04:55:00 PM	0	153		0		184	12	0	0		14	0					1205	
05:00:00 PM	0	166		0		212	8	0	0		16	0					1184	
05:05:00 PM	0	211		0		205	4	0	0		19	0					1204	
05:10:00 PM	0	199		0		233	5	0	0		8	0					1286	
05:15:00 PM	0	208		0		224	7	0	0		13	0					1336	
05:20:00 PM	0	200		0		210	5	0	0		12	0					1324	
05:25:00 PM	0	192		0		191	6	0	0		7	0					1275	
05:30:00 PM	0	144		0		194	9	0	0		7	0					1177	4941

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Lafayette Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	9		0		7	0	0	0		0	0						
04:40:00 PM	0	7		0		3	0	0	0		0	0						
04:45:00 PM	0	10		0		6	0	0	0		0	0					42	
04:50:00 PM	0	3		0		4	0	0	0		0	0					33	
04:55:00 PM	0	5		0		5	0	0	0		0	0					33	
05:00:00 PM	0	4		0		8	0	0	0		0	0					29	
05:05:00 PM	0	6		0		10	0	0	0		0	0					38	
05:10:00 PM	0	2		0		4	0	0	0		0	0					34	
05:15:00 PM	0	9		0		7	0	0	0		0	0					38	
05:20:00 PM	0	3		0		5	0	0	0		0	0					30	
05:25:00 PM	0	6		0		7	0	0	0		0	0					37	
05:30:00 PM	0	3		0		9	0	0	0		0	0					33	142

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	0		0	
05:15:00 PM	0	0	0		0	
05:20:00 PM	0	0	0		0	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***NW Hawthorne Ave***
City, State	Bend OR
Study ID #	
Location	44.057959 - -121.307182
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	2309	0	0	0	2412	259	0	0	0	223	0	0	0	0	0	2309	2671	223	0	2635	2309	259	0
Percent Heavy Vehicles																							
0.0%	3.1%	0.0%	0.0%	0.0%	2.7%	0.8%	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	2.5%	0.9%	0.0%	2.6%	3.1%	0.8%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	1		0		0	0	0	0		0	0					1	0	0	1		1

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound NW Hawthorne Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	206		0		208	18	0	0		17	0						
04:40:00 PM	0	196		0		177	20	0	0		17	0						
04:45:00 PM	0	209		0		185	25	0	0		18	0					1296	
04:50:00 PM	0	183		0		205	28	0	0		18	0					1281	
04:55:00 PM	0	157		0		188	21	0	0		15	0					1252	
05:00:00 PM	0	184		0		205	24	0	0		14	0					1242	
05:05:00 PM	0	212		0		206	25	0	0		28	0					1279	
05:10:00 PM	0	207		0		230	19	0	0		17	0					1371	
05:15:00 PM	0	210		0		219	18	0	0		17	0					1408	
05:20:00 PM	0	192		0		214	18	0	0		23	0					1384	
05:25:00 PM	0	198		0		186	23	0	0		21	0					1339	
05:30:00 PM	0	155		0		189	20	0	0		18	0					1257	5203

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound NW Hawthorne Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	1		0		0	0	0	0		0	0					1	
05:10:00 PM	0	0		0		0	0	0	0		0	0					1	
05:15:00 PM	0	0		0		0	0	0	0		0	0					1	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Hawthorne Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	198		0		204	17	0	0		17	0						
04:40:00 PM	0	186		0		173	20	0	0		17	0						
04:45:00 PM	0	201		0		180	24	0	0		18	0					1255	
04:50:00 PM	0	181		0		202	28	0	0		18	0					1248	
04:55:00 PM	0	151		0		184	21	0	0		15	0					1223	
05:00:00 PM	0	180		0		198	24	0	0		13	0					1215	
05:05:00 PM	0	205		0		197	25	0	0		28	0					1241	
05:10:00 PM	0	205		0		227	19	0	0		17	0					1338	
05:15:00 PM	0	200		0		212	18	0	0		17	0					1370	
05:20:00 PM	0	189		0		209	18	0	0		22	0					1353	
05:25:00 PM	0	191		0		180	23	0	0		21	0					1300	
05:30:00 PM	0	151		0		180	20	0	0		18	0					1222	5062

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				NW Hawthorne Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	8		0		4	1	0	0		0	0						
04:40:00 PM	0	10		0		4	0	0	0		0	0						
04:45:00 PM	0	8		0		5	1	0	0		0	0					41	
04:50:00 PM	0	2		0		3	0	0	0		0	0					33	
04:55:00 PM	0	6		0		4	0	0	0		0	0					29	
05:00:00 PM	0	4		0		7	0	0	0		1	0					27	
05:05:00 PM	0	7		0		9	0	0	0		0	0					38	
05:10:00 PM	0	2		0		3	0	0	0		0	0					33	
05:15:00 PM	0	10		0		7	0	0	0		0	0					38	
05:20:00 PM	0	3		0		5	0	0	0		1	0					31	
05:25:00 PM	0	7		0		6	0	0	0		0	0					39	
05:30:00 PM	0	4		0		9	0	0	0		0	0					35	141

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	1		1	
05:15:00 PM	0	0	0		1	
05:20:00 PM	0	0	0		1	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***NW Colorado Ave***
City, State	Bend OR
Study ID #	
Location	44.051697 - -121.30911
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.87

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
8	264	378	0	91	0	173	0	0	0	0	0	0	347	30	0	650	264	0	377	0	294	528	469
Percent Heavy Vehicles																							
0.0%	0.8%	1.3%	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.2%	0.0%	0.0%	1.1%	0.8%	#DIV/0!	1.1%	#DIV/0!	0.7%	0.8%	1.5%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	2	0	1	1	4

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	21	29	0	7	0	21	0	0	0	0	0	0	20	5	0		
04:40:00 PM	0	23	31	0	4	0	15	0	0	0	0	0	0	25	1	0		
04:45:00 PM	1	23	27	0	12	0	12	0	0	0	0	0	0	37	0	0	314	
04:50:00 PM	0	19	28	0	3	0	16	0	0	0	0	0	0	28	0	0	305	
04:55:00 PM	0	15	20	0	6	0	13	0	0	0	0	0	0	28	0	0	288	
05:00:00 PM	1	12	27	0	7	0	19	0	0	0	0	0	0	19	2	0	263	
05:05:00 PM	0	21	25	0	9	0	12	0	0	0	0	0	0	37	3	0	276	
05:10:00 PM	3	36	42	0	14	0	14	0	0	0	0	0	0	29	1	0	333	
05:15:00 PM	3	19	28	0	10	0	9	0	0	0	0	0	0	34	4	0	353	
05:20:00 PM	0	27	46	0	7	0	8	0	0	0	0	0	0	34	4	0	372	
05:25:00 PM	0	24	37	0	8	0	20	0	0	0	0	0	0	38	4	0	364	
05:30:00 PM	0	24	38	0	4	0	14	0	0	0	0	0	0	18	6	0	361	1291

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	21	27	0	7	0	21	0	0	0	0	0	0	20	5	0		
04:40:00 PM	0	23	31	0	3	0	15	0	0	0	0	0	0	24	1	0		
04:45:00 PM	1	23	25	0	12	0	12	0	0	0	0	0	0	37	0	0	308	
04:50:00 PM	0	19	28	0	3	0	16	0	0	0	0	0	0	28	0	0	301	
04:55:00 PM	0	15	20	0	6	0	13	0	0	0	0	0	0	28	0	0	286	
05:00:00 PM	1	11	27	0	7	0	19	0	0	0	0	0	0	19	2	0	262	
05:05:00 PM	0	21	25	0	9	0	12	0	0	0	0	0	0	36	3	0	274	
05:10:00 PM	3	35	41	0	14	0	14	0	0	0	0	0	0	29	1	0	329	
05:15:00 PM	3	19	28	0	10	0	9	0	0	0	0	0	0	33	4	0	349	
05:20:00 PM	0	27	46	0	7	0	8	0	0	0	0	0	0	34	4	0	369	
05:25:00 PM	0	24	37	0	7	0	20	0	0	0	0	0	0	37	4	0	361	
05:30:00 PM	0	24	38	0	4	0	14	0	0	0	0	0	0	18	6	0	359	1278

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0		
04:45:00 PM	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	6	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	
05:00:00 PM	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	
05:10:00 PM	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	
05:25:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	3	
05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	13

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	1	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	1	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	1	0	1	0	2	
05:25:00 PM	0	0	0	0	2	
05:30:00 PM	0	0	0	0	2	4

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***NW Colorado Ave***
City, State	Bend OR
Study ID #	
Location	44.051578 - -121.306089
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	17	0	199	0	644	217	0	1	0	180	381	0	0	216	862	561	0	1025	380	234
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	5.9%	0.0%	0.5%	0.0%	0.9%	2.3%	0.0%	0.0%	0.0%	1.1%	1.0%	0.0%	#DIV/0!	0.9%	1.3%	1.1%	#DIV/0!	1.0%	0.8%	2.6%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	0		0		2	0	0	2

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2		9	0	66	14		0		16	29	0		
04:40:00 PM					0		17	0	56	16		0		11	30	0		
04:45:00 PM					0		21	0	60	21		0		14	29	0	411	
04:50:00 PM					0		19	0	42	10		0		10	21	0	377	
04:55:00 PM					1		12	0	53	12		0		14	25	0	364	
05:00:00 PM					1		18	0	51	17		0		13	34	0	353	
05:05:00 PM					2		20	0	46	19		0		12	59	0	409	
05:10:00 PM					5		16	0	44	22		0		17	43	0	439	
05:15:00 PM					1		21	0	70	16		0		14	29	0	456	
05:20:00 PM					3		16	0	64	18		0		23	30	0	452	
05:25:00 PM					2		21	0	53	30		0		22	20	0	453	
05:30:00 PM					0		9	0	39	22		1		14	32	0	419	1639

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	0		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	0	
04:50:00 PM					0		0	0	0	0		0		0	0	0	0	
04:55:00 PM					0		0	0	0	0		0		0	0	0	0	
05:00:00 PM					0		0	0	0	0		0		1	0	0	1	
05:05:00 PM					0		0	0	0	0		0		0	0	0	1	
05:10:00 PM					0		0	0	0	0		0		0	0	0	1	
05:15:00 PM					0		0	0	0	0		0		0	0	0	0	
05:20:00 PM					0		0	0	0	0		0		0	0	0	0	
05:25:00 PM					0		0	0	0	0		0		0	0	0	0	

05:30:00 PM					0		0	0	0	0		0	1	0	0	1	2	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2		9	0	64	14		0		16	29	0		
04:40:00 PM					0		17	0	55	15		0		11	30	0		
04:45:00 PM					0		21	0	59	20		0		14	29	0	405	
04:50:00 PM					0		19	0	42	10		0		10	20	0	372	
04:55:00 PM					1		12	0	53	12		0		14	24	0	360	
05:00:00 PM					1		18	0	51	17		0		12	34	0	350	
05:05:00 PM					2		20	0	46	19		0		12	58	0	406	
05:10:00 PM					4		16	0	44	22		0		17	43	0	436	
05:15:00 PM					1		20	0	68	16		0		14	29	0	451	
05:20:00 PM					3		16	0	64	18		0		23	30	0	448	
05:25:00 PM					2		21	0	53	28		0		21	19	0	446	
05:30:00 PM					0		9	0	39	21		1		14	32	0	414	1620

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramps				NW Colorado Ave				NW Colorado Ave				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	2	0		0		0	0	0		
04:40:00 PM					0		0	0	1	1		0		0	0	0		
04:45:00 PM					0		0	0	1	1		0		0	0	0	6	
04:50:00 PM					0		0	0	0	0		0		0	1	0	5	
04:55:00 PM					0		0	0	0	0		0		0	1	0	4	
05:00:00 PM					0		0	0	0	0		0		1	0	0	3	
05:05:00 PM					0		0	0	0	0		0		0	1	0	3	
05:10:00 PM					1		0	0	0	0		0		0	0	0	3	
05:15:00 PM					0		1	0	2	0		0		0	0	0	5	
05:20:00 PM					0		0	0	0	0		0		0	0	0	4	
05:25:00 PM					0		0	0	0	2		0		1	1	0	7	
05:30:00 PM					0		0	0	0	1		0		0	0	0	5	19

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0		
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***SW Truman Ave***
City, State	Bend OR
Study ID #	
Location	44.044229 - -121.305958
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.90

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1504	0	0	0	2311	183	0	0	0	80	0	0	0	0	0	1504	2494	80	0	2391	1504	183	0
Percent Heavy Vehicles																							
0.0%	4.1%	0.0%	0.0%	0.0%	2.8%	2.2%	0.0%	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	0.0%	4.1%	2.7%	1.3%	0.0%	2.7%	4.1%	2.2%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0		0		0	0	0	0		0	0					0	0	0	0		0

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound SW Truman Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	131		0		200	18	0	0		4	0						
04:40:00 PM	0	122		0		175	17	0	0		4	0						
04:45:00 PM	0	148		0		181	16	0	0		4	0					1020	
04:50:00 PM	0	125		0		157	19	0	0		9	0					977	
04:55:00 PM	0	97		0		179	15	0	0		7	0					957	
05:00:00 PM	0	126		0		178	15	0	0		10	0					937	
05:05:00 PM	0	142		0		208	13	0	0		6	0					996	
05:10:00 PM	0	123		0		224	12	0	0		13	0					1070	
05:15:00 PM	0	144		0		222	14	0	0		8	0					1129	
05:20:00 PM	0	118		0		221	16	0	0		5	0					1120	
05:25:00 PM	0	127		0		185	15	0	0		6	0					1081	
05:30:00 PM	0	101		0		181	13	0	0		4	0					992	4078

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound SW Truman Ave				Westbound				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0		0		0	0	0	0		0	0						
04:40:00 PM	0	0		0		0	0	0	0		0	0						
04:45:00 PM	0	0		0		0	0	0	0		0	0					0	
04:50:00 PM	0	0		0		0	0	0	0		0	0					0	
04:55:00 PM	0	0		0		0	0	0	0		0	0					0	
05:00:00 PM	0	0		0		0	0	0	0		0	0					0	
05:05:00 PM	0	0		0		0	0	0	0		0	0					0	
05:10:00 PM	0	0		0		0	0	0	0		0	0					0	
05:15:00 PM	0	0		0		0	0	0	0		0	0					0	
05:20:00 PM	0	0		0		0	0	0	0		0	0					0	
05:25:00 PM	0	0		0		0	0	0	0		0	0					0	

05:30:00 PM	0	0		0		0	0	0	0		0	0					0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Truman Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	126		0		195	18	0	0		4	0						
04:40:00 PM	0	114		0		173	17	0	0		4	0						
04:45:00 PM	0	141		0		175	16	0	0		4	0					987	
04:50:00 PM	0	122		0		156	18	0	0		8	0					948	
04:55:00 PM	0	95		0		174	15	0	0		7	0					931	
05:00:00 PM	0	121		0		168	15	0	0		10	0					909	
05:05:00 PM	0	137		0		202	13	0	0		6	0					963	
05:10:00 PM	0	119		0		218	12	0	0		13	0					1034	
05:15:00 PM	0	136		0		214	14	0	0		8	0					1092	
05:20:00 PM	0	115		0		215	16	0	0		5	0					1085	
05:25:00 PM	0	124		0		181	13	0	0		6	0					1047	
05:30:00 PM	0	93		0		176	12	0	0		4	0					960	3948

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Truman Ave								15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	5		0		5	0	0	0		0	0						
04:40:00 PM	0	8		0		2	0	0	0		0	0						
04:45:00 PM	0	7		0		6	0	0	0		0	0					33	
04:50:00 PM	0	3		0		1	1	0	0		1	0					29	
04:55:00 PM	0	2		0		5	0	0	0		0	0					26	
05:00:00 PM	0	5		0		10	0	0	0		0	0					28	
05:05:00 PM	0	5		0		6	0	0	0		0	0					33	
05:10:00 PM	0	4		0		6	0	0	0		0	0					36	
05:15:00 PM	0	8		0		8	0	0	0		0	0					37	
05:20:00 PM	0	3		0		6	0	0	0		0	0					35	
05:25:00 PM	0	3		0		4	2	0	0		0	0					34	
05:30:00 PM	0	8		0		5	1	0	0		0	0					32	130

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0			
04:40:00 PM	0	0	0			
04:45:00 PM	0	0	0		0	
04:50:00 PM	0	0	0		0	
04:55:00 PM	0	0	0		0	
05:00:00 PM	0	0	0		0	
05:05:00 PM	0	0	0		0	
05:10:00 PM	0	0	0		0	
05:15:00 PM	0	0	0		0	
05:20:00 PM	0	0	0		0	
05:25:00 PM	0	0	0		0	
05:30:00 PM	0	0	0		0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US97 SB ramps*
E/W street:	*SW Reed Market*
City, State	Bend OR
Study ID #	
Location	44.039049 - -121.309913
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.91

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	679	0	150	0	0	710	52	0	0	457	62	0	0	829	762	519	52	62	607	1389
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	1.6%	0.0%	2.0%	0.0%	0.0%	1.8%	1.9%	0.0%	0.0%	1.8%	1.6%	0.0%	#DIV/0!	1.7%	1.8%	1.7%	1.9%	1.6%	1.8%	1.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	53	0	13	0	0	62	6	0	0	35	3	0		
04:40:00 PM	0	0	0	0	63	0	13	0	0	50	4	0	0	37	6	0		
04:45:00 PM	0	0	0	0	41	0	5	0	0	70	5	0	0	27	5	0	498	
04:50:00 PM	0	0	0	0	39	0	4	0	0	72	5	0	0	32	6	0	484	
04:55:00 PM	0	0	0	0	65	0	17	0	0	55	2	0	0	42	8	0	500	
05:00:00 PM	0	0	0	0	42	0	9	0	0	60	3	0	0	40	9	0	510	
05:05:00 PM	0	0	0	0	67	0	17	0	0	53	5	0	0	31	3	0	528	
05:10:00 PM	0	0	0	0	59	0	11	0	0	64	7	0	0	42	8	0	530	
05:15:00 PM	0	0	0	0	76	0	17	0	0	56	6	0	0	39	6	0	567	
05:20:00 PM	0	0	0	0	69	0	12	0	0	59	3	0	0	42	2	0	578	
05:25:00 PM	0	0	0	0	56	0	17	0	0	57	3	0	0	47	5	0	572	
05:30:00 PM	0	0	0	0	49	0	15	0	0	52	3	0	0	43	1	0	535	2110

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	51	0	13	0	0	60	6	0	0	34	3	0		
04:40:00 PM	0	0	0	0	62	0	12	0	0	50	4	0	0	36	6	0		
04:45:00 PM	0	0	0	0	39	0	5	0	0	68	4	0	0	27	5	0	485	
04:50:00 PM	0	0	0	0	39	0	4	0	0	71	5	0	0	31	6	0	474	
04:55:00 PM	0	0	0	0	64	0	15	0	0	54	2	0	0	40	7	0	486	
05:00:00 PM	0	0	0	0	41	0	9	0	0	59	3	0	0	40	9	0	499	
05:05:00 PM	0	0	0	0	65	0	17	0	0	53	5	0	0	30	3	0	516	
05:10:00 PM	0	0	0	0	58	0	11	0	0	64	7	0	0	42	8	0	524	
05:15:00 PM	0	0	0	0	76	0	17	0	0	53	6	0	0	37	6	0	558	
05:20:00 PM	0	0	0	0	69	0	12	0	0	57	3	0	0	42	2	0	570	
05:25:00 PM	0	0	0	0	56	0	17	0	0	57	3	0	0	47	5	0	565	
05:30:00 PM	0	0	0	0	48	0	15	0	0	51	3	0	0	43	1	0	531	2073

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				SW Reed Market				SW Reed Market				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	2	0	0	0	0	2	0	0	0	1	0	0		
04:40:00 PM	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0		
04:45:00 PM	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	0	13	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	10	
04:55:00 PM	0	0	0	0	1	0	2	0	0	1	0	0	0	2	1	0	14	
05:00:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	11	
05:05:00 PM	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	12	
05:10:00 PM	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	9	
05:20:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	4	37

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	1	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	1	0	0	2	
05:15:00 PM	0	0	0	0	1	
05:20:00 PM	0	0	0	0	1	
05:25:00 PM	1	0	0	0	1	
05:30:00 PM	0	0	0	0	1	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramps***
E/W street:	***SW Reed Market Rd***
City, State	Bend OR
Study ID #	
Location	44.067623 - -121.305901
Start Date	Wednesday, April 12, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.93

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
35	0	79	0	0	0	35	0	0	1292	97	0	0	449	27	0	114	35	1389	476	97	27	519	1371
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.9%	0.0%	0.0%	0.0%	2.0%	0.0%	0.0%	0.0%	0.0%	1.7%	1.9%	0.0%	0.0%	1.7%	1.8%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	2

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	2	0	5	0	0	0	2	0	0	107	8	0	0	34	2	0		
04:40:00 PM	5	0	13	0	0	0	1	0	0	107	6	0	0	37	4	0		
04:45:00 PM	1	0	4	0	0	0	1	0	0	101	10	0	0	30	6	0	486	
04:50:00 PM	2	0	14	0	0	0	2	0	0	106	5	0	0	34	2	0	491	
04:55:00 PM	6	0	6	0	0	0	2	0	0	109	11	0	0	42	1	0	495	
05:00:00 PM	2	0	7	0	0	0	4	0	0	97	5	0	0	43	0	0	500	
05:05:00 PM	2	0	3	0	0	0	2	0	0	106	14	0	0	30	0	0	492	
05:10:00 PM	2	0	5	0	0	0	5	0	0	116	7	0	0	43	1	0	494	
05:15:00 PM	4	0	7	0	0	0	4	0	0	121	11	0	0	37	1	0	521	
05:20:00 PM	3	0	4	0	0	0	2	0	0	121	7	0	0	39	4	0	544	
05:25:00 PM	4	0	7	0	0	0	3	0	0	108	5	0	0	45	5	0	542	
05:30:00 PM	2	0	4	0	0	0	7	0	0	93	8	0	0	35	1	0	507	2014

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	2	0	5	0	0	0	2	0	0	103	8	0	0	33	2	0		
04:40:00 PM	5	0	13	0	0	0	1	0	0	106	6	0	0	36	4	0		
04:45:00 PM	1	0	4	0	0	0	1	0	0	97	10	0	0	30	6	0	475	
04:50:00 PM	2	0	14	0	0	0	2	0	0	105	5	0	0	33	2	0	483	
04:55:00 PM	6	0	6	0	0	0	2	0	0	107	11	0	0	39	1	0	484	
05:00:00 PM	2	0	7	0	0	0	4	0	0	95	5	0	0	43	0	0	491	
05:05:00 PM	2	0	3	0	0	0	2	0	0	104	14	0	0	29	0	0	482	
05:10:00 PM	2	0	5	0	0	0	5	0	0	115	7	0	0	43	1	0	488	
05:15:00 PM	4	0	7	0	0	0	4	0	0	118	11	0	0	35	1	0	512	
05:20:00 PM	3	0	4	0	0	0	2	0	0	119	7	0	0	39	4	0	536	
05:25:00 PM	4	0	7	0	0	0	3	0	0	108	5	0	0	45	5	0	535	
05:30:00 PM	2	0	4	0	0	0	7	0	0	91	8	0	0	35	1	0	503	1981

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 NB ramps				US97 NB ramps				SW Reed Market Rd				SW Reed Market Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	1	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	11	
04:50:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	8	
04:55:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	0	11	
05:00:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	9	
05:05:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	10	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	9	
05:20:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	8	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	33

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	1	0	0	0	1	
04:55:00 PM	0	0	0	0	1	
05:00:00 PM	1	0	0	0	2	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	2

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Reed Lane***
City, State	Bend OR
Study ID #	
Location	44.032436 - -121.313051
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.96

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	1076	55	0	0	1706	0	0	0	0	0	0	0	0	146	0	1131	1706	0	146	1706	1222	0	55
Percent Heavy Vehicles																							
0.0%	5.3%	0.0%	0.0%	0.0%	3.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	5.0%	3.3%	#DIV/0!	1.4%	3.3%	4.8%	#DIV/0!	0.0%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
	0	0	0	0	0		0					0		0	0	0	1	0		0	1

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound				Westbound Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		87	2	0	0	149		0					0		9	0		
04:40:00 PM		105	4	0	0	142		0					0		15	0		
04:45:00 PM		81	5	0	0	127		0					0		15	0	741	
04:50:00 PM		81	1	0	0	138		0					0		13	0	727	
04:55:00 PM		104	2	0	0	148		0					0		3	0	718	
05:00:00 PM		93	6	0	0	129		0					0		21	0	739	
05:05:00 PM		77	6	0	0	147		0					0		12	0	748	
05:10:00 PM		79	3	0	0	157		0					0		13	0	743	
05:15:00 PM		92	6	0	0	149		0					0		5	0	746	
05:20:00 PM		96	6	0	0	152		0					0		17	0	775	
05:25:00 PM		90	5	0	0	139		0					0		10	0	767	
05:30:00 PM		91	9	0	0	129		0					0		13	0	757	2983

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound				Westbound Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		0	0	0	0	0		0					0		0	0		
04:40:00 PM		0	0	0	0	0		0					0		0	0		
04:45:00 PM		0	0	0	0	0		0					0		0	0	0	
04:50:00 PM		0	0	0	0	0		0					0		0	0	0	
04:55:00 PM		0	0	0	0	0		0					0		0	0	0	
05:00:00 PM		0	0	0	0	0		0					0		0	0	0	
05:05:00 PM		0	0	0	0	0		0					0		0	0	0	
05:10:00 PM		0	0	0	0	0		0					0		0	0	0	
05:15:00 PM		0	0	0	0	0		0					0		0	0	0	
05:20:00 PM		0	0	0	0	0		0					0		0	0	0	
05:25:00 PM		0	0	0	0	0		0					0		0	0	0	

05:30:00 PM		0	0	0	0	0		0					0		0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97								Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		81	2	0	0	141		0					0		9	0		
04:40:00 PM		97	4	0	0	137		0					0		14	0		
04:45:00 PM		79	5	0	0	122		0					0		15	0	706	
04:50:00 PM		79	1	0	0	134		0					0		13	0	700	
04:55:00 PM		98	2	0	0	144		0					0		3	0	695	
05:00:00 PM		88	6	0	0	127		0					0		21	0	716	
05:05:00 PM		72	6	0	0	144		0					0		11	0	722	
05:10:00 PM		78	3	0	0	153		0					0		13	0	722	
05:15:00 PM		86	6	0	0	148		0					0		5	0	725	
05:20:00 PM		91	6	0	0	143		0					0		17	0	749	
05:25:00 PM		84	5	0	0	133		0					0		10	0	734	
05:30:00 PM		86	9	0	0	124		0					0		13	0	721	2868

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97								Reed Lane				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM		6	0	0	0	8		0					0		0	0		
04:40:00 PM		8	0	0	0	5		0					0		1	0		
04:45:00 PM		2	0	0	0	5		0					0		0	0	35	
04:50:00 PM		2	0	0	0	4		0					0		0	0	27	
04:55:00 PM		6	0	0	0	4		0					0		0	0	23	
05:00:00 PM		5	0	0	0	2		0					0		0	0	23	
05:05:00 PM		5	0	0	0	3		0					0		1	0	26	
05:10:00 PM		1	0	0	0	4		0					0		0	0	21	
05:15:00 PM		6	0	0	0	1		0					0		0	0	21	
05:20:00 PM		5	0	0	0	9		0					0		0	0	26	
05:25:00 PM		6	0	0	0	6		0					0		0	0	33	
05:30:00 PM		5	0	0	0	5		0					0		0	0	36	115

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0		0		
04:40:00 PM	0	0		0		
04:45:00 PM	0	0		0	0	
04:50:00 PM	0	0		0	0	
04:55:00 PM	0	0		0	0	
05:00:00 PM	0	0		0	0	
05:05:00 PM	0	0		0	0	
05:10:00 PM	0	0		0	0	
05:15:00 PM	0	0		0	0	
05:20:00 PM	0	0		0	0	
05:25:00 PM	1	0		0	1	
05:30:00 PM	0	0		0	1	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramp***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028794 - -121.317252
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:45:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
3	0	355	0	0	0	0	0	0	457	33	0	27	581	0	1	358	0	490	609	60	0	584	813
Percent Heavy Vehicles																							
33.3%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	3.0%	0.0%	0.0%	0.2%	0.0%	0.0%	0.8%	0.0%	0.6%	0.2%	1.7%	0.0%	0.3%	0.5%

PHV- Bicycles																	PHV - Pedestrians				
																	in Crosswalk				
Northbound				Southbound				Eastbound				Westbound									
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0		0	0						0	0	0	0	0		0	0	6		0	0	6

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		27	0						37	1	0	2	43		1		
04:40:00 PM	2		23	0						37	5	0	6	43		0		
04:45:00 PM	0		36	0						41	3	0	1	55		0	363	
04:50:00 PM	0		24	0						38	4	0	4	51		0	373	
04:55:00 PM	1		29	0						41	4	0	2	48		0	382	
05:00:00 PM	0		21	0						53	2	0	0	39		0	361	
05:05:00 PM	0		38	0						32	4	0	3	43		0	360	
05:10:00 PM	0		34	0						33	3	0	5	61		0	371	
05:15:00 PM	0		32	0						31	3	0	1	49		0	372	
05:20:00 PM	0		33	0						39	3	0	0	49		0	376	
05:25:00 PM	0		31	0						35	1	0	2	54		0	363	
05:30:00 PM	0		27	0						40	0	0	1	46		0	361	1457

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		0	0						0	0	0	0	0		0		
04:40:00 PM	0		0	0						0	0	0	0	0		0		
04:45:00 PM	0		0	0						0	0	0	0	0		0	0	
04:50:00 PM	0		0	0						0	0	0	0	0		0	0	
04:55:00 PM	0		0	0						0	0	0	0	0		0	0	
05:00:00 PM	0		0	0						0	0	0	0	0		0	0	
05:05:00 PM	0		0	0						0	0	0	0	0		0	0	
05:10:00 PM	0		0	0						0	0	0	0	0		0	0	
05:15:00 PM	0		0	0						0	0	0	0	0		0	0	
05:20:00 PM	0		0	0						0	0	0	0	0		0	0	
05:25:00 PM	0		0	0						0	0	0	0	0		0	0	

05:30:00 PM	0		0	0					0	0	0	0	0		0	0	0	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		26	0						37	1	0	2	43		1		
04:40:00 PM	1		23	0						36	5	0	6	43		0		
04:45:00 PM	0		36	0						41	3	0	1	55		0	360	
04:50:00 PM	0		23	0						38	4	0	4	51		0	370	
04:55:00 PM	1		29	0						41	4	0	2	48		0	381	
05:00:00 PM	0		21	0						53	2	0	0	39		0	360	
05:05:00 PM	0		38	0						32	4	0	3	43		0	360	
05:10:00 PM	0		34	0						33	3	0	5	60		0	370	
05:15:00 PM	0		32	0						31	2	0	1	49		0	370	
05:20:00 PM	0		33	0						38	3	0	0	49		0	373	
05:25:00 PM	0		31	0						35	1	0	2	54		0	361	
05:30:00 PM	0		27	0						40	0	0	1	46		0	360	1450

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramp								SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0		1	0						0	0	0	0	0		0		
04:40:00 PM	1		0	0						1	0	0	0	0		0		
04:45:00 PM	0		0	0						0	0	0	0	0		0	3	
04:50:00 PM	0		1	0						0	0	0	0	0		0	3	
04:55:00 PM	0		0	0						0	0	0	0	0		0	1	
05:00:00 PM	0		0	0						0	0	0	0	0		0	1	
05:05:00 PM	0		0	0						0	0	0	0	0		0	0	
05:10:00 PM	0		0	0						0	0	0	0	1		0	1	
05:15:00 PM	0		0	0						0	1	0	0	0		0	2	
05:20:00 PM	0		0	0						1	0	0	0	0		0	3	
05:25:00 PM	0		0	0						0	0	0	0	0		0	2	
05:30:00 PM	0		0	0						0	0	0	0	0		0	1	7

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	1		0	0		
04:40:00 PM	2		0	0		
04:45:00 PM	0		0	0	3	
04:50:00 PM	0		0	0	2	
04:55:00 PM	0		0	0	0	
05:00:00 PM	0		0	0	0	
05:05:00 PM	0		0	0	0	
05:10:00 PM	1		0	0	1	
05:15:00 PM	0		0	0	1	
05:20:00 PM	1		0	0	2	
05:25:00 PM	1		0	0	2	
05:30:00 PM	0		0	0	2	6

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028803 - -121.315826
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:10:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	812	21	0	0	1374	307	0	1	816	0	0	0	284	0	0	833	1681	817	284	1374	813	591	837
Percent Heavy Vehicles																							
0.0%	7.1%	0.0%	0.0%	0.0%	3.3%	0.3%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.0%	2.8%	0.7%	0.0%	3.3%	7.1%	0.2%	0.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	71	2	0	0	116	27	0	0	64	0	0	0	19	0	0		
04:40:00 PM	0	71	1	0	0	112	27	0	0	57	0	0	0	24	0	0		
04:45:00 PM	0	62	3	0	0	95	23	0	0	83	0	0	0	29	0	0	886	
04:50:00 PM	0	80	2	0	0	107	34	0	0	63	0	0	0	22	0	0	895	
04:55:00 PM	0	68	1	0	0	121	20	0	0	56	0	0	0	27	0	0	896	
05:00:00 PM	0	62	3	0	0	98	20	0	0	83	0	0	0	15	0	0	882	
05:05:00 PM	0	67	0	0	0	117	19	0	0	71	0	0	0	26	0	0	874	
05:10:00 PM	0	67	4	0	0	140	31	0	0	62	0	0	0	34	0	0	919	
05:15:00 PM	0	64	1	0	0	120	31	0	0	65	0	0	0	19	0	0	938	
05:20:00 PM	0	63	4	0	0	115	28	0	0	80	0	0	0	20	0	0	948	
05:25:00 PM	0	72	0	0	0	122	24	0	1	64	0	0	0	25	0	0	918	
05:30:00 PM	0	65	0	0	0	111	23	0	0	68	0	0	0	24	0	0	909	3615

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound US97				Southbound US97				Eastbound SW Powers Rd				Westbound SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	64	2	0	0	110	27	0	0	62	0	0	0	19	0	0		
04:40:00 PM	0	63	1	0	0	107	27	0	0	56	0	0	0	24	0	0		
04:45:00 PM	0	60	3	0	0	91	23	0	0	83	0	0	0	29	0	0	851	
04:50:00 PM	0	77	2	0	0	102	34	0	0	61	0	0	0	22	0	0	865	
04:55:00 PM	0	62	1	0	0	119	20	0	0	56	0	0	0	27	0	0	872	
05:00:00 PM	0	57	3	0	0	94	20	0	0	83	0	0	0	15	0	0	855	
05:05:00 PM	0	63	0	0	0	113	19	0	0	71	0	0	0	26	0	0	849	
05:10:00 PM	0	63	4	0	0	136	30	0	0	62	0	0	0	34	0	0	893	
05:15:00 PM	0	60	1	0	0	119	31	0	0	65	0	0	0	19	0	0	916	
05:20:00 PM	0	57	4	0	0	112	28	0	0	79	0	0	0	20	0	0	924	
05:25:00 PM	0	67	0	0	0	117	24	0	1	64	0	0	0	25	0	0	893	
05:30:00 PM	0	61	0	0	0	108	23	0	0	68	0	0	0	24	0	0	882	3504

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound US97				Southbound US97				Eastbound SW Powers Rd				Westbound SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	6	0	0	0	2	0	0	0	0	0	0		
04:40:00 PM	0	8	0	0	0	5	0	0	0	1	0	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	35	
04:50:00 PM	0	3	0	0	0	5	0	0	0	2	0	0	0	0	0	0	30	
04:55:00 PM	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	24	
05:00:00 PM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	27	
05:05:00 PM	0	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	25	
05:10:00 PM	0	4	0	0	0	4	1	0	0	0	0	0	0	0	0	0	26	
05:15:00 PM	0	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	22	
05:20:00 PM	0	6	0	0	0	3	0	0	0	1	0	0	0	0	0	0	24	
05:25:00 PM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0	25	
05:30:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	27	111

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	1	0	0		
04:45:00 PM	0	0	0	0	1	
04:50:00 PM	0	0	0	0	1	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	1	0	0	0	1	
05:25:00 PM	1	0	0	0	2	
05:30:00 PM	0	0	0	0	2	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 NB ramp***
E/W street:	***SW Powers Rd***
City, State	Bend OR
Study ID #	
Location	44.028811 - -121.313896
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	1	0	28	0	193	641	0	0	0	255	138	0	0	29	834	393	0	331	283	642
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	0.9%	0.0%	0.0%	0.0%	0.0%	1.4%	0.0%	#DIV/0!	0.0%	1.0%	0.5%	#DIV/0!	1.2%	0.0%	0.9%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	1		0		0	0	0	1

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	1	0	0	1

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramp				SW Powers Rd				SW Powers Rd					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		1	0	14	50		0		26	14	0		
04:40:00 PM					0		1	0	17	41		0		19	9	0		
04:45:00 PM					0		4	0	19	65		0		20	6	0	306	
04:50:00 PM					0		6	0	12	57		0		20	9	0	305	
04:55:00 PM					1		4	0	17	40		0		25	16	0	321	
05:00:00 PM					0		0	0	21	56		0		9	12	0	305	
05:05:00 PM					0		1	0	10	67		0		26	10	0	315	
05:10:00 PM					0		2	0	14	51		0		32	7	0	318	
05:15:00 PM					0		2	0	14	50		0		18	12	0	316	
05:20:00 PM					0		1	0	16	66		0		18	15	0	318	
05:25:00 PM					0		2	0	13	46		0		23	15	0	311	
05:30:00 PM					0		4	0	26	52		0		19	13	0	329	1256

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound				15 Min	1 HR
					US97 NB ramp				SW Powers Rd				SW Powers Rd					
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	0		0		0	0	0		
04:40:00 PM					0		0	0	0	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	0	
04:50:00 PM					0		0	0	0	0		0		0	0	0	0	
04:55:00 PM					0		0	0	0	0		0		0	0	0	0	
05:00:00 PM					0		0	0	0	0		0		0	0	0	0	
05:05:00 PM					0		0	0	0	0		0		0	0	0	0	
05:10:00 PM					0		0	0	0	0		0		0	0	0	0	
05:15:00 PM					0		0	0	0	0		0		0	0	0	0	
05:20:00 PM					0		0	0	0	0		0		0	0	0	0	
05:25:00 PM					0		0	0	0	1		0		0	0	0	1	

05:30:00 PM					0		0	0	0	0		0	0	0	0	1	1	

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramp				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		1	0	14	48		0		26	13	0		
04:40:00 PM					0		1	0	16	41		0		19	9	0		
04:45:00 PM					0		4	0	19	65		0		20	6	0	302	
04:50:00 PM					0		6	0	11	56		0		20	9	0	302	
04:55:00 PM					1		4	0	17	39		0		25	16	0	318	
05:00:00 PM					0		0	0	21	56		0		9	12	0	302	
05:05:00 PM					0		1	0	10	66		0		26	10	0	313	
05:10:00 PM					0		2	0	14	51		0		32	7	0	317	
05:15:00 PM					0		2	0	14	50		0		18	12	0	315	
05:20:00 PM					0		1	0	16	65		0		18	15	0	317	
05:25:00 PM					0		2	0	13	46		0		23	14	0	309	
05:30:00 PM					0		4	0	26	52		0		19	13	0	327	1246

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 NB ramp				SW Powers Rd				SW Powers Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0		0	0	0	2		0		0	1	0		
04:40:00 PM					0		0	0	1	0		0		0	0	0		
04:45:00 PM					0		0	0	0	0		0		0	0	0	4	
04:50:00 PM					0		0	0	1	1		0		0	0	0	3	
04:55:00 PM					0		0	0	0	1		0		0	0	0	3	
05:00:00 PM					0		0	0	0	0		0		0	0	0	3	
05:05:00 PM					0		0	0	0	1		0		0	0	0	2	
05:10:00 PM					0		0	0	0	0		0		0	0	0	1	
05:15:00 PM					0		0	0	0	0		0		0	0	0	1	
05:20:00 PM					0		0	0	0	1		0		0	0	0	1	
05:25:00 PM					0		0	0	0	0		0		0	1	0	2	
05:30:00 PM					0		0	0	0	0		0		0	0	0	2	10

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		1	0	0		
04:45:00 PM		0	0	0	1	
04:50:00 PM		0	0	0	1	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	1

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Badger Rd***
City, State	Bend OR
Study ID #	
Location	44.024478 - -121.318609
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:05:00 PM
PHF (15-Min Int)	0.97

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	750	12	0	0	1086	23	0	0	0	5	0	0	0	90	0	762	1109	5	90	1091	840	23	12
Percent Heavy Vehicles																							
0.0%	6.3%	0.0%	0.0%	0.0%	3.7%	13.0%	0.0%	0.0%	0.0%	20.0%	0.0%	0.0%	0.0%	2.2%	0.0%	6.2%	3.9%	20.0%	2.2%	3.8%	5.8%	13.0%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound Badger Rd				Westbound Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	62	0	0	0	81	3	0	0	0	1	0	0	0	5	0		
04:40:00 PM	0	74	1	0	0	107	3	0	0	0	0	0	0	0	8	0		
04:45:00 PM	0	61	4	0	0	84	2	0	0	0	0	0	0	0	3	0	499	
04:50:00 PM	0	63	0	0	0	80	2	0	0	0	0	0	0	0	11	0	503	
04:55:00 PM	0	67	1	0	0	96	3	0	0	0	0	0	0	0	4	0	481	
05:00:00 PM	0	57	1	0	0	85	2	0	0	0	0	0	0	0	7	0	479	
05:05:00 PM	0	59	0	0	0	94	1	0	0	0	1	0	0	0	17	0	495	
05:10:00 PM	0	55	0	0	0	94	3	0	0	0	0	0	0	0	10	0	486	
05:15:00 PM	0	64	1	0	0	94	2	0	0	0	1	0	0	0	9	0	505	
05:20:00 PM	0	67	1	0	0	97	0	0	0	0	1	0	0	0	6	0	505	
05:25:00 PM	0	63	0	0	0	92	1	0	0	0	0	0	0	0	4	0	503	
05:30:00 PM	0	58	3	0	0	82	1	0	0	0	1	0	0	0	6	0	483	1966

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound Badger Rd				Westbound Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Badger Rd				Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	55	0	0	0	77	2	0	0	0	1	0	0	0	5	0		
04:40:00 PM	0	69	1	0	0	102	3	0	0	0	0	0	0	0	8	0		
04:45:00 PM	0	59	4	0	0	81	1	0	0	0	0	0	0	0	3	0	471	
04:50:00 PM	0	61	0	0	0	76	2	0	0	0	0	0	0	0	11	0	481	
04:55:00 PM	0	62	1	0	0	93	3	0	0	0	0	0	0	0	4	0	461	
05:00:00 PM	0	52	1	0	0	84	1	0	0	0	0	0	0	0	6	0	457	
05:05:00 PM	0	58	0	0	0	91	1	0	0	0	0	0	0	0	16	0	473	
05:10:00 PM	0	51	0	0	0	91	3	0	0	0	0	0	0	0	10	0	465	
05:15:00 PM	0	58	1	0	0	92	2	0	0	0	1	0	0	0	9	0	484	
05:20:00 PM	0	64	1	0	0	93	0	0	0	0	1	0	0	0	6	0	483	
05:25:00 PM	0	60	0	0	0	87	1	0	0	0	0	0	0	0	4	0	480	
05:30:00 PM	0	54	3	0	0	79	1	0	0	0	1	0	0	0	6	0	461	1873

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Badger Rd				Badger Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	4	1	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	5	0	0	0	5	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	3	1	0	0	0	0	0	0	0	0	0	28	
04:50:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	22	
04:55:00 PM	0	5	0	0	0	3	0	0	0	0	0	0	0	0	0	0	20	
05:00:00 PM	0	5	0	0	0	1	1	0	0	0	0	0	0	0	1	0	22	
05:05:00 PM	0	1	0	0	0	3	0	0	0	0	1	0	0	0	1	0	22	
05:10:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	21	
05:15:00 PM	0	6	0	0	0	2	0	0	0	0	0	0	0	0	0	0	21	
05:20:00 PM	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	22	
05:25:00 PM	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0	0	23	
05:30:00 PM	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	22	93

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Pinebrook Blvd***
City, State	Bend OR
Study ID #	
Location	44.021384 - -121.318883
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:15:00 PM
PHF (15-Min Int)	0.96

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	634	25	0	0	1015	51	0	0	0	5	0	0	0	130	0	659	1066	5	130	1020	764	51	25
Percent Heavy Vehicles																							
0.0%	6.9%	4.0%	0.0%	0.0%	3.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	0.0%	6.8%	3.7%	0.0%	3.1%	3.8%	6.3%	0.0%	4.0%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	3

All Vehicle Volumes

	Northbound US97				Southbound US97				Eastbound Pinebrook Blvd				Westbound Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	45	0	0	0	73	5	0	0	0	0	0	0	0	17	0		
04:40:00 PM	0	59	1	0	0	90	6	0	0	0	0	0	0	0	13	0		
04:45:00 PM	0	57	4	0	0	86	4	0	0	0	0	0	0	0	10	0	470	
04:50:00 PM	0	51	1	0	0	75	4	0	0	0	0	0	0	0	10	0	471	
04:55:00 PM	0	56	2	0	0	85	4	0	0	0	0	0	0	0	15	0	464	
05:00:00 PM	0	46	3	0	0	82	3	0	0	0	0	0	0	0	11	0	448	
05:05:00 PM	0	45	2	0	0	91	3	0	0	0	1	0	0	0	12	0	461	
05:10:00 PM	0	52	3	0	0	86	2	0	0	0	0	0	0	0	5	0	447	
05:15:00 PM	0	56	1	0	0	90	6	0	0	0	1	0	0	0	9	0	465	
05:20:00 PM	0	67	3	0	0	89	5	0	0	0	0	0	0	0	8	0	483	
05:25:00 PM	0	49	3	0	0	79	6	0	0	0	2	0	0	0	10	0	484	
05:30:00 PM	0	51	2	0	0	89	3	0	0	0	1	0	0	0	10	0	477	1860

Bicycles on Road

	Northbound US97				Southbound US97				Eastbound Pinebrook Blvd				Westbound Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Pinebrook Blvd				Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	37	0	0	0	70	5	0	0	0	0	0	0	0	17	0		
04:40:00 PM	0	56	0	0	0	87	6	0	0	0	0	0	0	0	13	0		
04:45:00 PM	0	54	4	0	0	82	4	0	0	0	0	0	0	0	10	0	445	
04:50:00 PM	0	49	1	0	0	71	4	0	0	0	0	0	0	0	9	0	450	
04:55:00 PM	0	51	2	0	0	83	4	0	0	0	0	0	0	0	14	0	442	
05:00:00 PM	0	44	3	0	0	79	3	0	0	0	0	0	0	0	10	0	427	
05:05:00 PM	0	44	2	0	0	88	3	0	0	0	1	0	0	0	12	0	443	
05:10:00 PM	0	49	3	0	0	83	2	0	0	0	0	0	0	0	5	0	431	
05:15:00 PM	0	50	1	0	0	86	6	0	0	0	1	0	0	0	9	0	445	
05:20:00 PM	0	60	3	0	0	87	5	0	0	0	0	0	0	0	8	0	458	
05:25:00 PM	0	48	3	0	0	74	6	0	0	0	2	0	0	0	9	0	458	
05:30:00 PM	0	48	2	0	0	86	3	0	0	0	1	0	0	0	10	0	455	1772

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Pinebrook Blvd				Pinebrook Blvd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	8	0	0	0	3	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	3	1	0	0	3	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	3	0	0	0	4	0	0	0	0	0	0	0	0	0	0	25	
04:50:00 PM	0	2	0	0	0	4	0	0	0	0	0	0	0	0	1	0	21	
04:55:00 PM	0	5	0	0	0	2	0	0	0	0	0	0	0	0	1	0	22	
05:00:00 PM	0	2	0	0	0	3	0	0	0	0	0	0	0	0	1	0	21	
05:05:00 PM	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	18	
05:10:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	16	
05:15:00 PM	0	6	0	0	0	4	0	0	0	0	0	0	0	0	0	0	20	
05:20:00 PM	0	7	0	0	0	2	0	0	0	0	0	0	0	0	0	0	25	
05:25:00 PM	0	1	0	0	0	5	0	0	0	0	0	0	0	0	1	0	26	
05:30:00 PM	0	3	0	0	0	3	0	0	0	0	0	0	0	0	0	0	22	88

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	1	1	0	2	
04:50:00 PM	0	0	0	0	2	
04:55:00 PM	0	1	0	0	3	
05:00:00 PM	0	0	0	0	1	
05:05:00 PM	0	0	0	0	1	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	3

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97***
E/W street:	***Ponderosa St***
City, State	Bend OR
Study ID #	
Location	44.007819 - -121.324039
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	04:40:00 PM
PHF (15-Min Int)	0.95

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	760	11	0	0	1350	130	0	0	0	18	0	0	0	110	0	771	1480	18	110	1368	870	130	11
Percent Heavy Vehicles																							
0.0%	6.4%	0.0%	0.0%	0.0%	3.6%	3.8%	0.0%	0.0%	0.0%	5.6%	0.0%	0.0%	0.0%	0.0%	0.0%	6.4%	3.6%	5.6%	0.0%	3.7%	5.6%	3.8%	0.0%

PHV- Bicycles																	PHV - Pedestrians				
	Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**	NB	SB	EB	WB	**Sum**
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	49	0	0	0	97	10	0	0	0	2	0	0	0	8	0		
04:40:00 PM	0	81	0	0	0	125	10	0	0	0	1	0	0	0	4	0		
04:45:00 PM	0	64	2	0	0	109	13	0	0	0	4	0	0	0	11	0	590	
04:50:00 PM	0	68	1	0	0	111	9	0	0	0	0	0	0	0	14	0	627	
04:55:00 PM	0	60	0	0	0	108	11	0	0	0	0	0	0	0	5	0	590	
05:00:00 PM	0	56	2	0	0	111	11	0	0	0	1	0	0	0	8	0	576	
05:05:00 PM	0	65	1	0	0	99	11	0	0	0	2	0	0	0	10	0	561	
05:10:00 PM	0	52	1	0	0	115	15	0	0	0	1	0	0	0	10	0	571	
05:15:00 PM	0	81	0	0	0	121	9	0	0	0	4	0	0	0	14	0	611	
05:20:00 PM	0	64	1	0	0	114	12	0	0	0	1	0	0	0	10	0	625	
05:25:00 PM	0	65	2	0	0	108	10	0	0	0	0	0	0	0	9	0	625	
05:30:00 PM	0	55	1	0	0	132	9	0	0	0	2	0	0	0	7	0	602	2379

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

K-D-N
KEY DATA NETWORK

05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	42	0	0	0	93	8	0	0	0	2	0	0	0	8	0		
04:40:00 PM	0	77	0	0	0	118	10	0	0	0	0	0	0	0	4	0		
04:45:00 PM	0	62	2	0	0	101	12	0	0	0	4	0	0	0	11	0	554	
04:50:00 PM	0	65	1	0	0	109	9	0	0	0	0	0	0	0	14	0	599	
04:55:00 PM	0	53	0	0	0	106	10	0	0	0	0	0	0	0	5	0	564	
05:00:00 PM	0	53	2	0	0	110	11	0	0	0	1	0	0	0	8	0	557	
05:05:00 PM	0	64	1	0	0	94	10	0	0	0	2	0	0	0	10	0	540	
05:10:00 PM	0	47	1	0	0	113	15	0	0	0	1	0	0	0	10	0	553	
05:15:00 PM	0	73	0	0	0	118	9	0	0	0	4	0	0	0	14	0	586	
05:20:00 PM	0	59	1	0	0	110	12	0	0	0	1	0	0	0	10	0	598	
05:25:00 PM	0	63	2	0	0	102	10	0	0	0	0	0	0	0	9	0	597	
05:30:00 PM	0	53	1	0	0	127	9	0	0	0	2	0	0	0	7	0	578	2275

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97				US97				Ponderosa St				China Hat Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	7	0	0	0	4	2	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	4	0	0	0	7	0	0	0	0	1	0	0	0	0	0		
04:45:00 PM	0	2	0	0	0	8	1	0	0	0	0	0	0	0	0	0	36	
04:50:00 PM	0	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	28	
04:55:00 PM	0	7	0	0	0	2	1	0	0	0	0	0	0	0	0	0	26	
05:00:00 PM	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	19	
05:05:00 PM	0	1	0	0	0	5	1	0	0	0	0	0	0	0	0	0	21	
05:10:00 PM	0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	0	18	
05:15:00 PM	0	8	0	0	0	3	0	0	0	0	0	0	0	0	0	0	25	
05:20:00 PM	0	5	0	0	0	4	0	0	0	0	0	0	0	0	0	0	27	
05:25:00 PM	0	2	0	0	0	6	0	0	0	0	0	0	0	0	0	0	28	
05:30:00 PM	0	2	0	0	0	5	0	0	0	0	0	0	0	0	0	0	24	104

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	***US97 SB ramps***
E/W street:	***Baker Rd***
City, State	Bend OR
Study ID #	
Location	43.992611 - -121.336303
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.92

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
0	0	0	0	66	0	481	0	52	340	0	0	0	297	178	0	0	547	392	475	0	230	778	406
Percent Heavy Vehicles																							
0.0%	0.0%	0.0%	0.0%	4.5%	0.0%	2.1%	0.0%	5.8%	4.4%	0.0%	0.0%	0.0%	3.0%	1.1%	0.0%	#DIV/0!	2.4%	4.6%	2.3%	#DIV/0!	2.2%	2.4%	4.4%

PHV- Bicycles

Northbound				Southbound				Eastbound				Westbound				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	**Sum**
				0		0	0	0	0		0		0	0	0	0

PHV - Pedestrians in Crosswalk

NB	SB	EB	WB	**Sum**
	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					2	38		0	1	29		0	23	13		0		
04:40:00 PM					10	35		0	6	27		0	22	9		0		
04:45:00 PM					3	51		0	3	26		0	21	15		0	334	
04:50:00 PM					4	40		0	4	27		0	26	9		0	338	
04:55:00 PM					6	33		0	6	22		0	20	12		0	328	
05:00:00 PM					7	37		0	7	26		0	23	13		0	322	
05:05:00 PM					6	37		0	4	40		0	28	16		0	343	
05:10:00 PM					3	52		0	7	28		0	25	8		0	367	
05:15:00 PM					7	40		0	3	32		0	24	12		0	372	
05:20:00 PM					6	48		0	3	27		0	28	23		0	376	
05:25:00 PM					6	32		0	6	23		0	30	28		0	378	
05:30:00 PM					6	38		0	2	33		0	27	20		0	386	1414

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					0	0		0	0	0		0	0	0		0		
04:40:00 PM					0	0		0	0	0		0	0	0		0		
04:45:00 PM					0	0		0	0	0		0	0	0		0	0	
04:50:00 PM					0	0		0	0	0		0	0	0		0	0	
04:55:00 PM					0	0		0	0	0		0	0	0		0	0	
05:00:00 PM					0	0		0	0	0		0	0	0		0	0	
05:05:00 PM					0	0		0	0	0		0	0	0		0	0	
05:10:00 PM					0	0		0	0	0		0	0	0		0	0	
05:15:00 PM					0	0		0	0	0		0	0	0		0	0	
05:20:00 PM					0	0		0	0	0		0	0	0		0	0	
05:25:00 PM					0	0		0	0	0		0	0	0		0	0	

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05:30:00 PM					0		0	0	0	0		0	0	0	0	0		

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					1		37	0	1	27		0		23	13	0		
04:40:00 PM					9		35	0	6	26		0		21	9	0		
04:45:00 PM					3		47	0	3	25		0		20	14	0	320	
04:50:00 PM					4		39	0	3	25		0		26	9	0	324	
04:55:00 PM					6		33	0	5	19		0		20	12	0	313	
05:00:00 PM					7		37	0	7	26		0		20	13	0	311	
05:05:00 PM					6		36	0	4	40		0		28	15	0	334	
05:10:00 PM					3		52	0	7	27		0		25	8	0	361	
05:15:00 PM					7		39	0	3	31		0		22	12	0	365	
05:20:00 PM					6		47	0	3	27		0		27	23	0	369	
05:25:00 PM					6		32	0	5	21		0		30	28	0	369	
05:30:00 PM					5		37	0	2	31		0		26	20	0	376	1372

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
					US97 SB ramps				Baker Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM					1		1	0	0	2		0		0	0	0		
04:40:00 PM					1		0	0	0	1		0		1	0	0		
04:45:00 PM					0		4	0	0	1		0		1	1	0	14	
04:50:00 PM					0		1	0	1	2		0		0	0	0	14	
04:55:00 PM					0		0	0	1	3		0		0	0	0	15	
05:00:00 PM					0		0	0	0	0		0		3	0	0	11	
05:05:00 PM					0		1	0	0	0		0		0	1	0	9	
05:10:00 PM					0		0	0	0	1		0		0	0	0	6	
05:15:00 PM					0		1	0	0	1		0		2	0	0	7	
05:20:00 PM					0		1	0	0	0		0		1	0	0	7	
05:25:00 PM					0		0	0	1	2		0		0	0	0	9	
05:30:00 PM					1		1	0	0	2		0		1	0	0	10	42

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM		0	0	0		
04:40:00 PM		0	0	0		
04:45:00 PM		0	0	0	0	
04:50:00 PM		0	0	0	0	
04:55:00 PM		0	0	0	0	
05:00:00 PM		0	0	0	0	
05:05:00 PM		0	0	0	0	
05:10:00 PM		0	0	0	0	
05:15:00 PM		0	0	0	0	
05:20:00 PM		0	0	0	0	
05:25:00 PM		0	0	0	0	
05:30:00 PM		0	0	0	0	0

K-D-N
KEY DATA NETWORK

Data Provided by K-D-N.com 503-594-4224	
N/S street:	*US97 SB ramps*
E/W street:	*Knott Rd*
City, State	Bend OR
Study ID #	
Location	43.991498 - -121.333495
Start Date	Thursday, April 13, 2017
Start Time	04:35:00 PM
Peak Hour Start	04:35:00 PM
Peak 15 Min Start	05:20:00 PM
PHF (15-Min Int)	0.89

Peak-Hour Volumes (PHV)

Northbound				Southbound				Eastbound				Westbound				Entering				Leaving			
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	NB	SB	EB	WB	NB	SB	EB	WB
44	1	95	0	0	0	0	0	247	160	0	0	0	449	17	0	140	0	407	466	0	265	493	255
Percent Heavy Vehicles																							
2.3%	100.0%	2.1%	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	3.1%	0.0%	0.0%	0.0%	2.4%	5.9%	0.0%	2.9%	0.0%	3.2%	2.6%	#DIV/0!	3.8%	2.4%	2.7%

PHV- Bicycles																	PHV - Pedestrians				
Northbound				Southbound				Eastbound				Westbound					in Crosswalk				
Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	NB	SB	EB	WB	Sum
0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0

All Vehicle Volumes

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	5	0	4	0	0	0	0	0	20	11	0	0	0	34	2	0		
04:40:00 PM	2	0	12	0	0	0	0	0	21	19	0	0	0	34	2	0		
04:45:00 PM	3	0	7	0	0	0	0	0	16	10	0	0	0	39	1	0	242	
04:50:00 PM	7	0	9	0	0	0	0	0	26	8	0	0	0	30	1	0	247	
04:55:00 PM	1	0	8	0	0	0	0	0	18	9	0	0	0	30	0	0	223	
05:00:00 PM	4	0	8	0	0	0	0	0	19	13	0	0	0	34	2	0	227	
05:05:00 PM	4	1	10	0	0	0	0	0	26	20	0	0	0	40	1	0	248	
05:10:00 PM	5	0	7	0	0	0	0	0	17	15	0	0	0	29	2	0	257	
05:15:00 PM	3	0	7	0	0	0	0	0	23	15	0	0	0	33	2	0	260	
05:20:00 PM	1	0	7	0	0	0	0	0	22	12	0	0	0	50	2	0	252	
05:25:00 PM	3	0	9	0	0	0	0	0	19	12	0	0	0	55	1	0	276	
05:30:00 PM	6	0	7	0	0	0	0	0	20	16	0	0	0	41	1	0	284	1013

Bicycles on Road

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	

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05:30:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3

Passenger vehicles and light trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	5	0	4	0	0	0	0	0	19	11	0	0	0	34	2	0		
04:40:00 PM	2	0	12	0	0	0	0	0	20	18	0	0	0	32	2	0		
04:45:00 PM	3	0	7	0	0	0	0	0	16	10	0	0	0	37	1	0	235	
04:50:00 PM	7	0	8	0	0	0	0	0	24	8	0	0	0	30	1	0	238	
04:55:00 PM	1	0	7	0	0	0	0	0	17	9	0	0	0	30	0	0	216	
05:00:00 PM	3	0	8	0	0	0	0	0	19	13	0	0	0	33	2	0	220	
05:05:00 PM	4	0	10	0	0	0	0	0	25	20	0	0	0	39	1	0	241	
05:10:00 PM	5	0	7	0	0	0	0	0	17	14	0	0	0	29	2	0	251	
05:15:00 PM	3	0	7	0	0	0	0	0	23	15	0	0	0	31	2	0	254	
05:20:00 PM	1	0	7	0	0	0	0	0	22	12	0	0	0	48	1	0	246	
05:25:00 PM	3	0	9	0	0	0	0	0	18	11	0	0	0	55	1	0	269	
05:30:00 PM	6	0	7	0	0	0	0	0	19	14	0	0	0	40	1	0	275	984

FHWA 4-13 -Truck/Multi-Unit/Heavy Trucks

	Northbound				Southbound				Eastbound				Westbound					
	US97 SB ramps				US97 SB ramps				Knott Rd				Knott Rd				15 Min	1 HR
Time	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Left	Thru	Right	Uturn	Sum	Sum
04:35:00 PM	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0		
04:40:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	2	0	0		
04:45:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	7	
04:50:00 PM	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	9	
04:55:00 PM	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	7	
05:00:00 PM	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	7	
05:05:00 PM	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	7	
05:10:00 PM	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6	
05:15:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	6	
05:20:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	6	
05:25:00 PM	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	7	
05:30:00 PM	0	0	0	0	0	0	0	0	1	2	0	0	0	1	0	0	9	29

Pedestrians Crossing					15 Min	1 HR
Time	NB	SB	EB	WB	Sum	Sum
04:35:00 PM	0	0	0	0		
04:40:00 PM	0	0	0	0		
04:45:00 PM	0	0	0	0	0	
04:50:00 PM	0	0	0	0	0	
04:55:00 PM	0	0	0	0	0	
05:00:00 PM	0	0	0	0	0	
05:05:00 PM	0	0	0	0	0	
05:10:00 PM	0	0	0	0	0	
05:15:00 PM	0	0	0	0	0	
05:20:00 PM	0	0	0	0	0	
05:25:00 PM	0	0	0	0	0	
05:30:00 PM	0	0	0	0	0	0

Intersection Traffic Operations

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	195	145	1360	345	90	980
Future Volume (vph)	195	145	1360	345	90	980
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0	4.0		4.0	4.0
Lane Util. Factor	1.00	1.00	0.95		1.00	1.00
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	0.97		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1693	1359	3226		1693	1714
Flt Permitted	0.95	1.00	1.00		0.95	1.00
Satd. Flow (perm)	1693	1359	3226		1693	1714
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	219	163	1528	388	101	1101
RTOR Reduction (vph)	0	108	17	0	0	0
Lane Group Flow (vph)	219	55	1899	0	101	1101
Confl. Bikes (#/hr)		1				
Heavy Vehicles (%)	1%	0%	3%	2%	1%	5%
Parking (#/hr)		0				
Turn Type	Prot	Perm	NA		Prot	NA
Protected Phases	4		6		5	2
Permitted Phases		4				
Actuated Green, G (s)	17.5	17.5	71.9		8.2	84.6
Effective Green, g (s)	18.0	18.0	73.9		8.7	86.6
Actuated g/C Ratio	0.16	0.16	0.66		0.08	0.77
Clearance Time (s)	4.5	4.5	6.0		4.5	6.0
Vehicle Extension (s)	2.2	2.2	5.4		2.2	5.4
Lane Grp Cap (vph)	270	217	2117		130	1318
v/s Ratio Prot	c0.13		c0.59		0.06	c0.64
v/s Ratio Perm		0.04				
v/c Ratio	0.81	0.25	0.90		0.78	0.84
Uniform Delay, d1	45.7	41.4	16.2		51.0	8.4
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	16.0	0.3	5.9		23.2	5.4
Delay (s)	61.7	41.7	22.1		74.2	13.8
Level of Service	E	D	C		E	B
Approach Delay (s)	53.2		22.1			18.8
Approach LOS	D		C			B

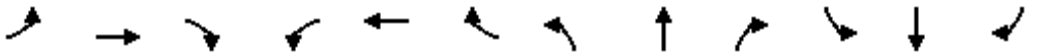
Intersection Summary			
HCM 2000 Control Delay	24.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	112.6	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	450	270	215	285	335	400
Future Volume (vph)	450	270	215	285	335	400
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
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)	1733	1488	1646	1683	1646	1473
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	1733	1488	1646	1683	1646	1473
Peak-hour factor, PHF	0.86	0.86	0.86	0.86	0.86	0.86
Adj. Flow (vph)	523	314	250	331	390	465
RTOR Reduction (vph)	0	78	0	0	0	328
Lane Group Flow (vph)	523	236	250	331	390	137
Heavy Vehicles (%)	1%	0%	1%	4%	1%	1%
Turn Type	NA	Perm	Prot	NA	Prot	Perm
Protected Phases	2		1	6	8	
Permitted Phases		2				8
Actuated Green, G (s)	23.2	23.2	15.1	43.3	20.8	20.8
Effective Green, g (s)	24.2	24.2	16.1	44.3	21.8	21.8
Actuated g/C Ratio	0.33	0.33	0.22	0.60	0.29	0.29
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	565	485	357	1006	484	433
v/s Ratio Prot	c0.30		c0.15	0.20	c0.24	
v/s Ratio Perm		0.16				0.09
v/c Ratio	0.93	0.49	0.70	0.33	0.81	0.32
Uniform Delay, d1	24.1	20.0	26.8	7.5	24.2	20.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.2	0.8	6.1	0.2	9.5	0.4
Delay (s)	45.3	20.7	32.9	7.7	33.7	20.8
Level of Service	D	C	C	A	C	C
Approach Delay (s)	36.1			18.5	26.6	
Approach LOS	D			B	C	

Intersection Summary			
HCM 2000 Control Delay	28.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	74.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	68.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

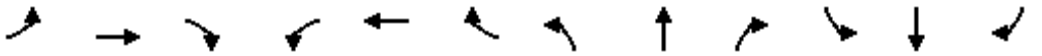
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	545	5	10	460	130	10	10	5	155	10	305
Future Volume (vph)	225	545	5	10	460	130	10	10	5	155	10	305
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (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	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		1.00	1.00	0.85		0.97			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1630	1730		1662	1733	1430		1664			1626	1434
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.79			0.42	1.00
Satd. Flow (perm)	1630	1730		1662	1733	1430		1337			720	1434
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)	245	592	5	11	500	141	11	11	5	168	11	332
RTOR Reduction (vph)	0	0	0	0	0	91	0	5	0	0	0	188
Lane Group Flow (vph)	245	597	0	11	500	50	0	22	0	0	179	144
Confl. Peds. (#/hr)			8	8			1		1	1		1
Confl. Bikes (#/hr)			5									6
Heavy Vehicles (%)	2%	1%	0%	0%	1%	4%	0%	0%	0%	3%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Perm	NA		Perm	NA	pm+ov
Protected Phases	5	2		1	6			8			4	5
Permitted Phases						6	8			4		4
Actuated Green, G (s)	16.1	49.4		0.9	34.2	34.2		4.4			25.1	41.2
Effective Green, g (s)	17.1	50.4		1.9	35.2	35.2		5.4			26.1	43.2
Actuated g/C Ratio	0.17	0.51		0.02	0.35	0.35		0.05			0.26	0.43
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	2.5	3.5		2.5	3.5	3.5		2.8			2.8	2.5
Lane Grp Cap (vph)	279	873		31	611	504		72			188	620
v/s Ratio Prot	c0.15	0.35		0.01	c0.29							0.04
v/s Ratio Perm						0.03		c0.02			c0.25	0.06
v/c Ratio	0.88	0.68		0.35	0.82	0.10		0.31			0.95	0.23
Uniform Delay, d1	40.3	18.7		48.3	29.4	21.7		45.4			36.2	17.8
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	25.1	2.3		5.0	8.6	0.1		2.2			51.6	0.1
Delay (s)	65.4	21.0		53.4	38.0	21.8		47.6			87.8	18.0
Level of Service	E	C		D	D	C		D			F	B
Approach Delay (s)		33.9			34.7			47.6			42.4	
Approach LOS		C			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	99.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



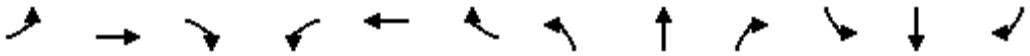
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	250	125	190	145	40	90	555	225	60	545	100
Future Volume (vph)	240	250	125	190	145	40	90	555	225	60	545	100
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total 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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		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	0.95		1.00	0.97		1.00	0.96		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)	1630	1616		1630	1684		1583	3095		1662	3172	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1616		1630	1684		1583	3095		1662	3172	
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)	264	275	137	209	159	44	99	610	247	66	599	110
RTOR Reduction (vph)	0	16	0	0	9	0	0	38	0	0	13	0
Lane Group Flow (vph)	264	396	0	209	194	0	99	819	0	66	696	0
Confl. Peds. (#/hr)	2		8	8		2	2					2
Confl. Bikes (#/hr)			4			1			2			1
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	5%	3%	0%	0%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	18.7	30.5		16.9	28.7		12.2	35.1		8.6	31.5	
Effective Green, g (s)	19.2	31.9		17.4	30.1		12.7	35.6		9.1	32.0	
Actuated g/C Ratio	0.17	0.29		0.16	0.27		0.12	0.32		0.08	0.29	
Clearance Time (s)	4.5	5.4		4.5	5.4		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	284	468		257	460		182	1001		137	922	
v/s Ratio Prot	c0.16	c0.24		0.13	0.11		c0.06	c0.26		0.04	0.22	
v/s Ratio Perm												
v/c Ratio	0.93	0.85		0.81	0.42		0.54	0.82		0.48	0.75	
Uniform Delay, d1	44.7	36.7		44.7	32.8		45.9	34.2		48.2	35.4	
Progression Factor	1.00	1.00		1.00	1.00		0.92	0.79		1.00	1.00	
Incremental Delay, d2	34.8	16.9		17.6	2.8		2.2	3.6		2.7	3.5	
Delay (s)	79.5	53.7		62.3	35.6		44.3	30.8		50.9	39.0	
Level of Service	E	D		E	D		D	C		D	D	
Approach Delay (s)		63.8			49.1			32.2			40.0	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	44.4	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	76.2%	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												
Traffic Volume (vph)	135	235	75	90	270	65	90	950	65	95	830	40
Future Volume (vph)	135	235	75	90	270	65	90	950	65	95	830	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		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	0.96		1.00	0.97		1.00	0.99		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)	1645	1677		1660	1693		1662	3194		1662	3201	
Flt Permitted	0.37	1.00		0.42	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	647	1677		726	1693		1662	3194		1662	3201	
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)	138	240	77	92	276	66	92	969	66	97	847	41
RTOR Reduction (vph)	0	7	0	0	6	0	0	3	0	0	2	0
Lane Group Flow (vph)	138	310	0	92	336	0	92	1032	0	97	886	0
Confl. Peds. (#/hr)	3		5	5		3	4		1	1		4
Confl. Bikes (#/hr)			2			4						2
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	2%	0%	3%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	65.7	56.1		64.3	55.4		9.7	55.2		9.8	55.3	
Effective Green, g (s)	67.7	57.1		66.3	56.4		10.7	56.2		10.8	56.3	
Actuated g/C Ratio	0.45	0.38		0.44	0.38		0.07	0.37		0.07	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	4.8		2.5	4.8	
Lane Grp Cap (vph)	362	638		382	636		118	1196		119	1201	
v/s Ratio Prot	c0.03	0.18		0.02	c0.20		0.06	c0.32		c0.06	0.28	
v/s Ratio Perm	0.14			0.09								
v/c Ratio	0.38	0.49		0.24	0.53		0.78	0.86		0.82	0.74	
Uniform Delay, d1	26.0	35.3		25.6	36.5		68.5	43.3		68.6	40.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	2.6		0.2	3.1		26.1	8.3		32.5	4.1	
Delay (s)	26.5	37.9		25.8	39.6		94.6	51.7		101.1	44.5	
Level of Service	C	D		C	D		F	D		F	D	
Approach Delay (s)		34.4			36.7			55.2			50.1	
Approach LOS		C			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

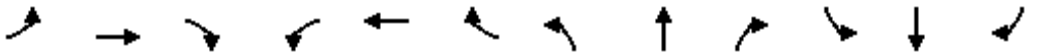


Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	145	935	60	170	820	125	90	290	110	250	415	55
Future Volume (vph)	145	935	60	170	820	125	90	290	110	250	415	55
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	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	0.98		1.00	0.96		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)	1646	3376		1646	3279		1646	1659		1706	1670	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3376		1646	3279		1646	1659		1706	1670	
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)	154	995	64	181	872	133	96	309	117	266	441	59
RTOR Reduction (vph)	0	4	0	0	10	0	0	12	0	0	4	0
Lane Group Flow (vph)	154	1055	0	181	995	0	96	414	0	266	496	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Confl. Bikes (#/hr)						1			1			3
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	10.0	38.0		12.0	40.0		6.0	28.0		17.0	39.0	
Effective Green, g (s)	11.0	39.0		13.0	41.0		7.0	29.0		18.0	40.0	
Actuated g/C Ratio	0.10	0.34		0.11	0.36		0.06	0.25		0.16	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	157	1144		186	1169		100	418		267	580	
v/s Ratio Prot	0.09	c0.31		c0.11	0.30		0.06	c0.25		c0.16	0.30	
v/s Ratio Perm												
v/c Ratio	0.98	0.92		0.97	0.85		0.96	0.99		1.00	0.86	
Uniform Delay, d1	51.9	36.5		50.8	34.2		53.9	42.9		48.5	34.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	65.8	12.5		57.7	6.6		76.1	41.4		53.7	11.7	
Delay (s)	117.7	49.1		108.5	40.8		129.9	84.2		102.2	46.5	
Level of Service	F	D		F	D		F	F		F	D	
Approach Delay (s)		57.8			51.1			92.6			65.8	
Approach LOS		E			D			F			E	

Intersection Summary			
HCM 2000 Control Delay	62.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

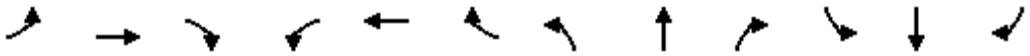
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	685	155	240	495	225	150	645	195	290	620	85
Future Volume (vph)	205	685	155	240	495	225	150	645	195	290	620	85
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.97		1.00	0.95		1.00	0.97		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)	1599	3192		1646	3092		1646	3157		1583	3222	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3192		1646	3092		1646	3157		1583	3222	
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)	214	714	161	250	516	234	156	672	203	302	646	89
RTOR Reduction (vph)	0	12	0	0	32	0	0	17	0	0	6	0
Lane Group Flow (vph)	214	863	0	250	718	0	156	858	0	302	729	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	24.2	40.0		24.6	40.4		19.4	43.0		31.1	54.7	
Effective Green, g (s)	25.2	41.0		25.6	41.4		20.4	44.0		32.1	55.7	
Actuated g/C Ratio	0.16	0.26		0.16	0.26		0.13	0.28		0.20	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	253	824		265	806		211	875		320	1130	
v/s Ratio Prot	0.13	c0.27		c0.15	0.23		0.09	c0.27		c0.19	0.23	
v/s Ratio Perm												
v/c Ratio	0.85	1.05		0.94	0.89		0.74	0.98		0.94	0.64	
Uniform Delay, d1	64.9	58.8		65.8	56.5		66.6	56.9		62.4	43.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	21.8	44.5		39.9	12.5		12.0	25.6		35.5	1.5	
Delay (s)	86.6	103.4		105.7	69.0		78.6	82.5		97.9	44.7	
Level of Service	F	F		F	E		E	F		F	D	
Approach Delay (s)		100.1			78.2			81.9			60.2	
Approach LOS		F			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	80.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	158.7	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												
Traffic Volume (vph)	0	370	20	125	370	0	0	0	0	110	320	205
Future Volume (vph)	0	370	20	125	370	0	0	0	0	110	320	205
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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						0.95	1.00
Frt		0.99		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.99	1.00
Satd. Flow (prot)		1738		1662	1750						3283	1488
Flt Permitted		1.00		0.23	1.00						0.99	1.00
Satd. Flow (perm)		1738		407	1750						3283	1488
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	0	425	23	144	425	0	0	0	0	126	368	236
RTOR Reduction (vph)	0	3	0	0	0	0	0	0	0	0	0	126
Lane Group Flow (vph)	0	445	0	144	425	0	0	0	0	0	494	110
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases				4						2		2
Actuated Green, G (s)		22.4		37.4	37.4						32.6	32.6
Effective Green, g (s)		23.4		38.4	38.4						33.6	33.6
Actuated g/C Ratio		0.29		0.48	0.48						0.42	0.42
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		0.2		0.2	0.2						0.2	0.2
Lane Grp Cap (vph)		508		367	840						1378	624
v/s Ratio Prot		c0.26		0.05	c0.24							
v/s Ratio Perm				0.13							0.15	0.07
v/c Ratio		0.88		0.39	0.51						0.36	0.18
Uniform Delay, d1		26.9		23.7	14.3						15.8	14.5
Progression Factor		1.00		0.22	0.18						1.00	1.00
Incremental Delay, d2		15.1		0.1	0.1						0.7	0.6
Delay (s)		42.0		5.3	2.6						16.6	15.1
Level of Service		D		A	A						B	B
Approach Delay (s)		42.0			3.3			0.0			16.1	
Approach LOS		D			A			A			B	

Intersection Summary			
HCM 2000 Control Delay	18.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



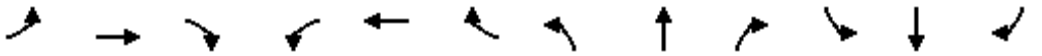
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	360	0	0	465	100	80	450	200	0	0	0
Future Volume (vph)	195	360	0	0	465	100	80	450	200	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			1.00	1.00		0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.96		1.00	0.93			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		0.97	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		0.99	1.00			
Satd. Flow (prot)	1661	1716			1733	1433		3202	1364			
Flt Permitted	0.20	1.00			1.00	1.00		0.99	1.00			
Satd. Flow (perm)	341	1716			1733	1433		3202	1364			
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)	212	391	0	0	505	109	87	489	217	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	75	0	0	130	0	0	0
Lane Group Flow (vph)	212	391	0	0	505	34	0	576	87	0	0	0
Confl. Peds. (#/hr)	23		47	47		23	103		27	27		103
Confl. Bikes (#/hr)			3			7			4			
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	3	8			4			6				
Permitted Phases	8					4	6		6			
Actuated Green, G (s)	39.0	39.0			24.3	24.3		31.0	31.0			
Effective Green, g (s)	40.0	40.0			25.3	25.3		32.0	32.0			
Actuated g/C Ratio	0.50	0.50			0.32	0.32		0.40	0.40			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	0.2	0.2			0.2	0.2		0.2	0.2			
Lane Grp Cap (vph)	347	858			548	453		1280	545			
v/s Ratio Prot	c0.08	0.23			c0.29							
v/s Ratio Perm	0.22					0.02		0.18	0.06			
v/c Ratio	0.61	0.46			0.92	0.08		0.45	0.16			
Uniform Delay, d1	25.4	13.0			26.4	19.2		17.6	15.4			
Progression Factor	0.69	0.46			1.00	1.00		1.00	1.00			
Incremental Delay, d2	1.8	0.1			20.8	0.0		1.1	0.6			
Delay (s)	19.4	6.1			47.2	19.2		18.7	16.0			
Level of Service	B	A			D	B		B	B			
Approach Delay (s)		10.8			42.2			18.0			0.0	
Approach LOS		B			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	23.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	67.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1250	175	230	1035	200	225
Future Volume (vph)	1250	175	230	1035	200	225
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	0.95	1.00	1.00	0.95	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	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3260	1458	1662	3260	1646	1488
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3260	1458	1662	3260	1646	1488
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1359	190	250	1125	217	245
RTOR Reduction (vph)	0	99	0	0	0	208
Lane Group Flow (vph)	1359	91	250	1125	217	37
Confl. Peds. (#/hr)					1	2
Heavy Vehicles (%)	2%	2%	0%	2%	1%	0%
Turn Type	NA	Perm	Prot	NA	Prot	Over
Protected Phases	2		1	6	8	1
Permitted Phases		2				
Actuated Green, G (s)	34.1	34.1	10.0	49.1	14.4	10.0
Effective Green, g (s)	35.1	35.1	11.0	50.1	15.4	11.0
Actuated g/C Ratio	0.48	0.48	0.15	0.68	0.21	0.15
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	5.0	5.0	2.6	5.0	2.6	2.6
Lane Grp Cap (vph)	1556	696	248	2222	344	222
v/s Ratio Prot	c0.42		c0.15	0.35	c0.13	0.02
v/s Ratio Perm		0.06				
v/c Ratio	0.87	0.13	1.01	0.51	0.63	0.17
Uniform Delay, d1	17.2	10.7	31.2	5.7	26.5	27.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.2	0.2	59.2	0.4	3.4	0.3
Delay (s)	23.4	10.9	90.5	6.1	29.8	27.5
Level of Service	C	B	F	A	C	C
Approach Delay (s)	21.9			21.4	28.6	
Approach LOS	C			C	C	

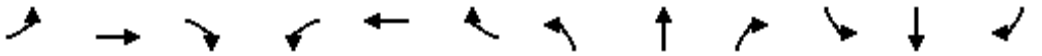
Intersection Summary			
HCM 2000 Control Delay	22.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	73.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	415	135	210	410	70	150	640	150	95	735	105
Future Volume (vph)	225	415	135	210	410	70	150	640	150	95	735	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.96	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	0.97		1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1733	1405	1614	3174		1646	3139		1630	3225	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1733	1405	1614	3174		1646	3139		1630	3225	
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)	239	441	144	223	436	74	160	681	160	101	782	112
RTOR Reduction (vph)	0	0	109	0	11	0	0	17	0	0	9	0
Lane Group Flow (vph)	239	441	35	223	499	0	160	824	0	101	885	0
Confl. Peds. (#/hr)	7		13	13		7	8		14	14		8
Confl. Bikes (#/hr)			5			1			1			
Heavy Vehicles (%)	2%	1%	2%	3%	2%	3%	1%	2%	1%	2%	1%	0%
Turn Type	Prot	NA	Perm	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases			4									
Actuated Green, G (s)	17.5	23.6	23.6	17.4	23.5		12.5	53.5		7.5	48.5	
Effective Green, g (s)	18.0	24.1	24.1	17.9	24.0		13.0	54.0		8.0	49.0	
Actuated g/C Ratio	0.15	0.20	0.20	0.15	0.20		0.11	0.45		0.07	0.41	
Clearance Time (s)	4.5	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		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	244	348	282	240	634		178	1412		108	1316	
v/s Ratio Prot	c0.15	c0.25		0.14	0.16		c0.10	0.26		0.06	c0.27	
v/s Ratio Perm			0.03									
v/c Ratio	0.98	1.27	0.13	0.93	0.79		0.90	0.58		0.94	0.67	
Uniform Delay, d1	50.8	48.0	39.3	50.4	45.6		52.9	24.6		55.7	28.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	51.2	141.2	0.1	38.7	6.2		39.5	1.8		65.7	2.8	
Delay (s)	102.0	189.1	39.5	89.2	51.8		92.4	26.4		121.4	31.7	
Level of Service	F	F	D	F	D		F	C		F	C	
Approach Delay (s)		137.7			63.1			36.9			40.8	
Approach LOS		F			E			D			D	

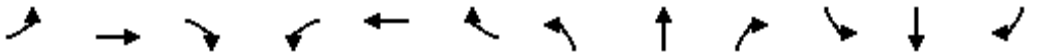
Intersection Summary			
HCM 2000 Control Delay	66.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	280	595	130	220	445	50	175	485	225	175	785	295
Future Volume (vph)	280	595	130	220	445	50	175	485	225	175	785	295
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		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	0.97		1.00	0.98		1.00	0.95		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)	1630	3142		1646	3175		1646	3117		1662	3292	1467
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3142		1646	3175		1646	3117		1662	3292	1467
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)	292	620	135	229	464	52	182	505	234	182	818	307
RTOR Reduction (vph)	0	18	0	0	8	0	0	47	0	0	0	0
Lane Group Flow (vph)	292	737	0	229	508	0	182	692	0	182	818	307
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												Free
Actuated Green, G (s)	19.0	30.4		13.0	24.4		14.4	31.9		14.7	32.2	110.0
Effective Green, g (s)	20.0	31.4		14.0	25.4		15.4	32.9		15.7	33.2	110.0
Actuated g/C Ratio	0.18	0.29		0.13	0.23		0.14	0.30		0.14	0.30	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	296	896		209	733		230	932		237	993	1467
v/s Ratio Prot	c0.18	c0.23		c0.14	0.16		c0.11	0.22		0.11	c0.25	
v/s Ratio Perm												c0.21
v/c Ratio	0.99	0.82		1.10	0.69		0.79	0.74		0.77	0.82	0.21
Uniform Delay, d1	44.9	36.7		48.0	38.7		45.7	34.7		45.4	35.7	0.0
Progression Factor	1.37	1.06		1.00	1.00		1.00	1.00		1.32	0.79	1.00
Incremental Delay, d2	35.3	4.0		90.2	2.6		16.3	5.3		11.4	6.6	0.3
Delay (s)	96.8	43.0		138.2	41.3		62.0	40.1		71.3	34.9	0.3
Level of Service	F	D		F	D		E	D		E	C	A
Approach Delay (s)		58.0			71.1			44.4			31.8	
Approach LOS		E			E			D			C	

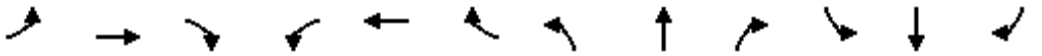
Intersection Summary			
HCM 2000 Control Delay	48.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



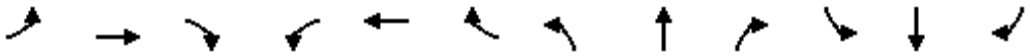
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	995	100	95	885	55	110	170	75	95	265	250
Future Volume (vph)	275	995	100	95	885	55	110	170	75	95	265	250
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		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	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		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	0.95		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)	1662	3166		1662	3229		1614	1642		1662	1716	1447
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1662	3166		1662	3229		1614	1642		1662	1716	1447
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)	302	1093	110	104	973	60	121	187	82	104	291	275
RTOR Reduction (vph)	0	7	0	0	4	0	0	15	0	0	0	218
Lane Group Flow (vph)	302	1196	0	104	1029	0	121	254	0	104	291	57
Confl. Peds. (#/hr)	5		11	11		5	3		6	6		3
Confl. Bikes (#/hr)									3			1
Heavy Vehicles (%)	0%	3%	4%	0%	2%	0%	3%	1%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												4
Actuated Green, G (s)	22.8	48.7		9.7	35.6		9.7	22.2		9.4	21.9	21.9
Effective Green, g (s)	23.8	49.7		10.7	36.6		10.7	23.2		10.4	22.9	22.9
Actuated g/C Ratio	0.22	0.45		0.10	0.33		0.10	0.21		0.09	0.21	0.21
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
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)	359	1430		161	1074		156	346		157	357	301
v/s Ratio Prot	c0.18	0.38		0.06	c0.32		c0.07	0.15		0.06	c0.17	
v/s Ratio Perm												0.04
v/c Ratio	0.84	0.84		0.65	0.96		0.78	0.73		0.66	0.82	0.19
Uniform Delay, d1	41.3	26.6		47.8	35.9		48.5	40.5		48.1	41.5	35.9
Progression Factor	1.00	1.00		0.89	1.49		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.9	6.0		7.1	18.1		20.3	7.4		9.1	13.0	0.2
Delay (s)	57.2	32.5		49.7	71.5		68.8	47.9		57.2	54.6	36.1
Level of Service	E	C		D	E		E	D		E	D	D
Approach Delay (s)		37.5			69.5			54.4			47.4	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	50.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



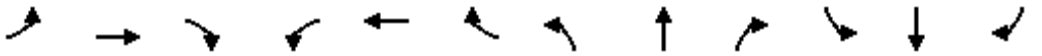
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	130	620	0	0	0	0	0	440	130
Future Volume (vph)	0	0	0	130	620	0	0	0	0	0	440	130
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.0						4.0	4.0
Lane Util. Factor					0.95						1.00	1.00
Frpb, ped/bikes					1.00						1.00	0.98
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					3268						1750	1450
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					3268						1750	1450
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	0	0	138	660	0	0	0	0	0	468	138
RTOR Reduction (vph)	0	0	0	0	27	0	0	0	0	0	0	91
Lane Group Flow (vph)	0	0	0	0	771	0	0	0	0	0	468	47
Confl. Peds. (#/hr)	3		2	2		3	2		11	11		2
Confl. Bikes (#/hr)						1						3
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Actuated Green, G (s)					28.5						18.5	18.5
Effective Green, g (s)					29.0						19.0	19.0
Actuated g/C Ratio					0.52						0.34	0.34
Clearance Time (s)					4.5						4.5	4.5
Vehicle Extension (s)					2.6						2.0	2.0
Lane Grp Cap (vph)					1692						593	491
v/s Ratio Prot											c0.27	
v/s Ratio Perm					0.24							0.03
v/c Ratio					0.46						0.79	0.10
Uniform Delay, d1					8.5						16.7	12.6
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					0.9						6.4	0.0
Delay (s)					9.4						23.1	12.7
Level of Service					A						C	B
Approach Delay (s)		0.0			9.4			0.0			20.7	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	14.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.59		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	57.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			



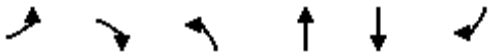
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	900	0	0	0	0	0	340	175	0	0	0
Future Volume (vph)	235	900	0	0	0	0	0	340	175	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0						4.0				
Lane Util. Factor		0.95						0.95				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.95				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		3230						3107				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		3230						3107				
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	270	1034	0	0	0	0	0	391	201	0	0	0
RTOR Reduction (vph)	0	33	0	0	0	0	0	43	0	0	0	0
Lane Group Flow (vph)	0	1271	0	0	0	0	0	549	0	0	0	0
Confl. Peds. (#/hr)	5		7	7		5	10		4	4		10
Confl. Bikes (#/hr)			3						1			
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Actuated Green, G (s)		32.7						14.3				
Effective Green, g (s)		33.2						14.8				
Actuated g/C Ratio		0.59						0.26				
Clearance Time (s)		4.5						4.5				
Vehicle Extension (s)		2.6						2.0				
Lane Grp Cap (vph)		1914						821				
v/s Ratio Prot								c0.18				
v/s Ratio Perm		0.39										
v/c Ratio		0.66						0.67				
Uniform Delay, d1		7.7						18.4				
Progression Factor		1.00						1.00				
Incremental Delay, d2		1.8						1.6				
Delay (s)		9.5						20.0				
Level of Service		A						C				
Approach Delay (s)		9.5			0.0			20.0			0.0	
Approach LOS		A			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	12.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	8.0
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												
Traffic Volume (vph)	175	260	50	110	265	50	120	545	55	145	735	115
Future Volume (vph)	175	260	50	110	265	50	120	545	55	145	735	115
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	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	0.98		1.00	0.98		1.00	0.99		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)	1646	1656		1614	1676		1646	3231		1630	3204	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	1656		1614	1676		1646	3231		1630	3204	
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	201	299	57	126	305	57	138	626	63	167	845	132
RTOR Reduction (vph)	0	5	0	0	6	0	0	6	0	0	9	0
Lane Group Flow (vph)	201	351	0	126	356	0	138	683	0	167	968	0
Confl. Peds. (#/hr)	3		1	1		3	10		1	1		10
Confl. Bikes (#/hr)			3									1
Heavy Vehicles (%)	1%	3%	2%	3%	2%	0%	1%	1%	4%	2%	1%	1%
Turn Type	Split	NA		Split	NA		Prot	NA		Prot	NA	
Protected Phases	4	4		8	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	28.0	28.0		25.1	25.1		14.8	34.0		16.3	35.5	
Effective Green, g (s)	29.0	29.0		26.1	26.1		15.3	35.0		16.8	36.5	
Actuated g/C Ratio	0.24	0.24		0.21	0.21		0.12	0.28		0.14	0.30	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	388	390		342	355		204	920		222	951	
v/s Ratio Prot	0.12	c0.21		0.08	c0.21		0.08	0.21		c0.10	c0.30	
v/s Ratio Perm												
v/c Ratio	0.52	0.90		0.37	1.00		0.68	0.74		0.75	1.02	
Uniform Delay, d1	40.9	45.5		41.4	48.4		51.4	39.9		51.0	43.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.9	22.6		0.5	48.8		7.8	3.1		12.8	33.7	
Delay (s)	41.7	68.1		41.8	97.2		59.2	43.0		63.9	76.9	
Level of Service	D	E		D	F		E	D		E	E	
Approach Delay (s)		58.6			82.9			45.7			75.0	
Approach LOS		E			F			D			E	

Intersection Summary			
HCM 2000 Control Delay	65.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	122.9	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	310	130	110	270	480	335
Future Volume (vph)	310	130	110	270	480	335
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	0.98
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)	1630	1473	1646	1716	1733	1439
Flt Permitted	0.95	1.00	0.24	1.00	1.00	1.00
Satd. Flow (perm)	1630	1473	418	1716	1733	1439
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	337	141	120	293	522	364
RTOR Reduction (vph)	0	101	0	0	0	213
Lane Group Flow (vph)	337	40	120	293	522	151
Confl. Bikes (#/hr)						3
Heavy Vehicles (%)	2%	1%	1%	2%	1%	1%
Turn Type	Prot	Prot	pm+pt	NA	NA	Perm
Protected Phases	7	4	5	2	6	
Permitted Phases			2			6
Actuated Green, G (s)	14.4	14.4	29.6	29.6	21.5	21.5
Effective Green, g (s)	14.9	14.9	30.1	30.1	22.0	22.0
Actuated g/C Ratio	0.28	0.28	0.57	0.57	0.42	0.42
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0	3.8	3.8	3.8	3.8
Lane Grp Cap (vph)	458	414	332	974	719	597
v/s Ratio Prot	c0.21	0.03	0.03	c0.17	c0.30	
v/s Ratio Perm			0.18			0.10
v/c Ratio	0.74	0.10	0.36	0.30	0.73	0.25
Uniform Delay, d1	17.3	14.1	7.1	6.0	13.0	10.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	5.7	0.1	0.9	0.2	3.9	0.3
Delay (s)	23.0	14.2	8.0	6.2	16.8	10.4
Level of Service	C	B	A	A	B	B
Approach Delay (s)	20.4			6.7	14.2	
Approach LOS	C			A	B	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	53.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	62.7%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	36

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	30	55	30	70	20	30	35	695	240	50	890	50
Future Vol, veh/h	30	55	30	70	20	30	35	695	240	50	890	50
Conflicting Peds, #/hr	2	0	0	0	0	2	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	130	-	0	-	-	0	115	-	150	100	-	100
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	4	12	2	6	4	26	3	1	2	4	5
Mvmt Flow	32	58	32	74	21	32	37	732	253	53	937	53

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2006	2104	939	1921	1904	734	992	0	0	985	0	0
Stage 1	1045	1045	-	806	806	-	-	-	-	-	-	-
Stage 2	961	1059	-	1115	1098	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.54	6.32	7.12	6.56	6.24	4.36	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.54	-	6.12	5.56	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.54	-	6.12	5.56	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4.036	3.408	3.518	4.054	3.336	2.434	-	-	2.218	-	-
Pot Cap-1 Maneuver	45	~ 51	307	~ 51	67	417	611	-	-	701	-	-
Stage 1	279	303	-	376	389	-	-	-	-	-	-	-
Stage 2	311	299	-	252	284	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	~ 27	~ 44	306	-	58	416	610	-	-	701	-	-
Mov Cap-2 Maneuver	~ 27	~ 44	-	-	58	-	-	-	-	-	-	-
Stage 1	262	279	-	353	365	-	-	-	-	-	-	-
Stage 2	254	281	-	166	262	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	$ 678.8		0.4	0.5
HCM LOS	F	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	610	-	-	36	306	-	416	701	-	-
HCM Lane V/C Ratio	0.06	-	-	2.485	0.103	-	0.076	0.075	-	-
HCM Control Delay (s)	11.3	-	-	$ 912	18.1	-	14.4	10.6	-	-
HCM Lane LOS	B	-	-	F	C	-	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	10	0.3	-	0.2	0.2	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	100.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	15	30	100	15	15	40	1090	330	10	980	5
Future Vol, veh/h	5	15	30	100	15	15	40	1090	330	10	980	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	2	2	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	50	300	-	300	200	-	300
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	1	0	0	3	3	2	0	4	25
Mvmt Flow	5	16	31	104	16	16	42	1135	344	10	1021	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1701	2606	511	1760	2267	570	1026	0	0	1481	0	0
Stage 1	1041	1041	-	1221	1221	-	-	-	-	-	-	-
Stage 2	660	1565	-	539	1046	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.52	6.5	6.9	4.16	-	-	4.1	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.52	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.52	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.51	4	3.3	2.23	-	-	2.2	-	-
Pot Cap-1 Maneuver	61	25	513	~ 54	41	470	667	-	-	460	-	-
Stage 1	250	310	-	192	255	-	-	-	-	-	-	-
Stage 2	423	174	-	497	308	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	38	23	513	~ 22	38	469	667	-	-	459	-	-
Mov Cap-2 Maneuver	38	23	-	~ 22	38	-	-	-	-	-	-	-
Stage 1	234	303	-	180	238	-	-	-	-	-	-	-
Stage 2	358	163	-	433	301	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	138.1	$ 1976.3	0.3	0.1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	667	-	-	26	513	23	469	459	-	-
HCM Lane V/C Ratio	0.062	-	-	0.801	0.061	5.208	0.033	0.023	-	-
HCM Control Delay (s)	10.8	-	-	$ 326.6	12.5	$ 2232.4	12.9	13	-	-
HCM Lane LOS	B	-	-	F	B	F	B	B	-	-
HCM 95th %tile Q(veh)	0.2	-	-	2.5	0.2	15.1	0.1	0.1	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	0.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	15	10	5	15	110	15	1425	70	65	1075	5
Future Vol, veh/h	5	15	10	5	15	110	15	1425	70	65	1075	5
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	100	-	0	170	-	100	200	-	50
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	0	0	3	0	3	5	2	3	0
Mvmt Flow	5	16	11	5	16	121	16	1566	77	71	1181	5

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	2147	2998	1182	2938	2926	784	1186	0	0	1643	0	0
Stage 1	1323	1323	-	1598	1598	-	-	-	-	-	-	-
Stage 2	824	1675	-	1340	1328	-	-	-	-	-	-	-
Critical Hdwy	7.3	6.5	6.2	7.3	6.5	6.945	4.1	-	-	4.13	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.3285	2.2	-	-	2.219	-	-
Pot Cap-1 Maneuver	32	~ 14	233	8	~ 15	335	596	-	-	392	-	-
Stage 1	194	228	-	113	167	-	-	-	-	-	-	-
Stage 2	338	153	-	190	226	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	-	~ 11	233	-	~ 12	335	596	-	-	392	-	-
Mov Cap-2 Maneuver	-	~ 11	-	-	~ 12	-	-	-	-	-	-	-
Stage 1	189	187	-	110	162	-	-	-	-	-	-	-
Stage 2	189	149	-	135	185	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s			0.1	0.9
HCM LOS	-	-		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	596	-	-	-	-	335	392	-	-
HCM Lane V/C Ratio	0.028	-	-	-	-	0.361	0.182	-	-
HCM Control Delay (s)	11.2	-	-	-	-	21.7	16.2	-	-
HCM Lane LOS	B	-	-	-	-	C	C	-	-
HCM 95th %tile Q(veh)	0.1	-	-	-	-	1.6	0.7	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	5.4

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	145	45	45	125	205	45
Future Vol, veh/h	145	45	45	125	205	45
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	1	0	0	0	2	0
Mvmt Flow	163	51	51	140	230	51

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	498	256	281	0	-	0
Stage 1	256	-	-	-	-	-
Stage 2	242	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	534	788	1293	-	-	-
Stage 1	789	-	-	-	-	-
Stage 2	801	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	511	788	1293	-	-	-
Mov Cap-2 Maneuver	511	-	-	-	-	-
Stage 1	755	-	-	-	-	-
Stage 2	801	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	15.4	2.1	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1293	-	557	-	-
HCM Lane V/C Ratio	0.039	-	0.383	-	-
HCM Control Delay (s)	7.9	0	15.4	-	-
HCM Lane LOS	A	A	C	-	-
HCM 95th %tile Q(veh)	0.1	-	1.8	-	-

Intersection	
Int Delay, s/veh	24.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	435	340	235	75	40	265
Future Vol, veh/h	435	340	235	75	40	265
Conflicting Peds, #/hr	0	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	90	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	1	1	2	4	3	2
Mvmt Flow	478	374	258	82	44	291

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	340	0	-	0	1629	301
Stage 1	-	-	-	-	299	-
Stage 2	-	-	-	-	1330	-
Critical Hdwy	4.11	-	-	-	6.43	6.22
Critical Hdwy Stg 1	-	-	-	-	5.43	-
Critical Hdwy Stg 2	-	-	-	-	5.43	-
Follow-up Hdwy	2.209	-	-	-	3.527	3.318
Pot Cap-1 Maneuver	1225	-	-	-	111	739
Stage 1	-	-	-	-	750	-
Stage 2	-	-	-	-	246	-
Platoon blocked, %			-	-	-	
Mov Cap-1 Maneuver	1225	-	-	-	68	738
Mov Cap-2 Maneuver	-	-	-	-	68	-
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	246	-

Approach	EB	WB	SB
HCM Control Delay, s	5.5	0	98.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1225	-	-	-	322
HCM Lane V/C Ratio	0.39	-	-	-	1.041
HCM Control Delay (s)	9.8	-	-	-	98.3
HCM Lane LOS	A	-	-	-	F
HCM 95th %tile Q(veh)	1.9	-	-	-	12.1

Intersection	
Int Delay, s/veh	9.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	15	175	10	10	25	140	785	30	40	495	30
Future Vol, veh/h	15	15	175	10	10	25	140	785	30	40	495	30
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	0	0	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	25	-	-	-	100	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	7	0	1	0	0	5	1	1	4	0	1	0
Mvmt Flow	16	16	192	11	11	27	154	863	33	44	544	33

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1857	1854	562	1941	1854	880	578	0	0	896	0	0
Stage 1	650	650	-	1188	1188	-	-	-	-	-	-	-
Stage 2	1207	1204	-	753	666	-	-	-	-	-	-	-
Critical Hdwy	7.17	6.5	6.21	7.1	6.5	6.25	4.11	-	-	4.1	-	-
Critical Hdwy Stg 1	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.17	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	4	3.309	3.5	4	3.345	2.209	-	-	2.2	-	-
Pot Cap-1 Maneuver	55	75	528	50	75	342	1001	-	-	766	-	-
Stage 1	450	468	-	232	264	-	-	-	-	-	-	-
Stage 2	219	259	-	405	460	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	37	60	528	21	60	342	1000	-	-	766	-	-
Mov Cap-2 Maneuver	37	60	-	21	60	-	-	-	-	-	-	-
Stage 1	380	441	-	196	223	-	-	-	-	-	-	-
Stage 2	162	219	-	234	433	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	41.3	163.8	1.4	0.7
HCM LOS	E	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	EBLn2	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1000	-	-	46	528	63	766	-	-
HCM Lane V/C Ratio	0.154	-	-	0.717	0.364	0.785	0.057	-	-
HCM Control Delay (s)	9.3	-	-	190.7	15.7	163.8	10	-	-
HCM Lane LOS	A	-	-	F	C	F	A	-	-
HCM 95th %tile Q(veh)	0.5	-	-	2.8	1.7	3.5	0.2	-	-

Intersection	
Int Delay, s/veh	37.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	130	480	60	85	475	45	15	60	40	15	65	80
Future Vol, veh/h	130	480	60	85	475	45	15	60	40	15	65	80
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	Free	-	-	None	-	-	None	-	-	None
Storage Length	100	-	75	80	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	5	2	3	4	10	0	0	3	9	3	0
Mvmt Flow	134	495	62	88	490	46	15	62	41	15	67	82

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	536	0	-	495	0	0	1527	1475	495	1504	1452	513
Stage 1	-	-	-	-	-	-	763	763	-	689	689	-
Stage 2	-	-	-	-	-	-	764	712	-	815	763	-
Critical Hdwy	4.1	-	-	4.13	-	-	7.1	6.5	6.23	7.19	6.53	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.19	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.19	5.53	-
Follow-up Hdwy	2.2	-	-	2.227	-	-	3.5	4	3.327	3.581	4.027	3.3
Pot Cap-1 Maneuver	1042	-	0	1064	-	-	97	128	573	96	130	565
Stage 1	-	-	0	-	-	-	400	416	-	425	445	-
Stage 2	-	-	0	-	-	-	399	439	-	361	412	-
Platoon blocked, %		-			-	-						
Mov Cap-1 Maneuver	1042	-	-	1064	-	-	35	102	573	40	104	565
Mov Cap-2 Maneuver	-	-	-	-	-	-	35	102	-	40	104	-
Stage 1	-	-	-	-	-	-	348	362	-	370	408	-
Stage 2	-	-	-	-	-	-	261	403	-	242	359	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.9	1.2	199	194.3
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	106	1042	-	1064	-	-	140
HCM Lane V/C Ratio	1.118	0.129	-	0.082	-	-	1.178
HCM Control Delay (s)	199	9	-	8.7	-	-	194.3
HCM Lane LOS	F	A	-	A	-	-	F
HCM 95th %tile Q(veh)	7.5	0.4	-	0.3	-	-	9.6

Intersection	
Int Delay, s/veh	6.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	140	985	805	40	20	245
Future Vol, veh/h	140	985	805	40	20	245
Conflicting Peds, #/hr	0	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	110	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	3	0	1	5	0	0
Mvmt Flow	152	1071	875	43	22	266

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	918	0	-	0	1737	899
Stage 1	-	-	-	-	897	-
Stage 2	-	-	-	-	840	-
Critical Hdwy	4.145	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2285	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	736	-	-	-	88	340
Stage 1	-	-	-	-	401	-
Stage 2	-	-	-	-	389	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	736	-	-	-	70	339
Mov Cap-2 Maneuver	-	-	-	-	70	-
Stage 1	-	-	-	-	318	-
Stage 2	-	-	-	-	389	-

Approach	EB	WB	SB
HCM Control Delay, s	1.4	0	47.9
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	736	-	-	-	70	339
HCM Lane V/C Ratio	0.207	-	-	-	0.311	0.786
HCM Control Delay (s)	11.2	-	-	-	78.1	45.4
HCM Lane LOS	B	-	-	-	F	E
HCM 95th %tile Q(veh)	0.8	-	-	-	1.1	6.4

Intersection	
Int Delay, s/veh	7.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	335	120	115	190	90	130
Future Vol, veh/h	335	120	115	190	90	130
Conflicting Peds, #/hr	0	0	0	0	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	0	1	1	0	1
Mvmt Flow	372	133	128	211	100	144

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	505	0	908	439
Stage 1	-	-	-	-	439	-
Stage 2	-	-	-	-	469	-
Critical Hdwy	-	-	4.11	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.309
Pot Cap-1 Maneuver	-	-	1065	-	308	620
Stage 1	-	-	-	-	654	-
Stage 2	-	-	-	-	634	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1065	-	265	620
Mov Cap-2 Maneuver	-	-	-	-	265	-
Stage 1	-	-	-	-	565	-
Stage 2	-	-	-	-	633	-

Approach	EB	WB	NB
HCM Control Delay, s	0	3.3	27
HCM LOS			D

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	401	-	-	1065	-
HCM Lane V/C Ratio	0.61	-	-	0.12	-
HCM Control Delay (s)	27	-	-	8.8	0
HCM Lane LOS	D	-	-	A	A
HCM 95th %tile Q(veh)	3.9	-	-	0.4	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	40	5	65	0	0	5	50	295	0	0	475	55
Future Vol, veh/h	40	5	65	0	0	5	50	295	0	0	475	55
Conflicting Peds, #/hr	2	0	0	0	0	2	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	60	-	-	-	-	90
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	3	0	0	0	0	0	2	1	0	0	2	2
Mvmt Flow	44	6	72	0	0	6	56	328	0	0	528	61

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	973	968	528	1038	1029	330	589	0	0	328	0	0
Stage 1	528	528	-	440	440	-	-	-	-	-	-	-
Stage 2	445	440	-	598	589	-	-	-	-	-	-	-
Critical Hdwy	7.13	6.5	6.2	7.1	6.5	6.2	4.12	-	-	4.1	-	-
Critical Hdwy Stg 1	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.13	5.5	-	6.1	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	4	3.3	3.5	4	3.3	2.218	-	-	2.2	-	-
Pot Cap-1 Maneuver	230	256	554	211	236	716	986	-	-	1243	-	-
Stage 1	532	531	-	600	581	-	-	-	-	-	-	-
Stage 2	590	581	-	492	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	218	241	554	172	223	715	986	-	-	1243	-	-
Mov Cap-2 Maneuver	218	241	-	172	223	-	-	-	-	-	-	-
Stage 1	502	531	-	566	548	-	-	-	-	-	-	-
Stage 2	551	548	-	423	499	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	21.3	10.1	1.3	0
HCM LOS	C	B		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	986	-	-	342	715	1243	-	-
HCM Lane V/C Ratio	0.056	-	-	0.357	0.008	-	-	-
HCM Control Delay (s)	8.9	-	-	21.3	10.1	0	-	-
HCM Lane LOS	A	-	-	C	B	A	-	-
HCM 95th %tile Q(veh)	0.2	-	-	1.6	0	0	-	-

Intersection	
Int Delay, s/veh	6.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	180	190	10	5	420	15	10	5	5	10	15	215
Future Vol, veh/h	180	190	10	5	420	15	10	5	5	10	15	215
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	130	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	11	0	0	6	0	0	0	50	0	27	2
Mvmt Flow	191	202	11	5	447	16	11	5	5	11	16	229

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	463	0	0	213	0	0	1178	1063	208	1060	1060	455
Stage 1	-	-	-	-	-	-	590	590	-	465	465	-
Stage 2	-	-	-	-	-	-	588	473	-	595	595	-
Critical Hdwy	4.14	-	-	4.1	-	-	7.1	6.5	6.7	7.1	6.77	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.77	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.77	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	3.5	4	3.75	3.5	4.243	3.318
Pot Cap-1 Maneuver	1088	-	-	1369	-	-	169	225	725	204	202	605
Stage 1	-	-	-	-	-	-	497	498	-	581	523	-
Stage 2	-	-	-	-	-	-	499	562	-	494	455	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1088	-	-	1369	-	-	84	185	725	171	166	605
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	185	-	171	166	-
Stage 1	-	-	-	-	-	-	410	410	-	479	521	-
Stage 2	-	-	-	-	-	-	300	560	-	399	375	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.3	0.1	37.7	21
HCM LOS			E	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	131	1088	-	-	1369	-	-	476
HCM Lane V/C Ratio	0.162	0.176	-	-	0.004	-	-	0.536
HCM Control Delay (s)	37.7	9	-	-	7.6	-	-	21
HCM Lane LOS	E	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.6	0.6	-	-	0	-	-	3.1

Intersection	
Int Delay, s/veh	4.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	10	265	25	20	455	90	15	30	15	65	20	15
Future Vol, veh/h	10	265	25	20	455	90	15	30	15	65	20	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	0	1	1	0	0	0	0	12	0
Mvmt Flow	11	294	28	22	506	100	17	33	17	72	22	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	606	0	0	322	0	0	950	980	308	955	944	556
Stage 1	-	-	-	-	-	-	330	330	-	600	600	-
Stage 2	-	-	-	-	-	-	620	650	-	355	344	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.62	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.108	3.3
Pot Cap-1 Maneuver	982	-	-	1249	-	-	242	252	737	240	252	534
Stage 1	-	-	-	-	-	-	687	649	-	491	474	-
Stage 2	-	-	-	-	-	-	479	468	-	666	619	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	982	-	-	1249	-	-	211	242	737	204	242	534
Mov Cap-2 Maneuver	-	-	-	-	-	-	211	242	-	204	242	-
Stage 1	-	-	-	-	-	-	677	640	-	484	461	-
Stage 2	-	-	-	-	-	-	430	455	-	608	610	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.3	21.9	33.8
HCM LOS			C	D

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	279	982	-	-	1249	-	-	233
HCM Lane V/C Ratio	0.239	0.011	-	-	0.018	-	-	0.477
HCM Control Delay (s)	21.9	8.7	0	-	7.9	0	-	33.8
HCM Lane LOS	C	A	A	-	A	A	-	D
HCM 95th %tile Q(veh)	0.9	0	-	-	0.1	-	-	2.4

Intersection	
Intersection Delay, s/veh	12.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	640	674	282	477
Demand Flow Rate, veh/h	641	678	282	479
Vehicles Circulating, veh/h	406	395	753	510
Vehicles Exiting, veh/h	482	640	294	563
Ped Vol Crossing Leg, #/h	1	3	7	1
Ped Cap Adj	0.999	1.000	0.999	1.000
Approach Delay, s/veh	8.8	17.7	12.2	9.4
Approach LOS	A	C	B	A

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	L	TR	LTR	LTR	LT	R
Assumed Moves	L	TR	LTR	LTR	LT	R
RT Channelized						Yield
Lane Util	0.229	0.771	1.000	1.000	1.000	
Follow-Up Headway, s	2.535	2.535	2.609	2.609	2.609	
Critical Headway, s	4.544	4.544	4.976	4.976	4.976	101
Entry Flow, veh/h	147	494	678	282	378	844
Cap Entry Lane, veh/h	981	981	922	640	820	1.000
Entry HV Adj Factor	0.993	1.000	0.994	1.000	0.995	101
Flow Entry, veh/h	146	494	674	282	376	844
Cap Entry, veh/h	974	981	917	640	816	0.120
V/C Ratio	0.150	0.504	0.735	0.441	0.461	5.4
Control Delay, s/veh	5.1	9.9	17.7	12.2	10.4	A
LOS	A	A	C	B	B	0
95th %tile Queue, veh	1	3	7	2	2	

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	309	404	542	442
Demand Flow Rate, veh/h	319	418	567	452
Vehicles Circulating, veh/h	482	504	292	438
Vehicles Exiting, veh/h	408	355	509	484
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.9	11.6	10.9	11.0
Approach LOS	A	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	319	418	567	452
Cap Entry Lane, veh/h	844	825	1024	883
Entry HV Adj Factor	0.969	0.966	0.956	0.979
Flow Entry, veh/h	309	404	542	442
Cap Entry, veh/h	818	798	979	864
V/C Ratio	0.378	0.507	0.553	0.512
Control Delay, s/veh	8.9	11.6	10.9	11.0
LOS	A	B	B	B
95th %tile Queue, veh	2	3	3	3

Intersection	
Intersection Delay, s/veh	23.0
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	802	791	634	21
Demand Flow Rate, veh/h	825	804	647	21
Vehicles Circulating, veh/h	293	320	572	1100
Vehicles Exiting, veh/h	828	899	546	24
Ped Vol Crossing Leg, #/h	1	0	0	4
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	20.7	21.1	28.7	8.6
Approach LOS	C	C	D	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	825	804	647	21
Cap Entry Lane, veh/h	1023	996	770	449
Entry HV Adj Factor	0.972	0.984	0.980	1.000
Flow Entry, veh/h	802	791	634	21
Cap Entry, veh/h	995	979	755	449
V/C Ratio	0.806	0.808	0.840	0.047
Control Delay, s/veh	20.7	21.1	28.7	8.6
LOS	C	C	D	A
95th %tile Queue, veh	9	9	10	0

Intersection	
Intersection Delay, s/veh	24.7
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	414	601	744	558
Demand Flow Rate, veh/h	418	607	754	564
Vehicles Circulating, veh/h	709	652	413	611
Vehicles Exiting, veh/h	466	515	714	648
Ped Vol Crossing Leg, #/h	8	0	0	5
Ped Cap Adj	0.999	1.000	1.000	0.999
Approach Delay, s/veh	17.2	31.9	24.7	22.7
Approach LOS	C	D	C	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	418	607	754	564
Cap Entry Lane, veh/h	670	710	906	740
Entry HV Adj Factor	0.990	0.991	0.986	0.990
Flow Entry, veh/h	414	601	744	558
Cap Entry, veh/h	662	703	893	732
V/C Ratio	0.625	0.855	0.833	0.763
Control Delay, s/veh	17.2	31.9	24.7	22.7
LOS	C	D	C	C
95th %tile Queue, veh	4	10	10	7

Intersection	
Intersection Delay, s/veh	12.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	278	250	653	614
Demand Flow Rate, veh/h	287	256	667	631
Vehicles Circulating, veh/h	637	665	336	271
Vehicles Exiting, veh/h	265	338	587	650
Ped Vol Crossing Leg, #/h	0	1	2	6
Ped Cap Adj	1.000	1.000	1.000	0.999
Approach Delay, s/veh	10.5	10.1	14.8	11.8
Approach LOS	B	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	287	256	667	631
Cap Entry Lane, veh/h	721	700	980	1047
Entry HV Adj Factor	0.969	0.976	0.979	0.973
Flow Entry, veh/h	278	250	653	614
Cap Entry, veh/h	698	684	958	1018
V/C Ratio	0.398	0.366	0.681	0.603
Control Delay, s/veh	10.5	10.1	14.8	11.8
LOS	B	B	B	B
95th %tile Queue, veh	2	2	6	4

Intersection	
Intersection Delay, s/veh	11.1
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	567	106	456	716
Demand Flow Rate, veh/h	572	111	462	720
Vehicles Circulating, veh/h	293	950	578	64
Vehicles Exiting, veh/h	491	90	287	997
Ped Vol Crossing Leg, #/h	13	2	11	5
Ped Cap Adj	0.998	1.000	0.998	0.999
Approach Delay, s/veh	10.8	10.2	14.8	9.1
Approach LOS	B	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	572	111	462	720
Cap Entry Lane, veh/h	1023	524	765	1293
Entry HV Adj Factor	0.991	0.955	0.986	0.995
Flow Entry, veh/h	567	106	456	716
Cap Entry, veh/h	1013	500	754	1285
V/C Ratio	0.560	0.212	0.605	0.557
Control Delay, s/veh	10.8	10.2	14.8	9.1
LOS	B	B	B	A
95th %tile Queue, veh	4	1	4	4

Intersection	
Intersection Delay, s/veh	15.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	340	443	593	623
Demand Flow Rate, veh/h	348	454	598	636
Vehicles Circulating, veh/h	594	605	535	306
Vehicles Exiting, veh/h	348	528	407	753
Ped Vol Crossing Leg, #/h	13	5	25	9
Ped Cap Adj	0.998	0.999	0.997	0.999
Approach Delay, s/veh	11.4	15.5	20.6	12.8
Approach LOS	B	C	C	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	348	454	598	636
Cap Entry Lane, veh/h	753	744	800	1010
Entry HV Adj Factor	0.976	0.976	0.992	0.979
Flow Entry, veh/h	340	443	593	623
Cap Entry, veh/h	734	726	791	988
V/C Ratio	0.463	0.610	0.750	0.631
Control Delay, s/veh	11.4	15.5	20.6	12.8
LOS	B	C	C	B
95th %tile Queue, veh	2	4	7	5

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	90	385	512	651
Demand Flow Rate, veh/h	91	398	527	683
Vehicles Circulating, veh/h	743	464	300	181
Vehicles Exiting, veh/h	121	363	534	681
Ped Vol Crossing Leg, #/h	0	2	3	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.3	10.3	10.1	11.0
Approach LOS	A	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	91	398	527	683
Cap Entry Lane, veh/h	647	860	1016	1147
Entry HV Adj Factor	0.989	0.967	0.972	0.952
Flow Entry, veh/h	90	385	512	651
Cap Entry, veh/h	640	831	987	1093
V/C Ratio	0.141	0.463	0.519	0.595
Control Delay, s/veh	7.3	10.3	10.1	11.0
LOS	A	B	B	B
95th %tile Queue, veh	0	2	3	4

Intersection	
Intersection Delay, s/veh	9.4
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	242	406	542	416
Demand Flow Rate, veh/h	244	407	545	421
Vehicles Circulating, veh/h	600	444	257	353
Vehicles Exiting, veh/h	174	358	587	498
Ped Vol Crossing Leg, #/h	11	9	8	6
Ped Cap Adj	0.998	0.999	0.999	0.999
Approach Delay, s/veh	8.8	10.0	9.5	8.9
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	244	407	545	421
Cap Entry Lane, veh/h	748	877	1062	963
Entry HV Adj Factor	0.992	0.998	0.994	0.988
Flow Entry, veh/h	242	406	542	416
Cap Entry, veh/h	741	874	1055	950
V/C Ratio	0.327	0.464	0.514	0.438
Control Delay, s/veh	8.8	10.0	9.5	8.9
LOS	A	A	A	A
95th %tile Queue, veh	1	2	3	2

Intersection	
Intersection Delay, s/veh	13.7
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	581	408	479	369
Demand Flow Rate, veh/h	595	424	497	374
Vehicles Circulating, veh/h	413	475	593	473
Vehicles Exiting, veh/h	434	615	415	426
Ped Vol Crossing Leg, #/h	12	6	0	2
Ped Cap Adj	0.998	0.999	1.000	1.000
Approach Delay, s/veh	14.8	11.2	17.3	9.8
Approach LOS	B	B	C	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	595	424	497	374
Cap Entry Lane, veh/h	906	850	754	852
Entry HV Adj Factor	0.977	0.962	0.964	0.987
Flow Entry, veh/h	581	408	479	369
Cap Entry, veh/h	883	817	726	840
V/C Ratio	0.658	0.499	0.659	0.439
Control Delay, s/veh	14.8	11.2	17.3	9.8
LOS	B	B	C	A
95th %tile Queue, veh	5	3	5	2

3rd Bypass Lane Merge Point Analysis

The first bypass you entered:

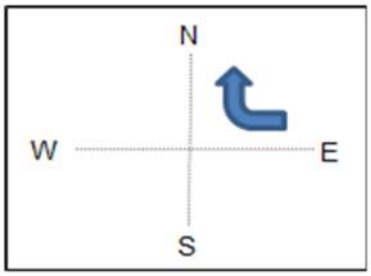
A heavy right turn volume approaches at the North leg.
The heavy right turn volume then exits on the West leg.

The second bypass you entered:

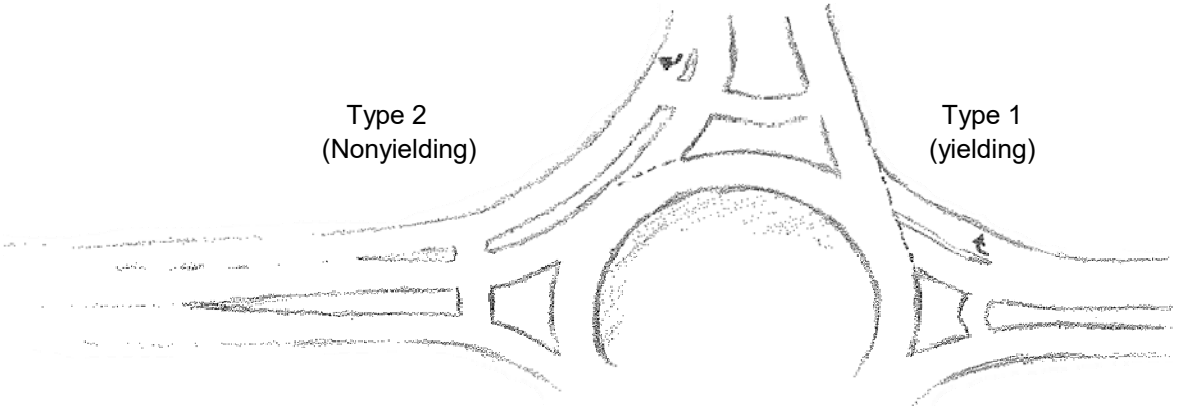
A heavy right turn volume approaches at the West leg.
The heavy right turn volume then exits on the South leg.

Entry on the Single Lane Roundabout Calculator with no volume from 1st or second Bypass:

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	60	200	105
	E	155	0	45	500
	S	330	230	0	0
	W	0	540	160	0



The heavy right turn volume enters from the East approach.
The heavy right turn volume then exits on the North leg.



○ Type 2 Nonyielding Bypass lane

If there is room for a new lane, then bypass LOS is A and capacity is expected to be high (higher than yielding bypass values shown below) and the analysis is complete for this bypass lane.
Considerations for a Type 2 nonyielding bypass lane:
- A median refuge should ensure a pedestrian only crosses one lane at a time
- Bypass travel path geometrically slows traffic
- Is there a heavy left turn volume down this leg to create a demand to quickly merge?

◉ Type 1 Yielding Bypass lane

Items to keep in mind if constrained to a Type 1 nonyielding bypass lane:
- Angle that driver has to look over the shoulder to merge, then forward to yield to pedestrians
- All traffic volume is now in one lane, consider what gaps exist for pedestrian
- Safety of heavy right movement merging into all movements exiting roundabout

		942	pc/h
Capacity	c	872	veh/h
Entry Flow Rates	v	64	veh/h
Volume to Capacity ratio	v/c	0.07	
Delay		4.8	s/veh
LOS		A	
HCM Queue		0	veh

The roundabout analysis with the North approach to the West leg bypass and previous bypasses volumes removed is to the right. Please print and electronically save this information.

3rd Type 1 Yielding Bypass Lane Calculator for Single-Lane Roundabouts 10/14/15

General Information		Passenger Car Equivalents			Rec
Analyst:	Pat Stoplight PE	bicycle	E_b	1	1
Agency:	Safety City	medium	E_m	1.5	1.5
Date:	42269	heavy	E_h	2	2
East leg:	0	South leg:		0	
Project:	Project Name		Year:	20yrs > build	

Roundabout Input			
3 or 4 legs			4
Portion of an hour:			0.25
Peak hr	4	30	PM

N / W / E / S

Pedestrian Crossings per	Approaches N	E	S	W
#	0	0	0	0

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	0	200	105
	E	155	0	45	500
	S	330	230	0	0
	W	0	540	160	0

THREE BYPASSES

Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	0	213	112
	E	165	0	48	532
	S	351	245	0	0
	W	0	574	170	0

Peak Hour Factor PHF		Approaches N	E	S	W
Exits	N	0.94	0.00	0.94	0.94
	E	0.94	0.94	0.94	0.94
	S	0.94	0.94	0.94	0.00
	W	0.00	0.94	0.94	0.94

Vehicle Factor f_{hv}		Approaches N	E	S	W
Exits	N	1.000	1.000	0.971	0.990
	E	0.971	1.000	0.980	1.000
	S	0.990	1.000	1.000	1.000
	W	1.000	0.980	0.980	1.000

# of Bicycles vph		Approaches N	E	S	W
Exits	N	0	0	1	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	1	0

Proportion of Bicycle P_b		Approaches N	E	S	W
Exits	N	0.000	0.000	0.005	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.006	0.000

# of Medium Trucks vph		Approaches N	E	S	W
Exits	N	0	0	0	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	0	0

Proportion of Medium P_m		Approaches N	E	S	W
Exits	N	0.000	0.000	0.000	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.000	0.000

# of Heavy Trucks vph		Approaches N	E	S	W
Exits	N	0	0	6	1.05
	E	4.65	0	0.9	0
	S	3.3	0	0	0
	W	0	10.8	3.2	0

Proportion of Heavy P_h		Approaches N	E	S	W
Exits	N	0.000	0.000	0.030	0.010
	E	0.030	0.000	0.020	0.000
	S	0.010	0.000	0.000	0.000
	W	0.000	0.020	0.020	0.000

Adjusted Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	0	219	113
	E	170	0	49	532
	S	355	245	0	0
	W	0	586	173	0
Entry Flow Rate (pc/h)		525	831	441	645
Conflict Flow (pc/h)		1004	505	815	770
bypass delay		31.6	34.9	0.0	27.3
Weighted Entry Veh Factor		0.984	0.986	0.976	0.998
1st Bypass		170.0	0.0	0.0	0.0
Weighted Conflict Factors		0.985	0.978	0.993	0.989
2nd Bypass Entry Flo		0	0	0	372
3rd bypass entry flow		0	64	0	0

Output		Approaches N	E	S	W
Conflict flow (veh/h)	v_c	989	494	809	762
Entry flow (veh/h)	v_i	517	819	430	644
Entry capacity (veh/h)	c_i	587	878	678	719
Pedestrian impedance	f_{ped}	1	1	1	1
Leg v/c ratio	x_i	0.88	0.93	0.63	0.90
Control delay (sec/veh)	d_i	39.7	37.3	17.1	37.3
LOS	n/a	E	E	C	E
HCM 95th% Queue (veh	Q_m	10	14	4	12

Int cntrl delay (sec/veh)	d_{int}	29.05
Intersection LOS	n/a	D

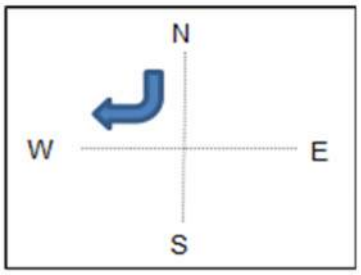
Project Name

Bypass Lane Merge Point Analysis

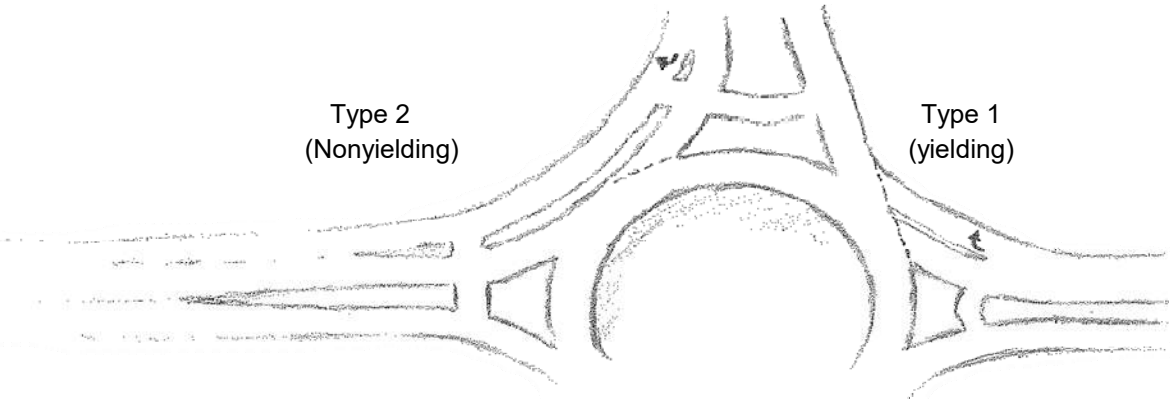
Only two selections are necessary (cell E13 and yield selection button).

Entry on the Single Lane Roundabout Calculator:

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	60	200	105
	E	155	0	45	500
	S	330	230	0	350
	W	160	540	160	0



A heavy right turn volume approaches at the North leg.
The heavy right turn volume then exits on the West leg.



○ Type 2 Nonyielding Bypass lane

If there is room for a new lane, then bypass LOS is A and capacity is expected to be high (higher than yielding bypass values shown below) and the analysis is complete for this bypass lane.

Considerations for a Type 2 nonyielding bypass lane:

- A median refuge should ensure a pedestrian only crosses one lane at a time
- Bypass travel path geometrically slows traffic
- Is there a heavy left turn volume down this leg to create a demand to quickly merge?

◉ Type 1 Yielding Bypass lane

Items to keep in mind if constrained to a Type 1 nonyielding bypass lane:

- Angle that driver has to look over the shoulder to merge, then forward to yield to pedestrians
- All traffic volume is now in one lane, consider what gaps exist for pedestrian
- Safety of heavy right movement merging into all movements exiting roundabout

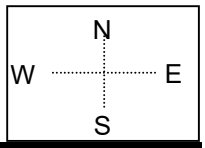
		771	pc/h
Capacity	c	771	veh/h
Entry Flow Rates	v	170	veh/h
Volume to Capacity ratio	v/c	0.22	
Delay		7.1	s/veh
LOS		A	
HCM Queue		1	veh

The roundabout analysis with the North approach to the West leg bypass volume removed is to the right. Please print and electronically save this information for your records.

Project Name

General Information		Passenger Car Equivalents			Rec
Analyst:	Pat Stoplight PE	bicycle	E_b	1	1
Agency:	Safety City	medium	E_m	1.5	1.5
Date:	9/22/2015	heavy	E_h	2	2
East leg:	0	South leg:	0		
Project:	Project Name		Year:	20yrs > build	

Roundabout Input			
3 or 4 legs			4
Portion of an hour:			0.25
Peak hr	4	30	PM



Pedestrian crossings per l	Approaches N	E	S	W
#	0	0	0	0

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	60	200	105
	E	155	0	45	500
	S	330	230	0	350
	W	0	540	160	0

ONE BYPASS

Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	64	213	112
	E	165	0	48	532
	S	351	245	0	372
	W	0	574	170	0

Peak Hour Factor PHF		Approaches N	E	S	W
Exits	N	0.94	0.94	0.94	0.94
	E	0.94	0.94	0.94	0.94
	S	0.94	0.94	0.94	0.94
	W	0.00	0.94	0.94	0.94

Vehicle Factor f_{hv}		Approaches N	E	S	W
Exits	N	1.000	0.962	0.971	0.990
	E	0.971	1.000	0.980	1.000
	S	0.990	1.000	1.000	1.000
	W	1.000	0.980	0.980	1.000

# of Bicycles vph		Approaches N	E	S	W
Exits	N	0	0	1	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	1	0

Proportion of Bicycle P_b		Approaches N	E	S	W
Exits	N	0.000	0.000	0.005	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.006	0.000

# of Medium Trucks vph		Approaches N	E	S	W
Exits	N	0	0	0	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	0	0

Proportion of Medium P_m		Approaches N	E	S	W
Exits	N	0.000	0.000	0.000	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.000	0.000

# of Heavy Trucks vph		Approaches N	E	S	W
Exits	N	0	2.4	6	1.05
	E	4.65	0	0.9	0
	S	3.3	0	0	0
	W	0	10.8	3.2	0

Proportion of Heavy P_h		Approaches N	E	S	W
Exits	N	0.000	0.040	0.030	0.010
	E	0.030	0.000	0.020	0.000
	S	0.010	0.000	0.000	0.000
	W	0.000	0.020	0.020	0.000

Adjusted Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	67	219	113
	E	170	0	49	532
	S	355	245	0	372
	W	0	586	173	0
Entry Flow Rate (pc/h)		525	898	441	1017
Conflict Flow (pc/h)		1004	505	815	770
Bypass Delay		31.6	0.0	0.0	0.0
Weighted Entry Veh Factor		0.984	0.984	0.976	0.999
1st Bypass Entry Flow		170	0	0	0
Weighted Conflict Factors		0.985	0.978	0.993	0.989

Output		Approaches N	E	S	W
Conflict flow (veh/h)	v_c	989	494	809	762
Entry flow (veh/h)	v_i	517	884	430	1016
Entry capacity (veh/h)	c_i	587	876	678	719
Pedestrian impedance	f_{ped}	1	1	1	1
Leg v/c ratio	x_i	0.88	1.01	0.63	1.41
Control delay (sec/veh)	d_i	39.7	54.6	17.1	210.4
LOS	n/a	E	F	C	F
HCM 95th% Queue (veh)	Q_m	10	19	4	45

Int cntrl delay (sec/veh)	d_{int}	98.33
Intersection LOS	n/a	F

4th Bypass Lane Merge Point Analysis

The first bypass you entered:

A heavy right turn volume approaches at the North leg.
The heavy right turn volume then exits on the West leg.

The second bypass you entered:

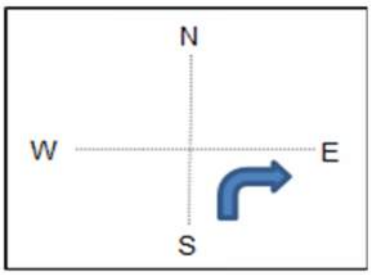
A heavy right turn volume approaches at the West leg.
The heavy right turn volume then exits on the South leg.

The third bypass you entered:

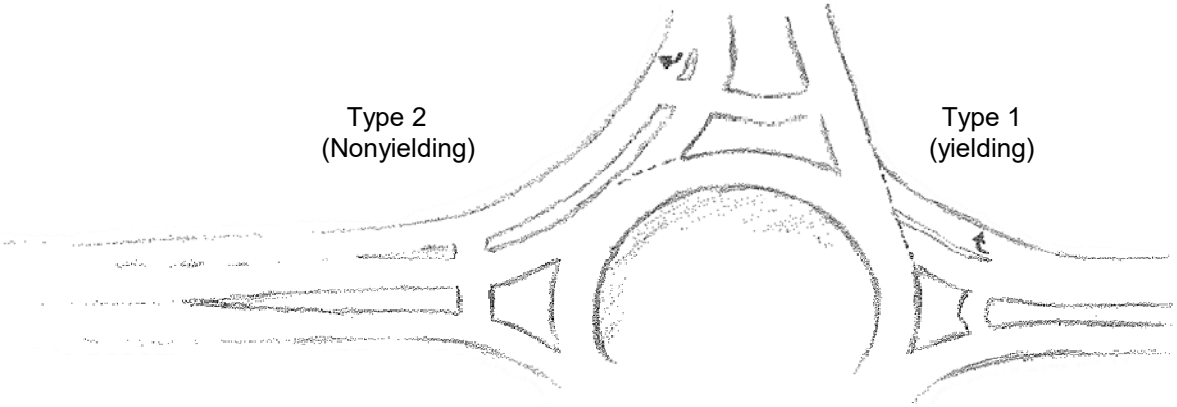
A heavy right turn volume approaches at the East leg.
The heavy right turn volume then exits on the North leg.

Entry on the Single Lane Roundabout Calculator with no volume from 1st or second Bypass:

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	0	200	105
	E	155	0	45	500
	S	330	230	0	0
	W	0	540	160	0



The heavy right turn volume enters from the South approach.
The heavy right turn volume then exits on the East leg.



○ Type 2 Nonyielding Bypass lane

If there is room for a new lane, then bypass LOS is A and capacity is expected to be high (higher than yielding bypass values shown below) and the analysis is complete for this bypass lane.
Considerations for a Type 2 nonyielding bypass lane:
- A median refuge should ensure a pedestrian only crosses one lane at a time
- Bypass travel path geometrically slows traffic
- Is there a heavy left turn volume down this leg to create a demand to quickly merge?

◉ Type 1 Yielding Bypass lane

Items to keep in mind if constrained to a Type 1 nonyielding bypass lane:
- Angle that driver has to look over the shoulder to merge, then forward to yield to pedestrians
- All traffic volume is now in one lane, consider what gaps exist for pedestrian
- Safety of heavy right movement merging into all movements exiting roundabout

		792	pc/h
Capacity	c	776	veh/h
Entry Flow Rates	v	48	veh/h
Volume to Capacity ratio	v/c	0.06	
Delay		5.2	s/veh
LOS		A	
HCM Queue		0	veh

The roundabout analysis with the North approach to the West leg bypass and previous bypasses volumes removed is to the right. Please print and electronically save this information.

4th Type 1 Yielding Bypass Lane Calculator for Single-Lane Roundabouts

10/14/15

General Information	
Analyst:	Pat Stoplight PE
Agency:	Safety City
Date:	42269
East leg:	0
Project:	Project Name

Passenger Car Equivalents			Rec
bicycle	E_b	1	1
medium	E_m	1.5	1.5
heavy	E_h	2	2
South leg:		0	
	Year:	20yrs > build	

Roundabout Input			
3 or 4 legs			4
Portion of an hour:			0.25
Peak hr	4	30	PM

N / W / E / S

FOUR BYPASSES

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	0	0	105
	E	155	0	0	500
	S	330	230	0	0
	W	0	540	160	0

Peak Hour Factor PHF		Approaches N	E	S	W
Exits	N	0.94	0.00	0.94	0.94
	E	0.94	0.94	0.00	0.94
	S	0.94	0.94	0.94	0.00
	W	0.00	0.94	0.94	0.94

# of Bicycles vph		Approaches N	E	S	W
Exits	N	0	0	1	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	1	0

# of Medium Trucks vph		Approaches N	E	S	W
Exits	N	0	0	0	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	0	0

# of Heavy Trucks vph		Approaches N	E	S	W
Exits	N	0	0	6	1.05
	E	4.65	0	0	0
	S	3.3	0	0	0
	W	0	10.8	3.2	0

Adjusted Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	0	0	113
	E	170	0	0	532
	S	355	245	0	0
	W	0	586	173	0
Entry Flow Rate (pc/h)		525	831	173	645
Conflict Flow (pc/h)		1004	286	815	770
bypass delay		31.6	34.9	7.8	27.3
Weighted Entry Veh Factor		0.984	0.986	0.946	0.998
1st Bypass		170.0	0.0	0.0	0.0
Weighted Conflict Factors		0.985	0.963	0.993	0.989
2nd Bypass Entry Flow		0	0	0	372
3rd bypass entry flow		0	0	0	372
4th bypass entry flow		0	0	48	0

Pedestrian Crossings per l	Approaches N	E	S	W
#	0	0	0	0

Flow Rate v_i		Approaches N	E	S	W
Exits	N	0	0	0	112
	E	165	0	0	532
	S	351	245	0	0
	W	0	574	170	0

Vehicle Factor f_{hv}		Approaches N	E	S	W
Exits	N	1.000	1.000	1.000	0.990
	E	0.971	1.000	1.000	1.000
	S	0.990	1.000	1.000	1.000
	W	1.000	0.980	0.980	1.000

Proportion of Bicycle P_b		Approaches N	E	S	W
Exits	N	0.000	0.000	0.000	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.006	0.000

Proportion of Medium P_m		Approaches N	E	S	W
Exits	N	0.000	0.000	0.000	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.000	0.000

Proportion of Heavy P_h		Approaches N	E	S	W
Exits	N	0.000	0.000	0.000	0.010
	E	0.030	0.000	0.000	0.000
	S	0.010	0.000	0.000	0.000
	W	0.000	0.020	0.020	0.000

Output		Approaches N	E	S	W
Conflict flow (veh/h)	v_c	989	275	809	762
Entry flow (veh/h)	v_i	517	819	164	644
Entry capacity (veh/h)	c_i	587	1046	657	719
Pedestrian impedance	f_{ped}	1	1	1	1
Leg v/c ratio	x_i	0.88	0.78	0.25	0.90
Control delay (sec/veh)	d_i	39.7	18.3	8.5	37.3
LOS	n/a	E	C	A	E
HCM 95th% Queue (veh)	Q_m	10	8	1	12

Int cntrl delay (sec/veh)	d_{int}	28.92
Intersection LOS	n/a	D

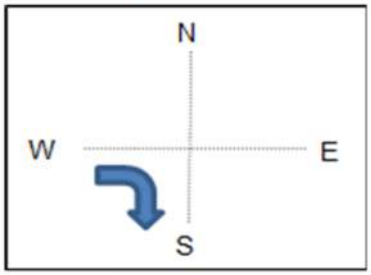
2nd Bypass Lane Merge Point Analysis

The first bypass you entered:

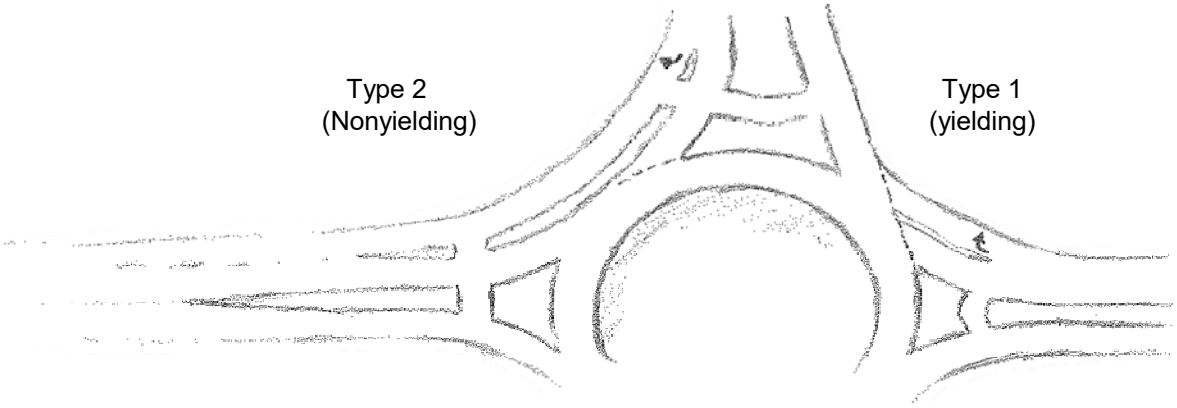
A heavy right turn volume approaches at the North leg.
The heavy right turn volume then exits on the West leg.

Entry on the Single Lane Roundabout Calculator with no volume from 1st Bypass:

Hour Volumes vph		Approaches N	E	S	W
Exits	N	0	60	200	105
	E	155	0	45	500
	S	330	230	0	350
	W	0	540	160	0



The heavy right turn volume enters from the West approach.
The heavy right turn volume then exits on the South leg.



○ Type 2 Nonyielding Bypass lane

If there is room for a new lane, then bypass LOS is A and capacity is expected to be high (higher than yielding bypass values shown below) and the analysis is complete for this bypass lane.
Considerations for a Type 2 nonyielding bypass lane:
- A median refuge should ensure a pedestrian only crosses one lane at a time
- Bypass travel path geometrically slows traffic
- Is there a heavy left turn volume down this leg to create a demand to quickly merge?

◉ Type 1 Yielding Bypass lane

Items to keep in mind if constrained to a Type 1 nonyielding bypass lane:
- Angle that driver has to look over the shoulder to merge, then forward to yield to pedestrians
- All traffic volume is now in one lane, consider what gaps exist for pedestrian
- Safety of heavy right movement merging into all movements exiting roundabout

		830	pc/h
Capacity	c	830	veh/h
Entry Flow Rates	v	372	veh/h
Volume to Capacity ratio	v/c	0.45	
Delay		10.1	s/veh
LOS		B	
HCM Queue		2	veh

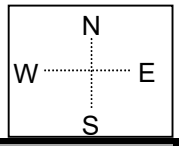
The roundabout analysis with the North approach to the West leg bypass and previous bypass volume removed is to the right. Please print and electronically save this information.

2nd Type 1 Yielding Bypass Lane Calculator for Single-Lane Roundabouts

10/14/15

General Information		Passenger Car Equivalents		Rec
Analyst:	Pat Stoplight PE	bicycle	E_b = 1	1
Agency:	Safety City	medium	E_m = 1.5	1.5
Date:	42269	heavy	E_h = 2	2
East leg:	0	South leg:	0	
Project:	Project Name		Year: 20yrs > build	

Roundabout Input			
3 or 4 legs			4
Portion of an hour:			0.25
Peak hr	4	30	PM



Pedestrian Crossings per	N	E	S	W
#	0	0	0	0

Hour Volumes vph		N	E	S	W
Exits	N	0	60	200	105
	E	155	0	45	500
	S	330	230	0	0
	W	0	540	160	0

TWO BYPASSES

Flow Rate v_i		N	E	S	W
Exits	N	0	64	213	112
	E	165	0	48	532
	S	351	245	0	0
	W	0	574	170	0

Peak Hour Factor PHF		N	E	S	W
Exits	N	0.94	0.94	0.94	0.94
	E	0.94	0.94	0.94	0.94
	S	0.94	0.94	0.94	0.00
	W	0.00	0.94	0.94	0.94

Vehicle Factor f_{hv}		N	E	S	W
Exits	N	1.000	0.962	0.971	0.990
	E	0.971	1.000	0.980	1.000
	S	0.990	1.000	1.000	1.000
	W	1.000	0.980	0.980	1.000

# of Bicycles vph		N	E	S	W
Exits	N	0	0	1	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	1	0

Proportion of Bicycle P_b		N	E	S	W
Exits	N	0.000	0.000	0.005	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.006	0.000

# of Medium Trucks vph		N	E	S	W
Exits	N	0	0	0	0
	E	0	0	0	0
	S	0	0	0	0
	W	0	0	0	0

Proportion of Medium P_m		N	E	S	W
Exits	N	0.000	0.000	0.000	0.000
	E	0.000	0.000	0.000	0.000
	S	0.000	0.000	0.000	0.000
	W	0.000	0.000	0.000	0.000

# of Heavy Trucks vph		N	E	S	W
Exits	N	0	2.4	6	1.05
	E	4.65	0	0.9	0
	S	3.3	0	0	0
	W	0	10.8	3.2	0

Proportion of Heavy P_h		N	E	S	W
Exits	N	0.000	0.040	0.030	0.010
	E	0.030	0.000	0.020	0.000
	S	0.010	0.000	0.000	0.000
	W	0.000	0.020	0.020	0.000

Adjusted Flow Rate v_i		N	E	S	W
Exits	N	0	67	219	113
	E	170	0	49	532
	S	355	245	0	0
	W	0	586	173	0
Entry Flow Rate (pc/h)		525	898	441	645
Conflict Flow (pc/h)		1004	505	815	770
bypass delay		31.6	0.0	0.0	27.3
Weighted Entry Veh Factor		0.984	0.984	0.976	0.998
1st Bypass		170.0	0.0	0.0	0.0
Weighted Conflict Factors		0.985	0.978	0.993	0.989
2nd Bypass Entry Flo		0	0	0	372

Output		N	E	S	W
Conflict flow (veh/h)	v_c	989	494	809	762
Entry flow (veh/h)	v_i	517	884	430	644
Entry capacity (veh/h)	c_i	587	876	678	719
Pedestrian impedance	f_{ped}	1	1	1	1
Leg v/c ratio	x_i	0.88	1.01	0.63	0.90
Control delay (sec/veh)	d_i	39.7	54.6	17.1	37.3
LOS	n/a	E	F	C	E
HCM 95th% Queue (veh	Q_m	10	19	4	12

Int cntrl delay (sec/veh)	d_{int}	34.82
Intersection LOS	n/a	D

Project Name

US 97/Parkway Travel Time Reliability

Table - Weekday PM Peak Hour Travel Time Reliability

Seg. No./ Name	From	To	Posted Speed (mph)	Avg. Speed (mph)	Average Travel Time (min)	Planning Time Index
US 97/Bend Parkway Southbound						
S1	Tumalo Pl	Clausen Rd	45-65	48	4.74	1.34
S2	Clausen Rd	US 20 Interchange	45	24	2.58	3.14
S3	US 20 Interchange	SE 3rd St Interchange	45	48	1.92	1.14
S5	SE 3rd St Interchange	Colorado Ave	45	45	2.40	1.15
S7	Colorado Ave	Reed Market Rd	45	44	1.26	1.22
S9	Reed Market Rd	Murphy Rd Interchange	45	37	2.79	1.80
S11	Murphy Rd Interchange	China Hat Rd	45	41	0.96	1.41
US 97/Bend Parkway Northbound						
N11	China Hat Rd	Murphy Rd Interchange	45	42	0.96	1.27
N9	Murphy Rd Interchange	Reed Market Rd	45	40	2.50	1.43
N7	Reed Market Rd	Colorado Ave	45	47	1.18	1.08
N5	Colorado Ave	SE 3rd St Interchange	45	46	2.31	1.13
N3	SE 3rd St Interchange	US 20 Interchange	45	45	2.00	1.06
N2	US 20 Interchange	Clausen Rd	45	20	3.15	4.24
N1	Clausen Rd	Tumalo Pl.	45-65	54	4.12	1.26
US 20/US 97 Business/SE 3rd Street Southbound						
S4	US 20 Interchange	SE 3rd St Interchange	35-45	23	3.78	2.28
S6	Bend Pkwy Interchange	US 20 (Greenwood Ave)	35-45	19	3.78	2.69
S8	US 20 (Greenwood Ave)	Reed Market Rd	35	16	5.56	2.56
S10	Reed Market Rd	Murphy Rd Interchange	35*45	22	3.96	2.34
US 97 Business/SE 3rd Street Northbound						
N10	Murphy Rd Interchange	Reed Market Rd	35-45	20	4.4	2.68
N8	Reed Market Rd	US 20 (Greenwood Ave)	35	18	5.16	2.90
N6	US 20 (Greenwood Ave)	Bend Pkwy Interchange	35-45	19	3.73	3.15
N4	Bend Pkwy Interchange	US 20 Interchange	35-45	26	3.97	2.09

Source: *US 97 Parkway Plan – Technical Memorandum #2: Existing Conditions*, DKS Associates, December 2017.

Appendix C - Updated Land Use Assumptions for Bend's Transportation Plan Memorandum

Updated Land Use Assumptions for Bend's Transportation Plan

PREPARED FOR: Steering Committee

COPY TO: Citywide Transportation Advisory Committee

PREPARED BY: Becky Hewitt, Angelo Planning Group

DATE: April 26, 2018

Introduction and Overview

The purpose of this memorandum is to describe the land use assumptions that are proposed for use in creating Bend's Transportation Plan.[1]

Transportation modeling and analysis begins with assumptions about land use and demographics, along with other inputs. The City and the Bend Metropolitan Planning Organization (BMPO)[2] must use 20-year growth estimates when their transportation plans are updated.[3] To accommodate this 20-year timeline, the transportation modeling will look ahead to 2040. Portland State University (PSU) recently released draft population projections for Bend and Deschutes County. The projection for 2040 is significantly higher for Bend than previous 2040 population projections. Because the City is required to use the most recent available official projection in evaluating future transportation needs, the land use inputs must account for the additional population growth. In addition, because job growth generally tends to track population growth, additional population growth likely means additional employment growth, which must also be accounted for in the land use assumptions.

The Urban Growth Boundary (UGB) planning and analysis was based on a future year of 2028. The land use assumptions for Bend's Transportation Plan will extend to 2040 and be broadly consistent with the land use designations, policies and strategies that emerged from the UGB process and are adopted in the City's Comprehensive Plan and Integrated Land Use and Transportation Plan (ILUTP).[4] This could mean assuming more infill and redevelopment in the core of the City, more compact and efficient development on vacant land throughout the UGB, as well as some additional expansion on the periphery in locations that were evaluated as part of the UGB process.[5] It is important to note that the land use assumptions for the Transportation Plan are just that – informed assumptions. The projected land use is an indicator of trends and

[1] This memorandum is an update of a memorandum titled "Proposed Land Use Assumptions for Bend's Transportation Plan," dated February 12, 2018. It has been updated to reflect updated population forecasts released in March 2018, and refinements to land use assumptions to respond to the updated projections.

[2] The Bend Metropolitan Planning Organization is the lead agency for regional transportation planning and the decision-making body for federal and state transportation funding for the Bend Area.

[3] The BMPO must update its plan every five years, and at the time of adoption, it must look out at least 20 years.

[4] As part of the City's UGB expansion planning process in 2014-2016, advisory committees and elected officials considered and adopted the Integrated Land Use and Transportation Plan, which contains strategies to provide more transportation choices, as required by state law. These included looking at how future growth patterns will affect people's transportation choices, and their ability to walk, bike, use transit, or make shorter trips.

[5] The areas outside the UGB that are identified as accommodating some of the projected 2040 growth were considered in some of the UGB scenarios but did not get included in the final approved UGB expansion.

patterns, not a precise prediction of the future, and it does not determine, or even guide, where or when the City might expand its urban growth boundary in the future.

Forecasts for 2040

The land use assumptions start from population and employment forecasts that estimate the number of people that will live and work in Bend by the year 2040. These forecasts come from state agencies that use the best available information about past growth and trends. Population forecasts are generated by PSU's Population Research Center using a model to forecast natural increase (births minus deaths) and net migration (in-migration minus out-migration). Employment forecasts are generated by assessing the economic opportunities analysis (EOA) prepared by the Oregon Office of Economic Analysis, the City of Bend EOA, and an assessment of regional employment data. The forecasts are "coordinated" in that population forecasts at the city level add up to match state-level population forecasts, and reference local, regional and statewide trends for employment. The approximate total existing and projected population and employment in the City of Bend are shown in Table 1.

Table 1: Population and Employment Estimates and Forecasts

	2014 (Estimated)	2028 (Projected)	2040 (Projected)
Population	84,000 *Source: Census Population Estimate*	115,000 *Source: Bend Housing Needs Analysis (August 2016)*	153,700 *Source: Portland State University Population Research Center (March 2018)*
Employment	43,000 *Source: Quarterly Census of Employment and Wages*	67,000 *Source: Bend Employment Opportunities Analysis (August 2016)*	88,100 *Source: Angelo Planning Group update based on analysis prepared for Bend MPO[6] (March 2018)*

Population growth projections were converted to projected new housing units based on Census data on average household size; the percent of population living in "group quarters" (e.g. dorms, nursing homes, etc.); and Bend's housing vacancy rate. All assumptions for these factors are consistent with the City's adopted Housing Needs Assessment (HNA). Some adjustments were also required for the employment projections to account for methodology differences between the 2028 projection and the 2040 projections. With all adjustments and conversions applied, the projected housing and employment growth from 2014 to 2040 is approximately 33,710 housing units and 33,800 jobs.

Background

The future growth pattern that formed the basis for the City's adopted strategies in the ILUTP looked ahead to the year 2040, even though the UGB planning process was mainly focused on planning for growth through 2028. The focus of the ILUTP is to create land use and transportation strategies to reduce Vehicle Miles Traveled (VMT) to meet statewide planning goals and standards in administrative rule. This means that the land use assumptions for the 2040 ILUTP analysis considered additional development and redevelopment beyond what was expected by 2028. Some of that additional development and redevelopment was assumed to occur in the central core of the City, in places that were identified as "Opportunity Areas" as part of the UGB process and which were designated for future mixed-use development. Some of the growth was assumed to occur in areas outside the UGB because participants thought it was

[6] Total employment growth was forecasted using the updated population forecast and the jobs-housing ratio applied for past 2040 employment projections, which is similar to the jobs-housing ratio as of 2015. The mix of employment types projected is based on analysis conducted for the Bend MPO.

unrealistic to assume that the City would not expand again for the next 20-plus years. The 2040 analysis used in the ILUTP was subsequently used for the 2040 Bend Redmond Regional Travel Demand Model land use assumptions. However, these assumptions have been updated for use in Bend's Transportation Plan to account for the additional population and employment growth reflected in the latest projections. The updated land use assumptions have followed the same basic principles and approach as were used for the prior work in the ILUTP. The following section provides additional explanation of where and what type of growth is assumed to occur through 2040.

2040 Spatial Allocations: Where Growth is Projected to Occur

This section summarizes where Bend's forecasted growth in housing and jobs is assumed to occur by 2040. At a high level, the land use allocations reflect the following assumptions, based on adopted City growth management policies and development trends:[7]

- Redevelopment with more housing and jobs in mixed use "opportunity areas" near the center of the City;
- Increasing density and redevelopment in some transit corridors (areas that have relatively frequent bus service);
- Development on much of the vacant buildable land within the City;
- Small amounts of residential infill and Accessory Dwelling Units (ADUs)[8] in existing neighborhoods where already allowed by existing zoning and comprehensive plan designations;
- Higher average density for future development, but within the ranges allowed today; and
- Limited UGB expansion on lands identified as potentially suitable for future expansion but not included in the 2016 UGB expansion.[9]

The projected housing and employment growth was distributed geographically based on several factors, including:

- Comprehensive plan land use designation (type and amount of development allowed);
- Presence of existing development and approved future development projects;
- Natural resource constraints;

[7] These assumptions and strategies are also reflected in the adopted ILUTP.

[8] Accessory Dwelling Units are small living quarters on a property with a single-family home that are independent of the main house (including having their own kitchen or kitchenette).

[9] State laws require that cities consider certain types of land first when expanding the UGB – generally land that is not designated as high-value farmland. All areas that were included in the 2016 UGB expansion were designated as "exception lands" by the state, meaning that they are not subject to farm and forest land protections. Additional areas outside the adopted UGB that are included in the land use assumptions through 2040 are also designated or proposed to be designated as exception lands. The eastern portion of a large Department of State Lands (DSL) property in the southeast has been formally proposed to be designated as exception land. The western portion of the property, which was previously designated as exception land, was included in the 2016 UGB expansion. These land use assumptions include allocating some future growth to the portion of the DSL property that proposed to be designated as exception land.

State regulations also require that cities consider factors like the ability to develop the land efficiently; the ability to provide infrastructure and public services cost-effectively; environmental, energy, economic and social consequences; and compatibility with nearby farms and forestry uses. All these were considered in the 2016 UGB expansion, which identified more potentially suitable land for future expansion than was needed to accommodate growth through 2028. As noted previously, **UGB expansions assumed beyond the adopted 2016 UGB are *for analysis purposes only*, and do not imply a guarantee or pre-determination of where or when future UGB expansions will take place.**

- Public land ownership;
- Subdivision contracts, covenants and restrictions (CC&Rs) that preclude further development;
- Redevelopment potential (for commercial, industrial, and mixed-use areas); and
- Land needed for new streets, parks, schools, and other public facilities and institutions.

To simplify the complex assumptions that were used to reflect the factors above in the many different land use designations and contexts in the City, this section summarizes how growth was assumed to occur in the following types of areas:

- **Core mixed-use "opportunity areas"** that were identified as part of the UGB process:
  - Bend Central District, between US 97 and 4th St and between NE Revere Ave and the railroad tracks;
  - Central Westside, including the new Oregon State University (OSU) Cascades campus;
  - "KorPine", near Crux Brewery between SW Bond St and US 97 and between Arizona Ave and Wilson Ave;
  - "East Downtown", between NW Harriman St and US 97, and between NW Franklin Ave and NW Irving Ave; and
  - Inner Highway 20 / Greenwood Ave, from NE 4th St to NE 10th St.
- **Other land inside the UGB** prior to the 2016 UGB expansion
- **2016 UGB Expansion areas** – 2,380 acres across 10 different areas on all sides of the City
- **Areas outside the adopted 2016 UGB** – land generally adjacent to the 2016 UGB expansion areas but not currently in the UGB (see footnote 9)

Figure 2 illustrates the relative intensity of housing growth in different areas, and Figure 3 illustrates the relative intensity of employment growth. Figure 1 and Table 2 summarize the housing and job growth assumed for each of those types of areas through 2040 to match up to the total population and employment growth forecast for the City. As shown in Figure 1, approximately 19% of the housing growth and 11% of employment growth between 2014 and 2040 is assumed to occur outside the current UGB.

Figure 1: New Housing and Employment (2014-2028 and 2014-2040) by Area

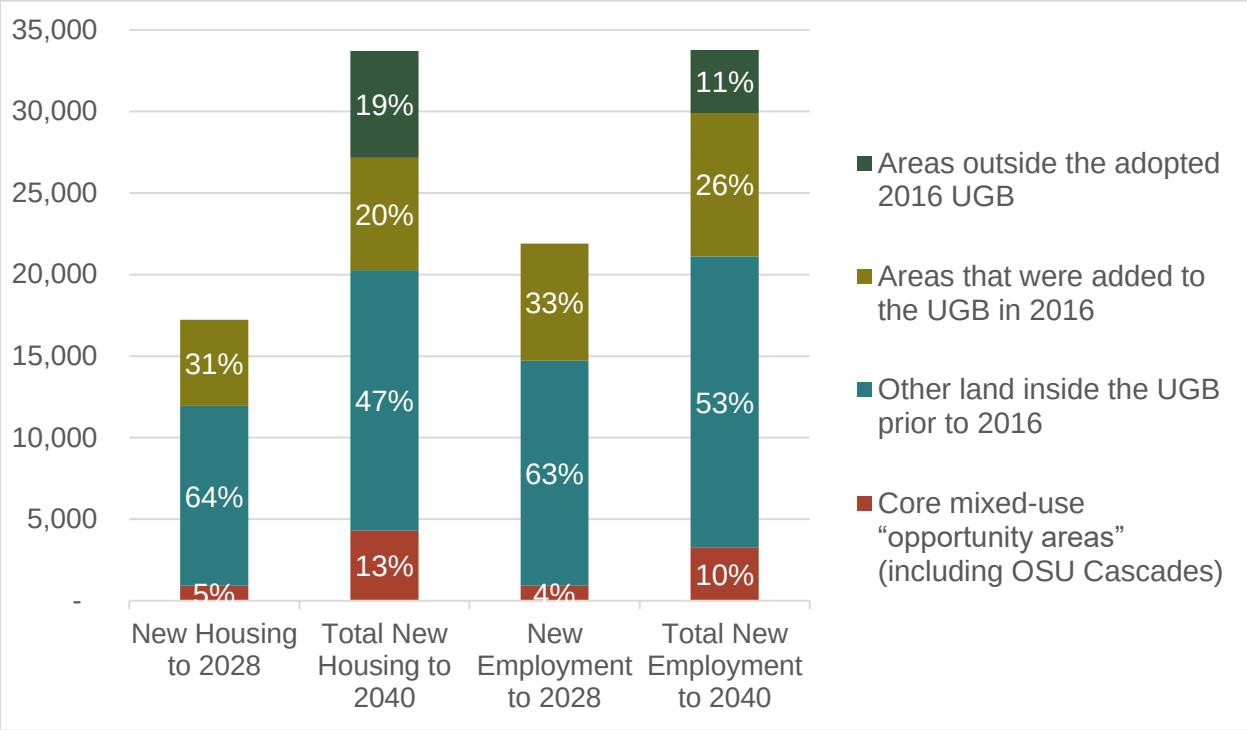


Table 2: New Housing and Employment (2014-2040) by Area

Type of Area	New Housing*	New Employment
Core mixed-use "opportunity areas" (including OSU Cascades)	4,300 (13%)	3,330 (10%)
Other land inside the "pre-2016" UGB	15,990 (47%)	18,260 (54%)
Areas that were added to the UGB in 2016	6,870 (20%)	8,810 (26%)
Areas outside the adopted 2016 UGB	6,550 (19%)	3,400 (10%)
Total	33,710 (100%)	33,800 (100%)

*Percentages do not sum precisely due to rounding – the missing 1% is split between multiple rows.

Examples of building prototypes and the approximate number of new housing units and new employees for each prototype are provided below.

- 4- to 5-story mixed use building with apartments above retail: 50 to 200 units and 5 to 20 employees
- 3-story multifamily (per building): 40 to 80 units
- 1- to 2-story office building: 10 to 50 employees
- 3- to 5-story office building: 50 to 200 employees
- Large retail building: 75 to 150 employees
- Small retail building: 2 to 10 employees

Figure 2: Heat map of projected housing growth (2014-2040)

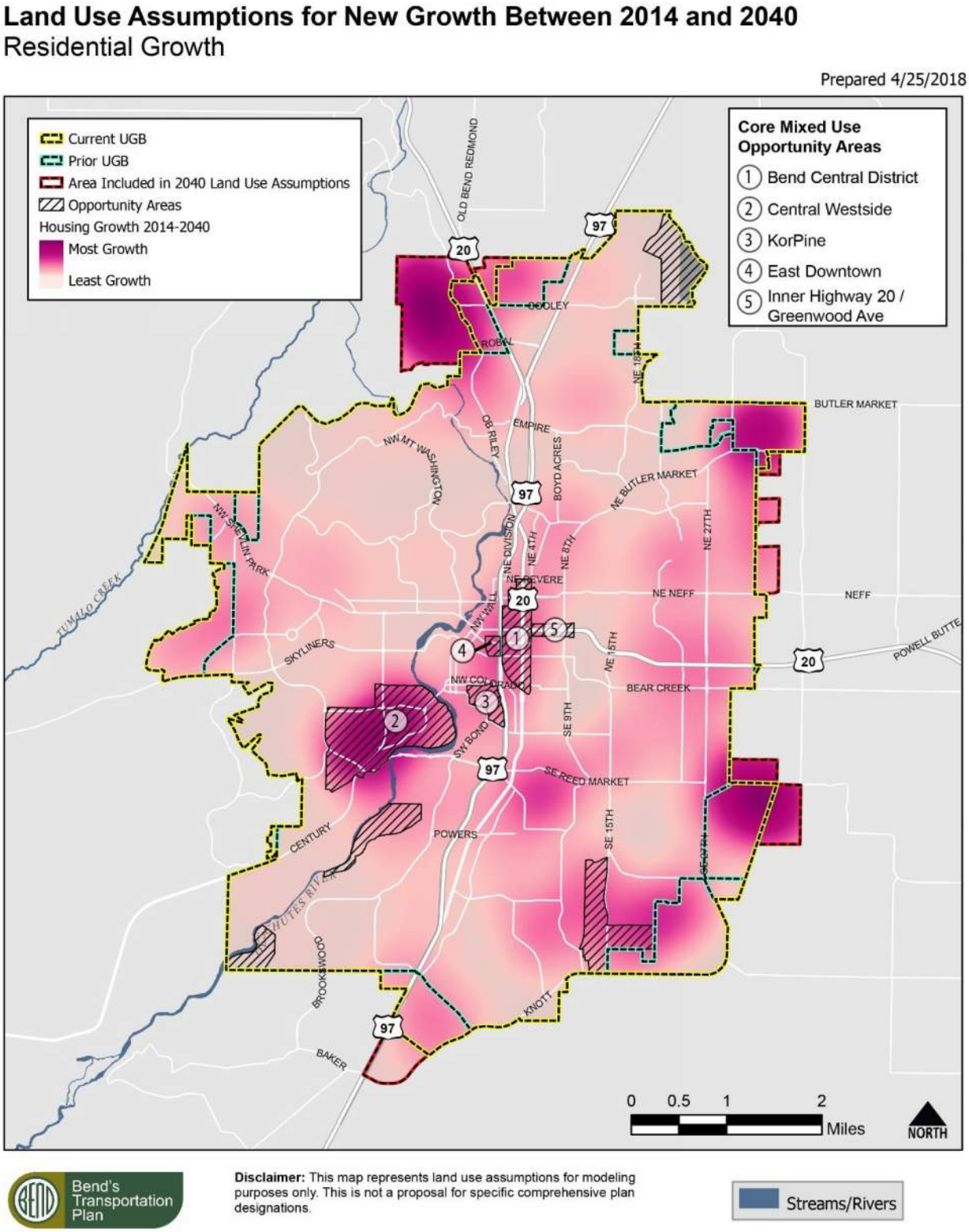
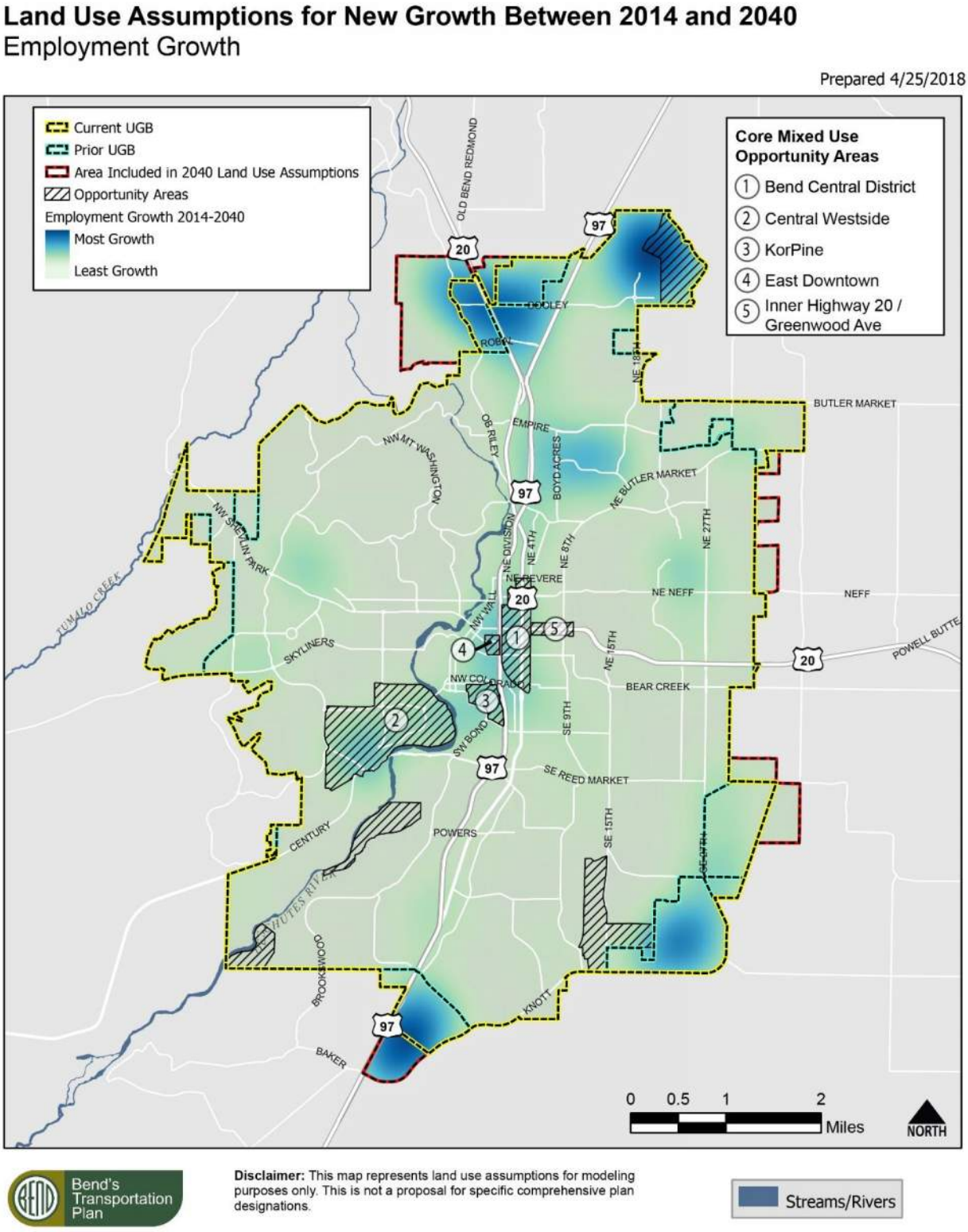


Figure 3: Heat map of projected employment growth (2014-2040)



Conclusions

The above-referenced 2040 growth projections are recommended for use in Bend's Transportation Plan, based on the following rationale and considerations:

- The amount of growth is based on and consistent with the most recent available population forecasts from PSU (March 2018 draft), which the City is required to use.
- The spatial allocations are consistent with Bend's adopted Comprehensive Plan, including the adopted Integrated Land Use and Transportation Plan.
- They are estimates of future growth, not detailed predictions or mandates, and do not commit the City to any future course of action on land use other than what is already adopted policy.
- The MPO plan must be updated every 5 years. That regular cycle provides an opportunity to regularly assess and update the land use data and forecasts. The City's Comprehensive Plan and Transportation System Plan are also updated periodically.

Appendix D - Performance Measures for Scenario Evaluation

TRANSPORTATION PERFORMANCE MEASURES FOR EVALUATING SCENARIOS

Approved by the Steering Committee – September 11, 2018

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Increase System Capacity, Quality, and Connectivity for All Users	Demand to Capacity Ratio (congestion)*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to predict where roadway segments or study intersections are at, near, or over capacity. Future alternatives would be compared to future "no build" scenario to see how ratios change. • *Monitoring:* Uses data collection program to monitor demand to capacity changes over time
	Sidewalk System Completeness	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of priority routes and type of facility proposed • *Monitoring:* Track progress towards sidewalk completeness
	Bicycle System Level of Traffic Stress	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of where comfortable bicycle routes exist, priority routes for improvement, and type of facility proposed • *Monitoring:* Track progress towards bicycle completeness
	Completeness of low-stress network	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of key low-stress bicycle routes and facilities • *Monitoring:* Track the completion of the planned low-stress network

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Ensure Safety for All Users	Reported fatal and injury crashes*	• Monitoring program *Note: Upcoming Transportation Safety Action Plan (TSAP) will identify specific safety projects*	• *Monitoring:* Reported fatal and injury crashes per year at study intersections or roadway segments
	Reported Crashes by Mode	• Monitoring program *Note: Upcoming Transportation Safety Action Plan (TSAP) will identify specific safety projects*	• *Monitoring:* Reported crashes over time citywide, along specific corridors, facility types, at specific locations, and by mode
	Qualitative Assessment of Predicted Crash Rates	• Differentiate between planning scenarios	• *Planning scenarios:* Identification of historical crash performance of various scenario features. (e.g., consideration of crash rates on 3-lane vs. 5-lane roadway corridors, potential benefits of grade-separated crossings, etc.) Information will be available when considering scenario performance.
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Vehicle Hours of Delay*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to predict vehicle hours of delay experienced by users. Future alternatives would be compared to future “no build” scenario to see how delay is changed • *Monitoring:* Uses data collection program to monitor delay along specific corridors
	Peak Hour Vehicle Miles Travelled on Rural Facilities (diversion)	• Differentiate between planning scenarios	• *Planning scenarios:* Travel demand modeling tool used to identify where travel demand increases on/diverts to rural facilities

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
	Travel Time Reliability* (Application requires scope of work modification)	• Differentiate between planning scenarios • Monitoring Program	• *Planning scenarios:* ODOT maintained tool to assess the reliability on travel times on major corridors. If travel times can be confidently predicted, drivers can plan their trips to arrive on time. Travel time reliability is especially important for freight and public transportation. Future scenarios would be compared to the future "committed" scenario to see if travel times are maintained or improved. • *Monitoring:* Use data collection program or secure data from private vendors to monitor reliability along specific corridors.
Protect Livability and Ensure Equity and Access	Measure performance through equity lens such as poverty, race, age, and disability	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Provide a "populations served" rating for projects based on existing demographics information and travel model flow information • *Monitoring:* Annual report card on transportation system to various populations
	Percentage of vulnerable populations within ¼ mile of sidewalks, bicycle facilities, or transit	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Measure proximity of vulnerable populations to multimodal facilities • *Monitoring:* Track changes to access over time.
	Employment accessibility (ex. Number of jobs that the majority of Bend residents can reach, within a reasonable timeframe. This is calculated for each mode.)	• Differentiate between planning scenarios • Monitoring program	• *Planning Scenarios*: Measure how well the transportation system enables residents to get from home to work, for whichever mode they choose to use. • *Monitoring*: Track how employment accessibility is improved over time, based on land use, demographic, and transportation changes
	Percentage of collector roads with an ADT above 4,000	• Differentiate between planning scenarios • Monitoring program	• *Planning Scenarios:* Identify collectors roads carrying more traffic than anticipated in future scenarios. • *Monitoring:* Track collector traffic volumes over time.

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Steward the Environment	Vehicle Miles Traveled Per Capita*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to estimate number and length of trips per capita. Future alternatives would be compared to future "no build" scenario to evaluate how number of trips and miles driven change. • *Monitoring:* Uses data collection program to monitor miles driven over time
Have a Regional Outlook and Future Focus	Arterial Roadway Miles with Demand to Capacity Ratio Deficiencies	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to estimate arterial roadway performance. Future alternatives would be compared to future "no build" scenario to evaluate how performance along arterials changes. • *Monitoring:* Uses data collection program to monitor congestion along arterials over time.
	Potential for alternative funding sources	• Differentiate between planning scenarios	• *Planning scenarios:* Qualitative assessment of different funding sources that may be made available by the project types for each scenario.
	Mode Split*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool will provide estimate of mode split for each scenario. • *Monitoring:* Annual reporting measure that identifies drive along, shared ride, walk, bike, and transit trips.

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Implement a Comprehensive Funding and Implementation Plan	Cost	• Differentiate between planning scenarios	• *Planning scenarios:* Planning level cost estimates for individual projects and scenario packages. Include estimate on maintenance costs.
	Roadway Lane miles	• Differentiate between planning scenarios	• *Planning scenarios:* Lane miles are intended as an indicator of demand for maintenance. Future alternatives would be compared to the future “no build” scenario.

*Recommended measures that are part of MPO planning requirements

Appendix E - Scenario Evaluation Memorandum

Scenario Evaluation Overview for CTAC

PREPARED FOR: Citywide Transportation Advisory Committee (CTAC)

PREPARED BY: DKS Associates

City of Bend Staff

DATE: November 26, 2019

Introduction

On December 4th, CTAC will review the scenario evaluation and develop a preliminary Citywide Hybrid Scenario. The team will refine the Hybrid Scenario to bring back to CTAC on December 11. At that meeting CTAC will create a recommendation for the Steering Committee's review and approval in January 2019[1]. Figure 1 describes the steps in the scenario evaluation process. Steps 1 and 2 from Figure 1 have been completed. CTAC will be asked to discuss and take action on the following (Step 3):

- Confirm Foundational Projects to add to the Baseline Projects
- Confirm Projects/Needs to address outside of the Citywide framework (in Phase 2, or as policy) or to remove from further consideration
- Provide direction on how to address needs that have significant options

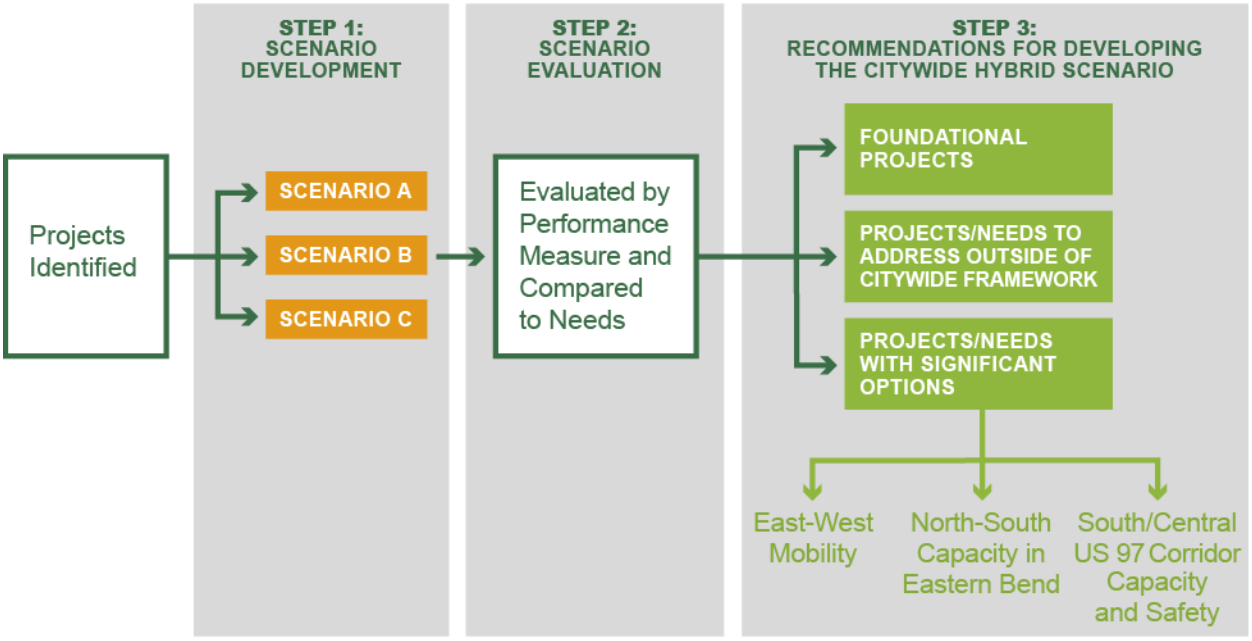


Figure 1: Process to Recommend Projects for the Citywide Hybrid Scenario

[1] As a reminder, CTAC will weigh in on project prioritization and matching funding sources to projects in spring/summer 2019. Not all projects in the Citywide framework will be funded in the next twenty years.

Step 1: Scenario Development

To help shape the Citywide transportation framework, CTAC and then the Steering Committee approved three transportation scenarios to address future needs,[2] each representing a different investment strategy. All scenarios included the Baseline Projects, comprised of the City of Bend 5-year Capital Improvement Program, Metropolitan Transportation Plan financially-constrained project list and Bend Urban Area Transportation System Plan.[3] The Baseline Projects include roadway capacity and safety enhancements as well as modernization projects to provide walking and biking connections to the Urban Growth Boundary (UGB) expansion areas (Attachment A).

Additional projects were used to create each of the following three scenarios. The scenarios were tested against the Performance Measures for each goal to learn which strategies/projects might best meet the Bend's transportation needs.

- **Scenario A: Build New Corridors.** Scenario A includes projects that focus on constructing new roads and extending existing roads, building new bridges and crossings of barriers and adding key multi-use paths.
- **Scenario B: Widen and Enhance Existing Corridors.** Scenario B includes projects that focus on widening existing corridors and upgrading them to include missing walking and bicycling facilities, without major new roadways, bridges, or paths.
- **Scenario C: Maximize the Existing Transportation System.** Scenario C maximizes the existing system with increased use of transit, technology, and transportation demand programs, without major new capital improvement projects.

Step 2: Scenario Evaluation

The project team evaluated the Scenarios using a variety of tools to determine performance with the approved scenario evaluation performance measures, as listed in Table 1 (a detailed description of the methodology and results are included in Attachment E). Table 1 compares each Scenario to the Baseline Projects alone to give a relative score for each performance measure. This analysis does not give an absolute prediction of future conditions in Bend for each scenario, instead it focuses on the comparative conditions between Scenarios. The evaluation informs the team's assessment of the types of projects or programs that best address the City's transportation needs. When looking at the high-level findings from the entire evaluation, some major lessons emerged about how different types of citywide investments perform compared to the TSP goals. Those lessons are summarized as follows:

Summary Findings

- Future motor vehicle congestion (corridor demand to capacity ratios, vehicle hours of delay, travel time reliability, etc.) could be reduced by either connectivity investments (new roads)

[2] Needs were broadly identified by the public during the June 2018 Open House and confirmed by CTAC at meeting #4 as: Safety, Capacity, Connectivity, and Access. At CTAC meeting #5, committee members reviewed projects by those need categories (www.bendoregon.gov/CTAC). A list of the key needs is provided in Attachment E, Table 24.

[3] Bend Urban Area Transportation System Plan

or roadway widening investments. Outside of reducing future congestion, each of those investment approaches would have different trade-offs for other performance measures:

  - **Pros**: Connectivity projects would improve accessibility for walking and biking, improve system safety by addressing barriers, and may reduce vehicle miles travelled (VMT) by reducing out-of-direction travel. **Cons**: Connectivity projects are costly and will increase operation and maintenance costs. These new connectivity projects will also pass through some neighborhoods that currently do not experience through traffic. As drivers choose new connections, this increased use of the new connections could affect neighborhood livability in some areas.
  - **Pros**: Roadway widening projects would enhance walking and bicycling facilities along improved roadways (safety and accessibility benefit) and focus regional traffic on arterial corridors. **Cons**: Corridor widening projects are costly and will increase operation and maintenance costs. Widening projects may also increase VMT, and may impact safety by creating higher volume/speed corridors that are difficult to cross.

- Improving walking and bicycling through Bend requires use of two related strategies: (1) filling key infrastructure gaps (sidewalks and bicycle facilities), and (2) improving overall connectivity by developing complete, connected corridors throughout the City (both along and crossing corridors).
- Demand for motor vehicle trips can be reduced by transit investments and by implementing policies and programs that encourage use of other modes (e.g., parking pricing and employer commute options).
- Concepts such as "mobility hubs"[4] have the potential to improve mobility and reduce demand for motor vehicle trips by providing first/last mile travel choices that connect to a robust regional transit system. This type of investment may also provide an opportunity to leverage public/private partnerships.
- Forecasted growth suggests that managing congestion and safety on US 97 may require changes to corridor operation and access management, such as implementing ramp meters and closing at-grade connections. Modeling indicates that these changes would have few impacts to nearby city streets.

Table 1: Scenario Performance Relative to the Baseline Projects

Project Goals	Performance Measures	Scenario A	Scenario B	Scenario C
Increase System Capacity, Quality, and Connectivity for All Users	Demand to Capacity Ratio			
	Sidewalk System Completeness			
	Bicycle System Level of Traffic Stress			

[4] Mobility hubs are physical places where different modes of travel and services converge, providing an integrated range of mobility services such as public transit, bike share, scooters, shuttles, and ride-share. This convergence of services helps to seamlessly link trips by different modes, including providing first/last mile services for regional transit connections.

Project Goals	Performance Measures	Scenario A	Scenario B	Scenario C
	Completeness of low-stress network			
Ensure Safety for All Users	Qualitative Assessment of Predicted Crash Rates			
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Vehicle Hours of Delay			
	Peak Hour VMT on Rural Facilities (diversion)			
	Travel Time Reliability			
Protect Livability and Ensure Equity and Access	Transportation Equity			
	Transit Accessibility for Vulnerable Populations			
	Employment accessibility			
	Percentage of collector roads with average daily trips above 4,000			
Steward the Environment	VMT per capita			
Have a Regional Outlook and Future Focus	Arterial Roadway Miles with Demand to Capacity Ratio Deficiencies			
	Potential for alternative funding sources			
	Mode Split			
Implement a Comprehensive Funding and Implementation Plan	Cost (capital costs)	$$$	$$$	$
	Roadway lane miles (indicator for operations and maintenance costs)			

Legend: = significant negative performance, = somewhat negative performance, = no significant change, = somewhat positive performance, = significant positive performance, **$** = less than $200 million, **$$** = $200-500 million, **$$$** = more than $500 million

Step 3: Recommendations for Developing the Citywide Hybrid Scenario

Drawing upon the findings from the scenario evaluation, the project team sorted projects from the scenarios into three categories:

1. **Foundational projects:** The project team recommends that these projects advance as part of the Citywide Hybrid Scenario since they provide a clear benefit without disproportionate trade-offs. These projects are listed in Attachment B.
2. **Projects recommended to be addressed outside of the Citywide Hybrid Scenario:** The project team recommends that these projects be addressed in one of the following ways:

- Through policy
- As neighborhood needs to be considered in Phase 2
- Deeds to be addressed through annual programmatic investments
- Set aside because they did not address an identified transportation need.

These projects are listed in Attachment C.

3. **Needs with significant project options:** The evaluation process identified a few need areas with major challenges that could be addressed in several ways. These needs areas were primarily related to locations that would be congested for motor vehicles in the future, and where potential improvements are large and complex projects with a range of tradeoffs. These need areas and options are listed in Attachment D. The project team recommends that CTAC discuss these tradeoffs to develop a recommended improvement approach.

Foundational Projects Recommended for the Citywide Hybrid Scenario

Desired CTAC action: Revise this list as needed and recommend advancing these projects to the Citywide Hybrid Scenario.

Several projects positively "moved the needle" on multiple performance measures, addressed identified needs, had limited competing alternatives, and are anticipated to have limited negative impacts or trade-offs. The project team recommends that CTAC consider adding these projects to the Baseline Projects for the Citywide Hybrid Scenario.

The recommended foundational projects are listed in Attachment B. These projects represent a range of investment types, including roadway capacity, safety, walking and biking, transit, demand management, and technology.

Projects Recommended to be Addressed Outside of the Citywide Framework

Desired CTAC action: Revise this list as needed and recommend addressing these projects outside of the Citywide framework and/or setting them aside.

The evaluation suggested that some projects may not fit into the Citywide Hybrid Scenario. Projects that are recommended to be addressed outside of the Citywide Framework generally fall into the following categories:

- Advance as neighborhood-level projects in Phase 2: These projects could have merit but did not address a Citywide need.
- Address through policy: Some projects are not likely to be warranted during the 20-year planning horizon but could be ready for project development or planning activities during the 20-year planning horizon (i.e. a northern bridge crossing of the Deschutes River) and should be captured with policy language.
- Address with programmatic investments: These would be on-going annual investments programs (i.e., a variety of smaller projects such as sidewalk infill) to help create complete, connected transportation systems.
- Set aside: These projects did not perform well when evaluated according to the performance measures, which reflect the transportation plan goals.

The projects recommended to be addressed outside of the Citywide Framework are listed in Attachment C. Identifying these projects narrows the range of options for CTAC to consider in identifying investment choices for the Citywide Framework.

Needs with Significant Project Options

Desired CTAC action: Discuss options and narrow project ideas on December 4; recommend approaches to address each need on December 11.

After accounting for the foundational projects and projects recommended to not advance to the Citywide Hybrid Scenario, three distinct need areas with major roadway capacity and congestion challenges emerged:

a) **East-West Capacity in Central Bend**: Forecasted congestion on east-west corridors in Central Bend, where limited system connectivity would focus traffic on Reed Market Road and Colorado Avenue. This need is broken into three subsets for discussion: Century Drive to 3rd Street, 3rd Street to 27th Street, and the railway switchyard.

b) **North-South Capacity in Eastern Bend**: Forecasted congestion on the Empire Avenue and 27th Street corridors could create potential diversion on the local urban and rural collector system.

c) **South/Central US 97 Corridor Capacity and Safety**: Forecasted congestion would create travel time and safety issues on the US 97 corridor. This need was broken into three subsets for discussion: major capacity options, overcrossing, and alternate route options.

The project team identified different combinations of capital improvement projects from the three scenarios that could address each need. In addition, the team identified a policy alternative to capital projects. This would be to accept a higher level of motor vehicle congestion, along with implementing the Baseline and Foundational projects. This policy concept is typically referred to as changing mobility standards.

Mobility standards (or targets) establish the level of vehicle congestion that is generally accepted on Oregon Department of Transportation (ODOT) or City facilities. These mobility standards are used in managing growth (e.g., proposed developments may need to mitigate impacts on roadways where they would cause congestion to exceed the standard) and for developing roadway projects.

Mobility standards for the City and ODOT currently measure roadway and intersection performance in terms of peak hour volume to capacity ratio and average delay per vehicle. For ODOT facilities, mobility standards are targets for peak hour volume to capacity ratios in the 30th-highest volume hour of the year. The City's standard is for an average weekday condition. Changing these standards or targets could allow more congestion in the defined peak hours (essentially raising the bar). In addition, for the ODOT facilities, the standards or targets could be modified to always look at average weekday conditions instead of 30th-highest hour conditions, and the City or ODOT could to look at the level of congestion in multiple hours (not just the peak hour of a day).

Changes to mobility standards to accept more congestion could be considered either alone or in combination with capital improvements in the need areas.

To help explain the tradeoffs for each set of project options, a subset of the performance measures was selected for comparison to the future Baseline (similar to the scenario evaluation) because they provided clear differentiation. The eight performance indicators are:

- Congestion (a combination of *demand to capacity ratio* and *vehicle hours of delay* performance measures)
- Safety
- Travel Time Reliability
- Employment Accessibility
- Mode Split
- VMT per capita
- Roadway Lane Miles (operations and maintenance cost)
- Capital Cost

Additional detail for the three need areas and the options are described in the need summary sheets in Attachment D.

List of Attachments

Attachment A: Baseline Project List and Map

Attachment B: Foundational Project List and Map

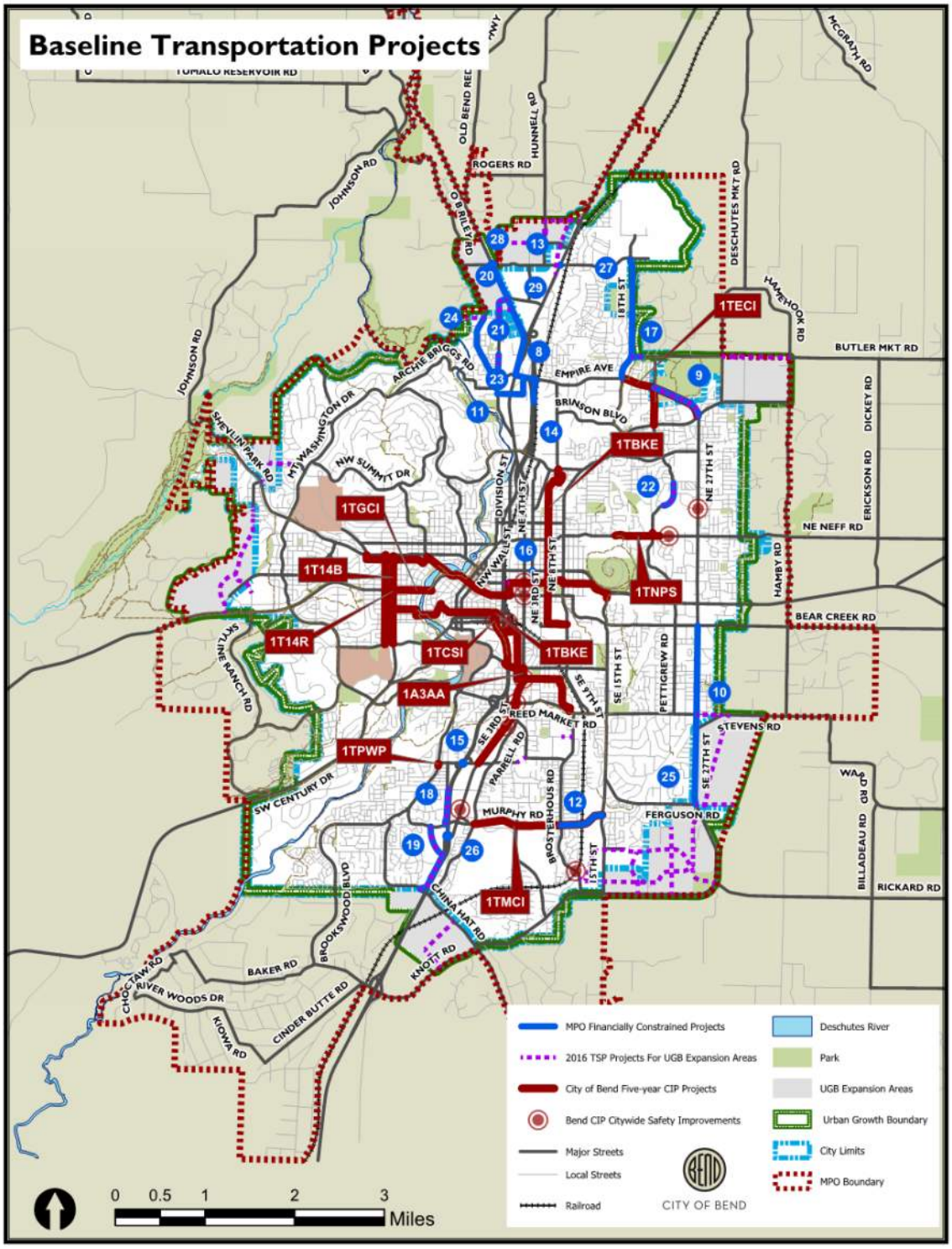
Attachment C: Projects Recommended to be Addressed Outside of the Citywide Framework

Attachment D: Needs with Significant Options

Attachment E: Detailed Technical Analysis

Attachment A: Baseline Project List and Map

Figure 1: Baseline (Bend MTP Financially Constrained and CIP) Projects[1]



[1] Baseline includes the Expansion Area transportation network that was adopted in November 2016. Some modifications of the layout may occur, as the Expansion Areas are master planned.

Figure 2: Baseline (Bend Urban Area Transportation Systems Plan Rural Road Network Upgrade) Projects

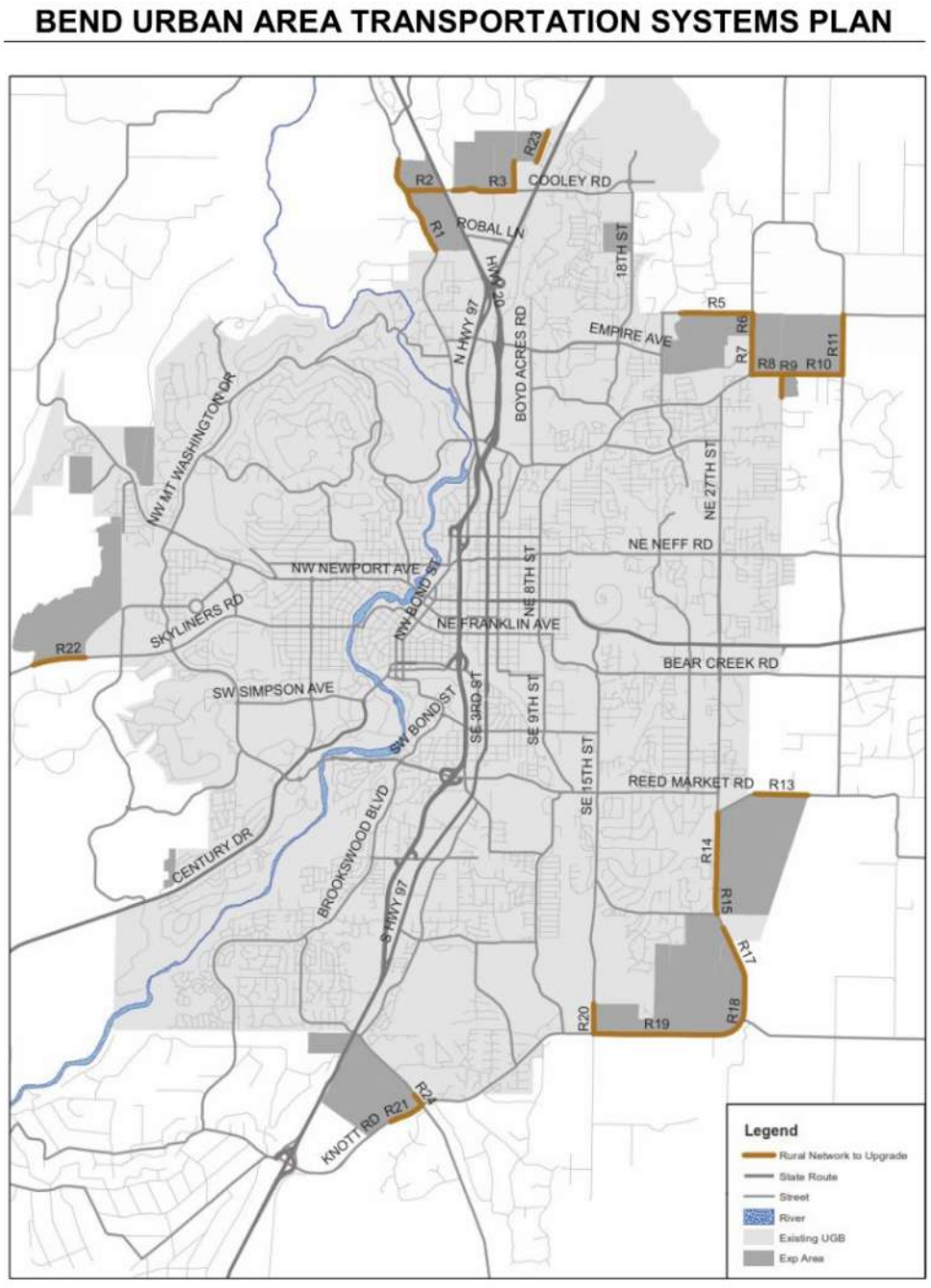


Figure 3: Baseline Scenario (Bend Urban Area Transportation Systems Plan New Roadway, Corridor and Intersection) Projects

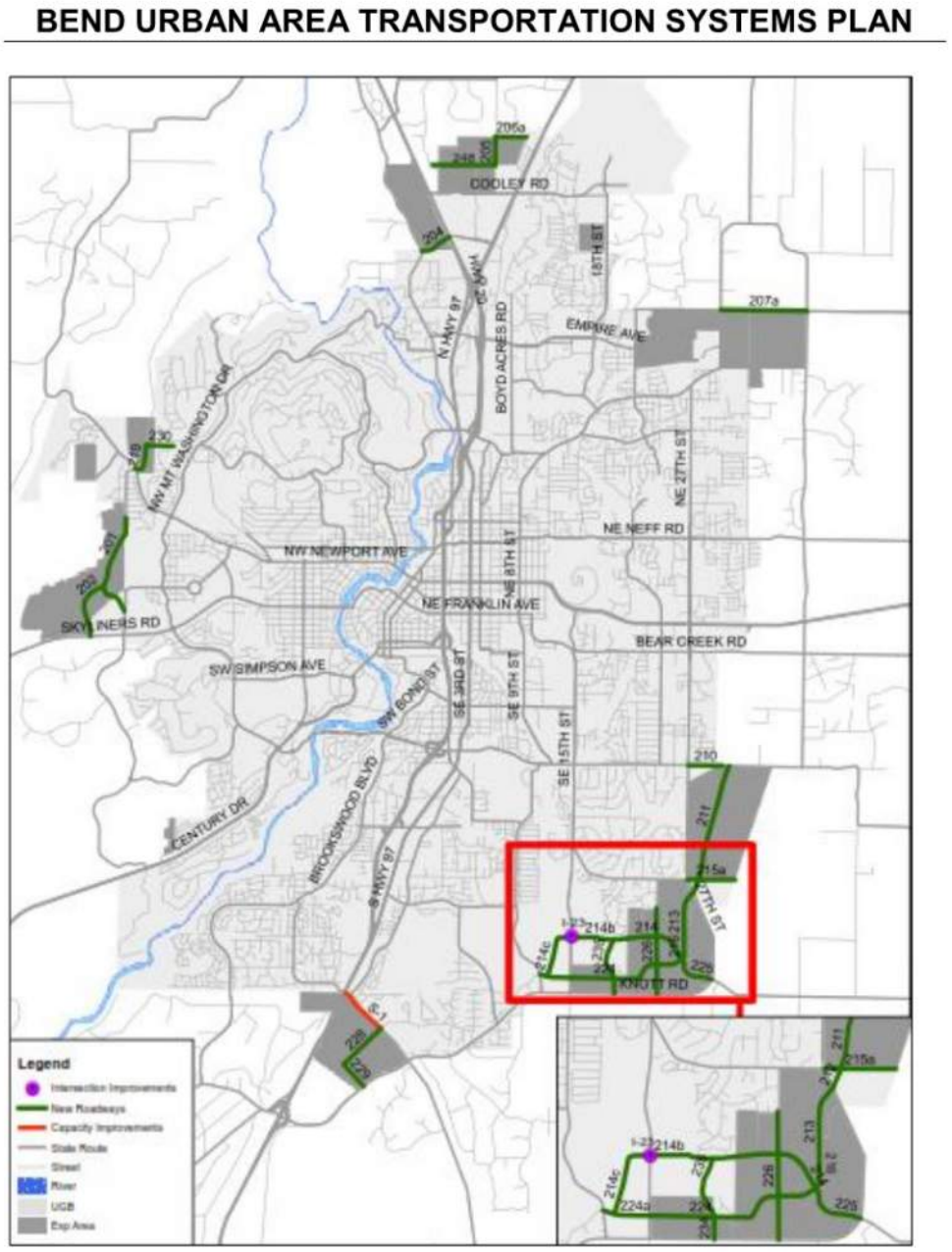


Table 1: Baseline Scenario (Financially Constrained) Project List

NUMBER	PROJECT	SOURCE
8	Empire Avenue: Widen to 5 lanes and install signal at southbound ramps	Bend MTP Financially Constrained Projects
9	Empire Avenue: Construct 2-lane extension	Bend MTP Financially Constrained Projects
10	Realign Stevens Road to connect directly to Reed Market Road	Bend MTP Financially Constrained Projects
11	O.B. Riley Road: Construct intersection control improvements	Bend MTP Financially Constrained Projects
12	Murphy Rd: Construct 2-lane extension	Bend MTP Financially Constrained Projects
13	US 97/Cooley Road area intersection and lane upgrade improvements	Bend MTP Financially Constrained Projects
14	Empire Ave: Widen existing ramp to 2 lanes	Bend MTP Financially Constrained Projects
15	US 97 Preliminary engineering and right-of-way acquisition for overcrossing or interchange	Bend MTP Financially Constrained Projects
17	Yeoman Road: Construct 2-lane extension	Bend MTP Financially Constrained Projects
18	New 2-lane North frontage road	Bend MTP Financially Constrained Projects
19	New 2-lane south frontage road	Bend MTP Financially Constrained Projects
20	Britta Street (north section): 2-lane road extension	Bend MTP Financially Constrained Projects
21	Britta Street: New 2-lane road extension	Bend MTP Financially Constrained Projects
22	Purcell Boulevard: New 2-lane road extension	Bend MTP Financially Constrained Projects
23	Mervin Samples Road to Sherman Road. Upgrade to 2-lane collector roadway and install traffic signal at US 20	Bend MTP Financially Constrained Projects
24	O.B. Riley Road. Upgrade to 3-lane arterial	Bend MTP Financially Constrained Projects
25	27th Street. Upgrade to 3-lane arterial	Bend MTP Financially Constrained Projects
26	US 97. Construct northbound on-ramps and southbound off-ramps	Bend MTP Financially Constrained Projects
27	18th Street. Complete 3-lane arterial corridor	Bend MTP Financially Constrained Projects
28	US 20. Construct intersection control improvements	Bend MTP Financially Constrained Projects
29	Add second southbound through lane on US 20	Bend MTP Financially Constrained Projects
1TMCI	Murphy Corridor Improvements	City of Bend Five-year CIP Projects
1TECI	Empire Corridor Improvements	City of Bend 2018-2023 CIP Projects

NUMBER	PROJECT	SOURCE
1TBKE	Bicycle Greenways	City of Bend 2018-2023 CIP Projects
1A3AA	South 3rd Street Pedestrian Improvements	City of Bend 2018-2023 CIP Projects
1TNPS	Neff and Purcell Intersection (Formerly Neff and Purcell Sidewalk)	City of Bend 2018-2023 CIP Projects
1TPWP	Powers and Brookswood Roundabout Phase II	City of Bend 2018-2023 CIP Projects
1TGCI	Galveston Corridor Improvements	City of Bend 2018-2023 CIP Projects
1T14B	14th Street Reconstruction Schedule B	City of Bend 2018-2023 CIP Projects
1T14R	14th Street Reconstruction	City of Bend 2018-2023 CIP Projects
1TCSI	Citywide Safety Improvements	City of Bend 2018-2023 CIP Projects
R1	O.B. Riley Road. Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R2	Cooley Road. Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R3	Cooley Rd. Curbs and sidewalk on north side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R4	Hunnell Road. Sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R5	Yoeman Road. Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R6	Deschutes Market Road. Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R7	Deschutes Market Road. Curb and sidewalk on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R8	Butler Market Road. Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R9	Butler Market Road. Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R10	Butler Market Road. Curb and sidewalk on north side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R11	Butler Market Road. Curbs and sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R12	Eagle Road. Curb, sidewalk, and bike lane on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades

NUMBER	PROJECT	SOURCE
R13	Stevens Road. Curbs, sidewalks, and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R14	Southeast 27th Street. Curb, sidewalk, and bike lane on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R15	Southeast 27th Street. Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R16	Southeast 27th Street. Curb and sidewalk on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R17	Southeast 27th Street. Curb and sidewalk on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R18	Southeast 27th Street. Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R19	Knott Road. Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R20	15th Street. Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R21	Knott Road. Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R22	Skyliners Road. Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R23	Clausen Drive. Sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R24	China Hat Road. Sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R25	China Hat Road. Widen bridge to include sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R26	Deschutes Market Road. Widen bridge to include sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
201	Skyline Ranch Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
202	Crossing Drive Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
204	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
205	Hunnell Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
206A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections

NUMBER	PROJECT	SOURCE
207A	Yeoman Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
210	New collector roadway to Stevens	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
211	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
212	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
213	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214B	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214C	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
215A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
216	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
219	Skyline Ranch Road	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
224	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
224A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
225	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
226	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
228	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
229	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
230	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
234	Raintree Court Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections

NUMBER	PROJECT	SOURCE
235	Raintree Court Extension North	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
248	Loco Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
S-1	Corridor improvement, China Hat, widen from 2 to 3 lanes	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
I-23	Roundabout at Murphy Road/Southeast 15th Street	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections

Attachment B: Foundational Project List and Map

Table 1: Foundational Projects to Advance to the Hybrid Scenario

Numbers	Project Descriptions	Cost	Key Measures Improved
A-1	Hawthorne Avenue Grade-Separated Crossing at US 97 and railroad (with additional bicycle and pedestrian improvements from Harriman to 1st Street*)	$$$$	Safety, sidewalk system completeness, completeness of the low-stress network, employment accessibility
A-6	US 97 North Parkway Extension including all improvements in the FEIS improvements	$$$$$$$	Safety, travel time reliability, congestion
A-8	Powers Road/US 97 interchange[1]	$$$$$	Safety, travel time reliability, congestion
A-10	US 97 Bicycle and Pedestrian Overcrossing at Badger Road (with additional bicycle and pedestrian improvements to Blakely Road*)	$$$$	Safety, sidewalk system completeness, completeness of the low-stress network, employment accessibility
A-11	3rd Street Multi-Use Path (A-11)	$$$	Safety, sidewalk system completeness, employment accessibility
A-12, A-14, C-6	Robal Road pedestrian and bicyclist improvements	$$$$$	Safety, sidewalk system completeness, completeness of the low-stress network, employment accessibility
B-3	Wilson Avenue protected bicycle facilities	$$	Low stress bicycle network
B-6*	Bicyclist/Pedestrian railroad grade-separated crossing on 6th Street	$$$$	Low stress bicycle network
B-17, B-20, B-21, C-7	Intersection safety and capacity improvements	$$$$$	Safety
B-18.a*	27th Street/Knott enhanced pedestrian and bicycle facilities	$$$	Low stress bicycle network
B-19	Hamby Road widening (from Stevens Road to Butler Market Road), including a roundabout at US 20	$$$$$$	Safety
B-25	Widen Bond/Reed Market Roundabout	$$$	Congestion
B-26	Railroad undercrossing on Brosterhous	$$$$$	Low stress bicycle network
B-27	Left turn lanes on Reed Market at 3rd Street	$$$	Safety, congestion
C-2, C-3, C-13	High capacity transit on Newport/Greenwood and 3rd Street, with mobility hubs	$$$$	Mode split, employment accessibility, equity, VMT per capita, congestion
C-9	US 97 Northbound/Colorado Avenue	$$$	Safety, congestion
C-10	Reduce turn movements at the Reed Market Road/US 97 northbound ramps	$	Safety, congestion
C-16	TMAs for key regional centers (consider a TDM policy for major employers/ institutions*)	$	Mode split, congestion, VMT per capita, congestion

[1] Pending feasibility from the US 97 Parkway Study

Numbers	Project Descriptions	Cost	Key Measures Improved
C-19	Improve traffic signal coordination on signalized corridors, including freight and transit signal priority on designated corridors	$$	Safety, congestion
C-20	Parking pricing downtown	$$	Mode split, congestion, VMT per capita
C-21	Traffic signal priority for freight and transit at signalized intersections on US 97	$$	Safety, congestion
LSN-1*	Olney/Wall traffic signal modification and rail crossing surfacing work	$	Low stress bicycle network
LSN-2*	Butler Market bicycle facilities, west of Brinson Ave	$$$	Low stress bicycle network
LSN-3*	Wilson from 15th Street to the railroad, with Wilson/3rd Street intersection improvements	$$	Low stress bicycle network
LSN-4*	Brosterhous from Parrell to Brentwood, with canal bridge	$$	Low stress bicycle network

* Project modified or added based on evaluation results. The Project Description column contains details.

Notes:

$ - Less than $500,000

$$ - $500,000 to $1 million

$$$ - $1 million to $5 million

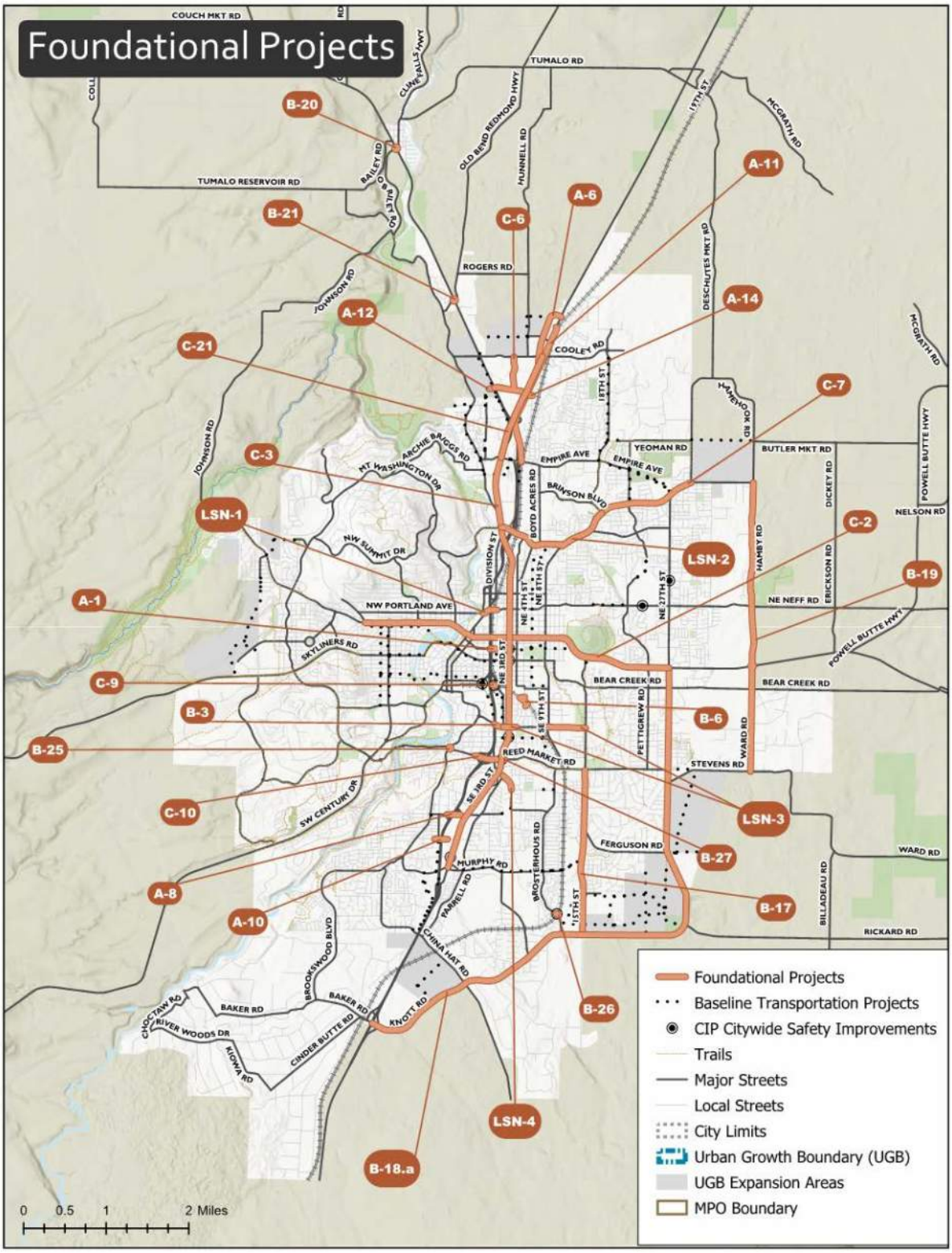
$$$$ - $5 million to $10 million

$$$$$ - $10 million to $50 million

$$$$$$ - $50 million to $100 million

$$$$$$$ - Greater than $100 million

Figure 1: Foundational Project Map



Attachment C: Projects Recommended to be Addressed Outside of the Citywide Framework

Neighborhood Level Projects for Phase 2 Evaluation

Table 1: Projects to Address at the Neighborhood Level

Number	Project	Notes
A-15	Trail connection from Colorado Avenue towards Division Street	More suited for neighborhood discussion with downtown stakeholders
A-17	Aune Road Extension to 3rd Street	For bicyclists, this is best if paired with widening 3rd Street under the railroad (B-29)
B-1	Greenwood Avenue protected bike facility	This would require the remainder of Greenwood to be made low-stress, which could be difficult to implement due to road width and parking uses
B-2	Revere Avenue bicycle facilities	Establishing a low-stress bike connection on Olney would be more practical; consider LSN-1 instead
B-4	US 20 protected bicycle facilities	Bear Creek bicycle facilities (B-24) would provide an alternate and quieter route that may be more practical to achieve
B-5	Franklin Avenue protected bicycle undercrossing of US 97	Could be a key low-stress bicycle network (LSBN) route in place of Hawthorne Avenue
B-13	Neff Road protected bike facilities and enhanced crossing from 8th to Purcell.	This is facility is impractical due to the width, slope, and curve of the road, and alternate routes exist
B-14	Greenwood Avenue enhanced crossings	Parts of this project are already programmed by ODOT, but surrounding road segments could be considered
B-23	Portland Avenue intersection improvements	This should include consideration of intersection at NW College
B-30	Protected bicyclist/pedestrian routes on Century Drive.	The Haul Road Trail and the Skyline Ranch Trail, plus recent 14th Street improvements, provide LTS 1 or 2 connectivity for bikes for almost all this project area, though this is not always a protected facility. Remaining sections that are high-stress: 14th from Portland to Newport, and an improved crossing to connect those two trails.
B-31	Portland Avenue-Olney Avenue protected bicycle facilities	This road is already LTS 2, but speed limit enforcement may improve safety
C-1	Greenwood Avenue road diet from Bond to 3rd Street	Would likely result in an LTS 3 facility, which is still high-stress for bicyclists
C-11	Convert Wall to southbound one-way from Bond to Newport	More suited for neighborhood discussion with downtown stakeholders

Policy Approach

Table 2: Projects to Advance through Policy

Number	Project	Rationale	Next Step
A-2	Cooley Road Extension	Limited traffic attraction	Consider in the future if the regional Redmond to Bend 19th Street Corridor Project is advanced
A-21	Grade separate rail crossings	Not a likely project for the citywide framework, but could be an action/policy to advance for future corridor planning	Address in policy within the TSP
C-8	Implement transit service on Butler Market	Not much attraction to transit on Butler	CET plan
C-14	Enhanced transit to Sunriver, LaPine, Tumalo/Sisters, Redmond	Does not move the needle for Bend	CET plan
C-17	20-mile-per-hour speed limit on streets in and approaching downtown	Not currently permissible by the City	Address in policy within the TSP
C-18	Increase transit service frequency to 10 minutes	Beyond Greenwood Avenue and 3rd Street, not sufficient demand to warrant 10-minute headways	CET Plan

Programmatic Approach

During the analysis, it became apparent that some of the future needs of Bend would be better served by a programmatic annual incremental improvement approach, as opposed to a patchwork of major capital projects. Two programmatic approaches were identified:

- Completing the low-stress bicycle network
- Creating a sidewalk infill program.

For bicycles, certain projects were identified as being high-performing projects for improving bicycle connectivity and critical regional investments for advancing the low-stress bicycle network. These key projects were identified as part of the foundational project list in Attachment B. Other bicycle-specific projects in the scenarios were identified as being desirable but not essential from a **regional** connectivity standpoint and are therefore identified in Table 1 for discussion at the neighborhood level in Phase 2 of the work program.

In addition, a number of bicycle projects at a local level would need to be implemented to create the complete low-stress bicycle network plan the City has developed. Due to the local and smaller scale nature of these projects, an annual investment program that provides the City with flexibility to prioritize projects each year and leverage the investments when possible with nearby projects or developments would be beneficial.

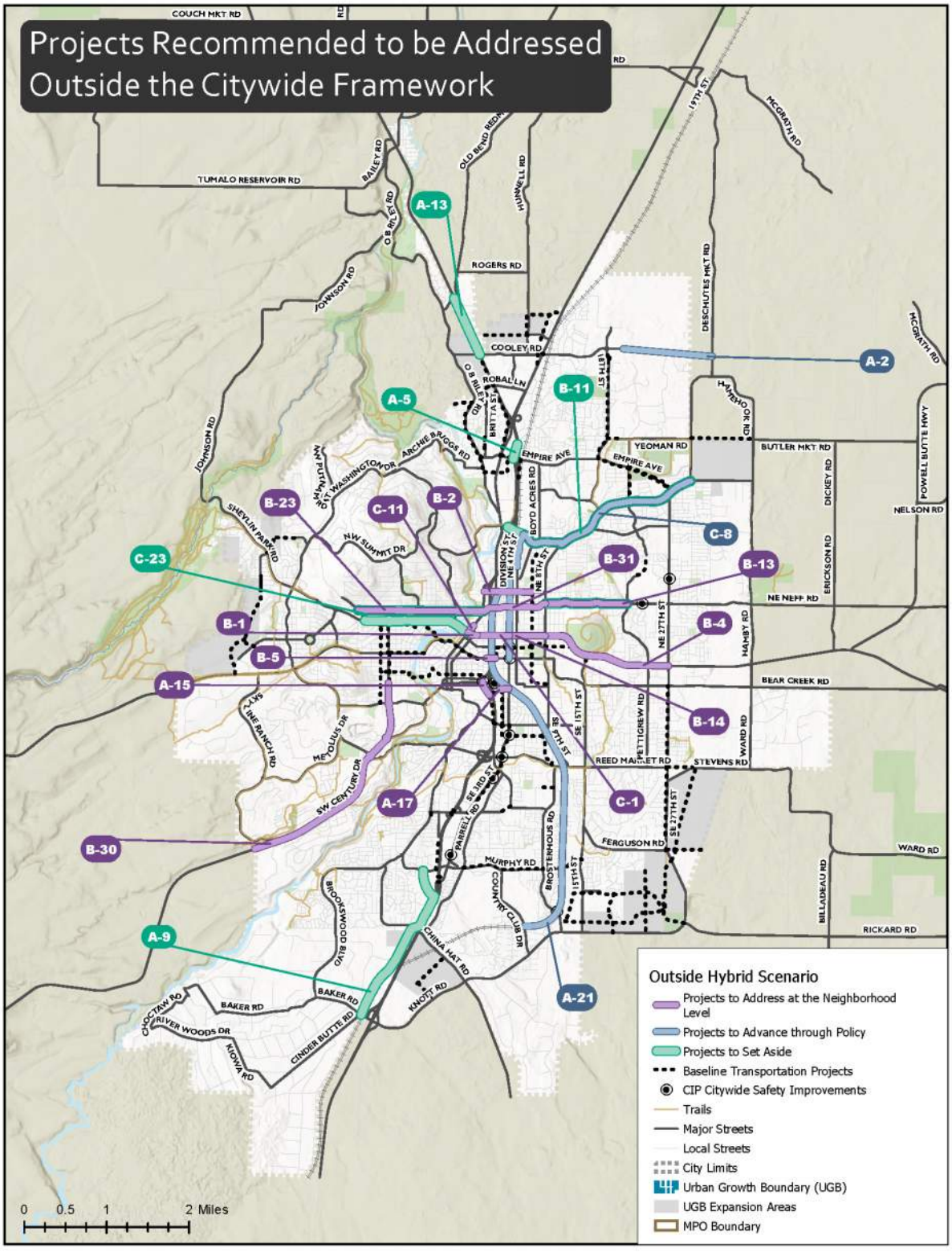
CTAC identified a need for sidewalk completeness. A number of the Foundational Projects would help complete the City's sidewalk network since all arterial and collector construction will include pedestrian facilities. However, the City is challenged to provide sidewalks on local streets where they are missing or in poor condition. Some sidewalk infill occurs as part of new development, as road frontage improvements. However, there is no other consistent and adequate funding for neighborhood-level sidewalk infill or reconstruction. A programmatic approach such as a shared local improvement district or annual investment program could begin to address the City's sidewalk infill needs.

Projects to Set Aside

Table 3: Projects to Set Aside

Number	Project	Rationale	Next Step
A-5	US 97/ Empire Avenue Southbound off-ramp	Not consistent with the US 97 North Parkway FEIS and no significant traffic attraction	US 97 Parkway Study may examine this further
A-9	US 97/Murphy frontage road	No traffic attraction	Eliminate from further consideration
A-13	US 20 Multi-Use Path (between Cooley Road and Old Bend-Redmond Highway)	No significant demand	Eliminate from further consideration
B-11	Butler Market Road widening	No traffic attraction	Eliminate from further consideration
B-13	Neff Road protected bike facilities and enhanced crossing from 8th to Purcell (B-13)	LSN includes Revere Avenue as key route	Advance only piece of Neff from Lark Spur Trail to 12th as part of the LSN
C-23	One way on Newport and Portland	Increases trip length and VMT, has impacts on downtown traffic	Eliminate from further consideration

Figure 1: Projects to Address Outside of the Citywide Framework



Attachment D: Needs with Significant Options

Legends for Attachment D:

$ - Less than $500,000
$$ - $500,000 to $1 million
$$$ - $1 million to $5 million
$$$$ - $5 million to $10 million
$$$$$ - $10 million to $50 million
$$$$$$ - $50 million to $100 million
$$$$$$$ - Greater than $100 million

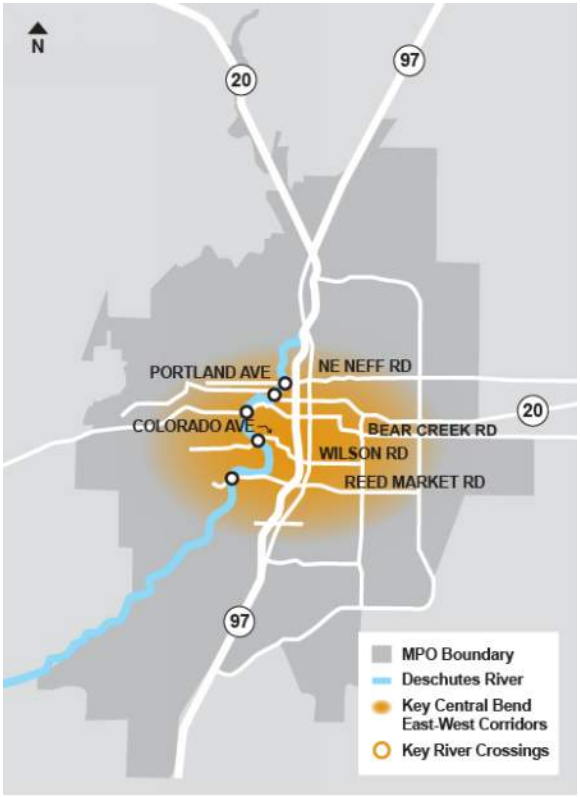
= significant negative performance
= somewhat negative performance
= no significant change
= somewhat positive performance
= significant positive performance

East-West Capacity in Central Bend Need

Central Bend's east-west roadway capacity is limited by the current connections used to cross the Deschutes River, the railroad, and US 97. Many of these roadways are forecasted to be extremely congested by 2040. Even with the Baseline and recommended foundational projects, peak hour demand could exceed roadway capacity by up to 60 percent. The analysis indicates that this level of demand would result in significant congestions impacts, such as:

- Peak hour levels of congestion would spread to multiple hours of the day.
- Travel times across Bend during the congested hours would be significantly less reliable. For example, a driver planning a trip along Reed Market Road that takes 20 minutes under light traffic conditions would need to plan for a 33-minute trip to ensure on-time arrival.
- Traffic would likely back-up from US 97/Reed Market Road interchange onto US 97 during peak hours, causing safety and congestion impacts on US 97.
- The Burlington North Santa Fe (BNSF) railroad switchyard, near Reed Market Road, would continue to cause extensive delay and unreliability. This effect would be compounded with the level of forecasted congestion, limiting the ability of drivers to take alternate routes around a train crossing event and significantly increasing the time it would take for vehicle queues along Reed Market Road to clear after a train crossing event.

East-West Capacity in Central Bend Need Area



While none of the scenarios or projects fully addressed east-west capacity needs, the model indicates that several combinations of projects could improve east-west capacity in this area of Bend. The east-west capacity need is divided into three subsets for discussion: Century Drive to 3rd Street, 3rd Street to 27th Street, and Railway switchyard.

East-West Capacity in Central Bend Need: Century Drive to 3rd Street

East -West Capacity in Central Bend Need: Century Drive to 3rd Street		
OPTION 1	**OPTION 2**	**OPTION 3**
Colorado Avenue Widening (*B-8*) Powers River Crossing (*A-4*)	Reed Market Widening from Century to 3rd (*B-7, B-15*) Reconstruct US 97/Reed Market Interchange	Only implement Baseline and foundational projects and adopt policies that allow for more congested conditions in some locations

Option 1: Widening the Colorado Avenue from Simpson to Arizona to 5 lanes would help reduce east-west congestion in the short term. In the long term, building a new Powers River Crossing could help reduce vehicle miles traveled (VMT) per capita by providing additional connectivity in southern Bend (reducing out-of-direction travel). It could also reduce congestion along the Reed Market corridor.

CHALLENGES: The Powers River Crossing would require mitigation of environmental and neighborhood impacts. Widening Colorado Avenue could impact bicycle and pedestrian safety, although appropriate design (e.g., flashing beacons and pedestrian median refuges) could mitigate this.

Option 2: Widening Reed Market Road to 5 lanes between Century Drive and 3rd Street would reduce congestion. The US 97/Reed Market Road interchange would need to be redesigned to accommodate the increase in volumes.

CHALLENGES: Widening Reed Market Road would contribute to an increase in VMT per capita. Widening Reed Market Road and modifying the interchange would require significant right-of-way acquisition and would be costly. Five-lane roadways typically have higher vehicle crash rates than 3-lane roadways. Wider roads would also make crossings more challenging and potentially less safe, although appropriate design (e.g., flashing beacons, pedestrian median refuges, under or over crossings) could mitigate this.

Option 3: Rely solely on the foundational (widening the Reed Market/Bond roundabout, adding turn lanes at Reed Market/3rd Street) and Baseline projects. Would likely require an acceptance of higher levels of congestion through new mobility standards.

CHALLENGES: As growth occurs, users would experience increased congestion and less reliable travel times.

Century Drive to 3rd Street Options Performance [1]			
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**	**OPTION 3**
Congestion [2]			
Safety			
Travel Time Reliability			
Employment Accessibility			
VMT per Capita			
Roadway Lane Miles (O&M Cost)			
Capital Cost	$$$$$$$	$$$$$$	$$$

[1] Comparison against the Baseline

[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio, vehicle hours of delay, and arterial roadway miles with demand-to-capacity ratio deficiencies.

East-West Capacity in Central Bend Need: 3rd Street to 27th Street

East -West Capacity in Central Bend Need: 3rd Street to 27th Street		
OPTION 1	**OPTION 2**	**OPTION 3**
Wilson Road Extension (*A-19*)	Reed Market Widening (*B-16*)	Only implement Baseline and foundational projects and adopt policies that allow for more congested conditions in some locations

Option 1: As a collector corridor, the Wilson Road Extension from 15th Street to Pettigrew would provide greater connectivity to the east and draw traffic away from the congested Reed Market corridor. This extension would provide an opportunity for enhanced pedestrian and bicycle access in the area.

CHALLENGES: Construction of the Wilson Road Extension would have neighborhood impacts to address.

Option 2: Reed Market widening from 3rd Street to 27th Street would provide significant congestion relief along Reed Market and other east-west corridors in Bend. Widening Reed Market would draw traffic from US 20, Bear Creek Road, and Wilson Road.

CHALLENGES: Widening Reed Market would have right-of-way and property acquisition challenges. Five-lane roadways typically have higher vehicle crash rates than 3-lane roadways. Wider roads would also make crossings more challenging and potentially less safe, although appropriate design (e.g., flashing beacons, pedestrian median refuges, under or over crossings) could mitigate this.

Option 3: Rely solely on the foundational and Baseline projects advancing to the hybrid, which would have limited benefit to the Reed Market Road corridor east of 3rd Street. This would likely require adopting mobility standards to accept higher levels of congestion.

CHALLENGES: As growth occurs, users would experience increased congestion and less reliable travel times.

3rd Street to 27th Street Options Performance [1]			
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**	**OPTION 3**
Congestion [2]			
Safety			
Travel Time Reliability			
Employment Accessibility			
VMT per Capita			
Roadway Lane Miles (O&M Cost)			
Capital Cost [3]	$$$$	$$$$$$	N/A

[1] Comparison against the Baseline

[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.

[3] The cost for Option 3 is listed as not applicable (N/A) for this need area, as there are no foundational projects with significant motor vehicle capacity benefit in this need area. Option 2 is identified as higher cost than Option 1 due to the longer length of the improvement and the right-of-way acquisitions that would be required along the corridor to widen to 5 lanes.

East-West Capacity in Central Bend Need: Railway Switchyard

East -West Capacity in Central Bend Need: Railway Switchyard		
OPTION 1	**OPTION 2**	**OPTION 3**
Relocate BNSF Switchyard *(C-24)*	Reed Market Road railroad overcrossing *(A-16)*	Do not implement a specific project and accept switchyard-related congestion

Option 1: Trains maneuvering in the switchyard or parking can block Reed Market Road for extended periods of time. The City does not have the ability to regulate the times of day or duration of railroad crossing closures. These delays could be mitigated by relocating the BNSF switchyard outside of Bend.

CHALLENGES: Relocating the switchyard would be costly. The cost of relocation would likely fall to the City (not the railroad), even though the new switchyard would likely be outside of the City and MPO boundary. BNSF approval and partnership would be required to complete the project.

Option 2: Grade-separating Reed Market Road would improve reliability on Reed Market Road by removing conflicts with the railroad. This would improve safety and reliability for pedestrian, bicycle and vehicular traffic.

CHALLENGES: Grade-separation would be costly and could have significant connectivity impacts. Because the new overcrossing would need to meet clearance requirements over the railroad, Reed Market Road would likely not connect directly to American Lane and 9th Street.

Option 3: Rely solely on the foundational and Baseline projects advancing to the hybrid, which would have limited impact on the unreliability associated with the railway switchyard.

CHALLENGES: Users would continue to experience unreliable travel times associated with the railway switchyard use.

Railway Switchyard Options Performance [1]			
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**	**OPTION 3**
Congestion [2]			
Safety			
Travel Time Reliability			
Employment Accessibility			
VMT per Capita			
Roadway Lane Miles (O&M Cost)			
Capital Cost [3]	$$$$$$	$$$$$	N/A

[1] Comparison against the Baseline

[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.

[3] The cost for Option 3 is listed as N/A for this need area, as there are no foundational projects with significant benefit to the railroad crossing need.

North-South Capacity in Eastern Bend Need

In eastern Bend, there are only a handful of corridors that provide north-south connectivity. The travel model shows that capacity challenges would be most noticeable along 27th Street. Long stretches of 27th Street would be significantly over capacity by 2040, with demand exceeding capacity by nearly 20 percent in some locations, leading to multiple hours of congestion and spreading of traffic onto surrounding roadways. Along Empire Boulevard and 27th Street, this level of congestion would significantly affect travel time reliability and could make a 20-minute trip take up to nearly 40 minutes during congested times.

North-South Capacity in Eastern Bend Need	
OPTION 1	**OPTION 2**
Empire Boulevard/27th Street widening from Boyd Acres Road to Reed Market Road (*B-12, B-18b, B-22*)	Only implement Baseline and foundational projects and adopt policies that allow for more congested conditions in some locations

Option 1:

Widening Empire Boulevard and 27th Street to 5 lanes would reduce congestion and improve reliability. The added capacity would draw traffic from parallel corridors including Brinson Boulevard, Butler Market Road, Purcell Boulevard, 15th Street, and Hamby Road. This could represent both a congestion and safety/livability benefit on those corridors.

CHALLENGES: Five-lane roadways typically have higher vehicle crash rates than 3-lane roadways. Wider roads would also make crossings more challenging and potentially less safe, although appropriate design (e.g., flashing beacons, pedestrian median refuges, under or over crossings) could mitigate this. Widening Empire Boulevard and 27th Street could have right-of-way impacts and a high cost.

Option 2:

Relies solely on the foundational (safety/capacity improvements at key intersections along 15th Street and Hamby Road) and Baseline (including the Purcell connection near Holliday Avenue) projects. This would likely require adopting mobility standards to accept higher levels of congestion.

CHALLENGES: These projects would have limited benefits to north-south mobility and would not address regional congestion issues. As growth occurs, users would experience increased congestion and less reliable travel times.

North-South Capacity in Eastern Bend Option Performance [1]		
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**
Congestion [2]		
Safety		
Travel Time Reliability		
Employment Accessibility		
VMT per Capita		
Roadway Lane Miles (O&M Cost)		
Capital Cost [3]	$$$$$$$	$$$$$$

[1] Comparison against the Baseline

[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.

[3] The Capital Cost for Option 2 includes foundational projects that would add roadway capacity benefit to this area.

South/Central US 97 Corridor Capacity and Safety

Long stretches of US 97 from Murphy Road to Empire Boulevard are forecasted to be at or over capacity by 2040. In some places on south/central US 97, the travel model shows demand would exceed capacity by nearly 10% during a typical weekday peak hour, which means that drivers would experience longer periods of congestion on a typical weekday. This level of congestion would impact travel time reliability and could make a 15 minutes trip take more than 20 minutes during congested times. In addition, this level of demand could significantly degrade the operations and safety of the at-grade connections of local streets onto US 97 where on/off maneuvers would be more difficult with the high levels of traffic volume.

In addition to congestion and safety issues on average weekday, seasonal traffic peaks increase volumes on US 97 by 20% to 30%. The US 97 Parkway Study has evaluated this 30th-highest hour traffic demand condition, where demand could exceed capacity by 30% to 40%, in detail and found that there could be much more significant delay and travel time reliability impacts along US 97 where on-ramp merges or weaves between ramps would create back-ups on US 97. In addition, the seasonal peak demand would create congestion at the US 97 interchanges and nearby arterial intersections on 3rd Street, with traffic queues likely backing up along the off-ramps and onto the US 97 mainline, creating significant safety and congestion challenges.

South/Central US 97 Corridor Capacity and Safety Need

Several combinations of projects could improve south/central US 97 corridor capacity and safety in Bend. This need is broken into three subsets for discussion: major capacity options, overcrossing, and alternate route option.

South/Central US 97 Corridor Capacity & Safety Need: Major Capacity Options

South/Central US 97 Corridor Capacity and Safety Need: Major Capacity Options		
OPTION 1	**OPTION 2**	**OPTION 3**
Close at-grade US 97 access and add ramp metering *(C-5, C-22)*	Add auxiliary lanes to US 97 *(B-10)*	Only implement Baseline and foundational projects and adopt policies that allow for more congested conditions in some locations

Option 1: Ramp metering would clear congestion on the south/central Parkway to a manageable level, with only a short stretch of roadway still over capacity in 2040. The removal of at-grade access points along this stretch of roadway would be a safety improvement over the Baseline. While the ramp metering and access closures would divert some traffic off US 97 to the local network, that impact would be spread across the network and would not increase volume significantly at any one location.

CHALLENGES: Would spread traffic to less congested corridors and would reduce business access near the at-grade closures. Cost implications are currently unknown. Could lead to traffic operations challenges at ramp terminal intersections from queue spillback.

Option 2: The addition of a southbound auxiliary lane (from Empire Boulevard to Butler Market Road) would increase capacity and decrease congestion on the segment of US 97 between Empire Boulevard and Butler Market Road. Could provide a safety benefit by extending the merge distance for southbound vehicles. The Parkway Study may identify additional locations where an auxiliary lane would be feasible. This would likely require adopting mobility standards to accept higher levels of congestion.

CHALLENGES: Limited benefit area (congestion would persist outside of auxiliary lane locations).

Option 3:
Relies solely on the foundational (Powers Interchange) and Baseline projects, which will not significantly impact south/central US 97 corridor capacity and safety. This would likely require adopting mobility standards to accept higher levels of congestion.

CHALLENGES: The Baseline and foundational projects would have minor impacts, without solving the larger regional capacity issues. As growth occurs, users would experience increased congestion and less reliable travel times.

South/Central US 97 Corridor Capacity and Safety Major Capacity Options Performance [1]			
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**	**OPTION 3**
Congestion [2]	⇈	^	^
Safety	⇈	^	^
Travel Time Reliability	⇈	^	^
Employment Accessibility	–	–	–
VMT per Capita	^	–	–
Roadway Lane Miles (O&M Cost)	–	v	–
Capital Cost [3]	*	$$$$$	$$$$$

[1]Comparison against the Baseline
[2]Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.
[3]The Capital Cost for Option 3 includes foundational projects that would add roadway capacity benefit to this area.
*Note: The capital costs of ramp metering is not known until further evaluation is completed by US 97 Parkway Study.

South/Central US 97 Corridor Capacity & Safety Need: Overcrossing

South/Central US 97 Corridor Capacity and Safety Need: Overcrossing	
OPTION 1	**OPTION 2**
Ponderosa Street/China Hat Road overcrossing *(A-3)*	Only implement Baseline and foundational projects

Option 1: The Ponderosa Street/China Hat Road overcrossing would connect an area of large expected household growth with an area of large employment growth (as well as potential school sites). Benefits include bicycle and pedestrian connectivity, as well as improved safety and reliability along US 97.

CHALLENGES: While the China Hat overcrossing provides the above benefits, the removal of access to US 97 also has the potential to divert traffic to Parrell Road. This project could also be an expensive option for providing additional neighborhood connectivity over US 97.

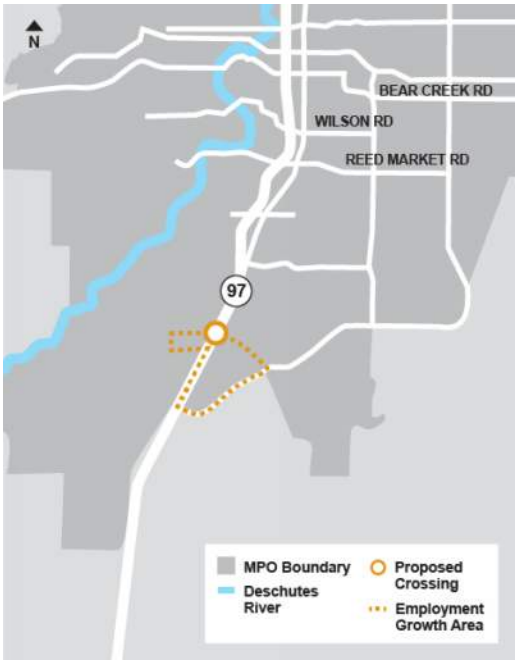
Option 2: Rely solely on the foundational and Baseline projects, with no additional projects to address south-central US 97 capacity and safety needs at this location. This option would not necessarily trigger the need for alternate mobility targets, as the Ponderosa/China Hat intersection need is for connectivity and safety, not a capacity deficiency.

CHALLENGES: Reduced connectivity, particularly if Ponderosa Street/China Hat Road at-grade access was closed (if projects C-5 and C-22 are advanced).

South/Central US 97 Corridor Capacity and Safety Overcrossing Option Performance [1]		
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**
Congestion [2]	^	|
Safety	^^	|
Travel Time Reliability	^	|
Employment Accessibility	^^	|
VMT per Capita	^	|
Roadway Lane Miles (O&M Cost)	v	|
Capital Cost [3]	$$$$	N/A

[1] Comparison against the Baseline
[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.
[3] The cost for Option 2 is listed as N/A for this need area, as there are no foundational projects with significant benefit to the safety and connectivity need.

South/Central US 97 Corridor Capacity and Safety Crossing Option



South/Central US 97 Corridor Capacity & Safety Need:
Alternate Route Option

South/Central US 97 Corridor Capacity and Safety Need: Alternate Route Option	
OPTION 1	**OPTION 2**
3rd Street widening under the railroad *(B-29)*	Only implement Baseline and foundational projects and adopt policies that allow for more congested conditions in some locations

Option 1: Widening 3rd Street under the railroad would improve 3rd Street operations and provide a less congested alternative to US 97. This option would also provide safer routes for pedestrians and bicyclists traveling on 3rd Street by providing a complete street under the railroad. Widening 3rd Street also has potential benefit to US 97 corridor management, where a full 5-lane alternate route is available for detours during incidents that require closure of US 97. If ramp-meters and access closures are advanced, having additional capacity along 3rd Street could benefit local trips.

CHALLENGES: This option would be relatively expensive and require coordination with the railroad. It is likely that a temporary rail line would need to be built around the undercrossing to maintain track operations during construction.

Option 2: Rely solely on the foundational and Baseline projects, with no additional projects to address south-central US 97 capacity and safety needs. This would likely require adopting mobility standards to accept higher levels of congestion.

CHALLENGES: As growth occurs, users would experience increased congestion along 3rd Street at the railroad undercrossing. The railroad undercrossing would continue to be a barrier for cyclists.

South/Central US 97 Corridor Capacity and Safety Alternate Route Option [1]		
PERFORMANCE INDICATORS	**OPTION 1**	**OPTION 2**
Congestion [2]	^	–
Safety	^	–
Travel Time Reliability	^	–
Employment Accessibility	^	–
VMT per Capita	–	–
Roadway Lane Miles (O&M Cost)	v	–
Capital Cost	$$$$$	N/A

[1] Comparison against the Baseline
[2] Congestion summarizes the results from the following performance measures: demand-to-capacity ratio and vehicle hours of delay.

[3] The cost for Option 2 is listed as N/A for this need area, as there are no foundational projects with significant benefit to the safety and connectivity need.

South/Central US 97 Corridor Capacity and Safety Need Option 1 Improvement Area

Attachment E: Detailed Technical Analysis

Scenario Evaluation Detailed Technical Analysis

PREPARED FOR: Citywide Transportation Advisory Committee
PREPARED BY: DKS Associates
City of Bend Staff
DATE: November 23, 2018

Introduction

The purpose of this memorandum is to document the analysis and findings from a comparative analysis of three aspirational future scenarios for the Bend Transportation System Plan (TSP) and Bend Metropolitan Planning Organization (MPO) Transportation Plan. The findings learned from this analysis will be used to guide the development of a hybrid scenario representing a Citywide framework for the Bend transportation network. The Citywide framework represents the regionally significant facilities (e.g., arterial and collector level corridors) that serve mobility needs throughout the City of Bend (area within the urban growth boundary) and Bend MPO area (area within the MPO boundary).

The document is organized into three overall topics: defining the scenarios and the evaluation tools, scenario evaluation, and findings and recommendations.

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Defining Scenarios and Evaluation Tools

The following sections describe the context that was used to help develop the scenarios, the measures and tools that were used to evaluate them and describes the scenarios themselves.

Legal and Planning Guideline Context

The key State of Oregon regulatory drivers for the scenario evaluation portion of this planning process are described in Oregon Administration Rule (OAR) 660-012-035.[1] The rule requires the evaluation of scenarios to consider the following as components of system alternatives:

- Improvements to existing facilities or services
- New facilities or services, including different modes or combinations of modes that could reasonably meet identified transportation needs
- Transportation system management measures
- Demand management measures
- A no-build alternative

These components have been included in the scenarios evaluated in the document, as described in the following sections. OAR 660-012-035 also includes a performance measure requirement for transportation plans within MPOs for reducing vehicle miles travelled (VMT) per capita, aimed at achieving the goal of increasing transportation choices and reducing reliance on automobile trips. The City of Bend addressed the VMT per capita requirement in the adopted Integrated Land Use and Transportation Plan (ILUTP, 2016), which includes strategies, programs, and measures that are integrated into this scenario evaluation. VMT per capita is included as a performance measure in the scenario evaluation.

In addition to State of Oregon planning requirements, there are Federal requirements for Performance Measures that the Bend MPO must address as part of this scenario evaluation for the Metropolitan Transportation Plan (MTP). These requirements are described in Chapter 23 of the Federal Register, part 490.[2] The Performance Measures in the Federal requirements includes measures for on-going system monitoring/reporting as well as scenario evaluation, so those relevant for this scenario evaluation process were identified.

Plan Goals and Corresponding Performance Measures

The Citywide Transportation Advisory Committee (CTAC) and the Steering Committee approved seven draft goals that provide guidance for shaping the Citywide transportation framework. In addition, CTAC recommended and the Steering Committee approved Performance Measures to help understand how different transportation scenarios could meet those Goals.

[1] Land Conservation and Development Department Chapter 660 Division 12 Transportation Planning, accessed on November 9, 2018.

[2] National Performance Management Measures; Assessing Performance of the National Highway System, Freight Movement on the Interstate System, and Congestion Mitigation and Air Quality Improvement Program, access on November 9, 2018.

Goal 1: Increase System Capacity, Quality and Connectivity for All Users

- Demand-to-Capacity Ratio
- Sidewalk System Completeness
- Bicycle System Level of Traffic Stress
- Completeness of Low-Stress Network

Goal 2: Ensure Safety for All Users

- Qualitative Assessment of Predicted Crashes

Goal 3: –Facilitate Housing Supply, Job Creating, and Economic Development to Meet Demand/Growth

- Vehicle Hours of Delay
- Peak Hour VMT on Rural Facilities
- Travel Time Reliability

Goal 4: Protect Livability and Ensure Equity and Access

- Transportation Equity
- Transit Accessibility for Vulnerable Populations
- Employment Accessibility
- Percent of Collector Roads with an average daily traffic (ADT) above 4,000 vehicles

Goal 5: Steward the Environment

- Vehicle Miles Traveled Per Capita

Goal 6: Have a Regional Outlook and Future Focus

- Arterial Roadway Miles with Demand-to-Capacity Ratio Deficiencies
- Potential for Alternative Funding
- Mode Split

Goal 7: Implement a Comprehensive Funding and Implementation Plan

- Cost
- Roadway Lane Miles

Evaluation Tools

The evaluations described in this memorandum were completed using the following tools:

- **ArcGIS mapping software.** This tool was used to provide mapping resources, including identifying key pedestrian and bicycle facilities, manage data inputs into other key evaluation tools, and create map figures for presentation.
  - *Tool Strengths:* spatial analysis for quantifying the amounts of different facility types and understanding the proximity relationships between transportation facilities and land use.
  - *Tool Limitations:* does not predict use of transportation facilities or the operational performance of those facilities.
- **Bend-Redmond Regional Travel Demand Model**. This tool is used to forecast future transportation growth and needs in Bend for the year 2040. The project team coordinated with Bend MPO staff and the Oregon Department of Transportation's (ODOT's) Transportation Planning Analysis Unit, who manages the model, to prepare model scenarios

that could be used to measure transportation system impacts for each growth configuration. Key assumptions used in the transportation modeling:

- *Tool Strengths:* links land use and the transportation network to forecast/predict how much people will travel, by which mode, and by which route, including sensitivity to system operational factors such as travel time due to congestion and pricing strategies.
- *Tool Limitations:* focuses on Citywide or regional mobility, so does not integrate some local street level facilities, the nuances of intersection controls or crossing limitations and their effect on routes people may take to avoid congestion, or the differences between the qualities of various pedestrian or bicycle facilities (limiting mode-split evaluation for walking and biking). This tool predicts what people will do based on current behavior, which is uncertain when considering 20-year timeframes. Travel patterns and modes are changing because of technology. With new mobility solutions and autonomous vehicles on the horizon, it is difficult to exactly predict what mobility will look like many years from now and account for this change in any currently available model for the Bend area.

- **Conveyal Analysis Tool.** An open-source software tool developed by Conveyal[3] was utilized for accessibility analysis. It uses land use data and transportation networks to determine what can be reached from a given point in the transportation network based on different modes of travel. A summary of key assumptions for this tool are included under Goal 4: Protect Livability and Ensure Equity and Access.
  - *Tool Strengths:* considers more refined details of route completeness to determine how far people can reasonably travel to reach a destination.
  - *Tool Limitations:* does not predict travel demand or facility usage and is not sensitive to varying levels of congestion in determining the distance a person can travel.

Key Travel Demand Model Assumptions

The Bend-Redmond Regional Travel Demand Model is a tool that utilizes an evaluation of supply (the transportation network) and demand (trip making generated from land use) to forecast the movement of people throughout the City. The model provides outputs that help assess network performance such as roadway volume and congestion at a regional scale, meaning that the network is limited primarily to arterials and collectors, not local streets. The regional modeling process includes an iterative feedback loop linking forecasted congestion (where motor vehicle demand is reaching and possibly exceeding facility capacities) to mode-choice and trip-distribution, which helps estimate when transportation network improvements can result in an increased number motor vehicle trips (also known as “induced demand”). However, note that in a regional area the size of Bend, induced demand effects tend to be limited compared to large regional areas like Los Angeles, California, or Seattle, Washington, where congestion lasting many hours of the day significantly alters how people choose to travel.

Key inputs developed for the travel demand model evaluation, as described in the following sub-sections, include land use, transit service, regional growth, and transportation network.

[3] Visit www.conveyal.com for more information

Land Use

The land use inputs are aggregations of population and employment in transportation analysis zones for all areas in the Bend MPO boundary. Population and the corresponding demographic data is represented by the number of households, their size, income level, and the average age of the head of household. In 2040, the projected population in Bend is 143,600 and the projected employment is 81,000. The methodology for population, employment and land use assumptions are documented in the Proposed Land Use Assumptions for Bend's Transportation Plan Technical Memorandum.[4]

Transit Service

The public transit system routes and frequency are an important factor for determining mode-split in the travel forecasts. The baseline public transit system in 2040 was based off the transit system from the Integrated Land Use and Transportation Plan.[5]

Regional Growth

The Bend Redmond Regional Travel Demand Model includes roadways and traffic volumes that enter/exit the Bend urban area via major roadways such as US 97 and US 20. Traffic growth on these corridors considers regional growth (i.e., growth in surrounding cities or other parts of the state) that would travel to or through Bend. The Bend Redmond 2040 model was estimated by a newer technique that integrates with the statewide travel demand model (developed and managed by ODOT) to enhance predictions of growth on major regional corridors.

Transportation Network

The travel demand model transportation network for the scenarios was based on the existing MTP financially constrained planned improvements. This is a subset of the City, County, and State planned improvements that is reasonably likely to be constructed, given anticipated funding sources. Current 5-year Capital Improvement Program (CIP) and improvements required from the 2016 Bend Urban Growth Boundary expansion were also included as a baseline assumption. Specific projects in the Baseline are discussed in the following sections.

Key Conveyal Analysis Tool Assumptions

The Conveyal Analysis Tool was used to analyze accessibility within Bend, using a 100- by 100-meter grid. To evaluate accessibility across the whole community, the Conveyal Analysis Tool utilized key inputs including land use, transit service and the transportation network.

Land Use

Land use data developed for the City of Bend's 2016 Urban Growth Boundary expansion was utilized. This data contained 2040 estimates of employment and population for each land parcel. It was calculated using Envision Tomorrow and was updated to include the proposed future land use assumption forecast totals described to CTAC and approved by the Steering Committee.[6]

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[4] Proposed Land Use Assumptions for Bend's Transportation Plan, February 12, 2018.

[5] Integrated Land Use and Transportation Plan. 2016.

[6] Proposed Land Use Assumptions for Bend's Transportation Plan, February 2018.

Transit Service

The baseline transit network used bus stops, routes, and schedules that existed as of October 6, 2018. The data were prepared in General Transit Feed Specification (GTFS) format by Trillium Solutions on behalf of Cascades East Transit. For future scenarios, additional bus routes, mobility hubs, and higher frequencies for certain routes were coded into the GTFS, according to the projects identified by CTAC.

Transportation Network

The baseline roadway network was based on the current network as well as assumptions from the MTP Financially Constrained Projects, the 2016 TSP projects for UGB expansion areas, the City of Bend five-year CIP projects, and the City of Bend CIP Citywide Safety Improvement project. Routable GIS data for this road network was taken from OpenStreetMap,[7] which was updated to reflect Deschutes County's roadway data, with additional links added for assumed future projects, as described previously .

The baseline bicycle network used the baseline roadway network, bike paths and multiuse trails (sourced from Bend Park and Recreation District's GIS data as well as OpenStreetMap), and data regarding the Level of Traffic Stress (LTS) of each roadway linkage.[8] The baseline pedestrian network used the baseline roadway network, pedestrian paths and multiuse trails (sourced from Bend Park and Recreation District's GIS data as well as aerial imagery and OpenStreetMap), and data regarding sidewalk completeness.

Baseline: MTP and CIP

This Baseline serves as a comparative condition for the analysis. The projects included in this Baseline are mapped in Figures 1 through 3 and summarized in Table 1.

[7] www.OpenStreetMap.com

[8] The LTS analysis from the Existing Conditions Technical Memorandum was updated to reflect changes to the baseline transportation system and for each scenario.

Figure 1: Baseline (Bend MTP Financially Constrained and CIP) Projects

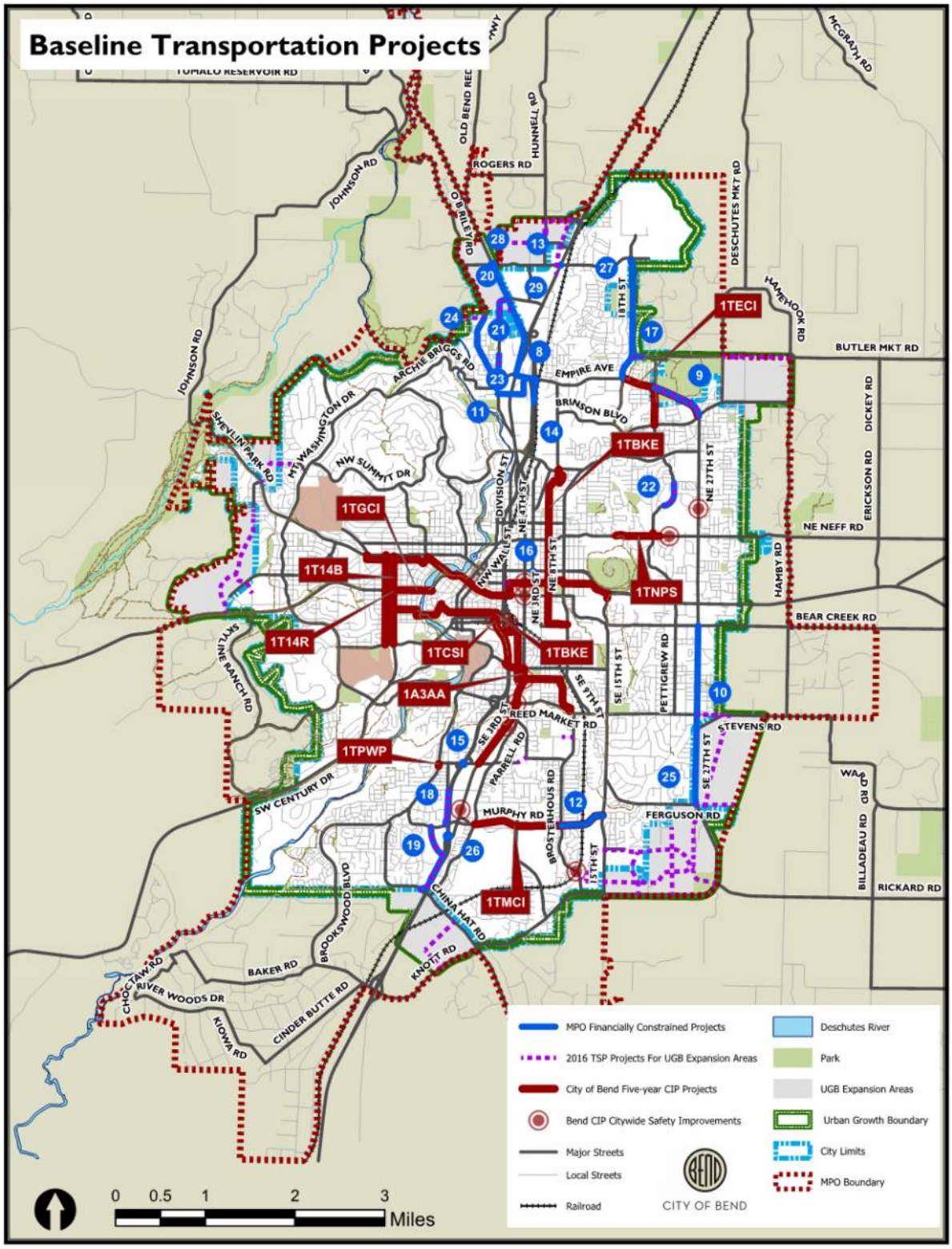


Figure 2: Baseline (Bend Urban Area Transportation Systems Plan Rural Road Network Upgrade) Projects

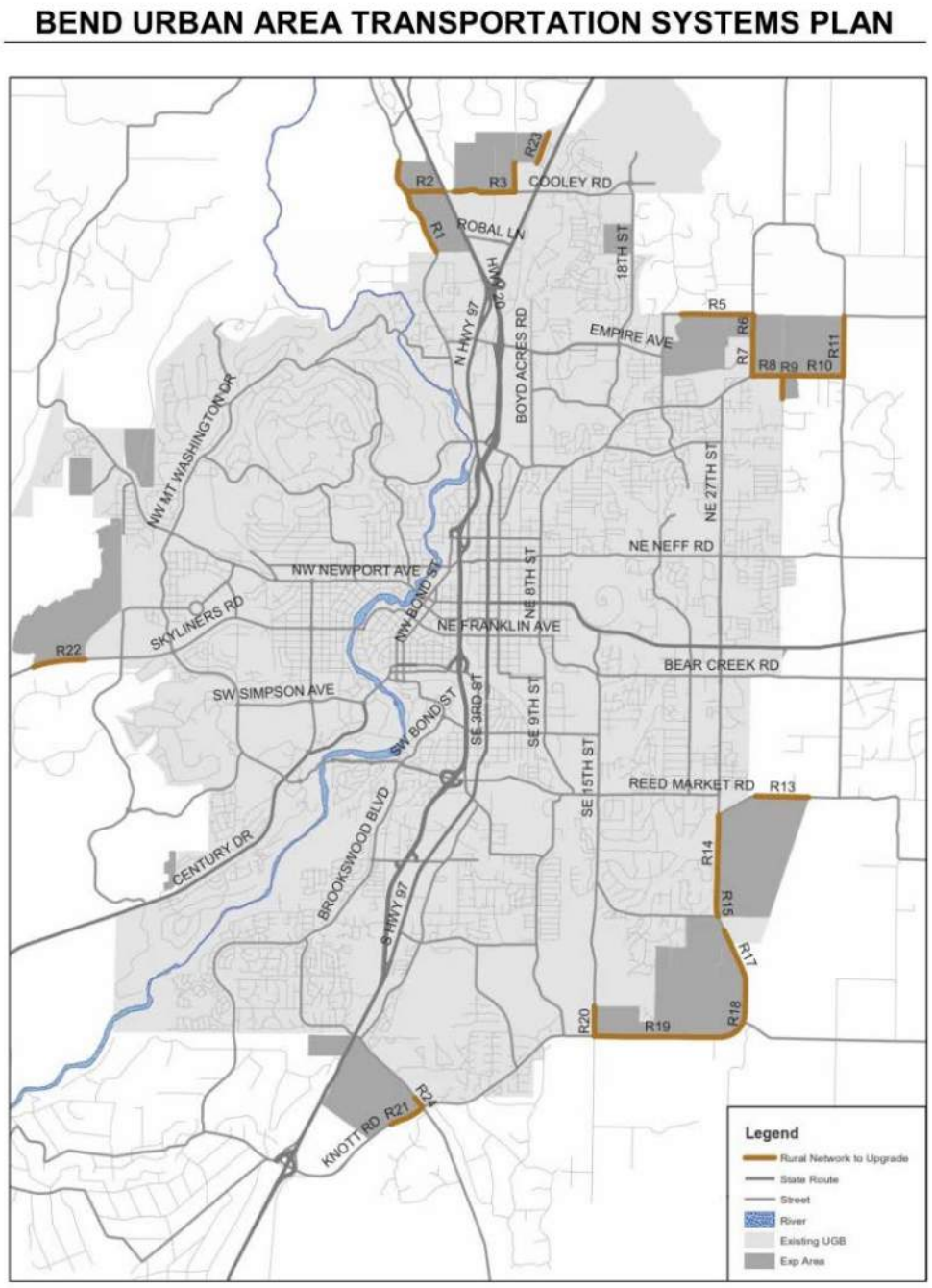


Figure 3: Baseline (Bend Urban Area Transportation Systems Plan New Roadway, Corridor and Intersection) Projects

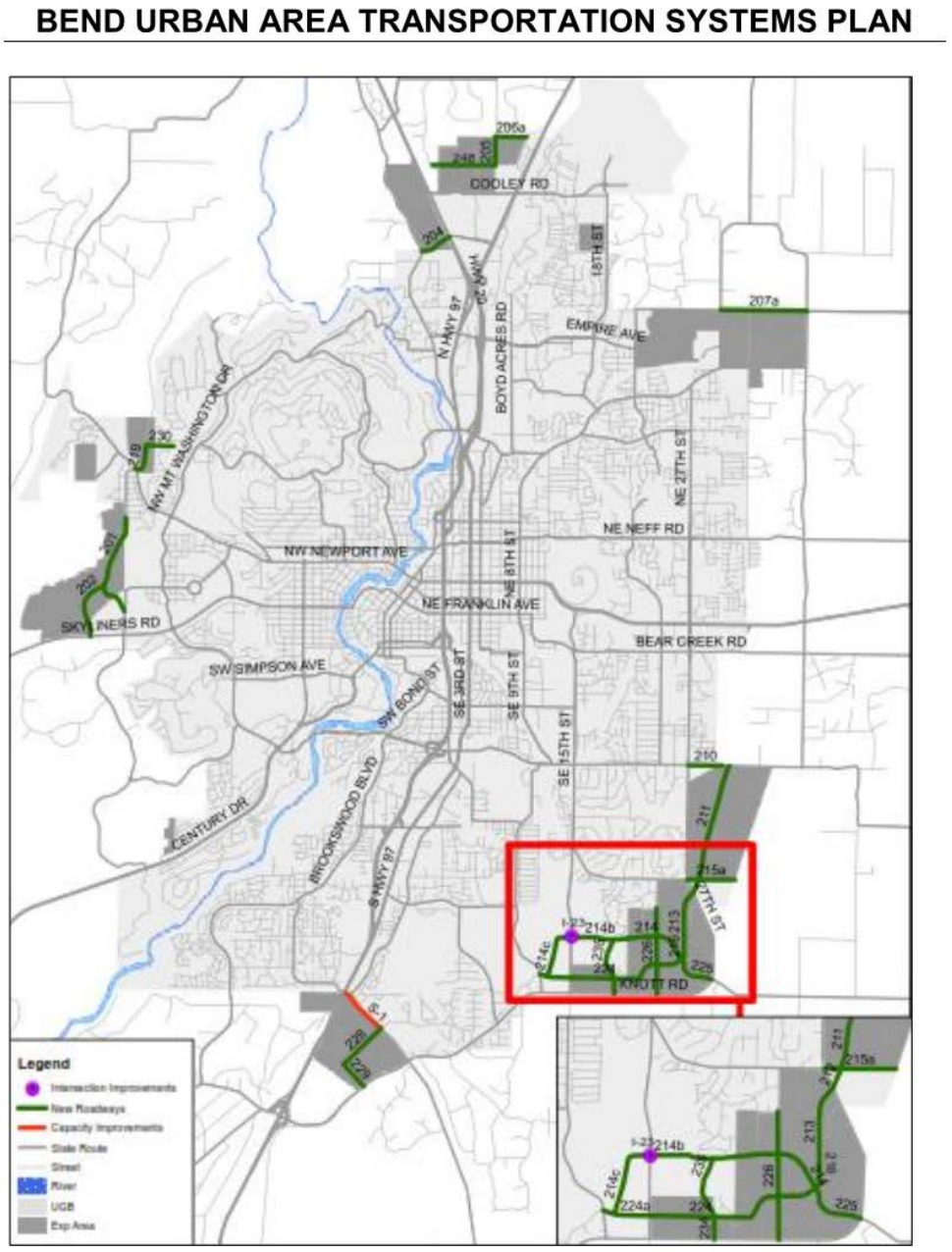


Table 1: Baseline (Financially Constrained) Project List

NUMBER	PROJECT	SOURCE
8	Empire Avenue: Widen to 5 lanes and install signal at Southbound ramps	Bend MTP Financially Constrained Projects
9	Empire Avenue: Construct 2-lane extension	Bend MTP Financially Constrained Projects
10	Realign Stevens Road to connect directly to Reed Market Road	Bend MTP Financially Constrained Projects
11	O.B. Riley Road: Construct intersection control improvements	Bend MTP Financially Constrained Projects
12	Murphy Road: Construct 2-lane extension	Bend MTP Financially Constrained Projects
13	US 97/Cooley Road area intersection and lane upgrade improvements	Bend MTP Financially Constrained Projects
14	Empire Ave: Widen existing ramp to 2 lanes	Bend MTP Financially Constrained Projects
15	US 97 Preliminary engineering and right-of-way acquisition for overcrossing or interchange	Bend MTP Financially Constrained Projects
17	Yeoman Road: Construct 2-lane extension	Bend MTP Financially Constrained Projects
18	New 2-lane north frontage road	Bend MTP Financially Constrained Projects
19	New 2-lane south frontage road	Bend MTP Financially Constrained Projects
20	Britta Street (north section): 2-lane road extension	Bend MTP Financially Constrained Projects
21	Britta Street: New 2-lane road extension	Bend MTP Financially Constrained Projects
22	Purcell Boulevard: New 2 lane road extension	Bend MTP Financially Constrained Projects
23	Mervin Samples Road to Sherman Road: Upgrade to 2-lane collector roadway and install traffic signal at US 20	Bend MTP Financially Constrained Projects
24	O.B. Riley Road: Upgrade to 3-lane arterial	Bend MTP Financially Constrained Projects
25	27th Street: Upgrade to 3-lane arterial	Bend MTP Financially Constrained Projects
26	US 97: Construct northbound on-ramps and southbound off-ramps	Bend MTP Financially Constrained Projects
27	18th Street: Complete 3-lane arterial corridor	Bend MTP Financially Constrained Projects
28	US 20: Construct intersection control improvements	Bend MTP Financially Constrained Projects
29	Add second southbound through lane on US 20	Bend MTP Financially Constrained Projects
1TMCI	Murphy Corridor Improvements	City of Bend Five-year CIP Projects
1TECI	Empire Corridor Improvements	City of Bend 2018-2023 CIP Projects
1TBKE	Bicycle Greenways	City of Bend 2018-2023 CIP Projects
1A3AA	South 3rd Street Pedestrian Improvements	City of Bend 2018-2023 CIP Projects
1TNPS	Neff and Purcell Intersection (Formerly Neff and Purcell Sidewalk)	City of Bend 2018-2023 CIP Projects
1TPWP	Powers and Brookswood Roundabout Phase II	City of Bend 2018-2023 CIP Projects
1TGCI	Galveston Corridor Improvements	City of Bend 2018-2023 CIP Projects
1T14B	14th Street Reconstruction Schedule B	City of Bend 2018-2023 CIP Projects

NUMBER	PROJECT	SOURCE
1T14R	14th Street Reconstruction	City of Bend 2018-2023 CIP Projects
1TCSI	Citywide Safety Improvements	City of Bend 2018-2023 CIP Projects
R1	O.B. Riley Road: Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R2	Cooley Road: Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R3	Cooley Road: Curbs and sidewalk on north side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R4	Hunnell Road: Sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R5	Yeoman Road: Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R6	Deschutes Market Road: Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R7	Deschutes Market Road: Curb and sidewalk on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R8	Butler Market Road: Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R9	Butler Market Road: Curbs, sidewalks and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R10	Butler Market Road: Curb and sidewalk on north side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R11	Butler Market Road: Curbs and sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R12	Eagle Road: Curb, sidewalk, and bike lane on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R13	Stevens Road: Curbs, sidewalks, and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R14	Southeast 27th Street: Curb, sidewalk, and bike lane on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R15	Southeast 27th Street: Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R16	Southeast 27th Street: Curb and sidewalk on east side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R17	Southeast 27th Street: Curb and sidewalk on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R18	Southeast 27th Street: Curbs, sidewalks, and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R19	Knott Road: Curbs, sidewalks, and bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R20	15th Street: Curb and sidewalk on east side, bike lanes both directions	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R21	Knott Road: Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R22	Skyliners Road: Curb and sidewalk on north side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades

NUMBER	PROJECT	SOURCE
R23	Clausen Drive: Sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R24	China Hat Road: Sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R25	China Hat Road: Widen bridge to include sidewalks on both sides	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
R26	Deschutes Market Road: Widen bridge to include sidewalk on west side	Bend Urban Area Transportation Systems Plan, Rural Road Network Upgrades
201	Skyline Ranch Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
202	Crossing Drive Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
204	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
205	Hunnell Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
206A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
207A	Yeoman Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
210	New collector roadway to Stevens	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
211	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
212	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
213	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214B	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
214C	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections

NUMBER	PROJECT	SOURCE
215A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
216	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
219	Skyline Ranch Road	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
224	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
224A	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
225	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
226	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
228	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
229	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
230	New collector roadway	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
234	Raintree Court Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
235	Raintree Court Extension North	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
248	Loco Road Extension	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
S-1	Corridor improvement, China Hat, widen from 2 to 3 lanes	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections
I-23	Roundabout at Murphy Road/Southeast 15th Street	Bend Urban Area Transportation Systems Plan, New Roadway, Corridor, and Intersections

Scenarios for Evaluation

Several options for addressing future needs and shaping the BMPO area were discussed, ranging from improving safety, to creating vibrant centers, to adding regional corridor capacity. Each scenario tests a different investment strategy. The scenarios were constructed to learn which types or combinations of projects and programs could potentially meet the needs of the community in 2040.

Scenario A: Build New Corridors

Scenario B: Widen and Enhance Existing Corridors

Scenario C: Maximize the Existing Transportation System

All three scenarios include the Baseline (current City of Bend 5-year CIP projects and MTP financially-constrained projects[9]). Additional "aspirational" projects or programs (projects or programs without identified funding based on current revenue projections) were added to each scenario, based on the theme. All scenarios were analyzed with a future year of 2040. For scenario comparison, the Baseline Projects were also evaluated. The three scenarios are discussed in further detail in the following sections.

Scenario A: Build New Corridors

The Scenario A theme focuses on building new corridors to improve connectivity. This scenario includes a new river crossing at Powers Road, the improvements from the US 97 North Parkway Extension Final Environmental Impact Statement (FEIS),[10] and several pedestrian and bicycle projects. The projects included in this scenario are shown in Figure 4 and summarized in Table 2.

[9] Projects on the Transportation System Development Charge (TSDC) project list were not included in the baseline. This is because their construction depends on development. In addition, the recent TSDC project cost update means that the current TSDC fee would not generate enough revenue to fully fund the TSDC project list. Therefore, it isn't possible at this time to determine which projects would be built.

[10] U.S. 97: Bend North Corridor Planning Phase. Planning study to improve the safety of U.S. 97 north of Bend.

Figure 4: Scenario A (Build New Corridors) Projects

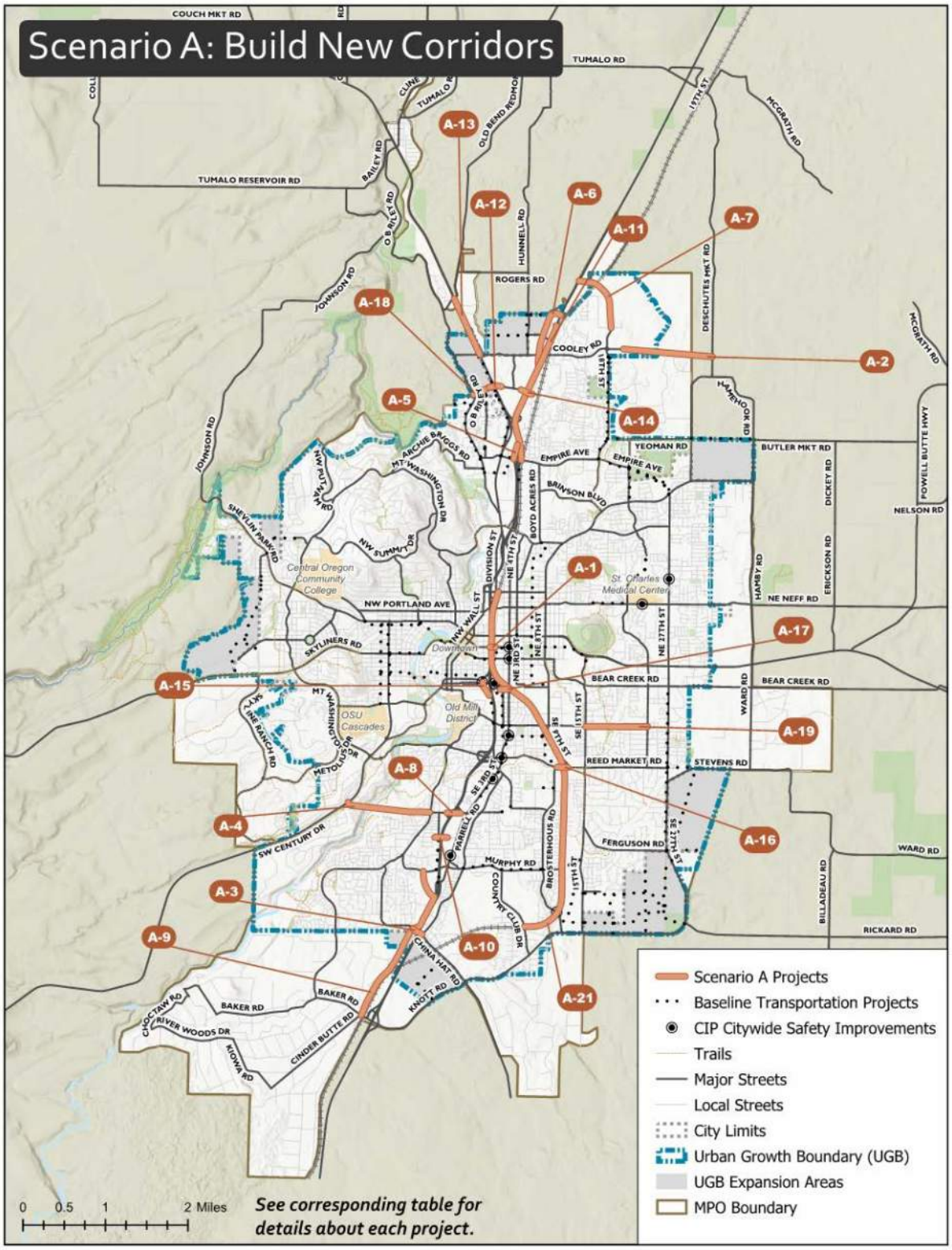


Table 2: Scenario A (Build New Corridors) Project List

NUMBER	PROJECT	NEED
A-1	Hawthorne Avenue Grade-separated Crossing at US 97/Railroad	Barriers for bicyclists and pedestrians through central Bend
A-2	Cooley Road Extension (between 18th St and Deschutes Market Rd)	East-West Corridor Congestion
A-3	Ponderosa Street/China Hat Road Overcrossing of US 97	East-West Corridor Congestion
A-4	Powers River Crossing (between Century Drive and US 97), note that the Scenic River Boundary is approximately 1 mile north of the southern UGB limits	East-West Corridor Congestion
A-5	US 97/Empire Avenue Southbound off-ramp	US 97 Corridor Capacity/Safety (Empire to Cooley)
A-6	US 97 North Parkway Extension (from Grandview Drive to US 97), including all improvements in the FEIS	US 97 Corridor Capacity/Safety (Empire to Cooley)
A-7	US 97 North Interchange with connection to 18th Street	US 97 Corridor Capacity/Safety (Empire to Cooley)
A-8	Powers Road/US 97 Interchange	US 97 Corridor Capacity/Safety (Murphy to Empire)
A-9	US 97/Murphy Road Frontage Road	US 97 Corridor Capacity/Safety (Murphy to Empire)
A-10	US 97 Pedestrian Overcrossing at Badger Road	US 97 Corridor Capacity/Safety (Murphy to Empire)
A-11	3rd Street Multi-Use Path (between Empire Avenue and Grandview Drive)	US 97-Hwy 20 Triangle Pedestrian and Bicyclist Access
A-12	Pedestrian/Bicycle Overcrossing of US 20 near Robal Road	US 97-Hwy 20 Triangle Pedestrian and Bicyclist Access
A-13	US 20 Multi-Use Path (between Cooley Road and Old Bend-Redmond Highway)	US 97-Hwy 20 Triangle Pedestrian and Bicyclist Access
A-14	Pedestrian/Bicycle Overcrossing of US 97 near Robal Road	US 97-Hwy 20 Triangle Pedestrian and Bicyclist Access
A-15	Trail connection from Colorado Avenue towards Division Street	Colorado Interchange Area Capacity and Ped/Bike Access
A-16	Reed Market Road Railroad Overcrossing	Reed Market Congestion and Safe Crossings (4th to 27th)
A-17	Aune Road extension to 3rd Street	Colorado Interchange Area Capacity and Ped/Bike Access
A-19	Extend Wilson from 15th to Pettigrew	East Connectivity
A-21	Grade separate rail crossings at Revere, Wilson, Reed Market, Country Club	East-West Corridor Congestion

Scenario B: Widen and Enhance Existing Corridors

The Scenario B theme focuses on using a variety of improvements to widen and enhance existing corridors increase capacity. Some of the widening projects in this scenario include Reed Market Road, Empire Boulevard, Butler Market Road, 27th Street, and Knott Road. All widening projects are assumed to include pedestrian and bicycle facilities, including protected bicycle facilities where appropriate. The projects included in this scenario are shown in Figure 5 and summarized in Table 4.

Figure 5: Scenario B (Widen and Enhance Existing Corridors) Projects

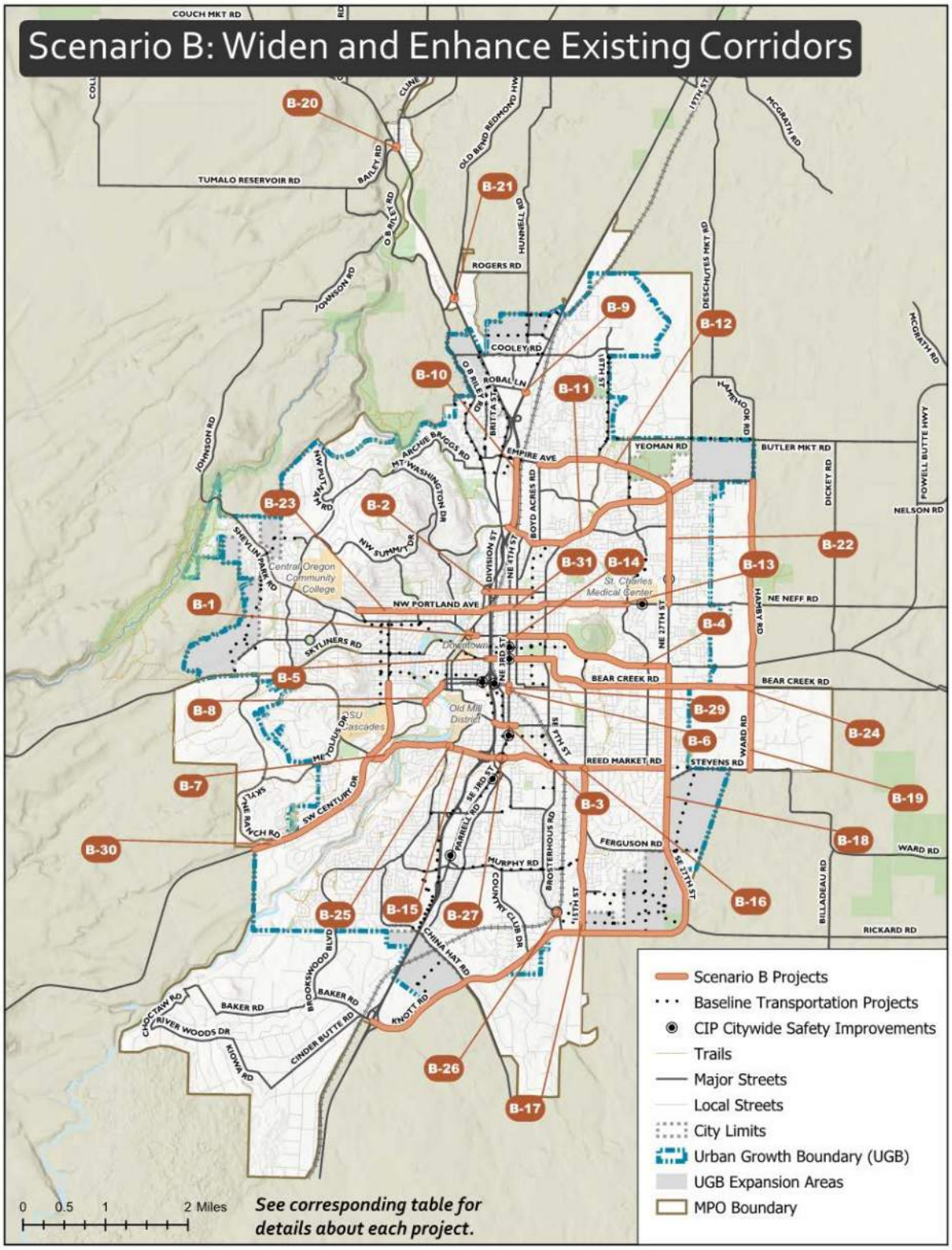


Table 3: Scenario B (Widen and Enhance Existing Corridors) Project List

NUMBER	PROJECT	NEED
B-1	Greenwood Ave protected bicycle facilities (between Wall St and Hill St)	Barriers for bicyclists and pedestrians through central Bend
B-2	Revere Ave bicycle facilities (between Wall St and 6th St)	Barriers for bicyclists and pedestrians through central Bend
B-3	Wilson Ave protected bicycle facilities (between 4th St and US 97)	Barriers for bicyclists and pedestrians through central Bend
B-4	US 20 protected bicycle facilities (from 3rd Street to 27th Street)	Barriers for bicyclists and pedestrians through central Bend
B-5	Protected bicycle undercrossing of US 97 at Franklin Avenue	Barriers for bicyclists and pedestrians through central Bend
B-6	Protected bicycle undercrossing of railroad at 3rd St	Barriers for bicyclists and pedestrians through central Bend
B-7	Reed Market Road widening (from Century Drive to Bond Street)	East-west Corridor Congestion
B-8	Colorado Ave widening (from Simpson Ave to Arizona Ave)	East-west Corridor Congestion
B-9	US 97/Robal Road intersection capacity improvements	US 97 Corridor Capacity/Safety (Empire Boulevard to Cooley Road)
B-10	US 97 southbound auxiliary lane (from Empire Boulevard to Butler Market Road)	US 97 Corridor Capacity/Safety (Murphy to Empire Boulevard)
B-11	Butler Market Road widening (from US 97 to Deschutes Market Road) with roundabout at Wells Acre Road	Butler Market Corridor Capacity and Safety Needs (US 97 to 27th)
B-12	Empire Boulevard widening (from Boyd Acres Road to Butler Market Road)	Butler Market Corridor Capacity and Safety Needs (US 97 to 27th)
B-13	Neff Road protected bicycle facilities and enhanced crossings (from 8th Street to Purcell Boulevard	Neff Corridor Safety (8th to Purcell)
B-14	Greenwood Ave enhanced crossings (from 3rd Street to 8th Street)	Greenwood Corridor Pedestrian/Bicyclist Safety)
B-15	Reed Market Road widening and enhanced pedestrian and bicyclist facilities (from Bond Street to 3rd Street)	Reed Market Congestion (Bond to 4th)
B-16	Reed Market Road widening and enhanced pedestrian and bicyclist facilities (from 3rd St to 27th St)	Reed Market Congestion and Safe Crossings (4th to 27th)
B-17	Corridor Improvements to 15th St between US 20 and Knott Road, including protected bike/pedestrian facilities and roundabouts at key intersections	15th St Capacity and Safety at major intersections (Knott Road to Wilson)

NUMBER	PROJECT	NEED
B-18	27th Street/Knott Road widening to 5 lanes (from US 97 to US 20)	15th Street Capacity and Safety at major intersections (Knott to Wilson), East-West Corridor Congestion
B-19	Hamby Road widening (from Stevens Road to Butler Market Road), including a roundabout at US 20	27th Street/US 20 and Hamby/US 20 Capacity and Safety
B-20	US 20 roundabout at Cook/Tumalo	US 20 West Rural Crossing Capacity and Safety
B-21	US 20 roundabout at Old Bend-Redmond Highway	US 20 West Rural Crossing Capacity and Safety
B-22	27th Street widening (from Neff Road to Butler Market Road)	27th Street capacity
B-23	Portland Ave intersection improvements	Congestion and traffic operations
B-24	Protected bicycle facility on Bear Creek Road	Safety and capacity
B-25	Widen Bond/Reed Market roundabout (partial two lane)	Bond/Reed Mkt roundabout capacity
B-26	Widen railroad undercrossing on Brosterhous	Bicycle and pedestrian access on Brosterhous
B-27	Provide dedicated left turn lanes on Reed Market at 3rd Street, possibly through widening or a road diet	Capacity on Reed Market Road
B-29	Widen 3rd Street to 4 lanes under the railroad, including complete street design	3rd Street Capacity (Greenwood to Wilson)
B-30	Protected bike/pedestrian routes on Century Drive	Safety and Capacity
B-31	Portland Ave-Olney Ave protected bicycle facilities (College Way to 8th Street)	Barriers for bicyclists and pedestrians through central Bend

Scenario C: Maximize the Existing Transportation System

The Scenario C theme focuses on using a variety of improvements to maximize the efficiency of the existing transportation system. These include mobility hubs at key locations along transit lines, high capacity transit routes, demand management and access management tools, and implementing new signal technologies. The projects included in this scenario are shown in Figure 6 and summarized in Tables 4A and 4B.

Figure 6: Scenario C (Maximize the Existing Transportation Systems) Projects

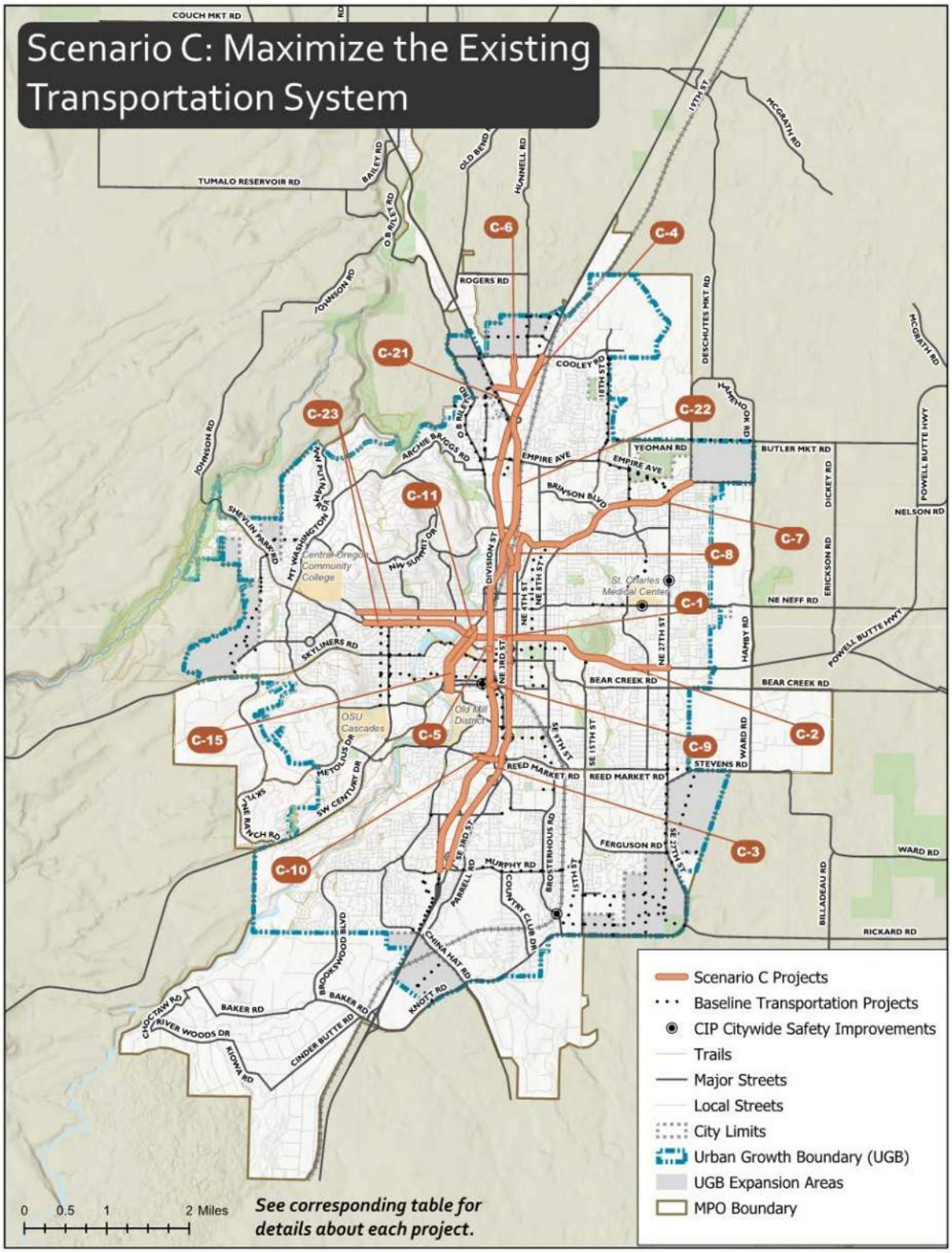


Table 4A: Scenario C (Maximize the Existing Transportation Systems) Project List

NUMBER	PROJECT	NEED
C-1	Greenwood Avenue road diet (from Bond Street to 3rd Street)	Barriers for bicyclists and pedestrians through central Bend
C-2	High-capacity transit on the Newport-Greenwood corridor, with mobility hubs at COCC, downtown, and St. Charles, including improved transit connections from neighborhoods to high capacity transit stops	East-West Corridor Congestion
C-3	3rd Street high-capacity transit with mobility hubs near Robal Road, downtown Bend, and Murphy Road	US 97 Corridor Capacity/Safety (Empire Boulevard to Cooley Road)
C-4	US 97 access management (from Cooley Road to US 20)	US 97 Corridor Capacity/Safety (Empire Boulevard to Cooley Road)
C-5	US 97 access at Hawthorne Ave closure	US 97 Corridor Capacity/Safety (Murphy Road to Empire Boulevard)
C-6	Enhance bicycle and pedestrian facilities: Robal and Hunnel corridor	US 97 - US 20 Triangle Ped/Bike Access
C-7	Butler Market Road intersection capacity improvements	Butler Market Corridor Capacity and Safety Needs (US 97 to 27th)
C-8	Implement transit service options along Butler Market from downtown into the Northeast UGB expansion area	Butler Market Corridor Capacity and Safety Needs (US 97 to 27th)
C-9	US 97 northbound/Colorado Avenue traffic signal	Colorado Interchange Area Capacity and Pedestrian/Bike Access
C-10	Reduce turn movements at the Reed Market Road/US 97 northbound ramps	Reed Market Congestion and Safety (Bond to 4th)
C-11	Convert Wall St to a southbound one-way between Bond and Newport with free right-turn at Wall/Bond and roundabout at Wall and Lafayette*	Congestion and traffic operations
C-15	Road diet on Wall and Bond with parking protected bicycle facilities	Bike access to downtown
C-21	Traffic signal priority for freight and transit at signalized intersections on US 97	US 97 Corridor Capacity/Safety (Empire to Cooley)
C-22	Close at-grade US 97 connections and install on-ramp metering	US 97 Corridor Capacity/Safety (Murphy to Empire Boulevard)
C-23	Evaluate one-way streets on Newport and Portland	General System Capacity
C-24	Relocate the BNSF railroad switch yard from near Reed Market Road to outside of Bend	East-West Corridor Congestion

Table 4B. Programs and projects that are not mapped

NUMBER	PROJECT	NEED
C-12	Sign the route from US 20 to US 97 to continue on 3rd St to Division ramp instead of Empire or provide traveler info.	Congestion and traffic operations
C-13	Mobility Hubs (access to transit, bike share, car share, etc.) at key gateways and activity centers	Transit Service to Outlying Areas
C-14	Enhanced transit service to Sunriver/La Pine, Tumalo/Sisters, and Redmond, connecting to Mobility Hubs	Transit Service to Outlying Areas
C-16	TDM program for major employers and institutions	Manage Congestion
C-17	Reduce speed limit to 20 miles per hour on key routes leading to and within downtown to improve safety for all users	Barriers for bicyclists and pedestrians through central Bend
C-18	Increase transit service frequency to 10-minute headways on major corridors	East-West Corridor Congestion
C-19	Improved traffic signal coordination on signalized corridors, including freight and transit signal priority on designated corridors	East-West Corridor Congestion
C-20	Parking pricing in Downtown Bend	Demand management

Scenario Comparison

The project team used both quantitative and qualitative assessments to help compare the impacts of the three different themes represented by the scenarios. The Performance Measures were grouped into categories based on their related draft TSP goals. The following sections describe performance measure indicators for each of the seven goals and provides the analysis output for each indicator by scenario.

Goal 1: Increase System Capacity, Quality and Connectivity for All Users

A reliable and effective transportation system with capacity and quality to accommodate all transportation needs and which is connected to destinations is vital to a well-functioning city. Expanding the connectivity and quality allows people to choose the transportation mode that works best for them, which may minimize congestion and provide reliable travel times.

The following indicators were used to compare system capacity, quality and connectivity across the analyzed scenarios:

- Demand-to-capacity ratio
- Sidewalk system completeness
- Bicycle system level of traffic stress
- Completeness of low-stress network

Demand-to-Capacity Ratio

Purpose and Overview

The level of congestion for motorists is one indicator of the quality of the transportation system for drivers. Increasing levels of congestion may result in more time spent in a vehicle and can divert trips to less congested local roads. If trips are diverted to local roads or collectors that travel through neighborhoods, quality of life may be affected. There may also be economic impacts due to delayed freight delivery and transit impacts due to less reliable transit schedules. This measure identifies potential future congestion issues and evaluates solutions. A related measure is Travel Time Reliability, discussed under Goal 3.

Demand-to-capacity ratio is predicted using a travel demand model. It is expressed as a decimal representation, with 1.0 representing a saturated, or “full” condition. The number describes the proportion of available capacity that is forecasted to be used along a roadway segment. A demand-to-capacity ratio is determined by dividing the forecasted traffic volume along a segment by the capacity of a given roadway segment. A lower ratio indicates smoother operations and minimal delays. As the ratio approaches 1.0, congestion increases, and performance is reduced. A ratio of greater than 1.0 means that the roadway is oversaturated and can result in increased queueing and delays.

Data Sources and Methods

The Bend-Redmond Regional Travel Demand Model was used to measure demand-to-capacity ratios for each scenario. The baseline roadway network was based on assumptions from the Bend MPO’s Metropolitan Transportation Plan Financially Constrained Projects, the 2016 TSP projects for Urban Growth Boundary (UBG) expansion areas, the City of Bend 5-year CIP

projects, and the City of Bend CIP Citywide Safety Improvements. Additional road and transit links were coded into the model by the project team for each scenario.

Baseline Conditions in 2040

The figures shown in Appendix A map the projected demand-to-capacity ratios on roadways across Bend under the baseline conditions in 2040. Dark red indicates a roadway that the model shows would be over capacity, while green shows that the model indicates no expected congestion issues. Model results indicate that congestion during the baseline 2040 PM peak hour would be pervasive throughout Bend. The model shows that many roadway segments may be over capacity or nearing capacity by 2040. Some notable roadways that the model shows as over capacity in the Baseline by 2040 include:

- Reed Market Road from Century Drive to 15th Street
- Colorado Avenue, from Simpson to the US 97 interchange
- Newport Avenue and Portland Avenue, from Wall Street to 9th Street
- US 97, in the triangle area
- US 97 south of Empire Boulevard and north of Butler Market Road
- US 97 south of Olney Avenue and north of Colorado Avenue
- 27th Street from Reed Market Road to US 20/Greenwood Avenue
- 27th Street from Neff Road to Empire Boulevard

Scenario A

In comparison to the Baseline, the model indicates that projects included in Scenario A would make some notable improvements in congestion. Scenario A was run in the Bend-Redmond Regional Travel Demand Model to provide inputs for this comparative analysis. In Scenario A, the North Parkway Extension (A-6) (including all improvements in the final environmental impact statement (FEIS) is obviously visible, as volume would shift from 3rd Street to the new US 97 alignment. The model also shows an increase in volume along the new 18th Street connection (A-18) to US 97, which would utilize the new Cooley Road extension (A-2). The new river crossing at Powers Road (A-4) would draw trips away from Reed Market Road. The model shows that the China Hat Road/Ponderosa Street overcrossing would change the distribution of trips in the nearby area, with more trips using Parrell to access the Murphy Road/US 97 Interchange. The model also shows that there would be a decrease in trips on Reed Market Road, Greenwood/US 20 and Neff Road near the Wilson Extension.

The model shows large differences between the Baseline Scenario and Scenario A in the area of the North Parkway Extension (A-6). Under the Baseline Scenario, large sections of US 97 would be significantly over capacity in northern Bend, as well as portions of US 20 in the triangle area. With the North Parkway Extension projects (A-6), the model shows that congestion improvements would extend to Butler Market Road before falling back to similar levels of congestion as the Baseline. The US 97 North Interchange connection to 18th Street (A-7) combined with the Cooley Road extension to Deschutes Market Road (A-2) would provide additional connectivity to the northeast area of Bend, possibly removing some congestion from 18th Street south of Cooley Road and from Empire Boulevard.

The model shows that a new bridge over the Deschutes River in the southern part of the City, called the Powers River Crossing (A-4), would significantly improve congestion on Reed Market Road west of US 97. However, even with the new river crossing, Reed Market Road near the US 97 interchange would still be over capacity.

The model shows improvements on Reed Market Road east of US 97 that are due to the Wilson Road Extension (A-19). This extension would provide another parallel east-west route, which could move trips off of Reed Market Road, Bear Creek Road and US 20.

While the model shows that the Powers River Crossing would be over capacity as a two-lane bridge, a test of a four-lane bridge shows that the bridge would be *under* capacity and that more trips would divert to the Powers River Crossing instead of using Reed Market Road. The Powers Road/US 97 Interchange (A-8) would decrease congestion along US 97 at Powers Road. The combination of the Powers River Crossing and an interchange at Powers Road and US 97 would be important to relieving the congestion at Reed Market Road.

The model shows that the China Hat Road/Ponderosa Street overcrossing (A-3) would shift trips to Parrell Road and to the Knott Road/Baker Street interchange. Overall, the system would still be able to handle the volume shift.

Scenario B

The Bend-Redmond Regional Travel Demand Model shows that Scenario B would make the most improvements over Baseline for demand-to-capacity because of the significant widening of several roadways. Many of the roadways would double their capacity, leading to a reduction in their demand-to-capacity ratios.

In Scenario B, the model shows that significantly more traffic would use the Reed Market Road, Empire Boulevard and 27th Street corridors than in the Baseline. Fewer trips would use Neff Road, US 20/Greenwood and Wilson Avenue. More trips would take the bridge on Colorado Avenue while slightly fewer trips would occur on Galveston Avenue, Portland Avenue and Newport Avenue.

With the additional widening in Scenario B, the model shows that Empire Boulevard and long stretches of 27th Street would be under capacity. This would allow those areas to act as an alternate route to access eastern Bend, instead of utilizing one of the congested east-west corridors, shifting volume from Neff Road, Greenwood Avenue, and Bear Creek Road to 27th Street. The model shows that widening of Empire Boulevard (B-12) would add some minimal congestion along US 97 at the Empire Interchange. The widening of Empire would mean that Butler Market Road would not see a significant shift in trips, leaving it significantly under capacity and potentially oversized.

The model shows that capacity issues along Reed Market Road would be minimalized with the extensive widening (B-7, B-15, B-16). This would shift a significant number of trips to this corridor, as it would be a major five lane east-west route through Bend. Widening of 27th Street/Knott road (B-18) south of Reed Market Road would not be beneficial since these corridors were uncongested in the Baseline and would not divert new trips to these facilities.

The model shows that widening the bridge at Colorado Avenue (B-8) would help relieve some stress along Franklin Avenue and Galveston Avenue. There would also be a reduction in trips along Newport Avenue and Greenwood Avenue; however, these roadways would remain

slightly over capacity in 2040. The Colorado Avenue Bridge would be at capacity in 2040 in the eastbound direction but would be under capacity in the westbound direction.

Scenario C

The Bend-Redmond travel demand model shows that Scenario C would also make demand-to-capacity ratio improvements when compared to the Baseline. Modeling Scenario C shows a reduction in trips on the Parkway, in large part due to the ramp metering and closure of right-in right-out (RIRO) access (C-22). Some trips would divert to Brookswood Boulevard and 3rd Street. There would also a reduction in trips along Greenwood Avenue/US 20 and Neff Road. The model shows that Portland Avenue and Newport Avenue appear to have a large difference in traffic, but this shift is because Scenario C shows those two streets converted to a couplet (C-23) (a pair of one-way streets). There would also be a shift in demand along Robal Road and Hunnel Road, due to access management along US 97 near the triangle area (C-4).

The model shows that the most significant improvement in congestion under Scenario C would occur along US 97. With ramp metering (C-22), the Parkway would be under capacity from the US 20 connection to the Knott Road/Baker Road interchange. Ramp metering would shift some local trips from US 97 to Brookswood Boulevard and 3rd Street, but both of those roadways would remain under capacity. North of the US 20 connection, US 97 would be just over capacity, an improvement over the Baseline.

The model shows that modifying Newport Avenue and Portland Avenue to a couplet (C-23) would cause more traffic to use Franklin Avenue and the Galveston Avenue Bridge, adding congestion to Galveston Avenue. Newport Avenue approaching the bridge would be slightly under capacity, but Portland Avenue would remain over capacity. The model shows that parking pricing in the downtown area (C-20) would decrease congestion, as fewer driving trips would be expected to access the downtown area, at least in single occupant motor vehicles.

The model shows that there would be slightly lower congestion along Greenwood Avenue/US 20 and Neff Road, with less peak hour demand on both corridors. Some of these trips would utilize the high-capacity transit corridor along Greenwood Avenue instead.

Summary

Overall, all three scenarios perform better than the Baseline for the Demand-to-Capacity Ratio (Congestion) Performance Measure. Table 5 shows the qualitative rating of each project with regards to demand-to-capacity ratios (in comparison to the Baseline). The models show that each scenario has significant projects which would make major improvements in this congestion measure.

- In Scenario A, the North Parkway Extension, with all improvements from the FEIS (A-6) would make some major capacity improvements on US 97, as would the Powers River Crossing (A-4) combined with the Powers Interchange (A-8) and the Wilson Road Extension (A-19).
- In Scenario B, Empire Boulevard widening (B-12), Reed Market Road widening (B-7, B-15, B-16) and 27th Street widening (B-18) would significantly improve capacity and reduce demand-to-capacity ratios.
- Scenario C shows that major improvements would happen along the Parkway with ramp metering and closure of the at-grade intersections (C-22).

Table 5: Qualitative Demand-to-Capacity Rating

Scenario	Demand-to-Capacity Rating
Scenario A	
Scenario B	
Scenario C	

Sidewalk System Completeness

Purpose and Overview

Providing transportation options for various modes of travel supports a balanced transportation system. Pedestrian activity is supported by providing safe and well-connected networks that link together various origins and destinations. If people do not feel safe or do not have adequate facilities to walk, they are more likely to drive or limit trips, leading to less balanced usage of the transportation system, higher vehicle-miles traveled, greater environmental impacts, or reduced opportunities.

Sidewalk system completeness is expressed as the percentage of Bend's arterial and collector roadways that have sidewalks on one or both sides of the road. This measure calculates the extent to which the sidewalk network is complete and to which Bend's built environment supports pedestrian activity. Note that this measure only considers whether or not a sidewalk is present; it does not consider the condition of the sidewalk. It also does not include local streets, where a large percentage of walking trips originate, and which can be of particular importance to those with mobility impairments or young children and which will be addressed in Phase 2 of the Transportation Plan update.

Sidewalk System Completeness can be used to indicate sidewalk completeness for the Baseline, and to compare between the alternative scenarios. An additional key evaluation of pedestrian connectivity is under Goal 4: Employment Accessibility.

Data Sources and Methods

Existing sidewalk location data were provided by the City of Bend Utility Department as GIS data. Additionally, aerial imagery was analyzed to identify and verify the locations of sidewalks on all public roadway corridors within Bend. The results were used to populate a presence/absence attribute on the Deschutes County Street centerline GIS dataset. All proposed roadway enhancements and new roadway corridors in the scenarios were assumed to provide sidewalks on both sides of the roadway unless otherwise specified. The improvements were coded into GIS. This enabled the team to compare the differences between the sidewalk system in the future scenarios. The sidewalk system completeness measure specifically measures the arterial and collector sidewalk system completeness since the scenario evaluation process focuses on regional level impacts.

Results

Table 6 shows the percent of sidewalk system completeness for each scenario. There is not a significant difference between the Baseline, Scenario A or Scenario C. Based on the assumption that all projects provide sidewalks on both sides of the roadway, Scenario B makes

the largest improvement on the Baseline, in large part because Scenario B impacts the most roadway miles of the scenarios.

Table 6: Sidewalk System Completeness on Arterial and Collector Roadways

Scenario	Sidewalk System Completeness (Arterials and Collectors)
Baseline	74%
Scenario A	75%
Scenario B	84%
Scenario C	75%

Bicycle System Level of Traffic Stress

Purpose and Overview

Providing transportation options for various modes of travel supports a balanced transportation system. Bicycle activity is encouraged by providing safe, comfortable, and well-connected networks that link together various origins and destinations. If potential bicycle users do not feel safe or do not have adequate facilities, they are more likely to rely on driving or limit trips, leading to less balanced usage of the transportation system, higher vehicle-miles traveled, greater environmental impacts, or reduced opportunities.

Safety and comfort are extremely important factors for bicyclists. While these perceptions are specific to each individual, the bicycle system Level of Traffic Stress (LTS)[11] provides a standardized method to identify whether roadways or bike facilities would feel safe and comfortable to different types of potential cyclists. In brief, LTS is calculated based on the physical infrastructure and design of a roadway, coupled with traffic speeds and volumes, and other relevant information. LTS is expressed on a scale from 1 to 4:

- Level 1: riders of most ages and abilities, including children as young as 10 years old
- Level 2: most adult cyclists,
- Level 3: experienced bicyclists, or
- Level 4: strong and fearless bicyclists.

This performance measure calculates, for each scenario, the number of lane miles of arterial and collector roadways that would have an LTS of 1 or 2. It is important to note that this measure does not include trails and separate bike facilities, such as multi-use paths, which are almost always LTS 1.

Total miles of LTS 1 or 2 facilities is one measure of the bicycle network, but it does not indicate whether low-stress facilities form an effective *network* throughout the area, nor does it include routes that are not located on roadways. The low-stress network and employment accessibility Performance Measures provide additional context for considering bicycle connectivity. These metrics are documented in the sections that follow.

[11] Oregon Department of Transportation, Analysis Procedures Manual, Version 2, Chapter 14, Multimodal Analysis

Data Sources and Methods

GIS data provided by City of Bend and Deschutes County, as well as aerial photography, were used to identify roadway corridor features relating to the bicycle facilities.

For this performance measure, all new roadway projects or corridor widening projects were assumed to be complete streets[12] unless otherwise stated, with bicycle facilities that provide an LTS 1 or LTS 2 experience. Project improvements associated with each scenario were coded into the GIS roadway centerline data to provide a quantitative assessment of the change in bicycle level of traffic stress between scenarios. This was calculated only for collectors and arterials since the scenario evaluation process focuses on regional level impacts.

Results

Scenario A, Scenario B and Scenario C would all make improvements over the Baseline, as shown in Table 7. Scenario B would see the largest gain in miles of low LTS facilities due to the number of miles of roadway that Scenario B would impact. By introducing low-stress bicycle facilities as part of the widening of Reed Market Road, Empire Boulevard and 27th Street, there would be a significant increase in miles of LTS bicycle facilities. Scenario A includes multi-use paths that do not factor into this analysis.

Table 7: Miles of LTS 1 or LTS 2 facilities on collector or arterial roadways

Scenario	Miles of LTS 1 or LTS 2 Bicycle Facilities	Change from 2040 Baseline (%)
Baseline	32.3	-
Scenario A	34.0	5%
Scenario B	47.4	47%
Scenario C	34.9	8%

Completeness of Low-Stress Network

Purpose and Overview

Well-connected bicycle networks provide more opportunity for multimodal travel and increase options available to people making trips. This performance measure calculates the percentage of the low-stress bicycle network which would be completed (i.e. have an LTS of 1 or 2) by the Baseline and Scenarios A, B and C. It can be used to compare bicycle connectivity between various future states.

Because this measure considers key routes for bicyclists, it is more refined than simply measuring the change in the LTS of the entire transportation network or counting new lane miles that are accessible for bicyclists. Certain routes and linkages are more important than others for developing connectivity across Bend. By measuring the completeness of the low-stress bicycle network, this measure helps indicate whether the Baseline and future scenarios would impact the bicycle network in the places where connectivity is needed most.

Data Sources and Methods

The City of Bend has identified key corridors and linkages that would be necessary to develop a Citywide network of low-stress bike routes to provide connectivity across Bend. Based on this

[12] "Complete streets" means including pedestrian, bicycle, and appropriate transit facilities.

analysis, staff and consultants identified priority roadways and intersections that would act as key corridors and connections in a future-state "Low-Stress Bicycle Network".

To calculate the completion of the low-stress bicycle network for each scenario, the bicycle LTS from existing conditions was updated to reflect expected changes from the baseline projects and the scenario projects. All new roadway projects or corridor widening projects were assumed to be complete streets[13] unless otherwise stated, with bicycle facilities that provide an LTS 1 or LTS 2 bicycle route, either on-street or off-street. Project improvements were coded into the GIS roadway centerline data to provide a quantitative assessment of the change in bicycle level of traffic stress between scenarios.

The resulting data was used to identify which linkages in the low-stress bicycle network were completed under the Baseline and each alternative. The level of completeness was calculated according to the number of lane miles completed and reported as a percentage of the total lane miles in the low-stress network.

Results

Scenario B performed best in this analysis, again due to the number of lane miles that would be impacted in this scenario. Scenario A and Scenario C each showed a small increase; they included fewer projects that often were not part of the low-stress network and not reachable for most people on bicycles. To increase bicycle connectivity, it would be helpful to use a network-focused approach, considering the LTS and which routes are needed for the overall system.

The employment accessibility metric (included under Goal 4) provides additional context for analyzing bicycle connectivity.

Table 8: Miles of Projects on the Low-Stress Bicycle Network

Scenario	Miles of Projects on the Low-Stress Bicycle Network	Low-Stress Network Completed by Each Scenario (%)
Scenario A	3.6	2%
Scenario B	21.4	13%
Scenario C	1.3	1%

Goal 2: Ensure Safety for All Users

Safety is one of the most important aspects of a well-functioning transportation system. Goal 2 seeks to reduce speeding, serious injury and fatal crashes, and maximize safe routes for all modes throughout the City, especially for people walking and biking. The safety measures help to answer the question "does the scenario improve the safety of transportation facilities and systems?"

A qualitative assessment of predicted crash rates was conducted to compare safety for all users across the analyzed scenarios. Two additional Performance Measures (reported fatal and injury crashes, reported crashes by mode) were identified as Performance Measures for monitoring programs.

[13] "Complete streets" means that streets are designed to include motor vehicle travel lanes, sidewalks, appropriate bicycle facilities, and transit facilities.

Qualitative Assessment of Predicted Crash Rates

Purpose and Overview

This performance measure seeks to identify the expected safety effects of each scenario. Specific project types, such as converting a two-way stop-controlled intersection to a roundabout or widening a roadway, have historical trends of observed safety impact that have been measured, analyzed, and documented in various studies. Information about these impacts can help quantitatively assess the relative safety effects of each scenario.

Data Sources and Methods

Existing safety data, including top 10% ODOT Safety Priority Index System (SPIS) locations, were examined for this performance measure. The SPIS network screening process utilizes crash rate, frequency, and severity data from the previous three years to help identify sites with a higher potential safety need. The top 10% SPIS sites were identified in the Existing Conditions Memorandum. Demand model volumes from the Bend-Redmond Regional Travel Demand Model were also used to guide the qualitative assessment. The Federal Highway Administration's Crash Modification Factors (CMF) Clearinghouse was used to research the potential safety implications of various projects.[14]

A qualitative safety assessment of the proposed projects was conducted for each scenario. Project types were compared to CMFs of relatively similar improvement types (i.e., roundabouts, protected bicycle facilities, three-lane versus five-lane roadway cross sections etc.) to estimate if, in general, crashes would likely increase or decrease for each scenario. This methodology is limited to trends and is not intended to predict future crash rates. The assessment also considered increases or decreases in forecasted traffic volume to the high crash rate locations identified in the existing conditions memo.

Results

Scenario A

Across Scenario A, one of the largest safety impacts would come from grade separation projects. Along US 97 and US 20 in Bend, there are numerous high-speed at-grade crossings, which can present a significant safety hazard. There are a several projects in Scenario A that would separate conflicting vehicle traffic and bicycle and pedestrian volumes along these routes, such as Ponderosa Street/China Hat Road overcrossing (A-3), Hawthorne Avenue grade separated crossing (A-1), US 97 pedestrian and bicycle overcrossing at Badger (A-10), and North Parkway Extension FEIS improvements (A-6). Grade separation would also occur at several of the at-grade railroad crossings in Bend in Scenario A (A-16, A-21).

In particular, the intersection of US 97 and Powers Road was identified in existing conditions as a top 10% SPIS site. The Powers Road Interchange project (A-6) would help address many of the safety issues associated with this location by grade separating the crossing of US 97 and building the on-ramps and off-ramps to current ODOT standards. The improvements at Powers Road combined with the grade separation of Ponderosa Street/China Hat Road (A-3) would add more trips to the intersection of Powers Road and Parrell Road, which may lead to safety impacts at this top 10% SPIS site.

[14] Federal Highway Administration Crash Modification Factor Clearinghouse, www.cmfclearinghouse.org Accessed October 2018

Scenario A also includes projects that would add multi-use paths for pedestrians and bicyclists, such as the 3rd Street multi-use path (A-11), the US 20 multi-use path (A-13) and the trail connection from Colorado Avenue (A-15). Separating vehicular and bicycle/pedestrian traffic would provide bicyclists and pedestrians with safer routes, which can increase active transportation travel. However, these projects should be considered with respect to how they relate to the broader bicycle and pedestrian network across Bend, as there are other critical pedestrian and bicycle needs in the core area that were not addressed in Scenario A.

An additional safety benefit that would be associated with Scenario A is a reduction in overall VMT and a slight decrease in VMT on rural facilities. With a reduction in VMT, especially on rural facilities that may not be built to current urban standards, the expected total number of crashes in Bend could be reduced. While VMT would be reduced in Scenario A, there would be an increase in the total miles of collectors with an average daily traffic above 4,000 vehicles per day. This could be an indicator of traffic diversion to lower facility types, such as local streets. With more vehicles using facilities that were designed for lower traffic volumes, the potential for crashes could increase.

Scenario B

Scenario B would provide large multimodal safety impacts. In this scenario, there would be significant improvements to bicycle facilities throughout Bend, with many facilities being upgraded to protected bicycle facilities, such as Greenwood Avenue (B-1), Revere Avenue (B-2), Wilson Avenue (B-3), US 20/Greenwood Avenue (B-4), Neff Road (B-13), 15th Street (B-17), Bear Creek Road (B-24), Century Drive (B-30), and Portland Avenue/Olney Avenue (B-31). Additionally, roadway widening projects were assumed to include a low-stress bicycle route, either on- or off-street. These provide safer routes for bicyclists to travel. There would also be protected pedestrian facilities and enhanced pedestrian crossings in this scenario, including along Greenwood Avenue (B-14) and Neff Road (B-13). Greenwood Avenue between 3rd and 9th street was identified as a top 10% SPIS site, with both pedestrian and bicyclist involved crashes reported along this stretch of roadway in the most recent SPIS crash data. Protected bicycle facilities and enhanced crossings along Greenwood Avenue in this location could have a high impact on safety outcomes.

Another known safety improvement is implementing a roundabout in place of a two-way or four-way stop-controlled intersection. Roundabouts help reduce speeds and reduce the severity of collisions, leading to an improvement in safety outcomes. Scenario B would provide roundabouts along US 20 at Cook/Tumalo (B-20) and Old Bend Redmond Highway (B-21) in the north area of Bend, along with a roundabout at US 20 and Hamby Road (B-19) in eastern Bend. The US 20/Hamby Road intersection is a current top 10% SPIS site in ODOT, meaning there could be a significant benefit from implementing a roundabout at this location. Roundabouts would be located along 15th Street (B-17) and Butler Market Road (in Scenario B as well.

Along Hamby Road from Stevens Road to Butler Market Road (B-19), the widening project would change the roadway from a two-lane road to a three-lane road. By providing a median with a turn lane, a reduction in rear-end collisions could be expected. However, many of the other roadway widening projects would be expected to worsen safety outcomes. Widening a roadway from a three-lane roadway to a five-lane roadway would lead to an increase in traffic volumes along the corridor (i.e. Reed Market Road (B-7, B-15, B-16), Butler Market Road (B-11), Empire Boulevard (B-12), 27th Street/Knott Road (B-18)). National crash modification

factors indicate these corridors would likely see an increase in crashes in the future compared to three-lane roadways. Particular care would need to be given to the design of the US 20/27th Street intersection with the widening of 27th Street (B-18). This is a current top 10% SPIS site, and more traffic demand at this location could negatively impact safety.

Many of the projects in Scenario B would affect current top 10% SPIS sites. The addition of protected bicycle facilities along Neff Road near Purcell (B-13) and significantly lower volumes along Neff Road near Purcell could lead to a reduction in crashes at this location. There could be less traffic demand along 3rd Street near Roosevelt Avenue and Wilson Avenue between 2nd and 3rd Street, in part due to the widening on Reed Market Road.

In Scenario B, there could be a slight increase in VMT. With an increase in VMT, the number of expected crashes could also increase in Bend. There is slightly more vehicular demand along 3rd Street near Franklin Avenue (another SPIS site) which could negatively impact safety.

Scenario C

The safety impacts in Scenario C are similar to the impacts discussed in Scenario A and Scenario B. Ramp metering (C-22) in Scenario C would necessitate at-grade access closures along US 97, which would reduce the potential for vehicle conflicts on the high-speed corridor. Access management near the triangle area along US 97 (C-4) would also reduce conflicts. Scenario C identifies enhanced pedestrian and bicycle facilities along Robal Road/Hunnel Road (C-6) and Wall Street/Bond Street (C-15), improving safety for active transportation users. Scenario C also identifies a road diet along Greenwood Avenue (C-1) in downtown Bend, which would reduce vehicle speeds and improve pedestrian and bicycle facilities along this segment. Reducing the speed limit on Franklin Avenue (C-17) could have a positive impact on safety, but the Newport/Portland couplet (C-23) would add demand to Franklin Avenue, potentially negating the safety impact. Overall, these projects make site-specific improvements to safety but should be considered in the context of the broader bicycle and pedestrian system.

Scenario C would have limited safety improvement for current top 10% SPIS sites. Along 3rd Street near Roosevelt Avenue, there would be slightly more traffic demand than in the Baseline, which could impact safety outcomes. However, there would be a slight decrease in traffic demand at Reed Market Road near 3rd Street and a reduction in turn movements (C-10), which could lead to fewer crashes.

Summary

To summarize the qualitative analysis discussed for each scenario above, a general safety rating was given for each scenario when compared to the Baseline. Overall, each of the scenarios would be expected to improve safety over the Baseline. Grade separated crossings and access management on high speed routes would significantly improve vehicular safety, while protected bicycle lanes and enhanced pedestrian facilities and crossings are expected to greatly improve safety for active transportation users. However, out of the three scenarios, both Scenario A and C are expected to have the highest positive safety impact, as shown in Table 9.

Table 9: Qualitative Safety Rating

Scenario	Qualitative Safety Rating
Scenario A	
Scenario B	
Scenario C	

Goal 3: Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth

Bend is a rapidly growing city, and the transportation system needs to grow with it to make sure its residents can access jobs, shopping areas, and housing. Commercial users such as freight need to be able to move goods reliably through and around the city.

The following indicators were used to compare economic development across the analyzed scenarios:

- Vehicle hours of delay
- Peak hour VMT on rural facilities (diversion)
- Travel time reliability

Vehicle Hours of Delay

Purpose and Overview

Vehicle hours of delay is a measure of total system congestion forecasted across all roadways the during the afternoon (PM) peak hour, typically between 5 PM and 6 PM. Essentially, this performance measure involves predicting how many minutes of delay that each vehicle would encounter during the peak hour of the day. Individual delays are then summed up for every vehicle on the roadway network. The result is the total hours of delay experienced by all vehicles during the afternoon peak hour. Vehicle hours of delay is an aggregate measure that can be used to consider the impacts to automobile travelers and the economy (value of lost time). It is a measure that is a part of MPO planning requirements.

Data Sources and Methods

The Bend-Redmond Regional Travel Demand Model was used to model vehicle hours of delay for each scenario, using 2040 land use assumptions. Inputs for the travel demand model are described in previous Performance Measures, such as the demand-to-capacity ratio.

Vehicle hours of delay were modeled for all trips beginning and ending within the MPO boundary (technically termed internal-internal). The origin-destination (O-D) delay was calculated for each O-D pair by subtracting the free-flow travel time from the model PM peak travel time. This delay was multiplied by the number of vehicle trips between the O-D pair to produce the vehicle delay. This measure was compiled for each scenario.

Results

Table 10 shows the vehicle hours of delay for each scenario. The model shows that Scenarios A, B, and C all would make improvements in vehicle hours of delay when compared to the

Baseline. Scenario B would have the lowest total vehicle hours of delay during the PM peak period. By widening many of the major corridors in Bend, congestion would significantly decrease, leading to a delay savings under Scenario B. Scenario A also would see a large reduction in vehicle delay. This is because increased connectivity leads to a reduction in delay as more trips utilize alternate routes to the most highly congested corridors. Scenario C shows a slight improvement in vehicle hours of delay. For a more detailed discussion of the impacts of individual projects on congestion, see the demand-to-capacity ratio section above.

Table 10: 2040 PM Peak Vehicle Hours of Delay

Scenario	Vehicle Hours of Delay (hours)	Change from 2040 Baseline (%)
Baseline	1053	Not applicable
Scenario A	874	-17
Scenario B	826	-22
Scenario C	1008	-4

Peak Hour Vehicle Miles Traveled on Rural Facilities

Purpose and Overview

Rural facilities are not typically designed for urban levels of traffic demand. An increase of diversion onto rural facilities (avoiding urban area congestion) could impact safety outcomes. By modeling the total number vehicle miles traveled on rural facilities, the scenarios can be compared to the Baseline to determine if the improvement scenarios are reducing diversion to surrounding rural facilities.

Data Sources and Methods

The Bend-Redmond Travel Demand Model was used to model the PM peak hour vehicle miles traveled on rural facilities for each scenario. Inputs for the travel demand model are described in previous Performance Measures, such as the demand-to-capacity ratio.

A rural facility was assumed to be any roadway within one mile outside of the UGB. The UGB was used for this performance measure with the assumption that by 2040, many of the roadways within the UGB expansion area would have been upgraded to urban standards. The forecasted peak hour volume on these facilities was multiplied by the length of the facility to determine the total peak hour vehicle miles traveled for each scenario.

Results

Table 11 shows the PM peak VMT on rural facilities in Bend. None of the scenarios would significantly change from Baseline. Both Scenario A and Scenario C would decrease rural VMT less than 2% over the Baseline, while Scenario B would increase rural VMT by less than 0.5%.

Within each scenario, the magnitude of change in peak hour VMT on rural roadways was relatively small. No individual project significantly impacted this performance measure for any of the scenarios.

Table 11: 2040 PM Peak VMT on Rural Facilities

Scenario	Vehicle Miles Traveled	Change from 2040 Baseline (%)
Baseline	36,040	Not applicable
Scenario A	35,464	-1.6%
Scenario B	36,224	+0.5%
Scenario C	35,473	-1.6%

Travel Time Reliability

Purpose and Overview

Travel time reliability is a measure of the consistency in travel times for automobiles over a corridor. Essentially, it predicts the extent of unexpected delays. If travel times can be confidently predicted, then drivers can plan their trips to arrive on time. However, where travel times are less reliable, unexpected delays can make trip planning a frustrating experience.

Travel time reliability is a measure that is a part of MPO planning requirements. It can be measured as the difference in trip times from day-to-day, and/or across different time periods of the same day. In this case, reliability from day-to-day was modeled.

Because the input data are not calibrated to Bend's local conditions, the results of this metric are useful for comparing the impacts of scenarios but they are not intended to be accurate measures of the system in Bend as a whole. The reported results are relative differences between scenarios, rather than as an overall result.

Data Sources and Methods

Travel time reliability analysis was performed using the Oregon Department of Transportation's HERS-ST analysis tool.[15] This complex modeling tool is used by state agencies to analyze major roadway deficiencies for programming and planning purposes. The tool captures probabilities and impacts from various delay events or causes, which makes it an effective tool for travel time reliability analysis of future conditions. The HERS-ST tool uses facility characteristics such as geometry, traffic control, and volume profile components to produce several delay measurements that can be used to calculate travel time reliability measures. These measures are not calibrated to local conditions; thus, only the relative difference is reported for evaluation of alternatives.

Travel time reliability was analyzed by using a planning time index (PTI) for specific corridors throughout Bend. The Federal Highway Administration (FHWA) defines PTI as 95th percentile travel time divided by the free-flow travel time, indicating the time a driver should allow to traverse the corridor segment while remaining on schedule 95% of the time. The planning time index represents the total travel time that should be planned for, including both typical and unexpected delay. For example, a PTI of 1.50 means that for a trip that takes 20 minutes in light traffic, a traveler should budget a total of 30 minutes to ensure on-time arrival 95 percent of the time. The higher the index, the less reliable the segment.

The travel time reliability was calculated for each scenario to compare to the Baseline.

[15] Oregon Department of Transportation Analysis Tools, Accessed October 2018

Results

The difference in travel time reliability was mapped across the different corridors in Bend, shown in Appendix B. For each scenario, the total miles of roadway with a high planning time index is shown in Table 12. A high PTI indicates a less reliable travel time. Under the Baseline, there would be over 37 miles of roadway with a PTI greater than 1.5. Sixteen of those miles would be highly unreliable corridors, with a PTI greater than 2.0.

Table 12: Miles of Roadway with a high planning time index

Scenario	PTI of 1.5-2.0 (miles)	PTI of 2.0+ (miles)
Baseline	21.5	16.3
Scenario A	20.9	13.4
Scenario B	14.2	15.3
Scenario C	19.4	16.4

In Scenario A, the travel demand model shows an overall reduction in unreliable corridors, with a total of approximately 34 miles. While Scenario B has the fewest miles of unreliable corridors overall, Scenario A sees the largest reduction in highly unreliable corridors (those with a PTI greater than 2.0). Reliability would be improved on US 97 with the addition of the North Parkway FEIS improvements (A-6). The North Parkway FEIS, the 18th Street Connection (A-17), and the Cooley Road Extension (A-2) also help improve travel time reliability on segments of Empire Boulevard. Reliability would be improved on US 97 near Powers Road due to the Powers Road Interchange (A-8). The Wilson Extension (A-19) would help improve travel time reliability on Reed Market Road and US 20/Greenwood Avenue by reducing volumes along those corridors.

Scenario B performs best overall on this measure. There would be a sharp decrease in miles with a planning time index over 1.5. With the proposed increased capacity along many of the arterial corridors, large stretches of Reed Market Road, Empire Boulevard and 27th Street would see significant improvements in travel time reliability. 3rd Street south of the railroad would also see improvements in travel time reliability, part of which can be attributed to the widening of the railroad undercrossing (B-29).

There would be a slight improvement in travel time reliability with Scenario C compared to the Baseline. This improvement largely comes from ramp metering and access management on the Parkway (C-22, C-4), with large segments of roadway having a PTI less than 1.5.

Goal 4: Protect Livability and Ensure Equity and Access

As Bend grows, it is important that the City retains its livability and is accessible to all residents regardless of income level or ability. The indicators to compare livability, equity and access are listed as follows:

- Employment accessibility
- Vulnerable populations within 0.25 mile of sidewalks, low-stress bicycle facilities, and transit
- Transportation equity
- Percentage of collector roads with an ADT above 4,000

Employment Accessibility

Purpose and Overview

In this context, accessibility measures the ease of reaching destinations – how well infrastructure and services enable people to get from Point A to Point B. There are many destinations that a person may wish to reach: jobs, schools, parks, shopping, and healthcare are a few examples. To simplify this analysis, this measure focused on employment, since it is a common type of destination.

This performance measure calculates how many jobs the average Bend resident could reach within 30 minutes if traveling by car, transit,[16] bicycle, (using low-stress bicycle routes), or on foot. It considers system completeness for each mode and measures how that impacts people's ability to travel between their homes and workplaces. This metric also specifically considers transit schedules and routes to measure not just whether people are located near transit, but whether transit enables them to reach key destinations in a reasonable amount of time.

Data Sources and Methods

Data sources used to calculate results are listed in the key assumptions for the Conveyal tool. For each scenario, additional links were added for proposed roadway, bicycle and pedestrian projects. Projects were assumed to be built to complete-streets standards; any roadway that was constructed or modified in a scenario was assumed to include a low-stress (LTS 1 or 2) bicycle facility and a pedestrian facility. For Scenario C, additional bus routes, mobility hubs, and higher frequencies for certain transit routes were coded to account for the projects identified by CTAC.

To calculate employment accessibility for each mode in each scenario, the Conveyal Analysis Tool was used to calculate how many jobs are reachable from a given point. The result is the number of jobs reachable for the average (50th percentile) 2040 Bend resident within 30 minutes of leaving home.

Transit was also analyzed as a 60-minute scenario in order to learn more about network connectivity. Thirty minutes was not felt to be a realistic time to walk to a bus stop, catch the bus, possibly transfer to another bus, and walk to the final destination.

[16] For transit, we measured employment accessibility for jobs within 30 minutes as well as jobs within 60 minutes.

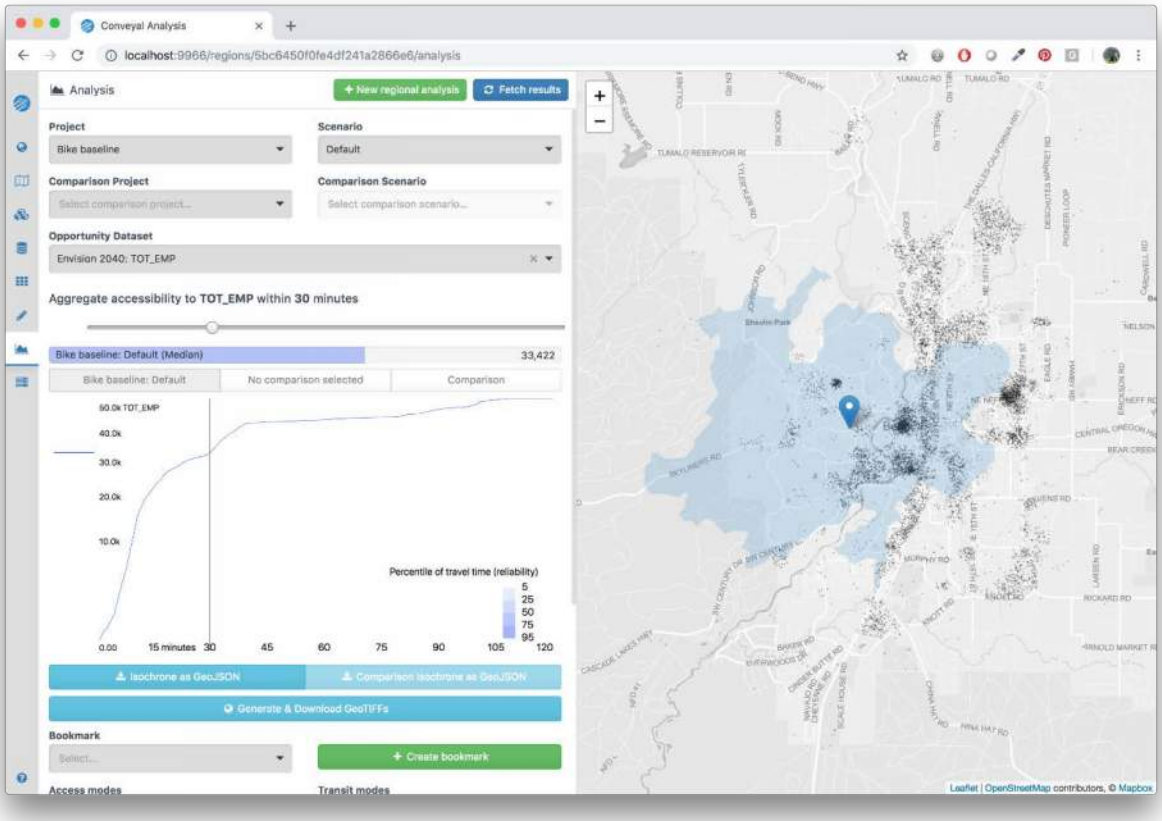
Since the viability of the bicycle network is so dependent upon user comfort and perceptions of safety, employment accessibility was measured using only low-stress connections (roadways with LTS 1 or 2). This measures how well an individual on a bicycle could reach destinations using roads and paths that would feel safe and comfortable to the average person.

An additional scenario was calculated to determine accessibility with an ideal bicycle network, if the whole roadway network were LTS 1 or 2. This measures the upper limit of what accessibility could be if the entire road network were reasonable for the average person on a bicycle. A low-stress bicycle network would generate results between these two bookends, depending on which roadway connections were included.

The pedestrian network is also dependent upon users' comfort and safety. Pedestrian accessibility was modeled for the entire road network and did not restrict the analysis only to road segments with sidewalks. Therefore, actual access may be lower depending on the geographic location, presence, and condition of sidewalks, and a person's physical abilities and comfort level with non-sidewalk routes. The sidewalk system completeness performance measure gives a sense of how complete the network is and should be considered alongside pedestrian accessibility.

Figure 7 shows a visualization of the regional accessibility results. Areas shaded in darker blue indicate areas where residents have access to a greater number of jobs within 30 minutes, using only low-stress bike routes. Locations of jobs are shown as clusters of dots, and the dark blue boundary line indicates the UGB area plus some additional areas (e.g. Gopher Gulch) that were assumed to develop, based on the future land use assumptions. The bar graph on the left indicates the number of jobs accessible to the n^{th} percentile. In this case, accessibility was calculated for the median, or 50th percentile, 2040 resident.

Figure 7: Example of Regional Accessibility Analysis



Results

Results for each scenario, by mode, are included in Table 13.

Table 13: Jobs accessible to the median[17] person in 30 minutes, by mode

Scenario	Auto	Pedestrian	Bicycle (low-stress facilities only)	Bicycle (all facilities)	Transit	Transit (60 mins)
Baseline	100%	7%	29%	64%	5%	40%
Scenario A	100%	7%	31%	77%	5%	40%
Scenario B	100%	7%	41%	64%	5%	40%
Scenario C	100%	7%	30%	63%	12%	67%

For every scenario, the median resident would have access to all jobs in Bend within 30 minutes. For transit, employment accessibility is lower than any other mode (5 to 12% of all jobs) when considering a 30-minute timeframe. This is important to keep in mind when considering how people make decisions about their mode choice. As thirty minutes does not allow much time to walk to a bus stop, catch a bus, possibly transfer, and then walk to a final destination, employment accessibility was also modeled for a 60-minute timeframe, which had much higher results (40 to 67% of all jobs). For both time periods, accessibility was

[17] 50th percentile

considerably higher in Scenario C, since this scenario featured improved transit service (higher frequency routes, additional routes, and higher mobility around three "mobility hubs"). The other scenarios did not include changes to transit service.

For pedestrians, accessibility remained almost the same (7%) in all scenarios. The main reason why these results are low is because walking is the slowest mode being considered; there are limits to how far a person can walk in thirty minutes, even with a very well-connected system. Scenario A had a slightly higher result since it includes several new connections and removed barriers to connectivity. This would have a more noticeable impact for residents near these new connections. However, the new connections would not significantly improve accessibility for the *median* person. It should be noted that this analysis does not consider sidewalk completeness; actual accessibility would be lower in areas that do not have sidewalks along collectors and arterials, where pedestrians may feel unsafe walking along a roadway shoulder. These needs can be considered as part of the neighborhood level process in Phase 2.

For bicyclists, using only low-stress roadways and paths, accessibility would increase in all scenarios, compared to the Baseline (29%). Scenario A (31%) and Scenario C (30%) each showed a small increase, and Scenario B (41%) showed a more substantial increase. The reason for this is because Scenario A includes new connections, such as highway overpasses (A-1, A-10), that removed some barriers to bicyclists; however, there was often a high-stress roadway link after the overpass, meaning that the new connections were not enough to provide a safe and comfortable route for people on bikes. Scenario B performed better because it includes significantly more roadway miles than either of the other scenarios. As a result, bicycle connectivity would increase, due to the assumption that new projects would be built to complete streets standards, with an LTS 1 or 2 bike facility. The accessibility improvements are not due to the roadway widening that features prominently in this scenario. Rather, the improvements are due to the inclusion of a lower-stress bike facility along new and modified corridors.

If the entire roadway network (besides Highway 97) were usable for bicyclists, then employment accessibility would be doubled (to 64%) compared to the Baseline. This remained constant (64%) in Scenario B. Accessibility would increase significantly in Scenario A due to the new roadway connections; these projects would now be accessible and usable to people on bikes, so they would provide significantly higher benefits. Accessibility would drop very slightly in Scenario C (63%) due to Newport/Portland becoming one-way roads (C-23).

The two bicycle results provide a set of bookends for considering bicycle-based accessibility on the current roadway network, versus a network where comfortable bike facilities are ubiquitous. Completing the low-stress bicycle network would provide results between these two bookends, depending on the exact connections and roadways that were included.

Vulnerable populations within 0.25 mile of sidewalks, low-stress bicycle facilities, and transit

Purpose and Overview

The purpose of this measure is to measure the proximity of vulnerable populations to multimodal facilities, including sidewalks, bicycle facilities and transit. This measure is intended as another means to consider equity, with a focus on all modes. After considering this performance measure more closely, the project team chose to analyze a more detailed metric

for transit. For sidewalks and bike facilities, the team recommends shifting this type of analysis into the neighborhood-level process in Phase 2 and refining the metric being used.

As written, this performance measure involves calculating the percentage of vulnerable populations that live within a quarter-mile of a sidewalk on a collector or arterial road. (This analysis would be replicated with a focus on low-stress bike facilities, and on transit lines). For sidewalks, this metric would not provide meaningful input into the scenario evaluation process; there is not a clear connection between living in proximity to a new sidewalk and being able to reach it or derive a benefit from it. The same is true for bike facilities and transit lines; there may be many barriers between a person's home and the new infrastructure or services, so the metric would not provide a meaningful indication of whether vulnerable populations would benefit from new scenario projects.

To develop more meaningful insight, the project team recommends that the intent of this performance measure be explored in detail as one component of the neighborhood-level process in Phase 2. For pedestrians, the project team could calculate sidewalk completeness (as a percentage and as a total length) for each neighborhood, considering how sidewalk completeness varies between total populations and vulnerable populations (based on ACS census data). This would give some insight regarding which neighborhoods were most lacking in pedestrian infrastructure, and whether this was correlated with other equity concerns. Moreover, this analysis would enable the project team to better estimate the need for sidewalks (in terms of length and cost), discuss whether certain areas seemed to be especially high priorities, and discuss how different levels of investment in a sidewalk completeness program would address the need.

The same approach could be considered for bike facilities. At the neighborhood level, this analysis would focus on identifying barriers to connectivity that cause neighborhoods to act as isolated "islands", where high-stress collector and arterial roadways prevent many people from accessing surrounding areas. The project team could consider barriers to connectivity for different neighborhoods, whether vulnerable populations tend to face more barriers than the general population, and which areas may be most important to improve connectivity.

For transit, the project team determined that accessibility analysis would show more meaningful results than simply considering populations living in a quarter-mile proximity to transit, since routes and schedules are very important for using transit. The team analyzed employment accessibility, by transit, for jobs earning close to, or below, median wage. This analysis was done for transit, since individuals earning lower incomes may gain the most from the ability to reach their job without the expense of car ownership. Essentially, this performance measure models how many low- or average-paying jobs in Bend would be reachable for the average person using public transit.

Data Sources and Methodology

Methods used for the transit employment accessibility analysis were the same as those used for employment accessibility overall. However, the analysis for this metric did not consider 2040 employment and land use forecasts, since future forecasts do not consider levels of future wages or where these types of jobs would be clustered. Instead, census data were used from the 2015 Longitudinal Employer-Household Dynamics' Origin-Destination Employment Statistics (LODES). These data were used to calculate employment accessibility to jobs earning at or below $3,333 per month. This wage level was chosen because it was what the LODES data

included, and also because it includes jobs which pay close to, or below, median wage for Bend in this timeframe (roughly $2,650 per month). Census data were provided at the 2010 block-group level.

Results

Results for each scenario, for transit, are included in Table 14.

Table 14: Accessibility to 2015 jobs earning less than $3333 per month, for the average[18] person

Scenario	Transit (30 minute access)	Transit (60 minute access)
Baseline	6%	58%
Scenario A	6%	58%
Scenario B	6%	58%
Scenario C	15%	87%

For both the 30- and the 60-minute timeframe, the results in this table are significantly higher in Scenario C than in the Baseline or Scenario A or Scenario B. This indicates that the transit projects in Scenario C could connect Bend residents to lower-wage jobs, offering benefits to those who rely on transit to commute to work. Again, this analysis is only one type of consideration, but does provide some additional context for considering equity.

Table 15 includes a summary of overall results for this performance measure for transit, with the understanding that pedestrians and bicyclists would be considered during the neighborhood process in Phase 2

Table 15: Qualitative Transit Accessibility Rating

Scenario	Transit Accessibility Rating
Scenario A	
Scenario B	
Scenario C	

Transportation Equity

Purpose and Overview

The transportation equity performance measure seeks to identify scenario performance based on how the transportation system investment impacts different areas considering poverty, age, disabilities, and race. This measure can provide a qualitative assessment to consider whether the costs and benefits of the transportation solutions identified in the scenarios appear to be distributed equitably.

Data Sources and Methods

The US Census Bureau's American Community Survey 5-year (2011 through 2016) data were used to create a series of maps of Bend (Appendix C). There are four maps for each scenario. Each map shows census block groups that are colored according to the proportion of people in

[18] 50th percentile

each block group that may be particularly vulnerable according the ACS data. Each of the four maps captures a different type of vulnerability; they show the proportion of the population that has been identified as:

- Limited English proficiency
- Persons with disabilities
- Senior citizens
- Low income[19]

The projects associated with each scenario were overlaid on each population map. Roadway projects are shown in violet. Transit improvements are shown as black and red lines. These maps were assessed to qualitatively consider whether some populations were either better served or more greatly impacted by the scenarios

Results

A visual examination of the twelve maps did not reveal significant findings for Scenario A. This scenario includes fewer projects than the others, and there does not appear to be a clear link or general trend (either positive or negative) between the locations of vulnerable populations and the location of projects. Improving connectivity across Bend would likely be beneficial for the whole city, not just particular areas. For specific projects, extending Wilson Avenue (A-19) could potentially impact low income populations since property would need to be acquired for this project.

Scenario B had similar overall results; projects included key corridors across the city and there was not a general trend between the locations of vulnerable populations and the location of projects. Considering specific projects, Scenario B could potentially impact low income populations through the core of the City if property needs to be acquired for the roadway widening projects.

Scenario C includes several transit improvements (new or higher frequency routes) that are located in areas with higher populations of people with low incomes and/or disabilities, particularly those around St. Charles Hospital and the south and east portions of Bend (C-2, C-3). These projects could provide benefits to vulnerable populations.

This examination provides an initial foundation for discussing equity at the regional level, but the results were limited and gave only preliminary insight. Additional discussions should be had as part of the neighborhood outreach process (Phase 2) to learn more about equity concerns, particularly in neighborhoods whose populations may be especially vulnerable.

Percent of Collector Roads with an ADT above 4,000 vehicles

Purpose and Overview

As congestion increases on the regional system, drivers begin to look for alternate routes. This shifts volume away from higher classification roadways to collectors. Modeling the traffic shifts on collector roadways can serve as a proxy for diversion onto local streets. This can also serve as an indicator of increased traffic on roadways that were not designed for high volume traffic.

[19] Percent of People with Income 50 to 130% of Federal Poverty Level. Source: ACS 2016 5-year estimate data

This measure seeks to quantify the change in demand volume on collector routes between scenarios to identify the potential for traffic volume increase on adjacent local streets.

Data Sources and Methods

The Bend-Redmond Travel Demand Model was used to forecast link-level traffic demands for average weekday conditions. Input data for the model are described earlier in this document.

The travel demand model identifies which roadways are collector roadways. For the purpose of this measure, the Powers River Crossing (A-4) was assumed to be an arterial roadway. The miles of collectors which would have an ADT above 4,000 was compared to the total miles of collectors for each scenario.

Results

Table 16 shows the percent of collector roads with an ADT above 4,000 vehicles per day. Scenario A would increase the number of collector roads with an ADT over 4,000 vehicles per day. By building new roads and improving connectivity on the local street system, more trips would divert to collector roads and help disperse vehicles. In particular, the Wilson Road Extension (A-19) (which is coded in the travel demand model as a collector) would draw a significant number of trips to the collector road system. Scenario B would improve congestion on many of the arterial roadways in Bend, helping reduce travel times on these routes. In turn, this draws more trips to the arterial network and away from collector roadways. On this measure for Scenario C, there would be no change from the Baseline.

Table 16: Collector roads with ADT above 4,000 vehicles per day

Scenario	Percent of collector roads with ADT greater than 4,000 vehicles/day
Baseline	20
Scenario A	22
Scenario B	17
Scenario C	20

Goal 5: Steward the Environment

A transportation system that stewards the environment is vital to promoting a healthy, livable community for its residents. Minimizing the impacts of the transportation system on natural features and air and water quality will allow for the plan to steward the environment.

Vehicle Miles Traveled Per Capita

Purpose and Overview

VMT per capita is a recommended performance measure as part of the City's state mandated planning requirements. VMT per capita generally demonstrates the combination of reliance on the automobile, proximity between land uses, and efficiency of the transportation system. Lower VMT can result from short auto trips and/or trips made by other modes such as walking, biking, or transit. Lower VMT values can indicate that the population has access to other travel modes or that the desired destinations (such as school, work, or shopping) are close to home or well-connected. These causes for VMT reduction are generally seen as improvements to quality of life.

Data Sources and Methods

The Bend-Redmond Travel Demand Model was used to measure the daily VMT for each scenario. Inputs for the model are described earlier in this document.

VMT were calculated for all daily trips beginning and ending within the BMPO boundary (technically termed internal to internal trips). Each internal to internal trip was multiplied by the length of each trip to determine the total VMT, which is divided by the projected 2040 population.

Results

Table 17 shows the vehicle miles traveled per capita for each of the scenarios. In 2040, the daily VMT is expected to be 9.95 miles per person under the Baseline.

Table 17: Daily VMT per capita

Scenario	VMT/Capita	Change from 2040 Baseline
Baseline	9.95	Not applicable
Scenario A	9.89	-0.53%
Scenario B	10.00	+0.58%
Scenario C	9.69	-2.60%

Under Scenario A, VMT would decrease to 9.89 miles per person. With increased connectivity, more trips would occur over a shorter distance. Transportation analysis zones near the Powers River Crossing (A-4) would see a reduction in average trip length, as would zones near the northeast UGB expansion area (Appendix D contains maps of the average trip length by zone). There would also be a small reduction in average trip length near the Wilson Road Extension (A-19). These reductions in average trip length from the zones near the edge of the UBG boundary would help drive down VMT per capita.

Under Scenario B, there would be an increase in VMT over the Baseline. In Scenario B, there would be less congestion on many of the major east-west connections in Bend. This would allow people to take longer routes that are quicker than some of the local connections, leading to an increase in VMT per capita. Average trip lengths would increase near Reed Market Road and Empire Boulevard/Butler Market Road, in particular.

While the relative differences of Scenarios A and B compared to the Baseline may seem limited, they are important and potentially significant differences from a regulatory perspective. As documented at length in the Bend UBG Expansion process, VMT per capita is a key measure in State regulations for MPO areas related to reducing reliance on the automobile over time. As found in the UGB Expansion process, VMT/capita in Bend is projected to increase, which triggered the need for the development and adoption of an Integrated Land Use and Transportation Plan (ILUTP) to demonstrate how the increase could be kept below 5%. The Baseline VMT per capita is near the 5% increase threshold, which therefore means a change as small as 0.5% is important.

Under Scenario C, there would be a significant decrease in VMT per capita over the Baseline. This results from a combination of fewer daily vehicle trips and a decrease in average trip length in key areas. There would be large improvements to the transit network under Scenario C (C-2, C-3, C-8, C-13, C-14, C-18), which would help drive down the number of daily vehicle trips. The

implementation of a Transportation Demand Management program (C-16) in Scenario C would also decrease the number of single occupancy vehicle trips, which would help lead to a decrease in VMT per capita. The average trip length also would significantly decrease in many of the locations near the mobility hubs (C-13) and where transit improvements occurred. The only mobility hub location where there would not be an obvious decrease in average trip length is near the Portland Avenue/Newport Avenue couplet (C-23). Trips occurring near the couplet would be required to cut through local streets to access the correct direction of travel, leading to longer trips on average in that area.

Goal 6: Have a Regional Outlook and Future Focus

Bend serves as a hub for regional transportation. As the City grows and adapts, it is important to create a system that is designed to test innovative and emerging transportation technologies.

The measures to compare the regional outlook for the BMPO area are:

- Arterial roadway miles with demand to capacity ratio deficiencies
- Potential for alternative funding
- Mode split

Arterial Roadway Miles with Demand to Capacity Ratio Deficiencies

Purpose and Overview

The level of congestion on the transportation system can indicate the quality of the system from a motorist standpoint. Increasing levels of congestion may not only require more time spent in a vehicle but may also affect the time of day that a trip occurs or, ultimately, reduce trips. Particularly for the arterial network, congestion can limit the mobility of regional trips coming to or leaving Bend. These actions can reduce quality of life and may also lead to economic impacts due to delayed goods movement and/or reduced trips to local merchants. This measure estimates the arterial roadway performance for each scenario.

Data Sources and Methods

The Bend-Redmond Travel Demand Model was used to model arterial roadway miles with demand-to-capacity ratios for each scenario. For this analysis, US 97 was included in the arterial roadway system in Bend. In Scenario A, the Powers River Crossing (A-4) and the US 97 North Interchange connection to 18th Street (A-7) were both coded as arterial roadways.

The demand-to-capacity (v/c) ratio for all arterials was calculated for the 2040 PM peak hour. A demand-to-capacity ratio deficiency was defined as any arterial segment with a v/c above 1.0. These roadway segments that the model identifies would be congested, with more demand for trips than can be served by the roadway. The total miles of arterial roadway with a deficiency were calculated for each scenario to compare to the 2040 Baseline.

Results

In Table 18, the miles of arterials with a demand-to-capacity ratio greater than 1.0 during the 2040 PM peak hour is shown. Under the Baseline, there would be 19.2 miles of arterials over capacity during the PM peak hour. In Scenario A, that would be reduced to 13.9 miles (7.1% of

arterials), while Scenario B would reduce it further, to 10.5 miles (5.6% of arterials). Scenario C would see a reduction to 14.9 miles of over-capacity arterials (8.0% of arterials).

Table 18: Arterial roads with capacity deficiencies

Scenario	Miles of arterials with v/c greater than 1.0	Percent of arterials with v/c greater than 1.0
Baseline	19.2	10.2
Scenario A	13.9	7.1
Scenario B	10.5	5.6
Scenario C	14.9	8.0

The largest improvement on this measure would occur in Scenario B. The widening projects in Scenario B would increase the capacity on many of the arterial roadways in Bend, such as the Empire Boulevard widening (B-12), 27th Street widening (B-18), and Reed Market Road widening (B-7, B-15, B-16).

Scenario A would also decrease the number of arterial roadways with capacity deficiencies. The Wilson Extension (A-19) would help reduce demand below capacity along nearby arterials. The Powers River Crossing (A-4) was coded as a three-lane bridge but expanding that to four or five lanes over the river could further reduce the miles of demand-to-capacity ratio deficiencies on arterials.

Small demand-to-capacity ratio reductions in Scenario C could account for the slight decrease from the Baseline, including less congestion along Newport Avenue with the addition of high-capacity transit (C-2).

Potential for Alternative Funding

Purpose and Overview

As the budget for projects becomes tighter, alternative funding sources (e.g., private industry transportation services) become attractive options for cities to investigate to help finance projects. Potential alternative funding sources may provide extra opportunities for projects that would otherwise be difficult to underwrite.

Data Sources and Methods

A qualitative review of individual project types in each scenario was conducted to determine what additional potential funding sources, if any, may exist. Each scenario details the potential alternative funding sources that may be available to projects within that scenario.

Results

In general, grant funding opportunities do not differentiate between new roadway connections and roadway widening projects, so Scenario A and B would likely have similar potential for alternative funding for roadway projects.

Over the past five years, there has been an increase in grant funding opportunities that focus on active transportation modes, as well as additional funds available for public transit. This may provide additional opportunities for the bicycle, pedestrian, and transit elements of Scenario A, B, and C to secure alternative funding. The mobility hubs (C-13) in Scenario C may be able to attract private partnerships or investment.

This qualitative comparison to the Baseline, as shown in Table 19, is based on information available at this time; trends for grant and other funding opportunities may change over the course of Bend's Transportation Plan 20-year planning horizon.

Table 19: Qualitative Rating for Alternative Funding Potential

Scenario	Alternative Funding Rating
Scenario A	
Scenario B	
Scenario C	

Mode Split

Purpose and Overview

In order to have a future focus when considering the emergence of shared and connected mobility, it is important to identify improvement opportunities for multimodal transportation to enhance access to those services. Mode split provides a quantitative measure of how each project shifts trips between walking, biking, transit, and auto trips. A higher percent of non-single occupancy vehicle (non-SOV) trips also has the potential to reduce congestion, improve air quality and the livability of the BMPO area.

Data Sources and Methods

The Bend-Redmond Travel Demand Model was used to model the daily mode split within the BMPO area during an average weekday.

Mode split was calculated for all daily trips beginning or ending within the BMPO boundary. A non-SOV trip includes walking, biking, and transit. For Scenario C, the transit mode split also encompasses any solutions associated with the mobility hubs, which may include several different smart mobility options.

Results

As shown in Table 20, Scenario A and B would perform similarly to the Baseline. In these scenarios, roughly 46% of all daily internal to intenral trips in the travel demand model would be single occupancy vehicle (SOV) trips. However, Scenario C would make significant improvements on this measure. There is a two percent reduction in SOV daily trips when compared to the Baseline. This is due in large part to the significant increase in transit trips, from 0.8% in the Baseline to 2.5% in Scenario C. The transit trips in Scenario C also include the estimated number of trips using mobility hubs. There is also a reduction in daily SOV trips with the implementation of a TDM program in the Baseline, further reducing SOV trips by 0.4%. The reduction in SOV trips by two percent is a large driver in the reduction of vehicle miles traveled per capita, discussed under Goal 5.

Note that while the relative differences between scenarios for mode-share seem limited (less than a few percent), this level of difference is significant as it relates closely to the VMT per capita performance measure. As described in the section for that performance measure, small variations in VMT per capita for Bend are important relative to meeting State regulations.

Table 20: Percent Daily Bend MPO Mode Share

Scenario	Single Occupancy Vehicle (SOV) (%)	Non-SOV Trips (%)
Baseline	46.7	53.3
Scenario A	46.8	53.2
Scenario B	46.7	53.3
Scenario C	44.7	55.3

Goal 7: Implement a Comprehensive Funding and Implementation Plan

Transportation improvements will be needed to serve growth and maintain and enhance livability in Bend. Stable, equitable and adequate funding for transportation programs and projects will be critical to allow Bend to continue to grow in a sustainable way.

Cost

Purpose and Overview

The funding required to address transportation improvements and maintain and operate the system can be substantial and may be an important factor for selecting a preferred transportation solution. This performance measure focuses on capital costs. Operations and maintenance needs are another important aspect; the magnitude of operation and maintenance funding needs is indicated by the following section, which considers the number of roadway miles.

Data Sources and Methods

Capital cost estimates were based on the general assumptions included in the recently completed Bend Transportation System Development Charge (TSDC) update.[20] These are currently being updated to reflect recent construction bids received by the City. Given the uncertainty of various unit cost assumptions and project specifics, current cost estimates provide a range of expected cost. These ranges will be further refined as specific unit costs are identified and the project moves towards a recommended funding package.

Results

A range of estimated cost is provided for each project in Appendix E. Several projects are subject to ongoing planning and evaluation studies. Estimated project costs will be further refined as the TSP process and other various efforts are advanced. Specifically, the need for additional right-of-way and/or reconstruction of existing curb lines would have a large impact on several project costs. As individual projects are further understood, these project elements can be better estimated.

In Scenario A, the majority of projects would represent relatively modest roadway extensions and planned connections. The largest driver of cost in this scenario are the North Parkway Extension FEIS improvements (A-6) and the Powers River Crossing (A-4). Both projects would require significant capital and right-of-way costs.

Several projects in Scenario B include roadway expansions that would require significant right-of-way acquisition. The widening of key corridors such as Empire Boulevard (B-12), 27th Street

[20] For more information, reference exhibits from the June 2018 Bend City Council meeting that addressed the TSDC cost increases

(B-18), Knott Road (B-18), Butler Market Road (B-12), Reed Market Road (B-6, B-15, B-16), and Colorado Road (B-8) would amount to large infrastructure projects that would require extensive right-of-way and construction costs. In addition, the feasibility of accommodating enhanced bicycle facilities within the existing curb lines of roadways would have a major impact on the actual costs to construct the bicycle facility projects identified in this scenario.

Most projects in Scenario C would not require the magnitude of capital costs of either Scenario A or Scenario B. However, several projects may require significant additional operational and administration costs, such as downtown parking pricing (C-20) or transit system expansions (C-2, C-3, C-8, C-13, C-14, C-18). The magnitude of those costs needs to be further coordinated with agency partners. In addition, the cost for installing ramp metering (C-22) would not be known until further evaluation is completed by the US 97 Parkway Study, which could significantly drive up costs in this scenario. The largest driver of cost in this scenario would be relocating the railroad switchyard (C-24).

Table 21 provides a relative capital cost of each scenario. The ranges for each scenario were developed by applying an average cost for each project based on the estimated cost range shown in Appendix E (e.g., a project cost range of $500,000 to $1,000,000 would add $750,000 to the estimated scenario cost).

Table 21: Relative Capital Cost by Scenario

Scenario	Relative Capital Cost
Scenario A	$$$
Scenario B	$$$
Scenario C	$

$ = less than $200 million, $$ = $200 to 500 million, $$$ = more than 500 million

Roadway Lane Miles

Purpose and Overview

While it is important to identify a range of solutions to potential problems, it is also important to understand the maintenance impacts of different solution packages. Roadway lane miles is intended as an indicator of the future demand for maintenance of the BMPO transportation system.

Data Sources and Methods

The network coded for the Bend-Redmond Travel Demand Model was used to measure roadway lane miles for each scenario. The total number of roadway lane miles was calculated from the travel demand model to compare the differences between scenarios.

Results

As shown in Table 22, Scenario B would have the most lane miles of roadway, followed by Scenario A, while Scenario C would have slightly fewer lane miles than the Baseline. In Scenario A, new connections such as the Powers River Crossing (A-4), the North Parkway Extension FEIS improvements (A-6) and the other roadway extensions would lead to an increase in lane miles. Scenario B widens long stretches of Empire Boulevard (B-12), 27th Street (B-18), Knott Road (B-18) and Reed Market Road (B-7, B-15, B-16), adding nearly 7% more lane miles of roadway over the Baseline. In Scenario C, there would not be a significant change

from the Baseline, but access management (C-4) and at-grade access closures along US 97 for ramp metering (C-22) would lead to a slight decrease in the number of lane miles.

Table 22: Lane miles of roadway

Scenario	Lane Miles of Roadway	Change from Baseline (%)
Baseline	464	Not Applicable
Scenario A	478	+2.8
Scenario B	497	+6.9
Scenario C	462	-0.6

Findings and Recommendations

The scenario evaluation described in this document is focused on learning about different investment options to help move towards the identification of a Citywide transportation framework. However, linkage between scenarios, Performance Measures, and individual project choices is complex. To organize the information and work from big-picture lessons to specific project needs, the findings and recommendations are sorted into the following topics and subsequent sections:

- Summary of Scenario Evaluation by Performance (High-Level Findings)
- Summary of Scenario Evaluation by Transportation Need (Area-Specific Findings)

Summary of Scenario Evaluation by Performance Measure

A key takeaway from the scenario evaluation is the lessons learned about how different types of Citywide transportation investment would perform compared to the plan's goals and corresponding Performance Measures. Table 23 shows the scenario evaluation results in a combined matrix of Performance Measures. Lessons learned at the scenario-level include:

- Motor vehicle congestion issues (corridor demand to capacity ratios, vehicle hours of delay, travel time reliability, etc.) forecasted in the future may be improved by either connectivity investments or corridor widening investments. However, each of those investment types have different secondary effects that are be important to consider:
  - Connectivity investments can improve accessibility for walking and biking, improve system safety by overcoming barriers, and reduce vehicle miles traveled by reducing out-of-direction travel. Connectivity investments are also generally costly and may spread motor vehicle travel patterns onto the collector system that must then consider compatibility with neighborhoods.
  - Corridor widening investments may provide opportunities to provide enhanced walking and biking facilities along roadways (both a safety and accessibility benefit) and focus regional traffic patterns onto arterial corridors. Corridor widening investments can also be costly, may significantly increase maintenance costs, may increase miles driven, and can impact safety by creating higher volume/speed corridors that are difficult to cross.
- Improving walking and biking through Bend is not as simple as filling in key gaps in facilities. The accessibility evaluation found that developing complete, connected corridors throughout the city (both along and crossing corridors) are important to improve travel choices.

- Transportation system demand for motor vehicle trips can be reduced by investments in the transit system (providing improved travel choices) and by implementing policies and programs in key areas, such as parking pricing and employer commute options that encourage travel by other modes.
- Looking towards the future of changing technology and shared mobility, concepts such as mobility hubs have the potential to improve mobility by providing first/last mile travel choices that connect to a robust regional transit system. This type of investment may also provide an opportunity to leverage public/private partnerships.
- Managing congestion and safety on US 97 through Bend is challenging with the projected levels of future growth. Corridor operations and access management solutions, including implementing ramp meters and closing at-grade connections, show significant potential to improving safety and operations with limited impacts to the surrounding city transportation network performance.

Overall, these lessons learned point to the pros and cons of various investment types represented in the three scenarios. Applying these to develop a hybrid scenario for the regional transportation framework should consider a balanced investment in demand management, system management, non-vehicular facilities and services, new complete street connections, and selected widening for capacity. The following section advances this concept by looking at investment performance by need area to begin identifying potential projects to advance.

Table 23: Scenario Performance Relative to the Baseline Projects

Project Goals	Performance Measures	Scenarios		
		A	B	C
Increase System Capacity, Quality, and Connectivity for All Users	Demand to Capacity Ratio (congestion)			
	Sidewalk System Completeness			
	Bicycle System Level of Traffic Stress			
	Completeness of low-stress network			
Ensure Safety for All Users	Qualitative Assessment of Predicted Crash Rates			
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Vehicle Hours of Delay			
	Peak Hour Vehicle Miles Traveled on Rural Facilities (diversion)			
	Travel Time Reliability			
Protect Livability and Ensure Equity and Access	Transportation Equity			
	Transit Accessibility for Vulnerable Populations			
	Employment accessibility			
	Percentage of collector roads with an ADT above 4,000			
Steward the Environment	Vehicle Miles Traveled Per Capita			
Have a Regional Outlook and Future Focus	Arterial Roadway Miles with Demand to Capacity Ratio Deficiencies			
	Potential for alternative funding sources			
	Mode Split*			
Implement a Comprehensive Funding and Implementation Plan	Cost			
	Roadway lane miles			

Summary of Scenario Performance by Transportation Need

As described in an earlier section, transportation needs throughout Bend were identified by technical evaluation, the public, and agency staff. The most common or significant needs were identified as key needs and used to help develop the projects in the three scenarios. Reflecting on how well each scenario may address the needs is a useful way to start understanding what type of improvements or projects perform best for each area.

Table 24 lists the scenario performance by key need. For each need, the scenario performance score considers Performance Measures that best match the need (e.g., a "capacity" need is compared to demand to capacity ratio and travel time reliability, while a "barrier for walking or biking" need is compared to accessibility, sidewalk completeness, safety, and completeness of the low-stress bicycle network).

The results of the scenario performance by needs begins to shape some potential project recommendations for a hybrid scenario or areas for further discussion, which is described in the following section. Sample findings that illustrate this include:

- *Barriers for Bicyclists and Pedestrians through Central Bend* appear to be best addressed with enhanced walking and bicycle facilities such as those in Scenario B.
- *15th Street Capacity and Safety at Key Intersections* appears to be best addressed with the roundabout projects included in Scenario C.
- *Manage Overall System Demand* appears to be best addressed with the transit and travel demand management strategies in Scenario C.
- *East-West Corridor Congestion* does not have a clear top performing investment strategy between new corridor connections or corridor widening and warrants additional discussion.

Table 24: Scenario Performance in Meeting Key Transportation Needs

Transportation Needs	Scenario A	Scenario B	Scenario C
Barriers for bicyclists and pedestrians through central Bend			
East-West Corridor Congestion			
US 97 Corridor Capacity/Safety (Empire to Cooley)			
US 97 Corridor Capacity/Safety (Murphy to Empire)			
US 97-Hwy 20 Triangle Pedestrian and Bicyclist Access			
Butler Market Corridor Capacity and Safety Needs (US 97 to 27th)			
Neff Corridor Safety (8th to Purcell)			
Greenwood Corridor Pedestrian/Bicyclist Safety			
Colorado Interchange Area Capacity and Pedestrian/Bike Access			
Reed Market Congestion (Bond to 4th)			
Reed Market Congestion and Safe Crossings (4th to 27th)			
15th Street Capacity and Safety at major intersections (Knott to Wilson)			
27th/US 20 and Hamby/US 20 Capacity and Safety			
US 20 West Rural Crossing Capacity and Safety			
3rd Street Capacity (Greenwood to Wilson)			
Transit Service to Outlying Areas			
Manage Overall System Vehicle Demand			
Century Drive Safety			
Safe Railroad Crossings			
27th Street Corridor Capacity and Safety			

TRANSPORTATION PERFORMANCE MEASURES FOR EVALUATING SCENARIOS

Approved by the Steering Committee – September 11, 2018

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Increase System Capacity, Quality, and Connectivity for All Users	Demand to Capacity Ratio (congestion)*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to predict where roadway segments or study intersections are at, near, or over capacity. Future alternatives would be compared to future "no build" scenario to see how ratios change. • *Monitoring:* Uses data collection program to monitor demand to capacity changes over time
	Sidewalk System Completeness	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of priority routes and type of facility proposed • *Monitoring:* Track progress towards sidewalk completeness
	Bicycle System Level of Traffic Stress	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of where comfortable bicycle routes exist, priority routes for improvement, and type of facility proposed • *Monitoring:* Track progress towards bicycle completeness
	Completeness of low-stress network	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Identification of key low-stress bicycle routes and facilities • *Monitoring:* Track the completion of the planned low-stress network

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Ensure Safety for All Users	Reported fatal and injury crashes*	• Monitoring program *Note: Upcoming Transportation Safety Action Plan (TSAP) will identify specific safety projects*	• *Monitoring:* Reported fatal and injury crashes per year at study intersections or roadway segments
	Reported Crashes by Mode	• Monitoring program *Note: Upcoming Transportation Safety Action Plan (TSAP) will identify specific safety projects*	• *Monitoring:* Reported crashes over time citywide, along specific corridors, facility types, at specific locations, and by mode
	Qualitative Assessment of Predicted Crash Rates	• Differentiate between planning scenarios	• *Planning scenarios:* Identification of historical crash performance of various scenario features. (e.g., consideration of crash rates on 3-lane vs. 5-lane roadway corridors, potential benefits of grade-separated crossings, etc.) Information will be available when considering scenario performance.
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Vehicle Hours of Delay*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to predict vehicle hours of delay experienced by users. Future alternatives would be compared to future “no build” scenario to see how delay is changed • *Monitoring:* Uses data collection program to monitor delay along specific corridors
	Peak Hour Vehicle Miles Travelled on Rural Facilities (diversion)	• Differentiate between planning scenarios	• *Planning scenarios:* Travel demand modeling tool used to identify where travel demand increases on/diverts to rural facilities

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
	Travel Time Reliability* (Application requires scope of work modification)	• Differentiate between planning scenarios • Monitoring Program	• *Planning scenarios:* ODOT maintained tool to assess the reliability on travel times on major corridors. If travel times can be confidently predicted, drivers can plan their trips to arrive on time. Travel time reliability is especially important for freight and public transportation. Future scenarios would be compared to the future "committed" scenario to see if travel times are maintained or improved. • *Monitoring:* Use data collection program or secure data from private vendors to monitor reliability along specific corridors.
Protect Livability and Ensure Equity and Access	Measure performance through equity lens such as poverty, race, age, and disability	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Provide a "populations served" rating for projects based on existing demographics information and travel model flow information • *Monitoring:* Annual report card on transportation system to various populations
	Percentage of vulnerable populations within ¼ mile of sidewalks, bicycle facilities, or transit	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Measure proximity of vulnerable populations to multimodal facilities • *Monitoring:* Track changes to access over time.
	Employment accessibility (ex. Number of jobs that the majority of Bend residents can reach, within a reasonable timeframe. This is calculated for each mode.)	• Differentiate between planning scenarios • Monitoring program	• *Planning Scenarios*: Measure how well the transportation system enables residents to get from home to work, for whichever mode they choose to use. • *Monitoring*: Track how employment accessibility is improved over time, based on land use, demographic, and transportation changes
	Percentage of collector roads with an ADT above 4,000	• Differentiate between planning scenarios • Monitoring program	• *Planning Scenarios:* Identify collectors roads carrying more traffic than anticipated in future scenarios. • *Monitoring:* Track collector traffic volumes over time.

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Steward the Environment	Vehicle Miles Traveled Per Capita*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to estimate number and length of trips per capita. Future alternatives would be compared to future "no build" scenario to evaluate how number of trips and miles driven change. • *Monitoring:* Uses data collection program to monitor miles driven over time
Have a Regional Outlook and Future Focus	Arterial Roadway Miles with Demand to Capacity Ratio Deficiencies	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool used to estimate arterial roadway performance. Future alternatives would be compared to future "no build" scenario to evaluate how performance along arterials changes. • *Monitoring:* Uses data collection program to monitor congestion along arterials over time.
	Potential for alternative funding sources	• Differentiate between planning scenarios	• *Planning scenarios:* Qualitative assessment of different funding sources that may be made available by the project types for each scenario.
	Mode Split*	• Differentiate between planning scenarios • Monitoring program	• *Planning scenarios:* Travel demand modeling tool will provide estimate of mode split for each scenario. • *Monitoring:* Annual reporting measure that identifies drive along, shared ride, walk, bike, and transit trips.

PROJECT GOALS	RECOMMENDED PERFORMANCE MEASURES	APPLICATION	EXAMPLE OUTPUT
Implement a Comprehensive Funding and Implementation Plan	Cost	• Differentiate between planning scenarios	• *Planning scenarios:* Planning level cost estimates for individual projects and scenario packages. Include estimate on maintenance costs.
	Roadway Lane miles	• Differentiate between planning scenarios	• *Planning scenarios:* Lane miles are intended as an indicator of demand for maintenance. Future alternatives would be compared to the future “no build” scenario.

*Recommended measures that are part of MPO planning requirements

Appendix F - Prioritization Criteria Memorandum

Project & Program Prioritization Criteria

June 20, 2019

Overview

The project prioritization criteria establish a method to help identify transportation investment priorities for the City of Bend. These criteria build on the work completed in Phase 1 and Phase 2 of the Bend TSP process that identified the 2040 Project List. As used here, investment priorities refers to what transportation facilities and programs are important to fund and implement, and, when those investments should occur over the near-, mid-, and long-term through 2040. The criteria presented herein are based upon the established project goals and are consistent with other City of Bend infrastructure planning efforts.

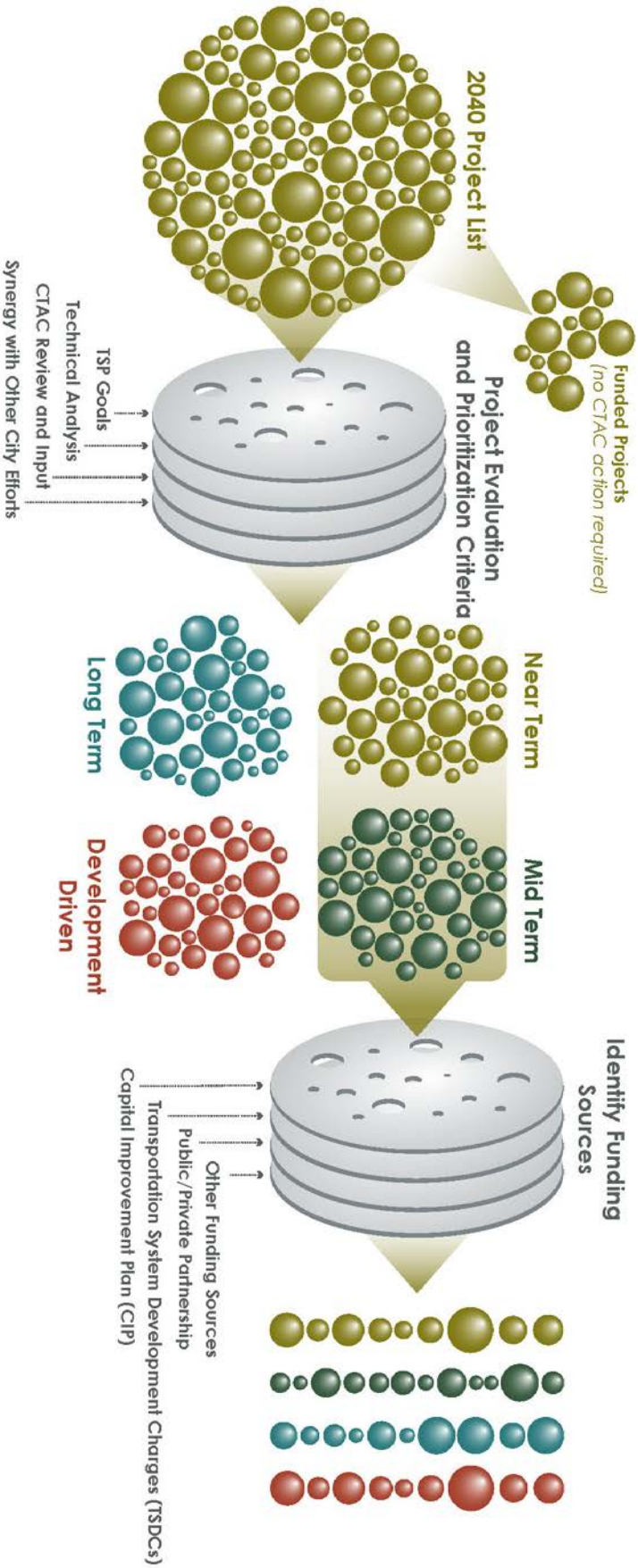
Figure 1 shows the general process that will guide project prioritization as part of the Bend Transportation System Plan (TSP). The evaluation will proceed along the following steps:

1. Identify the 2040 Project List (Current list developed as part of Phase 1 & Phase 2)
2. Establish the funding assumptions to be used[1]
3. Model and evaluate the 2040 Project List using performance measures established during Phase 1
4. Evaluate the 2040 Project List based on the prioritization criteria established in this document
5. Conduct a Citywide Transportation Advisory Committee (CTAC) work session to review the evaluation
6. Categorize the elements of the 2040 Project List as:
    - Near-term Project/Program
    - Mid-term Project/Program
    - Long-term Project/Program
    - Development Driven Project
7. Create the Funding Plan (near-term projects/programs) and Funding Strategy (mid- and long-term projects/programs)
8. Finalize the 2040 Prioritized Project List, Funding Plan and Funding Strategy

Steps 6-8 above will be iterative as CTAC and the Funding Work Group discuss choices and direction for their recommendations to the Steering Committee.

[1] Funding assumptions will be based on the Initial Funding Assessment, as further discussed by the Funding Work Group. An example of a funding assumption is the rate to be used for a Transportation Utility Fee.

Figure 1 – Prioritization Process Chart



Project and Program Screening Conducted To-Date

In 2018 as part of Phase 1, CTAC, the Steering Committee, and the project team conducted the initial screening of projects as part of the scenario evaluation effort. These Phase 1 efforts led to the development of the Citywide Transportation Framework (CTF). The CTF was refined via the Neighborhood Outreach effort, completed in early 2019. These first two phases of the TSP considered a number of projects and programs, some of which were either advanced for further evaluation or set aside for consideration in the future or through a different planning effort. The culmination of Phases 1 and 2 led to the development of the 2040 Project List that is comprised of viable projects and programs which will be evaluated during Phase 3 using the prioritization criteria.

Prioritization Criteria

The prioritization criteria will be used to differentiate, compare and identify trade-offs associated with the projects/programs in the 2040 Project List. This evaluation will be informed by data from the Bend-Redmond Regional Travel Demand Model and other technical and qualitative evaluations. Using this information, each of the projects or programs will be qualitatively rated to assess its ability to meet the TSP Goals & Objectives as guided by the prioritization criteria. The evaluation will then inform discussion to determine recommended timelines for implementation.

It is important to note that the proposed evaluation process is a blend of art and science; it is guided decision making as opposed to a rigid point system. For effectiveness, the prioritization criteria need to be easily understood and allow for differentiation between projects. This ensures a common understanding of each criterion's meaning and allows for a clear comparison among different ideas.

The criteria listed in Table 1 are based directly on the Goals & Objectives identified by CTAC and approved by the Steering Committee.

The prioritization criteria will be rated based on the scale shown in Table 2, using a "consumer reports" method of project rating.

Table 1. Prioritization Criteria

Goal	Application to Prioritization Criteria
Increase System Capacity, Quality, and Connectivity for All Users (e.g. drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)	Does the project or program: *Streets, transit, bicycle, & pedestrian to be evaluated independently* • Add to or enhance the street network • Address known areas of existing or future congestion or bottlenecks? • Add to or enhance the transit network? • Add to or enhance the bicycle network? • Add to or enhance the pedestrian network? • Increase the reliability of transit, on-time freight operations and vehicular travel? • Address a near-term or long-term need?

Goal	Application to Prioritization Criteria
Ensure Safety for All Users	Will the project or program: • Reduce the potential for fatalities and serious injuries? • Address known safety concern areas?
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Does the project or program: • Serve all Opportunity Areas or Expansion Areas, including those prioritized by City Council? • Allow the development of other priority areas identified areas for employment or housing?
Protect Livability and Ensure Equity and Access	Does the project or program: *Protect Livability:* • Support livability by helping ensure roads are used for their classification (i.e. reduce cut-through traffic on local streets)? *Ensure Equity and Access:* • Eliminate transportation related disparities such as high and adverse human health or environmental effects, high negative safety impacts, negative social and economic effects on disadvantaged or underserved populations? • Improve access to safe, appealing, affordable and reliable transportation choices to meet daily transportation needs of disadvantaged ~~transportation access f~~or underserved populations?
Steward the Environment	Does the project or program: • Limit impacts to natural features and the environment? • Reduce VMT and/or increase non-single occupancy vehicle travel)? • Preserve the functionality or quality of habitat areas?
Have a Regional Outlook and Future Focus	Does the project or program: • Support regional economic health and regional connectivity? • Help prepare Bend for future technology? • Help to implement other planned infrastructure projects within the City of Bend or by a partner agency?

Table 2. Prioritization Rating Scale

Rating	Description
●	The project/program clearly supports the criterion and/or makes substantial improvements in the criteria category
◒	The project/program idea partially addresses the criterion and/or makes moderate improvements in the criteria category
○	The project/program idea does not support the intent of, provides minor or incidental benefit and/or negatively impacts the criteria category
N/A	The project/program idea neither meets nor does not meet intent of criterion. The project idea has no effect, or criterion does not apply

Additional Considerations

In addition to the criteria described above, the prioritization process will also be informed by the forthcoming work by the Transportation Outreach Strategy Team and project synergy possible with other planned infrastructure projects (e.g., planned sewer project along an identified roadway project, planned ODOT project, etc.). These considerations will be handled on a case-by-case basis.

Appendix G - Preliminary Prioritization Evaluation Results Memorandum

2040 Transportation System Plan

Project & Program Evaluation and Preliminary Priorities

August 22, 2019

Introduction

Purpose

This memorandum summarizes the evaluation of the Bend TSP 2040 Project & Program List and presents initial project and program recommendations for timeframes of implementation, or "phasing buckets." This evaluation was conducted consistent with the Project & Program Prioritization Criteria, which were approved by the Steering Committee in June 2019.

Request to CTAC and the Process Ahead

This memorandum is preparatory material for the Citywide Transportation Advisory Committee (CTAC) meeting on August 28, 2019 (CTAC Meeting 12). **CTAC is asked to review this memo prior to the meeting** and participate at CTAC 12 to confirm and adjust proposed project and program phasing using the recommendations from the project team as a starting place.

The outcomes from CTAC Meeting 12 will then be taken through several iterative steps to further hone the prioritization and funding recommendations. Those steps are:

- Funding Work Group (FWG) Meeting 6 – prepare funding sources and amounts to align with CTAC's project and program priorities
- CTAC Meeting 13 – review of FWG input and refinement of priorities, creating a 2040 Prioritized Project List V1
- FWG Meetings 7-8 – creation of the draft TSP Funding Plan and Strategies Report
- CTAC 14 – finalize the draft TSP Funding Plan and Strategies Report and 2040 Prioritized Project List V2, for recommendation to the Steering Committee

The Role of the TSP in Prioritization and Funding

The TSP is a long-term planning document. It addresses a comprehensive set of Bend's transportation system needs, integrated with land use and other community needs and aspirations. The priorities and funding plans in the current TSP update will create clarity for Bend regarding **what** projects and programs are most important, **when** they should be constructed/implemented, and **how** they should be funded. However, it is important to note that those are planning-level recommendations and subject to refinement and change over time. Typical factors influencing refinements include population and employment growth rates (high vs. low); growth in specific locations of the Urban Growth Boundary (UGB); community priorities;

City Council priorities expressed through goals, budgets, and the Capital Improvement Program (CIP); partner agency projects; annual fluctuations in revenue collections; and outside grants or funding opportunities. The specific authorization and timing of individual projects is made through Bend's CIP and similar Council-directed decision making—using the TSP as guidance.

Project & Program Evaluation Overview

Defining the Timing of Priorities - "Phasing Buckets"

The City has identified phasing categories (herein referred to as "phasing buckets") described below. Each bucket contains projects and programs[1] that can be financed with existing funding sources as well as projects and programs that will need additional funding sources not yet secured by the City. Part of the FWG charge is to identify these additional funding sources the City needs to fund all the planned projects and programs.

(1) ***Near-term Priorities (Implementation Years 1-10)*****:** Bucket 1 (Table 4a and 4b and Figure 2) addresses near term priorities spanning 10 years to implement both the current 5-year CIP (2019-2023[2]) as well as additional projects and programs that rank as high priorities and are appropriate for the 6-10 year timeframe.[3] Additional projects and programs may also be added in the 1-5 year timeframe to complement, operate, and/or maintain those projects and programs already committed to by the City—within the delivery capacity and available revenue in that timeframe.

(2) ***Mid-term Priorities (Implementation Years 11-15)*****:** Bucket 2 (Table 5a and 5b and Figure 3) includes projects and programs identified by CTAC and the project team that support TSP goals and economic and community health or that are anticipated to be triggered by growth in the mid-term horizon.

(3) ***Long-term Priorities (Implementation Years 16-20)*****:** Bucket 3 (Table 6a and 6b and Figure 4) includes projects and programs identified by CTAC and the project team that are of lower priority for the community or are not likely triggered by growth or system needs until the long-term horizon. Even with that long-term frame of reference, these projects and programs help meet long-term transportation system needs and implement the Bend Comprehensive Plan.

(4) ***Expansion Area Driven Projects (previously called Development Driven Projects)***: The key distinction for Bucket 4 (Table 7 and Figure 5) projects is that their timing will be driven primarily by the timing of significant development near the project or program location, as opposed to City-initiated improvements of the transportation system. These projects may address important system needs, such as neighborhood streets needed to connect pedestrians, cyclists, and motorists in growth areas with the regional arterial and collector roadway system. They may also include "public" funding sources, such as Transportation System Development Charge (TSDC) funding, determined as part of development review, negotiated developer agreements, or an area-planning process.

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[1] As described later in this memorandum, all programs are recommended for inclusion in the Near-term "bucket."

[2] Current CIP projects identified as part of the 2019 Council Goals are not included in near term priorities (Table 4a) as they are fiscally committed via Franchise Fees and Transportation System Development Charges.

[3] The City's fiscal commitment in the TSP is for project planning. All actual funding authorizations are subject to subsequent Council action.

Specific timing for implementation is dependent on market conditions related to the pace of development in specific areas. These projects and programs contribute to the overall multimodal system and are an important component of the TSP. In evaluating these projects, the team discovered they were all associated with Bend's UGB expansion areas, so the bucket title was revised.

Each of the identified 2040 Projects and Programs has been categorized into one of the phasing buckets based on the following set of questions:

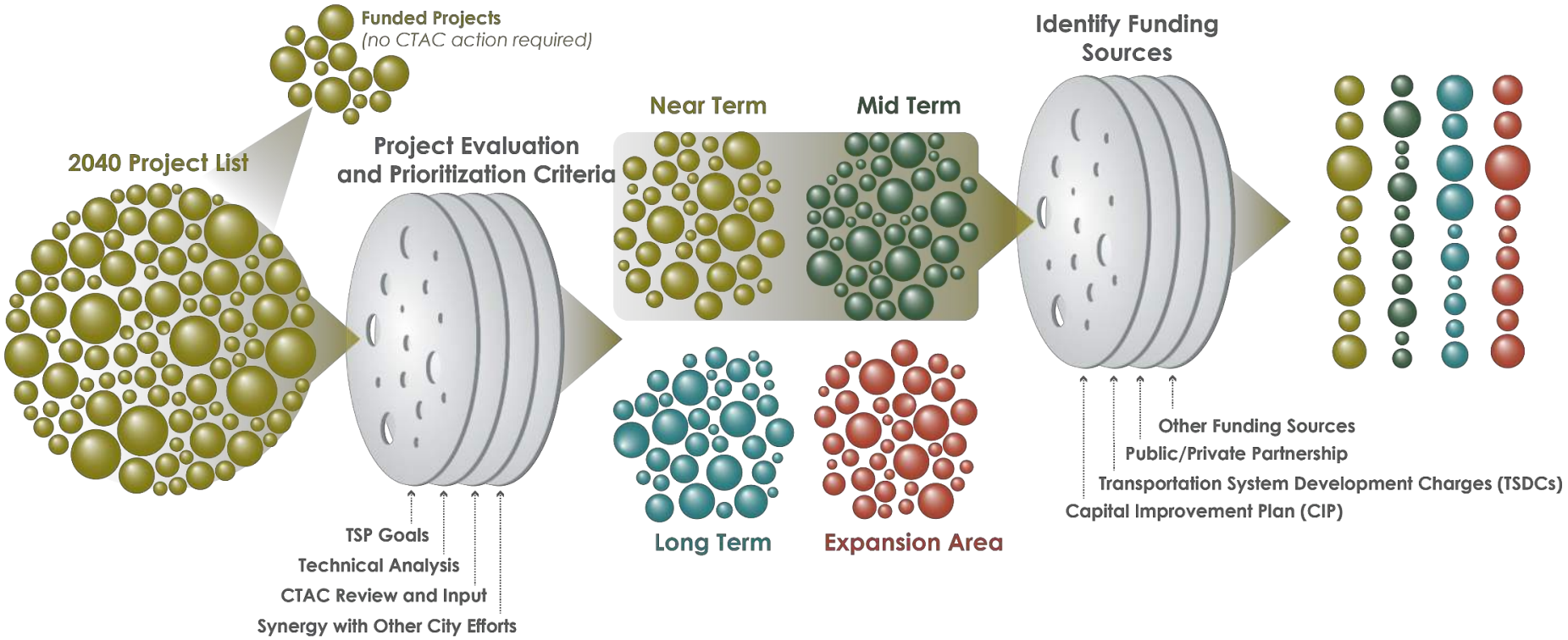
- Which projects most meaningfully address the project and program prioritization criteria?
- What is the likely funding available for each of the "buckets" and how can the City "right-size" the project and program list to best match the funding sources? (Note: this evaluation is based on initial estimate for available funding. These estimates will continue to be revised as the FWG refines revenue forecasts.)
- What projects and programs build upon and/or rely on synergies provided by other capital improvements projects within each bucket?

The categorization of each project and program into the phasing bucket categories requires an iterative process to ensure each bucket is both effective at addressing TSP goals and fits within the funding strategy. This iterative effort assumes that the near-term priorities comprise the TSP's 'fiscally committed' list and will be accompanied by a funding plan (identifying funding sources, amounts, timing) developed by the FWG for inclusion in the TSP. The mid-term and long-term project lists will have more general funding strategies and an assessment of what is "reasonably likely to be funded" with projected revenue streams to meet State planning requirements, reflecting the need to be flexible and adaptable over the long term.

The TSP is a living document that is updated every 5-7 years, including various amendments over time as needed based on new information or changing conditions. In concept, the mid- and long-term projects will move up in priority over time if the community grows as projected.

The general prioritization process is shown in Figure 1.

Figure 1. Prioritization Process Chart



How Projects & Programs Were Evaluated and Rated

Goals-based Criteria

The prioritization criteria were used to differentiate, compare, and identify trade-offs associated with the projects and programs in the 2040 Project List. The criteria used for this analysis, listed in Table 1, are based directly on the Goals & Objectives developed by CTAC and approved by the Steering Committee.[4] The prioritization criteria have been rated based on the scale shown in Table 2, using a "consumer reports" method of project rating. Please see Appendix A for the full text of the goals.

Table 1. Goals- Based Prioritization Criteria

Goal	Application to Prioritization Criteria
Increase System Capacity, Quality, and Connectivity for All Users (e.g. drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)	Does the project or program: *Streets, transit, bicycle, & pedestrian to be evaluated independently* • Add to or enhance the street network? • Address known areas of existing or future congestion or bottlenecks? • Add to or enhance the transit network? • Add to or enhance the bicycle network? • Add to or enhance the pedestrian network? • Increase the reliability of transit, on-time freight operations and vehicular travel? • Address a near-term or long-term need?
Ensure Safety for All Users	Will the project or program: • Reduce the potential for fatalities and serious injuries? • Address known safety concern areas?
Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth	Does the project or program: • Serve all Opportunity Areas or Expansion Areas, including those prioritized by City Council? • Allow the development of other priority areas identified areas for employment or housing?

[4] The project goals were approved by the Steering Committee on September 11, 2018. The prioritization criteria were approved by the Steering Committee on January 20, 2019.

Goal	Application to Prioritization Criteria
Protect Livability and Ensure Equity and Access	Does the project or program: *Protect Livability:* • Support livability by helping ensure roads are used for their classification (i.e. reduce cut-through traffic on local streets)? *Ensure Equity and Access:* • Eliminate transportation related disparities such as high and adverse human health or environmental effects, high negative safety impacts, negative social and economic effects on disadvantaged or underserved populations? • Improve access to safe, appealing, affordable and reliable transportation choices to meet daily transportation needs of disadvantaged or underserved populations?
Steward the Environment	Does the project or program: • Limit impacts to natural features and the environment? • Reduce VMT and/or increase non-single occupancy vehicle travel)? • Preserve the functionality or quality of habitat areas?
Have a Regional Outlook and Future Focus	Does the project or program: • Support regional economic health and regional connectivity? • Help prepare Bend for future technology? • Help to implement other planned infrastructure projects within the City of Bend or by a partner agency?

Table 2. Prioritization Rating Scale

Rating	Description
●	The project/program clearly supports the criterion and/or makes substantial improvements in the criteria category
◒	The project/program idea partially addresses the criterion and/or makes moderate improvements in the criteria category
○	The project/program idea does not support the intent of, provides minor or incidental benefit and/or negatively impacts the criteria category
N/A	The project/program idea neither meets nor does not meet intent of criterion. The project idea has no effect, or criterion does not apply

Methods Used for Rating the Projects and Programs

The evaluation was informed by technical and qualitative evaluations, including data from the Bend-Redmond Regional Travel Demand Model (BRM). Using this information, each of the projects or programs was rated to assess its ability to meet the TSP Goals as guided by the prioritization criteria. The sections below provide a brief description of how the projects were rated using the prioritization criteria. A summary of this evaluation is included in Appendix B.

Evaluating the Capacity, Quality and Connectivity Goal and Criteria

As shown in Table 1 the first goal listed is:

Increase System Capacity, Quality, and Connectivity for All Users (e.g. drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)

This goal and its criteria were evaluated using a number of methods, including modeling analysis with the BRM and qualitative system evaluation.

The BRM is a modeling tool that utilizes inputs of planned land use, demographics, transit service, regional travel growth, and the characteristics of the area transportation network to forecast travel and network performance such as roadway volume and congestion at a regional corridor scale. The model was developed (and is maintained by) ODOT and the Bend MPO and is a required analytical tool for evaluating compliance with Oregon's Transportation Planning Rule. The model is a helpful tool for quantifying differences between varying scenarios of projected land use or transportation system or service improvements. For a detailed discussion on the scenarios that were modeled in the project prioritization process, see Appendix C.

The model was used to evaluate projects and programs in two ways:

1. Model demand-to-capacity plots[5] (as shown in Appendix C) helped identify whether the project or programs addressed a projected area of congestion by comparing the proposed 2040 TSP Scenario[6] the 2040 Baseline Scenario. For example, a roadway extension project was evaluated by determining how much traffic it would attract, if that attracted traffic was diverted from a nearby congested link, and if that shift would result in a significant difference in that areas' demand-to-capacity ratio. Program improvements such as parking pricing in downtown Bend were evaluated in a similar way by evaluating the level of traffic differences on surrounding roadway links. This methodology, while quantitative with model information, requires judgement as the large number of projects and programs create overlapping benefits and impacts.
2. Model demand-to-capacity plots were also used to help determine when a regional corridor capacity need would be triggered. In this application, existing conditions[7], interim year[8], and future year 2040 plots were compared to assess which projects and programs address near-term, mid-term, or long-term needs. Projects or programs with benefits on corridors that were over capacity in each scenario were given a higher rating

[5] The model demand-to-capacity plots show both projected peak hour roadway volume (varying by line thickness) and the corresponding level of corridor congestion (varying by line color).

[6] The 2040 TSP Scenario includes all of the projects and programs that have been identified for the TSP.

[7] From the 2010 Base Year Scenario

[8] The interim year scenario represents land use and growth consistent with the UGB expansion work and most of the Baseline Scenario projects. Since the BRM was also used to model the Bend MPO transportation plan, which must be fiscally constrained, the following projects from the Baseline Scenario were not included in the Interim Year Scenario: South frontage road connecting to Murphy interchange area (Project 18) and Preliminary engineering and right of way acquisition for an overcrossing or interchange at US 97/Powers Road (Project 14).

for addressing congestion than projects or programs with benefits on corridors that were shown as under capacity in that model scenario.

When rating the impact of projects and programs on enhancing the pedestrian and bicyclist network, projects along the Low Stress Bicycle Network and Key Walking and Biking Routes were rated more highly than projects that did not improve conditions along those routes. In addition, projects that would make the pedestrian or bicyclist network higher-stress or decrease safe crossing opportunities were rated lower. Projects and programs that improved the transit network or the reliability of transit were also rated more highly.

For each project and program, the prioritization rating scale in Table 2 was applied, with notes recording highlights of the technical team rationale for the ratings. Please see Appendix B for the ratings and notes.

Evaluating Additional Goals and Criteria

As shown in Table 1, the additional goals include:

Ensure Safety for all Users;

Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth;

Protect Livability and Ensure Equity and Access;

Steward the Environment;

Have a Regional Outlook and Future Focus; and

Implement a Comprehensive Funding and Implementation Plan.

Each of the projects and programs was evaluated relative to the screening criteria summarized in Table 1 using both qualitative and quantitative data. A variety of technical analyses and the activities of ongoing planning studies helped inform this evaluation, such as the outcomes of the travel demand modeling efforts, ODOT's Parkway Study, the City's Transportation Safety Action Plan (TSAP), and various sub-area planning efforts within the City. The evaluation also benefited from feedback gleaned from various City staff members as well as other agency stakeholders about overall community needs and the trade-offs associated with a variety of long-term solutions. Using all of these sources, the team reviewed each of the projects and programs and applied their professional judgement regarding the prioritization ratings to be applied. The rationale for each rating was recorded and is in included in Appendix B.

Funding Revenue Assumptions

At a Funding Work Group (FWG) meeting on July 24, 2019, the project team shared draft funding projections for the nine funding tools recommended in the 2018 Initial Funding Assessment (IFA). The project team facilitated a conversation to confirm or amend the recommended tools, rates, and funding amounts from the IFA that should be used for this phase of planning. This discussion informed initial recommendations for the funding sources that are most appropriate for each generalized time period (particularly for years 1-10 and 11-15). As more is known about priority projects in each bucket, the assumptions will be revisited and adjusted to match specific projects to specific funding sources. A summary of the FWG conversation follows.

(1) ***Near-term Funding Plan (Implementation Years 1 – 10):*** In the near-term, the City will rely on several existing sources[9] and new revenue tools to fund capital projects and operations, maintenance (O&M), and program plans. Of the new tools under consideration, and based on input from the FWG, a general obligation bond and a Transportation Utility Fee (TUF) seemed most likely to be implemented in the near-term. The FWG recommended the following assumptions:

a. **General Obligation Bond:** The FWG agreed that $200m[10] is a reasonable top-end assumption for a general obligation bond to fund capital projects.

b. **Transportation Utility Fee (TUF):** The Funding Work Group agreed that a TUF would be a reasonable near-term tool and suggested that it should be targeted to prioritized O&M projects and programs. A TUF could generate up to $5m per year ($50m in years 1-10) given current TUF rates and assumptions.

c. **Vehicle registration fee (VRF):** If Deschutes County implements a VRF, the City could use those dollars towards projects of regional significance that are prioritized for funding in the near-term.

d. **Urban Renewal:** Assuming a new urban renewal area is adopted in the Core Area, these funds[11] may be used to fund a limited number of eligible capital projects in the urban renewal area as they become available; however, little urban renewal funding is likely to be available in the near-term.

e. **Other:** Additional core tools (a food and beverage sales tax or a fuel tax) could be possible in the near-term if needed to cover priority projects.

(2) ***Mid-term Funding Plan (Implementation Years 11 – 15):*** Additional funding sources will be needed in the mid-term. The FWG supported the following assumptions:

a. **General Obligation Bond:** An additional general obligation bond of about $200m could be possible for capital projects needed in the mid-term.

b. **Transportation Utility Fee:** If implemented, the TUF would continue to generate about $5m per year (in constant $2018) for O&M and programs in years 11-15.

c. **Urban Renewal:** Additional funding from the urban renewal area in the Core Area (if implemented in the near-term) will be available in the mid-term to fund eligible capital projects within the urban renewal area.

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[9] Existing sources include State Highway Fund dollars, Surface Transportation Block Grant dollars, general fund dollars, garbage franchise fees, water/sewer franchise fees, existing transportation-system development charges (TSDCs), and miscellaneous "other" dollars. Note that recently approved increases to the TSDC (up to $8,000 per Peak Hour Trip or PHT as of January 1, 2020) are included in the assumptions of existing funding. We note that these dollars are already allocated to specific transportation funding needs (over the 20-year planning horizon) per City policy. Some near-term projects have funding allocated from existing sources; others do not.

[10] The FWG provided direction that, for the purposes of estimating near-term funding capacity to support project prioritization, the upper bounds for a general obligation bond should not surpass $200m. It is likely that two $200m bonds could be implemented in the 20-year planning horizon. Per FWG discussion, we assume one $200m bond would be implemented in the near-term and a second $200m bond would be implemented in the mid-term.

[11] Projects eligible for urban renewal funding (preliminarily estimated at about $29m over the 20-year planning horizon) must be capital projects and they must be located within the urban renewal area. Little funding is likely to be available in years 1-10. Funding allocations for eligible transportation projects will be refined through BURA / Core Area Process.

d. **Transportation SDC:** Council could consider increasing the existing transportation-system development charge (TSDC) again in the mid-term to fund additional TSDC-eligible projects.

(3) **Other:** Additional revenue from other core tools (food / beverage sales tax, fuel tax, county VRF) could be available – if implemented in the near-term – or could be implemented in the mid-term. ***Long-term Funding Strategy (Implementation Years 16 – 20):*** In the long-term, revenue expectations are more ambiguous. New revenue tools (such as the food and beverage sales tax, fuel tax, urban renewal funding, or vehicle registration fee) could be implemented at this time. The City could also consider a third general obligation bond if necessary or additional increases to TSDC rates. TUF dollars will continue to be available (about $5m per year for O&M and program plans, assuming one has been implemented). In years leading up to Year 16, the City will begin to have a much clearer picture of the types of projects still requiring funding. At this time, the City will need to revisit the conversation to craft a more tangible funding plan for the final years of TSP implementation.

(4) ***Expansion Area Projects (Implementation Years 1 – 20):*** Because projects comprising this bucket will be implemented as development occurs, the foundational assumption for this bucket is that revenue would primarily derive from TSDCs[12] (including potential supplemental TSDCs that apply in specific expansion areas) and potentially local improvement districts (LIDs).[13]

The next phases of work will match projects to funding sources based on eligibility and available dollars.

Evaluation Findings

Capacity, Quality and Connectivity

The results of the 2040 TSP Project List Scenario analysis, combined with the findings from the existing conditions analysis, the 2040 Baseline Scenario analysis, and the Interim Land Use Scenario analysis, helped the project team identify the impacts of projects on system capacity, quality, and connectivity. This analysis also helps inform when certain projects may be needed, for prioritizing as a near term, mid-term or long-term project. *In particular, the timing of when needs would be triggered helped differentiate between projects and programs for this Goal.* The following sections highlight some of the key findings and needs from this analysis and how they informed project prioritization.

12 Any new revenue generated from a TSDC rate increase surpassing $8,000 per PHT.

13 Local street infrastructure improvements that benefit specific properties, in a defined area, may be funded by LID assessments. We cannot definitively know if or when property owners will opt-into forming a LID. Our initial projections suggest that about $14m could be made available through LIDs over the 20-year planning horizon. This assumes about two LIDs, worth $350,000 each, are implemented per year.

Existing Needs

A handful of key system needs were identified in the Existing Conditions and Needs Technical Memorandum[14]. The following list highlights the needs identified for existing conditions, which may be used to determine priorities to consider for the Near-term bucket:

- **Bend Parkway (US 97) Congestion and Safety:** Significant congestions occurs today on US 97, particularly on the northern end near the Cooley Road and Robal Road signalized intersections. There are also safety concerns at many of the at-grade intersections along US 97 and the right-in and right-out access points.
- **East-West Corridor Congestion:** A handful of key east-west corridors through the City were identified as not meeting current mobility standards, including areas around the Reed Market Road corridor and along US 20/Greenwood Avenue. Along east-west routes that do meet mobility standards today, many of them experience significant queuing during the p.m. peak hour.
- **Bicycle and Pedestrian Facilities**: Regional-level pedestrian and bicycle corridor connectivity is limited by major barriers and there are many corridors that lack low-stress facilities.
- **Transit:** Existing transit service is limited, particularly in the outer sections of the City. Only half of households are within a quarter mile of transit and there are limited bicycle and sidewalk facilities to safely get people to transit stops.

Interim Mobility Needs

Based on the Interim Land Use Scenario, there are two primary areas where added growth will cause key corridors to degrade significantly further in capacity per the BRM analysis, as shown in the volume-to-capacity plots in Appendix C. The following locations were identified as areas that would have significant mobility congestion needs in the midterm:

- **Bend Parkway (US 97) Congestion:** Under the Interim Land Use Scenario, portions of the Parkway exceed capacity. The north Parkway from Cooley Road to US 20 and the central Parkway between Hawthorne Avenue and Colorado Avenue are over capacity.
- **East-West Corridor Congestion**: By the Interim Land Use Scenario, several east-west corridors are forecasted to be over capacity. These include all of the major river crossings (Portland Avenue, Newport Avenue/Greenwood Avenue, Colorado Avenue and Reed Market Road). Reed Market Road shows the most congestion with segments between Century Drive and US 97 over capacity or nearing capacity.

2040 Needs and System Performance

System-Wide Performance

In addition to addressing specific need locations (discussed in the Needs section below), the 2040 TSP Project List Scenario also addresses some of the larger, system-wide goals articulated in the TSP. The 2040 TSP Project List Scenario significantly affects some of the travel demand modeling system-wide performance measures including:

[14] Existing Conditions and Needs, City of Bend Transportation System Plan Update, July 2018

- **Mode Split**: There is a significant shift to modes other than single-occupancy vehicles (SOVs) and a decrease in daily SOV trips by 3.5% with implementation of the 2040 TSP Project List Scenario over the 2040 Baseline Scenario. This shift was achieved through the combination of land use planning aligned with key services and programs, including: traffic demand management (C-16); downtown parking pricing (C-20); high capacity transit lines with mobility hubs; and investment in the bicycle Low-Stress Network and connected pedestrian system (Key Routes).
- **Vehicle Miles Travelled (VMT) per Capita**: With the additional mode shift and intentional investment in a combination of multimodal and connectivity projects, the 2040 TSP Project List Scenario decreases projected VMT per capita by over 4% when compared to the 2040 Baseline Scenario. This reduces VMT per capita to levels similar to 2010 conditions even with expansion of the Bend UGB, which is a key step forward in addressing the Statewide goal of decreasing VMT per capita.
- **Vehicle Hours of Delay**: Similarly, there is also an improvement (i.e., reduction) in vehicle hours of delay across the system during the projected pm peak hour in the 2040 TSP Project List Scenario. Total vehicle hours of delay for trips within Bend decreases by nearly 18% with the combined investment of the TSP Project List compared to the 2040 Baseline Scenario.

How Did the 2040 Project List Scenario Perform in Addressing Key System Needs?

The list below summarizes how the needs seen under existing conditions, in the Interim Land Use Scenario and in the 2040 Baseline Scenario are fully or partially addressed under the 2040 TSP Project List Scenario.

- **Bend Parkway (US 97) Congestion and Safety:** With the implementation of the North Parkway FEIS (Projects 13 and A-6), the Powers Road Interchange (A-8) and other Parkway Study Improvements (N-4) such as ramp metering and right-in right-out closures, the entire length of US 97 in Bend models as under capacity, which is a significant improvement over the 2040 Baseline Scenario. These improvements are also expected to significantly improve safety by limiting at-grade access on the Parkway.
- **East-West Corridor Congestion**: Improvement projects will make notable improvements in congestion and queuing at spot locations along east-west corridors (such as 17, A-17, C-7, N-13, C-9). Overall vehicle demand is reduced through TDM strategies (C-16, C-20), improved facilities for people walking and biking on the LSN (LSN, P-1 and P-2) and improved high capacity transit on Newport Avenue/Greenwood Avenue (C-2).

  However, the system in 2040 is still constrained and over capacity at the major bridge crossings. Some solutions include:

  - A study for a new long-term southern river crossing between Powers Road and Murphy Road (A-4) may help identify a solution for the continued congestion on east-west corridors. Beyond the transportation solution analysis, such a study addresses land use and natural resource considerations.
  - Congestion should continue to be monitored to determine if/when additional improvements are appropriate at key locations on east-west routes. Improvements may include targeted widening or other intersection improvements

as indicated by future conditions and application of TSP policies. Improvements may also include further use of demand-management strategies, implementation of the strategies in Bend's Integrated Land Use and Transportation Plan, targeted widening or intersection improvements, or adoption of alternative mobility standards.

- **North-South Corridor Congestion in Eastern Bend**: The modeling showed that Intersection improvements along 27th Street (N-5) and 15th Street (B-17), building upon the improvements underway with the Empire Avenue Extension projects connecting from Purcell to Butler Market, will help alleviate some congestion on the north-south routes in eastern Bend.

  However, these corridors are expected to still be over capacity in the 2040 TSP Project List Scenario in the long-term outlook (between Butler Market and Neff and Bear Creek and Reed Market) and should continue to be monitored to determine if/when additional improvements are appropriate. Improvements may also include further use of demand-management strategies, implementation of the strategies in Bend's Integrated Land Use and Transportation Plan, targeted widening or intersection improvements, or adoption of alternative mobility standards.

- **Bicycle and Pedestrian Facilities**: With the addition of projects on key routes of the LSN, a commitment to building complete streets and an emphasis on programmatic approaches to addressing pedestrian and bicyclist needs on all levels of the system (P-1,P-2,T-3,T-2,T-5,1TBKE), the 2040 TSP Project List makes enormous strides in addressing the lack of a connected network of low stress facilities. Starting these programs in the shorter term will help address existing needs while continuing to make improvements into the future.

- **Transit**: The high-capacity transit backbone of Greenwood Avenue/Newport Avenue (C-2) and 3rd Street between Murphy Road and the North Triangle Area (C-3) combined with mobility hubs (C-4) makes significant improvements in the transit network in Bend. These improvements (combined with investment in low stress pedestrian and bicycle networks and TDM strategies) help contribute to the shift away from SOVs, reduces VMT per capita and reduces p.m. peak hour motor vehicle delay.

The combination of the system-wide findings and the location specific findings from the travel demand model needs analysis informed the project prioritization process. The project team used the above findings in the preliminary placement of projects in near-, mid- and long- term buckets.

Qualitative Goals and Criteria Evaluation

In addition to the travel demand model-based analyses described above, each of the projects and programs was evaluated relative to the goals summarized in Table 1. This evaluation was based on information gleaned using both qualitative and quantitative data as well as the application of general planning principles and professional engineering judgement. This work was also informed by a variety of technical analyses and the activities of other ongoing planning studies within the City. The evaluation also benefited from feedback gleaned from various City staff members as well as other agency stakeholders about overall community needs and the trade-offs associated with a variety of long-term solutions. The team's evaluation of each of the projects and programs is in Appendix B.

While some projects clearly ranked high in a certain category, most projects did not equally meet the prioritization criteria for all of the goals (e.g., Simpson Avenue/Columbia Street intersection addresses capacity, however it does not address the housing supply/economic development or the regional network). To reasonably rank projects based on overall goals and, in turn not penalize projects if they did not meet one or more specific goals, the average ranking of each project was reported (i.e., if a project addressed a goal, how well did it do so?).

The following summarizes the qualitative analysis for ranking projects based on the goal criterion.

- **Goal: Increase System Capacity, Quality, and Connectivity for All Users (e.g. drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)**
    - The scoring of projects relative to this goal was described in detail in the previous section.
- **Goal: Ensure Safety for All Users**
    - Projects were evaluated based on the potential to reduce transportation-related risk for users of all ages and abilities, with a specific focus on those projects that would enhance the comfort and convenience for people walking, cycling and taking transit as well as those traveling with mobility aids. Projects with a high rating addressed the needs of all modes of travel versus those focused on only on vehicular capacity needs. The majority of the projects scored well.
- **Goal: Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth**
    - Projects within identified economic development priority areas for the City, including both expansion and opportunity areas, ranked very well in this category. Those projects that provide needed connections for these areas to existing multimodal infrastructure also scored well. Projects near planned new housing also ranked high.
- **Goal: Protect Livability and Ensure Equity and Access**
    - As noted in Table 1, livability and equity were analyzed separately as part of this goal.
    - Projects that scored well in the livability criteria are those that provide more localized benefits. These projects are generally within residential neighborhoods and improve the user's perception of "comfort" as well as filling in key connectivity gaps in the sidewalk, bicycle network and neighborhood street systems.
    - Projects that ranked highly in the equity category were those that provided key connections between transit, walking and cycling as well as filling in needed gaps in connecting these users between major destination points within the City. Vehicular-based capacity and maintenance projects did not rank highly for this goal.

- **Goal: Steward the Environment**
    - Projects that scored well were those that help to increase the percentage of trip-making by walking, cycling and transit and conversely lower single occupancy vehicle travel, VMT, and vehicular emissions within the City. Projects that did not rank well or were not rated for this criteria included roadway widening/capacity improvements, signal modifications, and new roads.
- **Goal: Have a Regional Outlook and Future Focus**
    - Regional projects that are along or connect to ODOT or County facilities scored well in this category. Improvements along City arterials and major collectors also scored well. The majority of projects on the local system did not receive a ranking (N/A).

Overall Conclusions from the Evaluation

At a high level, the Project and Program Criteria rating process revealed the following:

- Most projects and programs had a majority of ● and ◒ (good and partially good) ratings, and very few had ○ (poor) ratings. The team believes this reflects the thoughtful and iterative process that CTAC and the Bend community have used to identify key transportation needs and the best projects to address them through the earlier scenario development and improvements identification process (Phase I of the work program). Please see Appendix B for the individual project and program evaluations.
- Through implementation of the 2040 Project List, the evaluation shows that Bend has a significant opportunity to address many of its transportation needs and serve a future population of 150,000+ (the projected city population in 2040). The evaluation showed it will take a comprehensive mix of transportation strategies – increasing capacity in key locations, continued connectivity improvements, and implementation of the low stress bicycle and pedestrian network, transit improvements, and transportation demand management – to realize this opportunity.
- The relatively even performance of the projects in the evaluation also means that there were no significant “difference-makers” in the criteria or the project list.
- Even though there are no significant “difference-makers,” the evaluation helps point to strategies for CTAC to use in setting priorities. This will require a combination of professional and community judgement about those priorities, and implementation through funding strategies.
- For the preliminary priorities list in this memo, the team has applied the evaluation findings and its professional judgement using the following considerations:
    - Considerations for setting near-term priorities:
        - **Capacity-related projects that address key needs**, especially those identified in Existing Conditions and the Interim Scenario. These are solutions for the current problems and those that could become significant in the next 10 years. Examples of these projects are improvements to the US 97/Colorado Avenue Interchange (C-9), improvements to the Portland Avenue Corridor (N-13), and extension of Yeoman Road (17).

- **Identified safety needs** based on the TSP evaluation as well as the recommendations from the City's ongoing Transportation Safety Action Plan (TSAP).
- **Projects that reduce key gaps in the walking and biking system**, especially across the Deschutes River and high-stress barriers, such as the Parkway.
- **Transit-related projects** that were shown to be effective in the evaluation. Examples are Project C-13, Mobility Hubs, in combination with high capacity transit for the Newport/Greenwood Corridor (C-2) and 3rd Street Corridor (C-3)

- **Identification of "synergies" between projects**, and between projects and programs. Synergistic projects should co-exist in the buckets where the project and program outcomes will complement each other. Examples of these projects are improvements to the 15th Street corridor (B-17) coincide from a timing perspective with improvements to the 15th Street/Reed Market Road intersection (N-16). Additionally, the City will look for "opportunity projects" where construction in the right-of-way for a sewer or other improvement can be combined with a transportation improvement.
- **Initiation of programs in the near-term timeframe**. For example, Project C-16, Transportation Demand Management, is included as a near-term priority.

Please see Appendix B for the results of the criteria ratings for each individual project and program evaluated.

Preliminary Recommendations for Consideration by CTAC

The following section and tables comprise a set of preliminary recommendations for consideration by CTAC. The team's evaluation of each of the projects and programs is in Appendix B.

Approach Program Inclusion and Funding Allocation

Transportation Programs Generally

The Criteria Evaluation process revealed that each of the programs can meaningfully help toward achieving the TSP goals, and should be implemented in the near-term and continue to be refined and used throughout the duration of the TSP. These programs can help to improve roadway conditions, prioritize the continued addition of multimodal facilities throughout the City, implement key plan recommendations, and reduce vehicular demand.

As part of the evaluation process, the project team identified potential synergies amongst the list of programs considered and was able to consolidate the list to combine programs with similar purpose and intended outcomes. This will help with the overall implementation and administration over time. The recommended program list is summarized in Table 3.

Identifying consistent and appropriate levels of funding for these programs will be critical to effective implementation. The level of funding available over time will be dependent on those sources identified by the FWG and ultimately implemented by the City. The specific funding sources and funding levels will be addressed by the FWG.

Operations and Maintenance

Additionally, CTAC has recommended that the TSP incorporate the costs associated with ongoing operation and maintenance of the existing and future City's transportation infrastructure as part of the overall funding allocation. Initial estimates suggest the 2040 Project and Program list may add an additional $500,000 to $1 million in annualized costs to maintain the multimodal transportation system in a "state of good repair." This estimate will be continually refined as part of the final prioritization process. This cost is included in Table 3.

The project team recommends that CTAC support initiation of these programs during the Near-Term timeframe, with funding levels in that timeframe to be determined as part of the Funding Plan and Strategy.

Table 3. Recommended Program Funding Allocation

Program IDs	Combined Program	Description	Funding Approach	Notes
T-1	Address Capital Needs backlog to maintain a state of Good Repair for New Capital Projects	City program to address capital needs backlog to maintain a state of good repair for new capital projects, including reconstruction of streets, signals, bridges, and other transportation infrastructure.	Reserved funding (Estimated at $500k to $1 million per year)	Program to ensure operation and maintenance funding associated with new capital projects.
C-16	TDM Program for major employers and institutions	TDM program for major employers and institutions.	To-be determined based on future FWG, CTAC, and City evaluation.	Travel demand modeling has shown TDM implementation to be an effective tool for addressing future and existing congestion by limiting demand on the transportation system.
N-7, T-4	Transportation Safety Action Plan (TSAP) implementation	Safety projects and programs as defined by the Transportation Safety Action Plan including street lighting.	To-be determined based on future FWG, CTAC, and City evaluation.	Improving transportation safety is a goal of the Bend TSP and has been continually highlighted as a priority among CTAC members. Incorporating a street lighting program into the TSAP implementation program is consistent with systemic countermeasure recommendations made by the TSAP effort.
T-2, LSN, 1TBKE	Bicycle Program	This includes implementing the bicycle Low Stress Network, Neighborhood Greenways, wayfinding, crossings, and traffic calming.	To-be determined based on future FWG, CTAC, and City evaluation.	This is a comprehensive program to facilitate bicycle travel within the city. Program would include implementation and updates to the bicycle Low Stress Network Plan.
T-3, P-1, P-2, N-8	Pedestrian Program	This includes creating of a Pedestrian Master Plan to identify and prioritize pedestrian system improvements (local, collector, arterial sidewalk infill), transit access, safe routes to schools and parks, and wayfinding.	To-be determined based on future FWG, CTAC, and City evaluation.	This is a comprehensive pedestrian program to plan for and implement pedestrian infill and enhancement projects, including the Pedestrian System Master Plan and safe routes to school program. This may include enhanced access to transit facilities in collaboration with Cascades East Transit.
T-5	Bicycle and Pedestrian facility maintenance Program	City program to improve snow and debris clearing along key pedestrian and bicycle facilities.	To-be determined based on future FWG, CTAC, and City evaluation.	Program will require coordination with partner agencies, including the Bend Parks and Recreation District, which own and maintain key elements of the walking and biking system within Bend.
C-20	Parking pricing and management in downtown Bend	Implement the 2017 Downtown Parking Plan.	To-be determined based on future FWG, CTAC, and City evaluation.	Program will be coordinated with other City of Bend parking efforts and may be consolidated within a citywide program, as appropriate.
C-19, N-6	Traffic Signal Coordination improvements along signalized corridors, including freight and transit Signal Priority	Includes US 97 (mainline and ramp terminals), 3rd Street, 27th Street, Colorado/Arizona couplet, and US 20 (3rd Street and Greenwood) corridors.	To-be determined based on future FWG, CTAC, and City evaluation.	Program will require coordination with partner agencies, especially ODOT, which maintains traffic signals within the city.

Key Walking & Biking Route Priority Recommendations

Based on CTAC recommendations, the Steering Committee approved Key Routes that are essential to implementing both the bicycle Low Stress Network as well as the provision of continuous walking routes throughout the City. City staff also identified the nature of each individual project along those Routes that is needed to provide a usable, continuous, comfortable and convenient facility for walking and cycling. This information was used by the project team to identify timing of implementation priorities based on route effectiveness and synergies with other Near-term, Mid-term, or Long-term projects[15]. **These recommendations are included in Table 4b, Table 5b, and Table 6b and Figure 6 in the following sections.**

Recommended Near-term Priority Projects

Recommended Near-term priority projects are those that scored highly in each of the evaluation categories, addressed an identified existing or near-term need, and helped the City ensure geographic and modal diversity as part of the overall funding allocation. In some cases, projects that may be most needed in the longer term were identified for implementation in the near-term to maximize the overall effectiveness of project implementation and cost expenditures. In general, the identified Near-term projects are those that address:

- Identified existing or near-term vehicular capacity constraints. In particular, many of these projects help facilitate better access to the Parkway as well as recurring congestion along the City's east-west arterial system.
- Identified safety needs based on the TSP evaluation as well as the recommendations from the City's ongoing Transportation Safety Action Plan (TSAP).
- Gaps in the walking and biking system, especially across the Deschutes River and high-stress barriers, such as the Parkway.

In addition to the project list, the near-term priorities include the need to conduct additional planning studies to help refine future multimodal transportation needs along the Franklin Corridor, at the Reed Market Railroad Crossing, and a possible future Southern River Crossing.

Table 4a and Table 4b and Figure 2 present the recommended Near-term Priority Projects and Key Routes, respectively.

Recommended Mid-term Priority Projects

Mid-term projects are those that scored highly in each of the evaluation categories. Many, but not all, address existing or near-term needs and generally build on Near-Term projects and programs. In general, the mid-term projects help to:

- Provide additional east-west and north south street corridors to improve connectivity, safety, and reduce congestion throughout the City.
- Enhance access to the Parkway, such as at the Powers Road interchange and other implementation priorities that may be identified in the future as part of ODOT's ongoing Parkway Study.

[15] Key Route 10 does not require significant capital projects to implements and will be implemented through the LSN program. For this reason Key Route 10 is not included in a priority "bucket."

- Facilitate growth and improved mobility for all transportation system users within the Core Area of the City.

Table 5a and Table 5b and Figure 3 present the recommended Mid-term Priority Projects and Key Routes, respectively.

Recommended Long-term Priority Projects

Longer-term projects generally rated lower than the near- and mid-term projects or were identified as addressing a transportation system need later in the life cycle of the TSP. Over time, these projects will help support continued economic growth and prosperity within the City, consistent with the City's Comprehensive Plan, as well as support community health and wellbeing. The need for these projects may occur sooner than anticipated to address market conditions and unanticipated additional funding sources.

Table 6a and Table 6b and Figure 4 present the recommended Long-term Priority Projects and Key Routes, respectively.

Recommended Expansion Area Driven Projects

These projects are primarily those whose implementation will occur relative to the timing of land use development in one or more of the identified urban growth boundary "expansion areas." The specific nature of these projects will be refined as subarea planning and master planning efforts within each expansion area are conducted. Further, the specific projects identified as part of the TSP may change slightly to address development patterns, topographic/environmental considerations, and needed connections to the existing City multimodal connection in a timely fashion. **Table 7 and Figure 5 present the recommended Expansion Areas Driven Projects.**

Figure 2. Recommended Near-term Priorities

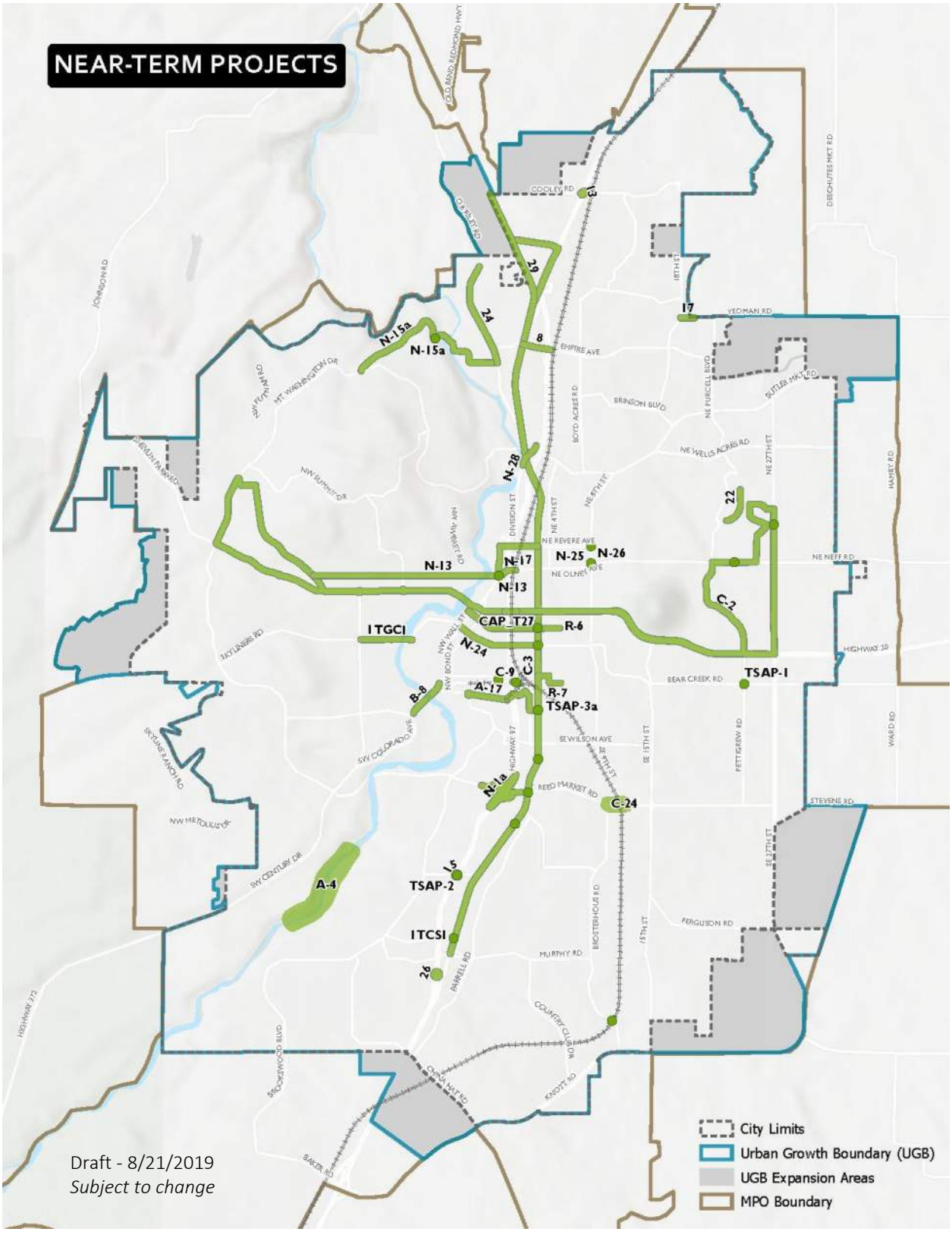


Table 4a: Recommended Near-term Priorities

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
8	Empire Avenue widening to five lanes near US 97 interchange and install traffic signal at SB ramp	Widen Empire to 5 lanes from US 20 to US 97 northbound ramp.	$2,900,000	$1,450,000	Near	On the LSN, improves east-west connectivity, over capacity in 2040, improves safety, supports NE expansion area and surrounding economic area.
13	US 97 North parkway extension (Phase 1: US 97 / Cooley Road area improvements)	Would construct initial phase of North Corridor Plan (project extents currently being considered by ODOT)	$110,000,000	$11,000,000	Near	Improves east-west connectivity, over capacity in 2040, improves safety, supports NE expansion area and surrounding economic area. Note: City and ODOT have recent allocations of state ($50 million) and federal ($60 million) to advance this project.
15	Powers Road / US 97 preliminary engineering and ROW acquisition for Interchange	May include interchange or overcrossing, pending outcome of the Parkway Study.	$6,500,000	$650,000	Near	Over capacity on Powers in 2028, reduces bottleneck along Parkway, improves ped/bike crossing opportunities of the Parkway, improves safety, supports opportunity area, improved functionality, key regional connection
17	Yeoman Road extension from 18th Street to western terminus	Includes two lane extension and bridge to cross canal.	$5,000,000	$5,000,000	Near	Improves connectivity for all users and reduces VMT. Includes a segment of Key Route 8 (coincides with Project 17 limits).
22	Purcell Boulevard extension From Full Moon Drive to Jackson Avenue	Includes two lane extension.	$2,288,000	$2,288,000	Near	Reduces demand on 27th street, improves connectivity for all users and reduces VMT, provides access to new housing development
24	O.B. Riley Road Arterial Corridor upgrade from Hardy Road south to Archie Briggs Road	Includes upgrade to three lane arterial with curb, sidewalk and bike lane improvements.	$6,700,000	$6,700,000	Near	Located on LSN, supports expansion area, improves functionality, key connection to county. Includes a segment of Key Route 10 (OB Riley Empire to Archie Briggs).
26	US 97 northbound on ramp and southbound off ramp at Murphy Road	Construct northbound on ramp and southbound off ramp at Murphy Road.	$10,000,000	$10,000,000	Near	Improves bottleneck congestion at US 97/Powers, reduces VMT.
29	US 20 southbound Roadway widening from Cooley Road to Empire Avenue	US 20 southbound widening to two lanes.	$4,800,000	$4,800,000	Near	Over capacity in 2028, improves safety, supports expansion areas, key regional connection.
1TCSI	Citywide safety improvements	Includes 3rd/Hawthorne, 3rd/COID Canal, 3rd/Pinebrook, Brosterhous/Railroad bridge, and Colorado Ave/US 97 improvements.	$1,000,000	$1,000,000	Near	Improves safety, improves livability and access for all users, may encourage alternative modes.
1TGCI	Galveston Corridor improvements	Multi-modal transportation facility improvements from 14th Street to Riverside Boulevard to help with pedestrian, bicycle, and vehicular connectivity in Galveston Avenue corridor. City is currently completing design effort for this project.	$3,900,000	$3,900,000	Near	Stormwater deficiencies, may encourage alternative modes, improved access, improves functionally
A-4	Study for southern river crossing	Study to identify new river crossing location between Powers Road and Murphy Road, connecting Century Drive to US 97 or 3rd Street.	$500,000	$500,000	Near	All river crossings are over capacity by 2028, improves connectivity of south Bend, supports opportunity areas, supports disparity of river crossing for southern residents, reduces VMT.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
A-17	Aune Road extension from Bond Street to 3rd Street	Two lane extension of Aune Road to connect 3rd Street and Bond Street. Includes intersection improvement at 3rd Street and a RAB at the intersection of Bond St and Industrial Way.	$13,500,000	$13,500,000	Long	On LSN, key east-west connection for all users, serves opportunity area. Includes a segment of Key Route 7 (Aune Division to 3rd Street).
B-8	Colorado Avenue corridor capacity improvements from Simpson Avenue to Arizona Avenue	Includes incremental approach for Colorado Avenue widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes intersection capacity improvements at Colorado Avenue/Simpson Avenue roundabout and Colorado Avenue/Industrial Way. Includes complete streets upgrade.	$21,000,000	$21,000,000	Near	Improves east-west connectivity, over capacity in 2028, improves capacity at both ends of the river crossing, on LSN, improves safety, serves opportunity area.
C-2	Newport Avenue / Greenwood Avenue corridor high-capacity transit (to be completed with C-13)	Includes HCT transit service connecting COCC to downtown to St. Charles Area. Includes improved transit connections from neighborhoods to HCT stops.	$1,000,000	$1,000,000	Long	High Capacity Transit has significant impact on reducing local/regional VMT, provides service for underserved populations.
C-3	3rd Street corridor high-capacity transit (to be completed with C-13)	Includes HCT transit service connecting northern Bend (the Triangle) to southern Bend. Includes improved transit connections from neighborhoods to HCT stops.	$1,000,000	$1,000,000	Long	High Capacity Transit has significant impact on reducing local/regional VMT, provides service for underserved populations.
C-9	Colorado Avenue / US 97 Northbound ramp intersection safety and capacity improvements	Includes traffic signal or roundabout.	$4,300,000	$430,000	Near	Over capacity in 2040; improves ped/bike crossing opportunities, improves safety, serves opportunity area, improves functionality
C-13	Mobility Hubs (to be completed with C-2 & C-3)	Citywide implementation of mobility hubs in coordination CET and HTC routes. Assumes up to 5 hubs.	$5,000,000	$5,000,000	Long	High Capacity Transit has significant impact on reducing local/regional VMT, provides service for underserved populations.
C-24	Study of at-grade railroad crossing solutions near Reed Market Road	Study the cost and feasibility of relocating the BNSF switchyards compared to a Reed Market Road overcrossing of the railroad.	$200,000	$200,000	Near	Improves safety at crossing, improves functionality, reduces negative social/economic impact.
CAP_T27	Greenwood Undercrossing Sidewalk Widening Improvements	Widen Parkway undercrossing to include improved multimodal facilities.	$10,400,000	$10,400,000	Near	Significantly improves ped/bike connectivity and safety, serves opportunity area, improves functionality
N-1a	Reed Market Road/US 97 Interchange improvement Study	Study at Reed Market Road/US 97 interchange.	$500,000	$500,000	Near	Over capacity in 2028, improves safety on key arterial, improves east-west connectivity, improves functionality.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
N-13	Portland Avenue Corridor Project from College Way to 3rd Street including improvements at Revere Avenue Interchange and Portland Avenue/Wall Street	Multi-modal transportation facility and safety improvements to help with pedestrian, bicycle, and vehicular connectivity.	$26,200,000	$26,200,000	Near	Over capacity in 2040, on LSN, significantly improves to ped/bike facilities, improved access to transit. Includes a segment of Key Route 3 (Portland College Way to Wall); Includes a segment of Key Route 10 (Wall Portland to Revere).
N-14	Improve Drake Park pedestrian bridge across the Deschutes River	Evaluate and repair/replace bridge to accommodate pedestrian and bicycle traffic.	$1,275,000	$1,275,000	Near	On LSN, encourages active modes, improves pedestrian connectivity
N-15a	Archie Briggs Road Bridge Replacement and Trail Crossing Improvement Design (Phase 1)	Design to improve pedestrian crossing at the Deschutes River Trail Crossing of Archie Briggs Road and replace Archie Briggs Road bridge. Phase 1 would construct trail crossing.	$500,000	$500,000	Near	Key motor vehicle connection in danger of failing structurally, river crossing, encourages active modes
N-17	Olney Protected Bicycle Lanes and Parkway Undercrossing	Provide protected bicycle lanes on Olney Avenue at Parkway undercrossing.	$1,820,000	$1,820,000	Near	On LSN and key routes, improves bicycle safety. Includes a segment of Key Route 3 (Olney Wall to RR).
N-24	Franklin Avenue Corridor Study	Conduct a corridor study to determine roadway and intersection improvement needs to serve all users.	$200,000	$200,000	Near	Improves pedestrian safety, improves access for bike/ped, encourages alternate modes
N-25	Olney Avenue/8th Street Intersection improvement	Improve intersection capacity.	$3,700,000	$3,700,000	Long	Improves safety, improves functionality
N-26	Revere Avenue/8th Street Intersection improvement	Improve intersection capacity.	$3,700,000	$3,700,000	Long	On LSN, improves ped/bike crossing opportunities
N-28	Butler Market Interchange Frontage Road at US 20/US97	Construct frontage road from US 97 southbound off-ramp to Division Street.	$6,180,000	$3,090,000	Long	Reduces congestion at US 20/Butler Market; improves connectivity for all users, improves safety, key connection to regional system. Includes a segment of Key Route 5 (coincides with limits of N-28).
R-6	Hawthorne Parkway Overcrossing	Close sidewalk gap along Hawthorne and create a grade-separated footbridge over BNSF RR and Hwy 97.	$15,000,000	$15,000,000	Near	On LSN and Key Route, critical east-west connection for ped/bike, improves bike/ped safety and connectivity, supports expansion/opportunity areas, supports neighborhood livability, improves equity of all users, encourages alternative modes. Includes all of Key Route 6.
R-7	3rd St at RR to Connect KorPine to 3rd St Key Route	Includes crossing improvements between RR & Wilson Avenue and RR & Franklin Avenue	$620,000	$620,000	Near	On LSN and Key Route 7, improves bike/ped safety and connectivity, supports expansion/opportunity areas, supports neighborhood livability, improves equity of all users, encourages alternative modes. Includes all of Key Route 7.
TSAP-1	Pettigrew Road & Bear Creek Road long term safety improvement	Construct single lane roundabout.	$3,700,000	$3,700,000	Near	On LSN and Key Route 2, improves safety, encourages alternate modes. Key Route 2 (on Bear Creek) crosses Purcell at this intersection.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
TSAP-2	US 97 & Powers Road - Interim Improvements	Includes enhanced pedestrian crossings and exit ramp widening[16]	$100,000	$100,000	Near	Improves safety, improves functionality, supports ODOT funded intersection improvements
TSAP-3a	3rd Street & Miller Avenue intersection improvements and 3rd Street modifications study (Phase 1)	Study of intersection improvements and 3rd Street modifications	$100,000	$100,000	Near	Improves safety, improves access, improves functionality. Specific preferred intersection improvement is not yet identified.
		Near-Term Total	**$273,583,000**	**$159,873,000**		
		Key Route Projects (Listed in Table 4b):		**$22,144,000**		
		Total		**$182,170,000**		

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

[16] Through ARTS funding is allocated for crosswalk treatments and illumination at US 97/Powers. The City is responsible for the cost of exit ramps. The cost estimate reflects the exit ramps only.

Table 4b: Recommended Near-term Key Routes*

Key Routes & Projects	Project Extents	Facility Type & Description	Cost Projection
ROUTE 1: Juniper Ridge to SE Elbow: Route runs north-south through the central portion of Bend connecting SE 15th Shared Use Path, 6th St Neighborhood Greenway, Boyd Acres Rd Shared Use Path			
R1-A	SE 9th St: Wilson Ave to Reed Market Rd	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway.	$720,000
R1-B	SE 9th St: Wilson Ave to Glenwood Ave	Buffered bike lane: Re-stripe roadway to include buffered bike lanes when roadway is repaved.	$1,000
R1-C	NE Boyd Acres Rd: Butler Market Rd to Empire Ave	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway.	$1,250,000
R1-D	SE 15th Street: Reed Mkt Rd to 300’ south of King Hezekiah	Shared use path adjacent to roadway: Convert an existing curb-tight sidewalk to a separated shared use path.	$930,000
ROUTE 2: NW Crossing to new Affordable Housing: Route runs east-west connecting Skyliners Rd, Franklin Ave and Bear Creek Rd			
R2-A	NW Franklin Ave: Harriman Ave to RR undercrossing	Improve transition at Hill St: Project would manage the conflict between right turns and crosswalk to sidewalk under RR. Crosswalk: Create safe crossing of Franklin at Harriman.	$1,000
R2-B	Franklin Ave Underpass: Hill St to 1st St	Shared use path adjacent to roadway: Widen sidewalk paths under RR and Hwy 97 to modernize design for roadside safety.	$8,500,000
R2-C	Franklin Ave: 1st St to 5th St	Buffered bike lane: Re-stripe roadway to include buffered bike lane westbound; includes crosswalks at 2nd St & 4th St and signal timing enhancements at 3rd St.	$1,000
R2-D	Bear Creek SRTS: Larkspur Trail to Coyner Trail	Trail: Close sidewalk gap and create a connection between Coyner and Larkspur Trail.	$560,000
R2-E	Bear Creek Rd: Cessna Ave to east UGB	Shared use path adjacent to roadway: Close sidewalk gap and create low-stress bikeway extending to 170 new affordable housing units.	$1,710,000
ROUTE 3: Shevlin Park to Big Sky Park: Route runs east-west connecting Shevlin Park Rd, Portland Ave, Olney Ave, and Neff Rd			
R3-A	Norton Ave: NE 6th St to NE 12th St	Neighborhood greenway: Create a low-stress bikeway on NE Norton Ave (SRTS3).	$1,000
R3-B	Hillside Trail: Connects NE 12th to Neff Rd	Hillside path: Close sidewalk gap and create a switchback shared use path (SRTS); includes school zone enhancements.	$190,000

Key Routes & Projects	Project Extents	Facility Type & Description	Cost Projection
R3-C	Neff Rd: NE 12th to Big Sky Park	Shared use path adjacent to roadway: Close sidewalk gaps and create a low-stress bikeway.	$3,740,000
R3-D	Deschutes River Footbridge: Drake Park	Upgrade footbridge: Accessibility upgrades and widen to reduce user conflicts.	$2,550,000
R3-E	Olney Avenue: Wall Street to railroad	Shared use path adjacent to roadway: close sidewalk gap over railroad and remove existing barrier to east-west bicycle connectivity and create right-turn hook crash countermeasure.	$310,000
Route 6: Hawthorne Overcrossing: Core Area connectivity			
R6-A	Hawthorne Overcrossing Bridge: NE 1st St to NE 5th St	Grade separated overpass: Close sidewalk gap along Hawthorne and create a grade-separated footbridge over BNSF RR and Hwy 97.	Cost Captured in R-6
Route 12: Wilson Ave: Route runs east-west connecting neighborhoods to services and transit			
R12-A	Wilson Ave: 2nd Street to SE 9th Street	Shared use path adjacent to roadway: Close sidewalk gap along Wilson Avenue and create a low-stress bikeway.	$930,000
R12-B	Wilson Avenue: 9th to 15th Street	Shared use path adjacent to roadway: Create a low-stress bikeway to connect near SE neighborhoods to Old Mill and Deschutes River Trail.	$750,000

*Key Routes are shown in Figure 6.

Figure 3. Recommended Mid-term Priorities

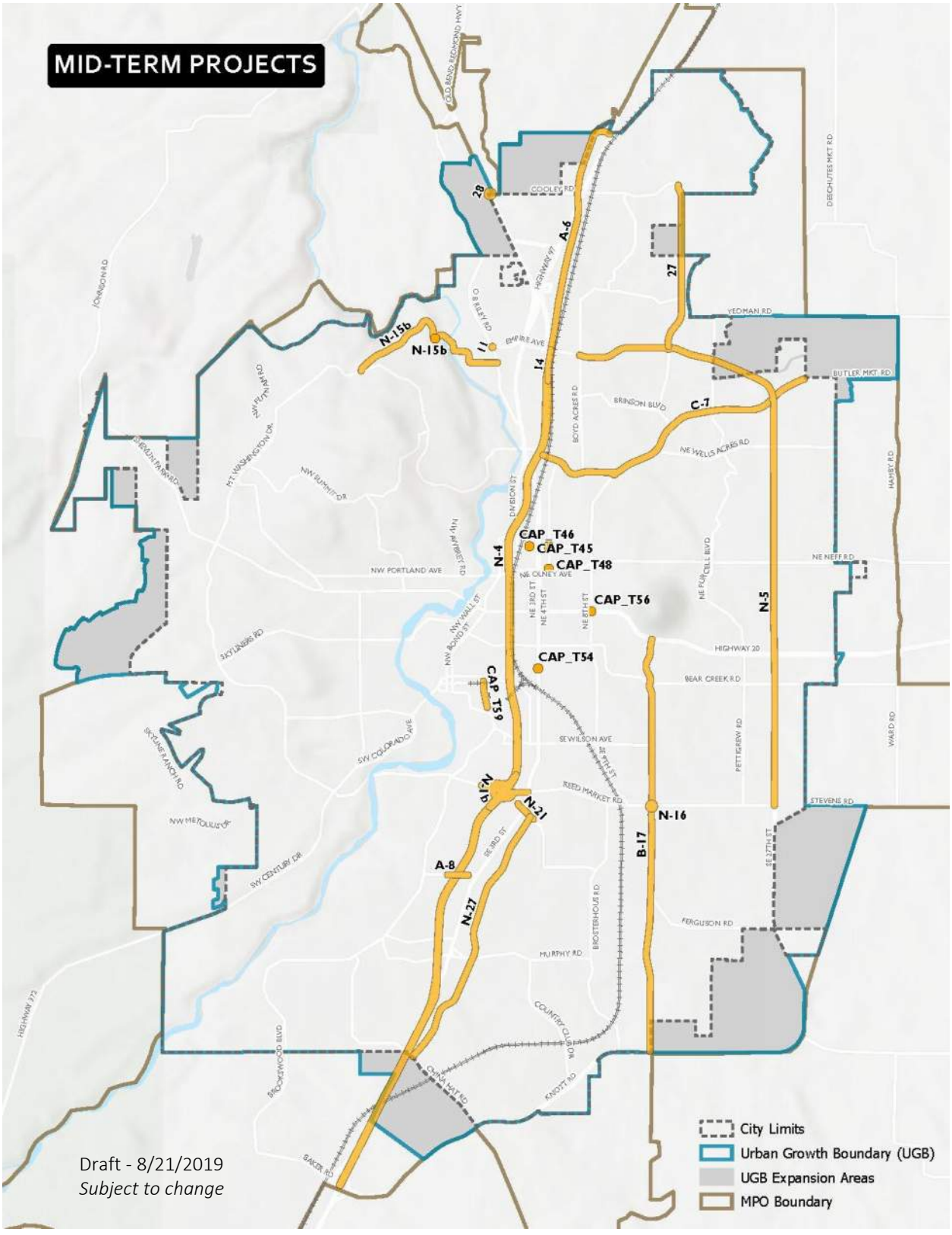


Table 5a: Recommended Mid-term Priorities

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
11	O.B. Riley Road intersection safety and capacity improvement	Improvements at key intersections such as Mervin Sampels, Archie Briggs Road, Halfway Road and Glen Vista/Hardy Road.	$1,900,000	$1,900,000	Long	Over capacity in 2040, on LSN, improves safety along corridor, supports expansion area, improves functionality of OB Riley, regional connection to county. Includes crossing for Key Route 10 across OB Riley.
14	US 97 / Empire Avenue northbound off ramp widening	US 97/Empire Avenue northbound off ramp widening to two lanes.	$1,800,000	$180,000	Long	Reduces potential for spill-back to US 97, supports regional connectivity.
27	18th Street Arterial Corridor upgrade from Cooley Road to Butler Market Road	Includes upgrade to three lane arterial.	$7,800,000	$7,800,000	Near	On LSN and key route, safety/capacity improvement, supports opportunity areas, improves functionality, parallel route to US 97. Includes a segment of Key Route 8 (18th Egypt to Cooley) and runs parallel to Key Route 8 (Egypt to Yeoman) (include).
28	US 20 intersection safety and capacity improvements	From Robal Road to Old Bend-Redmond Hwy. Intersection control improvements to be determined	$20,000,000	$2,000,000	Long	Over capacity in 2040, intersection control will improve ped/bike crossing opportunities, supports expansion areas, key regional connection
A-6	US 97 North parkway extension (Phase 2; next phase of Project 13)	Includes remaining improvements in the US 97 Bend North Corridor Project FEIS after construction of initial phase.	$200,000,000	$20,000,000	Near	Provides congestion relief for a significant part of the Parkway. Includes ped/bike improvements to North 3rd Street. Improves access safety, supports expansion areas.
A-8	Powers Road interchange	Grade separated interchange or overcrossing of US 97 (pending Parkway Study).	$20,000,000	$2,000,000	Near	Over capacity on Powers in 2028, reduces bottleneck along Parkway, improves ped/bike crossing opportunities of the Parkway, improves safety, supports opportunity area, improved functionality, key regional connection
B-17	15th Street Corridor safety and capacity improvements	From US 20 to Reed Market Road. Includes roundabouts at key intersections, including Wilson Avenue, Ferguson Road, and Knott Road.	$20,500,000	$20,500,000	Long	On LSN and Key Route 1, improves safety, serves opportunity area, improves functionality and encourages alternative modes. Includes a segment of Key Route 1 (from SE 15th Knott to Reed Market).
C-7	Butler Market Road intersection safety and capacity improvements	From US 97 to 27th Street. Includes roundabouts or traffic signals at 4th Street, Brinson Boulevard, and Purcell Boulevard. Wells Acres Road roundabout as a separate baseline project.	$7,000,000	$7,000,000	Near	Over capacity in 2028, on LSN and Key Route 5, improves safety, improves functionality. Includes a segment of Key Route 5 (Butler Market Parkway to Brinson).
CAP_T45	Revere Avenue/2nd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN, improves safety, serves opportunity area, improves functionality
CAP_T46	Revere Avenue/4th Street Intersection improvement	Improve intersection capacity.	$3,700,000	$3,700,000	Long	On LSN, improves safety, serves opportunity area, improves functionality
CAP_T48	Olney Avenue/4th Street Intersection improvement	Improve intersection capacity.	$3,700,000	$3,700,000	Long	On LSN, improves safety, serves opportunity area, improves functionality
CAP_T54	Clay Avenue/3rd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	Improves safety, serves opportunity area, improves functionality
CAP_T56	Greenwood/8th Street Intersection improvement	Improve intersection capacity.	$2,100,000	$2,100,000	Long	Improves safety, serves opportunity area, improves functionality

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
CAP_T59	Sisemore Street Extension	Construct street extension from Arizona avenue to Bond Street.	$2,400,000	$2,400,000	Near	Improved connectivity for all users, reduces VMT, serves opportunity area, improves access
N-1b	Construct Reed Market Road/US 97 Interchange improvement	Construct improvement.	$50,000,000	$25,000,000	Near	Over capacity in 2028, improves safety on key arterial, improves east-west connectivity, improves functionality.
N-4	US 97 operational and safety management improvements (as identified in the Parkway Study) and associated City street improvements.	Includes elements of the Parkway Study not currently defined in the project list, such as improvements to implement ramp metering or other interchange improvements.	$100,000,000	$10,000,000	Near/Long	Improves safety, improves access to regional connection. This project would fund additional elements of the Parkway Plan not currently identified as a specific project.
N-5	Incremental mobility, reliability, and safety improvements to Empire Boulevard / 27th Street Corridor from Boyd Acres Road to Reed Market Road	Includes incremental approach for Empire Boulevard/27th Street widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes complete streets upgrade.	$41,800,000	$41,800,000	Near	Over capacity in 2028, on LSN and Key Route 8, improves safety, supports expansion areas, improves functionality. Includes a segment of Key Route 8 (27th Street/Reed Market Road to Forum).
N-15b	Archie Briggs Road Bridge Replacement and Trail Crossing Improvement Construction (Phase 2)	Construct pedestrian crossing improvement at the Deschutes River Trail Crossing of Archie Briggs Road and replace Archie Briggs Road bridge. Phase 2 would construct bridge replacement.	$6,000,000	$6,000,000	Near	Key motor vehicle connection in danger of failing structurally, river crossing, encourages active modes
N-16	Reed Market Road/15th Street intersection safety and capacity improvements	Includes expanding the partial multi-lane roundabout to a full multi-lane roundabout.	$1,100,000	$1,100,000	Near	Over capacity in 2040, on LSN (LSN crosses this intersection to connect to Key Route 1), key east-west connectivity
N-21	3rd Street Canal Crossing just south of 3rd Street/Brosterhous Road	Construct pedestrian facilities on 3rd Street across the canal bridge.	$980,000	$980,000	Long	On LSN, improves bike/ped safety, improves access for all modes, encourages alternate modes
N-27	Parrell Road Urban Upgrade from China Hat Road to Brosterhous Road	Construct complete street upgrades and reconstruct roadway from China Hat Road to Brosterhous Road including a roundabout at Chase Road and Powers Road (upon completion of Chase Road extension).	$29,100,000	$29,100,000	Near	On LSN and Key Route 9, improves bike/ped safety, improves access for all modes, encourages alternate modes. Includes much of Key Route 9 (Parrell China Hat to Brosterhous which coincides with complete limits of N-27)
		Mid-Term Total	**$520,300,000**	**$187,680,000**		
		Key Route Projects (Listed in Table 5b):		**$2,640,000**		
		Total		**$190,320,000**		

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Table 5b: Recommended Mid-term Key Routes*

Key Routes & Projects	Project Extents	Facility Type & Description	Cost Projection
Route 7: 3rd St at RR to Connect KorPine to 3rd St			
R7-A	3rd St	Crosswalk: Create a safe crossing of 3rd St between BNSF RR and Wilson Ave using RRFB5 and safety islands.	$215,000
R7-B	3rd St	Crosswalk: Create a safe crossing of 3rd St between BNSF RR and Franklin Ave using RRFB and safety islands.	$215,000
R-7C	3rd St	3rd Street Underpass: Near Term Enhancements to sidewalk.	$190,000
Route 8: 27th St: Route runs north-south connecting neighborhoods to services and transit			
R8-A	27th St: Hwy 20 to Reed Mkt Rd	Shared use path adjacent to road: Close sidewalk gap along 27th Street and create a low-stress bikeway.	$2,020,000
Route 9: Route runs north-south parallel to 3rd Street			
R9-A	Parrell Rd: Murphy Rd to Brosterhous Rd	Shared use path adjacent to road: Close sidewalk gap along Parrell Rd and create a low-stress bikeway on both sides of the street.	Costs captured in N-27

*Key Routes are shown in Figure 6.

Figure 4. Recommended Long-term Priorities

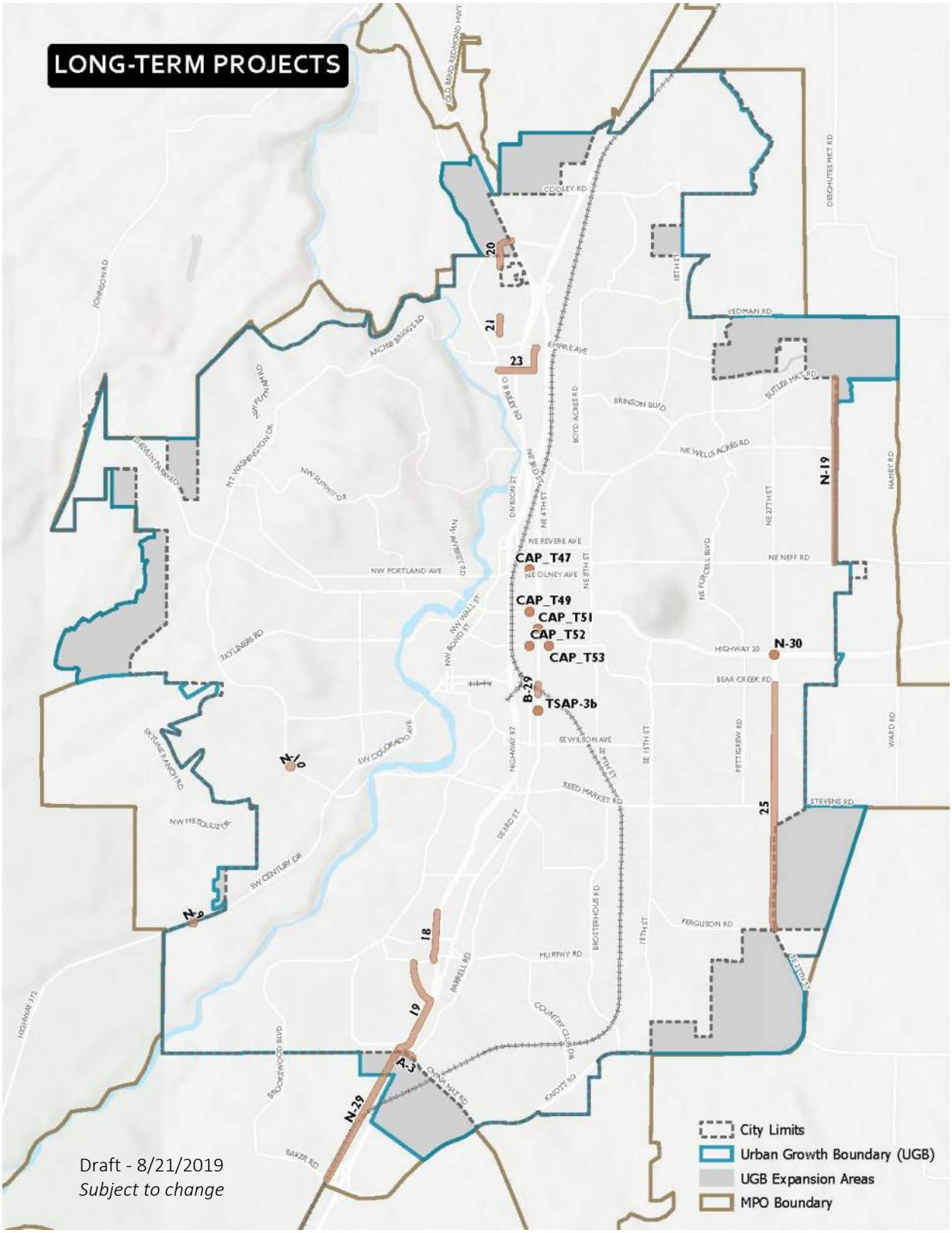


Table 6a: Recommended Long-term Priorities

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
18	New North Frontage Road near Murphy Road	Improvements to be determined.	$5,400,000	$5,400,000	Long	On LSN and Key Route 10, increased connectivity for ped/bike/motor vehicle, improves livability for nearby residents. Includes segment of Key Route 10 (Frontage Murphy to Badger).
19	New South Frontage Road near Murphy Road	Improvements to be determined.	$13,800,000	$13,800,000	Near	On LSN and Key Route 10, increased connectivity for ped/bike/motor vehicle, improves livability for nearby residents. Includes segment of Key Route 10 (frontage Ponderosa to north of Romaine Village Way)
20	Britta Street extension (north section)	Includes two lane extension from Hardy Rad to Robal Road.	$2,700,000	$2,700,000	Long	On LSN and Key Route 10, increased connectivity for ped/bike/motor vehicle, supports expansion area, supports connectivity to school, reduces VMT, connects to regional network. Includes segment of Key Route 10 (Britta Robal to Hardy).
21	Britta Street extension (south section)	Includes two lane extension from Halfway Road to Ellie Lane.	$1,000,000	$1,000,000	Long	On LSN and Key Route 10, increased connectivity for ped/bike/motor vehicle, supports expansion area, supports connectivity to school, reduces VMT, connects to regional network. Includes a segment of Key Route 10 (Britta Halfway to Ellie).
23	Mervin Sampels Road / Sherman Road Collector Corridor upgrade	Includes upgrade to two lane collector roadway and a traffic signal at US 20 from O.B. Riley Road to Empire Boulevard.	$6,100,000	$6,100,000	Long	Under capacity in 2040, improves bike/ped conditions, not on LSN or key route, improved multimodal facilities, reduces business cut through supports nearby developments.
25	27th Street Arterial Corridor upgrade from Bear Creek Road to Ferguson Road	Includes upgrade to three lane arterial and intersection improvements at Ferguson Road	$8,600,000	$8,600,000	Long	On LSN and Key Route 8, improves intersection and multimodal safety, supports expansion areas, improved functionality, improved access to transit, improves key region route on eastside. Includes a segment of Key Route 8 (27th Bear Creek to Ferguson).
A-3	Ponderosa Street / China Hat Road overcrossing	Vehicle, pedestrian and bicycle access over US 97 at Ponderosa Street/China Hat Road. Includes intersection improvement at Parrell Road/China Hat Road.	$15,000,000	$15,000,000	Long	Reduces congestion at China Hat/US 97, adds connectivity for ped/bikes and vehicles, key east-west connection, improves pedestrian safety, supports livability and equity for multimodal users (on LSN), encourages multimodal use.
B-29	3rd Street railroad undercrossing widening	Widen 3rd Street to 4-lanes under the railroad, including complete street design from Emerson Avenue to Miller Avenue.	$13,700,000	$13,700,000	Long	Over capacity in 2040, on LSN and Key Route 7, significantly improves existing bike/ped conditions, improves multimodal safety. Includes a segment of Key Route 7 (RR Underpass).
CAP_T47	Olney Avenue/2nd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN and Key Route 3, improves safety, serves opportunity area, improves functionality.
CAP_T49	Greenwood/2nd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN, improves safety, serves opportunity area, improves functionality.
CAP_T51	Hawthorne Avenue/3rd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN and Key Route 6, improves safety, serves opportunity area, improves functionality.
CAP_T52	Franklin Avenue/2nd Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN and Key Route 2, improves safety, serves opportunity area, improves functionality.
CAP_T53	Franklin Avenue/4th Street Intersection improvement	Improve intersection capacity.	$210,000	$210,000	Long	On LSN and Key Route 2, improves safety, serves opportunity area, improves functionality.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
N-9	Century Drive/Skyline Ranch Road roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	$3,700,000	$3,700,000	Long	Under capacity in 2040, improves safety, improves roadway functionality. Provides critical crossing of high-speed Century Drive to access Key Route 4.
N-10	Mt. Washington Drive/Metolius Drive roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	$3,700,000	$3,700,000	Long	Under capacity in 2040, improves safety, improves roadway functionality.
N-19	Eagle Road Functional Urban Upgrade	Classify roadway as Minor Collector from Neff Road to Butler Market Road and construct complete street upgrades.	$14,500,000	$14,500,000	Long	Significant ped/bike improvements, serves NE expansion area, improves functionality, reduces VMT.
N-29	US 97 Frontage Road	Construct frontage road from Ponderosa Street to Baker Road.	$6,550,000	$3,275,000	Long	On LSN, improves connectivity, supports regional connectivity.
N-30	US 20/27th Street Intersection Improvement	Improve intersection capacity.	$2,100,000	$210,000	Long	Over capacity in 2040, on LSN and Key Route 8, improves functionality, supports regional connectivity.
TSAP-3b	3rd Street & Miller Avenue intersection improvements and 3rd Street modifications implementation (Phase 2)	Construct intersection improvements and 3rd Street modifications	$3,100,000	$3,100,000	Near	Improves safety, improves access, improves functionality. Specific preferred intersection improvement is not yet identified.
		Long-Term Total	**$101,000,000**	**$95,835,000**		
		Key Route Projects (Listed in Table 6b):		**$1,950,000**		
		Total		**$97,785,000**		

TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Table 6b: Recommended Long-term Key Routes*

Key Routes & Projects	Project Extents	Facility Type & Description	Cost Projection
Route 4: West UGB to Portland Ave: Route runs north-south connecting Haul Rd Trail to 15th St Neighborhood Greenway			
SW-1	Newport Ave: NW College Way to NW 9th St	Sidewalks: Close sidewalk gap on Newport Ave and connect Newport Ave to 15th St neighborhood greenway	$390,000
R4-A	NW 15th St: Lexington Ave to Milwaukie Ave	Hillside path: Close sidewalk gap and create a hillside switchback shared use path within the 15th St neighborhood greenway.	$125,000
R4-B	NW 14th St: Ogden Ave to Portland Ave	Hillside path: Close sidewalk gap and create a hillside switchback shared use path within 14th St right-of-way to connect route to Portland Ave.	$125,000
Route 5: Route runs along Butler Market Rd			
R5-A	Butler Market Rd: Brinson Blvd to NE 6th St	Shared use path adjacent to roadway: Close sidewalk gap along both sides of Butler Market Rd and create low-stress bikeway.	$1,310,000

*Key Routes are shown in Figure 6.

Figure 5. Recommended Expansion Area Driven Projects

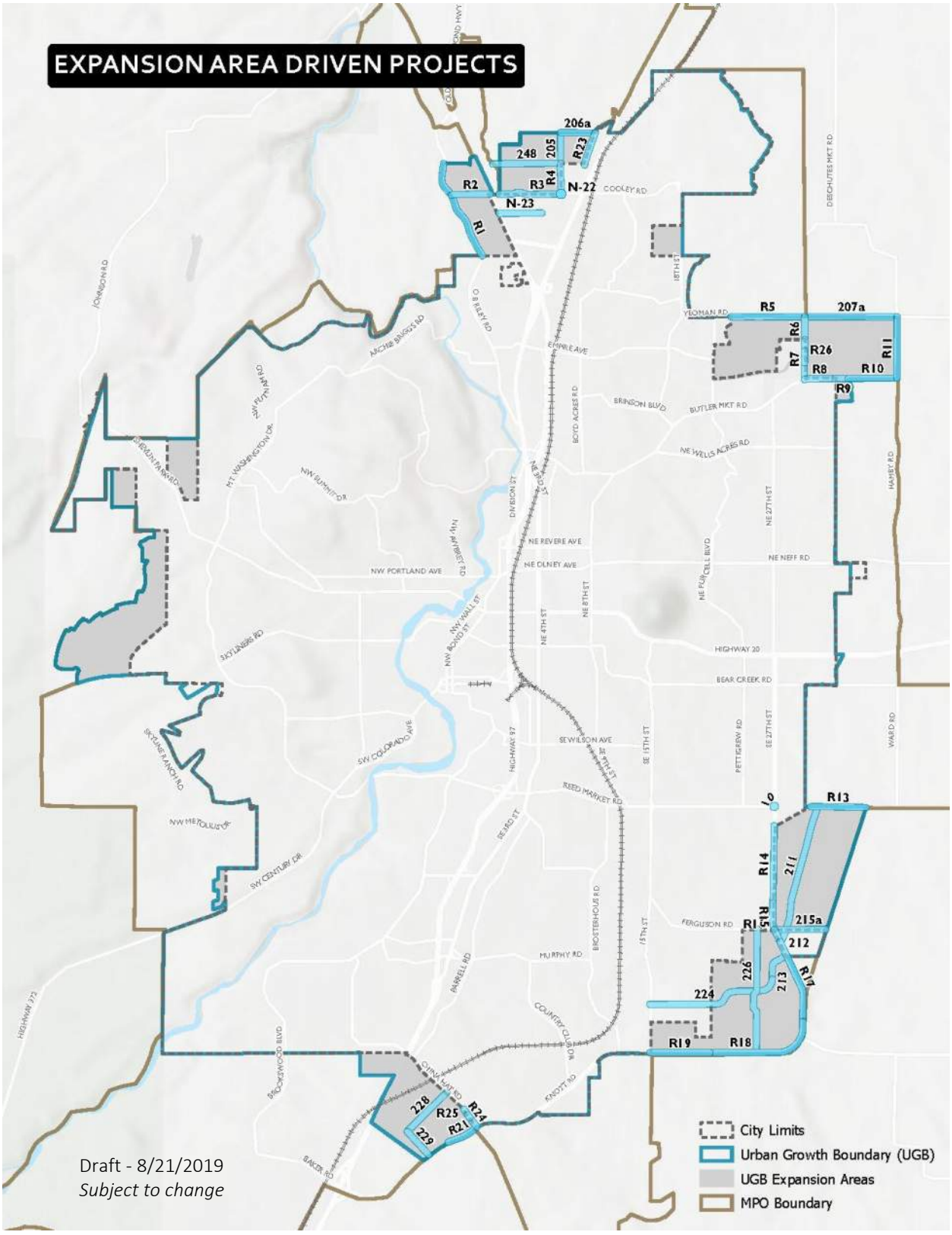


Table 7: Recommended Expansion Area Driven Projects

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
10	Stevens Road realignment	Includes connection to Reed Market Road and bridge to cross canal	$4,700,000	$4,700,000	Near	27th Street over capacity in 2028, improves ped/bike connectivity; existing Stevens configuration on LSN, roadway alignment improves safety, supports DSL expansion area, reduces cut through, supports regional connectivity to county.
205	Hunnell Road extension	Construct a two lane collector roadway in the Triangle UGB expansion area.	$2,400,000	$2,400,000	Long	Improves connectivity for all users, supports expansion area, improves access, reduces VMT, connection to regional facility.
211	New Road in DSL UGB expansion area	Construct a two lane collector.	$9,500,000	$9,500,000	Long	On LSN, improves connectivity for all users, supports expansion area, improves access.
212	New Road in DSL UGB expansion area	Construct a two lane collector.	$1,100,000	$1,100,000	Long	On LSN, improves connectivity for all users, supports expansion area, improves access.
213	New Road in the Elbow UGB expansion area	Construct a two lane collector.	$4,000,000	$4,000,000	Near	On LSN and Key Route 8, supports expansion area, improves connectivity and access.
224	New Road in the Elbow UGB expansion area	Construct a two lane collector.	$10,200,000	$10,200,000	Long	Supports expansion area, improves connectivity and access.
226	New Road in the Elbow UGB expansion area	Construct a two lane collector.	$7,100,000	$7,100,000	Near	Supports expansion area, improves connectivity and access.
228	New Road in the Thumb UGB expansion area	Construct a two lane collector.	$4,300,000	$4,300,000	Near	Supports expansion area, improves connectivity and access.
229	New Road in the Thumb UGB expansion area	Construct a two lane collector.	$2,500,000	$2,500,000	Near	Supports expansion area, improves connectivity and access.
248	Loco Road extension	Construct a two lane collector.	$5,300,000	$5,300,000	Long	Supports expansion area, improves connectivity and access.
206a	New Road in Triangle UGB expansion area	Construct a two lane collector.	$2,500,000	$2,500,000	Long	Supports expansion area, improves connectivity and access.
207a	Yeoman Road extension from Deschutes Market Road to Hamehook Road	Construct a two lane collector.	$10,900,000	$10,900,000	Near	On LSN and Key Route 5, supports expansion area, improves connectivity and access, reduces VMT. Includes a segment of Key Route 5 (Yeoman (east of Deschutes to Hamehook)).
214b	New Road in the southeast UGB	Construct a two lane collector.	$4,500,000	$4,500,000	Near	Supports expansion area, improves connectivity and access.
215a	New Road in DSL UGB expansion area	Construct a two lane collector.	$3,900,000	$3,900,000	Long	On LSN and supports expansion area, improves connectivity and access.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
N-18	Projects of Regional Significance from Subarea Planning Efforts	Subarea planning efforts will identify infrastructure needs to serve Opportunity and Expansion Areas, which are key development areas for the City. Projects that result should be added to the 2040 project list as necessary.	TBD	TBD	Long	Improves local and regional connectivity.
N-22	Cooley Road/Hunnell Road Intersection Improvement	Add intersection improvement at Cooley/Hunnell to Cooley Road.	$3,700,000	$3,700,000	Long	Under capacity 2040, improves ped/bike crossing conditions, on LSN, improves functionality.
N-23	Collector between US20 and Hunell Rd	Construct new collector between US 20 and Hunnell Road. Road would be south of Cooley road and north of Robal Road.	$4,000,000	$4,000,000	Long	Reduces congestion at US 20/Cooley Road, serves opportunity area, improves network connectivity, connects two regional facilities (US97 & OR20).
R1	O.B. Riley Road rural Road upgrade from Hardy Rd to Cooley Rd	Includes curb and sidewalk on east side, bike lanes both directions.	$2,400,000	$2,400,000	Near	On LSN and Key Route 10, improves pedestrian safety, supports expansion area, improves functionality, regional connection to county. Includes a segment of Key Route 10 (OB Riley North UGB Limit to Robal extension).
R2	Cooley Road rural Road upgrade from O.B. Riley Road to US 20	Includes curbs, sidewalks and bike lanes both directions.	$1,300,000	$1,300,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality, supports regional connectivity
R3	Cooley Road rural Road upgrade from US 20 to Hunnell Road	Includes curb and sidewalk on north side, bike lanes both directions, and an intersection improvement at Cooley Road/Hunnell Road.	$1,100,000	$1,100,000	Long	Under capacity in 2040, on LSN, improves pedestrian safety, supports expansion area, improves functionality, supports regional connectivity
R4	Hunnell Road rural Road upgrade from Cooley Road to Loco Road	Includes sidewalk on west side of Hunnell Road.	$200,000	$200,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R5	Yeoman Road rural Road upgrade from western terminus to Deschutes Market Road	Includes curbs, sidewalks and bike lanes both directions.	$2,500,000	$2,500,000	Near	On LSN and key route, improves pedestrian safety, supports expansion area, improves functionality.
R6	Deschutes Market Road rural Road upgrade from Yeoman Road to canal	Includes curb and sidewalk on east side, bike lanes both directions.	$500,000	$500,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R7	Deschutes Market Road rural Road upgrade from canal to Butler Market Road	Includes curb and sidewalk on east side of Deschutes Market Road.	$400,000	$400,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R8	Butler Market Road rural Road upgrade from Deschutes Market Road to Eagle Road	Includes curb and sidewalk on north side of Butler Market Road.	$300,000	$300,000	Near	Improves pedestrian safety, supports expansion area, improves functionality.
R9	Butler Market Road rural Road upgrade from Eagle Road to Clyde Lane	Includes curbs, sidewalks and bike lanes for both directions on Butler Market Road.	$400,000	$400,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R10	Butler Market Road rural Road upgrade from Clyde Lane to Hamby Road	Includes curb and sidewalk on north side, bike lanes for both directions on Butler Market Road.	$1,100,000	$1,100,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.

Project ID	Project	Description/ Location	Total Cost	City Proportionate Cost	Addresses Near or Long Term Capacity Need	Notes
R11	Butler Market Road rural Road upgrade from Hamby Road to Hamehook Road	Includes curbs and sidewalks on both sides of Butler Market Road.	$1,100,000	$1,100,000	Long	On LSN, Improves pedestrian safety, supports expansion area, improves functionality.
R13	Stevens Road rural Road upgrade from Stevens realignment to Bend UGB boundary	Includes curbs, sidewalks and bike lanes for both directions of Stevens Road.	$1,900,000	$1,900,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R14	SE 27th Street rural Road upgrade from Stevens Road to Ferguson Road	Includes curb, sidewalk, and bike lane on east side of 27th Street.	$1,300,000	$1,300,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R15	SE 27th Street rural Road upgrade from Ferguson Road to Diamondback Lane	Includes curb and sidewalk on east side, bike lanes for both directions on 27th Street.	$600,000	$600,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R16	SE 27th Street rural Road upgrade from Diamondback Lane to access road	Includes curb and sidewalk on east side of 27th Street.	$100,000	$100,000	Long	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R17	SE 27th Street rural Road upgrade from access road to Knott Road	Includes curbs and sidewalks on both sides of 27th Street.	$1,300,000	$1,300,000	Long	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R18	Knott Road rural Road upgrade from 15th Street to Raintree Court	Includes curbs, sidewalks and bike lanes for both directions on Knott Road.	$500,000	$500,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R19	Knott Road rural Road upgrade from Raintree Court to SE 27th Street	Includes curbs, sidewalks and bike lanes for both directions on Knott Road.	$5,500,000	$5,500,000	Near	On LSN, improves pedestrian safety, supports expansion area, improves functionality.
R21	Knott Road rural Road upgrade south of China Hat Road	Includes curb and sidewalk on north side of Knott Road.	$300,000	$300,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R23	Clausen Drive rural Road upgrade from Loco Road to northern terminus	Includes sidewalk on west side of Clausen Drive.	$200,000	$200,000	Long	Improves pedestrian safety, supports expansion area, improves functionality.
R24	China Hat Road rural Road upgrade north of Knott Road	Includes sidewalks on both sides of China Hat Road.	$200,000	$200,000	Long	On LSN, improves pedestrian safety, supports expansion area, improves functionality, supports regional connectivity.
R25	China Hat Road canal bridge widening	Widen bridge to include sidewalk on both sides of China Hat Road.	$400,000	$400,000	Long	Improves pedestrian safety, supports expansion area, improves functionality, supports regional connectivity.
R26	Deschutes Market Road canal bridge widening	Widen bridge to include sidewalk on west side of Deschutes Market Road.	$400,000	$400,000	Long	Improves multimodal facilities.
	Expansion Area Driven Total	**$104,600,000**	**$104,600,000**			

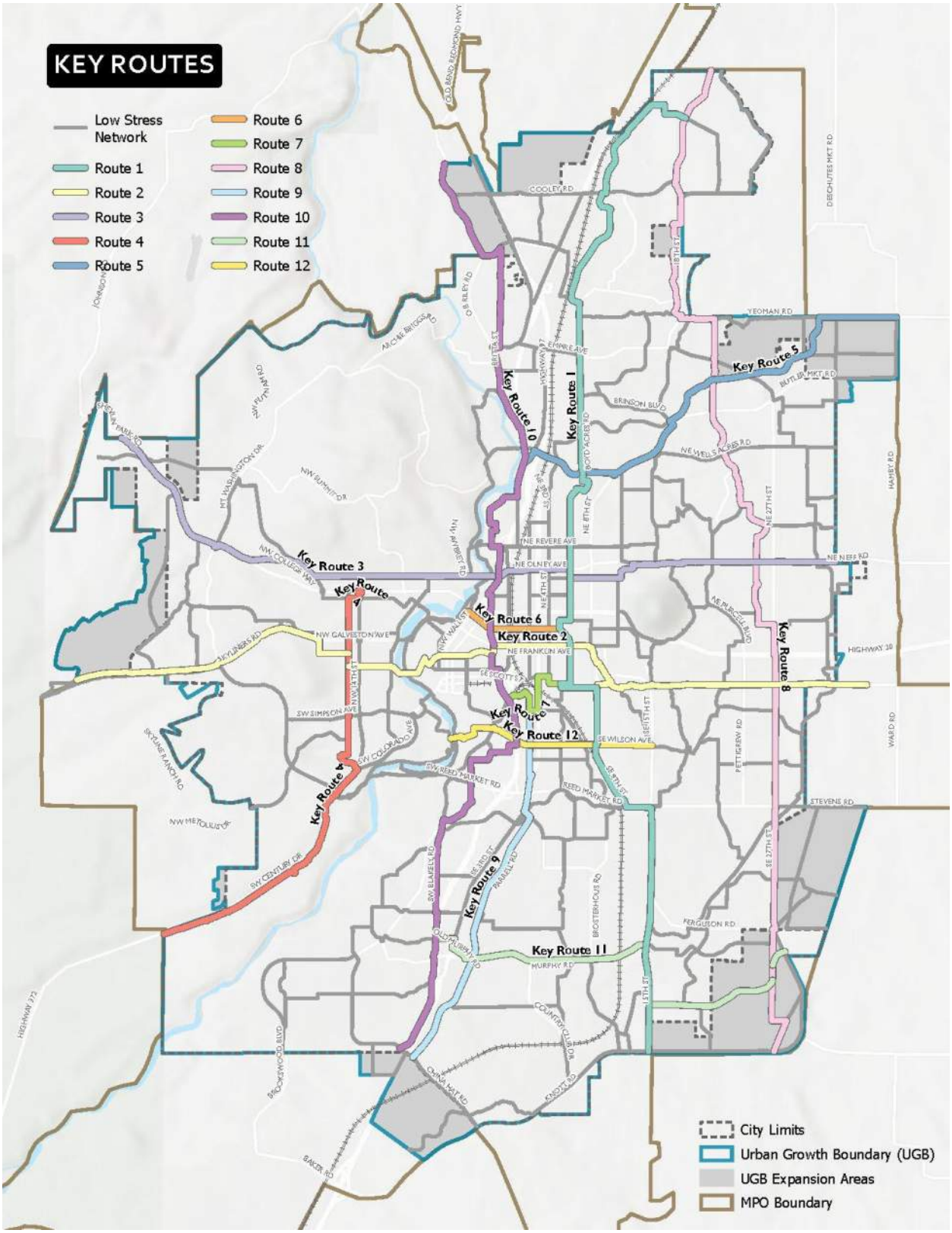
TSDC – Project is on current Transportation System Development Charge Project List (TSDC) and eligible for existing TSDC revenue

Core Area Urban Renewal Area – Project is within possible Core Area Urban Renewal Area and may be eligible for future funding from that area.

Murphy Crossing or Juniper Ridge Urban Renewal Area – Project is within existing urban renewal area and may be eligible for funding from that area.

TSDC and Urban Renewal Area – Project is on the current Transportation System Development Charge Project List and in one existing or proposed Urban Renewal Area.

Figure 6. Key Routes



Appendix A: Bend TSP Goals & Objectives

Bend's Transportation Plan Goals

Approved by the Steering Committee on September 11, 2018

Goal Definition

Bend's Transportation Plan Goals define the community's desired outcomes for the transportation system. The Goals will shape the policies and actions in the Plan, and guide the projects and programs that carry out the Plan.

Preamble

The Goals articulated in this document were developed by the Citywide Transportation Advisory Committee (CTAC) after consideration and review of the City Council's articulated goals for CTAC, and through an extensive CTAC-led process of identifying issues and potential solutions from stakeholders in our regional and city transportation systems. CTAC recognizes that the Goals as drafted are not necessarily comprehensive. CTAC acknowledges that there may be additional issues and solutions that should be considered as the project moves forward and CTAC membership learns more about our transportation system, funding options, community interests, and solutions implemented by other jurisdictions. It is the express intent of CTAC through the adoption of the draft Goals that no issue, policy, solution or project should be excluded from CTAC deliberations and recommendations, regardless of whether the issue, policy, solution or project is specifically identified in the current CTAC-adopted draft Goal.

Goals

Increase System Capacity, Quality, and Connectivity for All Users (e.g. drivers, walkers, bicyclists, transit riders, mobility device users, commercial vehicles, and other forms of transportation)

- Increase route choices and connections for all users
    - Roads: increase capacity and efficiency
    - Sidewalks: increase access and connectivity
    - Bicycle facilities: increase total miles of bike routes/facilities
    - Transit: increase transit participation
- Use technology to enhance system performance, including accessible technology (i.e. audible signals)
- Increase the number of people who walk, ride a bike and/or take transit
- Provide reliable travel times for commuters, emergency vehicles, and commercial users
- Minimize congestion
- Reduce vehicle operating and maintenance costs due to poor pavement conditions
- Emphasize asset management

Ensure Safety for All Users

- Reduce serious injuries and fatalities
- Maximize safe routes within and between neighborhoods and throughout the community for all users
- Design and build facilities and routes that maximize safety for pedestrians and bicyclists
- Ensure safe speeds

Approved by Steering Committee – September 11,2018

Facilitate Housing Supply, Job Creation, and Economic Development to Meet Demand/Growth

- Build new roads and upgrade existing roads to serve areas targeted for growth (prioritized opportunity and expansion areas) and job creation
- Provide access and connectivity to expanded housing supply
- Improve connectivity and route choices for commercial users

Protect Livability and Ensure Equity and Access

- Incorporate a complete streets approach for all new road projects and road reconstruction
- Increase Safe Routes to Schools
- Ensure that all income levels and abilities have access to the transportation option that best meets their needs
- Encourage the use of roads for their stated classification
- Keep through freight traffic on ODOT facilities

Steward the Environment

- Minimize the impacts of transportation system on natural features
- Minimize the impacts of system on air and water quality and noise
- Reduce carbon emissions from transportation

Have a Regional Outlook and Future Focus

- Coordinate and partner with other public and private capital improvement projects and local/regional planning initiatives
- Create a system that is designed to implement innovative and emerging transportation technologies

Implement a Comprehensive Funding and Implementation Plan

- Identify stable, equitable, adequate and achievable funding for transportation programs and projects
- Ensure that the financial plan and investment priorities are transparent, understandable, and broadly supported by the community
- Produce a funding plan that includes contributions from residents, visitors, and businesses and that delivers benefits to all users and geographies equitably and in a timely manner
- Include performance measures/benchmarks and a formal process to periodically assess progress to-date and adjust or update the plan as needed
- Achieve financial stability

Appendix B: Criteria Evaluation Results

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
Program																										
C-16	TDM Program for major employers and institutions	TDM program for major employers and institutions.	Program	◑	N/A	N/A	N/A	N/A	N/A	Long	Fewer vehicle trips to TDM areas	◑	N/A	◑	◑	◑	●	◑	◑	supports economic growth, supports livability and equity, reduces VMT, future technology opportunity	No	No	Near-term	TBD	100%	TBD
C-19	Traffic Signal Coordination improvements along signalized corridors, including freight and transit Signal Priority	Includes US 97 (mainline and ramp terminals), 3rd Street, 27th Street, Colorado/Arizona couplet, and US 20 (3rd Street and Greenwood) corridors.	Program	◑	N/A	◑	N/A	N/A	●	Near	N/A	◕	N/A	N/A	○	○	●	●	◑	supports transit, reduces VMT, future technology opportunity	No	No	Near-term	TBD	100%	TBD
C-20	Parking pricing and management in downtown Bend	Implement the 2017 Downtown Parking Plan.	Program	◑	N/A	N/A	N/A	N/A	N/A	Long	Fewer vehicle trips downtown	◑	N/A	N/A	●	◑	◑	N/A	◕	improves livability, encourages alternate modes	No	Yes	Near-term	TBD	100%	TBD
N-7	Transportation safety Action Plan (TSAP) implementation	Safety projects and programs as defined by the Transportation Safety Action Plan including street lighting.	Program	N/A	N/A	N/A	N/A	N/A	N/A	Near	Need to address near term safety needs	N/A	●	N/A	●	◑	N/A	N/A	●	improves safety for pedestrians, encourages alternate modes	No	No	Near-term	TBD	100%	TBD
T-1	Address Capital Needs backlog to maintain a state of Good Repair	City program to address capital needs backlog to maintain a state of good repair, including reconstruction of streets, signals, bridges, and other transportation infrastructure.	Program	N/A	◑	N/A	N/A	N/A	N/A	N/A	N/A	◑	N/A	N/A	◑	N/A	N/A	N/A	◑	improves safety for pedestrians, encourages alternate modes	No	No	Near-term	TBD	100%	TBD
T-10	Pedestrian Program	This includes bicycle greenways, traffic calming, pedestrian system improvements (local, collector, arterial sidewalk infill), CET implementation, LSN implementation, school zone enforcement and SRTS	Program	N/A	N/A	N/A	●	N/A	N/A	N/A	N/A	●	●	○	●	●	●	N/A	●	improves safety for pedestrians, encourages alternate modes	No	No	Near-term	TBD	100%	TBD
T-11	Bicycle Program	This includes bicycle greenways, traffic calming, pedestrian system improvements (local, collector, arterial sidewalk infill), CET implementation, LSN implementation, school zone enforcement and SRTS	Program	N/A	N/A	N/A	●	N/A	N/A	N/A	N/A	●	●	○	●	●	●	N/A	●	improves safety for pedestrians, encourages alternate modes	No	No	Near-term	TBD	100%	TBD
T-5	Bicycle and Pedestrian facility maintenance Program	City program to improve snow and debris clearing along key pedestrian and bicycle facilities.	Program	N/A	N/A	N/A	●	●	N/A	N/A	N/A	●	●	N/A	●	◑	N/A	N/A	●	improves safety for pedestrians, encourages alternate modes	No	No	Near-term	TBD	100%	TBD
Near Term																										
8	Empire Avenue widening to five lanes	Widen Empire to 5 lanes (near interchange) and install traffic signal at SB ramps.	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	◑	Near	Empire over capacity in 2040. Signal improves pedestrian/bike crossing opportunities. On LSN; Approaching capacity in interim scenario.	◕	●	●	◑	○	○	●	◑	improves safety, supports NE expansion area and surrounding economic area, provides additional capacity for key arterial, partner with ODOT	Yes	No	Near-term	$ 2,900,000	50%	$ 1,450,000
13	US 97 North parkway extension (phase 1)	Includes interim Cooley Road improvements	Roadway Safety/Capacity	●	N/A	N/A	N/A	N/A	●	Near	Over capacity in 2040; On unreliable corridor; improves congestion in interim scenario	●	●	●	◑	○	○	●	◕	imprives safety, supports north triangle expansion area, improves functionality, reduces emissions, supports region	No	No	Near-term	$ 110,000,000	10%	$ 11,000,000
15	Powers Road / US 97 preliminary engineering and ROW acquisition for Interchange	May include interchange or overcrossing, pending outcome of the Parkway Study	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	●	Near	Same score as Project A-8	◕	●	◑	◑	○	○	●	◑	improved safety, supports COID opporunity area, improved functionality, reduces emissions, key regional connection on ODOT facility	No	No	Near-term	$ 6,500,000	10%	$ 650,000
17	Yeoman Road extension	Includes two lane extension and bridge to cross canal	Complete Street (All Modes)	N/A	●	N/A	●	●	N/A	Near	Increased connectivity for pedestrian/bike/motor vehicle. Extension part of key walking and biking network. Significant traffic demand in 2040 and interim scenario.	●	○	●	◑	○	N/A	N/A	◑	serves NE expansion area, improves functionality of network, reduces VMT	No	No	Near-term	$ 5,000,000	100%	$ 5,000,000
22	Purcell Boulevard extension	From Full Moon Drive to Jackson Avenue. Includes two lane extension	Complete Street (All Modes)	●	●	N/A	●	●	N/A	Near	Reduces demand on 27th Street. Increased connectivity for pedestrian/bike/motor vehicle. Extension part of key walking and biking network. Significant demand in 2040 and interim scenario.	●	◑	◑	●	◑	◑	N/A	◕	access to new housing developments, improves regional connectivity, reduces VMT	No	No	Near-term	$ 2,288,000	100%	$ 2,288,000
24	O.B. Riley Road Arterial Corridor upgrade	From Hardy Road to US 20. Includes upgrade to three lane arterial with curb, sidewalk and bike lane improvements	Complete Street (All Modes)	N/A	N/A	N/A	●	●	N/A	Near	Improve pedestrian/bike conditions, on key walking and biking route.	●	◑	●	◑	○	N/A	◑	◑	multimodal improvements, supports OB Riley expansion area, improves functionality, connection to county	No	No	Near-term	$ 6,700,000	100%	$ 6,700,000
26	US 97 northbound on ramp and southbound off ramp at Murphy Road	US 97 northbound on ramp and southbound off ramp at Murphy Road	Roadway Safety/Capacity	●	●	N/A	N/A	N/A	●	Near	Improves the congestion bottleneck at Powers/US 97	●	◑	●	◑	○	○	●	◑	improves connectivity of south Bend, reduces VMT, key connection to ODOT facility	No	Yes, Murphy	Near-term	$ 10,000,000	100%	$ 10,000,000
29	US 20 southbound Roadway widening	From Cooley Road to US 97 interchange. US 20 southbound widening to two lanes	Roadway Safety/Capacity	●	N/A	N/A	N/A	N/A	●	Near	Over capacity in 2040 as single lane on US 20; Improves capacity on unreliable corridor; Over capacity in interim scenario as single lane	●	●	●	◑	○	N/A	●	◕	improves safety, supports OB Riley and North Triangle expansion area,key regional connection on ODOT facility	No	Yes, JR	Near-term	$ 4,800,000	100%	$ 4,800,000
1TCSI	Citywide safety improvements	Includes 3rd/Hawthorne, 3rd/COID Canal, 3rd/Pinebrook, Brosterhous/Railroad bridge, and Colorado Ave/US 97 improvements	Roadway Safety/Capacity	N/A	N/A	N/A	N/A	N/A	N/A	Near	N/A	N/A	●	N/A	●	●	○	◑	◕	safety improvements, improves livability and access for all users, may encourage alternative modes, ODOT facility intersections	No	Yes, Core	Near-term	$ 1,000,000	100%	$ 1,000,000
1TGCI	Galveston Corridor improvements	14th to Riverside. Multi-modal transportation facility improvements to help with pedestrian, bicycle, and vehicular connectivity in Galveston Avenue corridor. City is currently completing design effort for this project.	Roadway Safety/Capacity	N/A	N/A	N/A	◑	◑	N/A	Near	Not on key walking and biking routes or LSN. Near term due to stormwater deficiencies	◑	◑	○	●	◑	○	N/A	◑	multimodal safety improvements, improved functionality for all, improved access to transit, may encourage alternative modes	No	No	Near-term	$ 3,900,000	100%	$ 3,900,000
A-17	Aune Road extension	Two lane extension of Aune Road to connect 3rd Street and Bond Street. Includes intersection improvement at 3rd Street and a RAB at the intersection of Bond St and Industrial Way.	Complete Street (All Modes)	◑	●	N/A	◑	◑	N/A	Long	Under capacity in 2040; Adds connectivity in KorPine area, including to the bike and pedestrian network. Significant traffic demand in 2040.	◕	N/A	●	◑	○	◑	N/A	◑	serves korpine opportunity area, improves local connectivity, improves access, reduces VMT	No	Yes, Core	Near-term	$ 13,500,000	100%	$ 13,500,000
A-4	Study for southern river crossing	Study to identify new river crossing location between Powers Road and Murphy Road, connecting Century Drive to US 97 or 3rd Street	Complete Street (All Modes)	●	●	N/A	◑	◑	●	Near	Near term because bridges are all over capacity by the interim scenario.	●	N/A	◑	◑	◑	◑	N/A	◑	improves connectivity of south Bend, supports COID and River Rim opportunity area, supports disapritiy of river crossing for southern residents, reduces VMT, key connection	No	No	Near-term	$ 500,000	100%	$ 500,000
B-8	Colorado Avenue corridor capacity improvements	Includes incremental approach for Colorado Avenue widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes intersection capacity improvements at Colorado Avenue/Simpson Avenue roundabout and Colorado Avenue/Industrial Way. Includes complete streets upgrade.	Roadway Safety/Capacity	●	N/A	N/A	N/A	N/A	●	Near	Improves capacity at both ends of the bridge. Still over capacity along Colorado south of the bridge; Not on key walking and biking route; on LSN; Over capacity in interim scenario; on unreliable corridor	●	◑	◑	◑	○	N/A	N/A	◑	improves safety, serves Central Westside opportunity area, improves functionality	Yes	No	Near-term	$ 21,000,000	100%	$ 21,000,000
C-13	Mobility Hubs	Should be implemented in connection with Project C-2 abd C-3.	CTAC Recomm.	N/A	N/A	●	◑	◑	N/A	Long	N/A	◕	N/A	◑	●	●	●	○	◕	improves connectivity for all users, reduces disparities, improves transit ammenities, reduces VMT, supports future infrastructure	No	No	Near-term	$ 5,000,000	100%	$ 5,000,000
C-2	Newport Avenue / Greenwood Avenue corridor high-capacity transit and mobility hubs	Mt. Washington to 27th St. Includes HCT transit service connecting COCC to downtown to St. Charles Area. Includes improved transit connections from neighborhoods to HCT stops. Should be implemented in connection with Project C-13.	Transit	●	N/A	●	◑	◑	◑	Long	N/A	◕	N/A	○	◑	●	◑	N/A	◑	improves access to transit, reduces VMT, provides service for underserved	No	Yes, Core	Near-term	$ 1,000,000	100%	$ 1,000,000
C-24	Study of at-grade railroad crossing solutions near Reed Market Road	Study the cost and feasibility of relocating the BNSF switchyards compared to a Reed Market Road overcrossing of the railroad.	Complete Street (All Modes)	●	N/A	N/A	N/A	N/A	●	Near	N/A	●	◑	N/A	◑	N/A	N/A	◑	◕	improves safety at crossing, improves functionality, rduces negative social/economic impact, regional BNSF facility	No	No	Near-term	$ 200,000	100%	$ 200,000
C-3	3rd Street corridor high-capacity transit and mobility hubs	Murphy near Robal. Includes HCT transit service connecting northern Bend (the Triangle) to southern Bend. Includes improved transit connections from neighborhoods to HCT stops.	Transit	◑	N/A	●	◑	◑	◑	Long	N/A	◕	N/A	○	◑	●	◑	N/A	◑	improves access to transit, reduces VMT, provides service for underserved	No	Yes, Core	Near-term	$ 1,000,000	100%	$ 1,000,000
C-9	Colorado Avenue / US 97 Northbound ramp intersection safety and capacity improvements	Includes traffic signal or roundabout.	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	N/A	Near	Over capacity in 2040; improves pedestrian/bike crossing opportunities; not on LSN or key walking and biking route; over capacity in interim scenario	◕	●	◑	◑	N/A	N/A	●	◕	improves safety, serves Korpine opportunity area, improves functionality, regional connection to ODOT facility	No	Yes, Core	Near-term	$ 4,300,000	10%	$ 430,000

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
CAP_T27	Greenwood Undercrossing Improvements	Underpass of the Parkways. Widen undercrossing to include improved multimodal facilities	Core Area Project Recommendation	N/A	N/A	N/A	●	●	N/A	Near	Significant improvement over today's pedestrian/bike conditions; not on key walking and biking network or LSN	●	●	●	◑	N/A	○	N/A	◕	improved safety for all modes, serves Bend Central District opportunity area, improves functionality	No	Yes, Core	Near-term	$ 10,400,000	100%	$ 10,400,000
N-13	Portland Avenue Corridor Project	From College Way to NE 3rd. Multi-modal transportation facility and safety improvements to help with pedestrian, bicycle, and vehicular connectivity in the Portland Avenue corridor. Project includes improvements to the Revere Avenue Interchange area and an intersection improvement at Portland Avenue/Wall Street.	Complete Street (All Modes)	●	N/A	N/A	●	●	N/A	Near	Over capacity in 2040; key walking and biking route; significantly improves pedestrian/bike conditions over today	●	◑	○	●	◑	○	N/A	◑	multimodal safety improvements, improved functionality for all, improved access to transit, may encourage alternative modes	Yes	No	Near-term	$ 26,200,000	100%	$ 26,200,000
N-14	Improve all City-owned pedestrian bridges across the Deschutes River	Evaluate and repair/replace bridges to accommodate pedestrian and bicycle traffic.	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	N/A	●	N/A	N/A	●	◑	◑	N/A	◕	encourages active modes, improves pedestrian connectivity	No	No	Near-term	$ 1,275,000	100%	$ 1,275,000
N-15a	Archie Briggs Road Bridge and Pedestrian Improvement Design	Construct improved pedestrian crossing at the Deschutes River Trail Crossing of Archie Briggs Road. City is currently seeking funding to replace the Archie Briggs Road vehicular bridge due to maintenance issues.	Pedestrian/ Bicyclist	N/A	●	N/A	◑	◑	N/A	Near	Key motor vehicle connection in danger of failing structurally	◕	○	N/A	◑	○	◑	N/A	◔	improves bridge safety, encourages active modes	Yes	No	Near-term	$ 500,000	100%	$ 500,000
N-17	Olney Protected Bicycle Lanes	Provide protected bicycle lanes on Olney Avenue at Parkway undercrossing.	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	N/A	N/A	Near	On key walking and biking network	●	●	N/A	◑	N/A	N/A	N/A	●	improves bicycle safety	No	Yes, Core	Near-term	$ 1,820,000	100%	$ 1,820,000
N-1a	Reed Market Road Interchange improvement Study	Reed Market Road interchange improvements as defined by the Parkway Study.	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	●	Near	Reed Market over capacity in 2040 and interim scenario.	◕	●	N/A	◑	N/A	○	●	◕	improves safety on key arterial, improves functionality, reduces emissions, regional connection on ODOT facility	No	No	Near-term	$ 500,000	100%	$ 500,000
N-24	Franklin Avenue Corridor Study	Conduct a corridor study to determine roadway and intersection improvement needs to serve all users.	Staff recomm.	N/A	N/A	◑	●	●	N/A	Near	N/A	●	●	N/A	●	●	○	N/A	◕	improves pedestrian safety, improves access for bike/ped, supports livability, encourages alterate modes	No	Yes, Core	Near-term	$ 200,000	100%	$ 200,000
N-25	Olney Avenue/8th Street Intersection improvement	Improve intersection capacity.	Staff recomm.	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity 2040; not on key walking and biking network; no significant changes to pedestrian/bike	◑	●	N/A	●	◑	◑	N/A	◕	improves safety, improves functionality, reduces emissions	No	No	Near-term	$ 3,700,000	100%	$ 3,700,000
N-26	Revere Avenue/8th Street Intersection improvement	Improve intersection capacity.	Staff recomm.	◑	N/A	N/A	●	◑	N/A	Long	Under capacity 2040; not on key walking and biking network; on LSN; Two way stop control to roundabout/signal improves pedestrian/bike crossing opportunities	◕	●	N/A	◑	N/A	○	N/A	◑	improves safety, improves funcitionality	No	No	Near-term	$ 3,700,000	100%	$ 3,700,000
N-28	Butler Market Interchange Frontage Road	US 20/Butler Market Road. Construct frontage road from US 97 southbound off-ramp to Division Street	TSAP/Parkway Coordination	●	●	N/A	●	●	N/A	Long	Reduces congestion at US 20/Butler Market; improves connectivity for vehicles, bike and pedestrians; on key walking and biking network; Significant traffic demand in 2040.	●	●	N/A	◑	N/A	N/A	●	●	improves safety, improves functionality, regional connection to ODOT facility	No	No	Near-term	$ 6,180,000	50%	$ 3,090,000
R-6	Hawthorne Overcrossing	Core Area connectivity	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network	●	●	N/A	●	●	●	N/A	●	improves bike/ped safety and connectivity, supports expansion/opportunity areas, supports neighborhood livability, improves equity of all users, encourages alternative modes	No	Yes, Core	Near-term	$ 15,000,000	100%	$ 15,000,000
R-7	3rd St at RR to Connect KorPine to 3rd St	3rd St at RR to Connect KorPine to 3rd St	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network	●	●	◑	●	●	●	N/A	●	improves bike/ped safety and connectivity, supports expansion/opportunity areas, supports neighborhood livability, improves equity of all users, encourages alternative modes	No	Yes, Core	Near-term	$ 620,000	100%	$ 620,000
TSAP-1	Purcell Boulevard & Pettigrew Road & Bear Creek Road	Long-term: single lane roundabout	TSAP Project	●	●	N/A	◑	◑	◑	Near	N/A	◕	●	◑	●	●	●	N/A	●	improves safety, improves funcitionality, improves connectivity for all users, reduces disparities	Yes	No	Near-term	$ 3,700,000	100%	$ 3,700,000
TSAP-2	US 97 & Powers Road - Interim Improvements	Enhanced pedestrian crossings, realign enntrance ramp approaches	TSAP Project	◑	●	N/A	◑	◑	◑	Near	N/A	◕	●	◑	●	●	●	●	●	improves safety, improves funcitionality, improves connectivity for all users, reduces disparities	No	No	Near-term	$ 100,000	100%	$ 100,000
TSAP-3a	3rd Street & Miller Avenue (Phase 1: Study)	Study of intersection improvements and 3rd Street modifications	TSAP Project	◑	●	N/A	◑	◑	◑	Near	N/A	◕	●	○	●	●	●	N/A	◕	improves safety, improves funcitionality, improves connectivity for all users, reduces disparities	No	Yes, Core	Near-term	$ 100,000	100%	$ 100,000
																							Near-term Total	**$ 273,583,000**		**$ 159,873,000**

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
Mid-Term																										
11	O.B. Riley Road intersection safety and capacity improvement	Improvements at key intersections such as Mervin Sampels, Archie Briggs Road, Halfway Road and Glen Vista/Hardy Road	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	N/A	Long	Over capacity in 2040 near Empire/Archi Briggs. Key walking and biking route. Improves pedestrian/bike crossing opportunities of O.B. Riley; under capacity in interim scenario	◕	●	●	○	○	N/A	●	◕	improves safety at intersections, supports OB Riley expansion area, improves functionality of OB Riley, regional connection to county	No	No	Mid-term	$ 1,900,000	100%	$ 1,900,000
14	US 97 / Empire Avenue northbound off ramp widening	US 97/Empire Avenue northbound off ramp widening to two lanes	Roadway Safety/Capacity	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity in 2040 (w/ ramp meters). Significant traffic demand in 2040 and interim scenario.	◑	●	○	◑	N/A	○	●	◑	reduces potential for spill back to US 97, supports regional connectivity on ODOT facility	Yes	No	Mid-term	$ 1,800,000	10%	$ 180,000
27	18th Street Arterial Corridor upgrade	Includes upgrade to three lane arterial	Roadway Safety/Capacity	◑	N/A	N/A	●	●	N/A	Near	Under capacity in 2040. Bike lanes exist today.	●	◑	●	◑	○	○	◑	◑	safety/capacity improvement, supports NE expansion area and juniper ridge opportunity area, improves functionality, parallel route to US 97	Yes	No	Mid-term	$ 7,800,000	100%	$ 7,800,000
28	US 20 intersection safety and capacity improvements	Intersection control improvements to be determined.	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	●	Long	Over capacity in 2040; Intersection control will improve pedestrian/bike crossing opportunities; Not on key walking and biking route, on LSN; on unreliable corridor; Under capacity in interim scenario.	◕	●	●	◑	○	N/A	●	◕	improves safety, supports OB Riley and North Triangle expansion area,key regional connection on ODOT facility	No	No	Mid-term	$ 20,000,000	10%	$ 2,000,000
A-6	US 97 North parkway extension (phase 2)	Includes all improvements in the US 97 Bend North Corridor Project FEIS	Roadway Safety/Capacity	●	●	N/A	◑	◑	●	Near	Provides congestion relief for a significant part of the Parkway. Adds additional street network with significant traffic demand in 2040 and interim scenario. Includes pedestrian/bike improvements to North 3rd Street.	●	●	●	◑	◑	N/A	●	●	improves safety and capacity of northend, serves opportunity area, improves livablity of northend, improves access safety, regional connection on ODOT facility	No	No	Mid-term	$ 200,000,000	10%	$ 20,000,000
A-8	Powers Road interchange	Grade separated interchange or overcrossing of US 97 (pending Parkway Study)	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	●	Near	Reduces bottleneck along Parkway; Improves pedestrian/cyclist crossing opportunities of the Parkway; on unreliable corridor; Over capacity on Powers in interim scenario	◕	●	◑	◑	○	○	●	◑	improved safety at intersection, serves COID & River Rim opportunity areas, improves functionality, reduces emissions, regional connection on ODOT facility	No	No	Mid-term	$ 20,000,000	10%	$ 2,000,000
B-17	15th Street Corridor safety and capacity improvements	Includes roundabouts at key intersections, including Wilson Avenue, Ferguson Road, and Knott Road.	Roadway Safety/Capacity	◑	N/A	N/A	●	●	◑	Long	Ferguson nearing capacity in 2040; on key walking and biking route; under capacity in interim scenario	◕	●	●	◑	◑	◑	N/A	◕	improves safety, serves 15th St opportunity area, improves functionality and encourages alternative modes, reduces emission	Yes	No	Mid-term	$ 20,500,000	100%	$ 20,500,000
C-7	Butler Market Road intersection safety and capacity improvements	US97 to 27th St. Includes roundabouts or traffic signals at 4th Street, Brinson Boulevard, and Purcell Boulevard. Wells Acres Road roundabout as a separate baseline project.	Roadway Safety/Capacity	●	N/A	N/A	●	●	●	Near	Over capacity in 2040; partially on key walking and biking route; on unreliable corridor; over capacity in interim scenario	●	◑	N/A	○	○	N/A	N/A	◔	improves safety, improves funtionality	Yes	No	Mid-term	$ 7,000,000	100%	$ 7,000,000
CAP_T45	Revere Avenue/2nd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity 2040; not on key walking and biking network; on LSN	◑	●	●	◑	N/A	○	N/A	◕	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Mid-term	$ 210,000	100%	$ 210,000
CAP_T46	Revere Avenue/4th Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	●	◑	N/A	Long	Under capacity 2040; not on key walking and biking network; on LSN; All way stop control to roundabout/signal improves pedestrian/bike crossing opportunities	◕	●	●	◑	N/A	○	N/A	◕	improves safety, serves Bend Central District opportunity area, improves funcitionality	Yes	Yes, Core	Mid-term	$ 3,700,000	100%	$ 3,700,000
CAP_T48	Onley Avenue/4th Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	●	●	N/A	Long	Under capacity 2040; On key walking and biking network	●	◑	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Mid-term	$ 3,700,000	100%	$ 3,700,000
CAP_T54	Clay Avenue/3rd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	●	N/A	N/A	N/A	N/A	N/A	Long	Over capacity in 2040 without 3rd Street widening; On key walking and biking network; Under capacity in interim scenario.	●	◑	●	◑	N/A	○	N/A	◕	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Mid-term	$ 210,000	100%	$ 210,000
CAP_T56	Greenwood/8th Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	●	N/A	N/A	○	○	◑	Long	Over capacity 2040, under capacity in interim scenario; on unreliable corridor	◔	◑	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Mid-term	$ 2,100,000	100%	$ 2,100,000
CAP_T59	Sisemore Street Extension	Arizona Avenue to Bond Street. Construct street extension	Core Area Project Recommendation	N/A	●	N/A	◑	◑	N/A	Near	Adds connectivity in KorPine area, for bike/pedestrian/motor vehicle. Significant traffic demand in 2040; not on key walking and biking route	◕	N/A	●	◑	○	◑	N/A	◑	serves korpine opportunity area, improves local connectivity, improves access, reduces VMT	No	No	Mid-term	$ 2,400,000	100%	$ 2,400,000
N-4	US 97 operational and safety management improvements and associated City street improvements	Includes potential recommended Parkway Plan projects such as RI/RO Access Modifications/Closures, Ramp Meters, Butler Market Interchange Improvements, Revere Ave Lane Re-allocation, US 97 Auxiliary Lanes, Baker/Knott Interchange ramp terminal improvements, etc.	Roadway Safety/Capacity	●	N/A	N/A	N/A	N/A	●	Near/Long	N/A	●	●	N/A	○	N/A	N/A	●	◕	improves safety, ODOT facility	No	No	Mid-term	$ 100,000,000	10%	$ 10,000,000
N-5	Empire Boulevard / 27th Street Corridor capacity improvements	Includes incremental approach for Empire Boulevard/27th Street widening, including right-of-way acquisition and monitoring for if/when widening is appropriate. Implement alternate mobility targets and identify smaller projects to incrementally improve mobility, reliability and safety. Includes complete streets upgrade.	Roadway Safety/Capacity	●	N/A	N/A	○	○	●	Near	Over capacity in interim scenario and 2040; On unreliable corridor	◑	◑	●	◑	N/A	N/A	N/A	◕	improves safety, supports expansion areas, improves functionality	No	No	Mid-term	$ 41,800,000	100%	$ 41,800,000
N-15b	Archie Briggs Road Bridge and Pedestrian Improvement	Construct improved pedestrian crossing at the Deschutes River Trail Crossing of Archie Briggs Road. City is currently seeking funding to replace the Archie Briggs Road vehicular bridge due to maintenance issues.	Pedestrian/ Bicyclist	N/A	●	N/A	◑	◑	N/A	Near	Key connection in danger of failing structurally	◕	○	N/A	◑	○	◑	N/A	◔	improves bridge safety, encourages active modes	Yes	No	Mid-term	$ 6,000,000	100%	$ 6,000,000
N-16	Reed Market Road/15th Street intersection safety and capacity improvements	Includes expanding the partial multi-lane roundabout to a full multi-lane roundabout.	Roadway Safety/Capacity	●	N/A	N/A	○	○	●	Near	Over capacity in 2040; full multilane roundabout more difficult for pedestrians/bicyclists to cross; on unreliable corridor; approaching capacity in interim scenario	◑	●	◑	◑	N/A	N/A	N/A	◕	improves safety and capacity for key arterial	No	No	Mid-term	$ 1,100,000	100%	$ 1,100,000
N-1b	Construct Reed Market Road Interchange improvements	Reed Market Road interchange improvements as defined by the Parkway Study.	Roadway Safety/Capacity	●	N/A	N/A	◑	◑	●	Near	Reed Market over capacity in 2040 and interim scenario.	◕	●	N/A	◑	N/A	○	●	◕	improves safety on key arterial, improves functionality, reduces emissions, regional connection on ODOT facility	No	No	Mid-term	$ 50,000,000	50%	$ 25,000,000
N-21	3rd Street Canal Crossing	Construct pedestrian facilities on 3rd Street across the canal bridge.	Staff recomm.	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key pedestrian/bike route	◑	●	N/A	◑	◑	○	N/A	◑	improves bike/ped safety, improves access for all modes, encourages alternate modes	No	No	Mid-term	$ 980,000	100%	$ 980,000
N-27	Parrell Road Urban Upgrade	China Hat Road to Brosterhous Road. Construct complete street upgrades and reconstruct roadway	Staff recomm.	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network	●	◑	N/A	●	◑	◑	N/A	◕	improves bike/ped safety, improves access for all modes, encourages alternate modes	No	Yes, Murphy	Mid-term	$ 29,100,000	100%	$ 29,100,000
																							Mid-term Total	**$ 520,300,000**		**$ 187,680,000**
Long- Term																										
18	New North Frontage Road near Murphy Road	Improvements to be determined	Complete Street (All Modes)	N/A	◑	N/A	●	●	N/A	Long	Increased connectivity for pedestrian/bike/motor vehicle. Moderate traffic demand in 2040 and interim scenario. Extension part of key walking and biking network.	●	○	N/A	◑	○	N/A	N/A	◔	improves livability for nearby residents	No	Yes, Murphy	Long-term	$ 5,400,000	100%	$ 5,400,000
19	New South Frontage Road	Improvements to be determined	Complete Street (All Modes)	N/A	◑	N/A	●	●	N/A	Near	Increased connectivity for pedestrian/bike/motor vehicle. Significant traffic demand in 2040. Extension part of key walking and biking network.	●	○	N/A	◑	○	N/A	N/A	◔	improves livability for nearby residents	No	Yes, Murphy	Long-term	$ 13,800,000	100%	$ 13,800,000
20	Britta Street extension (north section)	Includes two lane extension	Complete Street (All Modes)	N/A	◑	N/A	●	●	N/A	Long	Increased connectivity for pedestrian/bike/motor vehicle. Moderate demand in 2040 and interim scenario. Extension part of key walking and biking network.	●	○	●	◑	◑	○	◑	◑	supports OB Riley expansion area,supports connectivity to school, reduces VMT, connects to ODOT facility	No	No	Long-term	$ 2,700,000	100%	$ 2,700,000
21	Britta Street extension	Includes two lane extension	Complete Street (All Modes)	N/A	◑	N/A	●	●	N/A	Long	Increased connectivity for pedestrian/bike/motor vehicle. Moderate traffic demand in 2040 and interim scenario. Extension part of key walking and biking network.	●	○	●	◑	◑	○	○	◑	supports OB Riley expansion area,supports connectivity to school, reduces VMT, near key regional network	No	No	Long-term	$ 1,000,000	100%	$ 1,000,000

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
23	Mervin Sampels Road / Sherman Road Collector Corridor upgrade	Includes upgrade to two lane collector roadway and a traffic signal at US 20	Complete Street (All Modes)	◑	N/A	N/A	◑	◑	N/A	Long	Under capacity in 2040. Improves bike/pedestrian conditions. Not on LSN or key route.	◑	○	◑	◑	○	N/A	N/A	◔	improved multimodal facilties, reduces business cut through supports nearby developments	No	No	Long-term	$ 6,100,000	100%	$ 6,100,000
25	27th Street Arterial Corridor upgrade	Includes upgrade to three lane arterial and intersection improvements at Ferguson Road	Complete Street (All Modes)	◑	N/A	N/A	●	●	N/A	Long	Ferguson/27th under capacity in 2040. Key pedestrian/bike route.	●	●	●	◑	◑	N/A	◑	◕	improves intersection and multimodal safety, supports East Hwy 20 and DSL expansion areas, improved functionality, improved access to transit, improves key region route on eastside	Yes	No	Long-term	$ 8,600,000	100%	$ 8,600,000
A-3	Ponderosa Street / China Hat Road overcrossing	Vehicle, pedestrian and bicycle access over US 97 at Ponderosa Street/China Hat Road. Includes intersection improvement at Parrell Road/China Hat Road.	Complete Street (All Modes)	●	●	N/A	◑	◑	N/A	Long	Reduces congestion at China Hat/US 97; Adds connectivity for pedestrians, bicyclists and vehicles; Not on key walking and biking route; Significant traffic demand in 2040 and interim scenario; under capacity in interim scenario	◕	●	N/A	●	◑	○	◑	◕	improves pedestrian safety, supports livabilty and equity for multiodal users, encourages multimodal use, crosses ODOT facility	No	No	Long-term	$ 15,000,000	100%	$ 15,000,000
B-29	3rd Street railroad undercrossing widening	Emerson Ave to Miller Ave. Widen 3rd Street to 4-lanes under the railroad, including complete street design.	Complete Street (All Modes)	●	N/A	N/A	●	●	●	Long	Over capacity in 2040; significantly improves existing bike/pedestrian conditions; on key walking and biking routes; under capacity in interim scenario	●	◑	N/A	◑	○	N/A	N/A	◑	improves capacity, improves multimodal safety	No	Yes, Core	Long-term	$ 13,700,000	100%	$ 13,700,000
CAP_T47	Olney Avenue/2nd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	●	●	N/A	Long	Under capacity 2040; On key walking and biking network	●	○	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Long-term	$ 210,000	100%	$ 210,000
CAP_T49	Greenwood/2nd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity 2040; not on key walking and biking routes or LSN; on unreliable corridor	◑	◑	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Long-term	$ 210,000	100%	$ 210,000
CAP_T51	Hawthorne Avenue/3rd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	◑	◑	N/A	Long	Under capacity 2040; not on key walking and biking route or LSN; Two-way stop control to signal would improve pedestrian/bike crossing opportunities	◑	◑	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	Yes	Yes, Core	Long-term	$ 210,000	100%	$ 210,000
CAP_T52	Franklin Avenue/2nd Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity 2040; on key walking and biking route	◑	◑	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Long-term	$ 210,000	100%	$ 210,000
CAP_T53	Franklin Avenue/4th Street Intersection improvement	Improve intersection capacity.	Core Area Project Recommendation	◑	N/A	N/A	N/A	N/A	N/A	Long	Under capacity 2040; on key walking and biking route	◑	○	●	◑	N/A	○	N/A	◑	improves safety, serves Bend Central District opportunity area, improves funcitionality	No	Yes, Core	Long-term	$ 210,000	100%	$ 210,000
N-9	Century Drive/Skyline Ranch Road roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	Roadway Safety/Capacity	◑	N/A	N/A	●	●	N/A	Long	Under capacity in 2040	●	●	N/A	●	◑	◑	◑	◕	improves safety, improves roadway functionality, reduces emissions, connection to County	No	No	Long-term	$ 3,700,000	100%	$ 3,700,000
N-10	Mt. Washington Drive/Metolius Drive roundabout	Address existing and future safety and operational needs at intersection; specific improvements to be evaluated in next phase of work.	Roadway Safety/Capacity	◑	N/A	N/A	●	◑	N/A	Long	Under capacity in 2040	◕	●	N/A	●	◑	◑	N/A	◕	improves safety, improves roadway functionality, reduces emissions	No	No	Long-term	$ 3,700,000	100%	$ 3,700,000
N-19	Eagle Road Functional Urban Upgrade	Neff Road to Butler Market Road. Classify roadway as Minor Collector and construct complete street upgrades.	Staff recomm.	N/A	N/A	N/A	◑	◑	N/A	Long	Significant improvement over today's pedestrian/bike conditions; not on key walking and biking network or LSN	◑	○	●	◑	○	N/A	N/A	◑	serves NE expansion area, improves functionality of network, reduces VMT	No	No	Long-term	$ 14,500,000	100%	$ 14,500,000
N-29	US 97 Frontage Road	Ponderosa Street to Baker Road	Parkway Coordination	N/A	◑	N/A	◑	◑	N/A	Long	Moderate traffic demand in 2040 and interim scenario; not on key walking and biking route	◑	N/A	◑	◑	○	N/A	◑	◑	supports the Thumb expansion area, improves connectivity, supports ODOT facility	No	No	Long-term	$ 6,550,000	50%	$ 3,275,000
N-30	US 20/27th Street Intersection Improvement	Improve intersection capacity	Steering Committee Addition	●	N/A	N/A	○	○	●	Long	Over capacity in 2040 and makes significant improvement but will not get below v/c 1.0; worsen conditions for bike/pedestrian crossing (on key walking and biking route); under capacity in interim scenario	◑	○	N/A	◑	N/A	N/A	●	◑	improves functionality and capacity, regional connection to ODOT facility	No	No	Long-term	$ 2,100,000	10%	$ 210,000
TSAP-3b	3rd Street & Miller Avenue (Phase 2: Implementation)	Construction of Intersection improvements and 3rd Street modifications in the vicinity of the intersection (no preferred alternative selected - assumed high cost alternative)	TSAP Project	◑	●	N/A	◑	◑	◑	Near	N/A	◕	●	○	●	●	●	N/A	◕	N/A	No	Yes, Core	Long-term	$ 3,100,000	100%	$ 3,100,000
																							Long-term Total	**$ 101,000,000**		**$ 95,835,000**

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
Expansion Area Driven																										
10	Stevens Road realignment	Includes connection to Reed Market Road and bridge to cross canal	Roadway Safety/Capacity	●	●	N/A	◑	◑	N/A	Near	Intersection improvement at Stevens/27th/Reed Market can help decrease congestion (27th over capacity in 2040); Improves pedestrian and bicyclist connectivity; Existing Stevens configuration on LSN; 27th over capacity in interim scenario.	◕	●	●	◑	○	○	●	◕	roadway alignment improves safety, supports DSL expansion area, reduces cut through, supports regional connectivity to county	No	No	Expansion Area Driven	$ 4,700,000	100%	$ 4,700,000
205	Hunnell Road extension	Two lane collector roadway	Complete Street (All Modes)	N/A	◑	N/A	◑	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles. Not on key walking and biking route or LSN. Moderate traffic demand in 2040.	◑	N/A	●	●	◑	○	N/A	◕	supports North Triangle expansion area, improves connectivity and access, reduces VMT	No	Yes, JR	Expansion Area Driven	$ 2,400,000	100%	$ 2,400,000
211	New Road in DSL UGB expansion area	Two lane collector roadway	Complete Street (All Modes)	N/A	◑	N/A	●	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles; Not on key walking and biking route; On LSN; Minimal traffic demand in interim scenario.	◕	N/A	●	●	◑	N/A	N/A	◕	supports DSL expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 9,500,000	100%	$ 9,500,000
212	New Road in DSL UGB expansion area	Two lane collector roadway	Complete Street (All Modes)	N/A	◑	N/A	●	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles; Moderate traffic demand in 2040 and in interim scenario; Not on key walking and biking route; On LSN.	◕	N/A	●	●	◑	N/A	N/A	◕	supports DSL expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 1,100,000	100%	$ 1,100,000
213	New Road in the Elbow UGB expansion area (east-west collector from western edge of High Desert MS property to SE 27th Street)	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	●	●	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles; Substantial traffic demand in 2040 and interim scenario; On key walking and biking route; (Extension of project 216)	●	N/A	●	●	◑	N/A	N/A	●	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 4,000,000	100%	$ 4,000,000
224	New Road in the Elbow UGB expansion area (east-west collector from SE 15th Street to western edge of High Desert MS property)	Two lane collector roadway	Complete Street (All Modes)	N/A	◑	N/A	●	●	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles; Moderate traffic demand in 2040 and interim scenario; On key walking and biking route	●	N/A	●	●	◑	N/A	N/A	●	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 10,200,000	100%	$ 10,200,000
226	New Road in the Elbow UGB expansion area (north-south collector)	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	◑	◑	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles; Substantial traffic demand in 2040 and interim scenario; Not on key walking and biking route	◕	N/A	●	●	◑	N/A	N/A	◕	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 7,100,000	100%	$ 7,100,000
228	New Road	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	◑	◑	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles; Substantial traffic demand in 2040 and interim scenario; Not on key walking and biking route	◕	N/A	●	●	◑	N/A	N/A	◕	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 4,300,000	100%	$ 4,300,000
229	New Road	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	◑	◑	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles; Substantial traffic demand in 2040 and interim scenario; Not on key walking and biking route	◕	N/A	●	●	◑	N/A	N/A	◕	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 2,500,000	100%	$ 2,500,000
248	Loco Road extension	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	◑	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles; Minimal traffic demand in 2040 and interim scenario; Not on key walking and biking route	◕	N/A	●	●	◑	N/A	N/A	◕	supports the Elbow expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 5,300,000	100%	$ 5,300,000
206a	New Road in Triangle UGB expansion area	Two lane collector roadway	Complete Street (All Modes)	N/A	◑	N/A	◑	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles. Not on key walking and biking network or LSN. Moderate traffic demand in 2040 and minimal demand in interim scenario.	◑	N/A	●	●	◑	○	N/A	◕	supports North Triangle expansion area, improves connectivity and access, reduces VMT	No	No	Expansion Area Driven	$ 2,500,000	100%	$ 2,500,000
207a	Yeoman Road extension from Deschutes Market Road to Hamehook Road	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	●	●	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles. On key walking and biking route. Substantial traffic demand in 2040 and interim scenario	●	N/A	●	●	◑	○	N/A	◕	supports NE expansion area, improves connectivity and access, reduces VMT	No	No	Expansion Area Driven	$ 10,900,000	100%	$ 10,900,000
214b	New Road in the southeast UGB	Two lane collector roadway	Complete Street (All Modes)	N/A	●	N/A	◑	◑	N/A	Near	Adds connectivity for pedestrians, bicyclists and vehicles; Substantial traffic demand in 2040 and interim scenario; Not on key walking and biking route	◕	N/A	●	●	◑	N/A	N/A	◕	supports the Elbow and the Thumb expansion areas, improves connectivity and access	No	No	Expansion Area Driven	$ 4,500,000	100%	$ 4,500,000
215a	New Road in DSL UGB expansion area	Two lane collector roadway	Complete Street (All Modes)	N/A	○	N/A	◑	◑	N/A	Long	Adds connectivity for pedestrians, bicyclists and vehicles; Minimal traffic demand in 2040 and interim scenario; Not on key walking and biking route	◔	N/A	●	●	◑	N/A	N/A	◕	supports DSL expansion area, improves connectivity and access	No	No	Expansion Area Driven	$ 3,900,000	100%	$ 3,900,000
N-18	Projects of Regional Significance from Subarea Planning Efforts	Subarea planning efforts will identify infrastructure needs to serve Opportunity and Expansion Areas, which are key development areas for the City. Projects that result should be added to the 2040 project list as necessary.	Roadway Safety/Capacity	N/A	N/A	N/A	N/A	N/A	N/A	Long	N/A	N/A	N/A	●	◑	N/A	N/A	○	◑	improves local and regional connectivity	No	No	Expansion Area Driven	TBD	100%	TBD
N-22	Cooley Road/Hunnell Road Intersection Improvement	Add intersection improvement at Cooley/Hunnell to Cooley Road rural Road upgrade project (R3) already in baseline.	Staff recomm.	◑	N/A	N/A	●	◑	N/A	Long	Under capacity in 2040; improves pedestrian/bike crossing conditions, on LSN, improvement over today's conditions for pedestrians but not on key walking or biking route	◕	◑	●	◑	○	○	N/A	◕	improves intersection safety, serves north triangle opportunity area, improves functionality of north end, reduces emission, provides alterate route	Yes	No	Expansion Area Driven	$ 3,700,000	100%	$ 3,700,000
N-23	Collector between Cooley Road & Robal Road	Construct new collector between US 20 and Hunnell Road. Road would be south of Cooley road and north of Robal Road.	Staff recomm.	●	●	N/A	◑	◑	◑	Long	Reduces congestion at Cooley/US 20 in 2040; increases connectivity for vehicles/bicyclists/pedestrians; not on LSN or key walking and biking routes; Cooley/US 20 under capacity in interim scenario	◕	N/A	●	◑	N/A	N/A	◑	◕	serves north triangle opportunity area, improves network connectivity, connects two regional facilities (US97 & OR20)	No	No	Expansion Area Driven	$ 4,000,000	100%	$ 4,000,000
R1	O.B. Riley Road rural Road upgrade	Includes curb and sidewalk on east side, bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network	●	●	●	◑	◑	N/A	●	●	improves pedestrian safety, supports OB Riley expansion area, improves functionality of OB Riley, regional connection to county	No	No	Expansion Area Driven	$ 2,400,000	100%	$ 2,400,000
R2	Cooley Road rural Road upgrade from O.B. Riley Road to US 20	From O.B. Riley Road to US 20. Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking routes; on LSN	◕	●	●	◑	◑	N/A	●	◕	improves pedestrian safety, supports NE expansion area and Juniper Ridge opportunity area, improves functionality, regional connection to ODOT	No	No	Expansion Area Driven	$ 1,300,000	100%	$ 1,300,000
R3	Cooley Road rural Road upgrade from US 20 to Hunnell Road	From US 20 to Hunnell Road. Includes curb and sidewalk on north side, bike lanes both directions, and an intersection improvement at Cooley Road/Hunnell Road	Pedestrian/ Bicyclist	◑	N/A	N/A	●	◑	N/A	Long	Under capacity in 2040. On LSN, not on key walking and biking routes.	◕	●	●	◑	◑	N/A	●	◕	improves pedestrian safety, supports NE expansion area and Juniper Ridge opportunity area, improves functionality, regional connection to ODOT	Yes	Yes, JR	Expansion Area Driven	$ 1,100,000	100%	$ 1,100,000
R4	Hunnell Road rural Road upgrade from Cooley Road to Loco Road	Includes sidewalk on west side	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking routes	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports North Triangle expansion area, improves functionality	Yes	Yes, JR	Expansion Area Driven	$ 200,000	100%	$ 200,000
R5	Yeoman Road rural Road upgrade from western terminus to Deschutes Market Road	Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network	●	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 2,500,000	100%	$ 2,500,000
R6	Deschutes Market Road rural Road upgrade from Yeoman Road to canal	Includes curb and sidewalk on east side, bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	◑	◑	N/A	Long	Not on key walking and biking routes or LSN	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 500,000	100%	$ 500,000
R7	Deschutes Market Road rural Road upgrade from canal to Butler Market Road		Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking routes or LSN	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 400,000	100%	$ 400,000
R8	Butler Market Road rural Road upgrade from Deschutes Market Road to Eagle Road	Includes curb and sidewalk on east side	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking routes; on LSN	◕	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 300,000	100%	$ 300,000
R9	Butler Market Road rural Road upgrade from Eagle Road to Clyde Lane	Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking routes; on LSN	◕	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 400,000	100%	$ 400,000
R10	Butler Market Road rural Road upgrade from Clyde Lane to Hamby Road	Includes curb and sidewalk on north side, bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking routes; on LSN	◕	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 1,100,000	100%	$ 1,100,000
R11	Butler Market Road rural Road upgrade from Hamby Road to Hanbrook Road	Includes curbs and sidewalks on both sides	Pedestrian/ Bicyclist	N/A	N/A	N/A	◑	◑	N/A	Long	Not on key walking and biking routes or LSN	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports NE expansion area, improves functionality	No	No	Expansion Area Driven	$ 1,100,000	100%	$ 1,100,000
R13	Stevens Road rural Road upgrade from Stevens realignment to Bend UGB boundary	From Stevens realignment to Bend UGB boundary. Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	◑	◑	N/A	Long	Not on key walking and biking routes or LSN	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports East Hwy 20 & DSL expansion areas, improves functionality	No	No	Expansion Area Driven	$ 1,900,000	100%	$ 1,900,000

		Description	Type	Reduces Congestion/ Bottlenecks	Street	Transit	Bicycle	Pedes-trian	Reliab-ility	Near/ Long Term Capacity Need	Capacity Notes	Sub Total	Ensure Safety for All Users	Facilitate Housing, Job Creation, Econ Dev	Livab-ility	Equity	Steward the Environ-ment	Regional Outlook	Ave	Notes	*TSDC List?*	Urban Renew Area?	Prioritization Recomm-endation	Cost Estimate	City Proportion	City Proportion Cost Estimate
R14	SE 27th Street rural Road upgrade from Stevens Road to Ferguson Road	From Stevens Road to Ferguson Road. Includes curb, sidewalk, and bike lane on east side	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network, on LSN	●	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow & DSL expansion areas, improves functionality	No	No	Expansion Area Driven	$ 1,300,000	100%	$ 1,300,000
R15	SE 27th Street rural Road upgrade from Ferguson Road to Diamondback Lane	From Ferguson Road to Diamondback Lane. Includes curb and sidewalk on east side, bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	●	N/A	Near	On key walking and biking network, on LSN	●	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow expansion area, improves functionality	No	No	Expansion Area Driven	$ 600,000	100%	$ 600,000
R16	SE 27th Street rural Road upgrade from Diamondback Lane to access road	From Diamondback Lane to access road. Includes curb and sidewalk on east side	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking routes	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow expansion area, improves functionality	No	No	Expansion Area Driven	$ 100,000	100%	$ 100,000
R17	SE 27th Street rural Road upgrade from access road to Knott Road	From access road to Knott Road. Includes curbs and sidewalks on both sides	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking routes	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow expansion area, improves functionality	No	No	Expansion Area Driven	$ 1,300,000	100%	$ 1,300,000
R18	Knott Road rural Road upgrade from 15th Street to Raintree Court	From Knott Road to 15th Street. Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking network, on LSN	◕	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow expansion area, improves functionality	No	No	Expansion Area Driven	$ 500,000	100%	$ 500,000
R19	Knott Road rural Road upgrade from Raintree Court to SE 27th Street	From 27th Street to 15th Street. Includes curbs, sidewalks and bike lanes both directions	Pedestrian/ Bicyclist	N/A	N/A	N/A	●	◑	N/A	Near	Not on key walking and biking network, on LSN	◕	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Elbow & Thumb expansion areas, improves functionality	No	No	Expansion Area Driven	$ 5,500,000	100%	$ 5,500,000
R21	Knott Road rural Road upgrade south of China Hat Road	South of China Hat Road. Includes curb and sidewalk on north side	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking network	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the Thumb expansion area, improves functionality	No	No	Expansion Area Driven	$ 300,000	100%	$ 300,000
R23	Clausen Drive rural Road upgrade from Loco Road to northern terminus	From Loco Road to northern terminus. Includes sidewalk on west side	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking network	◑	●	●	◑	○	N/A	N/A	◕	improves pedestrian safety, supports the North Triangle expansion area, improves functionality	Yes	No	Expansion Area Driven	$ 200,000	100%	$ 200,000
R24	China Hat Road rural Road upgrade north of Knott Road	North of Knott Road. Includes sidewalks on both sides	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking network	◑	●	●	◑	○	N/A	○	◑	improves pedestrian safety, supports the Thumb expansion area, improves functionality, improves access to US 97	No	No	Expansion Area Driven	$ 200,000	100%	$ 200,000
R25	China Hat Road canal bridge widening	North of Knott Road. Widen bridge to include sidewalk on both sides	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking network	◑	●	N/A	○	N/A	N/A	N/A	◑	improves multimodal safety	Yes	No	Expansion Area Driven	$ 400,000	100%	$ 400,000
R26	Deschutes Market Road canal bridge widening	North of Monticello Drive. Widen bridge to include sidewalk on west sides	Pedestrian/ Bicyclist	N/A	N/A	N/A	N/A	◑	N/A	Long	Not on key walking and biking network	◑	●	◑	○	○	N/A	N/A	◑	improves multimodal safety, supports NE expansion area	No	No	Expansion Area Driven	$ 400,000	100%	$ 400,000
																							Expansion Area Driven Total	**$ 104,600,000**		**$ 104,600,000**

Appendix C: Volume-to-Capacity Model Plots

Appendix C: Modeling Data Sources and Scenarios for Prioritization

The Bend-Redmond Regional Travel Demand Model (BRM) is a modeling tool that utilizes inputs of planned land use, demographics, transit service, regional travel growth, and the characteristics of the area transportation network to forecast travel and network performance such as roadway volume and congestion at a regional corridor scale. The model was developed (and is maintained by) ODOT and the Bend MPO and is a required analytical tool for evaluating compliance with Oregon's Transportation Planning Rule. The model is a helpful tool for quantifying differences between varying scenarios of projected land use or transportation system or service improvements.

The BRM was used to measure demand-to-capacity ratios for three scenarios for the Bend Transportation Plan:

1. The 2040 Baseline Scenario -- previously modeled for the Detailed Scenario Evaluation in Phase I of the work program. The full project list for the Baseline Scenario is included in the Phase I Scenario Evaluation memo[1].
2. Interim Land Use Scenario – This scenario represents the land use and growth consistent with the UGB expansion work, approximately 10 years in the future. The roadway network for this scenario included most of the Baseline Scenario Projects.[2]
3. 2040 TSP Project List Scenario – This scenario includes all projects and programs that have been identified for prioritization and approved by the Steering Committee.

The model demand-to-capacity ratio plots were used to help prioritize projects and programs. Demand-to-capacity ratio is predicted using a travel demand model. It is expressed as a decimal representation, with 1.0 representing a saturated, or "full" condition. The number describes the proportion of available capacity that is forecasted to be used along a roadway segment. A demand-to-capacity ratio is determined by dividing the forecasted traffic volume along a segment by the capacity of a given roadway segment. A lower ratio indicates smoother operations and minimal delays. As the ratio approaches 1.0, congestion increases, and performance is reduced. A ratio of greater than 1.0 means that the roadway is oversaturated and can result in increased queueing and delays.

The model demand-to-capacity plots for the Interim Land Use Scenario, the 2040 Baseline Scenario and the 2040 TSP Project List Scenario are included in Figures C-1 to C-3.

[1] *Scenario Evaluation Overview for CTAC, Attachment A: Baseline Project List and Map*, November 2019, https://www.bendoregon.gov/home/showdocument?id=39611

[2] Since the BRM was also used to model the Bend MPO transportation plan, which must be fiscally constrained, the following projects from the Baseline Scenario were not included in the Interim Year Scenario: South frontage road connecting to Murphy interchange area (Project 18) and Preliminary engineering and right of way acquisition for an overcrossing or interchange at US 97/Powers Road (Project 14).

The model plots were used to evaluate projects and programs in two ways during the prioritization process:

1. To help identify whether the project or programs addressed a projected area of congestion by comparing the proposed 2040 TSP Scenario with the 2040 Baseline Scenario. For example, a roadway extension project was evaluated by determining how much traffic it would attract, if that attracted traffic was diverted from a nearby congested link, and if that shift would result in a significant difference in that areas' volume-to-capacity ratio. Program improvements such as parking pricing in downtown Bend were evaluated in a similar way by evaluating the level of traffic differences on surrounding roadway links. This methodology, while quantitative with model information, requires judgement as the large number of projects and programs create overlapping benefits and impacts.
2. To help determine when a regional corridor capacity need would be triggered. In this application, existing conditions (from the 2010 base year model Scenario), interim year and future year 2040 plots were compared to assess which projects and programs address near-term, mid-term, or long-term needs. Projects or programs with benefits on corridors that were over capacity in the 2040 Baseline Scenario were given a higher rating for addressing congestion than projects or programs with benefits on corridors that were shown as under capacity in the model.

Figure C-1: Interim Land Use Scenario Demand-to-Capacity Ratios

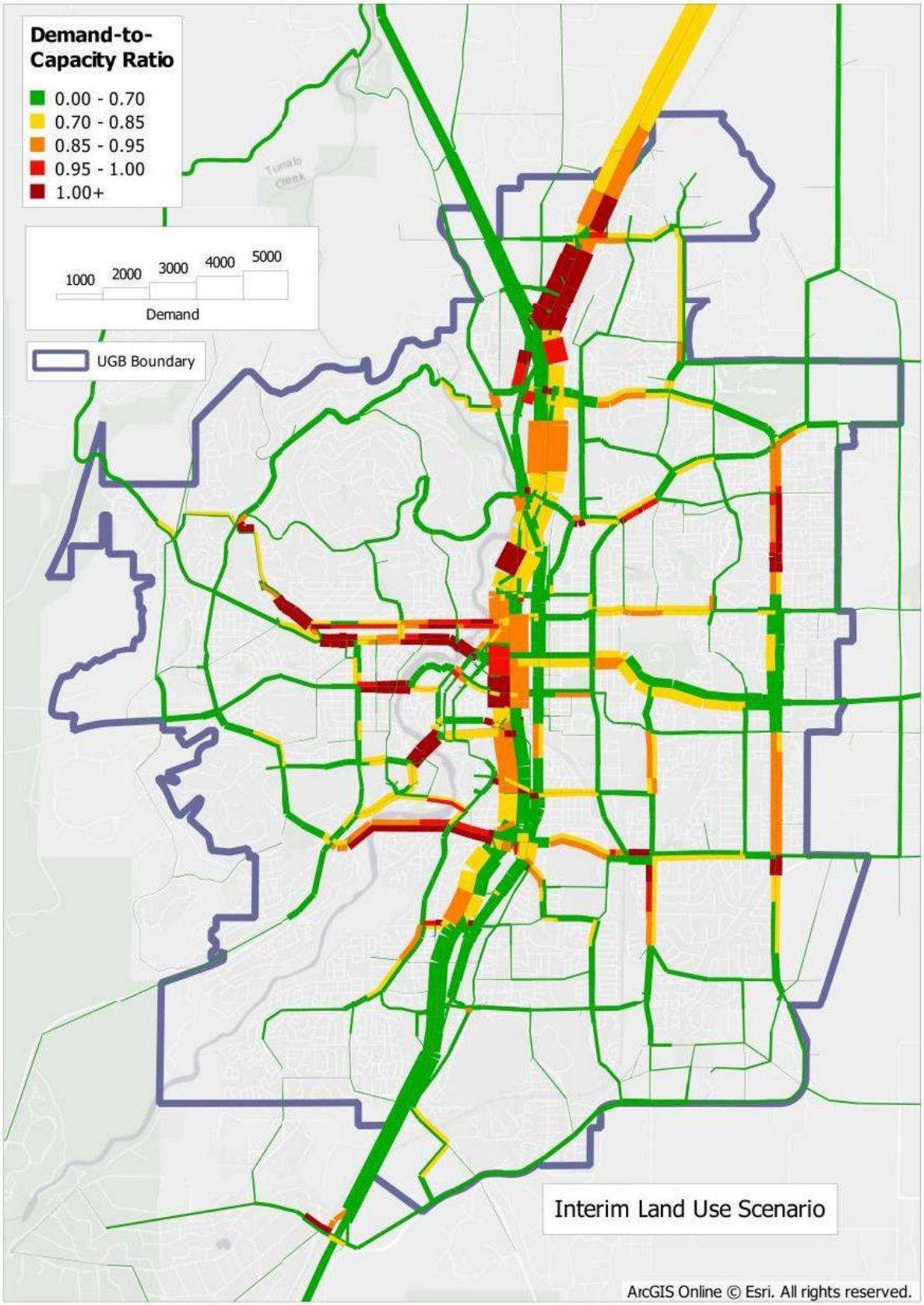


Figure C-2: 2040 Baseline Scenario Demand-to-Capacity Ratios

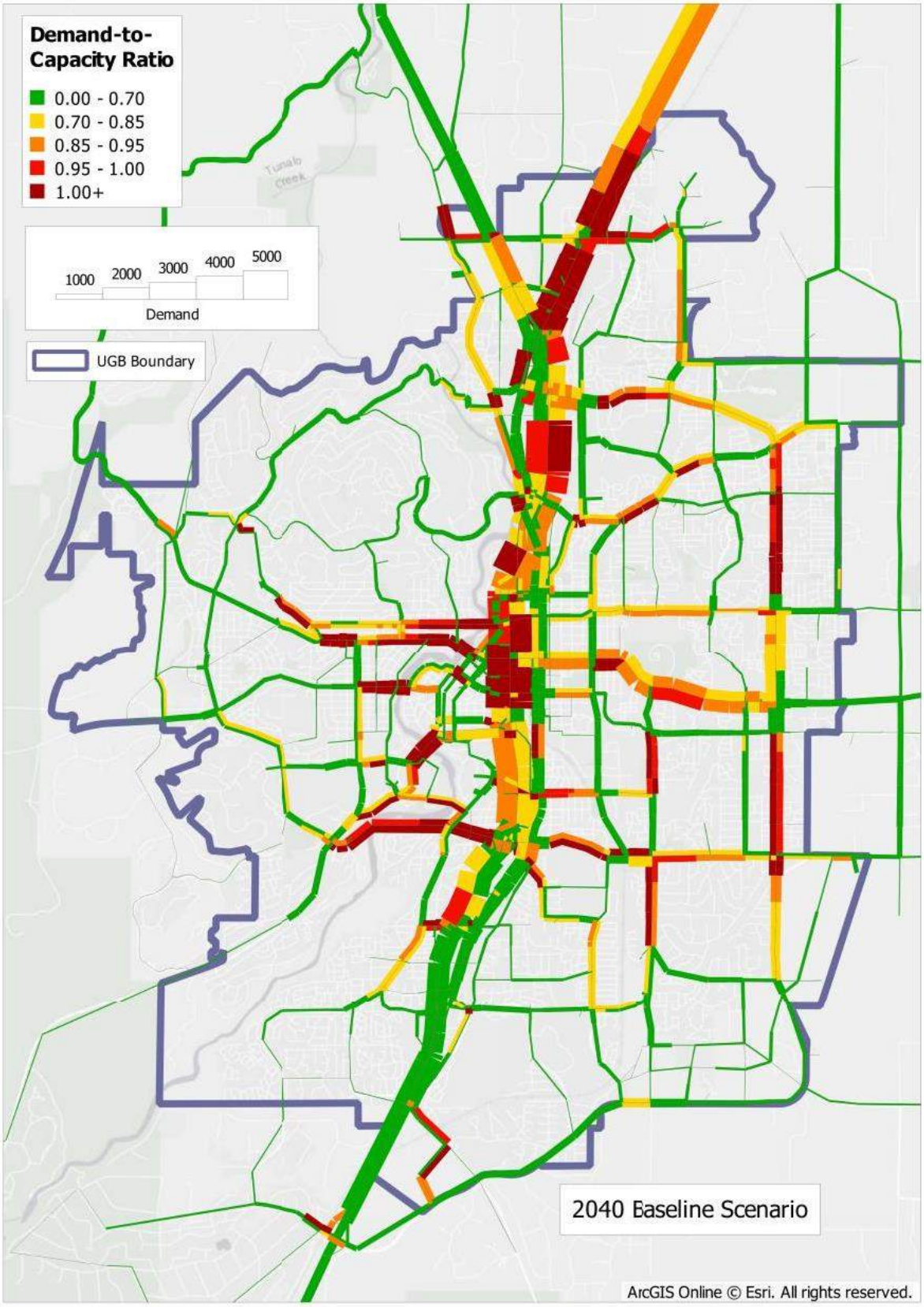
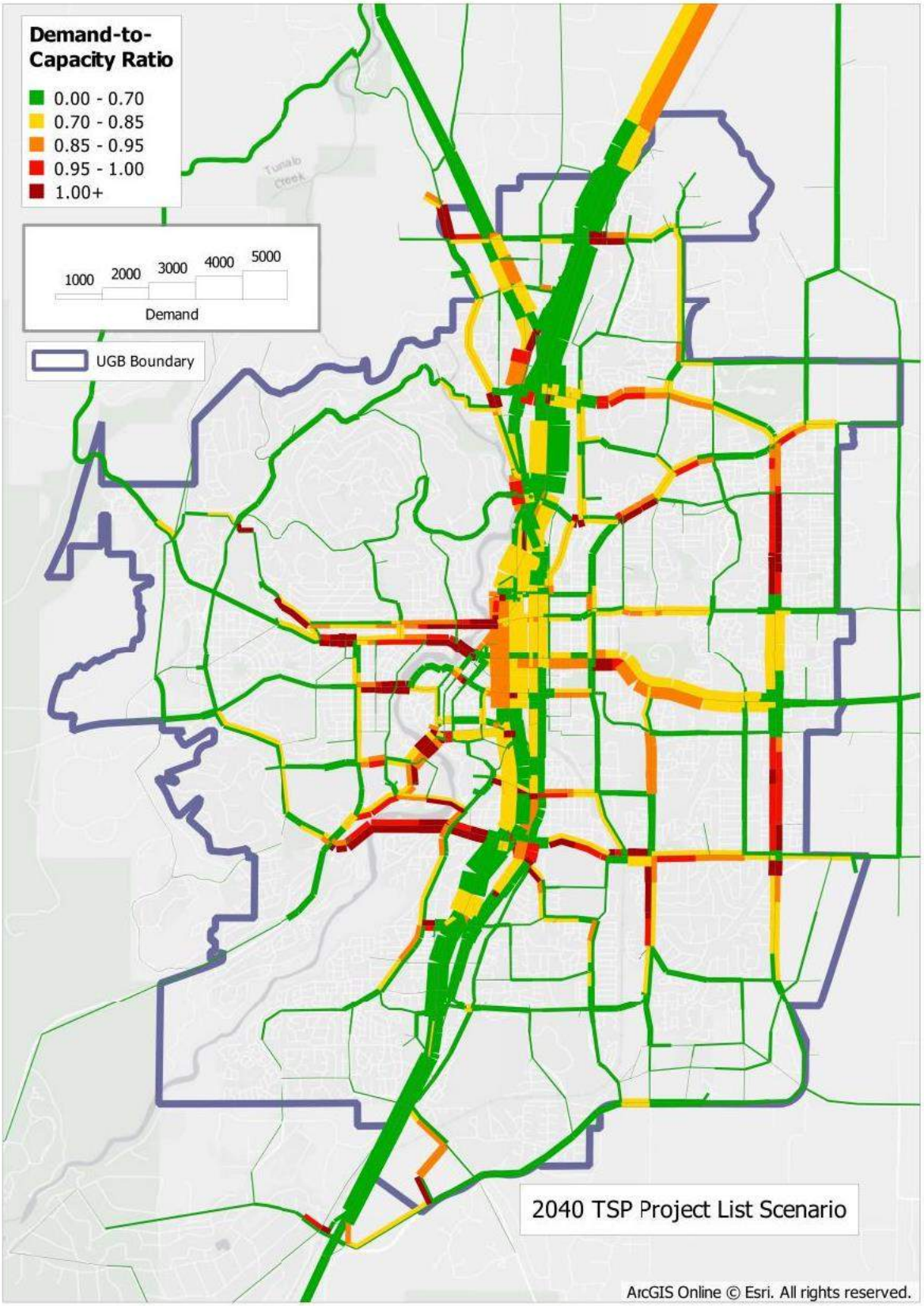
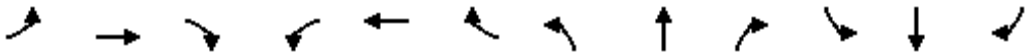


Figure C-3: 2040 TSP Project List Scenario Demand-to-Capacity Ratios





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	90	100	140	355	190	220	200	1950	455	105	1575	85
Future Volume (vph)	90	100	140	355	190	220	200	1950	455	105	1575	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Total Lost time (s)	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	1.00	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.99	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	0.91		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)	1710	1642		3285	1800	1359	1710	3320	1500	1693	3240	
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)	1710	1642		3285	1800	1359	1710	3320	1500	1693	3240	
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)	95	105	147	374	200	232	211	2053	479	111	1658	89
RTOR Reduction (vph)	0	36	0	0	0	195	0	0	105	0	2	0
Lane Group Flow (vph)	95	216	0	374	200	37	211	2053	374	111	1745	0
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	3%	2%	1%	5%	0%
Parking (#/hr)						0						
Turn Type	Split	NA		Split	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases						4			6			
Actuated Green, G (s)	20.3	20.3		19.1	19.1	19.1	10.6	56.6	56.6	6.6	52.6	
Effective Green, g (s)	20.8	20.8		19.6	19.6	19.6	11.1	58.6	58.6	7.1	54.6	
Actuated g/C Ratio	0.17	0.17		0.16	0.16	0.16	0.09	0.48	0.48	0.06	0.45	
Clearance Time (s)	4.5	4.5		4.5	4.5	4.5	4.5	6.0	6.0	4.5	6.0	
Vehicle Extension (s)	3.0	3.0		2.2	2.2	2.2	3.0	5.4	5.4	2.2	5.4	
Lane Grp Cap (vph)	291	279		527	288	218	155	1593	719	98	1448	
v/s Ratio Prot	0.06	c0.13		c0.11	0.11		0.12	c0.62		0.07	c0.54	
v/s Ratio Perm						0.03			0.25			
v/c Ratio	0.33	0.78		0.71	0.69	0.17	1.36	1.29	0.52	1.13	1.20	
Uniform Delay, d1	44.5	48.4		48.6	48.4	44.2	55.5	31.7	22.0	57.5	33.8	
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	0.7	12.6		3.8	6.1	0.2	198.4	134.8	1.5	131.1	99.0	
Delay (s)	45.2	61.0		52.3	54.5	44.4	253.9	166.6	23.5	188.6	132.8	
Level of Service	D	E		D	D	D	F	F	C	F	F	
Approach Delay (s)		56.7			50.6			148.3			136.1	
Approach LOS		E			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	125.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	122.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	46.8
Intersection LOS	E

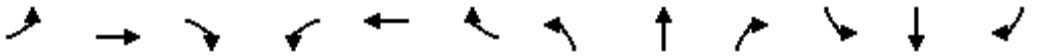
Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	2	1
Adj Approach Flow, veh/h	1006	942	390	738
Demand Flow Rate, veh/h	1009	948	390	740
Vehicles Circulating, veh/h	513	661	1167	795
Vehicles Exiting, veh/h	769	896	355	814
Ped Vol Crossing Leg, #/h	1	3	7	1
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	16.9	112.9	24.9	14.8
Approach LOS	C	F	C	B

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	L	TR	LTR	LTR	LT	R
Assumed Moves	L	TR	LTR	LTR	LT	R
RT Channelized						Yield
Lane Util	0.300	0.700	1.000	1.000	1.000	
Follow-Up Headway, s	2.700	2.700	2.700	2.700	2.700	
Critical Headway, s	4.100	4.100	4.100	4.100	4.100	253
Entry Flow, veh/h	303	706	948	390	487	741
Cap Entry Lane, veh/h	901	901	805	547	726	1.000
Entry HV Adj Factor	0.990	1.000	0.994	1.000	0.995	253
Flow Entry, veh/h	300	706	942	390	485	741
Cap Entry, veh/h	892	900	799	547	723	0.341
V/C Ratio	0.336	0.784	1.179	0.713	0.670	9.1
Control Delay, s/veh	7.8	20.7	112.9	24.9	17.9	A
LOS	A	C	F	C	C	2
95th %tile Queue, veh	1	8	30	6	5	

Intersection	
Intersection Delay, s/veh	31.2
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	2
Conflicting Circle Lanes	2	1	1	2
Adj Approach Flow, veh/h	691	847	853	772
Demand Flow Rate, veh/h	697	866	858	772
Vehicles Circulating, veh/h	1030	468	833	791
Vehicles Exiting, veh/h	533	811	894	543
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	64.6	36.2	15.6	13.1
Approach LOS	F	E	C	B

Lane	Left	Right	Left	Left	Bypass	Left	Right
Designated Moves	LT	R	LTR	LT	R	LT	TR
Assumed Moves	LT	R	LTR	LT	R	LT	TR
RT Channelized					Yield		
Lane Util	0.898	0.102	1.000	1.000		0.470	0.530
Follow-Up Headway, s	2.700	2.700	2.700	2.700		2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100	412	4.100	4.100
Entry Flow, veh/h	626	71	866	446	718	363	409
Cap Entry Lane, veh/h	607	607	933	706	0.990	729	729
Entry HV Adj Factor	0.990	1.000	0.978	0.998	408	1.000	1.000
Flow Entry, veh/h	620	71	847	445	711	363	409
Cap Entry, veh/h	601	607	912	704	0.574	728	729
V/C Ratio	1.031	0.117	0.929	0.632	14.5	0.498	0.561
Control Delay, s/veh	71.2	7.3	36.2	16.6	B	12.2	13.9
LOS	F	A	E	C	4	B	B
95th %tile Queue, veh	16	0	14	5		3	4



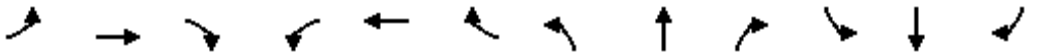
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	350	620	5	15	540	195	10	15	5	215	15	455
Future Volume (vph)	350	620	5	15	540	195	10	15	5	215	15	455
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (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	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		1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1630	1730		1662	1733	1430		1678			1626	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (perm)	1630	1730		1662	1733	1430		1678			1626	1458
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)	380	674	5	16	587	212	11	16	5	234	16	495
RTOR Reduction (vph)	0	0	0	0	0	99	0	5	0	0	0	384
Lane Group Flow (vph)	380	679	0	16	587	113	0	27	0	0	250	111
Confl. Peds. (#/hr)			8	8			1		1	1		1
Confl. Bikes (#/hr)			5									6
Heavy Vehicles (%)	2%	1%	0%	0%	1%	4%	0%	0%	0%	3%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Over
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6						
Actuated Green, G (s)	21.3	54.2		1.8	34.7	34.7		4.4			19.0	21.3
Effective Green, g (s)	22.3	55.2		2.8	35.7	35.7		5.4			20.0	22.3
Actuated g/C Ratio	0.22	0.56		0.03	0.36	0.36		0.05			0.20	0.22
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	2.5	3.5		2.5	3.5	3.5		2.8			2.8	2.5
Lane Grp Cap (vph)	365	960		46	622	513		91			327	327
v/s Ratio Prot	c0.23	0.39		0.01	c0.34			c0.02			c0.15	0.08
v/s Ratio Perm						0.08						
v/c Ratio	1.04	0.71		0.35	0.94	0.22		0.30			0.76	0.34
Uniform Delay, d1	38.6	16.2		47.4	30.9	22.2		45.2			37.5	32.4
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	58.2	2.5		3.3	23.2	0.3		1.7			10.0	0.5
Delay (s)	96.7	18.7		50.7	54.1	22.4		46.8			47.5	32.8
Level of Service	F	B		D	D	C		D			D	C
Approach Delay (s)		46.7			45.8			46.8			37.7	
Approach LOS		D			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	99.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	82.4%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	12.6
Intersection LOS	B

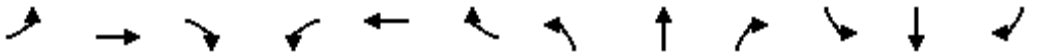
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	372	511	676	426
Demand Flow Rate, veh/h	384	528	706	434
Vehicles Circulating, veh/h	573	555	329	550
Vehicles Exiting, veh/h	411	480	628	533
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.0	13.6	14.4	10.7
Approach LOS	A	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	384	528	706	434
Cap Entry Lane, veh/h	861	873	1037	876
Entry HV Adj Factor	0.969	0.968	0.957	0.981
Flow Entry, veh/h	372	511	676	426
Cap Entry, veh/h	834	845	993	859
V/C Ratio	0.446	0.605	0.681	0.495
Control Delay, s/veh	10.0	13.6	14.4	10.7
LOS	A	B	B	B
95th %tile Queue, veh	2	4	6	3



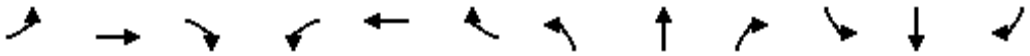
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	300	150	285	150	75	90	785	340	115	760	100
Future Volume (vph)	290	300	150	285	150	75	90	785	340	115	760	100
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		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	0.95		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)	1630	1615		1630	1648		1583	3088		1662	3194	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1615		1630	1648		1583	3088		1662	3194	
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)	319	330	165	313	165	82	99	863	374	126	835	110
RTOR Reduction (vph)	0	17	0	0	16	0	0	44	0	0	9	0
Lane Group Flow (vph)	319	478	0	313	231	0	99	1193	0	126	936	0
Confl. Peds. (#/hr)	2		8	8		2	2					2
Confl. Bikes (#/hr)			4			1			2			1
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	5%	3%	0%	0%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	20.9	29.6		17.5	26.2		7.5	36.5		7.5	36.5	
Effective Green, g (s)	21.4	31.0		18.0	27.6		8.0	37.0		8.0	37.0	
Actuated g/C Ratio	0.19	0.28		0.16	0.25		0.07	0.34		0.07	0.34	
Clearance Time (s)	4.5	5.4		4.5	5.4		4.5	4.5		4.5	4.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	317	455		266	413		115	1038		120	1074	
v/s Ratio Prot	0.20	c0.30		c0.19	0.14		0.06	c0.39		c0.08	0.29	
v/s Ratio Perm												
v/c Ratio	1.01	1.05		1.18	0.56		0.86	1.15		1.05	0.87	
Uniform Delay, d1	44.3	39.5		46.0	35.9		50.4	36.5		51.0	34.3	
Progression Factor	1.00	1.00		1.00	1.00		0.96	0.73		1.00	1.00	
Incremental Delay, d2	52.1	56.4		111.6	5.4		25.8	73.0		96.2	7.9	
Delay (s)	96.4	95.9		157.6	41.2		74.3	99.7		147.2	42.2	
Level of Service	F	F		F	D		E	F		F	D	
Approach Delay (s)		96.1			106.3			97.9			54.5	
Approach LOS		F			F			F			D	

Intersection Summary			
HCM 2000 Control Delay	86.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



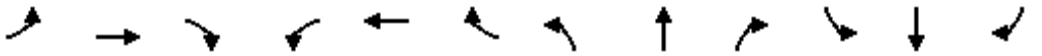
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	200	1160	80	225	1020	170	95	345	120	325	575	70
Future Volume (vph)	200	1160	80	225	1020	170	95	345	120	325	575	70
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
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	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	0.98		1.00	0.96		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)	1646	3374		1646	3273		1646	1663		1706	1672	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3374		1646	3273		1646	1663		1706	1672	
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)	213	1234	85	239	1085	181	101	367	128	346	612	74
RTOR Reduction (vph)	0	5	0	0	12	0	0	11	0	0	4	0
Lane Group Flow (vph)	213	1314	0	239	1254	0	101	484	0	346	682	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Confl. Bikes (#/hr)						1			1			3
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	11.0	38.0		13.0	40.0		6.0	27.0		17.0	38.0	
Effective Green, g (s)	12.0	39.0		14.0	41.0		7.0	28.0		18.0	39.0	
Actuated g/C Ratio	0.10	0.34		0.12	0.36		0.06	0.24		0.16	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	171	1144		200	1166		100	404		267	567	
v/s Ratio Prot	0.13	c0.39		c0.15	0.38		0.06	0.29		c0.20	c0.41	
v/s Ratio Perm												
v/c Ratio	1.25	1.15		1.20	1.08		1.01	1.20		1.30	1.20	
Uniform Delay, d1	51.5	38.0		50.5	37.0		54.0	43.5		48.5	38.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	149.9	77.5		126.1	49.3		92.7	111.2		158.0	107.3	
Delay (s)	201.4	115.5		176.6	86.3		146.7	154.7		206.5	145.3	
Level of Service	F	F		F	F		F	F		F	F	
Approach Delay (s)		127.5			100.6			153.3			165.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	130.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.22		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
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												
Traffic Volume (vph)	265	830	220	325	655	275	225	895	255	375	940	125
Future Volume (vph)	265	830	220	325	655	275	225	895	255	375	940	125
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.97		1.00	0.96		1.00	0.97		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)	1599	3178		1646	3103		1646	3162		1583	3224	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3178		1646	3103		1646	3162		1583	3224	
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)	276	865	229	339	682	286	234	932	266	391	979	130
RTOR Reduction (vph)	0	15	0	0	29	0	0	16	0	0	7	0
Lane Group Flow (vph)	276	1079	0	339	939	0	234	1182	0	391	1103	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	21.0	41.0		23.0	43.0		21.0	47.0		29.0	55.0	
Effective Green, g (s)	22.0	42.0		24.0	44.0		22.0	48.0		30.0	56.0	
Actuated g/C Ratio	0.14	0.26		0.15	0.28		0.14	0.30		0.19	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	219	834		246	853		226	948		296	1128	
v/s Ratio Prot	0.17	c0.34		c0.21	0.30		0.14	c0.37		c0.25	0.34	
v/s Ratio Perm												
v/c Ratio	1.26	1.29		1.38	1.10		1.04	1.25		1.32	0.98	
Uniform Delay, d1	69.0	59.0		68.0	58.0		69.0	56.0		65.0	51.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	148.5	141.2		193.6	62.2		69.4	119.9		166.2	21.4	
Delay (s)	217.5	200.2		261.6	120.2		138.4	175.9		231.2	72.8	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		203.7			156.9			169.8			114.1	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	160.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.29		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	123.9%	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												
Traffic Volume (vph)	355	735	240	240	450	60	375	625	305	185	1045	365
Future Volume (vph)	355	735	240	240	450	60	375	625	305	185	1045	365
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		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	0.96		1.00	0.98		1.00	0.95		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)	1630	3110		1646	3166		1646	3111		1662	3292	1467
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3110		1646	3166		1646	3111		1662	3292	1467
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)	370	766	250	250	469	62	391	651	318	193	1089	380
RTOR Reduction (vph)	0	29	0	0	9	0	0	54	0	0	0	0
Lane Group Flow (vph)	370	987	0	250	523	0	391	915	0	193	1089	380
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												Free
Actuated Green, G (s)	16.0	28.0		13.0	25.0		17.0	37.0		12.0	32.0	110.0
Effective Green, g (s)	17.0	29.0		14.0	26.0		18.0	38.0		13.0	33.0	110.0
Actuated g/C Ratio	0.15	0.26		0.13	0.24		0.16	0.35		0.12	0.30	1.00
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	251	819		209	748		269	1074		196	987	1467
v/s Ratio Prot	c0.23	c0.32		0.15	0.17		c0.24	0.29		0.12	c0.33	
v/s Ratio Perm												c0.26
v/c Ratio	1.47	1.21		1.20	0.70		1.45	0.85		0.98	1.10	0.26
Uniform Delay, d1	46.5	40.5		48.0	38.4		46.0	33.4		48.4	38.5	0.0
Progression Factor	1.14	1.31		1.00	1.00		1.00	1.00		1.37	0.88	1.00
Incremental Delay, d2	215.3	93.6		125.3	2.6		223.7	8.5		46.3	56.5	0.3
Delay (s)	268.5	146.7		173.3	41.1		269.7	41.9		112.7	90.2	0.3
Level of Service	F	F		F	D		F	D		F	F	A
Approach Delay (s)		179.2			83.3			107.4			72.3	
Approach LOS		F			F			F			E	

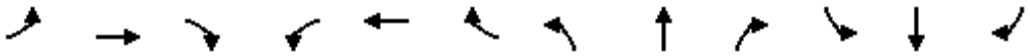
Intersection Summary			
HCM 2000 Control Delay	111.7	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.28		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	112.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	105.3
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	574	883	1069	628
Demand Flow Rate, veh/h	579	892	1083	634
Vehicles Circulating, veh/h	898	819	569	933
Vehicles Exiting, veh/h	669	833	908	778
Ped Vol Crossing Leg, #/h	8	0	0	5
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	34.1	144.3	141.7	53.3
Approach LOS	D	F	F	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	579	892	1083	634
Cap Entry Lane, veh/h	671	713	863	654
Entry HV Adj Factor	0.991	0.990	0.987	0.990
Flow Entry, veh/h	574	883	1069	628
Cap Entry, veh/h	665	706	852	647
V/C Ratio	0.862	1.251	1.254	0.970
Control Delay, s/veh	34.1	144.3	141.7	53.3
LOS	D	F	F	F
95th %tile Queue, veh	10	32	38	14



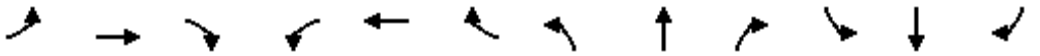
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	335	1265	0	0	0	0	0	470	235	0	0	0
Future Volume (vph)	335	1265	0	0	0	0	0	470	235	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0						4.0				
Lane Util. Factor		0.95						0.95				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.95				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		3229						3110				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		3229						3110				
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)	381	1438	0	0	0	0	0	534	267	0	0	0
RTOR Reduction (vph)	0	40	0	0	0	0	0	17	0	0	0	0
Lane Group Flow (vph)	0	1779	0	0	0	0	0	785	0	0	0	0
Confl. Peds. (#/hr)	5		7	7		5	10		4	4		10
Confl. Bikes (#/hr)			3						1			
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Actuated Green, G (s)		30.0						17.0				
Effective Green, g (s)		30.5						17.5				
Actuated g/C Ratio		0.54						0.31				
Clearance Time (s)		4.5						4.5				
Vehicle Extension (s)		2.6						2.0				
Lane Grp Cap (vph)		1758						971				
v/s Ratio Prot								c0.25				
v/s Ratio Perm		0.55										
v/c Ratio		1.01						0.81				
Uniform Delay, d1		12.8						17.7				
Progression Factor		1.00						1.00				
Incremental Delay, d2		24.4						4.7				
Delay (s)		37.2						22.4				
Level of Service		D						C				
Approach Delay (s)		37.2			0.0			22.4			0.0	
Approach LOS		D			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	32.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	80.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	65.6
Intersection LOS	F

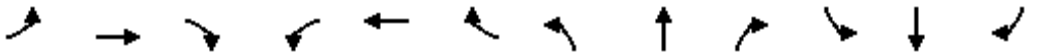
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	744	195	889	1150
Demand Flow Rate, veh/h	750	206	901	1159
Vehicles Circulating, veh/h	676	1435	787	110
Vehicles Exiting, veh/h	593	253	639	1531
Ped Vol Crossing Leg, #/h	13	2	11	5
Ped Cap Adj	0.998	1.000	0.998	0.999
Approach Delay, s/veh	42.6	18.0	137.4	33.1
Approach LOS	E	C	F	D

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	750	206	901	1159
Cap Entry Lane, veh/h	796	446	731	1226
Entry HV Adj Factor	0.992	0.947	0.986	0.992
Flow Entry, veh/h	744	195	889	1150
Cap Entry, veh/h	788	422	720	1216
V/C Ratio	0.944	0.462	1.235	0.946
Control Delay, s/veh	42.6	18.0	137.4	33.1
LOS	E	C	F	D
95th %tile Queue, veh	14	2	32	17



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	265	340	85	135	330	55	185	740	65	155	1015	160
Future Volume (vph)	265	340	85	135	330	55	185	740	65	155	1015	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	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	0.97		1.00	0.98		1.00	0.99		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)	1646	1646		1614	1680		1646	3238		1630	3203	
Flt Permitted	0.13	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	224	1646		344	1680		1646	3238		1630	3203	
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)	288	370	92	147	359	60	201	804	71	168	1103	174
RTOR Reduction (vph)	0	8	0	0	5	0	0	6	0	0	10	0
Lane Group Flow (vph)	288	454	0	147	414	0	201	869	0	168	1267	0
Confl. Peds. (#/hr)	3		1	1		3	10		1	1		10
Confl. Bikes (#/hr)			3									1
Heavy Vehicles (%)	1%	3%	2%	3%	2%	0%	1%	1%	4%	2%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	46.0	35.0		32.0	26.0		14.6	44.5		15.0	44.9	
Effective Green, g (s)	47.0	36.0		34.0	27.0		15.1	45.5		15.5	45.9	
Actuated g/C Ratio	0.39	0.30		0.28	0.22		0.13	0.38		0.13	0.38	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	277	493		171	378		207	1227		210	1225	
v/s Ratio Prot	c0.14	0.28		0.05	0.25		c0.12	0.27		0.10	c0.40	
v/s Ratio Perm	c0.27			0.19								
v/c Ratio	1.04	0.92		0.86	1.10		0.97	0.71		0.80	1.03	
Uniform Delay, d1	34.7	40.6		37.9	46.5		52.2	31.6		50.7	37.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	64.8	22.7		32.1	74.7		54.0	1.8		18.7	34.9	
Delay (s)	99.5	63.4		70.0	121.2		106.2	33.4		69.5	71.9	
Level of Service	F	E		E	F		F	C		E	E	
Approach Delay (s)		77.2			107.9			47.0			71.6	
Approach LOS		E			F			D			E	

Intersection Summary			
HCM 2000 Control Delay	71.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.05		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	99.1%	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												
Traffic Volume (vph)	225	300	305	85	210	80	205	560	185	80	860	285
Future Volume (vph)	225	300	305	85	210	80	205	560	185	80	860	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	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	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	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	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)	1630	1750	1473	1662	1678		1646	1716	1488	1662	1733	1439
Flt Permitted	0.22	1.00	1.00	0.56	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	385	1750	1473	986	1678		1646	1716	1488	1662	1733	1439
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)	245	326	332	92	228	87	223	609	201	87	935	310
RTOR Reduction (vph)	0	0	132	0	12	0	0	0	84	0	0	87
Lane Group Flow (vph)	245	326	200	92	303	0	223	609	117	87	935	223
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)	46.1	36.9	36.9	28.2	23.5		7.6	39.4	39.4	5.0	36.8	36.8
Effective Green, g (s)	46.6	37.4	37.4	29.2	24.0		8.1	39.9	39.9	5.5	37.3	37.3
Actuated g/C Ratio	0.45	0.36	0.36	0.28	0.23		0.08	0.38	0.38	0.05	0.36	0.36
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		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		3.8	3.8	3.8	3.0	3.8	3.8
Lane Grp Cap (vph)	395	629	529	310	387		128	658	570	87	621	516
v/s Ratio Prot	c0.11	0.19		0.01	c0.18		c0.14	c0.35		0.05	c0.54	
v/s Ratio Perm	0.17		0.14	0.07					0.08			0.15
v/c Ratio	0.62	0.52	0.38	0.30	0.78		1.74	0.93	0.21	1.00	1.51	0.43
Uniform Delay, d1	20.5	26.2	24.7	28.5	37.6		48.0	30.6	21.4	49.2	33.4	25.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	3.0	0.7	0.5	0.5	10.0		364.3	19.2	0.2	96.5	235.9	0.8
Delay (s)	23.5	26.9	25.1	29.0	47.6		412.2	49.8	21.7	145.7	269.2	26.1
Level of Service	C	C	C	C	D		F	D	C	F	F	C
Approach Delay (s)		25.3			43.4			122.6			204.6	
Approach LOS		C			D			F			F	

Intersection Summary			
HCM 2000 Control Delay	119.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	104.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	147.1
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	1560	1066	815	848
Demand Flow Rate, veh/h	1562	1082	836	858
Vehicles Circulating, veh/h	978	939	1100	1318
Vehicles Exiting, veh/h	997	997	799	618
Ped Vol Crossing Leg, #/h	0	2	8	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	144.5	245.2	20.3	150.7
Approach LOS	F	F	C	F

Lane	Left	Bypass	Left	Bypass	Left	Right	Left	Bypass
Designated Moves	LT	R	LT	R	L	TR	LT	R
Assumed Moves	LT	R	LT	R	L	TR	LT	R
RT Channelized		Yield		Yield				Yield
Lane Util	1.000		1.000		0.384	0.616	1.000	
Follow-Up Headway, s	2.700		2.700		2.700	2.000	2.700	
Critical Headway, s	4.100	641	4.100	85	4.100	4.100	4.100	201
Entry Flow, veh/h	921	905	997	832	321	515	657	623
Cap Entry Lane, veh/h	632	1.000	651	0.962	575	698	487	1.000
Entry HV Adj Factor	0.998	641	0.987	82	0.981	0.972	0.985	201
Flow Entry, veh/h	919	905	984	800	315	500	647	623
Cap Entry, veh/h	630	0.709	642	0.103	565	678	480	0.323
V/C Ratio	1.458	16.6	1.532	5.5	0.558	0.738	1.349	10.1
Control Delay, s/veh	233.6	C	265.2	A	16.9	22.4	194.4	B
LOS	F	6	F	0	C	C	F	1
95th %tile Queue, veh	44		50		3	7	29	

Intersection	
Int Delay, s/veh	50.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	210	510	15	5	785	20	10	5	10	20	15	215
Future Vol, veh/h	210	510	15	5	785	20	10	5	10	20	15	215
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	130	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	4	11	0	0	6	0	0	0	50	0	27	2
Mvmt Flow	223	543	16	5	835	21	11	5	11	21	16	229

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	856	0	0	559	0	0	1975	1863	551	1861	1861	846
Stage 1	-	-	-	-	-	-	997	997	-	856	856	-
Stage 2	-	-	-	-	-	-	978	866	-	1005	1005	-
Critical Hdwy	4.14	-	-	4.1	-	-	7.1	6.5	6.7	7.1	6.77	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.77	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.77	-
Follow-up Hdwy	2.236	-	-	2.2	-	-	3.5	4	3.75	3.5	4.243	3.318
Pot Cap-1 Maneuver	776	-	-	1022	-	-	47	74	452	57	63	362
Stage 1	-	-	-	-	-	-	297	325	-	355	342	-
Stage 2	-	-	-	-	-	-	304	373	-	294	289	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	776	-	-	1022	-	-	~ 10	52	452	40	45	362
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 10	52	-	40	45	-
Stage 1	-	-	-	-	-	-	212	232	-	253	340	-
Stage 2	-	-	-	-	-	-	106	371	-	200	206	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	3.3	0.1	$ 517.7	$ 309.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	22	776	-	-	1022	-	-	175
HCM Lane V/C Ratio	1.209	0.288	-	-	0.005	-	-	1.52
HCM Control Delay (s)	$ 517.7	11.5	-	-	8.5	-	-	$ 309.1
HCM Lane LOS	F	B	-	-	A	-	-	F
HCM 95th %tile Q(veh)	3.5	1.2	-	-	0	-	-	17.2

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	34.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	15	620	40	20	695	90	20	30	20	65	20	15
Future Vol, veh/h	15	620	40	20	695	90	20	30	20	65	20	15
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	0	1	1	0	0	0	0	12	0
Mvmt Flow	17	689	44	22	772	100	22	33	22	72	22	17

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	872	0	0	733	0	0	1631	1661	711	1639	1633	822
Stage 1	-	-	-	-	-	-	745	745	-	866	866	-
Stage 2	-	-	-	-	-	-	886	916	-	773	767	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.62	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.108	3.3
Pot Cap-1 Maneuver	782	-	-	881	-	-	82	98	436	81	96	377
Stage 1	-	-	-	-	-	-	409	424	-	351	357	-
Stage 2	-	-	-	-	-	-	342	354	-	395	397	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	782	-	-	881	-	-	59	90	436	~ 51	88	377
Mov Cap-2 Maneuver	-	-	-	-	-	-	59	90	-	~ 51	88	-
Stage 1	-	-	-	-	-	-	394	408	-	338	339	-
Stage 2	-	-	-	-	-	-	290	336	-	332	382	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.2	0.2	121.5	$ 480.9
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	97	782	-	-	881	-	-	65
HCM Lane V/C Ratio	0.802	0.021	-	-	0.025	-	-	1.709
HCM Control Delay (s)	121.5	9.7	0	-	9.2	0	-	$ 480.9
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	4.3	0.1	-	-	0.1	-	-	10

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	92.4

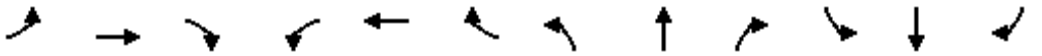
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇃	↱		⇕			⇕	
Traffic Vol, veh/h	20	40	10	120	115	190	0	340	140	110	405	15
Future Vol, veh/h	20	40	10	120	115	190	0	340	140	110	405	15
Conflicting Peds, #/hr	0	0	1	1	0	0	2	0	0	0	0	2
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	100	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	0	0	0	6	1	2	0	1	4	2	3	0
Mvmt Flow	22	44	11	132	126	209	0	374	154	121	445	16

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1316	1225	456	1175	1156	451	463	0	0	528	0	0
Stage 1	697	697	-	451	451	-	-	-	-	-	-	-
Stage 2	619	528	-	724	705	-	-	-	-	-	-	-
Critical Hdwy	7.1	6.5	6.2	7.16	6.51	6.22	4.1	-	-	4.12	-	-
Critical Hdwy Stg 1	6.1	5.5	-	6.16	5.51	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.1	5.5	-	6.16	5.51	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.554	4.009	3.318	2.2	-	-	2.218	-	-
Pot Cap-1 Maneuver	136	180	609	165	197	608	1109	-	-	1039	-	-
Stage 1	435	446	-	580	573	-	-	-	-	-	-	-
Stage 2	480	531	-	411	441	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	30	151	607	~ 111	166	608	1107	-	-	1039	-	-
Mov Cap-2 Maneuver	30	151	-	~ 111	166	-	-	-	-	-	-	-
Stage 1	434	375	-	580	573	-	-	-	-	-	-	-
Stage 2	246	531	-	300	371	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	213.7	289.7	0	1.9
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	WBLn2	SBL	SBT	SBR
Capacity (veh/h)	1107	-	-	74	132	608	1039	-	-
HCM Lane V/C Ratio	-	-	-	1.04	1.956	0.343	0.116	-	-
HCM Control Delay (s)	0	-	-	213.7$	512.6	14	8.9	0	-
HCM Lane LOS	A	-	-	F	F	B	A	A	-
HCM 95th %tile Q(veh)	0	-	-	5.6	20.5	1.5	0.4	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



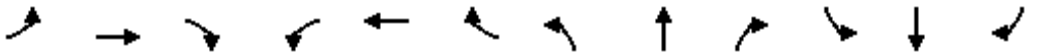
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	215	95	75	255	150	70	740	75	40	500	475
Future Volume (vph)	370	215	95	75	255	150	70	740	75	40	500	475
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	5.0	5.0		5.0	5.0	4.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor	1.00	1.00		1.00	0.95	0.95	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	0.99		1.00	1.00	0.98	1.00	1.00		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	0.95		1.00	0.99	0.85	1.00	0.99		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)	1646	1652		1662	1645	1377	1662	1701		1599	1733	1420
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.20	1.00		0.09	1.00	1.00
Satd. Flow (perm)	1646	1652		1662	1645	1377	351	1701		159	1733	1420
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)	402	234	103	82	277	163	76	804	82	43	543	516
RTOR Reduction (vph)	0	14	0	0	2	0	0	3	0	0	0	314
Lane Group Flow (vph)	402	323	0	82	291	147	76	883	0	43	543	202
Confl. Peds. (#/hr)			3	3			4		5	5		4
Confl. Bikes (#/hr)			7			16			7			6
Heavy Vehicles (%)	1%	0%	0%	0%	0%	1%	0%	1%	2%	4%	1%	1%
Turn Type	Prot	NA		Prot	NA	Free	pm+pt	NA		pm+pt	NA	Perm
Protected Phases	1	6		5	2		3	8		7	4	
Permitted Phases						Free	8			4		4
Actuated Green, G (s)	20.1	35.9		6.3	22.1	108.5	47.3	43.4		45.3	42.4	42.4
Effective Green, g (s)	20.1	35.9		6.3	22.1	108.5	47.3	43.4		45.3	42.4	42.4
Actuated g/C Ratio	0.19	0.33		0.06	0.20	1.00	0.44	0.40		0.42	0.39	0.39
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
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)	304	546		96	335	1377	200	680		104	677	554
v/s Ratio Prot	c0.24	0.20		0.05	c0.18		c0.01	c0.52		0.01	0.31	
v/s Ratio Perm						c0.11	0.15			0.16		0.14
v/c Ratio	1.32	0.59		0.85	0.87	0.11	0.38	1.30		0.41	0.80	0.36
Uniform Delay, d1	44.2	30.2		50.6	41.8	0.0	21.2	32.5		25.9	29.3	23.5
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	166.3	1.7		48.1	20.6	0.2	1.2	145.0		2.7	6.8	0.4
Delay (s)	210.5	31.9		98.8	62.4	0.2	22.4	177.6		28.5	36.1	23.9
Level of Service	F	C		F	E	A	C	F		C	D	C
Approach Delay (s)		129.0			50.6			165.3			30.1	
Approach LOS		F			D			F			C	

Intersection Summary			
HCM 2000 Control Delay	94.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.17		
Actuated Cycle Length (s)	108.5	Sum of lost time (s)	20.0
Intersection Capacity Utilization	108.2%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	23.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	129	612	650	802
Demand Flow Rate, veh/h	129	622	658	809
Vehicles Circulating, veh/h	1100	454	325	452
Vehicles Exiting, veh/h	161	529	904	624
Ped Vol Crossing Leg, #/h	1	1	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	12.6	17.7	14.0	37.7
Approach LOS	B	C	B	E

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
Entry Flow, veh/h	129	622	658	809
Cap Entry Lane, veh/h	449	868	991	870
Entry HV Adj Factor	1.000	0.984	0.988	0.991
Flow Entry, veh/h	129	612	650	802
Cap Entry, veh/h	449	854	979	862
V/C Ratio	0.287	0.716	0.664	0.930
Control Delay, s/veh	12.6	17.7	14.0	37.7
LOS	B	C	B	E
95th %tile Queue, veh	1	6	5	14



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	95	95	130	245	220	210	215	1915	400	110	1610	125
Future Volume (vph)	95	95	130	245	220	210	215	1915	400	110	1610	125
Ideal Flow (vphpl)	1750	1750	1750	1800	1750	1800	1750	1800	1800	1800	1800	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	2.0	4.0	4.0	4.0
Lane Util. Factor	1.00	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	1.00	1.00	1.00	0.99	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)	1662	1750	1488	1693	1750	1359	1662	3320	1500	1693	3257	1488
Flt Permitted	0.37	1.00	1.00	0.65	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	642	1750	1488	1155	1750	1359	1662	3320	1500	1693	3257	1488
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)	100	100	137	258	232	221	226	2016	421	116	1695	132
RTOR Reduction (vph)	0	0	108	0	0	97	0	0	0	0	0	49
Lane Group Flow (vph)	100	100	29	258	232	124	226	2016	421	116	1695	83
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	0%	0%	1%	0%	0%	0%	3%	2%	1%	5%	0%
Parking (#/hr)						0						
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Free	Prot	NA	Perm
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4		4			Free			2
Actuated Green, G (s)	24.5	24.5	24.5	24.5	24.5	24.5	16.5	72.0	120.0	8.5	64.0	64.0
Effective Green, g (s)	25.0	25.0	25.0	25.0	25.0	25.0	17.0	74.0	120.0	9.0	66.0	66.0
Actuated g/C Ratio	0.21	0.21	0.21	0.21	0.21	0.21	0.14	0.62	1.00	0.08	0.55	0.55
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	6.0		4.5	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	2.2	2.2	2.2	3.0	5.4		2.2	5.4	5.4
Lane Grp Cap (vph)	133	364	310	240	364	283	235	2047	1500	126	1791	818
v/s Ratio Prot		0.06			0.13		0.14	c0.61		0.07	c0.52	
v/s Ratio Perm	0.16		0.02	c0.22		0.09			0.28			0.06
v/c Ratio	0.75	0.27	0.09	1.07	0.64	0.44	0.96	0.98	0.28	0.92	0.95	0.10
Uniform Delay, d1	44.6	39.9	38.3	47.5	43.4	41.4	51.2	22.5	0.0	55.1	25.3	12.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	21.0	0.4	0.1	79.4	2.9	0.6	47.7	16.5	0.5	55.8	11.4	0.1
Delay (s)	65.6	40.3	38.5	126.9	46.2	41.9	98.9	38.9	0.5	110.9	36.8	13.0
Level of Service	E	D	D	F	D	D	F	D	A	F	D	B
Approach Delay (s)		47.1			74.2			37.9			39.6	
Approach LOS		D			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	43.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	95.4%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	40.1
Intersection LOS	E

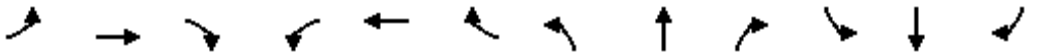
Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	1
Conflicting Circle Lanes	1	1	2	1
Adj Approach Flow, veh/h	958	953	364	690
Demand Flow Rate, veh/h	960	959	364	692
Vehicles Circulating, veh/h	508	576	1102	822
Vehicles Exiting, veh/h	790	890	366	713
Ped Vol Crossing Leg, #/h	1	3	7	1
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	17.6	88.7	19.6	15.1
Approach LOS	C	F	C	C

Lane	Left	Right	Left	Left	Left	Bypass
Designated Moves	L	TR	LTR	LTR	LT	R
Assumed Moves	L	TR	LTR	LTR	LT	R
RT Channelized						Yield
Lane Util	0.254	0.746	1.000	1.000	1.000	
Follow-Up Headway, s	2.700	2.700	2.700	2.700	2.700	
Critical Headway, s	4.100	4.100	4.100	4.100	4.100	216
Entry Flow, veh/h	244	716	959	364	476	729
Cap Entry Lane, veh/h	904	904	859	575	712	1.000
Entry HV Adj Factor	0.992	1.000	0.993	1.000	0.995	216
Flow Entry, veh/h	242	716	953	364	474	729
Cap Entry, veh/h	897	904	853	575	708	0.296
V/C Ratio	0.270	0.792	1.117	0.634	0.669	8.5
Control Delay, s/veh	6.8	21.2	88.7	19.6	18.1	A
LOS	A	C	F	C	C	1
95th %tile Queue, veh	1	8	26	4	5	

Intersection	
Intersection Delay, s/veh	25.8
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	1	1	2
Conflicting Circle Lanes	2	1	1	2
Adj Approach Flow, veh/h	653	804	847	772
Demand Flow Rate, veh/h	659	823	852	772
Vehicles Circulating, veh/h	1025	441	811	775
Vehicles Exiting, veh/h	522	789	873	489
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	53.8	27.0	14.9	12.8
Approach LOS	F	D	B	B

Lane	Left	Right	Left	Left	Bypass	Left	Right
Designated Moves	LTR	R	LTR	LT	R	LT	TR
Assumed Moves	LT	R	LTR	LT	R	LT	TR
RT Channelized					Yield		
Lane Util	0.909	0.091	1.000	1.000		0.470	0.530
Follow-Up Headway, s	2.700	2.700	2.700	2.700		2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100	433	4.100	4.100
Entry Flow, veh/h	599	60	823	419	730	363	409
Cap Entry Lane, veh/h	609	609	952	718	0.990	738	738
Entry HV Adj Factor	0.990	1.000	0.977	0.998	429	1.000	1.000
Flow Entry, veh/h	593	60	804	418	723	363	409
Cap Entry, veh/h	604	609	930	716	0.594	737	738
V/C Ratio	0.983	0.098	0.864	0.584	15.0	0.492	0.554
Control Delay, s/veh	58.6	7.0	27.0	14.8	B	12.0	13.5
LOS	F	A	D	B	4	B	B
95th %tile Queue, veh	14	0	11	4		3	3



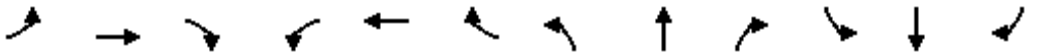
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	370	595	5	10	470	185	10	15	5	200	15	530
Future Volume (vph)	370	595	5	10	470	185	10	15	5	200	15	530
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (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	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		1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1630	1730		1662	1733	1430		1678			1627	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (perm)	1630	1730		1662	1733	1430		1678			1627	1458
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)	402	647	5	11	511	201	11	16	5	217	16	576
RTOR Reduction (vph)	0	0	0	0	0	99	0	5	0	0	0	441
Lane Group Flow (vph)	402	652	0	11	511	102	0	27	0	0	233	135
Confl. Peds. (#/hr)			8	8			1		1	1		1
Confl. Bikes (#/hr)			5									6
Heavy Vehicles (%)	2%	1%	0%	0%	1%	4%	0%	0%	0%	3%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Over
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6						
Actuated Green, G (s)	22.3	56.1		0.9	34.7	34.7		4.4			17.8	22.3
Effective Green, g (s)	23.3	57.1		1.9	35.7	35.7		5.4			18.8	23.3
Actuated g/C Ratio	0.23	0.58		0.02	0.36	0.36		0.05			0.19	0.23
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	2.5	3.5		2.5	3.5	3.5		2.8			2.8	2.5
Lane Grp Cap (vph)	382	995		31	623	514		91			308	342
v/s Ratio Prot	c0.25	0.38		0.01	c0.29			c0.02			c0.14	0.09
v/s Ratio Perm						0.07						
v/c Ratio	1.05	0.66		0.35	0.82	0.20		0.30			0.76	0.40
Uniform Delay, d1	38.0	14.3		48.0	28.8	21.9		45.1			38.0	32.0
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	60.5	1.6		5.0	8.7	0.2		1.7			10.0	0.6
Delay (s)	98.4	16.0		53.1	37.5	22.1		46.7			48.0	32.6
Level of Service	F	B		D	D	C		D			D	C
Approach Delay (s)		47.4			33.5			46.7			37.0	
Approach LOS		D			C			D			D	

Intersection Summary			
HCM 2000 Control Delay	40.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	99.2	Sum of lost time (s)	18.0
Intersection Capacity Utilization	78.7%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	12.3
Intersection LOS	B

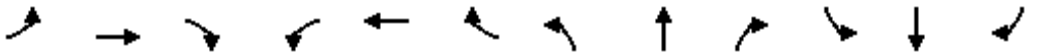
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	367	516	664	420
Demand Flow Rate, veh/h	379	533	693	428
Vehicles Circulating, veh/h	567	542	329	543
Vehicles Exiting, veh/h	404	480	617	532
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.8	13.5	13.9	10.5
Approach LOS	A	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	379	533	693	428
Cap Entry Lane, veh/h	865	881	1037	881
Entry HV Adj Factor	0.969	0.969	0.958	0.981
Flow Entry, veh/h	367	516	664	420
Cap Entry, veh/h	838	854	994	864
V/C Ratio	0.438	0.605	0.668	0.486
Control Delay, s/veh	9.8	13.5	13.9	10.5
LOS	A	B	B	B
95th %tile Queue, veh	2	4	5	3



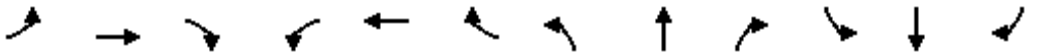
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	255	115	270	135	105	65	795	310	145	750	100
Future Volume (vph)	270	255	115	270	135	105	65	795	310	145	750	100
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.5	4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		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	1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1630	1623		1630	1624		1583	3228	1454	1662	3193	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1630	1623		1630	1624		1583	3228	1454	1662	3193	
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)	297	280	126	297	148	115	71	874	341	159	824	110
RTOR Reduction (vph)	0	14	0	0	23	0	0	0	244	0	9	0
Lane Group Flow (vph)	297	392	0	297	240	0	71	874	97	159	925	0
Confl. Peds. (#/hr)	2		8	8		2	2					2
Confl. Bikes (#/hr)			4			1			2			1
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	5%	3%	0%	0%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			
Actuated Green, G (s)	24.6	32.1		23.0	30.5		6.2	33.5	33.5	12.5	39.8	
Effective Green, g (s)	25.1	33.5		23.5	31.9		6.7	34.0	33.5	13.0	40.3	
Actuated g/C Ratio	0.21	0.28		0.20	0.27		0.06	0.28	0.28	0.11	0.34	
Clearance Time (s)	4.5	5.4		4.5	5.4		4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	5.0		3.0	5.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	340	453		319	431		88	914	405	180	1072	
v/s Ratio Prot	0.18	c0.24		c0.18	0.15		0.04	c0.27		c0.10	0.29	
v/s Ratio Perm									0.07			
v/c Ratio	0.87	0.87		0.93	0.56		0.81	0.96	0.24	0.88	0.86	
Uniform Delay, d1	45.9	41.1		47.5	38.0		56.0	42.3	33.4	52.8	37.3	
Progression Factor	1.00	1.00		1.00	1.00		0.93	0.93	2.49	1.00	1.00	
Incremental Delay, d2	21.1	19.4		32.9	5.1		28.6	14.8	0.2	36.2	7.3	
Delay (s)	67.0	60.5		80.3	43.1		80.8	53.9	83.5	89.0	44.6	
Level of Service	E	E		F	D		F	D	F	F	D	
Approach Delay (s)		63.3			62.8			63.2			51.1	
Approach LOS		E			E			E			D	

Intersection Summary			
HCM 2000 Control Delay	59.5	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



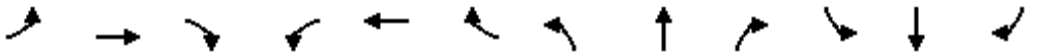
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	1110	60	275	925	175	115	395	150	335	585	70
Future Volume (vph)	205	1110	60	275	925	175	115	395	150	335	585	70
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0	5.0	4.0	4.0	5.0	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95	1.00	1.00	1.00	1.00	0.97	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	1.00	0.98	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	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	
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)	1646	3382		1646	3353	1483	1646	1733	1464	3310	1673	
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)	1646	3382		1646	3353	1483	1646	1733	1464	3310	1673	
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)	218	1181	64	293	984	186	122	420	160	356	622	74
RTOR Reduction (vph)	0	3	0	0	0	75	0	0	114	0	3	0
Lane Group Flow (vph)	218	1242	0	293	984	111	122	420	46	356	693	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Confl. Bikes (#/hr)						1			1			3
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA	pm+ov	Prot	NA	Perm	Prot	NA	
Protected Phases	5	2		1	6	7	3	8		7	4	
Permitted Phases						6			8			
Actuated Green, G (s)	15.0	38.0		17.0	40.0	53.0	6.0	32.0	32.0	13.0	39.0	
Effective Green, g (s)	16.0	39.0		18.0	41.0	53.0	7.0	33.0	32.0	14.0	40.0	
Actuated g/C Ratio	0.13	0.32		0.15	0.34	0.44	0.06	0.28	0.27	0.12	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7	2.5	2.5	2.5	2.5	2.5	2.5	
Lane Grp Cap (vph)	219	1099		246	1145	716	96	476	390	386	557	
v/s Ratio Prot	0.13	c0.37		c0.18	0.29	0.02	c0.07	0.24		0.11	c0.41	
v/s Ratio Perm						0.06			0.03			
v/c Ratio	1.00	1.13		1.19	0.86	0.15	1.27	0.88	0.12	0.92	1.24	
Uniform Delay, d1	52.0	40.5		51.0	36.8	20.1	56.5	41.6	33.3	52.5	40.0	
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	59.2	70.3		118.9	7.1	0.1	181.1	17.2	0.1	27.2	124.2	
Delay (s)	111.1	110.8		169.9	44.0	20.1	237.6	58.9	33.4	79.6	164.2	
Level of Service	F	F		F	D	C	F	E	C	E	F	
Approach Delay (s)		110.8			66.2			84.1			135.6	
Approach LOS		F			E			F			F	

Intersection Summary			
HCM 2000 Control Delay	98.4	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	108.4%	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												
Traffic Volume (vph)	290	740	355	365	555	225	220	1090	255	345	975	105
Future Volume (vph)	290	740	355	365	555	225	220	1090	255	345	975	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		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	0.95		1.00	0.96		1.00	0.97		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)	1599	3116		1646	3107		1646	3181		1583	3236	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3116		1646	3107		1646	3181		1583	3236	
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)	302	771	370	380	578	234	229	1135	266	359	1016	109
RTOR Reduction (vph)	0	36	0	0	27	0	0	13	0	0	5	0
Lane Group Flow (vph)	302	1105	0	380	785	0	229	1388	0	359	1120	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Confl. Bikes (#/hr)			2			1						
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	28.0	40.0		24.0	36.0		21.0	51.0		25.0	55.0	
Effective Green, g (s)	29.0	41.0		25.0	37.0		22.0	52.0		26.0	56.0	
Actuated g/C Ratio	0.18	0.26		0.16	0.23		0.14	0.32		0.16	0.35	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	289	798		257	718		226	1033		257	1132	
v/s Ratio Prot	0.19	c0.35		c0.23	0.25		0.14	c0.44		c0.23	c0.35	
v/s Ratio Perm												
v/c Ratio	1.04	1.39		1.48	1.09		1.01	1.34		1.40	0.99	
Uniform Delay, d1	65.5	59.5		67.5	61.5		69.0	54.0		67.0	51.7	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	65.2	181.1		235.2	62.0		63.3	161.3		200.6	23.9	
Delay (s)	130.7	240.6		302.7	123.5		132.3	215.3		267.6	75.6	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		217.6			180.6			203.6			122.1	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	181.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.37		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	132.3%	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												
Traffic Volume (vph)	335	705	245	235	445	60	340	615	290	185	950	360
Future Volume (vph)	335	705	245	235	445	60	340	615	290	185	950	360
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	5.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		0.97	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3228	1454	1646	3165		3193	3115		1662	3292	1467
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3228	1454	1646	3165		3193	3115		1662	3292	1467
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)	349	734	255	245	464	62	354	641	302	193	990	375
RTOR Reduction (vph)	0	0	70	0	9	0	0	47	0	0	0	0
Lane Group Flow (vph)	349	734	185	245	518	0	354	896	0	193	990	375
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2									Free
Actuated Green, G (s)	27.6	29.7	42.7	19.3	21.4		13.0	36.8		14.2	38.0	120.0
Effective Green, g (s)	28.6	30.7	42.7	20.3	22.4		14.0	37.8		15.2	39.0	120.0
Actuated g/C Ratio	0.24	0.26	0.36	0.17	0.19		0.12	0.31		0.13	0.32	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	388	825	517	278	590		372	981		210	1069	1467
v/s Ratio Prot	0.21	c0.23	0.04	0.15	c0.16		0.11	c0.29		0.12	c0.30	
v/s Ratio Perm			0.09									c0.26
v/c Ratio	0.90	0.89	0.36	0.88	0.88		0.95	0.91		0.92	0.93	0.26
Uniform Delay, d1	44.3	43.0	28.5	48.7	47.5		52.7	39.5		51.8	39.1	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.40	0.95	1.00
Incremental Delay, d2	22.7	12.4	0.3	26.0	13.8		34.1	14.2		31.3	11.1	0.3
Delay (s)	67.0	55.5	28.8	74.7	61.3		86.8	53.8		103.7	48.1	0.3
Level of Service	E	E	C	E	E		F	D		F	D	A
Approach Delay (s)		53.4			65.5			62.8			43.5	
Approach LOS		D			E			E			D	

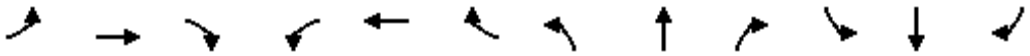
Intersection Summary			
HCM 2000 Control Delay	54.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	17.0
Intersection Capacity Utilization	90.1%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	85.5
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	563	814	1037	644
Demand Flow Rate, veh/h	568	822	1050	650
Vehicles Circulating, veh/h	875	814	563	874
Vehicles Exiting, veh/h	649	799	880	762
Ped Vol Crossing Leg, #/h	8	0	0	5
Ped Cap Adj	0.999	1.000	1.000	0.999
Approach Delay, s/veh	30.2	104.5	124.0	48.0
Approach LOS	D	F	F	E

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	568	822	1050	650
Cap Entry Lane, veh/h	683	716	867	684
Entry HV Adj Factor	0.991	0.991	0.987	0.990
Flow Entry, veh/h	563	814	1037	644
Cap Entry, veh/h	676	709	856	677
V/C Ratio	0.832	1.148	1.211	0.951
Control Delay, s/veh	30.2	104.5	124.0	48.0
LOS	D	F	F	E
95th %tile Queue, veh	9	25	34	14



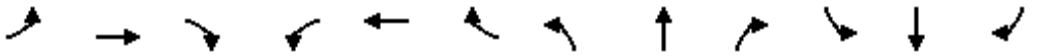
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	375	1345	0	0	0	0	0	270	135	0	0	0
Future Volume (vph)	375	1345	0	0	0	0	0	270	135	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0						4.0				
Lane Util. Factor		0.95						0.95				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.95				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		3228						3110				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		3228						3110				
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)	426	1528	0	0	0	0	0	307	153	0	0	0
RTOR Reduction (vph)	0	35	0	0	0	0	0	15	0	0	0	0
Lane Group Flow (vph)	0	1919	0	0	0	0	0	445	0	0	0	0
Confl. Peds. (#/hr)	5		7	7		5	10		4	4		10
Confl. Bikes (#/hr)			3						1			
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Actuated Green, G (s)		34.7						12.3				
Effective Green, g (s)		35.2						12.8				
Actuated g/C Ratio		0.63						0.23				
Clearance Time (s)		4.5						4.5				
Vehicle Extension (s)		2.6						2.0				
Lane Grp Cap (vph)		2029						710				
v/s Ratio Prot								c0.14				
v/s Ratio Perm		0.59										
v/c Ratio		0.95						0.63				
Uniform Delay, d1		9.5						19.5				
Progression Factor		1.00						1.00				
Incremental Delay, d2		10.7						1.3				
Delay (s)		20.3						20.7				
Level of Service		C						C				
Approach Delay (s)		20.3			0.0			20.7			0.0	
Approach LOS		C			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	56.0	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			

Intersection	
Intersection Delay, s/veh	26.3
Intersection LOS	D

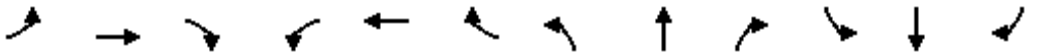
Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	1
Conflicting Circle Lanes	1	2	2	1
Adj Approach Flow, veh/h	817	178	944	1195
Demand Flow Rate, veh/h	824	188	957	1204
Vehicles Circulating, veh/h	659	1626	861	99
Vehicles Exiting, veh/h	88	192	622	1715
Ped Vol Crossing Leg, #/h	13	2	11	5
Ped Cap Adj	0.998	1.000	0.999	0.999
Approach Delay, s/veh	60.9	21.4	20.2	8.2
Approach LOS	F	C	C	A

Lane	Left	Left	Left	Right	Left	Bypass
Designated Moves	LTR	LTR	LT	TR	LT	R
Assumed Moves	LTR	LTR	LT	TR	LT	R
RT Channelized						Yield
Lane Util	1.000	1.000	0.470	0.530	1.000	
Follow-Up Headway, s	2.700	2.700	2.700	2.700	2.700	
Critical Headway, s	4.100	4.100	4.100	4.100	4.100	556
Entry Flow, veh/h	824	188	450	507	648	1247
Cap Entry Lane, veh/h	806	385	691	691	1236	1.000
Entry HV Adj Factor	0.992	0.947	0.986	0.987	0.987	556
Flow Entry, veh/h	817	178	444	500	639	1246
Cap Entry, veh/h	798	365	680	681	1219	0.446
V/C Ratio	1.024	0.488	0.652	0.735	0.525	7.4
Control Delay, s/veh	60.9	21.4	17.9	22.2	8.8	A
LOS	F	C	C	C	A	2
95th %tile Queue, veh	19	3	5	6	3	



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	240	345	75	135	280	75	175	860	55	175	1255	160
Future Volume (vph)	240	345	75	135	280	75	175	860	55	175	1255	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	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	0.97		1.00	0.97		1.00	0.99		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)	1646	1651		1614	1662		1646	3252		1630	3218	
Flt Permitted	0.14	1.00		0.16	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	239	1651		272	1662		1646	3252		1630	3218	
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)	261	375	82	147	304	82	190	935	60	190	1364	174
RTOR Reduction (vph)	0	7	0	0	8	0	0	4	0	0	9	0
Lane Group Flow (vph)	261	450	0	147	378	0	190	991	0	190	1530	0
Confl. Peds. (#/hr)	3		1	1		3	10		1	1		10
Confl. Bikes (#/hr)			3									1
Heavy Vehicles (%)	1%	3%	2%	3%	2%	0%	1%	1%	4%	2%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	41.0	30.0		30.0	24.0		13.5	48.0		16.5	51.0	
Effective Green, g (s)	42.0	31.0		32.0	25.0		14.0	49.0		17.0	52.0	
Actuated g/C Ratio	0.35	0.26		0.27	0.21		0.12	0.41		0.14	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	236	426		150	346		192	1327		230	1394	
v/s Ratio Prot	c0.12	0.27		0.06	0.23		c0.12	0.30		0.12	c0.48	
v/s Ratio Perm	c0.27			0.20								
v/c Ratio	1.11	1.06		0.98	1.09		0.99	0.75		0.83	1.10	
Uniform Delay, d1	32.7	44.5		40.8	47.5		52.9	30.2		50.1	34.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	89.9	59.5		66.6	75.6		61.3	2.2		20.5	55.3	
Delay (s)	122.6	104.0		107.5	123.1		114.2	32.4		70.6	89.3	
Level of Service	F	F		F	F		F	C		E	F	
Approach Delay (s)		110.7			118.8			45.6			87.2	
Approach LOS		F			F			D			F	

Intersection Summary			
HCM 2000 Control Delay	83.5	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.11		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	102.6%	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												
Traffic Volume (vph)	255	275	285	85	200	85	185	550	180	85	840	285
Future Volume (vph)	255	275	285	85	200	85	185	550	180	85	840	285
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.5	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	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	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	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)	1630	1750	1473	1662	1672		1646	1716	1488	1662	3292	1438
Flt Permitted	0.26	1.00	1.00	0.48	1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	440	1750	1473	833	1672		1646	1716	1488	1662	3292	1438
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)	277	299	310	92	217	92	201	598	196	92	913	310
RTOR Reduction (vph)	0	0	214	0	16	0	0	0	79	0	0	157
Lane Group Flow (vph)	277	299	96	92	293	0	201	598	117	92	913	153
Confl. Bikes (#/hr)												3
Heavy Vehicles (%)	2%	0%	1%	0%	0%	0%	1%	2%	0%	0%	1%	1%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4		4	8					2			6
Actuated Green, G (s)	36.1	27.1	27.1	26.5	22.0		13.5	36.9	36.9	6.6	30.0	30.0
Effective Green, g (s)	36.6	27.6	27.6	27.5	22.5		14.0	37.4	36.9	7.1	30.5	30.5
Actuated g/C Ratio	0.39	0.30	0.30	0.30	0.24		0.15	0.40	0.40	0.08	0.33	0.33
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.5	3.0	3.0	3.0	3.0		3.8	3.8	3.8	3.0	3.8	3.8
Lane Grp Cap (vph)	302	518	436	290	404		247	689	589	126	1078	471
v/s Ratio Prot	c0.10	0.17		0.02	0.18		c0.12	c0.35		0.06	0.28	
v/s Ratio Perm	c0.26		0.07	0.08					0.08			0.11
v/c Ratio	0.92	0.58	0.22	0.32	0.73		0.81	0.87	0.20	0.73	0.85	0.32
Uniform Delay, d1	23.9	27.8	24.7	24.6	32.5		38.3	25.6	18.4	42.1	29.1	23.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	30.9	1.6	0.3	0.6	6.4		18.9	11.5	0.2	19.4	6.5	0.5
Delay (s)	54.8	29.4	24.9	25.2	38.8		57.2	37.1	18.6	61.5	35.6	24.1
Level of Service	D	C	C	C	D		E	D	B	E	D	C
Approach Delay (s)		35.7			35.7			37.5			34.7	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	35.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	93.1	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	32.1
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	2	2	2	2
Conflicting Circle Lanes	2	2	2	2
Adj Approach Flow, veh/h	924	1049	771	908
Demand Flow Rate, veh/h	926	1065	792	918
Vehicles Circulating, veh/h	1027	906	1105	1258
Vehicles Exiting, veh/h	1149	991	848	713
Ped Vol Crossing Leg, #/h	0	2	8	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	26.7	28.3	23.4	49.2
Approach LOS	D	D	C	E

Lane	Left	Right	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	LT	TR	LT	TR
Assumed Moves	LT	TR	LT	TR	LT	TR	LT	TR
RT Channelized								
Lane Util	0.470	0.530	0.470	0.530	0.470	0.530	0.469	0.531
Follow-Up Headway, s	2.700	2.700	2.700	2.700	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100	4.100	4.100	4.100	4.100
Entry Flow, veh/h	435	491	501	564	372	420	431	487
Cap Entry Lane, veh/h	608	608	667	667	573	573	510	510
Entry HV Adj Factor	0.998	0.997	0.984	0.986	0.975	0.973	0.990	0.988
Flow Entry, veh/h	434	490	493	556	363	409	427	481
Cap Entry, veh/h	607	607	657	658	559	558	505	504
V/C Ratio	0.715	0.807	0.751	0.845	0.649	0.733	0.845	0.955
Control Delay, s/veh	23.0	30.1	23.8	32.3	20.8	25.8	39.2	58.1
LOS	C	D	C	D	C	D	E	F
95th %tile Queue, veh	6	8	7	9	5	6	9	12

Intersection	
Intersection Delay, s/veh	15.6
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	772	845	27	266
Demand Flow Rate, veh/h	840	894	32	275
Vehicles Circulating, veh/h	46	254	850	884
Vehicles Exiting, veh/h	1113	628	36	264
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.8	20.7	6.6	11.2
Approach LOS	B	C	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	840	894	32	275
Cap Entry Lane, veh/h	1287	1098	697	679
Entry HV Adj Factor	0.920	0.945	0.844	0.966
Flow Entry, veh/h	772	845	27	266
Cap Entry, veh/h	1184	1038	588	656
V/C Ratio	0.653	0.814	0.046	0.405
Control Delay, s/veh	11.8	20.7	6.6	11.2
LOS	B	C	A	B
95th %tile Queue, veh	5	9	0	2

Intersection	
Int Delay, s/veh	221.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		⇕			⇕			⇕			⇕	
Traffic Vol, veh/h	15	455	25	20	670	100	15	35	20	220	35	35
Future Vol, veh/h	15	455	25	20	670	100	15	35	20	220	35	35
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	4	0	0	1	1	0	0	0	0	12	0
Mvmt Flow	17	506	28	22	744	111	17	39	22	244	39	39

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	855	0	0	534	0	0	1437	1453	520	1429	1412	800
Stage 1	-	-	-	-	-	-	554	554	-	844	844	-
Stage 2	-	-	-	-	-	-	883	899	-	585	568	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.62	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.62	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4.108	3.3
Pot Cap-1 Maneuver	793	-	-	1044	-	-	112	132	560	~ 114	131	388
Stage 1	-	-	-	-	-	-	520	517	-	361	366	-
Stage 2	-	-	-	-	-	-	343	360	-	501	491	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	793	-	-	1044	-	-	72	123	560	~ 78	122	388
Mov Cap-2 Maneuver	-	-	-	-	-	-	72	123	-	~ 78	122	-
Stage 1	-	-	-	-	-	-	504	501	-	350	351	-
Stage 2	-	-	-	-	-	-	263	345	-	430	476	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.3	0.2	65.4	$ 1240.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	132	793	-	-	1044	-	-	91
HCM Lane V/C Ratio	0.589	0.021	-	-	0.021	-	-	3.541
HCM Control Delay (s)	65.4	9.6	0	-	8.5	0	-	$ 1240.7
HCM Lane LOS	F	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3	0.1	-	-	0.1	-	-	32.6

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	71	528	544	566
Demand Flow Rate, veh/h	71	544	555	581
Vehicles Circulating, veh/h	757	383	183	320
Vehicles Exiting, veh/h	144	355	645	607
Ped Vol Crossing Leg, #/h	2	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.8	10.9	8.4	10.7
Approach LOS	A	B	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	71	544	555	581
Cap Entry Lane, veh/h	748	995	1159	1044
Entry HV Adj Factor	1.000	0.970	0.981	0.974
Flow Entry, veh/h	71	528	544	566
Cap Entry, veh/h	748	965	1137	1017
V/C Ratio	0.095	0.547	0.479	0.556
Control Delay, s/veh	5.8	10.9	8.4	10.7
LOS	A	B	A	B
95th %tile Queue, veh	0	3	3	4

Intersection	
Intersection Delay, s/veh	28.9
Intersection LOS	D

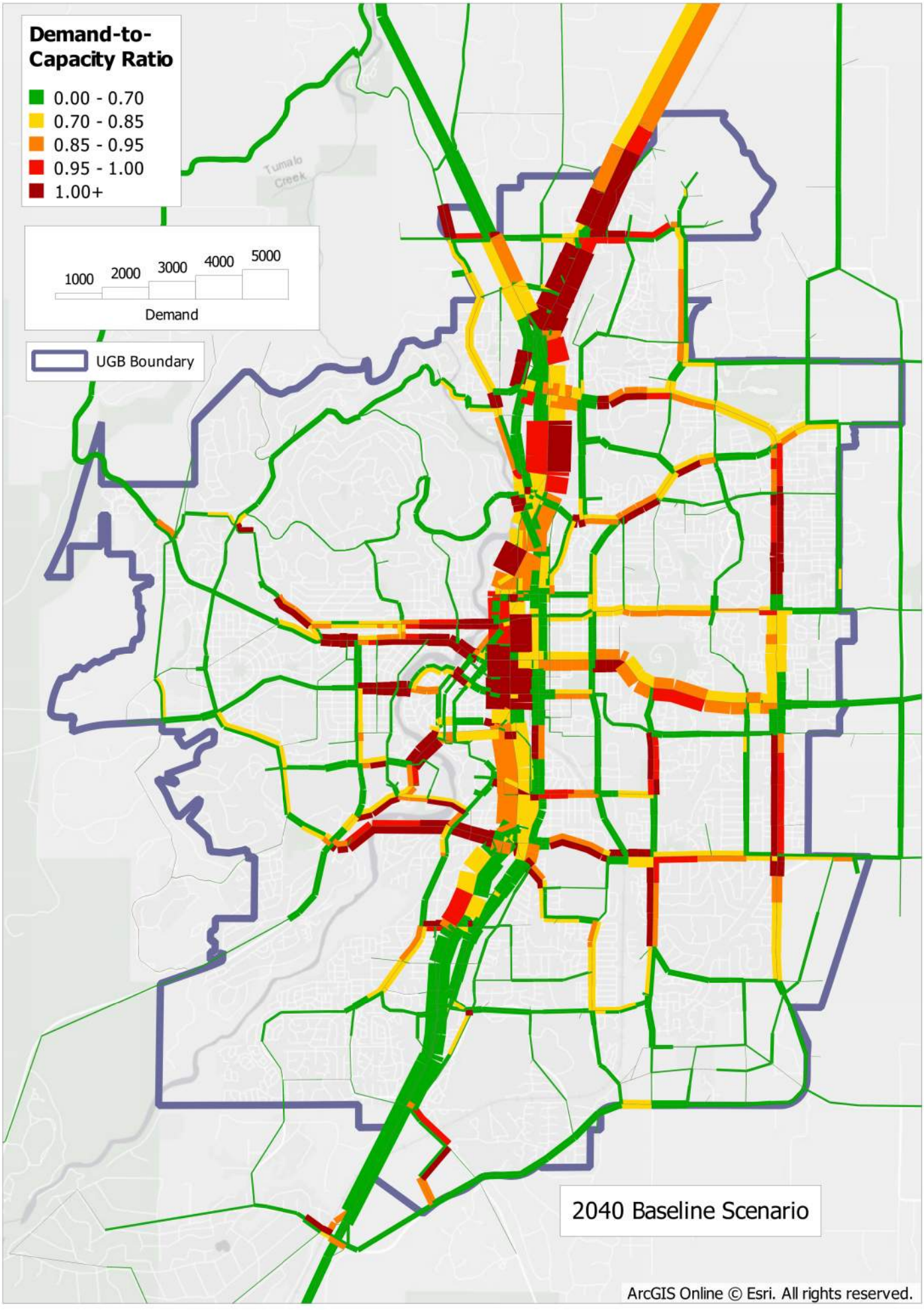
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	723	652	783	907
Demand Flow Rate, veh/h	726	654	791	917
Vehicles Circulating, veh/h	631	1031	662	565
Vehicles Exiting, veh/h	429	422	695	955
Ped Vol Crossing Leg, #/h	4	5	3	0
Ped Cap Adj	0.999	1.000	1.000	1.000
Approach Delay, s/veh	31.8	24.7	50.8	10.9
Approach LOS	D	C	F	B

Lane	Left	Left	Bypass	Left	Left	Bypass
Designated Moves	LTR	LT	R	LTR	LT	R
Assumed Moves	LTR	LT	R	LTR	LT	R
RT Channelized			Yield			Yield
Lane Util	1.000	1.000		1.000	1.000	
Follow-Up Headway, s	2.700	2.700		2.700	2.700	
Critical Headway, s	4.100	4.100	165	4.100	4.100	422
Entry Flow, veh/h	726	489	643	791	495	961
Cap Entry Lane, veh/h	823	607	0.990	804	866	0.990
Entry HV Adj Factor	0.996	1.000	163	0.990	0.987	418
Flow Entry, veh/h	723	489	636	783	489	951
Cap Entry, veh/h	820	607	0.256	795	855	0.439
V/C Ratio	0.882	0.806	8.9	0.984	0.572	8.9
Control Delay, s/veh	31.8	30.0	A	50.8	12.5	A
LOS	D	D	1	F	B	2
95th %tile Queue, veh	12	8		16	4	

Intersection	
Intersection Delay, s/veh	14.3
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	129	521	591	796
Demand Flow Rate, veh/h	129	529	598	803
Vehicles Circulating, veh/h	1001	437	325	359
Vehicles Exiting, veh/h	161	486	805	607
Ped Vol Crossing Leg, #/h	1	1	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.4	11.2	11.0	19.7
Approach LOS	A	B	B	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	129	529	598	803
Cap Entry Lane, veh/h	621	955	1040	1014
Entry HV Adj Factor	1.000	0.985	0.988	0.991
Flow Entry, veh/h	129	521	591	796
Cap Entry, veh/h	621	940	1027	1004
V/C Ratio	0.208	0.554	0.575	0.792
Control Delay, s/veh	8.4	11.2	11.0	19.7
LOS	A	B	B	C
95th %tile Queue, veh	1	3	4	9


Demand-to-Capacity Ratio
0.00 - 0.70
0.70 - 0.85
0.85 - 0.95
0.95 - 1.00
1.00+
1000
2000
3000
4000
5000
Demand
UGB Boundary
Tumalo Creek
2040 Baseline Scenario
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Appendix H - Transportation Planning Rule (TPR) Analysis Memorandum

Bend's Transportation Plan

2040 TSP Project List TPR Analysis Technical Memorandum

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DATE: April 24, 2020

Introduction

This memorandum documents the transportation system performance analysis conducted for the Bend Transportation System Plan (TSP) for the purposes of making findings for compliance with the State's Transportation Planning Rule (TPR) requirements. Specifically, this memorandum includes evaluation of vehicle miles traveled (VMT) per capita and intersection performance compared to required targets. In addition, the memorandum includes several system and corridor performance measures that are a subset of the TSP scenario evaluation performance measures for consistency with (and comparison to) the previously evaluated scenarios.

The underlying inputs to this evaluation include both land use (demand) and transport network (supply) assumptions for the horizon year of 2040. The land use assumptions utilized to determine demand for the horizon year is consistent with the City of Bend Comprehensive Plan's land use designations and growth area projections for the Bend Metropolitan Planning Organization MPO's Metropolitan Transportation Plan (MTP), including consistency with coordinated population projections. The transportation network includes the full set of improvement projects, programs, and policies documented in the Bend TSP, which were determined to be reasonably likely to be funded (as described in Chapter 5[1] and Chapter 6[2] of the TSP).

System Performance

To help understand how the improved transportation system will perform in Bend, the Bend-Redmond Model (BRM) was used to calculate system-level performance measures. These measures are a subset of the TSP performance measures for evaluating scenarios[3]. Where applicable, results are compared to the Baseline Scenario to provide context for how the system improves with the implementation of the TSP Project List. Table 1 below lists these system performance metrics from the BRM. The results for each metric are discussed in more detail

[1] Chapter 5: Transportation Projects and Programs, Bend's Transportation System Plan Update

[2] Chapter 6: Transportation Funding Strategy, Bend's Transportation System Plan Update

[3] Recommended Performance Measures Memo, Bend's Transportation System Plan Update, August 2018

following Table 1. For additional description about the metrics and how they are measured, see the detailed technical analysis from the scenario evaluation[4].

Table 1. System Performance Metrics

System Performance Metric	2040 TSP Project List	% change relative to 2040 Baseline Scenario
Vehicle Miles Travelled (VMT) per Capita (miles per person)	9.50	- 4.5%
Vehicle Hours of Delay (VHD)	632	- 28.6%
Mode Split (% Single Occupancy Vehicle Trips)	43.4%	- 3.3%

Vehicle Miles Travelled per Capita

VMT per capita helps demonstrate how a combination of automobile usage and proximity of complimentary land uses can affect the efficiency of the transportation system. As documented at length in the Bend Urban Growth Boundary (UGB) Expansion process, VMT/capita is also a key measure in State regulations for MPO areas related to reducing reliance on the automobile over time. As found in the UGB Expansion process, VMT/capita in Bend is projected to increase as the region grows in geography and population, which triggered the need for the development and adoption of an Integrated Land Use and Transportation Plan (ILUTP) to demonstrate how the increase over year 2010 conditions could be kept below a 5% increase and work towards a no-increase condition. While the Baseline Scenario VMT/capita is near the 5% increase threshold, the 2040 TSP Project List is only a 0.3% increase, well below the threshold and consistent with the trend projected in the Bend ILUTP.

This major improvement can be attributed to the balanced investment of the 2040 TSP Project List that complements the planned land use pattern. The 2040 TSP project list helps reduce vehicle demand through implementing transportation demand management programs (TSP Program/Project P-2) such as parking pricing (P-7) and investments in key walking (P-5, R1-A to R12-B), bicycling (R1-A to R12-B) and transit infrastructure (T-1 to T-3). In addition, the 2040 TSP project list also improves the efficiency of the transportation system by adding connectivity in areas with projected large growth to help shorten the length of vehicle trips. For example, there are new roads to connect Opportunity and Expansion Areas, extensions of Purcell Boulevard (C-2), Murphy Road (CIP), Britta Road (C-50), and Empire Boulevard (2020-2024 City of Bend Transportation Capital Improvement Program (CIP).

Vehicle Hours of Delay

Vehicle hours of delay (VHD) is a measure of total system congestion forecasted in the BRM across all roadways in Bend. The reduction in total VHD can be traced back to some of the causes listed above for changes in VMT/capita (reduction in overall vehicle demand, added connectivity to provide alternative routes to congested areas). However, another major contributor to the decrease in system congestion between the Baseline Scenario and the TSP Project List is the implementation of projects to reduce key bottlenecks in the system such as the North Parkway Extension (Phase 1 and C-40), ramp metering on the Parkway (C-4), and the Reed Market Road interchange improvements (C-19 to C-20).

[4] Scenario Evaluation Detailed Technical Analysis (Scenario Evaluation Overview for CTAC, Attachment E: Detailed Technical Analysis), November 2019

Mode Split

Mode split provides a quantitative measure of how each project shifts trips between walking, biking, transit, and auto. A lower percentage of single occupancy vehicle (SOV) trips also has the potential to reduce congestion and improve air quality in Bend.

With an investment in key walking and biking routes, transit improvements, and supporting mobility hubs (T-3), the TSP Project List leads to a decrease in SOV trips with a corresponding increase in transit, walking and biking trips. Note that while the relative differences between the Baseline Scenario and the TSP Project List for mode-share appears limited (only a few percent), this level of change is significant as it relates closely to the VMT/capita performance measure, where even small changes are important relative to meeting State regulations.

Corridor Performance

In addition to measuring system-wide metrics, the BRM was used to measure corridor level performance across the network.

Demand-to-capacity (d/c) ratio is the corridor performance measure for motor vehicles, derived from the BRM and is determined by dividing the forecasted weekday peak hour traffic demand along a segment by the roadway corridor capacity. The d/c ratio represents levels of motor vehicle congestion, with a lower ratio indicating smoother operations and minimal delays. As the ratio approaches 1.0, expected congestion increases. When it exceeds 1.0, the roadway is oversaturated and can result in increased queuing, delays, and longer peak traffic conditions. Table 2 summarizes corridor performance across the network using the d/c ratio. Note that this corridor-level measure is an indicator of the potential for congestion and used for high-level planning purposes. Additional details for actual intersection bottleneck projected performance for key intersections in discussed in the following section.

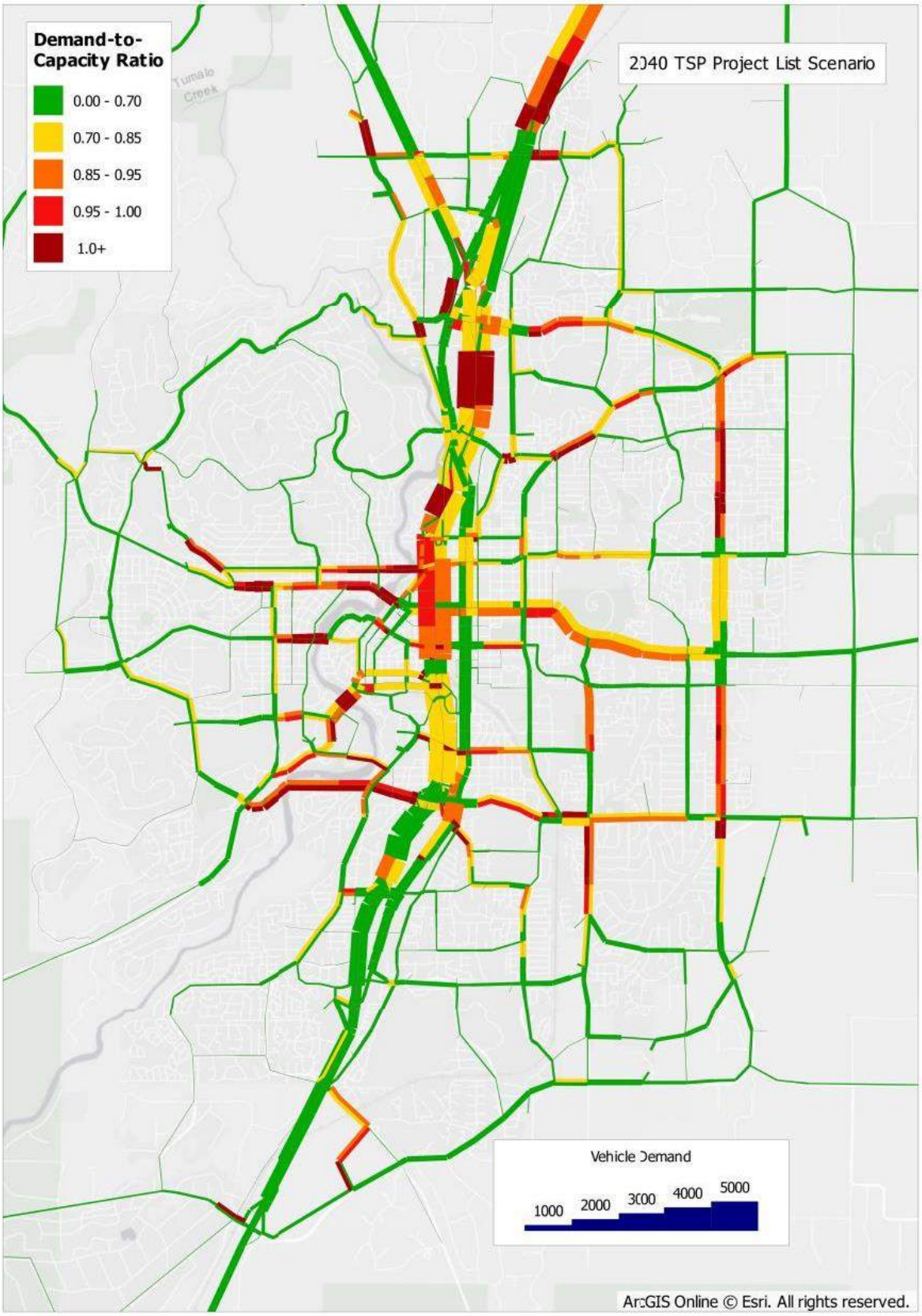
As listed in Table 2, the miles of arterials with d/c ratios greater than 1.0 are cut nearly in half under the TSP Project List compared to the Baseline Scenario (a reduction of 46%). This is in large part due to connectivity projects spreading traffic demand as well as a reduction in vehicle demand on key corridors, as discussed above under Mode Split, particularly along Greenwood Avenue, Butler Market Road and Empire Boulevard.

Table 2. Corridor Performance Metric

Corridor Performance Metric	2040 TSP Project List	% change relative to 2040 Baseline Scenario
Demand-to-Capacity (D/C) Ratio (Percent of arterial roadways with demand-to-capacity ratio > 1.0)	4.5%	- 46%

Figure 1 below shows d/c ratio plots from the BRM for the TSP Project List for 2040 average weekday peak hour conditions. With the implementation of ramp meters (C-4) and the North Parkway Extension (Phase 1 and C-40), most of the Parkway is under capacity, except a few segments between Butler Market Boulevard and Empire Boulevard. The darkest areas on the map (showing higher d/c ratios and more congestion) are typically around capacity constrained crossings of the Deschutes River.

Figure 1. TSP Project List 2040 Demand-to-Capacity Ratio Map



Intersection Performance

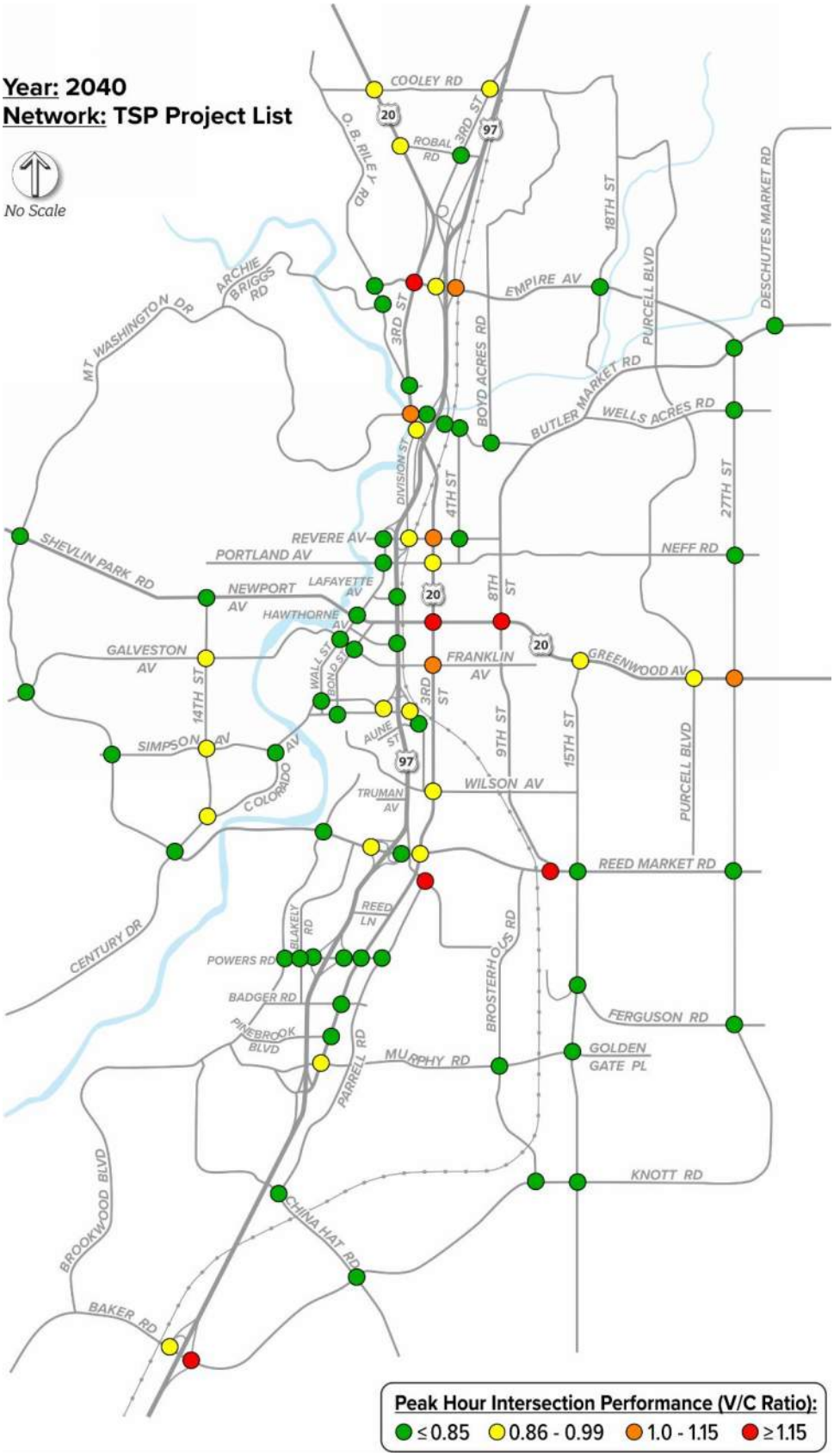
Intersection operations were analyzed at each of the study intersections using 2040 post-processed future motor vehicle volumes, following the methodology described in the project Methods and Assumptions Memorandum[5]. Results represent peak summer (30th Highest Hour (30 HV)) conditions for Oregon Department of Transportation (ODOT) intersections and average weekday peak hour conditions for City of Bend intersections.

Figure 2 below shows a summary of intersection volume-to-capacity (v/c) ratios at each of the study intersections. A table of intersection operations for all of the study intersections is included in Attachment A, while Attachment B includes the analysis software reports.

The majority of study intersection in Bend are shown as operating well under capacity (v/c ≤ 0.85). There are some intersections that are approaching ODOT mobility targets (v/c ≤ 0.85) or City mobility targets (v/c ≤ 1.0). Intersections that are forecast to exceed mobility targets over the 20-year planning horizon are discussed in the sections below, organized by key motor vehicle mobility needs of East-West Capacity in Central Bend, North-South Capacity in Eastern Bend, and US 97/Parkway Corridor Capacity.

[5] City of Bend intersection performance analysis is based on peak hour volume without applying a Peak-Hour-Factor (PHF) to evaluate peak 15-minute conditions. ODOT intersections include a PHF adjustment per ODOT's required methodology.

Figure 2. TSP Project List Scenario Intersection Operations



East-West Capacity in Central Bend

East-west capacity in Central Bend was identified as a need in both existing conditions[6] and during the scenario evaluation process. In particular, Deschutes River bridge crossings, Reed Market Road, and Greenwood Avenue (US 20) are existing and future capacity constraints for motor vehicles. Each area is discussed below.

Deschutes River Bridge Crossings Capacity

Bend has a limited number of bridges over the river connecting the west side of Bend to downtown and the east. While a project has been included in the TSP Project List to study an additional southern river crossing (C-4) to improve connectivity and relieve demand on existing corridors, the 2040 TSP Project List Scenario does not include major capacity improvements for crossing the river. However, smaller intersection improvements at key bottlenecks leading to the bridges, such as the Portland Ave/Wall St intersection improvement (C-8), Colorado Avenue intersection improvements (C-7), and Reed Market/Bond Street roundabout (CIP) will help improve traffic flow and reduce bottlenecks at bridges. Table 3 lists the intersection operations for key study intersections at or near bridge crossings. All are expected to meet City mobility targets within the 20-year horizon.

Table 3. Deschutes River Bridge Crossings 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Wall St & Portland Ave	RAB	18	C	0.68	City of Bend	v/c ≤ 1.0	C-8
NW 14th St & Newport Ave	RAB	20	C	0.79	City of Bend	v/c ≤ 1.0	-
Wall St & Greenwood Ave	Signal	26	C	0.72	City of Bend	v/c ≤ 1.0	-
NW 14th St & Galveston Ave	RAB	49	E	0.94	City of Bend	v/c ≤ 1.0	-
Wall St & Franklin Ave	Signal	25	C	0.70	City of Bend	v/c ≤ 1.0	-
Bond St & Franklin Ave	Signal	21	C	0.74	City of Bend	v/c ≤ 1.0	-
SW 14th St & Simpson Ave	RAB	44	E	0.88	City of Bend	v/c ≤ 1.0	-
Colorado Ave & Simpson Ave	RAB	25	C	0.75	City of Bend	v/c ≤ 1.0	C-7
Century Dr & Colorado Ave	RAB	55	F	0.95	City of Bend	v/c ≤ 1.0	-
Wall St & Colorado Ave	Signal	13	B	0.64	City of Bend	v/c ≤ 1.0	-
Bond St & Arizona Ave	Signal	12	B	0.74	City of Bend	v/c ≤ 1.0	-
Century Dr & Reed Market Rd	RAB	29	D	0.81	City of Bend	v/c ≤ 1.0	-
Brookswood Blvd & Reed Market Rd	RAB	13	B	0.61	City of Bend	v/c ≤ 1.0	CIP

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[6] Existing Conditions and Needs Technical Memorandum, July 2018

Reed Market Road Capacity

Reed Market Road is a congested corridor under existing conditions with unreliable travel times, particularly with the at-grade railroad crossing located near a switchyard. The 2040 TSP Project List includes a number of projects to help reduce bottlenecks on this congested corridor and determine a solution for delays due to the at-grade railroad crossing (CIP, C-14, C-19, C-20, S-2). Table 4 shows the intersection capacity results for the key east-west corridor.

Table 4. Reed Market Road 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Century Dr & Reed Market Rd	RAB	29	D	0.81	City of Bend	v/c ≤ 1.0	-
Brookswood Blvd & Reed Market Rd	RAB	13	B	0.61	City of Bend	v/c ≤ 1.0	CIP
US 97 NB Ramps & Reed Market Rd	Signal	35	C	**0.89**	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 SB Ramps & Reed Market Rd	Signal	11	B	0.80	ODOT	v/c ≤ 0.85	C-19, C-20
SE 3rd St & Reed Market Rd	Signal	77	E	0.99	City of Bend	v/c ≤ 1.0	CIP
SE 9th St & Reed Market Rd	TWSC	12 / **>300**	B / F	0.25 / 1.89	City of Bend	Delay ≤ 50 s	S-2, C-44
SE 15th St & Reed Market Rd	RAB	21	C	0.64	City of Bend	v/c ≤ 1.0	C-14
SE 27th St & Reed Market Rd	Signal	50	D	0.86	City of Bend	v/c ≤ 1.0	C-31, C-65

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

Greenwood Avenue (US 20) Capacity

Greenwood Avenue (US 20) serves regional and commuter traffic and is a key route that runs east-west through Bend. Table 5 lists in the intersection operations under the 2040 TSP Project List scenario. While projects and programs like mobility hubs (T-3), improvements to the transit system (T-1 and T-2) and implementing transportation demand management strategies (P-2) such as parking pricing (P-7) are projected to significantly reduce peak hour vehicle demand in the area, Greenwood Avenue remains a key regional route with delays and congestion. Greenwood Avenue is also constrained by surrounding land uses and there are limited opportunities for spot congestion improvements that would be in balance with non-auto safety and planned land-use patterns. As such, nearly all the study intersections along Greenwood Avenue exceed current ODOT mobility targets (note that four of the six exceeded mobility targets under existing conditions) and many are forecast to exceed capacity in 2040 with the planned system.

Table 5. Greenwood Avenue (US 20) 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
Wall St & Greenwood Ave	Signal	26	C	0.72	City of Bend	v/c ≤ 1.0	-
US 20 (NE 3rd St) & Greenwood Ave	Signal	170	F	**1.33**	ODOT	v/c ≤ 0.85	-
NE 8th Ave & US 20 (Greenwood Ave)	Signal	125	F	**1.20**	ODOT	v/c ≤ 0.85	-
SE 15th St & US 20 (Greenwood Ave)	Signal	40	D	**0.92**	ODOT	v/c ≤ 0.85	C-62
Purcell Blvd & US 20 (Greenwood Ave)	Signal	53	D	**0.95**	ODOT	v/c ≤ 0.85	C-62
SE 27th Ave & US 20 (Greenwood Ave)	Signal	61	E	**1.04**	ODOT	v/c ≤ 0.85	C-31, C-62

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

North-South Capacity in Eastern Bend

North-south capacity in Eastern Bend was identified as a need during the scenario evaluation process. In particular, US 20/3rd Street, 15th Street, and 27th Street/Empire Boulevard were all identified as north-south routes projected in the BRM as being over capacity in 2040. Each area is discussed below.

US 20/3rd Street

Table 6 shows the intersection capacity results for US 20/3rd Street, which is a key regional route and provides an alternate route to the Parkway through Bend. Nearly all of the intersections on US 20/3rd Street north of Franklin Avenue fail to meet mobility standards, with many of the intersections over capacity. This is due in part to the more stringent ODOT mobility target, which requires analysis of higher peak summer volumes (30 HV) instead of average weekday volumes.

Table 6. US 20/3rd Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
US 20 & Cooley Rd	RAB	30	F	**0.95**	ODOT	v/c ≤ 0.85	C-26
US 20 & Robal Rd	RAB	33	F	**0.94**	ODOT	v/c ≤ 0.85	C-26
US 20 & Empire Blvd	Signal	120	F	**1.25**	ODOT	v/c ≤ 0.85	C-40
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	27	C	0.82	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Butler Market Rd	Signal	52	D	**1.04**	ODOT	v/c ≤ 0.85	C-21
US 20 (NE 3rd St) & Division St	Signal	31	C	**0.88**	ODOT	v/c ≤ 0.85	C-21
US 20 (NE 3rd St) & Revere Ave	Signal	92	F	**1.10**	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Olney Ave	Signal	64	E	**0.97**	ODOT	v/c ≤ 0.85	-
US 20 (NE 3rd St) & Greenwood Ave	Signal	170	F	**1.33**	ODOT	v/c ≤ 0.85	-
NE 3rd St & Franklin Ave	Signal	79	E	**1.09**	City of Bend	v/c ≤ 1.0	C-36
NE 3rd St & Wilson Ave	Signal	46	D	0.92	City of Bend	v/c ≤ 1.0	C-22
SE 3rd St & Reed Market Rd	Signal	77	E	0.99	City of Bend	v/c ≤ 1.0	CIP
SE 3rd St & Powers Rd	Signal	27	C	0.71	City of Bend	v/c ≤ 1.0	C-37
SE 3rd St & Badger Rd	Signal	12	B	0.53	City of Bend	v/c ≤ 1.0	C-38
SE 3rd St & Pinebrook Blvd	TWSC	13 / 91[A]	B / F	0.23 /0.63	City of Bend	Delay ≤ 50 s	-
SE 3rd St & Murphy Rd	Signal	34	D	0.76	City of Bend	v/c ≤ 1.0	-

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[A] Worst minor movement is less than 100 peak hour trips and therefore does not exceed City mobility targets.

15th Street

Table 7 shows the intersection capacity results for 15th Street, which is one of the few north-south routes through eastern Bend that helps provide connectivity to Expansion Areas. With intersection improvements planned at key cross streets (e.g. Reed Market Road (C-14), Ferguson Road (C-34), Murphy Road (CIP)), the only study intersection expected to exceed mobility standards on 15th Street is US 20/Greenwood Avenue.

Table 7. 15th Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
SE 15th St & US 20 (Greenwood Ave)	Signal	43	D	**0.98**	ODOT	v/c ≤ 0.85	C-62
SE 15th St & Reed Market Rd	RAB	21	C	0.64	City of Bend	v/c ≤ 1.0	C-14
SE 15th St & Ferguson Rd	RAB	11	B	0.56	City of Bend	v/c ≤ 1.0	C-34
SE 15th St & Murphy Rd	RAB	8	A	0.43	City of Bend	v/c ≤ 1.0	CIP
SE 15th St & Knott Rd	RAB	13	B	0.63	City of Bend	v/c ≤ 1.0	-

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

27th Street/Empire Boulevard

The planned extension of Empire Boulevard to 27th Street, 27th Street provides an alternate route to access US 20 to the east and help connect major growth areas. Table 8 lists the intersection capacity results for the key north-south corridor. With incremental intersection improvements planned on 27th Street (C-31) and intersection improvements planned at Empire Road (CIP) and Wells Acres Road (C-35), the only intersection forecast to exceed mobility targets along 27th Street is at US 20/Greenwood Avenue.

Table 8. 27th Street 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
NE 18th St & Empire Blvd	RAB	28	D	0.68	City of Bend	v/c ≤ 1.0	-
NE 27th St & Butler Market Rd	RAB	7	A	0.76	City of Bend	v/c ≤ 1.0	CIP
NE 27th St & Wells Acres Rd	Signal	8	A	0.67	City of Bend	v/c ≤ 1.0	C-35
NE 27th St & Neff Rd	RAB	41	D	0.83	City of Bend	v/c ≤ 1.0	-
SE 27th Ave & US 20 (Greenwood Ave)	Signal	61	E	**1.04**	ODOT	v/c ≤ 0.85	C-31, C-62
SE 27th St & Reed Market Rd	Signal	50	D	0.86	City of Bend	v/c ≤ 1.0	C-65
SE 27th St & Ferguson Rd	RAB	6	A	0.13	City of Bend	v/c ≤ 1.0	C-53

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

US 97/Parkway Corridor Capacity

Table 9 lists the intersection operations for each of the study intersections along the Parkway. With the implementation of the North Parkway Extension (Phase 1 and C-40) and ramp metering (C-42) paired with at-grade access closures, there are only three intersections or ramps (out of 24) expected to be over capacity. However, ODOT's current mobility target is a v/c less than 0.85, so eight intersections are forecast to exceed the mobility target under 30HV conditions.

Table 9. US 97/Parkway 2040 Intersection Operations (PM Peak Hour)

Intersection	Int. Control	Delay (s/veh)	Level of Service	Volume/ Capacity	Jurisdiction	Mobility Target	Project?
3rd Street (US 97 Bus) & Cooley Rd	Signal	67	E	**0.89**	ODOT	v/c ≤ 0.85	Phase 1, C-40
3rd Street (US 97 Bus) & Robal Rd	Signal	34	C	0.73	ODOT	v/c ≤ 0.85	Phase 1, C-40
US 97 SB On-ramp & Empire Blvd	Signal	70	E	**0.99**	ODOT	v/c ≤ 0.85	C-13
US 97 NB Ramps & Empire Blvd	Signal	55	E	**1.10**	ODOT	v/c ≤ 0.85	C-13
US 97 SB Off-ramp & Butler Market Rd	RAB	10	B	0.55	ODOT	v/c ≤ 0.85	C-21
US 97 NB Ramps & Butler Market Rd	TWSC	11 / 25	B /C	0.11 / 0.13	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	-
Wall St & Revere Ave	Signal	25	C	0.84	ODOT	v/c ≤ 0.85	C-9
Division St & Revere Ave	Signal	37	D	**0.92**	ODOT	v/c ≤ 0.85	C-9
US 97 & Lafayette Ave	Parkway Exit Only	NA	NA	NA	ODOT	v/c ≤ 0.85	C-42
US 97 & Hawthorne Ave	Parkway Exit Only	NA	NA	NA	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Colorado Ave	Signal	48	D	**0.98**	ODOT	v/c ≤ 0.85	-
US 97 NB Ramps & Colorado Ave	Signal	37	D	**0.90**	ODOT	v/c ≤ 0.85	C-7
US 97 & Truman Ave	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Reed Market Rd	Signal	35	C	**0.89**	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 NB Ramps & Reed Market Rd	Signal	11	B	0.80	ODOT	v/c ≤ 0.85	C-19, C-20
US 97 & Reed Ln	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42

US 97 SB Ramps & Powers Rd	Signal	29	C	0.81	ODOT	v/c ≤ 0.85	C-41
US 97 NB Ramps & Powers Rd	Signal	17	B	0.70	ODOT	v/c ≤ 0.85	C-41
US 97 & Badger Rd	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 & Pinebrook Blvd	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 & Ponderosa St	Access Closed	-	-	-	ODOT	v/c ≤ 0.85	C-42
US 97 SB Ramps & Baker Rd [A]	TWSC	8 / 37	A / E	0.05 / 0.86	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	
US 97 NB Ramps & Knott Rd [A]	TWSC	12 / >300	B / F	0.38 / **2.86**	ODOT	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	

Note: Signalized intersection v/c, delay, and level of service (LOS) results are reported for the overall intersection. Roundabout (RAB) results are reported for the overall intersection for City facilities and for the worst leg for ODOT facilities. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

[A] The US 97 Interchange at Baker Rd/Knott Rd is outside the urban growth boundary.

Alternate Mobility Targets

It is important for a TSP to identify a full range of transportation system projects and services that would address the transportation needs and deficiencies over the 20-year planning horizon. However, it is also important (and required) for a TSP to identify which transportation projects and services are reasonably likely to be implemented over the 20-year planning horizon, based on financial or other constraints. This exercise enables the community, local agencies and the state to establish realistic expectations for how that transportation system will likely operate at the end of the 20-year planning horizon.

As noted in the sections above, while the major investments in transportation through the TSP Project List (the reasonably likely to be funded list) will result in significantly improved system, corridor, and intersection performance, not all intersections will be able to meet current state or local mobility targets for motor vehicles. Particularly for the ODOT system, there is a need to investigate alternate mobility targets along the US 97 and US 20 corridors. Alternate mobility targets can align performance expectations with the balance of community goals established through the TSP development process, enabling subsequent studies, land use development processes, and improvement project/program development to proceed in a consistent fashion. The process for evaluating and establishing alternate mobility targets on the ODOT system will be documented in a separate memorandum.

Findings

Based on the evaluation presented above, the Bend TSP's reasonably likely to be funded improvement program (the Bend TSP Project List) was found to comply with the State's TPR system performance requirements as follows:

- VMT/capita is projected to decrease by 4.5% compared to the baseline scenario, resulting in levels nearly equal to year 2010 conditions. This is consistent with the adopted Bend ILUTP.
- The City study intersections were found to meet mobility targets at almost all locations. Locations not meeting mobility targets were, in general, improved compared to Baseline conditions and the resulting balance of planned improvements and intersection performance are consistent with the TSP's Goals.
- The ODOT study intersections were found to exceed mobility targets in a number of locations. The Bend TSP policies should support subsequent evaluation and potential implementation of alternate mobility targets on the ODOT system.

Attachments:

- Attachment A – 2040 TSP Project List Intersection Operations (all study intersections)
- Attachment B – 2040 TSP Project List Intersection Analysis (software report)

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	462	723	173	407
Demand Flow Rate, veh/h	467	730	175	412
Vehicles Circulating, veh/h	577	5	649	735
Vehicles Exiting, veh/h	570	819	395	0
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.9	8.8	6.8	13.0
Approach LOS	B	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LR	LTR
Assumed Moves	TR	LT	LR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	467	730	175	412
Cap Entry Lane, veh/h	858	1328	812	761
Entry HV Adj Factor	0.990	0.990	0.989	0.988
Flow Entry, veh/h	462	723	173	407
Cap Entry, veh/h	850	1315	803	752
V/C Ratio	0.544	0.550	0.215	0.542
Control Delay, s/veh	11.9	8.8	6.8	13.0
LOS	B	A	A	B
95th %tile Queue, veh	3	3	1	3

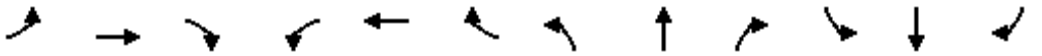
Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Future Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	1	0	0	1	2	0	0	0	0	0	0
Mvmt Flow	82	723	5	11	717	228	5	5	16	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	946	0	0	729	0	0	1744	1859	727
Stage 1	-	-	-	-	-	-	891	891	-
Stage 2	-	-	-	-	-	-	853	968	-
Critical Hdwy	4.13	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	721	-	-	884	-	-	96	74	427
Stage 1	-	-	-	-	-	-	404	363	-
Stage 2	-	-	-	-	-	-	421	335	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	721	-	-	883	-	-	84	0	427
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	0	-
Stage 1	-	-	-	-	-	-	353	0	-
Stage 2	-	-	-	-	-	-	421	0	-

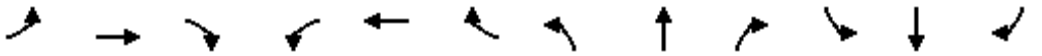
Approach	EB	WB	NB
HCM Control Delay, s	1.1	0.1	24.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	211	721	-	-	883	-	-
HCM Lane V/C Ratio	0.129	0.113	-	-	0.012	-	-
HCM Control Delay (s)	24.6	10.6	-	-	9.1	-	-
HCM Lane LOS	C	B	-	-	A	-	-
HCM 95th %tile Q(veh)	0.4	0.4	-	-	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Future Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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
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)		1691		1630	1716						1662	1458
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1691		1630	1716						1662	1458
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	626	74	32	358	0	0	0	0	453	0	647
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	0	294
Lane Group Flow (vph)	0	696	0	32	358	0	0	0	0	0	453	353
Heavy Vehicles (%)	0%	2%	2%	2%	2%	0%	0%	0%	0%	0%	2%	2%
Turn Type		NA		Prot	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases										2		2
Actuated Green, G (s)		44.2		2.4	51.6						28.4	28.4
Effective Green, g (s)		45.2		3.4	52.6						29.4	29.4
Actuated g/C Ratio		0.50		0.04	0.58						0.33	0.33
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		849		61	1002						542	476
v/s Ratio Prot		c0.41		c0.02	0.21							
v/s Ratio Perm											0.27	0.24
v/c Ratio		0.82		0.52	0.36						0.84	0.74
Uniform Delay, d1		18.9		42.5	9.8						28.1	26.9
Progression Factor		1.00		1.27	0.66						1.00	1.00
Incremental Delay, d2		8.7		5.8	0.7						10.7	6.2
Delay (s)		27.6		59.6	7.2						38.8	33.1
Level of Service		C		E	A						D	C
Approach Delay (s)		27.6			11.5			0.0			35.5	
Approach LOS		C			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	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												
Traffic Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Future Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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				
Frt	1.00	1.00			0.94		1.00	0.85				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1646	1733			1614		1630	1458				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1646	1733			1614		1630	1458				
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)	316	763	0	0	342	305	47	0	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	30	0	0	48	0	0	0	0
Lane Group Flow (vph)	316	763	0	0	617	0	47	5	0	0	0	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	3	8			4			6				
Permitted Phases							6					
Actuated Green, G (s)	23.6	73.0			44.4		7.0	7.0				
Effective Green, g (s)	24.6	74.0			45.4		8.0	8.0				
Actuated g/C Ratio	0.27	0.82			0.50		0.09	0.09				
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Lane Grp Cap (vph)	449	1424			814		144	129				
v/s Ratio Prot	c0.19	0.44			c0.38			0.00				
v/s Ratio Perm							c0.03					
v/c Ratio	0.70	0.54			0.76		0.33	0.04				
Uniform Delay, d1	29.4	2.5			17.9		38.5	37.5				
Progression Factor	0.84	1.11			1.00		1.00	1.00				
Incremental Delay, d2	3.0	0.9			6.5		1.3	0.1				
Delay (s)	27.7	3.7			24.4		39.8	37.6				
Level of Service	C	A			C		D	D				
Approach Delay (s)		10.7			24.4			38.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	12.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	410	420	220	75	500
Future Vol, veh/h	60	410	420	220	75	500
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	4
Mvmt Flow	63	432	442	232	79	526

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	442	0	-	0	1000	442
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	558	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1129	-	-	-	272	611
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	252	611
Mov Cap-2 Maneuver	-	-	-	-	252	-
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	35.4
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1129	-	-	-	252	611
HCM Lane V/C Ratio	0.056	-	-	-	0.313	0.861
HCM Control Delay (s)	8.4	0	-	-	25.7	36.8
HCM Lane LOS	A	A	-	-	D	E
HCM 95th %tile Q(veh)	0.2	-	-	-	1.3	9.7

Intersection	
Int Delay, s/veh	47.8

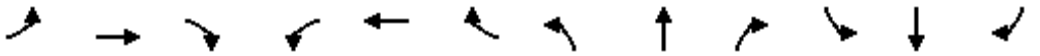
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Future Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	4	0	0	3	1	0	0	0	5	0	2
Mvmt Flow	310	217	0	0	641	152	54	0	179	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	793	0	-	-	-	0	1554	1630	217
Stage 1	-	-	-	-	-	-	837	837	-
Stage 2	-	-	-	-	-	-	717	793	-
Critical Hdwy	4.16	-	-	-	-	-	9.4	9.5	7.7
Critical Hdwy Stg 1	-	-	-	-	-	-	8.4	8.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	8.4	8.5	-
Follow-up Hdwy	2.254	-	-	-	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	810	-	0	0	-	-	~ 34	26	756
Stage 1	-	-	0	0	-	-	213	192	-
Stage 2	-	-	0	0	-	-	268	208	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	810	-	-	-	-	-	~ 19	0	756
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 19	0	-
Stage 1	-	-	-	-	-	-	120	0	-
Stage 2	-	-	-	-	-	-	268	0	-

Approach	EB	WB	NB
HCM Control Delay, s	7.2	0	$ 301.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	19	756	810	-	-	-
HCM Lane V/C Ratio	2.86	0.237	0.382	-	-	-
HCM Control Delay (s)	$ 1260.5	11.2	12.2	0	-	-
HCM Lane LOS	F	B	B	A	-	-
HCM 95th %tile Q(veh)	7.2	0.9	1.8	-	-	-

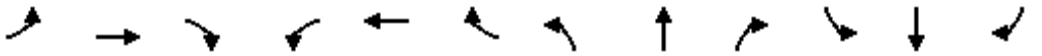
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Future Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	0.99	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	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1707	1468		1677	1468	1662	3260	1451	1662	3224	
Flt Permitted		0.83	1.00		0.74	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1456	1468		1287	1468	1662	3260	1451	1662	3224	
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)	16	16	403	177	32	86	237	1097	183	38	1355	16
RTOR Reduction (vph)	0	0	257	0	0	70	0	0	43	0	0	0
Lane Group Flow (vph)	0	32	146	0	209	16	237	1097	140	38	1371	0
Confl. Peds. (#/hr)	1		1	1		1			2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		19.5	19.5		19.5	19.5	18.0	66.4	66.4	4.1	52.5	
Effective Green, g (s)		20.5	20.5		20.5	19.5	19.0	67.4	67.4	5.1	53.5	
Actuated g/C Ratio		0.20	0.20		0.20	0.19	0.18	0.64	0.64	0.05	0.51	
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	4.8	4.8	2.5	4.8	
Lane Grp Cap (vph)		284	286		251	272	300	2092	931	80	1642	
v/s Ratio Prot							c0.14	0.34		0.02	c0.43	
v/s Ratio Perm		0.02	0.10		c0.16	0.01			0.10			
v/c Ratio		0.11	0.51		0.83	0.06	0.79	0.52	0.15	0.47	0.83	
Uniform Delay, d1		34.8	37.8		40.6	35.2	41.1	10.1	7.4	48.6	22.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	1.2		20.1	0.1	12.8	0.9	0.3	3.2	5.2	
Delay (s)		34.9	38.9		60.7	35.3	53.9	11.1	7.8	51.9	27.1	
Level of Service		C	D		E	D	D	B	A	D	C	
Approach Delay (s)		38.6			53.3			17.4			27.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

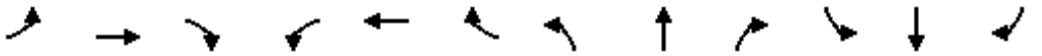
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	430	180	250	410	115	110	1170	135	140	740	50
Future Volume (vph)	175	430	180	250	410	115	110	1170	135	140	740	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	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	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
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)	188	462	194	269	441	124	118	1258	145	151	796	54
RTOR Reduction (vph)	0	0	112	0	0	80	0	8	0	0	4	0
Lane Group Flow (vph)	188	462	82	269	441	44	118	1396	0	151	846	0
Confl. Peds. (#/hr)	5					5	5		3	3		5
Heavy Vehicles (%)	1%	1%	0%	1%	1%	0%	0%	2%	0%	0%	5%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	18.2	27.3	27.3	21.7	30.8	30.8	10.6	44.0		7.0	40.4	
Effective Green, g (s)	19.2	28.3	28.3	22.7	31.8	31.8	11.6	45.0		8.0	41.4	
Actuated g/C Ratio	0.16	0.24	0.24	0.19	0.27	0.27	0.10	0.38		0.07	0.34	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	408	350	311	459	386	160	1202		110	1082	
v/s Ratio Prot	0.11	c0.27		c0.16	c0.25		0.07	c0.44		c0.09	0.27	
v/s Ratio Perm			0.06			0.03						
v/c Ratio	0.71	1.13	0.24	0.86	0.96	0.11	0.74	1.16		1.37	0.78	
Uniform Delay, d1	47.8	45.9	37.1	47.2	43.5	33.4	52.7	37.5		56.0	35.3	
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	8.9	85.8	0.3	21.3	32.0	0.1	16.2	82.0		214.8	5.6	
Delay (s)	56.7	131.6	37.4	68.5	75.5	33.6	68.9	119.5		270.8	40.9	
Level of Service	E	F	D	E	E	C	E	F		F	D	
Approach Delay (s)		93.3			67.0			115.6			75.6	
Approach LOS		F			E			F			E	

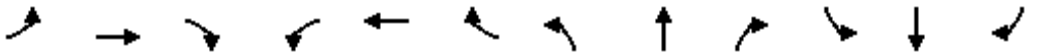
Intersection Summary			
HCM 2000 Control Delay	91.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



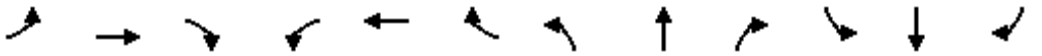
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Future Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00						1.00	
Frpb, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00						0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)	1805	1827	1532	1805	1837						1504	
Flt Permitted	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (perm)	1805	1827	1532	1805	1837						1504	
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)	15	1119	557	474	1088	31	0	0	0	15	5	52
RTOR Reduction (vph)	0	0	164	0	1	0	0	0	0	0	44	0
Lane Group Flow (vph)	15	1119	393	474	1118	0	0	0	0	0	28	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			4			1						
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	0%	20%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA					Perm	NA	
Protected Phases	5	2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)	2.0	62.0	62.0	26.5	86.5						18.0	
Effective Green, g (s)	2.5	62.5	62.5	27.0	87.0						18.5	
Actuated g/C Ratio	0.02	0.52	0.52	0.22	0.72						0.15	
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)	37	951	797	406	1331						231	
v/s Ratio Prot	0.01	c0.61		c0.26	0.61							
v/s Ratio Perm			0.26								0.02	
v/c Ratio	0.41	1.18	0.49	1.17	0.84						0.12	
Uniform Delay, d1	58.0	28.8	18.5	46.5	11.6						43.7	
Progression Factor	1.00	1.00	1.00	0.96	1.52						1.00	
Incremental Delay, d2	7.1	90.6	2.2	86.1	2.7						1.1	
Delay (s)	65.1	119.3	20.7	130.7	20.4						44.8	
Level of Service	E	F	C	F	C						D	
Approach Delay (s)		86.4			53.2			0.0			44.8	
Approach LOS		F			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	69.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



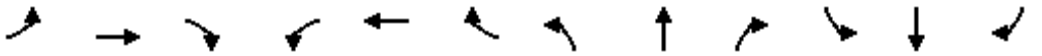
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Future Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			*0.78	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97		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)	1646	1667			2676	1402		1636	1444			
Flt Permitted	0.06	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	103	1667			2676	1402		1636	1444			
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)	129	1054	0	0	1382	258	280	5	597	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	77	0	0	0
Lane Group Flow (vph)	129	1054	0	0	1382	197	0	285	520	0	0	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			3			1						
Heavy Vehicles (%)	1%	5%	0%	0%	2%	3%	2%	0%	3%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Actuated Green, G (s)	73.0	73.0			62.0	62.0		37.0	37.0			
Effective Green, g (s)	74.0	74.0			63.0	63.0		38.0	38.0			
Actuated g/C Ratio	0.62	0.62			0.52	0.52		0.32	0.32			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	2.5	5.2			5.2	5.2		2.5	2.5			
Lane Grp Cap (vph)	153	1027			1404	736		518	457			
v/s Ratio Prot	0.05	c0.63			0.52							
v/s Ratio Perm	0.47					0.14		0.17	c0.36			
v/c Ratio	0.84	1.03			0.98	0.27		0.55	1.14			
Uniform Delay, d1	47.1	23.0			28.0	15.7		33.9	41.0			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	3.9	16.3			20.3	0.4		1.0	85.4			
Delay (s)	51.1	39.3			48.4	16.2		34.9	126.4			
Level of Service	D	D			D	B		C	F			
Approach Delay (s)		40.6			43.3			96.9			0.0	
Approach LOS		D			D			F			A	

Intersection Summary			
HCM 2000 Control Delay	55.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.0%	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												
Traffic Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
Future Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
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	3.5	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.95		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3440		1752	1764		1752	3539	1583	3335	3386	
Flt Permitted	0.13	1.00		0.35	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	241	3440		648	1764		1752	3539	1583	3335	3386	
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)	200	316	63	363	511	237	79	968	237	1100	911	142
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	55	0	10	0
Lane Group Flow (vph)	200	365	0	363	735	0	79	968	182	1100	1043	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	4%	3%	3%	0%	3%	2%	2%	5%	5%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		1	6	7	5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	36.5	30.5		54.0	43.0		7.2	28.0	46.5	29.0	49.8	
Effective Green, g (s)	38.5	31.5		55.0	44.0		8.2	29.5	49.5	30.0	51.3	
Actuated g/C Ratio	0.30	0.25		0.43	0.35		0.06	0.23	0.39	0.24	0.41	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.5	5.0	5.0	5.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.8	2.5	2.5	4.8	
Lane Grp Cap (vph)	159	856		451	613		113	825	619	790	1373	
v/s Ratio Prot	c0.07	0.11		0.12	c0.42		0.05	c0.27	0.05	c0.33	0.31	
v/s Ratio Perm	0.31			0.23					0.07			
v/c Ratio	1.26	0.43		0.80	1.20		0.70	1.17	0.29	1.39	0.76	
Uniform Delay, d1	40.5	39.9		26.4	41.2		57.9	48.5	26.5	48.2	32.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	156.9	0.3		9.8	104.7		16.0	90.7	0.2	184.3	2.9	
Delay (s)	197.4	40.2		36.1	145.9		73.9	139.2	26.7	232.6	35.2	
Level of Service	F	D		D	F		E	F	C	F	D	
Approach Delay (s)		94.5			110.0			114.4			136.1	
Approach LOS		F			F			F			F	

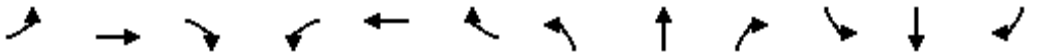
Intersection Summary			
HCM 2000 Control Delay	120.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	126.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Future Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	5.0	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	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	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	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
Flt Permitted	0.30	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	518	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
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)	207	239	136	49	234	114	201	1212	71	255	1576	125
RTOR Reduction (vph)	0	0	40	0	41	94	0	3	0	0	0	56
Lane Group Flow (vph)	207	239	96	49	193	20	201	1280	0	255	1576	69
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	2%	3%	2%
Turn Type	pm+pt	NA	custom	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8 1			4						2
Actuated Green, G (s)	26.8	21.8	44.0	4.0	20.8	20.8	17.2	53.0		21.2	57.0	57.0
Effective Green, g (s)	28.8	22.8	45.0	5.0	21.8	20.8	18.2	54.0		22.2	58.0	58.0
Actuated g/C Ratio	0.24	0.19	0.38	0.04	0.18	0.17	0.15	0.45		0.18	0.48	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5		3.0	2.5	2.5	2.5	4.8		2.5	4.8	4.8
Lane Grp Cap (vph)	180	329	543	68	314	255	247	1453		301	1560	704
v/s Ratio Prot	c0.06	0.14		0.03	0.11		0.12	0.40		c0.16	c0.49	
v/s Ratio Perm	c0.22		0.07			0.01						0.05
v/c Ratio	1.15	0.73	0.18	0.72	0.61	0.08	0.81	0.88		0.85	1.01	0.10
Uniform Delay, d1	45.2	45.7	25.1	56.8	45.2	41.6	49.3	30.1		47.3	31.0	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.83		1.00	1.00	1.00
Incremental Delay, d2	113.2	7.3	0.1	31.1	3.0	0.1	11.7	5.2		19.0	25.3	0.3
Delay (s)	158.4	53.0	25.2	87.9	48.3	41.7	59.6	30.3		66.3	56.3	17.1
Level of Service	F	D	C	F	D	D	E	C		E	E	B
Approach Delay (s)		84.0			51.3			34.2			55.1	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

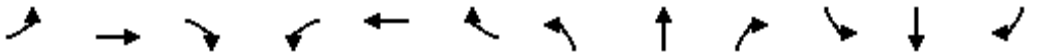
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Future Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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			*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	0.98		1.00	0.97			1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1646	1687		1646	1689			3260			3228	1488
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1646	1687		1646	1689			3260			3228	1488
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)	565	82	11	326	54	11	0	908	87	0	1332	424
RTOR Reduction (vph)	0	4	0	0	6	0	0	5	0	0	0	72
Lane Group Flow (vph)	565	89	0	326	59	0	0	990	0	0	1332	352
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	0%	1%	1%	1%	1%	2%	2%	1%	3%	0%
Turn Type	Prot	NA		Prot	NA			NA			NA	pm+ov
Protected Phases	7	4		3	8			6			2	7
Permitted Phases												2
Actuated Green, G (s)	39.0	19.0		28.4	8.4			57.6			57.6	96.6
Effective Green, g (s)	40.0	20.0		29.4	9.4			58.6			58.6	98.6
Actuated g/C Ratio	0.33	0.17		0.24	0.08			0.49			0.49	0.82
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.8			4.8	3.0
Lane Grp Cap (vph)	548	281		403	132			1591			1576	1272
v/s Ratio Prot	c0.34	0.05		0.20	c0.03			0.30			c0.41	0.09
v/s Ratio Perm												0.14
v/c Ratio	1.03	0.32		0.81	0.44			0.62			0.85	0.28
Uniform Delay, d1	40.0	44.0		42.7	52.8			22.6			26.7	2.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.49	0.00
Incremental Delay, d2	46.6	0.7		11.4	2.4			1.8			2.2	0.0
Delay (s)	86.6	44.6		54.0	55.2			24.4			15.4	0.0
Level of Service	F	D		D	E			C			B	A
Approach Delay (s)		80.7			54.2			24.4			11.7	
Approach LOS		F			D			C			B	

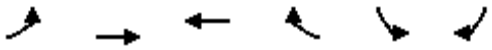
Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Future Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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			1.00	0.99	1.00		0.98
Flpb, ped/bikes					1.00			1.00	1.00	1.00		1.00
Frt					0.99			1.00	0.85	1.00		0.85
Flt Protected					1.00			1.00	1.00	0.95		1.00
Satd. Flow (prot)					1706			1731	1459	1630		1455
Flt Permitted					1.00			1.00	1.00	0.95		1.00
Satd. Flow (perm)					1706			1731	1459	1630		1455
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	0	0	0	558	63	11	474	1116	168	0	653
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	263	0	0	347
Lane Group Flow (vph)	0	0	0	0	615	0	0	485	853	168	0	306
Confl. Peds. (#/hr)	2					2	1		1	1		1
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	1%	1%	2%	0%	0%
Turn Type					NA		Split	NA	custom	Prot		Perm
Protected Phases		2			6		8	8	1	4		
Permitted Phases									2 8			4
Actuated Green, G (s)					47.5			31.0	78.5	26.5		26.5
Effective Green, g (s)					48.5			32.0	80.5	27.5		27.5
Actuated g/C Ratio					0.40			0.27	0.67	0.23		0.23
Clearance Time (s)					5.0			5.0	5.0	5.0		5.0
Vehicle Extension (s)					3.0			3.0	3.0	3.0		3.0
Lane Grp Cap (vph)					689			461	1027	373		333
v/s Ratio Prot					c0.36			c0.28	0.34	0.10		
v/s Ratio Perm									0.25			c0.21
v/c Ratio					0.89			1.05	0.83	0.45		0.92
Uniform Delay, d1					33.3			44.0	14.7	39.8		45.2
Progression Factor					0.55			1.00	1.00	1.00		1.00
Incremental Delay, d2					11.2			56.3	5.8	0.9		29.2
Delay (s)					29.5			100.3	20.5	40.6		74.4
Level of Service					C			F	C	D		E
Approach Delay (s)		0.0			29.5			44.6			67.5	
Approach LOS		A			C			D			E	

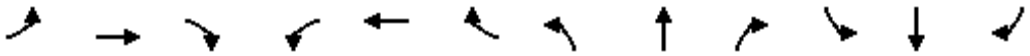
Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	800	420	260	410	30	330
Future Volume (vph)	800	420	260	410	30	330
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	0.99	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)	1646	1716	1733	1453	1568	1473
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1646	1716	1733	1453	1568	1473
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	889	467	289	456	33	367
RTOR Reduction (vph)	0	0	0	91	0	318
Lane Group Flow (vph)	889	467	289	365	33	49
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	1%	2%	1%	1%	6%	1%
Turn Type	Prot	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	7	7	
Permitted Phases				6		7
Actuated Green, G (s)	67.2	96.0	24.8	40.8	16.0	16.0
Effective Green, g (s)	67.2	96.0	24.8	40.8	16.0	16.0
Actuated g/C Ratio	0.56	0.80	0.21	0.34	0.13	0.13
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)	921	1372	358	542	209	196
v/s Ratio Prot	c0.54	0.27	c0.17	c0.09	0.02	
v/s Ratio Perm				0.16		0.03
v/c Ratio	0.97	0.34	0.81	0.67	0.16	0.25
Uniform Delay, d1	25.3	3.3	45.3	33.9	46.0	46.6
Progression Factor	0.86	1.07	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.2	0.4	17.5	6.6	1.6	3.0
Delay (s)	37.1	3.9	62.8	40.4	47.6	49.6
Level of Service	D	A	E	D	D	D
Approach Delay (s)		25.6	49.1		49.5	
Approach LOS		C	D		D	

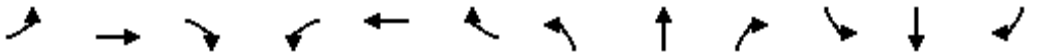
Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



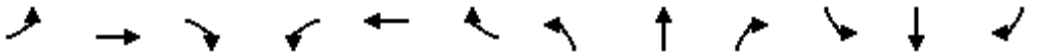
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Future Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0		4.0			
Lane Util. Factor		0.95			0.95		1.00		1.00			
Frpb, ped/bikes		1.00			0.99		1.00		1.00			
Flpb, ped/bikes		1.00			1.00		1.00		1.00			
Frt		0.98			0.94		1.00		0.85			
Flt Protected		1.00			1.00		0.95		1.00			
Satd. Flow (prot)		3210			3049		1662		1488			
Flt Permitted		1.00			1.00		0.95		1.00			
Satd. Flow (perm)		3210			3049		1662		1488			
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)	0	1806	237	0	694	484	177	0	172	0	0	0
RTOR Reduction (vph)	0	8	0	0	96	0	0	0	39	0	0	0
Lane Group Flow (vph)	0	2035	0	0	1082	0	177	0	133	0	0	0
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA		Prot		Perm			
Protected Phases		2			6		3					
Permitted Phases									8			
Actuated Green, G (s)		93.5			93.5		16.5		16.5			
Effective Green, g (s)		94.5			94.5		17.5		17.5			
Actuated g/C Ratio		0.79			0.79		0.15		0.15			
Clearance Time (s)		5.0			5.0		5.0		5.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2527			2401		242		217			
v/s Ratio Prot		c0.63			0.35		c0.11					
v/s Ratio Perm									0.09			
v/c Ratio		0.81			0.45		0.73		0.61			
Uniform Delay, d1		7.4			4.2		49.0		48.1			
Progression Factor		0.77			1.00		1.00		1.00			
Incremental Delay, d2		1.6			0.1		10.8		5.0			
Delay (s)		7.3			4.3		59.8		53.1			
Level of Service		A			A		E		D			
Approach Delay (s)		7.3			4.3			56.5			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



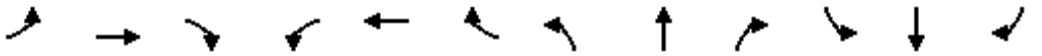
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Future Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	6.0
Lane Util. Factor	1.00	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	0.99	1.00	1.00	0.99	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	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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	237	279	26	374	500	121	126	237	132	158	674	168
RTOR Reduction (vph)	0	0	20	0	0	81	0	0	112	0	0	125
Lane Group Flow (vph)	237	279	6	374	500	40	126	237	20	158	674	43
Confl. Peds. (#/hr)	1					1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	0%	0%	1%	6%	0%	5%	4%	0%	5%	7%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	19.2	28.1	28.1	29.4	38.3	38.3	10.8	17.8	17.8	23.7	30.7	30.7
Effective Green, g (s)	20.2	29.1	29.1	30.4	39.3	39.3	11.8	19.8	17.8	24.7	32.7	30.7
Actuated g/C Ratio	0.17	0.24	0.24	0.25	0.33	0.33	0.10	0.17	0.15	0.21	0.27	0.26
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	424	355	416	540	480	155	527	215	325	846	362
v/s Ratio Prot	0.14	0.16		c0.23	c0.30		c0.08	0.07		0.10	c0.22	
v/s Ratio Perm			0.00			0.03			0.01			0.03
v/c Ratio	0.86	0.66	0.02	0.90	0.93	0.08	0.81	0.45	0.09	0.49	0.80	0.12
Uniform Delay, d1	48.5	41.0	34.6	43.3	38.9	27.9	53.0	45.2	44.1	42.0	40.6	34.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.34	1.42	7.57	1.00	1.00	1.00
Incremental Delay, d2	21.9	3.7	0.0	21.5	21.9	0.1	24.4	2.5	0.8	1.1	5.3	0.1
Delay (s)	70.4	44.6	34.6	64.9	60.9	28.0	95.7	66.9	334.8	43.2	45.8	34.4
Level of Service	E	D	C	E	E	C	F	E	F	D	D	C
Approach Delay (s)		55.4			58.4			145.6			43.5	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	67.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



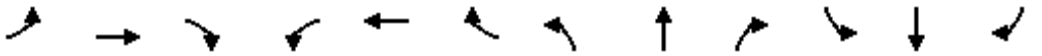
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Future Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		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	0.98		1.00	0.89		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	1718		1658	1528		1662	1750	1462	1614	1745	
Flt Permitted	0.51	1.00		0.34	1.00		0.57	1.00	1.00	0.31	1.00	
Satd. Flow (perm)	898	1718		601	1528		999	1750	1462	529	1745	
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)	17	150	17	661	122	306	50	228	606	194	306	6
RTOR Reduction (vph)	0	3	0	0	77	0	0	0	125	0	1	0
Lane Group Flow (vph)	17	164	0	661	351	0	50	228	481	194	311	0
Confl. Peds. (#/hr)			5	5					1	1		
Confl. Bikes (#/hr)						2			1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	1%	3%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA	
Protected Phases		8		7	4			6	7	5	2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	14.5	14.5		61.4	61.4		19.8	19.8	61.7	34.0	34.0	
Effective Green, g (s)	15.5	15.5		62.4	62.4		20.8	20.8	63.7	35.0	35.0	
Actuated g/C Ratio	0.15	0.15		0.59	0.59		0.20	0.20	0.60	0.33	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.5	2.5		3.0	4.0		5.2	5.2	3.0	3.0	5.2	
Lane Grp Cap (vph)	132	252		786	904		197	345	939	280	579	
v/s Ratio Prot		0.10		c0.34	0.23			0.13	0.21	c0.07	0.18	
v/s Ratio Perm	0.02			c0.16			0.05		0.12	c0.16		
v/c Ratio	0.13	0.65		0.84	0.39		0.25	0.66	0.51	0.69	0.54	
Uniform Delay, d1	39.1	42.4		16.7	11.4		35.7	39.0	12.0	27.6	28.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	5.0		8.1	0.4		1.5	6.4	0.5	7.2	1.9	
Delay (s)	39.4	47.4		24.8	11.8		37.3	45.4	12.4	34.8	30.5	
Level of Service	D	D		C	B		D	D	B	C	C	
Approach Delay (s)		46.7			19.7			22.3			32.1	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	105.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



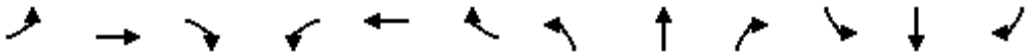
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Future Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00			1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1646	1716	1431	1589	1692			1719	1473	1662	1667	1466
Flt Permitted	0.12	1.00	1.00	0.54	1.00			0.87	1.00	0.22	1.00	1.00
Satd. Flow (perm)	208	1716	1431	908	1692			1520	1473	387	1667	1466
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)	289	367	294	22	544	100	161	283	244	122	28	383
RTOR Reduction (vph)	0	0	135	0	5	0	0	0	73	0	0	103
Lane Group Flow (vph)	289	367	159	22	639	0	0	444	171	122	28	280
Confl. Peds. (#/hr)			7	7								
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	1%	2%	0%	4%	1%	1%	0%	0%	1%	0%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	1	6		5	2			8			4	1
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)	67.8	60.6	60.6	49.1	46.9			36.6	36.6	36.6	36.6	52.5
Effective Green, g (s)	68.8	61.6	61.6	51.1	47.9			37.6	37.6	37.6	37.6	54.5
Actuated g/C Ratio	0.60	0.54	0.54	0.45	0.42			0.33	0.33	0.33	0.33	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5			2.0	2.0	2.0	2.0	3.0
Lane Grp Cap (vph)	337	924	770	424	708			499	484	127	547	749
v/s Ratio Prot	c0.13	0.21		0.00	c0.38						0.02	0.06
v/s Ratio Perm	0.39		0.11	0.02				0.29	0.12	c0.32		0.14
v/c Ratio	0.86	0.40	0.21	0.05	0.90			0.89	0.35	0.96	0.05	0.37
Uniform Delay, d1	27.6	15.5	13.7	17.8	31.1			36.4	29.2	37.7	26.2	19.1
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	18.9	0.2	0.1	0.1	14.8			17.0	0.2	67.1	0.0	0.3
Delay (s)	46.4	15.7	13.8	17.8	45.8			53.4	29.3	104.7	26.2	19.4
Level of Service	D	B	B	B	D			D	C	F	C	B
Approach Delay (s)		24.5			44.9			44.9			39.3	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.8%	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												
Traffic Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Future Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		1.00			1.00	0.98				1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00				1.00	1.00	
Frt		0.98			1.00	0.85				1.00	0.92	
Flt Protected		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (prot)		3196			1716	1436				1548	1467	
Flt Permitted		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (perm)		3196			1716	1436				1548	1467	
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	1313	170	0	835	55	0	0	0	775	0	264
RTOR Reduction (vph)	0	47	0	0	0	4	0	0	0	0	35	0
Lane Group Flow (vph)	0	1436	0	0	835	51	0	0	0	535	469	0
Confl. Peds. (#/hr)	2		1	1		2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type		NA			NA	pm+ov				Split	NA	
Protected Phases		2			6	4				4	4	
Permitted Phases						6						
Actuated Green, G (s)		62.6			62.6	110.0				47.4	47.4	
Effective Green, g (s)		63.6			63.6	112.0				48.4	48.4	
Actuated g/C Ratio		0.53			0.53	0.93				0.40	0.40	
Clearance Time (s)		5.0			5.0	5.0				5.0	5.0	
Vehicle Extension (s)		5.2			5.2	3.0				3.0	3.0	
Lane Grp Cap (vph)		1693			909	1436				624	591	
v/s Ratio Prot		0.45			c0.49	0.01				c0.35	0.32	
v/s Ratio Perm						0.02						
v/c Ratio		0.85			0.92	0.04				0.86	0.79	
Uniform Delay, d1		24.1			25.8	0.3				32.7	31.4	
Progression Factor		1.00			0.91	1.00				1.00	1.00	
Incremental Delay, d2		5.5			14.2	0.0				11.2	7.2	
Delay (s)		29.6			37.8	0.3				43.9	38.6	
Level of Service		C			D	A				D	D	
Approach Delay (s)		29.6			35.5			0.0			41.3	
Approach LOS		C			D			A			D	

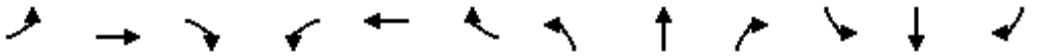
Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Future Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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		0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	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	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1750	1488	1646	1458		3225	3018		1511	3115	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1750	1488	1646	1458		3225	3018		1511	3115	
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)	76	212	60	76	87	92	342	332	141	386	908	71
RTOR Reduction (vph)	0	0	50	0	35	0	0	33	0	0	4	0
Lane Group Flow (vph)	76	212	10	76	144	0	342	440	0	386	975	0
Confl. Peds. (#/hr)	1					1			4	4		
Heavy Vehicles (%)	2%	0%	0%	1%	9%	11%	0%	3%	7%	10%	6%	0%
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4	4	3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.2	19.8	19.8	7.2	19.8		20.1	37.7		34.3	51.9	
Effective Green, g (s)	8.2	20.8	20.8	8.2	20.8		21.1	39.7		35.3	53.9	
Actuated g/C Ratio	0.07	0.17	0.17	0.07	0.17		0.18	0.33		0.29	0.45	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	
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)	111	303	257	112	252		567	998		444	1399	
v/s Ratio Prot	c0.05	c0.12	0.01	0.05	0.10		c0.11	0.15		c0.26	c0.31	
v/s Ratio Perm												
v/c Ratio	0.68	0.70	0.04	0.68	0.57		0.60	0.44		0.87	0.70	
Uniform Delay, d1	54.6	46.7	41.3	54.6	45.5		45.6	31.5		40.2	26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.73	0.42	
Incremental Delay, d2	16.1	6.9	0.1	15.1	3.1		1.8	1.4		13.3	1.2	
Delay (s)	70.7	53.6	41.4	69.7	48.6		47.4	32.9		42.6	12.3	
Level of Service	E	D	D	E	D		D	C		D	B	
Approach Delay (s)		55.2			54.9			39.0			20.9	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

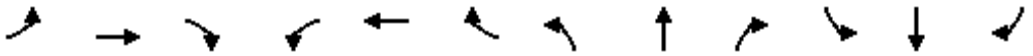
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Future Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
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	0.97		1.00	0.97		1.00	0.99		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)	1646	1682		1662	1688		1662	3187		1662	3205	
Flt Permitted	0.10	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	169	1682		244	1688		1662	3187		1662	3205	
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)	153	332	97	153	362	97	112	1321	112	143	1138	46
RTOR Reduction (vph)	0	7	0	0	7	0	0	4	0	0	2	0
Lane Group Flow (vph)	153	422	0	153	452	0	112	1429	0	143	1182	0
Confl. Peds. (#/hr)	3		5	5		3	4		1	1		4
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	2%	0%	3%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	50.0	40.0		48.0	39.0		12.3	68.0		13.0	68.7	
Effective Green, g (s)	52.0	41.0		50.0	40.0		13.3	69.0		14.0	69.7	
Actuated g/C Ratio	0.35	0.27		0.33	0.27		0.09	0.46		0.09	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	4.8		2.5	4.8	
Lane Grp Cap (vph)	166	459		175	450		147	1466		155	1489	
v/s Ratio Prot	c0.07	0.25		0.06	c0.27		0.07	c0.45		c0.09	0.37	
v/s Ratio Perm	0.25			0.23								
v/c Ratio	0.92	0.92		0.87	1.01		0.76	0.97		0.92	0.79	
Uniform Delay, d1	39.9	52.9		40.4	55.0		66.8	39.6		67.5	34.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.4	25.9		34.8	43.8		19.7	18.2		49.7	4.4	
Delay (s)	87.4	78.8		75.2	98.8		86.5	57.8		117.2	38.5	
Level of Service	F	E		E	F		F	E		F	D	
Approach Delay (s)		81.1			92.9			59.9			47.0	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	63.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		

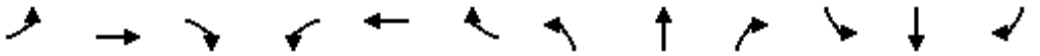
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Future Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.96		1.00	0.95		1.00	0.97		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)	1599	3151		1646	3093		1646	3169		1583	3235	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3151		1646	3093		1646	3169		1583	3235	
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)	312	880	312	370	599	271	245	974	260	344	995	109
RTOR Reduction (vph)	0	23	0	0	33	0	0	15	0	0	5	0
Lane Group Flow (vph)	313	1170	0	370	837	0	245	1219	0	344	1099	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	28.0	42.0		24.0	38.0		20.0	49.0		25.0	54.0	
Effective Green, g (s)	29.0	43.0		25.0	39.0		21.0	50.0		26.0	55.0	
Actuated g/C Ratio	0.18	0.27		0.16	0.24		0.13	0.31		0.16	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	289	846		257	753		216	990		257	1112	
v/s Ratio Prot	0.20	c0.37		c0.22	0.27		0.15	c0.38		c0.22	0.34	
v/s Ratio Perm												
v/c Ratio	1.08	1.38		1.44	1.11		1.13	1.23		1.34	0.99	
Uniform Delay, d1	65.5	58.5		67.5	60.5		69.5	55.0		67.0	52.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	76.9	179.9		218.6	68.1		102.1	113.0		176.3	23.9	
Delay (s)	142.4	238.4		286.1	128.6		171.6	168.0		243.3	76.1	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		218.4			175.6			168.6			115.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	169.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	127.2%	ICU Level of Service	H
Analysis Period (min)	15		

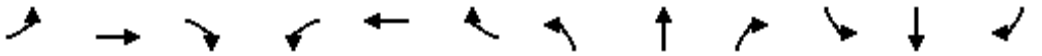
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Future Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
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	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	0.98		1.00	0.96		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)	1646	3375		1646	3274		1646	1661		1706	1669	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3375		1646	3274		1646	1661		1706	1669	
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)	207	1197	80	229	1074	176	117	378	138	346	564	80
RTOR Reduction (vph)	0	4	0	0	12	0	0	11	0	0	5	0
Lane Group Flow (vph)	207	1273	0	229	1238	0	117	505	0	346	639	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	11.0	38.0		12.0	39.0		7.0	28.0		17.0	38.0	
Effective Green, g (s)	12.0	39.0		13.0	40.0		8.0	29.0		18.0	39.0	
Actuated g/C Ratio	0.10	0.34		0.11	0.35		0.07	0.25		0.16	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	171	1144		186	1138		114	418		267	566	
v/s Ratio Prot	0.13	0.38		c0.14	c0.38		0.07	0.30		c0.20	c0.38	
v/s Ratio Perm												
v/c Ratio	1.21	1.11		1.23	1.09		1.03	1.21		1.30	1.13	
Uniform Delay, d1	51.5	38.0		51.0	37.5		53.5	43.0		48.5	38.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	136.7	63.2		141.8	54.0		91.5	114.0		158.0	78.8	
Delay (s)	188.2	101.2		192.8	91.5		145.0	157.0		206.5	116.8	
Level of Service	F	F		F	F		F	F		F	F	
Approach Delay (s)		113.4			107.2			154.8			148.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	124.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

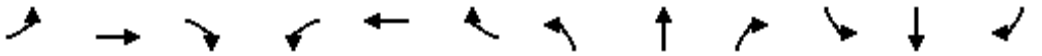
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Future Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		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	0.99		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)	1662	3166		1662	3231		1614	1733	1442	1662	1716	1448
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)	1662	3166		1662	3231		1614	1733	1442	1662	1716	1448
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)	305	1337	132	126	1095	63	142	221	121	111	300	268
RTOR Reduction (vph)	0	6	0	0	4	0	0	0	101	0	0	217
Lane Group Flow (vph)	305	1463	0	126	1154	0	142	221	20	111	300	51
Confl. Peds. (#/hr)	5		11	11		5	3		6	6		3
Heavy Vehicles (%)	0%	3%	4%	0%	2%	0%	3%	1%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	22.2	59.3		9.0	46.1		10.0	19.4	19.4	12.3	21.7	21.7
Effective Green, g (s)	23.2	60.3		10.0	47.1		11.0	20.4	19.4	13.3	22.7	22.7
Actuated g/C Ratio	0.19	0.50		0.08	0.39		0.09	0.17	0.16	0.11	0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	321	1590		138	1268		147	294	233	184	324	273
v/s Ratio Prot	0.18	c0.46		0.08	c0.36		c0.09	0.13		0.07	c0.17	
v/s Ratio Perm									0.01			0.04
v/c Ratio	0.95	0.92		0.91	0.91		0.97	0.75	0.08	0.60	0.93	0.19
Uniform Delay, d1	47.8	27.6		54.6	34.5		54.3	47.4	42.7	50.8	47.8	40.9
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	37.1	10.2		50.9	11.3		63.3	9.9	0.1	4.6	31.3	0.2
Delay (s)	84.9	37.8		105.5	45.7		117.7	57.3	42.9	55.5	79.1	41.1
Level of Service	F	D		F	D		F	E	D	E	E	D
Approach Delay (s)		45.9			51.6			71.4			60.2	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.7%	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												
Traffic Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Future Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
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)	359	734	266	240	474	62	318	625	297	208	953	349
RTOR Reduction (vph)	0	0	40	0	9	0	0	52	0	0	0	0
Lane Group Flow (vph)	359	734	226	240	528	0	318	870	0	208	953	349
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2									Free
Actuated Green, G (s)	19.0	27.7	44.8	16.2	24.9		17.1	33.0		13.1	29.0	110.0
Effective Green, g (s)	20.0	28.7	46.8	17.2	25.9		18.1	34.0		14.1	30.0	110.0
Actuated g/C Ratio	0.18	0.26	0.43	0.16	0.24		0.16	0.31		0.13	0.27	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	296	842	619	257	745		270	962		213	897	1467
v/s Ratio Prot	c0.22	c0.23	0.06	c0.15	0.17		c0.19	c0.28		0.13	c0.29	
v/s Ratio Perm			0.10									0.24
v/c Ratio	1.21	0.87	0.37	0.93	0.71		1.18	0.90		0.98	1.06	0.24
Uniform Delay, d1	45.0	38.9	21.5	45.8	38.6		46.0	36.4		47.8	40.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.21	0.59	1.00
Incremental Delay, d2	122.8	10.7	0.3	38.4	2.9		111.6	13.5		43.1	42.8	0.3
Delay (s)	167.8	49.6	21.8	84.2	41.5		157.6	49.9		101.0	66.3	0.3
Level of Service	F	D	C	F	D		F	D		F	E	A
Approach Delay (s)		75.4			54.7			77.5			55.8	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	66.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1495	195	245	1235	250	270
Future Volume (vph)	1495	195	245	1235	250	270
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	0.95	1.00	1.00	0.95	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	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3260	1458	1662	3260	1646	1488
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3260	1458	1662	3260	1646	1488
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1625	212	266	1342	272	293
RTOR Reduction (vph)	0	76	0	0	0	243
Lane Group Flow (vph)	1625	136	266	1342	272	50
Confl. Peds. (#/hr)					1	2
Heavy Vehicles (%)	2%	2%	0%	2%	1%	0%
Turn Type	NA	Perm	Prot	NA	Prot	Over
Protected Phases	2		1	6	8	1
Permitted Phases		2				
Actuated Green, G (s)	56.2	56.2	18.0	79.2	22.8	18.0
Effective Green, g (s)	57.2	57.2	19.0	80.2	23.8	19.0
Actuated g/C Ratio	0.51	0.51	0.17	0.72	0.21	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	5.0	5.0	2.6	5.0	2.6	2.6
Lane Grp Cap (vph)	1664	744	281	2334	349	252
v/s Ratio Prot	c0.50		c0.16	0.41	c0.17	0.03
v/s Ratio Perm		0.09				
v/c Ratio	0.98	0.18	0.95	0.57	0.78	0.20
Uniform Delay, d1	26.7	14.8	46.0	7.7	41.6	39.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8	0.2	39.1	0.6	10.2	0.3
Delay (s)	43.6	15.0	85.1	8.2	51.8	40.2
Level of Service	D	B	F	A	D	D
Approach Delay (s)	40.3			20.9	45.8	
Approach LOS	D			C	D	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Intersection Delay, s/veh	10.0
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	635	705	300	20
Demand Flow Rate, veh/h	649	714	302	20
Vehicles Circulating, veh/h	116	222	561	919
Vehicles Exiting, veh/h	823	641	204	17
Ped Vol Crossing Leg, #/h	1	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	9.0	11.9	8.1	5.8
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	649	714	302	20
Cap Entry Lane, veh/h	1220	1125	869	661
Entry HV Adj Factor	0.979	0.987	0.993	1.000
Flow Entry, veh/h	635	705	300	20
Cap Entry, veh/h	1194	1111	863	661
V/C Ratio	0.532	0.634	0.348	0.030
Control Delay, s/veh	9.0	11.9	8.1	5.8
LOS	A	B	A	A
95th %tile Queue, veh	3	5	2	0

Intersection	
Intersection Delay, s/veh	13.4
Intersection LOS	B

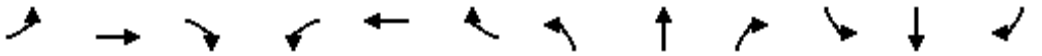
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	665	390	425	670
Demand Flow Rate, veh/h	669	390	428	681
Vehicles Circulating, veh/h	364	553	741	405
Vehicles Exiting, veh/h	722	616	292	538
Ped Vol Crossing Leg, #/h	3	3	3	3
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	13.7	9.6	13.7	15.3
Approach LOS	B	A	B	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	669	390	428	681
Cap Entry Lane, veh/h	1010	874	757	979
Entry HV Adj Factor	0.994	1.000	0.993	0.984
Flow Entry, veh/h	665	390	425	670
Cap Entry, veh/h	1003	874	752	963
V/C Ratio	0.663	0.446	0.566	0.696
Control Delay, s/veh	13.7	9.6	13.7	15.3
LOS	B	A	B	C
95th %tile Queue, veh	5	2	4	6

Intersection	
Intersection Delay, s/veh	30.1
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	125	640	430	970
Demand Flow Rate, veh/h	125	646	437	982
Vehicles Circulating, veh/h	1277	366	465	416
Vehicles Exiting, veh/h	121	536	937	596
Ped Vol Crossing Leg, #/h	0	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.8	13.0	9.6	52.9
Approach LOS	B	B	A	F

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	125	646	437	982
Cap Entry Lane, veh/h	503	1008	935	970
Entry HV Adj Factor	1.000	0.990	0.984	0.988
Flow Entry, veh/h	125	640	430	970
Cap Entry, veh/h	503	998	920	959
V/C Ratio	0.249	0.641	0.468	1.012
Control Delay, s/veh	10.8	13.0	9.6	52.9
LOS	B	B	A	F
95th %tile Queue, veh	1	5	3	20



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	115	235	370	45	150	20	180	515	45	35	1005	205
Future Volume (vph)	115	235	370	45	150	20	180	515	45	35	1005	205
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	0.95		1.00	0.95	
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	0.85	1.00	0.98		1.00	0.99		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)	1661	1716	1488	1662	1717		1646	3191		1662	3173	
Flt Permitted	0.51	1.00	1.00	0.38	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	898	1716	1488	657	1717		1646	3191		1662	3173	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	115	235	370	45	150	20	180	515	45	35	1005	205
RTOR Reduction (vph)	0	0	172	0	6	0	0	4	0	0	14	0
Lane Group Flow (vph)	115	235	198	45	164	0	180	556	0	35	1196	0
Confl. Peds. (#/hr)	1					1	3		1	1		3
Heavy Vehicles (%)	0%	2%	0%	0%	0%	0%	1%	3%	0%	0%	2%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Prot	NA		Prot	NA	
Protected Phases		8			4		1	6		5	2	
Permitted Phases	8		8	4								
Actuated Green, G (s)	20.5	20.5	20.5	20.5	20.5		16.2	61.4		4.9	50.1	
Effective Green, g (s)	20.5	20.5	20.5	20.5	20.5		16.2	62.6		4.9	51.3	
Actuated g/C Ratio	0.20	0.20	0.20	0.20	0.20		0.16	0.63		0.05	0.51	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	5.2		4.0	5.2	
Vehicle Extension (s)	3.5	3.5	3.5	3.5	3.5		2.5	5.2		2.5	5.2	
Lane Grp Cap (vph)	184	351	305	134	351		266	1997		81	1627	
v/s Ratio Prot		c0.14			0.10		c0.11	0.17		0.02	c0.38	
v/s Ratio Perm	0.13		0.13	0.07								
v/c Ratio	0.62	0.67	0.65	0.34	0.47		0.68	0.28		0.43	0.74	
Uniform Delay, d1	36.2	36.6	36.5	33.9	34.9		39.4	8.5		46.2	19.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.8	5.0	5.1	1.8	1.2		6.1	0.3		2.7	3.0	
Delay (s)	43.0	41.6	41.6	35.7	36.1		45.5	8.8		48.9	22.0	
Level of Service	D	D	D	D	D		D	A		D	C	
Approach Delay (s)		41.8			36.0			17.7			22.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	27.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	83.2%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

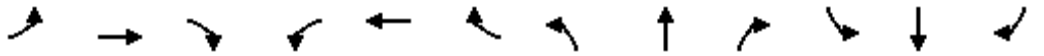
Intersection	
Int Delay, s/veh	5.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	185	130	50	255	190	165
Future Vol, veh/h	185	130	50	255	190	165
Conflicting Peds, #/hr	1	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	50	0	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	3	4	3	3	5	2
Mvmt Flow	185	130	50	255	190	165

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	629	273	355	0	-	0
Stage 1	273	-	-	-	-	-
Stage 2	356	-	-	-	-	-
Critical Hdwy	6.43	6.24	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.336	2.227	-	-	-
Pot Cap-1 Maneuver	445	761	1198	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	707	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	423	761	1198	-	-	-
Mov Cap-2 Maneuver	423	-	-	-	-	-
Stage 1	733	-	-	-	-	-
Stage 2	707	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.2	1.3	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1198	-	423	761	-	-
HCM Lane V/C Ratio	0.042	-	0.437	0.171	-	-
HCM Control Delay (s)	8.1	0	20	10.7	-	-
HCM Lane LOS	A	A	C	B	-	-
HCM 95th %tile Q(veh)	0.1	-	2.2	0.6	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	15	20	80	25	35	20	600	35	30	1160	95
Future Volume (vph)	70	15	20	80	25	35	20	600	35	30	1160	95
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
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	0.91			1.00	0.85	1.00	0.99		1.00	0.99	
Flt Protected	0.95	1.00			0.96	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1629	1587			1643	1469	1498	3202		1662	3222	
Flt Permitted	0.63	1.00			0.75	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1084	1587			1286	1469	1498	3202		1662	3222	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	15	20	80	25	35	20	600	35	30	1160	95
RTOR Reduction (vph)	0	18	0	0	0	31	0	2	0	0	3	0
Lane Group Flow (vph)	70	17	0	0	105	4	20	633	0	30	1252	0
Confl. Peds. (#/hr)	1		2	2		1	1		3	3		1
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	2%	0%	0%	2%	4%	0%	11%	3%	0%	0%	2%	0%
Turn Type	Perm	NA		Perm	NA	Perm	Prot	NA		Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8		8						
Actuated Green, G (s)	10.4	10.4			10.4	10.4	2.0	60.9		4.3	63.2	
Effective Green, g (s)	10.9	10.9			10.9	10.9	2.5	62.3		4.8	64.6	
Actuated g/C Ratio	0.12	0.12			0.12	0.12	0.03	0.69		0.05	0.72	
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5	5.4		4.5	5.4	
Vehicle Extension (s)	4.0	4.0			4.0	4.0	4.0	4.2		2.5	4.7	
Lane Grp Cap (vph)	131	192			155	177	41	2216		88	2312	
v/s Ratio Prot		0.01					0.01	0.20		c0.02	c0.39	
v/s Ratio Perm	0.06				c0.08	0.00						
v/c Ratio	0.53	0.09			0.68	0.02	0.49	0.29		0.34	0.54	
Uniform Delay, d1	37.2	35.1			37.9	34.9	43.1	5.3		41.1	5.9	
Progression Factor	1.00	1.00			1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	5.3	0.3			12.1	0.1	11.9	0.3		1.7	0.9	
Delay (s)	42.4	35.4			50.0	34.9	55.0	5.6		42.8	6.8	
Level of Service	D	D			D	C	E	A		D	A	
Approach Delay (s)		40.1			46.2			7.1			7.6	
Approach LOS		D			D			A			A	

Intersection Summary			
HCM 2000 Control Delay	11.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	58.2%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4.6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	15	5	40	5	5	35	140	530	5	55	1085	70
Future Vol, veh/h	15	5	40	5	5	35	140	530	5	55	1085	70
Conflicting Peds, #/hr	0	0	0	0	0	0	1	0	4	4	0	1
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	110	-	115	15	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	3	1	3	17	2	2	0
Mvmt Flow	15	5	40	5	5	35	140	530	5	55	1085	70

Major/Minor	Minor2			Minor1			Major1			Major2		
Conflicting Flow All	1779	2050	579	1472	2083	272	1156	0	0	539	0	0
Stage 1	1231	1231	-	817	817	-	-	-	-	-	-	-
Stage 2	548	819	-	655	1266	-	-	-	-	-	-	-
Critical Hdwy	7.5	6.5	6.9	7.5	6.5	6.96	4.12	-	-	4.14	-	-
Critical Hdwy Stg 1	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.5	5.5	-	6.5	5.5	-	-	-	-	-	-	-
Follow-up Hdwy	3.5	4	3.3	3.5	4	3.33	2.21	-	-	2.22	-	-
Pot Cap-1 Maneuver	53	56	463	90	54	723	606	-	-	1025	-	-
Stage 1	191	252	-	341	393	-	-	-	-	-	-	-
Stage 2	493	392	-	426	242	-	-	-	-	-	-	-
Platoon blocked, %								-	-		-	-
Mov Cap-1 Maneuver	36	41	463	59	39	721	605	-	-	1022	-	-
Mov Cap-2 Maneuver	36	41	-	59	39	-	-	-	-	-	-	-
Stage 1	147	238	-	261	301	-	-	-	-	-	-	-
Stage 2	355	301	-	361	229	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	91	33.2	2.6	0.4
HCM LOS	F	D		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	605	-	-	96	172	1022	-	-
HCM Lane V/C Ratio	0.231	-	-	0.625	0.262	0.054	-	-
HCM Control Delay (s)	12.7	-	-	91	33.2	8.7	-	-
HCM Lane LOS	B	-	-	F	D	A	-	-
HCM 95th %tile Q(veh)	0.9	-	-	3	1	0.2	-	-

Intersection	
Int Delay, s/veh	3.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	300	50	180	420	10	160
Future Vol, veh/h	300	50	180	420	10	160
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	150	0	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	1	0	3
Mvmt Flow	300	50	180	420	10	160

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	350	0	1080	300
Stage 1	-	-	-	-	300	-
Stage 2	-	-	-	-	780	-
Critical Hdwy	-	-	4.1	-	6.4	6.23
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.327
Pot Cap-1 Maneuver	-	-	1220	-	244	737
Stage 1	-	-	-	-	756	-
Stage 2	-	-	-	-	455	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1220	-	208	737
Mov Cap-2 Maneuver	-	-	-	-	243	-
Stage 1	-	-	-	-	644	-
Stage 2	-	-	-	-	455	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.5	11.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	243	737	-	-	1220	-
HCM Lane V/C Ratio	0.041	0.217	-	-	0.148	-
HCM Control Delay (s)	20.5	11.2	-	-	8.5	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.1	0.8	-	-	0.5	-

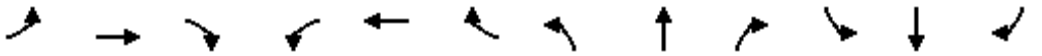
Intersection	
Int Delay, s/veh	8.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	5	480	50	135	590	60	35	5	110	35	5	15
Future Vol, veh/h	5	480	50	135	590	60	35	5	110	35	5	15
Conflicting Peds, #/hr	3	0	0	0	0	3	2	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	25	0	0	0	0	0	6	0	0	0	0	0
Mvmt Flow	5	480	50	135	590	60	35	5	110	35	5	15

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	653	0	0	530	0	0	1417	1438	505	1466	1433	625
Stage 1	-	-	-	-	-	-	515	515	-	893	893	-
Stage 2	-	-	-	-	-	-	902	923	-	573	540	-
Critical Hdwy	4.35	-	-	4.1	-	-	7.16	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.16	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.16	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.425	-	-	2.2	-	-	3.554	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	834	-	-	1048	-	-	112	134	571	107	135	488
Stage 1	-	-	-	-	-	-	535	538	-	339	363	-
Stage 2	-	-	-	-	-	-	327	351	-	508	524	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	832	-	-	1048	-	-	88	105	571	70	106	486
Mov Cap-2 Maneuver	-	-	-	-	-	-	88	105	-	70	106	-
Stage 1	-	-	-	-	-	-	530	533	-	335	288	-
Stage 2	-	-	-	-	-	-	247	279	-	403	519	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.5	43.9	85.4
HCM LOS			E	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	235	832	-	-	1048	-	-	95
HCM Lane V/C Ratio	0.638	0.006	-	-	0.129	-	-	0.579
HCM Control Delay (s)	43.9	9.4	0	-	8.9	0	-	85.4
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.9	0	-	-	0.4	-	-	2.7



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	125	585	100	235	315	95	325	715	275	115	1080	175
Future Volume (vph)	125	585	100	235	315	95	325	715	275	115	1080	175
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	0.99		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	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)	1614	3142		1630	3128		1646	3085		1630	3260	1444
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1614	3142		1630	3128		1646	3085		1630	3260	1444
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	125	585	100	235	315	95	325	715	275	115	1080	175
RTOR Reduction (vph)	0	9	0	0	16	0	0	25	0	0	0	65
Lane Group Flow (vph)	125	676	0	235	394	0	325	965	0	115	1080	110
Confl. Peds. (#/hr)	2		1	1		2	1		9	9		1
Confl. Bikes (#/hr)									1			
Heavy Vehicles (%)	3%	3%	5%	2%	2%	3%	1%	3%	1%	2%	2%	2%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	3	8		7	4		1	6		5	2	3
Permitted Phases												2
Actuated Green, G (s)	14.9	34.3		25.1	44.5		28.1	59.4		13.2	44.5	59.4
Effective Green, g (s)	15.4	34.8		25.6	45.0		28.6	59.9		13.7	45.0	60.4
Actuated g/C Ratio	0.10	0.23		0.17	0.30		0.19	0.40		0.09	0.30	0.40
Clearance Time (s)	4.5	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	4.3		2.5	4.3	2.5
Lane Grp Cap (vph)	165	728		278	938		313	1231		148	978	619
v/s Ratio Prot	0.08	c0.22		c0.14	0.13		c0.20	0.31		0.07	c0.33	0.02
v/s Ratio Perm												0.06
v/c Ratio	0.76	0.93		0.85	0.42		1.04	0.78		0.78	1.10	0.18
Uniform Delay, d1	65.5	56.4		60.3	42.0		60.7	39.4		66.7	52.5	28.8
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.1	17.9		20.1	0.2		61.2	5.0		21.4	61.7	0.1
Delay (s)	82.6	74.3		80.4	42.3		121.9	44.4		88.0	114.2	28.9
Level of Service	F	E		F	D		F	D		F	F	C
Approach Delay (s)		75.6			56.2			63.6			101.1	
Approach LOS		E			E			E			F	

Intersection Summary			
HCM 2000 Control Delay	77.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.7%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	9.9
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	115	575	580	460
Demand Flow Rate, veh/h	115	591	593	467
Vehicles Circulating, veh/h	648	358	249	361
Vehicles Exiting, veh/h	180	484	514	587
Ped Vol Crossing Leg, #/h	3	0	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	5.9	11.5	9.9	9.0
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	115	591	593	467
Cap Entry Lane, veh/h	813	1014	1102	1012
Entry HV Adj Factor	1.000	0.973	0.978	0.985
Flow Entry, veh/h	115	575	580	460
Cap Entry, veh/h	812	987	1078	997
V/C Ratio	0.142	0.583	0.538	0.461
Control Delay, s/veh	5.9	11.5	9.9	9.0
LOS	A	B	A	A
95th %tile Queue, veh	0	4	3	2

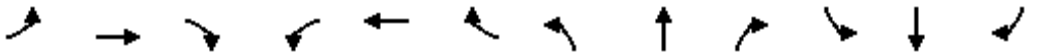
Intersection	
Int Delay, s/veh	6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	180	45	105	300	440	135
Future Vol, veh/h	180	45	105	300	440	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	100	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	1	0	0	0	2	0
Mvmt Flow	180	45	105	300	440	135

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1018	508	575	0	-	0
Stage 1	508	-	-	-	-	-
Stage 2	510	-	-	-	-	-
Critical Hdwy	6.41	6.2	4.1	-	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.3	2.2	-	-	-
Pot Cap-1 Maneuver	264	569	1008	-	-	-
Stage 1	606	-	-	-	-	-
Stage 2	605	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	237	569	1008	-	-	-
Mov Cap-2 Maneuver	345	-	-	-	-	-
Stage 1	543	-	-	-	-	-
Stage 2	605	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	28.1	2.3	0
HCM LOS	D		

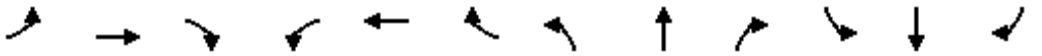
Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1008	-	374	-	-
HCM Lane V/C Ratio	0.104	-	0.602	-	-
HCM Control Delay (s)	9	-	28.1	-	-
HCM Lane LOS	A	-	D	-	-
HCM 95th %tile Q(veh)	0.3	-	3.8	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	345	595	5	15	515	185	10	15	5	210	15	460
Future Volume (vph)	345	595	5	15	515	185	10	15	5	210	15	460
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	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		1.00	1.00	0.85		0.98			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (prot)	1630	1730		1662	1733	1430		1676			1626	1458
Flt Permitted	0.95	1.00		0.95	1.00	1.00		0.98			0.96	1.00
Satd. Flow (perm)	1630	1730		1662	1733	1430		1676			1626	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	345	595	5	15	515	185	10	15	5	210	15	460
RTOR Reduction (vph)	0	0	0	0	0	97	0	5	0	0	0	360
Lane Group Flow (vph)	345	600	0	15	515	88	0	25	0	0	225	100
Confl. Peds. (#/hr)			8	8			1		1	1		1
Heavy Vehicles (%)	2%	1%	0%	0%	1%	4%	0%	0%	0%	3%	0%	2%
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA		Split	NA	Over
Protected Phases	5	2		1	6		8	8		4	4	5
Permitted Phases						6						
Actuated Green, G (s)	20.3	54.3		1.8	35.8	35.8		4.3			17.4	20.3
Effective Green, g (s)	21.3	55.3		2.8	36.8	36.8		5.3			18.4	21.3
Actuated g/C Ratio	0.22	0.57		0.03	0.38	0.38		0.05			0.19	0.22
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0		5.0			5.0	5.0
Vehicle Extension (s)	2.5	3.5		2.5	3.5	3.5		2.8			2.8	2.5
Lane Grp Cap (vph)	355	978		47	652	538		90			305	317
v/s Ratio Prot	c0.21	0.35		0.01	c0.30			c0.02			c0.14	0.07
v/s Ratio Perm						0.06						
v/c Ratio	0.97	0.61		0.32	0.79	0.16		0.28			0.74	0.32
Uniform Delay, d1	38.0	14.1		46.6	27.1	20.3		44.4			37.4	32.1
Progression Factor	1.00	1.00		1.00	1.00	1.00		1.00			1.00	1.00
Incremental Delay, d2	40.0	1.2		2.8	6.5	0.2		1.5			8.8	0.4
Delay (s)	78.0	15.3		49.4	33.6	20.4		45.9			46.2	32.6
Level of Service	E	B		D	C	C		D			D	C
Approach Delay (s)		38.2			30.5			45.9			37.0	
Approach LOS		D			C			D			D	

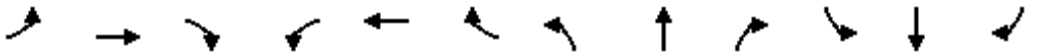
Intersection Summary			
HCM 2000 Control Delay	35.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	97.8	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	435	130	350	630	20	0	0	0	150	430	185
Future Volume (vph)	60	435	130	350	630	20	0	0	0	150	430	185
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	3.5	3.5		3.5	3.5						3.5	3.5
Lane Util. Factor	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	0.88
Flpb, ped/bikes	1.00	1.00		1.00	1.00						0.99	1.00
Frt	1.00	0.97		1.00	1.00						1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00						0.99	1.00
Satd. Flow (prot)	1646	3116		1646	1723						3242	1296
Flt Permitted	0.95	1.00		0.95	1.00						0.99	1.00
Satd. Flow (perm)	1646	3116		1646	1723						3242	1296
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	60	435	130	350	630	20	0	0	0	150	430	185
RTOR Reduction (vph)	0	32	0	0	1	0	0	0	0	0	0	138
Lane Group Flow (vph)	60	533	0	350	649	0	0	0	0	0	580	47
Confl. Peds. (#/hr)	12		47	47		12	38		18	18		38
Confl. Bikes (#/hr)			1			11			1			24
Heavy Vehicles (%)	1%	2%	0%	1%	1%	0%	0%	0%	0%	0%	1%	1%
Turn Type	Prot	NA		Prot	NA					Perm	NA	Perm
Protected Phases	5	2		1	6						4	
Permitted Phases										4		4
Actuated Green, G (s)	4.2	28.2		20.9	44.9						20.4	20.4
Effective Green, g (s)	4.2	28.2		20.9	44.9						20.4	20.4
Actuated g/C Ratio	0.05	0.35		0.26	0.56						0.25	0.25
Clearance Time (s)	3.5	3.5		3.5	3.5						3.5	3.5
Vehicle Extension (s)	3.0	3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)	86	1098		430	967						826	330
v/s Ratio Prot	0.04	c0.17		c0.21	c0.38							
v/s Ratio Perm											0.18	0.04
v/c Ratio	0.70	0.49		0.81	0.67						0.70	0.14
Uniform Delay, d1	37.3	20.2		27.7	12.3						27.0	23.0
Progression Factor	1.00	1.00		1.00	1.00						1.00	1.00
Incremental Delay, d2	21.8	1.5		11.2	3.7						2.7	0.2
Delay (s)	59.1	21.8		39.0	16.1						29.8	23.2
Level of Service	E	C		D	B						C	C
Approach Delay (s)		25.4			24.1			0.0			28.2	
Approach LOS		C			C			A			C	

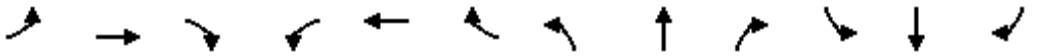
Intersection Summary			
HCM 2000 Control Delay	25.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	10.5
Intersection Capacity Utilization	72.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	595	25	100	375	0	0	0	0	175	390	305
Future Volume (vph)	0	595	25	100	375	0	0	0	0	175	390	305
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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						0.95	1.00
Frpb, ped/bikes		0.99		1.00	1.00						1.00	0.86
Flpb, ped/bikes		1.00		1.00	1.00						0.97	1.00
Frt		0.99		1.00	1.00						1.00	0.85
Flt Protected		1.00		0.95	1.00						0.98	1.00
Satd. Flow (prot)		1715		1608	1733						3163	1285
Flt Permitted		1.00		0.16	1.00						0.98	1.00
Satd. Flow (perm)		1715		266	1733						3163	1285
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	595	25	100	375	0	0	0	0	175	390	305
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	148
Lane Group Flow (vph)	0	618	0	100	375	0	0	0	0	0	565	157
Confl. Peds. (#/hr)	30		138	138		30	71		53	53		71
Heavy Vehicles (%)	0%	1%	0%	3%	1%	0%	0%	0%	0%	0%	1%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases				4						2		2
Actuated Green, G (s)		29.6		42.6	42.6						27.4	27.4
Effective Green, g (s)		30.6		43.6	43.6						28.4	28.4
Actuated g/C Ratio		0.38		0.55	0.55						0.35	0.35
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		0.2		0.2	0.2						0.2	0.2
Lane Grp Cap (vph)		655		295	944						1122	456
v/s Ratio Prot		c0.36		0.04	c0.22							
v/s Ratio Perm				0.15							0.18	0.12
v/c Ratio		0.94		0.34	0.40						0.50	0.34
Uniform Delay, d1		23.9		24.7	10.6						20.3	19.0
Progression Factor		1.00		0.47	0.20						1.00	1.00
Incremental Delay, d2		22.0		0.2	0.1						1.6	2.1
Delay (s)		45.9		11.7	2.2						21.9	21.0
Level of Service		D		B	A						C	C
Approach Delay (s)		45.9			4.2			0.0			21.6	
Approach LOS		D			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

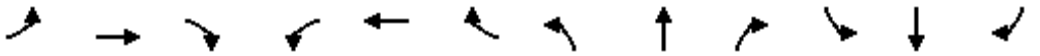
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	380	465	0	0	455	130	70	575	155	0	0	0
Future Volume (vph)	380	465	0	0	455	130	70	575	155	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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		0.95	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97		1.00	0.93			
Flpb, ped/bikes	1.00	1.00			1.00	1.00		0.98	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		0.99	1.00			
Satd. Flow (prot)	1660	1716			1733	1440		3237	1369			
Flt Permitted	0.23	1.00			1.00	1.00		0.99	1.00			
Satd. Flow (perm)	410	1716			1733	1440		3237	1369			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	380	465	0	0	455	130	70	575	155	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	88	0	0	103	0	0	0
Lane Group Flow (vph)	380	465	0	0	455	42	0	645	52	0	0	0
Confl. Peds. (#/hr)	23		47	47		23	103		27	27		103
Heavy Vehicles (%)	0%	2%	0%	0%	1%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	3	8			4			6				
Permitted Phases	8					4	6		6			
Actuated Green, G (s)	44.1	44.1			23.1	23.1		25.9	25.9			
Effective Green, g (s)	45.1	45.1			24.1	24.1		26.9	26.9			
Actuated g/C Ratio	0.56	0.56			0.30	0.30		0.34	0.34			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	0.2	0.2			0.2	0.2		0.2	0.2			
Lane Grp Cap (vph)	496	967			522	433		1088	460			
v/s Ratio Prot	c0.16	0.27			c0.26							
v/s Ratio Perm	0.27					0.03		0.20	0.04			
v/c Ratio	0.77	0.48			0.87	0.10		0.59	0.11			
Uniform Delay, d1	21.7	10.4			26.5	20.1		22.0	18.3			
Progression Factor	0.40	0.32			1.00	1.00		1.00	1.00			
Incremental Delay, d2	4.2	0.1			14.4	0.0		2.4	0.5			
Delay (s)	13.0	3.5			40.8	20.2		24.4	18.8			
Level of Service	B	A			D	C		C	B			
Approach Delay (s)		7.7			36.3			23.3			0.0	
Approach LOS		A			D			C			A	

Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.3%	ICU Level of Service	D
Analysis Period (min)	15		

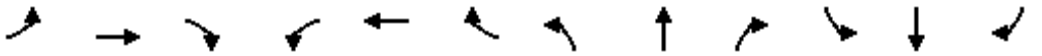
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	330	550	175	240	495	95	180	860	180	145	1100	165
Future Volume (vph)	330	550	175	240	495	95	180	860	180	145	1100	165
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	0.99		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	1.00	0.85	1.00	0.98		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	1733	1424	1614	3166		1646	3151		1630	3292	1465
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	1733	1424	1614	3166		1646	3151		1630	3292	1465
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	330	550	175	240	495	95	180	860	180	145	1100	165
RTOR Reduction (vph)	0	0	33	0	13	0	0	15	0	0	0	43
Lane Group Flow (vph)	330	550	142	240	577	0	180	1025	0	145	1100	122
Confl. Peds. (#/hr)	7		13	13		7	8		14	14		8
Heavy Vehicles (%)	2%	1%	2%	3%	2%	3%	1%	2%	1%	2%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4	1	3	8		1	6		5	2	7
Permitted Phases			4									2
Actuated Green, G (s)	21.5	36.0	47.5	16.5	31.0		11.5	39.0		10.5	38.0	59.5
Effective Green, g (s)	22.0	36.5	48.5	17.0	31.5		12.0	39.5		11.0	38.5	60.5
Actuated g/C Ratio	0.18	0.30	0.40	0.14	0.26		0.10	0.33		0.09	0.32	0.50
Clearance Time (s)	4.5	4.5	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		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	298	527	623	228	831		164	1037		149	1056	787
v/s Ratio Prot	c0.20	c0.32	0.02	0.15	0.18		c0.11	0.33		0.09	c0.33	0.03
v/s Ratio Perm			0.08									0.05
v/c Ratio	1.11	1.04	0.23	1.05	0.69		1.10	0.99		0.97	1.04	0.15
Uniform Delay, d1	49.0	41.8	23.5	51.5	39.9		54.0	40.0		54.4	40.8	16.0
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	84.1	51.1	0.1	74.1	2.3		98.8	25.4		65.2	39.2	0.1
Delay (s)	133.1	92.8	23.6	125.6	42.2		152.8	65.4		119.5	79.9	16.1
Level of Service	F	F	C	F	D		F	E		F	E	B
Approach Delay (s)		93.9			66.3			78.3			76.5	
Approach LOS		F			E			E			E	

Intersection Summary			
HCM 2000 Control Delay	79.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	103.0%	ICU Level of Service	G
Analysis Period (min)	15		

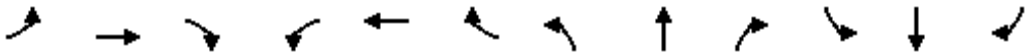
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	115	1005	0	0	0	0	0	375	215
Future Volume (vph)	0	0	0	115	1005	0	0	0	0	0	375	215
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)					4.0						4.0	4.0
Lane Util. Factor					0.95						1.00	1.00
Frpb, ped/bikes					1.00						1.00	0.99
Flpb, ped/bikes					1.00						1.00	1.00
Frt					1.00						1.00	0.85
Flt Protected					0.99						1.00	1.00
Satd. Flow (prot)					3278						1750	1452
Flt Permitted					0.99						1.00	1.00
Satd. Flow (perm)					3278						1750	1452
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	115	1005	0	0	0	0	0	375	215
RTOR Reduction (vph)	0	0	0	0	13	0	0	0	0	0	0	53
Lane Group Flow (vph)	0	0	0	0	1107	0	0	0	0	0	375	162
Confl. Peds. (#/hr)	3		2	2		3	2		11	11		2
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	1%
Turn Type				Perm	NA						NA	Perm
Protected Phases					6						4	
Permitted Phases				6								4
Actuated Green, G (s)					31.4						15.6	15.6
Effective Green, g (s)					31.9						16.1	16.1
Actuated g/C Ratio					0.57						0.29	0.29
Clearance Time (s)					4.5						4.5	4.5
Vehicle Extension (s)					2.6						2.0	2.0
Lane Grp Cap (vph)					1867						503	417
v/s Ratio Prot											c0.21	
v/s Ratio Perm					0.34							0.11
v/c Ratio					0.59						0.75	0.39
Uniform Delay, d1					7.8						18.1	16.0
Progression Factor					1.00						1.00	1.00
Incremental Delay, d2					1.4						5.2	0.2
Delay (s)					9.2						23.3	16.2
Level of Service					A						C	B
Approach Delay (s)		0.0			9.2			0.0			20.7	
Approach LOS		A			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	13.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.64		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	65.2%	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												
Traffic Volume (vph)	380	1290	0	0	0	0	0	290	130	0	0	0
Future Volume (vph)	380	1290	0	0	0	0	0	290	130	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0						4.0				
Lane Util. Factor		0.95						0.95				
Frpb, ped/bikes		1.00						0.99				
Flpb, ped/bikes		1.00						1.00				
Frt		1.00						0.95				
Flt Protected		0.99						1.00				
Satd. Flow (prot)		3227						3123				
Flt Permitted		0.99						1.00				
Satd. Flow (perm)		3227						3123				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	380	1290	0	0	0	0	0	290	130	0	0	0
RTOR Reduction (vph)	0	36	0	0	0	0	0	28	0	0	0	0
Lane Group Flow (vph)	0	1634	0	0	0	0	0	392	0	0	0	0
Confl. Peds. (#/hr)	5		7	7		5	10		4	4		10
Confl. Bikes (#/hr)			3						1			
Heavy Vehicles (%)	1%	2%	0%	0%	0%	0%	0%	1%	1%	0%	0%	0%
Turn Type	Perm	NA						NA				
Protected Phases		2						8				
Permitted Phases	2											
Actuated Green, G (s)		35.7						11.3				
Effective Green, g (s)		36.2						11.8				
Actuated g/C Ratio		0.65						0.21				
Clearance Time (s)		4.5						4.5				
Vehicle Extension (s)		2.6						2.0				
Lane Grp Cap (vph)		2086						658				
v/s Ratio Prot								c0.13				
v/s Ratio Perm		0.51										
v/c Ratio		0.78						0.60				
Uniform Delay, d1		7.1						19.9				
Progression Factor		1.00						1.00				
Incremental Delay, d2		3.0						1.0				
Delay (s)		10.1						20.9				
Level of Service		B						C				
Approach Delay (s)		10.1			0.0			20.9			0.0	
Approach LOS		B			A			C			A	

Intersection Summary			
HCM 2000 Control Delay	12.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	56.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	74.1%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	10.5
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	350	430	645	355
Demand Flow Rate, veh/h	361	444	676	363
Vehicles Circulating, veh/h	437	579	254	537
Vehicles Exiting, veh/h	463	350	544	485
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.1	11.5	11.8	9.1
Approach LOS	A	B	B	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	361	444	676	363
Cap Entry Lane, veh/h	955	857	1098	885
Entry HV Adj Factor	0.970	0.970	0.955	0.978
Flow Entry, veh/h	350	430	645	355
Cap Entry, veh/h	926	831	1049	865
V/C Ratio	0.378	0.518	0.616	0.410
Control Delay, s/veh	8.1	11.5	11.8	9.1
LOS	A	B	B	A
95th %tile Queue, veh	2	3	4	2

Intersection	
Intersection Delay, s/veh	20.5
Intersection LOS	C

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	775	815	700	30
Demand Flow Rate, veh/h	797	828	713	30
Vehicles Circulating, veh/h	323	353	542	1144
Vehicles Exiting, veh/h	851	902	578	37
Ped Vol Crossing Leg, #/h	1	0	0	4
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	17.9	21.1	23.2	7.1
Approach LOS	C	C	C	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	797	828	713	30
Cap Entry Lane, veh/h	1042	1018	881	556
Entry HV Adj Factor	0.972	0.984	0.982	1.000
Flow Entry, veh/h	775	815	700	30
Cap Entry, veh/h	1013	1002	865	556
V/C Ratio	0.765	0.813	0.809	0.054
Control Delay, s/veh	17.9	21.1	23.2	7.1
LOS	C	C	C	A
95th %tile Queue, veh	8	9	9	0

Intersection	
Intersection Delay, s/veh	48.5
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	530	775	910	620
Demand Flow Rate, veh/h	535	783	922	626
Vehicles Circulating, veh/h	813	720	545	782
Vehicles Exiting, veh/h	595	747	803	721
Ped Vol Crossing Leg, #/h	8	0	0	5
Ped Cap Adj	0.999	1.000	1.000	0.999
Approach Delay, s/veh	22.3	60.4	65.7	31.0
Approach LOS	C	F	F	D

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	535	783	922	626
Cap Entry Lane, veh/h	717	769	879	734
Entry HV Adj Factor	0.990	0.990	0.987	0.990
Flow Entry, veh/h	530	775	910	620
Cap Entry, veh/h	709	762	868	726
V/C Ratio	0.747	1.018	1.049	0.854
Control Delay, s/veh	22.3	60.4	65.7	31.0
LOS	C	F	F	D
95th %tile Queue, veh	7	18	21	10

Intersection	
Intersection Delay, s/veh	30.7
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	570	455	895	570
Demand Flow Rate, veh/h	585	468	910	586
Vehicles Circulating, veh/h	611	896	498	666
Vehicles Exiting, veh/h	641	512	697	698
Ped Vol Crossing Leg, #/h	0	1	2	6
Ped Cap Adj	1.000	1.000	1.000	0.999
Approach Delay, s/veh	17.5	20.6	51.2	19.8
Approach LOS	C	C	F	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	585	468	910	586
Cap Entry Lane, veh/h	836	672	911	802
Entry HV Adj Factor	0.974	0.972	0.983	0.973
Flow Entry, veh/h	570	455	895	570
Cap Entry, veh/h	814	654	896	780
V/C Ratio	0.700	0.696	0.999	0.732
Control Delay, s/veh	17.5	20.6	51.2	19.8
LOS	C	C	F	C
95th %tile Queue, veh	6	6	18	7

Intersection	
Intersection Delay, s/veh	11.6
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	85	445	630	685
Demand Flow Rate, veh/h	86	461	648	720
Vehicles Circulating, veh/h	773	585	311	176
Vehicles Exiting, veh/h	122	374	548	870
Ped Vol Crossing Leg, #/h	0	2	3	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.2	12.1	12.1	11.4
Approach LOS	A	B	B	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	86	461	648	720
Cap Entry Lane, veh/h	739	853	1051	1166
Entry HV Adj Factor	0.988	0.965	0.972	0.952
Flow Entry, veh/h	85	445	630	685
Cap Entry, veh/h	730	823	1022	1110
V/C Ratio	0.116	0.541	0.617	0.618
Control Delay, s/veh	6.2	12.1	12.1	11.4
LOS	A	B	B	B
95th %tile Queue, veh	0	3	4	4

Intersection	
Intersection Delay, s/veh	43.9
Intersection LOS	E

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	605	570	795	700
Demand Flow Rate, veh/h	621	585	801	714
Vehicles Circulating, veh/h	653	810	809	465
Vehicles Exiting, veh/h	526	800	465	930
Ped Vol Crossing Leg, #/h	13	5	25	9
Ped Cap Adj	0.998	0.999	0.997	0.999
Approach Delay, s/veh	21.8	27.8	93.7	19.3
Approach LOS	C	D	F	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	621	585	801	714
Cap Entry Lane, veh/h	810	718	719	935
Entry HV Adj Factor	0.974	0.975	0.993	0.980
Flow Entry, veh/h	605	570	795	700
Cap Entry, veh/h	788	700	711	915
V/C Ratio	0.768	0.815	1.118	0.765
Control Delay, s/veh	21.8	27.8	93.7	19.3
LOS	C	D	F	C
95th %tile Queue, veh	7	9	23	8

Intersection	
Intersection Delay, s/veh	55.3
Intersection LOS	F

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	860	715	730	515
Demand Flow Rate, veh/h	867	716	735	521
Vehicles Circulating, veh/h	701	722	775	685
Vehicles Exiting, veh/h	505	788	793	753
Ped Vol Crossing Leg, #/h	11	9	8	6
Ped Cap Adj	0.998	0.999	0.999	0.999
Approach Delay, s/veh	89.5	41.3	56.4	16.4
Approach LOS	F	E	F	C

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	867	716	735	521
Cap Entry Lane, veh/h	781	768	738	790
Entry HV Adj Factor	0.992	0.999	0.993	0.988
Flow Entry, veh/h	860	715	730	515
Cap Entry, veh/h	773	766	732	780
V/C Ratio	1.112	0.933	0.998	0.660
Control Delay, s/veh	89.5	41.3	56.4	16.4
LOS	F	E	F	C
95th %tile Queue, veh	24	13	16	5

Intersection	
Intersection Delay, s/veh	29.3
Intersection LOS	D

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	745	580	670	485
Demand Flow Rate, veh/h	763	603	697	491
Vehicles Circulating, veh/h	560	599	790	653
Vehicles Exiting, veh/h	584	888	533	549
Ped Vol Crossing Leg, #/h	12	6	0	2
Ped Cap Adj	0.998	0.999	1.000	1.000
Approach Delay, s/veh	30.7	18.3	48.0	14.2
Approach LOS	D	C	E	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	763	603	697	491
Cap Entry Lane, veh/h	869	844	729	810
Entry HV Adj Factor	0.976	0.962	0.961	0.988
Flow Entry, veh/h	745	580	670	485
Cap Entry, veh/h	847	811	701	800
V/C Ratio	0.879	0.715	0.956	0.607
Control Delay, s/veh	30.7	18.3	48.0	14.2
LOS	D	C	E	B
95th %tile Queue, veh	11	6	14	4

Intersection	
Intersection Delay, s/veh	10.7
Intersection LOS	B

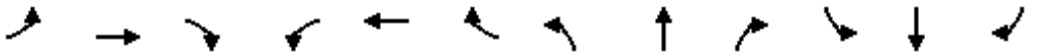
Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	110	500	430	700
Demand Flow Rate, veh/h	112	503	430	703
Vehicles Circulating, veh/h	857	331	314	340
Vehicles Exiting, veh/h	186	413	655	494
Ped Vol Crossing Leg, #/h	1	1	1	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	7.1	9.2	7.8	14.2
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	112	503	430	703
Cap Entry Lane, veh/h	693	1035	1049	1028
Entry HV Adj Factor	0.982	0.994	1.000	0.996
Flow Entry, veh/h	110	500	430	700
Cap Entry, veh/h	680	1029	1049	1024
V/C Ratio	0.162	0.486	0.410	0.684
Control Delay, s/veh	7.1	9.2	7.8	14.2
LOS	A	A	A	B
95th %tile Queue, veh	1	3	2	6

Intersection	
Intersection Delay, s/veh	16.7
Intersection LOS	C

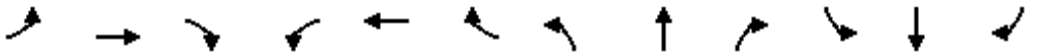
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1055	550	455
Demand Flow Rate, veh/h	1066	563	465
Vehicles Circulating, veh/h	93	475	423
Vehicles Exiting, veh/h	795	684	615
Ped Vol Crossing Leg, #/h	0	2	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	21.7	13.0	9.7
Approach LOS	C	B	A

Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100
Entry Flow, veh/h	1066	563	465
Cap Entry Lane, veh/h	1242	928	965
Entry HV Adj Factor	0.990	0.976	0.978
Flow Entry, veh/h	1055	550	455
Cap Entry, veh/h	1229	905	944
V/C Ratio	0.858	0.607	0.482
Control Delay, s/veh	21.7	13.0	9.7
LOS	C	B	A
95th %tile Queue, veh	12	4	3



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	30	175	15	10	40	110	870	55	90	610	30
Future Volume (vph)	15	30	175	15	10	40	110	870	55	90	610	30
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Lane Width	10	10	10	12	12	12	12	12	12	12	12	12
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		1.00	0.85		0.92		1.00	0.99		1.00	0.99	
Flt Protected		0.98	1.00		0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1570	1375		1539		1645	1714		1662	1720	
Flt Permitted		0.89	1.00		0.93		0.36	1.00		0.21	1.00	
Satd. Flow (perm)		1428	1375		1446		631	1714		362	1720	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	30	175	15	10	40	110	870	55	90	610	30
RTOR Reduction (vph)	0	0	148	0	34	0	0	2	0	0	2	0
Lane Group Flow (vph)	0	45	27	0	31	0	110	923	0	90	638	0
Confl. Peds. (#/hr)							1					1
Heavy Vehicles (%)	7%	0%	1%	0%	0%	5%	1%	1%	4%	0%	1%	0%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)		8.2	8.2		8.2		35.4	35.4		35.4	35.4	
Effective Green, g (s)		8.2	8.2		8.2		36.4	36.4		36.4	36.4	
Actuated g/C Ratio		0.16	0.16		0.16		0.69	0.69		0.69	0.69	
Clearance Time (s)		4.0	4.0		4.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)		222	214		225		436	1186		250	1190	
v/s Ratio Prot								c0.54			0.37	
v/s Ratio Perm		c0.03	0.02		0.02		0.17			0.25		
v/c Ratio		0.20	0.13		0.14		0.25	0.78		0.36	0.54	
Uniform Delay, d1		19.4	19.1		19.2		3.0	5.4		3.3	4.0	
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.5	0.3		0.3		0.3	3.3		0.9	0.5	
Delay (s)		19.8	19.4		19.4		3.3	8.7		4.2	4.4	
Level of Service		B	B		B		A	A		A	A	
Approach Delay (s)		19.5			19.4			8.1			4.4	
Approach LOS		B			B			A			A	

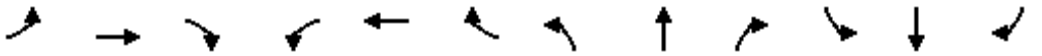
Intersection Summary			
HCM 2000 Control Delay	8.4	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	52.6	Sum of lost time (s)	8.0
Intersection Capacity Utilization	82.5%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	300	150	280	175	95	110	755	320	135	730	120
Future Volume (vph)	290	300	150	280	175	95	110	755	320	135	730	120
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		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	1.00	0.85	1.00	0.95		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1630	1716	1434	1630	1649		1583	3228	1488	1662	3180	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1630	1716	1434	1630	1649		1583	3228	1488	1662	3180	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	300	150	280	175	95	110	755	320	135	730	120
RTOR Reduction (vph)	0	0	73	0	17	0	0	0	101	0	12	0
Lane Group Flow (vph)	290	300	77	280	253	0	110	755	219	135	838	0
Confl. Peds. (#/hr)	2		8	8		2	2					2
Heavy Vehicles (%)	2%	2%	2%	2%	0%	0%	5%	3%	0%	0%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	5	2	3	1	6		3	8	1	7	4	
Permitted Phases			2						8			
Actuated Green, G (s)	22.3	25.7	35.7	23.4	26.8		10.0	29.6	53.0	12.4	32.0	
Effective Green, g (s)	22.8	27.1	36.7	23.9	28.2		10.5	30.1	54.0	12.9	32.5	
Actuated g/C Ratio	0.21	0.25	0.33	0.22	0.26		0.10	0.27	0.49	0.12	0.30	
Clearance Time (s)	4.5	5.4	4.5	4.5	5.4		4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)	3.0	5.0	3.0	3.0	5.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	337	422	530	354	422		151	883	784	194	939	
v/s Ratio Prot	c0.18	c0.17	0.01	c0.17	0.15		0.07	0.23	0.06	c0.08	c0.26	
v/s Ratio Perm			0.04						0.09			
v/c Ratio	0.86	0.71	0.15	0.79	0.60		0.73	0.86	0.28	0.70	0.89	
Uniform Delay, d1	42.1	37.9	25.7	40.7	35.9		48.4	37.9	16.5	46.7	37.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		0.77	0.74	0.47	1.00	1.00	
Incremental Delay, d2	19.5	9.8	0.1	11.4	6.2		9.6	4.8	0.1	10.3	10.7	
Delay (s)	61.6	47.6	25.8	52.1	42.1		46.8	32.8	7.9	57.0	47.8	
Level of Service	E	D	C	D	D		D	C	A	E	D	
Approach Delay (s)		48.7			47.2			27.4			49.1	
Approach LOS		D			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	41.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	82.7%	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												
Traffic Volume (vph)	245	335	100	150	300	60	155	720	65	175	1130	150
Future Volume (vph)	245	335	100	150	300	60	155	720	65	175	1130	150
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	5.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		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	0.96
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	0.97		1.00	0.99		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)	1646	1639		1614	1674		1646	3237		1630	3292	1420
Flt Permitted	0.16	1.00		0.21	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	278	1639		361	1674		1646	3237		1630	3292	1420
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	245	335	100	150	300	60	155	720	65	175	1130	150
RTOR Reduction (vph)	0	9	0	0	6	0	0	6	0	0	0	76
Lane Group Flow (vph)	245	426	0	150	354	0	155	779	0	175	1130	74
Confl. Peds. (#/hr)	3		1	1		3	10		1	1		10
Heavy Vehicles (%)	1%	3%	2%	3%	2%	0%	1%	1%	4%	2%	1%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	pm+ov
Protected Phases	7	4		3	8		1	6		5	2	7
Permitted Phases	4			8								2
Actuated Green, G (s)	43.8	31.8		32.7	25.7		11.8	40.0		14.6	42.8	55.9
Effective Green, g (s)	44.8	32.8		34.7	26.7		12.8	41.0		15.6	43.8	55.9
Actuated g/C Ratio	0.40	0.29		0.31	0.24		0.11	0.36		0.14	0.39	0.49
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)	279	474		198	394		185	1170		224	1271	762
v/s Ratio Prot	c0.11	c0.26		0.05	0.21		0.09	0.24		c0.11	c0.34	0.01
v/s Ratio Perm	0.24			0.18								0.04
v/c Ratio	0.88	0.90		0.76	0.90		0.84	0.67		0.78	0.89	0.10
Uniform Delay, d1	27.2	38.7		31.5	42.0		49.3	30.4		47.3	32.5	15.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	25.1	19.5		14.5	22.3		26.4	1.3		15.6	7.9	0.0
Delay (s)	52.2	58.3		46.0	64.3		75.6	31.7		62.8	40.4	15.4
Level of Service	D	E		D	E		E	C		E	D	B
Approach Delay (s)		56.1			58.9			39.0			40.5	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	45.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	113.4	Sum of lost time (s)	17.0
Intersection Capacity Utilization	92.5%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Intersection	
Int Delay, s/veh	25.5

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	505	210	145	365	180	145
Future Vol, veh/h	505	210	145	365	180	145
Conflicting Peds, #/hr	0	0	0	0	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	1	0	1	1	0	1
Mvmt Flow	505	210	145	365	180	145

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	715	0	1267	610
Stage 1	-	-	-	-	610	-
Stage 2	-	-	-	-	657	-
Critical Hdwy	-	-	4.11	-	6.4	6.21
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.309
Pot Cap-1 Maneuver	-	-	890	-	188	496
Stage 1	-	-	-	-	546	-
Stage 2	-	-	-	-	519	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	890	-	~ 149	496
Mov Cap-2 Maneuver	-	-	-	-	~ 149	-
Stage 1	-	-	-	-	435	-
Stage 2	-	-	-	-	518	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	117.4
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	149	496	-	-	890	-
HCM Lane V/C Ratio	1.208	0.292	-	-	0.163	-
HCM Control Delay (s)	199.8	15.2	-	-	9.8	0
HCM Lane LOS	F	C	-	-	A	A
HCM 95th %tile Q(veh)	10.4	1.2	-	-	0.6	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

Intersection	
Int Delay, s/veh	37.4

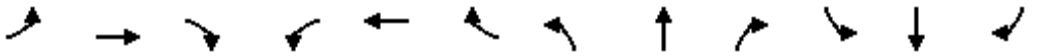
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	165	1165	890	155	100	350
Future Vol, veh/h	165	1165	890	155	100	350
Conflicting Peds, #/hr	0	0	0	0	0	2
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	110	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	3	0	1	5	0	0
Mvmt Flow	165	1165	890	155	100	350

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	1045	0	-	0	1881	970
Stage 1	-	-	-	-	968	-
Stage 2	-	-	-	-	913	-
Critical Hdwy	4.145	-	-	-	6.6	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.2285	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	659	-	-	-	~ 71	~ 310
Stage 1	-	-	-	-	372	-
Stage 2	-	-	-	-	356	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	659	-	-	-	~ 53	~ 309
Mov Cap-2 Maneuver	-	-	-	-	~ 53	-
Stage 1	-	-	-	-	279	-
Stage 2	-	-	-	-	356	-

Approach	EB	WB	SB
HCM Control Delay, s	1.5	0	230.3
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	659	-	-	-	53	309
HCM Lane V/C Ratio	0.25	-	-	-	1.887	1.133
HCM Control Delay (s)	12.3	-	-	-	$ 584.7	129.1
HCM Lane LOS	B	-	-	-	F	F
HCM 95th %tile Q(veh)	1	-	-	-	9.7	14.3

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	195	215	35	165	65	210	600	105	70	790	240
Future Volume (vph)	175	195	215	35	165	65	210	600	105	70	790	240
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.0	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	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)	1630	1733	1473	1646	1733	1473	1646	1716	1473	1646	1733	1473
Flt Permitted	0.36	1.00	1.00	0.64	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	624	1733	1473	1100	1733	1473	1646	1716	1473	1646	1733	1473
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	195	215	35	165	65	210	600	105	70	790	240
RTOR Reduction (vph)	0	0	79	0	0	51	0	0	53	0	0	56
Lane Group Flow (vph)	175	195	136	35	165	14	210	600	52	70	790	184
Heavy Vehicles (%)	2%	1%	1%	1%	1%	1%	1%	2%	1%	1%	1%	1%
Turn Type	pm+pt	NA	pm+ov	pm+pt	NA	pm+ov	Prot	NA	Perm	Prot	NA	pm+ov
Protected Phases	7	4	5	3	8	1	5	2		1	6	7
Permitted Phases	4		4	8		8			2			6
Actuated Green, G (s)	40.9	33.0	48.1	21.7	18.8	25.3	15.1	61.9	61.9	6.5	53.3	70.4
Effective Green, g (s)	41.9	34.0	50.1	23.7	19.8	27.3	16.1	62.9	61.9	7.5	54.3	72.4
Actuated g/C Ratio	0.34	0.27	0.40	0.19	0.16	0.22	0.13	0.51	0.50	0.06	0.44	0.58
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	3.0	3.8	3.0	3.0	3.0	3.8	3.8	3.8	3.0	3.8	3.0
Lane Grp Cap (vph)	356	474	641	226	276	370	213	868	733	99	757	905
v/s Ratio Prot	c0.07	0.11	0.03	0.00	c0.10	0.00	c0.13	0.35		0.04	c0.46	0.03
v/s Ratio Perm	0.09		0.06	0.02		0.01			0.04			0.10
v/c Ratio	0.49	0.41	0.21	0.15	0.60	0.04	0.99	0.69	0.07	0.71	1.04	0.20
Uniform Delay, d1	31.1	37.0	24.2	41.6	48.6	38.2	54.0	23.3	16.2	57.3	35.0	12.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.1	0.6	0.2	0.3	3.5	0.0	57.3	2.5	0.1	20.5	44.6	0.1
Delay (s)	32.2	37.5	24.4	41.9	52.0	38.2	111.3	25.9	16.3	77.8	79.6	12.4
Level of Service	C	D	C	D	D	D	F	C	B	E	E	B
Approach Delay (s)		31.1			47.3			44.4			64.9	
Approach LOS		C			D			D			E	

Intersection Summary			
HCM 2000 Control Delay	49.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	124.3	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	2	2
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	140	25	705	850
Demand Flow Rate, veh/h	142	25	712	867
Vehicles Circulating, veh/h	790	769	82	86
Vehicles Exiting, veh/h	163	25	850	708
Ped Vol Crossing Leg, #/h	0	0	0	2
Ped Cap Adj	1.000	1.000	1.000	0.998
Approach Delay, s/veh	7.2	5.2	7.4	11.3
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Right	Left	Right
Designated Moves	LTR	LTR	L	TR	L	TR
Assumed Moves	LTR	LTR	L	TR	L	TR
RT Channelized						
Lane Util	1.000	1.000	0.093	0.907	0.006	0.994
Follow-Up Headway, s	2.700	2.700	2.700	2.535	2.700	2.535
Critical Headway, s	4.100	4.100	4.100	4.544	4.100	4.544
Entry Flow, veh/h	142	25	66	646	5	862
Cap Entry Lane, veh/h	729	741	1252	1318	1249	1313
Entry HV Adj Factor	0.985	0.994	0.985	0.990	1.000	0.980
Flow Entry, veh/h	140	25	65	640	5	845
Cap Entry, veh/h	718	737	1233	1305	1246	1284
V/C Ratio	0.195	0.034	0.053	0.490	0.004	0.658
Control Delay, s/veh	7.2	5.2	3.3	7.8	2.9	11.3
LOS	A	A	A	A	A	B
95th %tile Queue, veh	1	0	0	3	0	5

Intersection	
Intersection Delay, s/veh	12.9
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	765	740	20	270
Demand Flow Rate, veh/h	831	783	23	279
Vehicles Circulating, veh/h	39	270	831	773
Vehicles Exiting, veh/h	1013	583	39	280
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.5	15.6	6.2	9.9
Approach LOS	B	C	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	831	783	23	279
Cap Entry Lane, veh/h	1294	1085	707	739
Entry HV Adj Factor	0.921	0.945	0.870	0.968
Flow Entry, veh/h	765	740	20	270
Cap Entry, veh/h	1192	1025	615	715
V/C Ratio	0.642	0.722	0.033	0.378
Control Delay, s/veh	11.5	15.6	6.2	9.9
LOS	B	C	A	A
95th %tile Queue, veh	5	7	0	2

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	605	775	65	115
Demand Flow Rate, veh/h	627	782	65	117
Vehicles Circulating, veh/h	122	60	672	691
Vehicles Exiting, veh/h	686	677	77	151
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.9	10.4	5.3	6.2
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	627	782	65	117
Cap Entry Lane, veh/h	1215	1274	798	786
Entry HV Adj Factor	0.965	0.990	1.000	0.980
Flow Entry, veh/h	605	775	65	115
Cap Entry, veh/h	1172	1261	798	771
V/C Ratio	0.516	0.614	0.081	0.149
Control Delay, s/veh	8.9	10.4	5.3	6.2
LOS	A	B	A	A
95th %tile Queue, veh	3	4	0	1

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	50	270	490	835
Demand Flow Rate, veh/h	51	275	499	852
Vehicles Circulating, veh/h	943	438	306	157
Vehicles Exiting, veh/h	66	367	688	556
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	6.5	6.8	8.9	14.3
Approach LOS	A	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	51	275	499	852
Cap Entry Lane, veh/h	649	954	1055	1183
Entry HV Adj Factor	0.978	0.981	0.981	0.980
Flow Entry, veh/h	50	270	490	835
Cap Entry, veh/h	635	936	1035	1159
V/C Ratio	0.079	0.288	0.473	0.720
Control Delay, s/veh	6.5	6.8	8.9	14.3
LOS	A	A	A	B
95th %tile Queue, veh	0	1	3	7

Intersection	
Int Delay, s/veh	2.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	235	25	155	550	10	130
Future Vol, veh/h	235	25	155	550	10	130
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	1	8	0	0	7	0
Mvmt Flow	235	25	155	550	10	130

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	260	0	1108	248
Stage 1	-	-	-	-	248	-
Stage 2	-	-	-	-	860	-
Critical Hdwy	-	-	4.1	-	6.47	6.2
Critical Hdwy Stg 1	-	-	-	-	5.47	-
Critical Hdwy Stg 2	-	-	-	-	5.47	-
Follow-up Hdwy	-	-	2.2	-	3.563	3.3
Pot Cap-1 Maneuver	-	-	1316	-	227	796
Stage 1	-	-	-	-	782	-
Stage 2	-	-	-	-	406	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1316	-	188	796
Mov Cap-2 Maneuver	-	-	-	-	188	-
Stage 1	-	-	-	-	649	-
Stage 2	-	-	-	-	406	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.8	12.1
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	647	-	-	1316	-
HCM Lane V/C Ratio	0.216	-	-	0.118	-
HCM Control Delay (s)	12.1	-	-	8.1	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.8	-	-	0.4	-

Intersection	
Intersection Delay, s/veh	12.0
Intersection LOS	B

Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	590	940	250
Demand Flow Rate, veh/h	602	959	255
Vehicles Circulating, veh/h	184	56	724
Vehicles Exiting, veh/h	795	730	291
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	9.1	14.7	8.8
Approach LOS	A	B	A

Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100
Entry Flow, veh/h	602	959	255
Cap Entry Lane, veh/h	1159	1277	767
Entry HV Adj Factor	0.981	0.980	0.980
Flow Entry, veh/h	590	940	250
Cap Entry, veh/h	1136	1252	752
V/C Ratio	0.520	0.751	0.332
Control Delay, s/veh	9.1	14.7	8.8
LOS	A	B	A
95th %tile Queue, veh	3	8	1

USER REPORT FOR SITE

Project: 2040 TSP TPR PHF 1.0

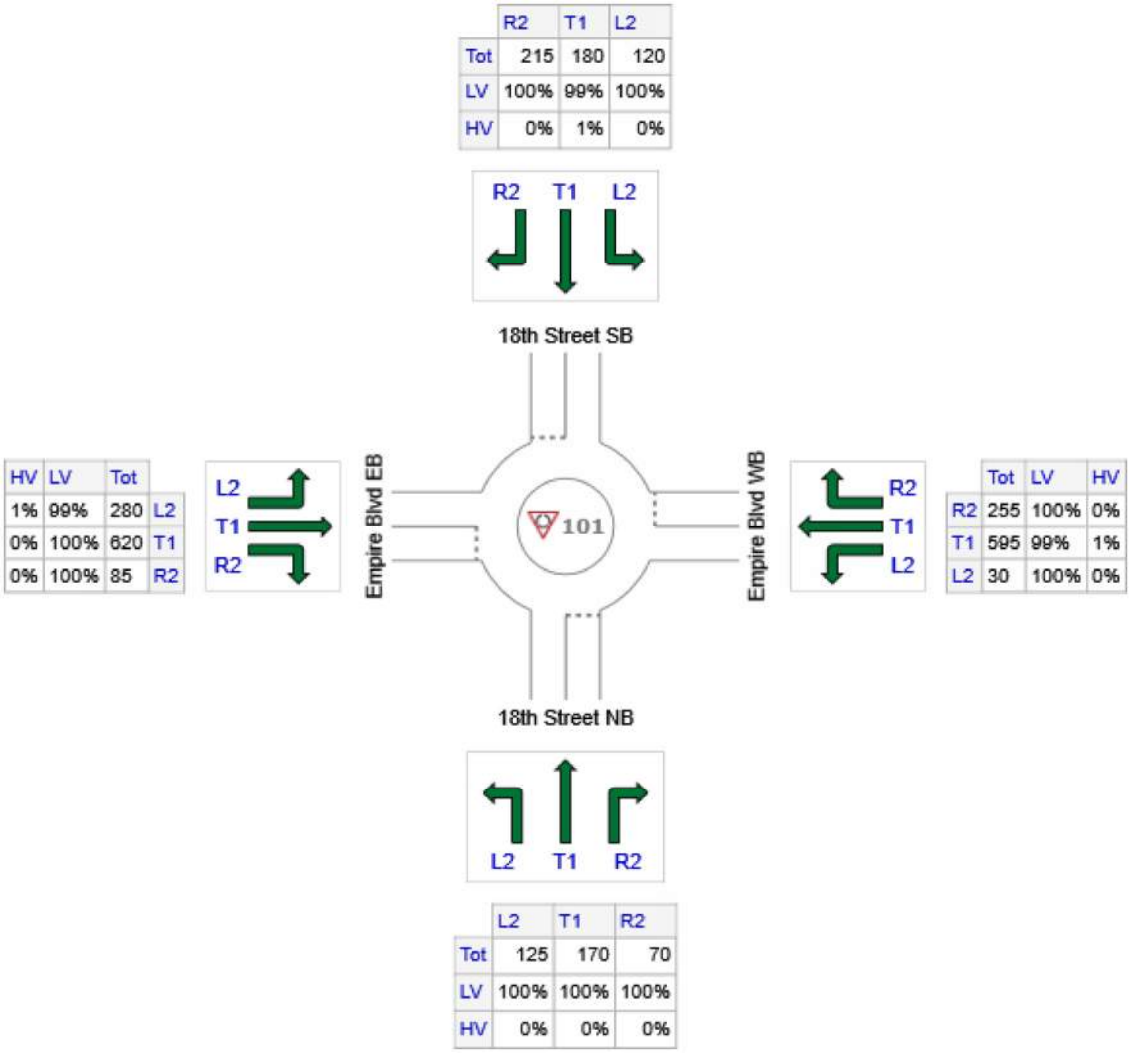
Template: Default Site User Report

Site: 101 [Empire/18th - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 18th Street NB	365	365	0
E: Empire Blvd WB	880	874	6
N: 18th Street SB	515	513	2
W: Empire Blvd EB	985	982	3
Total	2745	2734	11

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 18th Street NB													
Lane 1[d]	365	0.0	610	0.598	100	17.3	LOS C	3.5	88.3	Full	1600	0.0	0.0
Approach	365	0.0		0.598		17.3	LOS C	3.5	88.3				
East: Empire Blvd WB													
Lane 1[d]	880	0.7	852	1.033	100	61.6	LOS F	39.0	981.5	Full	1600	0.0	0.0
Approach	880	0.7		1.033		61.6	LOS F	39.0	981.5				
North: 18th Street SB													
Lane 1[d]	300	0.6	750	0.400	100	10.0	LOS B	1.8	45.6	Full	1600	0.0	0.0
Lane 2	215	0.0	754	0.285	100	8.1	LOS A	1.0	25.0	Full	1600	0.0	0.0
Approach	515	0.3		0.400		9.2	LOS A	1.8	45.6				
West: Empire Blvd EB													
Lane 1	280	1.0	1025	0.273	100	6.2	LOS A	1.0	26.0	Full	1600	0.0	0.0
Lane 2[d]	705	0.0	1035	0.681	100	14.0	LOS B	8.9	221.9	Full	1600	0.0	0.0
Approach	985	0.3		0.681		11.8	LOS B	8.9	221.9				
Intersection	2745	0.4		1.033		28.0	LOS D	39.0	981.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

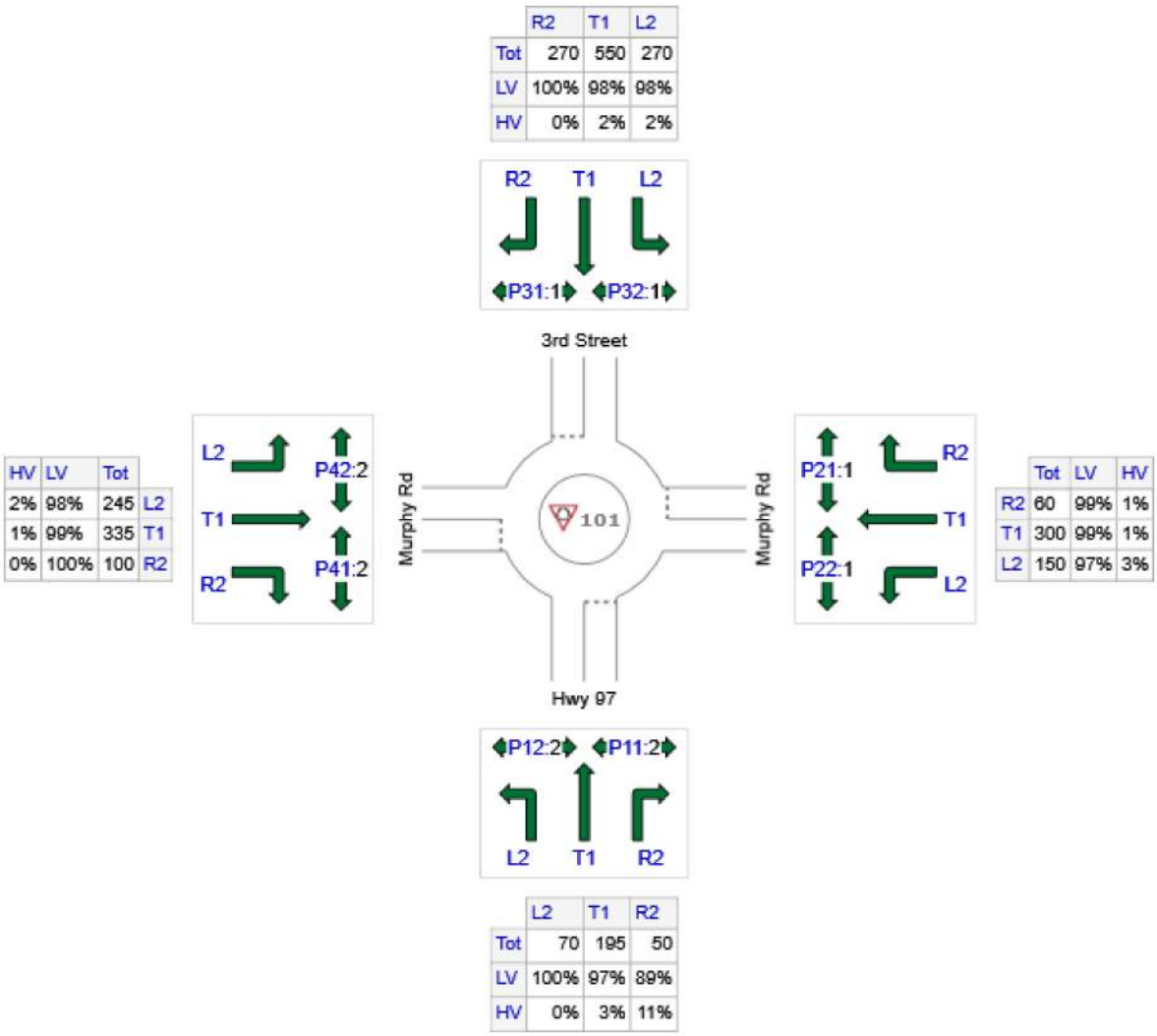
d Dominant lane on roundabout approach

Site: 101 [Murphy/3rd - 2040 TSP Project List]

Murphy/3rd
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Hwy 97	315	304	11
E: Murphy Rd	510	502	8
N: 3rd Street	1090	1074	16
W: Murphy Rd	680	672	8
Total	2595	2551	44

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Hwy 97													
Lane 1[d]	315	3.6	673	0.468	100	12.3	LOS B	2.5	18.1	Full	500	0.0	0.0
Approach	315	3.6		0.468		12.3	LOS B	2.5	18.1				
East: Murphy Rd													
Lane 1[d]	510	1.6	809	0.630	100	15.0	LOS C	6.3	44.5	Full	500	0.0	0.0
Approach	510	1.6		0.630		15.0	LOS C	6.3	44.5				
North: 3rd Street													
Lane 1	270	2.0	872	0.310	100	7.5	LOS A	1.4	9.8	Full	500	0.0	0.0
Lane 2[d]	820	1.3	875	0.937	100	45.8	LOS E	30.5	215.8	Full	500	0.0	0.0
Approach	1090	1.5		0.937		36.3	LOS E	30.5	215.8				
West: Murphy Rd													
Lane 1[d]	580	1.4	613	0.947	100	61.3	LOS F	18.7	132.6	Full	500	0.0	0.0
Lane 2	100	0.0	548	0.183	100	8.9	LOS A	0.7	4.6	Full	500	0.0	0.0
Approach	680	1.2		0.947		53.6	LOS F	18.7	132.6				
Intersection	2595	1.7		0.947		33.7	LOS D	30.5	215.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

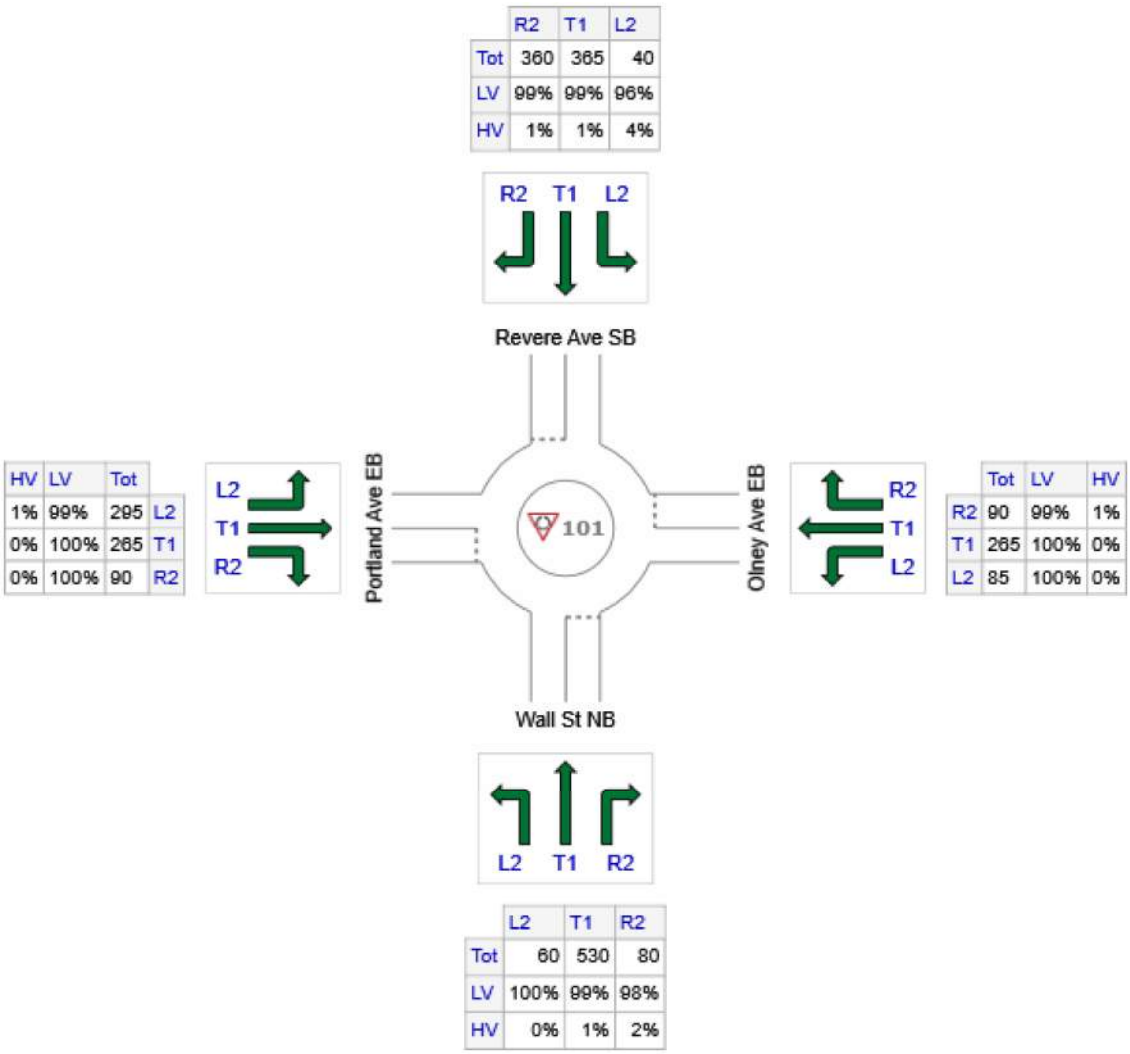
d Dominant lane on roundabout approach

Site: 101 [Portland/Wall - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Wall St NB	670	663	7
E: Olney Ave EB	440	439	1
N: Revere Ave SB	765	756	9
W: Portland Ave EB	650	647	3
Total	2525	2505	20

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: Wall St NB													
Lane 1[d]	670	1.0	737	0.909	100	38.1	LOS E	19.1	480.2	Full	1600	0.0	0.0
Approach	670	1.0		0.909		38.1	LOS E	19.1	480.2				
East: Olney Ave EB													
Lane 1[d]	440	0.2	554	0.795	100	31.0	LOS D	8.1	203.8	Full	1600	0.0	0.0
Approach	440	0.2		0.795		31.0	LOS D	8.1	203.8				
North: Revere Ave SB													
Lane 1[d]	405	1.3	965	0.420	100	8.5	LOS A	2.2	55.4	Full	1600	0.0	0.0
Lane 2	360	1.0	968	0.372	100	7.8	LOS A	1.8	45.8	Short	200	0.0	NA
Approach	765	1.2		0.420		8.2	LOS A	2.2	55.4				
West: Portland Ave EB													
Lane 1[d]	650	0.5	928	0.701	100	15.9	LOS C	8.6	215.5	Full	1600	0.0	0.0
Approach	650	0.5		0.701		15.9	LOS C	8.6	215.5				
Intersection	2525	0.8		0.909		22.1	LOS C	19.1	480.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

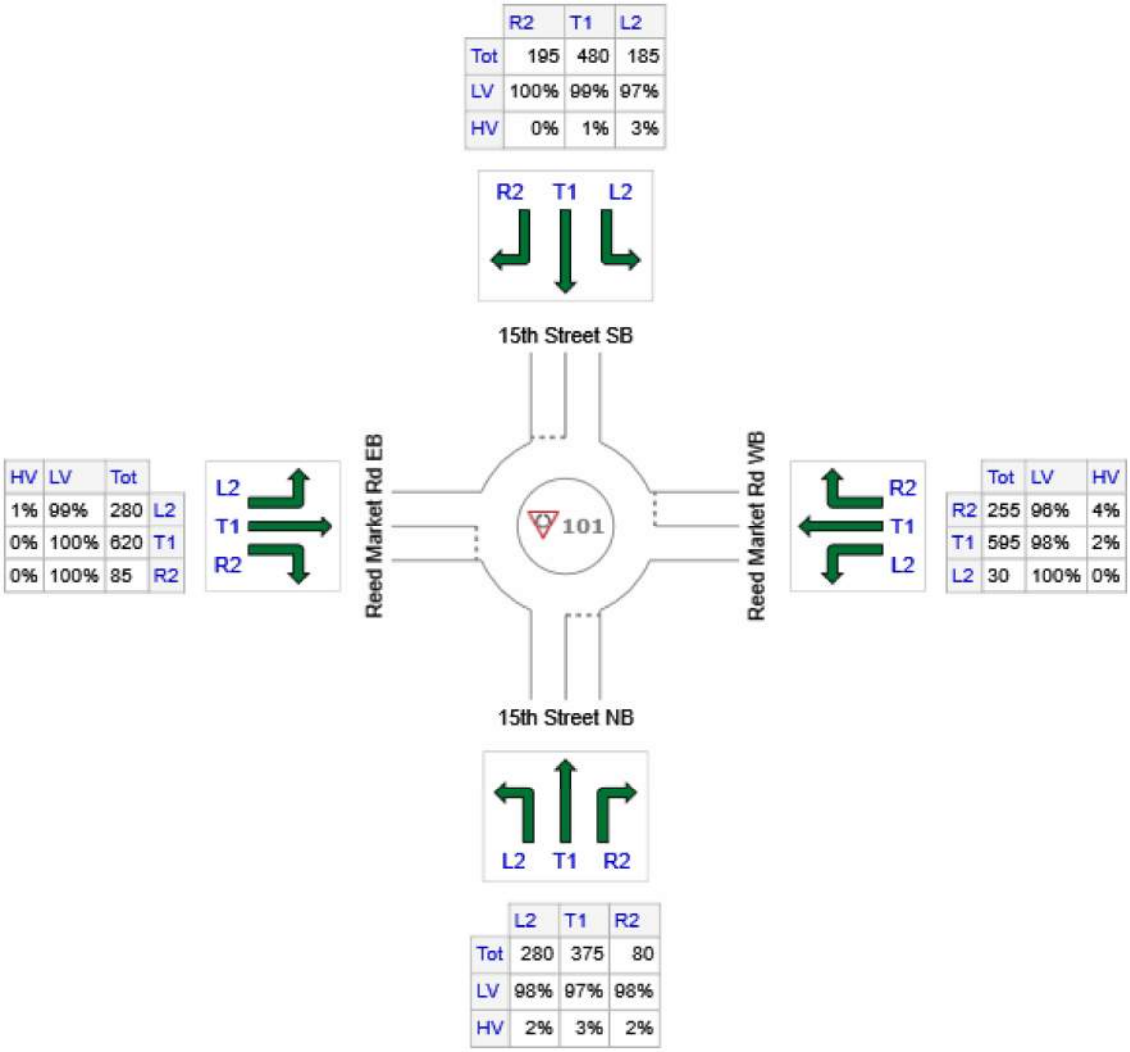
d Dominant lane on roundabout approach

Site: 101 [Reed Market/15th - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 15th Street NB	735	717	18
E: Reed Market Rd WB	880	858	22
N: 15th Street SB	860	850	10
W: Reed Market Rd EB	985	982	3
Total	3460	3406	54

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 15th Street NB													
Lane 1[d]	400	2.3	548	0.729	100	25.9	LOS D	5.5	139.9	Full	1600	0.0	0.0
Lane 2	335	2.8	480	0.698	96[6]	26.5	LOS D	4.7	120.5	Full	1600	0.0	0.0
Approach	735	2.5		0.729		26.2	LOS D	5.5	139.9				
East: Reed Market Rd WB													
Lane 1[d]	438	1.9	619	0.707	100	22.1	LOS C	5.6	142.7	Full	1600	0.0	0.0
Lane 2	187	2.0	550	0.340	48[6]	11.6	LOS B	1.4	36.0	Full	1600	0.0	0.0
Lane 3	255	4.0	773	0.330	47[5]	8.6	LOS A	1.3	34.5	Short	300	0.0	NA
Approach	880	2.5		0.707		16.0	LOS C	5.6	142.7				
North: 15th Street SB													
Lane 1[d]	462	1.8	637	0.725	100	22.7	LOS C	6.2	156.3	Full	1600	0.0	0.0
Lane 2	398	0.5	575	0.693	96[6]	22.7	LOS C	5.4	134.7	Full	1600	0.0	0.0
Approach	860	1.2		0.725		22.7	LOS C	6.2	156.3				
West: Reed Market Rd EB													
Lane 1[d]	626	0.4	776	0.807	100	25.0	LOS C	10.8	269.8	Full	1600	0.0	0.0
Lane 2	274	0.0	706	0.388	48[6]	10.2	LOS B	1.9	47.9	Full	1600	0.0	0.0
Lane 3	85	0.0	917	0.093	11[5]	4.8	LOS A	0.3	8.5	Short	200	0.0	NA
Approach	985	0.3		0.807		19.1	LOS C	10.8	269.8				
Intersection	3460	1.6		0.807		20.7	LOS C	10.8	269.8				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

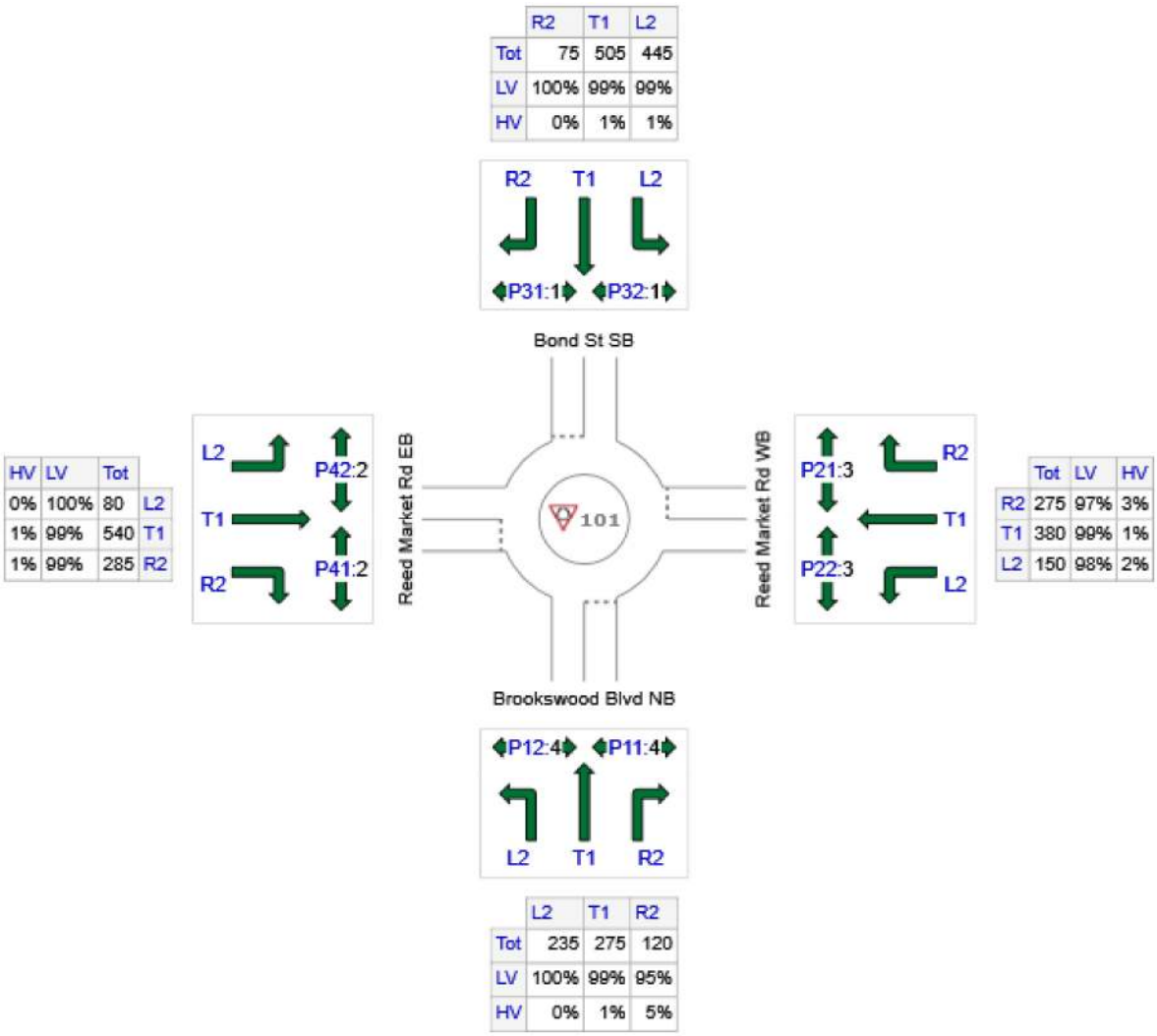
5 Lane under-utilisation found by the program
6 Lane under-utilisation due to downstream effects
d Dominant lane on roundabout approach

Site: 101 [Reed Market/Bond - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Brookswood Blvd NB	630	621	9
E: Reed Market Rd WB	805	790	15
N: Bond St SB	1025	1016	10
W: Reed Market Rd EB	905	897	8
Total	3365	3323	42

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Brookswood Blvd NB													
Lane 1	235	0.0	458	0.513	100	22.7	LOS C	4.3	29.8	Full	500	0.0	0.0
Lane 2[d]	395	2.2	585	0.676	100	21.2	LOS C	8.1	58.1	Full	500	0.0	0.0
Approach	630	1.4		0.676		21.8	LOS C	8.1	58.1				
East: Reed Market Rd WB													
Lane 1[d]	530	1.3	1033	0.513	100	7.5	LOS A	3.5	24.5	Full	500	0.0	0.0
Lane 2	275	3.0	794	0.346	100	6.1	LOS A	1.8	12.7	Short	60	0.0	NA
Approach	805	1.9		0.513		7.0	LOS A	3.5	24.5				
North: Bond St SB													
Lane 1	445	1.0	708	0.629	100	18.2	LOS B	6.0	42.5	Full	500	0.0	0.0
Lane 2[d]	580	0.9	857	0.677	100	12.4	LOS B	7.8	54.7	Full	500	0.0	0.0
Approach	1025	0.9		0.677		14.9	LOS B	7.8	54.7				
West: Reed Market Rd EB													
Lane 1[d]	620	0.9	773	0.802	100	13.0	LOS B	8.1	57.4	Full	500	0.0	0.0
Lane 2	285	1.0	561	0.508	100	9.4	LOS A	3.1	21.5	Short	60	0.0	NA
Approach	905	0.9		0.802		11.9	LOS B	8.1	57.4				
Intersection	3365	1.2		0.802		13.5	LOS B	8.1	58.1				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

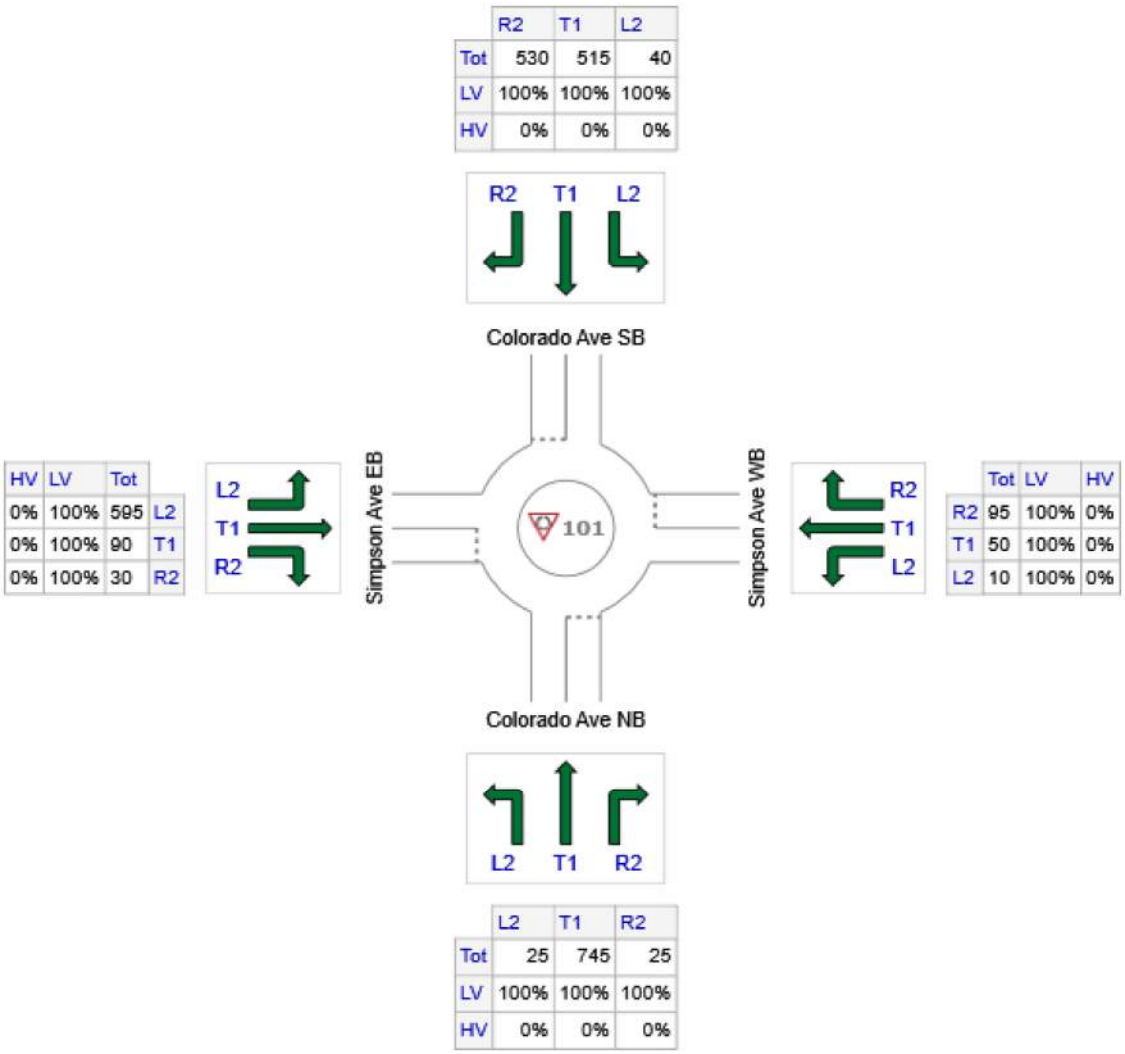
d Dominant lane on roundabout approach

Site: 101 [Colorado/Simpson - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: Colorado Ave NB	795	795	0
E: Simpson Ave WB	155	155	0
N: Colorado Ave SB	1085	1085	0
W: Simpson Ave EB	715	715	0
Total	2750	2750	0

Lane Use and Performance													
	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: Colorado Ave NB													
Lane 1	398	0.0	734	0.541	100	13.3	LOS B	3.7	26.1	Full	500	0.0	0.0
Lane 2[d]	398	0.0	734	0.541	100	13.3	LOS B	3.7	26.1	Full	500	0.0	0.0
Approach	795	0.0		0.541		13.3	LOS B	3.7	26.1				
East: Simpson Ave WB													
Lane 1[d]	155	0.0	445	0.348	100	14.1	LOS B	1.4	9.6	Full	500	0.0	0.0
Approach	155	0.0		0.348		14.1	LOS B	1.4	9.6				
North: Colorado Ave SB													
Lane 1[d]	1085	0.0	1265	0.857	100	22.4	LOS C	16.6	116.4	Full	500	0.0	0.0
Approach	1085	0.0		0.857		22.4	LOS C	16.6	116.4				
West: Simpson Ave EB													
Lane 1[d]	715	0.0	776	0.922	100	45.4	LOS E	24.9	174.0	Full	500	0.0	0.0
Approach	715	0.0		0.922		45.4	LOS E	24.9	174.0				
Intersection	2750	0.0		0.922		25.3	LOS D	24.9	174.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

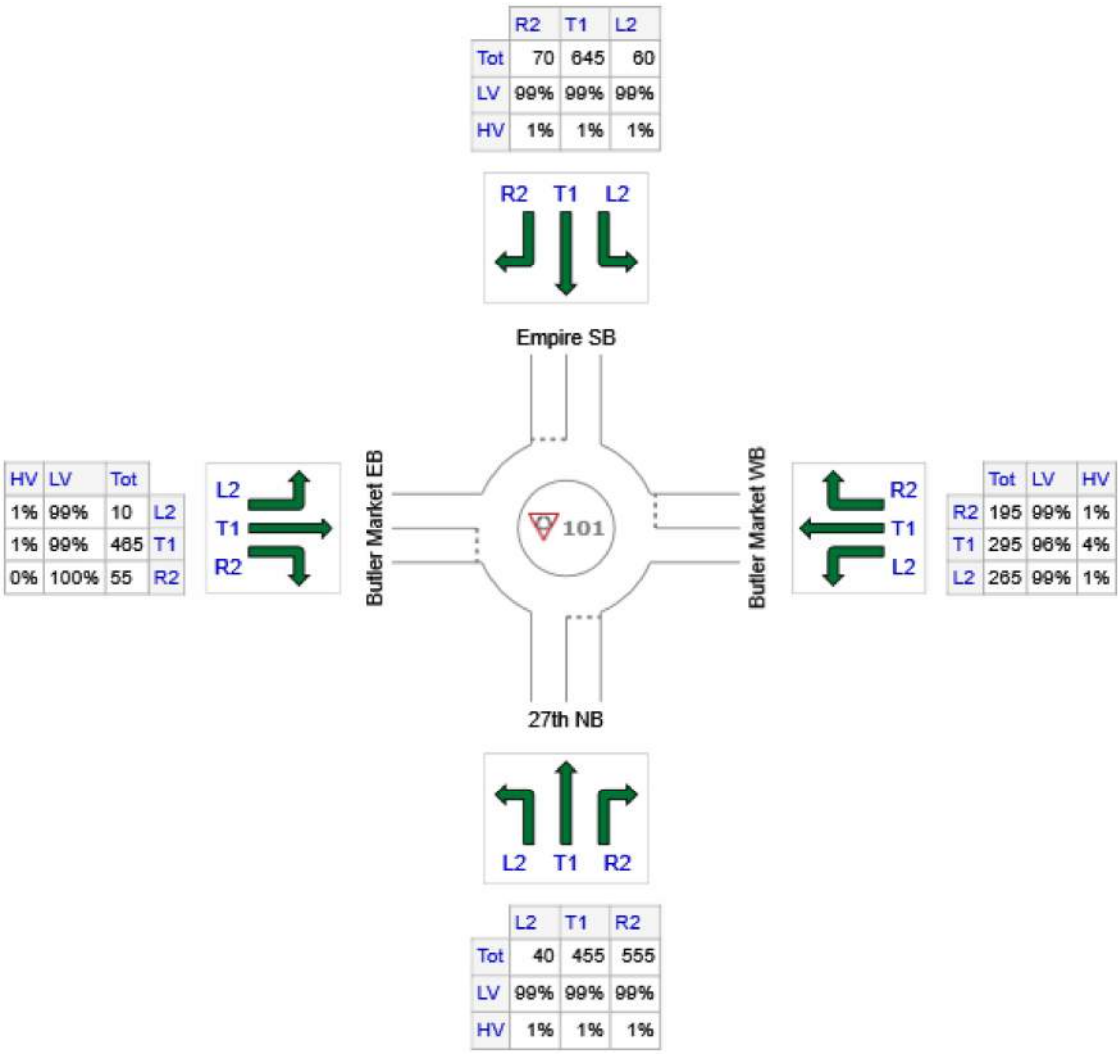
d Dominant lane on roundabout approach

Site: 101 [Empire/27th - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 27th NB	1050	1040	11
E: Butler Market WB	755	739	16
N: Empire SB	775	767	8
W: Butler Market EB	530	525	5
Total	3110	3071	39

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist m	Lane Config	Lane Length m	Cap. Adj. %	Prob. Block. %
South: 27th NB													
Lane 1	495	1.0	906	0.546	98[5]	7.2	LOS A	3.6	25.5	Full	500	0.0	0.0
Lane 2[d]	555	1.0	996	0.557	100	6.6	LOS A	3.8	26.9	Full	500	0.0	0.0
Approach	1050	1.0		0.557		6.9	LOS A	3.8	26.9				
East: Butler Market WB													
Lane 1	363	1.8	867	0.419	100	9.9	LOS A	2.7	19.3	Full	500	0.0	0.0
Lane 2[d]	392	2.5	935	0.419	100	6.4	LOS A	2.8	19.9	Full	500	0.0	0.0
Approach	755	2.2		0.419		8.0	LOS A	2.8	19.9				
North: Empire SB													
Lane 1	368	1.0	863	0.427	100	7.1	LOS A	2.4	16.9	Full	500	0.0	0.0
Lane 2[d]	407	1.0	953	0.427	100	6.0	LOS A	2.4	17.2	Full	500	0.0	0.0
Approach	775	1.0		0.427		6.5	LOS A	2.4	17.2				
West: Butler Market EB													
Lane 1	244	1.0	688	0.354	100	7.7	LOS A	1.8	12.6	Full	500	0.0	0.0
Lane 2[d]	286	0.8	808	0.354	100	6.8	LOS A	1.9	13.1	Full	500	0.0	0.0
Approach	530	0.9		0.354		7.2	LOS A	1.9	13.1				
Intersection	3110	1.3		0.557		7.1	LOS A	3.8	26.9				

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

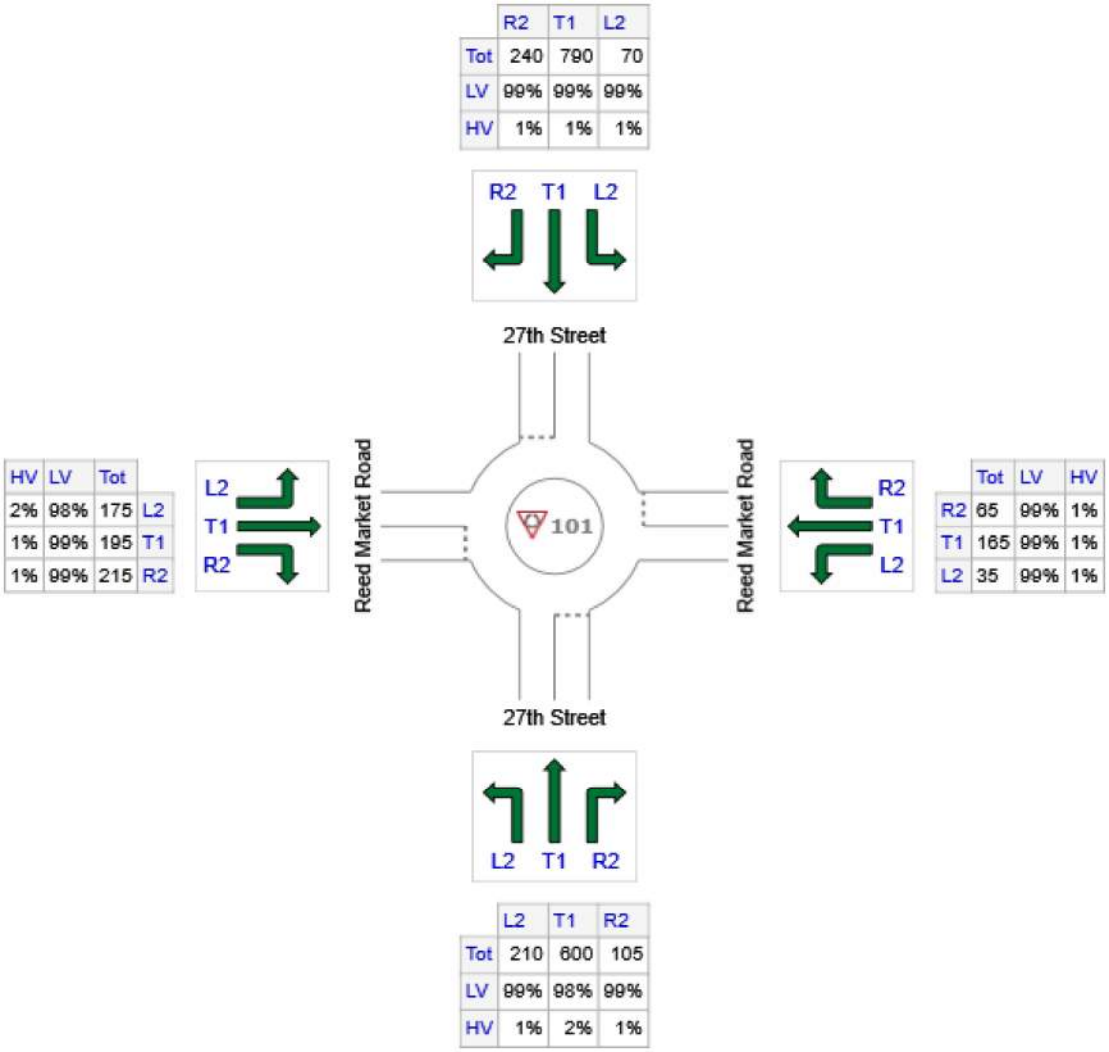
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Site: 101 [27th/Reed Market - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: 27th Street	915	900	15
E: Reed Market Road	265	262	3
N: 27th Street	1100	1089	11
W: Reed Market Road	585	577	8
Total	2865	2829	36

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: 27th Street													
Lane 1[d]	810	1.7	932	0.869	100	27.5	LOS D	19.5	495.3	Full	1600	0.0	0.0
Lane 2	105	1.0	939	0.112	100	4.9	LOS A	0.4	9.1	Full	1600	0.0	0.0
Approach	915	1.7		0.869		24.9	LOS C	19.5	495.3				
East: Reed Market Road													
Lane 1[d]	265	1.0	614	0.432	100	12.4	LOS B	1.9	48.5	Full	1600	0.0	0.0
Approach	265	1.0		0.432		12.4	LOS B	1.9	48.5				
North: 27th Street													
Lane 1[d]	860	1.0	962	0.894	100	29.9	LOS D	23.8	599.1	Full	1600	0.0	0.0
Lane 2	240	1.0	962	0.249	100	6.2	LOS A	0.9	22.8	Full	1600	0.0	0.0
Approach	1100	1.0		0.894		24.7	LOS C	23.8	599.1				
West: Reed Market Road													
Lane 1[d]	585	1.3	660	0.887	100	37.5	LOS E	12.2	307.4	Full	1600	0.0	0.0
Approach	585	1.3		0.887		37.5	LOS E	12.2	307.4				
Intersection	2865	1.3		0.894		26.3	LOS D	23.8	599.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

USER REPORT FOR SITE

Project: 2040 TSP TPR

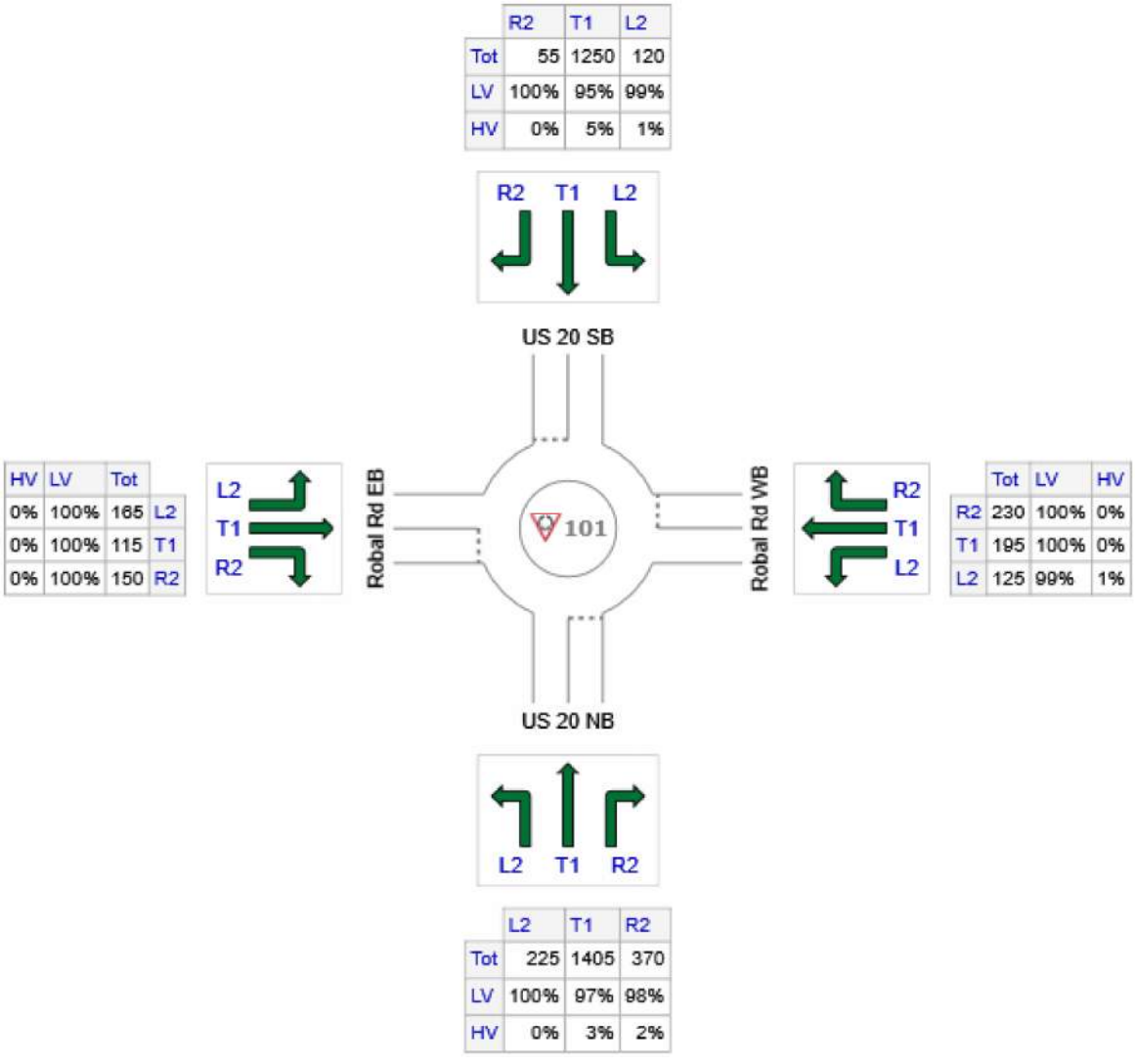
Template: Default Site User Report

Site: 101 [US 20/Robal - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	2000	1950	50
E: Robal Rd WB	550	549	1
N: US 20 SB	1425	1361	64
W: Robal Rd EB	430	430	0
Total	4405	4291	115

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	827	2.1	896	0.923	100	35.7	LOS E	27.0	685.8	Full	1600	0.0	0.0
Lane 2[d]	889	3.0	963	0.923	100	34.1	LOS D	28.1	719.5	Full	1600	0.0	0.0
Lane 3	389	2.0	1127	0.346	100	6.6	LOS A	1.6	41.8	Short	350	0.0	NA
Approach	2105	2.5		0.923		29.6	LOS D	28.1	719.5				
East: Robal Rd WB													
Lane 1	132	1.0	226	0.583	78[5]	39.0	LOS E	2.4	59.4	Full	1600	0.0	0.0
Lane 2[d]	205	0.0	274	0.748	100	47.5	LOS E	3.9	96.3	Full	1600	0.0	0.0
Lane 3	242	0.0	336	0.721	100	37.7	LOS E	3.9	98.2	Short	450	0.0	NA
Approach	579	0.2		0.748		41.5	LOS E	3.9	98.2				
North: US 20 SB													
Lane 1	717	4.3	763	0.940	100	42.7	LOS E	22.6	584.6	Full	1600	0.0	0.0
Lane 2[d]	783	4.6	833	0.940	100	40.4	LOS E	23.9	619.6	Full	1600	0.0	0.0
Approach	1500	4.5		0.940		41.5	LOS E	23.9	619.6				
West: Robal Rd EB													
Lane 1[d]	295	0.0	352	0.838	100	50.0	LOS F	6.0	149.1	Full	1600	0.0	0.0
Lane 2	158	0.0	298	0.530	100	27.6	LOS D	2.3	56.5	Full	1600	0.0	0.0
Approach	453	0.0		0.838		42.2	LOS E	6.0	149.1				
Intersection	4637	2.6		0.940		36.2	LOS E	28.1	719.5				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

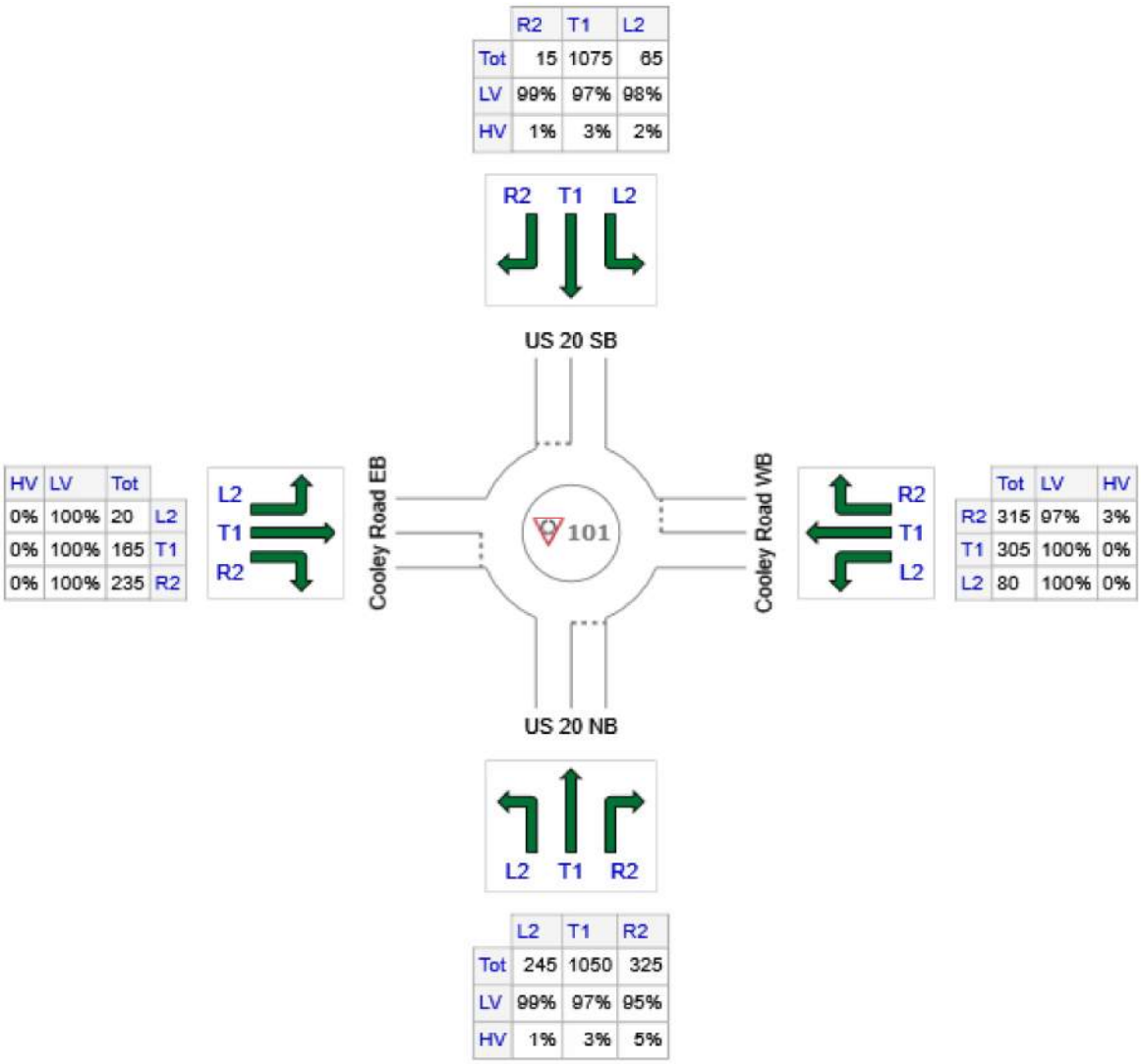
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Site: 101 [US 20/Cooley - 2040 TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	1620	1570	50
E: Cooley Road WB	700	691	9
N: US 20 SB	1155	1121	34
W: Cooley Road EB	420	420	0
Total	3895	3802	93

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	829	2.4	1034	0.802	100	19.9	LOS C	18.9	480.7	Full	1600	0.0	0.0
Lane 2[d]	876	3.8	1093	0.802	100	19.1	LOS C	18.9	487.1	Full	1600	0.0	0.0
Approach	1705	3.1		0.802		19.5	LOS C	18.9	487.1				
East: Cooley Road WB													
Lane 1	346	0.0	366	0.945	100	68.1	LOS F	10.3	258.5	Full	1600	0.0	0.0
Lane 2[d]	391	2.5	414	0.945	100	63.2	LOS F	10.9	277.9	Full	1600	0.0	0.0
Approach	737	1.4		0.945		65.5	LOS F	10.9	277.9				
North: US 20 SB													
Lane 1	579	2.9	711	0.814	100	27.3	LOS D	10.8	277.2	Full	1600	0.0	0.0
Lane 2[d]	637	3.0	783	0.814	100	25.4	LOS D	11.3	289.8	Full	1600	0.0	0.0
Approach	1216	2.9		0.814		26.3	LOS D	11.3	289.8				
West: Cooley Road EB													
Lane 1	195	0.0	401	0.486	91[5]	19.6	LOS C	2.2	55.4	Full	1600	0.0	0.0
Lane 2[d]	247	0.0	463	0.535	100	19.0	LOS C	2.6	66.2	Full	1600	0.0	0.0
Approach	442	0.0		0.535		19.3	LOS C	2.6	66.2				
Intersection	4100	2.4		0.945		29.7	LOS D	18.9	487.1				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Appendix I - Alternative Mobility Target Memorandum

Alternate Mobility Targets Technical Memorandum

PREPARED FOR: City of Bend

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DATE: May 26, 2020

Purpose

This technical memorandum summarizes a preliminary evaluation of potential locations where alternate mobility targets may be needed on the State highway system within Bend. This evaluation reflects the community-driven outcomes and technical work performed as part of the Bend Transportation System Plan (TSP) update and of the US 97 Parkway Plan. The findings presented herein identify locations where alternative mobility targets should be considered as part of future collaboration and work efforts between the City of Bend, ODOT Region 4, Bend MPO, and other key stakeholders. Final review and approval of alternate mobility targets for State highway corridors would be an action of the Oregon Transportation Commission (OTC).

Introduction

The Oregon Transportation Planning Rule (TPR) requires cities to identify the needs associated with existing and planned multimodal facilities. The TPR also requires that the TSPs identify those projects that are needed to maintain mobility on ODOT facilities, consistent with the performance targets in the Oregon Highway Plan (OHP). It is also important (and required) for a TSP to identify which transportation projects and services are reasonably likely to be implemented over the 20-year planning horizon, based on financial or other constraints. This enables the community, local agencies, and the state to establish realistic expectations for how that transportation system will likely operate at the end of the 20-year planning horizon.

Consistent with the OHP Policy 1F, the ability to meet OHP mobility targets may not be consistent with a city's land use plan or their TSP goals. In these cases, the TSP's goals, policies, projects, and programs should reflect significant collaboration between the community, agency stakeholders, and partners to identify a balance of multimodal investments needed to support the community through the 20-year planning horizon. In some cases, as with this Bend TSP update, this may result in a choice to not add capacity to major roadways due to the desire to balance capacity with other community priorities such as safety, land use, financial limitations, or engineering design feasibility. As such, it is appropriate to consider adjusting long term roadway performance expectations through the adoption of alternate standards or mobility targets. While this outcome does not "solve" projected congestion issues, it does align investments strategies with the community supported vision.

In addition to establishing realistic expectations for future system performance, this process will help reduce the potential for state and local investment needs in the 20-year planning horizon by not continuing to require compliance with standards or targets that both parties acknowledge

cannot likely be achieved, assuming that the community continues to grow in accordance with its existing, adopted land use plan.

A key note regarding mobility targets for State highways is that targets in the Oregon Highway Plan (OHP) relate to evaluations for development review processes or Transportation Planning Rule (TPR) compliance. Alternate mobility targets would modify the Oregon Highway Plan targets for a facility. A separate set of standards related to the development and design of facility improvements is located in ODOT's Highway Design Manual. These standards would not be changed with an alternate mobility target. However, adopting alternate mobility targets can be helpful in requesting design exceptions during project development.

The Need for Alternate Mobility Targets in Bend

In Bend there is a significant amount of population and employment growth projected over the 20-year planning horizon. Even with the transportation improvements identified as reasonably likely to be funded in the City's TSP (approximately $1B of projects and programs), transportation analysis forecasts portions of US 20 (3rd Street and Greenwood Avenue) and intersections along US 97/Bend Parkway to exceed ODOT's current mobility targets by the end of the 20-year planning horizon.

An evaluation of the disparity between the current targets and forecasted traffic operations confirmed the need for assessing the potential to mitigate conditions through other means, while balancing the community's goals established in the Bend TSP Goals and Policies. The findings of that evaluation are described below.

Current Mobility Targets

Currently, all ODOT intersections in the Bend study area must comply with the volume to capacity (v/c) ratio targets in the Oregon Highway Plan (OHP). ODOT v/c ratio targets are based on highway classification and area type. Within Bend, the v/c target is 0.85.

ODOT standard analysis procedure also requires intersection operating conditions to be compared to existing OHP Mobility Targets during the 30th highest annual hour of traffic (30 HV). Within Bend, the 30 HV typically occurs during the summer months, when traffic volumes increase due to an influx of vacationers and visitors, leading to a significant increase in traffic over average weekday conditions (from a 5 percent to 40 percent increase in some areas).

Scenarios Evaluated to Meet Future Needs

A scenario evaluation process guided the testing of various sets of transportation strategies that could address identified deficiencies. This scenario evaluation process was based on the community's desired outcomes for the transportation system, as articulated through the TSP Goals and Policies.

The scenario evaluation process resulted in an assessment of how various investment packages could help achieve the Goals, as evaluated by a number of system-wide performance measures.

Three primary investment packages were assessed:

- Scenario A: Build New Corridors – primarily comprised of building new streets, extending existing streets, building new bridges and crossings, and adding key multi-use paths to increase the capacity of the City's existing transportation facilities.
- Scenario B: Widen and Enhance Existing Corridors – primarily included projects that use the existing transportation system by widening existing corridors and adding missing walking and bicycling facilities to increase the connectivity of the City's transportation system.

- Scenario C: Maximize the Existing Transportation System – relied on increased use of transit, technology, and transportation demand programs to increase the efficiency of the City's existing transportation system.

The scenario-based evaluation process led to a hybrid investment strategy of transportation projects and programs that will form the basis of the City's transportation system changes over the next 20 years. This hybrid scenario combined the most promising elements of the three scenarios evaluated into a robust and effective set of improvements, including:

- Citywide connected bicycle and pedestrian corridors that reduce reliance on vehicle trips, including grade-separated crossings of US 97
- Enhancements to the public transit system, including two high-capacity transit corridors (including along Hwy 20 from 3rd Street to 27th Street) and the construction of micro-mobility hubs that serve first/last mile trips
- Travel Demand Management Programs for major employers and institutions
- Parking pricing and management in downtown Bend
- Implementation of the Deschutes County ITS Plan, including traffic signal coordination as well as freight and transit signal priority
- Local system connectivity projects and intersection bottleneck improvement projects that provide route choices on the Bend arterial and collector system
- Completion of the US 97 North Parkway Extension
- Access Management and Ramp Metering on US 97
- Construction of the US 97 / Powers Road Interchange (or grade-separated crossing)
- Widening of US 20 between Cooley Road and Empire Avenue
- Intersection capacity improvements on US 20 at Cooley Road and Robal Road
- US 97 Interchange improvements at Empire Avenue, Revere Avenue, Colorado Avenue, Reed Market Road, Murphy Road
- Construction of an overcrossing of US 97 at China Hat Road, connecting to a frontage road to the Murphy Road Interchange

Future Intersection Operations

Future year 2040 peak hour conditions were evaluated at study intersections throughout Bend assuming implementation of the reasonably likely to be funded TSP projects and programs. These projects and programs are anticipated to be synonymous with the Bend Metropolitan Transportation Plan's Update to the financially constrained project list. Given the increased growth in Bend over the 20-year planning horizon, traffic demand in the summer p.m. peak period is forecast to exceed capacity at many intersections by 2040. As listed in Table 1 and Table 2, 7 (out of 16) study intersections along US 97/Bend Parkway and 12 (out of 13) study intersections along US 20 would fail to comply with the existing mobility targets.

It should be noted that while the 3rd Street (US 97 Bus) & Cooley Rd intersection is forecast as failing to meet mobility targets in the 2040 horizon, the actual design of this intersection has not yet been finalized. The ultimate design of Phase 1 of the North Parkway Extension may significantly change the performance of this intersection. In addition, the upcoming Baker Interchange Area Management Plan will likely identify improvements to the US 97 ramp terminal intersections at Baker/Knott Road.

Table 1: US 97 Intersection Operation Results (2040 PM Peak Hour, 30HV, w/ TSP project list improvements)

US 97/ Bend Pkwy Intersection	Int. Control	Existing OHP Mobility Target	Delay (s/veh)	Level of Service	Volume/ Capacity	TSP Project?
3rd Street (US 97 Bus) & Cooley Rd	Signal	v/c ≤ 0.85	67	E	**0.89**	US 97 North Parkway Extension Phase 1
3rd Street (US 97 Bus) & Robal Rd	Signal	v/c ≤ 0.85	34	C	0.73	US 97 North Parkway Extension Phase 1
US 97 SB On-ramp & Empire Blvd	Signal	v/c ≤ 0.85	70	E	**0.99**	Empire Ave widening (C-13)
US 97 NB Ramps & Empire Blvd	Signal	v/c ≤ 0.85	55	E	**1.10**	Empire Ave widening (C-13)
US 97 SB Off-ramp & Butler Market Rd	RAB	v/c ≤ 0.85	10	B	0.55	Butler Market Rd/US 20/US 97 improvement (C-21)
US 97 NB Ramps & Butler Market Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	11 / 25	B /C	0.11 / 0.13	-
US 97 SB Ramps & Revere Ave	Signal	v/c ≤ 0.85	25	C	0.84	Revere Ave interchange improvements (C-9)
US 97 NB Ramps & Revere Ave	Signal	v/c ≤ 0.85	37	D	**0.92**	Revere Ave interchange improvements (C-9)
US 97 SB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	48	D	**0.98**	-
US 97 NB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	37	D	**0.90**	US 97/Colorado Ave NB ramp capacity improvement (C-7)
US 97 SB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	35	C	**0.89**	US 97/Reed Market Rd interchange (C-19,C-20)
US 97 NB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	11	B	0.80	US 97/Reed Market Rd interchange (C-19,C-20)
US 97 SB Ramps & Powers Rd	Signal	v/c ≤ 0.85	29	C	0.81	Powers Rd interchange (C-41)
US 97 NB Ramps & Powers Rd	Signal	v/c ≤ 0.85	17	B	0.70	Powers Rd interchange (C-41)
US 97 SB Ramps & Baker Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	8 / 37	A /E	0.06 / **0.86**	-
US 97 NB Ramps & Knott Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	12 / >300	B /F	0.38 / **2.86**	-
US 97/ Bend Pkwy Intersections meeting targets					7 / 16	

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. Two-way stop control (TWSC) intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the target.

Table 2: US 20 Intersection Operation Results (2040 PM Peak Hour, 30HV, w/ TSP project list improvements)

US 20 (3rd Str/ Greenwood Ave) Intersection	Int. Control	Existing OHP Mobility Target	Delay	LOS	V/C Ratio	TSP Project?
US 20 & Cooley Rd	RAB	v/c ≤ 0.85	30	F	**0.95**	US 20 intersection safety and capacity improvements near US 20/Robal Rd (C-26)
US 20 & Robal Rd	RAB	v/c ≤ 0.85	33	F	**0.94**	US 20 intersection safety and capacity improvements near US 20/Robal Rd (C-26)
US 20 & Empire Blvd	Signal	v/c ≤ 0.85	120	F	**1.25**	US 97 North Parkway Extension Phase 2 (C-40)
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	v/c ≤ 0.85	27	C	0.82	-
US 20 (NE 3rd St) & Butler Market Rd	Signal	v/c ≤ 0.85	52	D	**1.04**	Butler Market Rd/US 20/US 97 improvement (C-21)
US 20 (NE 3rd St) & Division St	Signal	v/c ≤ 0.85	31	C	**0.88**	Butler Market Rd/US 20/US 97 improvement (C-21)
US 20 (NE 3rd St) & Revere Ave	Signal	v/c ≤ 0.85	92	F	**1.10**	**-**
US 20 (NE 3rd St) & Olney Ave	Signal	v/c ≤ 0.85	64	E	**0.97**	**-**
US 20 (NE 3rd St) & Greenwood Ave	Signal	v/c ≤ 0.85	170	F	**1.33**	**-**
US 20 (Greenwood Ave) & NE 8th Ave	Signal	v/c ≤ 0.85	125	F	**1.20**	**-**
US 20 (Greenwood Ave) & SE 15th St	Signal	v/c ≤ 0.85	40	D	**0.92**	US 20 operational improvements from 15th Street to east UBG (C-62)
US 20 (Greenwood Ave) & Purcell Blvd	Signal	v/c ≤ 0.85	53	D	**0.95**	US 20 operational improvements from 15th Street to east UBG (C-62)
US 20 (Greenwood Ave) & SE 27th Ave	Signal	v/c ≤ 0.85	61	E	**1.04**	US 20/27th St intersection improvement (C-31, C-62)
US 20 Intersections meeting targets					1 / 13	

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the target.

Factors Limiting the Ability to Meet Existing Mobility Targets

Several factors combine to make compliance with the current mobility targets within Bend difficult. They include the following.

Projected Multimodal Travel Needs

The importance of US 20 and US 97 to statewide, regional, and local travel creates significant multimodal demands for both short and long trips along the corridor. These users include:

- People driving taking advantage of the higher speeds and grade separations to make local trips to homes, work, and shopping
- People driving making regional trips between cities (including between Redmond, Sisters, Sunriver, La Pine and other Central and Eastern Oregon destinations)
- Freight traveling to and through Bend
- Transit traveling along the main state facility or crossing at a local street
- People biking and walking along and across US 20 and US 97

Balancing the needs of each of these various users was a key factor in the Bend Citywide Transportation Advisory Committee's discussions and decisions in evaluating scenarios and identifying projects and programs.

Existing and planned development patterns

In many areas along US 20 and US 97, adjacent existing development and planned urban form promoting increased density and mixed-land use constrains the ability to widen the highway right-of-way or provide parallel alternate routes. Obtaining needed right-of-way for highway widening would require acquisition and removal of such development, which would be very expensive and undesirable to the community.

Financial factors

Funding for transportation improvements is limited and constrains the ability of Bend and ODOT to pay for highway capacity improvements. Therefore, while the Bend TSP includes a robust transportation funding strategy that enables the TSP 2040 project and programs list to be designated reasonably likely to be funded, there are remaining facility mobility target performance deficiencies that could not be addressed within the funding constraints.

Alternate Mobility Target Evaluation

Figure 2 shows the ODOT methodology for determining alternate mobility targets. A summary of each step under consideration at this time (Steps 1 through 4) is discussed below and Tables 2 and 3 list the results for each individual intersection. In addition to the steps outlined below, additional considerations could be taken when determining alternate mobility targets to ensure other goals and objectives within the TSP continue to be addressed (such as safety, equity, economic vitality, etc.)

Figure 2: Alternate Mobility Target Methodology

Step 1: Implement recommended improvements

With the implementation of the recommended improvements in the TSP, nearly half of the study intersections along US 97 (7 out of 16) and one study intersection along US 20 (out of 13) are forecast to meet existing mobility standards. To be compliant with mobility targets, alternate mobility targets would be needed for the remaining state study intersections within Bend.

Step 2: Increase v/c targets

Step 2 maintains the same methodology as in Step 1 (using 30 HV) but raises the v/c target from 0.85 to 1.0. Fourteen of the 16 study intersections along US 97 and 7 of the 13 study intersections along US 20 are forecast to have a v/c ratio less than 1.0 under 30 HV conditions.

Step 3: Remove peaking

Setting the peak hour factor (PHF) to 1.0 relaxes the peaking assumptions and allows for analysis of the peak hour volumes instead of the peak 15-minute volumes. With a PHF of 1.0, 9 of the 13 study intersection would have a v/c ratio of 1.0 or less. No additional intersections along US 97 would have a v/c ratio less than 1.0.

Step 4: Analyze average weekday conditions

Step 4 analyzes average weekday (AWD) conditions instead of 30 HV conditions. In Bend, the 30 HV range anywhere from roughly five to 40 percent higher than AWD volumes. The City of Bend uses an average weekday mobility target on City facilities. Analyzing average weekday conditions instead of the 30 HV gives a more accurate representation of typical conditions instead of peak summer conditions when there is an influx of visitors in Bend. Using AWD volumes with a PHF of 1.0, all the study intersections except one on US 97 and 10 of the 13 study intersections on US 20 are forecast to operate with a v/c ratio of 1.0 or less.

Table 3: US 97 Intersection Operations Results (2040 PM Peak Hour)

US 97/ Bend Parkway Intersection	Int. Control	Existing OHP Mobility Target	*Step 1: 30HV, with Recommended Improvements*	*Step 2: 30HV, V/C ≤ 1.0*	Step 3: 30HV, PHF=1.0, V/C ≤ 1.0	Step 4: AWD, PHF=1.0, V/C ≤ 1.0
3rd Street (US 97 Bus) & Cooley Rd	Signal	v/c ≤ 0.85	**0.89**	0.89	0.85	0.77
3rd Street (US 97 Bus) & Robal Rd	Signal	v/c ≤ 0.85	0.73	0.73	0.67	0.63
US 97 SB On-ramp & Empire Blvd	Signal	v/c ≤ 0.85	**0.99**	0.99	0.96	0.88
US 97 NB Ramps & Empire Blvd	Signal	v/c ≤ 0.85	**1.10**	**1.10**	**1.01**	0.90
US 97 SB Off-ramp & Butler Market Rd	RAB	v/c ≤ 0.85	0.55	0.55	0.51	0.46
US 97 NB Ramps & Butler Market Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Butler Market Rd)	0.11 / 0.13	0.11 / 0.13	0.10 / 0.10	0.08 / 0.08
US 97 SB Ramps & Revere Ave	Signal	v/c ≤ 0.85	0.84	0.84	0.74	0.68
US 97 NB Ramps & Revere Ave	Signal	v/c ≤ 0.85	**0.92**	0.92	0.80	0.74
US 97 SB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	**0.98**	0.98	0.91	0.81
US 97 NB Ramps & Colorado Ave	Signal	v/c ≤ 0.85	**0.90**	0.90	0.80	0.72
US 97 SB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	**0.89**	0.89	0.81	0.70
US 97 NB Ramps & Reed Market Rd	Signal	v/c ≤ 0.85	0.80	0.80	0.74	0.66
US 97 SB Ramps & Powers Rd	Signal	v/c ≤ 0.85	0.81	0.81	0.77	0.66
US 97 NB Ramps & Powers Rd	Signal	v/c ≤ 0.85	0.70	0.70	0.66	0.58
US 97 SB Ramps & Baker Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Baker Rd)	0.06 / **0.86**	0.06 / 0.86	0.05 / 0.80	0.05 / 0.68
US 97 NB Ramps & Knott Rd	TWSC	v/c ≤ 0.85 (ramp) v/c ≤ 0.95 (Knott Rd)	0.38 / **2.86**	0.38 / **2.86**	0.33 / **1.72**	0.33 / **1.05**
US 97/Parkway Intersections meeting targets			**Step 1:** 7 / 16	**Step 2:** 14 / 16	**Step 3:** 14 / 16	**Step 4:** 15 / 16

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the mobility target at that step.

Table 4: US 20 Intersection Operations Results (2040 PM Peak Hour)

US 20 (3rd Str/ Greenwood Ave) Intersection	**Int. Control**	**Existing OHP Mobility Target**	***Step 1: 30HV, with Recommended Improvements***	***Step 2: 30HV, V/C ≤ 1.0***	**Step 3: 30HV, PHF=1.0, V/C ≤ 1.0**	**Step 4: AWD, PHF=1.0, V/C ≤ 1.0**
US 20 & Cooley Rd	RAB	v/c ≤ 0.85	**0.95**	0.95	0.84	0.83
US 20 & Robal Rd	RAB	v/c ≤ 0.85	**0.94**	0.94	0.87	0.86
US 20 & Empire Blvd	Signal	v/c ≤ 0.85	**1.25**	**1.25**	**1.18**	**1.07**
US 20 (NE 3rd St) & O.B. Riley Rd	Signal	v/c ≤ 0.85	0.82	0.82	0.77	0.71
US 20 (NE 3rd St) & Butler Market Rd	Signal	v/c ≤ 0.85	**1.04**	**1.04**	0.94	0.86
US 20 (NE 3rd St) & Division St	Signal	v/c ≤ 0.85	**0.88**	0.88	0.81	0.75
US 20 (NE 3rd St) & Revere Ave	Signal	v/c ≤ 0.85	**1.10**	**1.10**	**1.02**	0.97
US 20 (NE 3rd St) & Olney Ave	Signal	v/c ≤ 0.85	**0.97**	0.97	0.95	0.88
US 20 (NE 3rd St) & Greenwood Ave	Signal	v/c ≤ 0.85	**1.33**	**1.33**	**1.27**	**1.18**
US 20 (Greenwood Ave) & NE 8th Ave	Signal	v/c ≤ 0.85	**1.20**	**1.20**	**1.12**	**1.03**
US 20 (Greenwood Ave) & SE 15th St	Signal	v/c ≤ 0.85	**0.92**	0.92	0.90	0.79
US 20 (Greenwood Ave) & Purcell Blvd	Signal	v/c ≤ 0.85	**0.95**	0.95	0.94	0.84
US 20 (Greenwood Ave) & SE 27th Ave	Signal	v/c ≤ 0.85	**1.04**	**1.04**	1.00	0.93
US 20 Intersections meeting targets			**Step 1:** 1 / 13	**Step 2:** 7 / 13	**Step 3:** 9 / 13	**Step 4:** 10 / 13

Note: Signalized intersection volume-to-capacity (v/c) results are reported for the overall intersection. Roundabout (RAB) results are reported for the worst leg. TWSC intersection results are reported for the worst major approach/worst minor.

Bold, Red and Shaded indicates a v/c ratio greater than the mobility target at that step.

Summary of Findings

As noted in the sections above, while the major investments in transportation through the TSP 2040 Project and Programs List (the reasonably likely to be funded list) will result in improved intersection performance on ODOT facilities, not all intersections will be able to meet state v/c targets and there is a need to investigate alternate mobility targets in select locations. Alternate mobility targets can help establish realistic expectations for future system performance and create targets that help the community continue to grow in accordance with its existing, adopted land use plan.

Given the differing roles that each of the highway plays within the community, region, and the state, the following considerations should be taken when selecting alternate mobility targets.

US 20 Considerations:

- Only two-thirds of the study intersections along US 20 are forecast to operate with a v/c less than 1.0 under 30 HV conditions with no peaking factors. Only one additional study intersection is forecast to operate with a v/c less than 1.0 under average weekday conditions, meaning three study intersections (US 20/Empire Boulevard, US 20 (3rd Street)/Greenwood Avenue, and US 20/15th Street) would exceed capacity in future year average weekday conditions.
- Analysis is currently underway to determine the exact improvements related to the North Parkway Extension and through that work (or separate work on the North Parkway Extension Phase 2), US 20/Empire Boulevard capacity issues may be mitigated.
- Aside from US 20/Empire Boulevard, the remaining three intersections that do not operate with a v/c less than 1.0 under 30 HV conditions are located within the Bend Central District Opportunity Area as identified in the Bend Comprehensive Plan.
- An alternate mobility target for US 20 in Bend could consider:
    - Establishing a boundary in the Bend Central District area where peak hour motor vehicle mobility targets are not applied to better balance the goals in the TSP (instead relying upon safety, complete multimodal facilities, etc.). This could mirror a Multimodal Mixed Use Area approach to support the integrated land use and transportation planning in this core redevelopment area.
    - Setting a 30 HV (with no peak hour factor) target of 1.0 outside of the Bend Central District (e.g., north of Underwood Avenue and east of 8th Street).
    - Setting an average weekday target outside of the Bend Central District. This target could be set lower than 1.0 to provide more flexibility in handling day-to-day traffic variations. Using average weekday conditions would be consistent with the City's development review code and would better align with the travel demand forecast tools utilized for system planning in the Bend region.
    - Establishing targets or policies for other performance factors such as safety, equity, economic vitality, or multimodal mobility, consistent with the Bend TSP Goals and Policies.

US 97 Considerations:

- All the ramp terminals TWSC approach at Knott Road and US 97 NB ramp) along US 97 are forecast to operate with a v/c less than 1.0 under 30 HV conditions when using a peak hour factor of 1.0.
- If average weekday conditions were used as the mobility target for US 97 intersections in Bend all the intersections (except the TWSC approach at Knott Road NB ramp) would meet a v/c ratio of 0.9 or less.

- While this alternate mobility target memo sets up a framework for determining alternate mobility targets at intersection locations, additional analysis may consider safety, mainline highway operations and target weave, merge and diverge movements.
- If alternate mobility targets are set along US 97, additional considerations should be taken to ensure that queues do not back up onto the safe stopping distance areas from the mainline exits, creating safety issues.
- An alternate mobility target for US 97 in Bend could consider:
    - Further evaluation of ramp terminal intersection performance to understand the potential for queue spillback onto the mainline.
    - Setting a 30 HV (with no peak hour factor) target of 1.0 for ramp terminals and other intersections.
    - Setting an average weekday target of 0.90 or lower for ramp terminals and intersections. Using average weekday conditions would be consistent with the City's development review code and would better align with the travel demand forecast tools utilized for system planning in the Bend region.
    - Further evaluation to understand if an alternate mobility target for mainline weave, merge, and diverge operations should be established.
    - Establishing targets or policies for other performance factors such as safety, equity, economic vitality, or multimodal mobility, consistent with the Bend TSP Goals and Policies.

Appendix J - Technical Analysis Files

Intersection	
Intersection Delay, s/veh	10.4
Intersection LOS	B

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	462	723	173	407
Demand Flow Rate, veh/h	467	730	175	412
Vehicles Circulating, veh/h	577	5	649	735
Vehicles Exiting, veh/h	570	819	395	0
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	11.9	8.8	6.8	13.0
Approach LOS	B	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LR	LTR
Assumed Moves	TR	LT	LR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	467	730	175	412
Cap Entry Lane, veh/h	858	1328	812	761
Entry HV Adj Factor	0.990	0.990	0.989	0.988
Flow Entry, veh/h	462	723	173	407
Cap Entry, veh/h	850	1315	803	752
V/C Ratio	0.544	0.550	0.215	0.542
Control Delay, s/veh	11.9	8.8	6.8	13.0
LOS	B	A	A	B
95th %tile Queue, veh	3	3	1	3

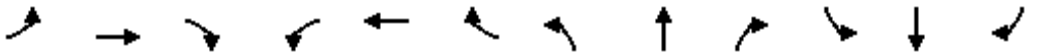
Intersection	
Int Delay, s/veh	0.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Future Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	3	1	0	0	1	2	0	0	0	0	0	0
Mvmt Flow	82	723	5	11	717	228	5	5	16	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	946	0	0	729	0	0	1744	1859	727
Stage 1	-	-	-	-	-	-	891	891	-
Stage 2	-	-	-	-	-	-	853	968	-
Critical Hdwy	4.13	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	721	-	-	884	-	-	96	74	427
Stage 1	-	-	-	-	-	-	404	363	-
Stage 2	-	-	-	-	-	-	421	335	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	721	-	-	883	-	-	84	0	427
Mov Cap-2 Maneuver	-	-	-	-	-	-	84	0	-
Stage 1	-	-	-	-	-	-	353	0	-
Stage 2	-	-	-	-	-	-	421	0	-

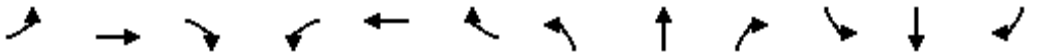
Approach	EB	WB	NB
HCM Control Delay, s	1.1	0.1	24.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	211	721	-	-	883	-	-
HCM Lane V/C Ratio	0.129	0.113	-	-	0.012	-	-
HCM Control Delay (s)	24.6	10.6	-	-	9.1	-	-
HCM Lane LOS	C	B	-	-	A	-	-
HCM 95th %tile Q(veh)	0.4	0.4	-	-	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Future Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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
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)		1691		1630	1716						1662	1458
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1691		1630	1716						1662	1458
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	626	74	32	358	0	0	0	0	453	0	647
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	0	294
Lane Group Flow (vph)	0	696	0	32	358	0	0	0	0	0	453	353
Heavy Vehicles (%)	0%	2%	2%	2%	2%	0%	0%	0%	0%	0%	2%	2%
Turn Type		NA		Prot	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases										2		2
Actuated Green, G (s)		44.2		2.4	51.6						28.4	28.4
Effective Green, g (s)		45.2		3.4	52.6						29.4	29.4
Actuated g/C Ratio		0.50		0.04	0.58						0.33	0.33
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		849		61	1002						542	476
v/s Ratio Prot		c0.41		c0.02	0.21							
v/s Ratio Perm											0.27	0.24
v/c Ratio		0.82		0.52	0.36						0.84	0.74
Uniform Delay, d1		18.9		42.5	9.8						28.1	26.9
Progression Factor		1.00		1.27	0.66						1.00	1.00
Incremental Delay, d2		8.7		5.8	0.7						10.7	6.2
Delay (s)		27.6		59.6	7.2						38.8	33.1
Level of Service		C		E	A						D	C
Approach Delay (s)		27.6			11.5			0.0			35.5	
Approach LOS		C			B			A			D	

Intersection Summary			
HCM 2000 Control Delay	28.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	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												
Traffic Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Future Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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				
Frt	1.00	1.00			0.94		1.00	0.85				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1646	1733			1614		1630	1458				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1646	1733			1614		1630	1458				
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)	316	763	0	0	342	305	47	0	53	0	0	0
RTOR Reduction (vph)	0	0	0	0	30	0	0	48	0	0	0	0
Lane Group Flow (vph)	316	763	0	0	617	0	47	5	0	0	0	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	3	8			4			6				
Permitted Phases							6					
Actuated Green, G (s)	23.6	73.0			44.4		7.0	7.0				
Effective Green, g (s)	24.6	74.0			45.4		8.0	8.0				
Actuated g/C Ratio	0.27	0.82			0.50		0.09	0.09				
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Lane Grp Cap (vph)	449	1424			814		144	129				
v/s Ratio Prot	c0.19	0.44			c0.38			0.00				
v/s Ratio Perm							c0.03					
v/c Ratio	0.70	0.54			0.76		0.33	0.04				
Uniform Delay, d1	29.4	2.5			17.9		38.5	37.5				
Progression Factor	0.84	1.11			1.00		1.00	1.00				
Incremental Delay, d2	3.0	0.9			6.5		1.3	0.1				
Delay (s)	27.7	3.7			24.4		39.8	37.6				
Level of Service	C	A			C		D	D				
Approach Delay (s)		10.7			24.4			38.6			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	17.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	12.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	410	420	220	75	500
Future Vol, veh/h	60	410	420	220	75	500
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	4
Mvmt Flow	63	432	442	232	79	526

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	442	0	-	0	1000	442
Stage 1	-	-	-	-	442	-
Stage 2	-	-	-	-	558	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1129	-	-	-	272	611
Stage 1	-	-	-	-	652	-
Stage 2	-	-	-	-	577	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1129	-	-	-	252	611
Mov Cap-2 Maneuver	-	-	-	-	252	-
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	577	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	35.4
HCM LOS			E

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1129	-	-	-	252	611
HCM Lane V/C Ratio	0.056	-	-	-	0.313	0.861
HCM Control Delay (s)	8.4	0	-	-	25.7	36.8
HCM Lane LOS	A	A	-	-	D	E
HCM 95th %tile Q(veh)	0.2	-	-	-	1.3	9.7

Intersection	
Int Delay, s/veh	47.8

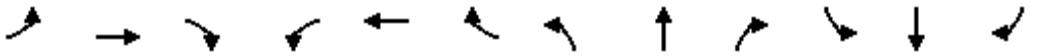
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Future Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	6	4	0	0	3	1	0	0	0	5	0	2
Mvmt Flow	310	217	0	0	641	152	54	0	179	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	793	0	-	-	-	0	1554	1630	217
Stage 1	-	-	-	-	-	-	837	837	-
Stage 2	-	-	-	-	-	-	717	793	-
Critical Hdwy	4.16	-	-	-	-	-	9.4	9.5	7.7
Critical Hdwy Stg 1	-	-	-	-	-	-	8.4	8.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	8.4	8.5	-
Follow-up Hdwy	2.254	-	-	-	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	810	-	0	0	-	-	~ 34	26	756
Stage 1	-	-	0	0	-	-	213	192	-
Stage 2	-	-	0	0	-	-	268	208	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	810	-	-	-	-	-	~ 19	0	756
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 19	0	-
Stage 1	-	-	-	-	-	-	120	0	-
Stage 2	-	-	-	-	-	-	268	0	-

Approach	EB	WB	NB
HCM Control Delay, s	7.2	0	$ 301.7
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	19	756	810	-	-	-
HCM Lane V/C Ratio	2.86	0.237	0.382	-	-	-
HCM Control Delay (s)	$ 1260.5	11.2	12.2	0	-	-
HCM Lane LOS	F	B	B	A	-	-
HCM 95th %tile Q(veh)	7.2	0.9	1.8	-	-	-

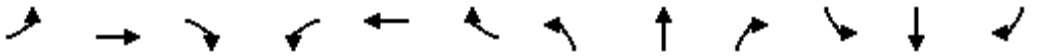
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Future Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	0.99	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	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1707	1468		1677	1468	1662	3260	1451	1662	3224	
Flt Permitted		0.83	1.00		0.74	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1456	1468		1287	1468	1662	3260	1451	1662	3224	
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)	16	16	403	177	32	86	237	1097	183	38	1355	16
RTOR Reduction (vph)	0	0	257	0	0	70	0	0	43	0	0	0
Lane Group Flow (vph)	0	32	146	0	209	16	237	1097	140	38	1371	0
Confl. Peds. (#/hr)	1		1	1		1			2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		19.5	19.5		19.5	19.5	18.0	66.4	66.4	4.1	52.5	
Effective Green, g (s)		20.5	20.5		20.5	19.5	19.0	67.4	67.4	5.1	53.5	
Actuated g/C Ratio		0.20	0.20		0.20	0.19	0.18	0.64	0.64	0.05	0.51	
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	4.8	4.8	2.5	4.8	
Lane Grp Cap (vph)		284	286		251	272	300	2092	931	80	1642	
v/s Ratio Prot							c0.14	0.34		0.02	c0.43	
v/s Ratio Perm		0.02	0.10		c0.16	0.01			0.10			
v/c Ratio		0.11	0.51		0.83	0.06	0.79	0.52	0.15	0.47	0.83	
Uniform Delay, d1		34.8	37.8		40.6	35.2	41.1	10.1	7.4	48.6	22.0	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	1.2		20.1	0.1	12.8	0.9	0.3	3.2	5.2	
Delay (s)		34.9	38.9		60.7	35.3	53.9	11.1	7.8	51.9	27.1	
Level of Service		C	D		E	D	D	B	A	D	C	
Approach Delay (s)		38.6			53.3			17.4			27.8	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

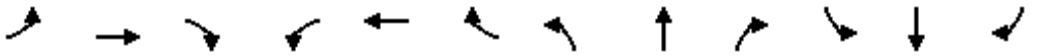
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	430	180	250	410	115	110	1170	135	140	740	50
Future Volume (vph)	175	430	180	250	410	115	110	1170	135	140	740	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	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	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
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)	188	462	194	269	441	124	118	1258	145	151	796	54
RTOR Reduction (vph)	0	0	112	0	0	80	0	8	0	0	4	0
Lane Group Flow (vph)	188	462	82	269	441	44	118	1396	0	151	846	0
Confl. Peds. (#/hr)	5					5	5		3	3		5
Heavy Vehicles (%)	1%	1%	0%	1%	1%	0%	0%	2%	0%	0%	5%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	18.2	27.3	27.3	21.7	30.8	30.8	10.6	44.0		7.0	40.4	
Effective Green, g (s)	19.2	28.3	28.3	22.7	31.8	31.8	11.6	45.0		8.0	41.4	
Actuated g/C Ratio	0.16	0.24	0.24	0.19	0.27	0.27	0.10	0.38		0.07	0.34	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	263	408	350	311	459	386	160	1202		110	1082	
v/s Ratio Prot	0.11	c0.27		c0.16	c0.25		0.07	c0.44		c0.09	0.27	
v/s Ratio Perm			0.06			0.03						
v/c Ratio	0.71	1.13	0.24	0.86	0.96	0.11	0.74	1.16		1.37	0.78	
Uniform Delay, d1	47.8	45.9	37.1	47.2	43.5	33.4	52.7	37.5		56.0	35.3	
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	8.9	85.8	0.3	21.3	32.0	0.1	16.2	82.0		214.8	5.6	
Delay (s)	56.7	131.6	37.4	68.5	75.5	33.6	68.9	119.5		270.8	40.9	
Level of Service	E	F	D	E	E	C	E	F		F	D	
Approach Delay (s)		93.3			67.0			115.6			75.6	
Approach LOS		F			E			F			E	

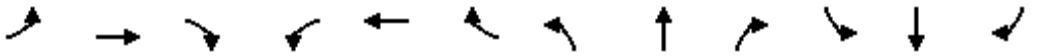
Intersection Summary			
HCM 2000 Control Delay	91.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



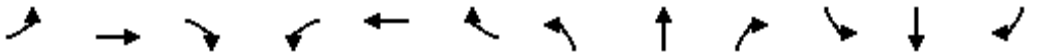
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Future Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00						1.00	
Frpb, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00						0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)	1805	1827	1532	1805	1837						1504	
Flt Permitted	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (perm)	1805	1827	1532	1805	1837						1504	
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)	15	1119	557	474	1088	31	0	0	0	15	5	52
RTOR Reduction (vph)	0	0	164	0	1	0	0	0	0	0	44	0
Lane Group Flow (vph)	15	1119	393	474	1118	0	0	0	0	0	28	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			4			1						
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	0%	20%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA					Perm	NA	
Protected Phases	5	2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)	2.0	62.0	62.0	26.5	86.5						18.0	
Effective Green, g (s)	2.5	62.5	62.5	27.0	87.0						18.5	
Actuated g/C Ratio	0.02	0.52	0.52	0.22	0.72						0.15	
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)	37	951	797	406	1331						231	
v/s Ratio Prot	0.01	c0.61		c0.26	0.61							
v/s Ratio Perm			0.26								0.02	
v/c Ratio	0.41	1.18	0.49	1.17	0.84						0.12	
Uniform Delay, d1	58.0	28.8	18.5	46.5	11.6						43.7	
Progression Factor	1.00	1.00	1.00	0.96	1.52						1.00	
Incremental Delay, d2	7.1	90.6	2.2	86.1	2.7						1.1	
Delay (s)	65.1	119.3	20.7	130.7	20.4						44.8	
Level of Service	E	F	C	F	C						D	
Approach Delay (s)		86.4			53.2			0.0			44.8	
Approach LOS		F			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	69.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.99		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



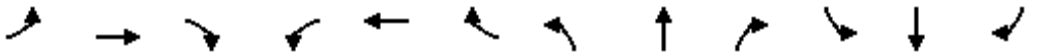
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Future Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			*0.78	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97		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)	1646	1667			2676	1402		1636	1444			
Flt Permitted	0.06	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	103	1667			2676	1402		1636	1444			
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)	129	1054	0	0	1382	258	280	5	597	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	61	0	0	77	0	0	0
Lane Group Flow (vph)	129	1054	0	0	1382	197	0	285	520	0	0	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			3			1						
Heavy Vehicles (%)	1%	5%	0%	0%	2%	3%	2%	0%	3%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Actuated Green, G (s)	73.0	73.0			62.0	62.0		37.0	37.0			
Effective Green, g (s)	74.0	74.0			63.0	63.0		38.0	38.0			
Actuated g/C Ratio	0.62	0.62			0.52	0.52		0.32	0.32			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	2.5	5.2			5.2	5.2		2.5	2.5			
Lane Grp Cap (vph)	153	1027			1404	736		518	457			
v/s Ratio Prot	0.05	c0.63			0.52							
v/s Ratio Perm	0.47					0.14		0.17	c0.36			
v/c Ratio	0.84	1.03			0.98	0.27		0.55	1.14			
Uniform Delay, d1	47.1	23.0			28.0	15.7		33.9	41.0			
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00			
Incremental Delay, d2	3.9	16.3			20.3	0.4		1.0	85.4			
Delay (s)	51.1	39.3			48.4	16.2		34.9	126.4			
Level of Service	D	D			D	B		C	F			
Approach Delay (s)		40.6			43.3			96.9			0.0	
Approach LOS		D			D			F			A	

Intersection Summary			
HCM 2000 Control Delay	55.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.10		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.0%	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												
Traffic Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
Future Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
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	3.5	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.95		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3440		1752	1764		1752	3539	1583	3335	3386	
Flt Permitted	0.13	1.00		0.35	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	241	3440		648	1764		1752	3539	1583	3335	3386	
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)	200	316	63	363	511	237	79	968	237	1100	911	142
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	55	0	10	0
Lane Group Flow (vph)	200	365	0	363	735	0	79	968	182	1100	1043	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	4%	3%	3%	0%	3%	2%	2%	5%	5%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		1	6	7	5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	36.5	30.5		54.0	43.0		7.2	28.0	46.5	29.0	49.8	
Effective Green, g (s)	38.5	31.5		55.0	44.0		8.2	29.5	49.5	30.0	51.3	
Actuated g/C Ratio	0.30	0.25		0.43	0.35		0.06	0.23	0.39	0.24	0.41	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.5	5.0	5.0	5.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.8	2.5	2.5	4.8	
Lane Grp Cap (vph)	159	856		451	613		113	825	619	790	1373	
v/s Ratio Prot	c0.07	0.11		0.12	c0.42		0.05	c0.27	0.05	c0.33	0.31	
v/s Ratio Perm	0.31			0.23					0.07			
v/c Ratio	1.26	0.43		0.80	1.20		0.70	1.17	0.29	1.39	0.76	
Uniform Delay, d1	40.5	39.9		26.4	41.2		57.9	48.5	26.5	48.2	32.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	156.9	0.3		9.8	104.7		16.0	90.7	0.2	184.3	2.9	
Delay (s)	197.4	40.2		36.1	145.9		73.9	139.2	26.7	232.6	35.2	
Level of Service	F	D		D	F		E	F	C	F	D	
Approach Delay (s)		94.5			110.0			114.4			136.1	
Approach LOS		F			F			F			F	

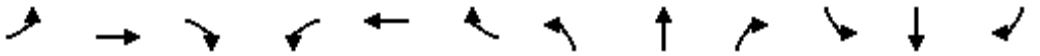
Intersection Summary			
HCM 2000 Control Delay	120.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.25		
Actuated Cycle Length (s)	126.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Future Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	5.0	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	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	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	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
Flt Permitted	0.30	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	518	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
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)	207	239	136	49	234	114	201	1212	71	255	1576	125
RTOR Reduction (vph)	0	0	40	0	41	94	0	3	0	0	0	56
Lane Group Flow (vph)	207	239	96	49	193	20	201	1280	0	255	1576	69
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	2%	3%	2%
Turn Type	pm+pt	NA	custom	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8 1			4						2
Actuated Green, G (s)	26.8	21.8	44.0	4.0	20.8	20.8	17.2	53.0		21.2	57.0	57.0
Effective Green, g (s)	28.8	22.8	45.0	5.0	21.8	20.8	18.2	54.0		22.2	58.0	58.0
Actuated g/C Ratio	0.24	0.19	0.38	0.04	0.18	0.17	0.15	0.45		0.18	0.48	0.48
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5		3.0	2.5	2.5	2.5	4.8		2.5	4.8	4.8
Lane Grp Cap (vph)	180	329	543	68	314	255	247	1453		301	1560	704
v/s Ratio Prot	c0.06	0.14		0.03	0.11		0.12	0.40		c0.16	c0.49	
v/s Ratio Perm	c0.22		0.07			0.01						0.05
v/c Ratio	1.15	0.73	0.18	0.72	0.61	0.08	0.81	0.88		0.85	1.01	0.10
Uniform Delay, d1	45.2	45.7	25.1	56.8	45.2	41.6	49.3	30.1		47.3	31.0	16.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.83		1.00	1.00	1.00
Incremental Delay, d2	113.2	7.3	0.1	31.1	3.0	0.1	11.7	5.2		19.0	25.3	0.3
Delay (s)	158.4	53.0	25.2	87.9	48.3	41.7	59.6	30.3		66.3	56.3	17.1
Level of Service	F	D	C	F	D	D	E	C		E	E	B
Approach Delay (s)		84.0			51.3			34.2			55.1	
Approach LOS		F			D			C			E	

Intersection Summary			
HCM 2000 Control Delay	51.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

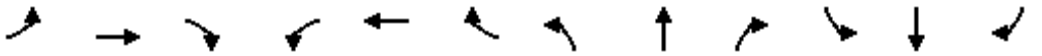
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Future Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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			*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	0.98		1.00	0.97			1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1646	1687		1646	1689			3260			3228	1488
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1646	1687		1646	1689			3260			3228	1488
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)	565	82	11	326	54	11	0	908	87	0	1332	424
RTOR Reduction (vph)	0	4	0	0	6	0	0	5	0	0	0	72
Lane Group Flow (vph)	565	89	0	326	59	0	0	990	0	0	1332	352
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	0%	1%	1%	1%	1%	2%	2%	1%	3%	0%
Turn Type	Prot	NA		Prot	NA			NA			NA	pm+ov
Protected Phases	7	4		3	8			6			2	7
Permitted Phases												2
Actuated Green, G (s)	39.0	19.0		28.4	8.4			57.6			57.6	96.6
Effective Green, g (s)	40.0	20.0		29.4	9.4			58.6			58.6	98.6
Actuated g/C Ratio	0.33	0.17		0.24	0.08			0.49			0.49	0.82
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.8			4.8	3.0
Lane Grp Cap (vph)	548	281		403	132			1591			1576	1272
v/s Ratio Prot	c0.34	0.05		0.20	c0.03			0.30			c0.41	0.09
v/s Ratio Perm												0.14
v/c Ratio	1.03	0.32		0.81	0.44			0.62			0.85	0.28
Uniform Delay, d1	40.0	44.0		42.7	52.8			22.6			26.7	2.5
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.49	0.00
Incremental Delay, d2	46.6	0.7		11.4	2.4			1.8			2.2	0.0
Delay (s)	86.6	44.6		54.0	55.2			24.4			15.4	0.0
Level of Service	F	D		D	E			C			B	A
Approach Delay (s)		80.7			54.2			24.4			11.7	
Approach LOS		F			D			C			B	

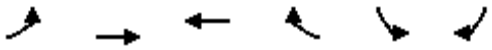
Intersection Summary			
HCM 2000 Control Delay	31.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Future Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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			1.00	0.99	1.00		0.98
Flpb, ped/bikes					1.00			1.00	1.00	1.00		1.00
Frt					0.99			1.00	0.85	1.00		0.85
Flt Protected					1.00			1.00	1.00	0.95		1.00
Satd. Flow (prot)					1706			1731	1459	1630		1455
Flt Permitted					1.00			1.00	1.00	0.95		1.00
Satd. Flow (perm)					1706			1731	1459	1630		1455
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	0	0	0	558	63	11	474	1116	168	0	653
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	263	0	0	347
Lane Group Flow (vph)	0	0	0	0	615	0	0	485	853	168	0	306
Confl. Peds. (#/hr)	2					2	1		1	1		1
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	1%	1%	2%	0%	0%
Turn Type					NA		Split	NA	custom	Prot		Perm
Protected Phases		2			6		8	8	1	4		
Permitted Phases									2 8			4
Actuated Green, G (s)					47.5			31.0	78.5	26.5		26.5
Effective Green, g (s)					48.5			32.0	80.5	27.5		27.5
Actuated g/C Ratio					0.40			0.27	0.67	0.23		0.23
Clearance Time (s)					5.0			5.0	5.0	5.0		5.0
Vehicle Extension (s)					3.0			3.0	3.0	3.0		3.0
Lane Grp Cap (vph)					689			461	1027	373		333
v/s Ratio Prot					c0.36			c0.28	0.34	0.10		
v/s Ratio Perm									0.25			c0.21
v/c Ratio					0.89			1.05	0.83	0.45		0.92
Uniform Delay, d1					33.3			44.0	14.7	39.8		45.2
Progression Factor					0.55			1.00	1.00	1.00		1.00
Incremental Delay, d2					11.2			56.3	5.8	0.9		29.2
Delay (s)					29.5			100.3	20.5	40.6		74.4
Level of Service					C			F	C	D		E
Approach Delay (s)		0.0			29.5			44.6			67.5	
Approach LOS		A			C			D			E	

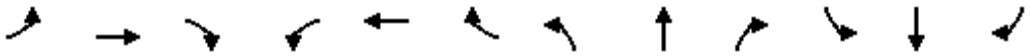
Intersection Summary			
HCM 2000 Control Delay	47.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.98		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	800	420	260	410	30	330
Future Volume (vph)	800	420	260	410	30	330
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	0.99	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)	1646	1716	1733	1453	1568	1473
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1646	1716	1733	1453	1568	1473
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	889	467	289	456	33	367
RTOR Reduction (vph)	0	0	0	91	0	318
Lane Group Flow (vph)	889	467	289	365	33	49
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	1%	2%	1%	1%	6%	1%
Turn Type	Prot	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	7	7	
Permitted Phases				6		7
Actuated Green, G (s)	67.2	96.0	24.8	40.8	16.0	16.0
Effective Green, g (s)	67.2	96.0	24.8	40.8	16.0	16.0
Actuated g/C Ratio	0.56	0.80	0.21	0.34	0.13	0.13
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)	921	1372	358	542	209	196
v/s Ratio Prot	c0.54	0.27	c0.17	c0.09	0.02	
v/s Ratio Perm				0.16		0.03
v/c Ratio	0.97	0.34	0.81	0.67	0.16	0.25
Uniform Delay, d1	25.3	3.3	45.3	33.9	46.0	46.6
Progression Factor	0.86	1.07	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.2	0.4	17.5	6.6	1.6	3.0
Delay (s)	37.1	3.9	62.8	40.4	47.6	49.6
Level of Service	D	A	E	D	D	D
Approach Delay (s)		25.6	49.1		49.5	
Approach LOS		C	D		D	

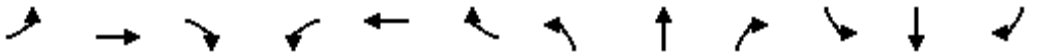
Intersection Summary			
HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



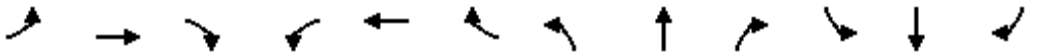
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Future Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0		4.0			
Lane Util. Factor		0.95			0.95		1.00		1.00			
Frpb, ped/bikes		1.00			0.99		1.00		1.00			
Flpb, ped/bikes		1.00			1.00		1.00		1.00			
Frt		0.98			0.94		1.00		0.85			
Flt Protected		1.00			1.00		0.95		1.00			
Satd. Flow (prot)		3210			3049		1662		1488			
Flt Permitted		1.00			1.00		0.95		1.00			
Satd. Flow (perm)		3210			3049		1662		1488			
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)	0	1806	237	0	694	484	177	0	172	0	0	0
RTOR Reduction (vph)	0	8	0	0	96	0	0	0	39	0	0	0
Lane Group Flow (vph)	0	2035	0	0	1082	0	177	0	133	0	0	0
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA		Prot		Perm			
Protected Phases		2			6		3					
Permitted Phases									8			
Actuated Green, G (s)		93.5			93.5		16.5		16.5			
Effective Green, g (s)		94.5			94.5		17.5		17.5			
Actuated g/C Ratio		0.79			0.79		0.15		0.15			
Clearance Time (s)		5.0			5.0		5.0		5.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2527			2401		242		217			
v/s Ratio Prot		c0.63			0.35		c0.11					
v/s Ratio Perm									0.09			
v/c Ratio		0.81			0.45		0.73		0.61			
Uniform Delay, d1		7.4			4.2		49.0		48.1			
Progression Factor		0.77			1.00		1.00		1.00			
Incremental Delay, d2		1.6			0.1		10.8		5.0			
Delay (s)		7.3			4.3		59.8		53.1			
Level of Service		A			A		E		D			
Approach Delay (s)		7.3			4.3			56.5			0.0	
Approach LOS		A			A			E			A	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



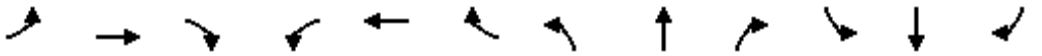
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Future Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	6.0
Lane Util. Factor	1.00	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	0.99	1.00	1.00	0.99	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	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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	237	279	26	374	500	121	126	237	132	158	674	168
RTOR Reduction (vph)	0	0	20	0	0	81	0	0	112	0	0	125
Lane Group Flow (vph)	237	279	6	374	500	40	126	237	20	158	674	43
Confl. Peds. (#/hr)	1					1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	0%	0%	1%	6%	0%	5%	4%	0%	5%	7%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	19.2	28.1	28.1	29.4	38.3	38.3	10.8	17.8	17.8	23.7	30.7	30.7
Effective Green, g (s)	20.2	29.1	29.1	30.4	39.3	39.3	11.8	19.8	17.8	24.7	32.7	30.7
Actuated g/C Ratio	0.17	0.24	0.24	0.25	0.33	0.33	0.10	0.17	0.15	0.21	0.27	0.26
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	277	424	355	416	540	480	155	527	215	325	846	362
v/s Ratio Prot	0.14	0.16		c0.23	c0.30		c0.08	0.07		0.10	c0.22	
v/s Ratio Perm			0.00			0.03			0.01			0.03
v/c Ratio	0.86	0.66	0.02	0.90	0.93	0.08	0.81	0.45	0.09	0.49	0.80	0.12
Uniform Delay, d1	48.5	41.0	34.6	43.3	38.9	27.9	53.0	45.2	44.1	42.0	40.6	34.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.34	1.42	7.57	1.00	1.00	1.00
Incremental Delay, d2	21.9	3.7	0.0	21.5	21.9	0.1	24.4	2.5	0.8	1.1	5.3	0.1
Delay (s)	70.4	44.6	34.6	64.9	60.9	28.0	95.7	66.9	334.8	43.2	45.8	34.4
Level of Service	E	D	C	E	E	C	F	E	F	D	D	C
Approach Delay (s)		55.4			58.4			145.6			43.5	
Approach LOS		E			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	67.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



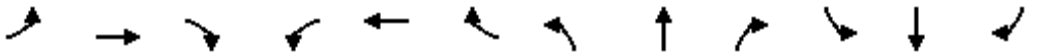
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Future Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		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	0.98		1.00	0.89		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	1718		1658	1528		1662	1750	1462	1614	1745	
Flt Permitted	0.51	1.00		0.34	1.00		0.57	1.00	1.00	0.31	1.00	
Satd. Flow (perm)	898	1718		601	1528		999	1750	1462	529	1745	
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)	17	150	17	661	122	306	50	228	606	194	306	6
RTOR Reduction (vph)	0	3	0	0	77	0	0	0	125	0	1	0
Lane Group Flow (vph)	17	164	0	661	351	0	50	228	481	194	311	0
Confl. Peds. (#/hr)			5	5					1	1		
Confl. Bikes (#/hr)						2			1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	1%	3%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA	
Protected Phases		8		7	4			6	7	5	2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	14.5	14.5		61.4	61.4		19.8	19.8	61.7	34.0	34.0	
Effective Green, g (s)	15.5	15.5		62.4	62.4		20.8	20.8	63.7	35.0	35.0	
Actuated g/C Ratio	0.15	0.15		0.59	0.59		0.20	0.20	0.60	0.33	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.5	2.5		3.0	4.0		5.2	5.2	3.0	3.0	5.2	
Lane Grp Cap (vph)	132	252		786	904		197	345	939	280	579	
v/s Ratio Prot		0.10		c0.34	0.23			0.13	0.21	c0.07	0.18	
v/s Ratio Perm	0.02			c0.16			0.05		0.12	c0.16		
v/c Ratio	0.13	0.65		0.84	0.39		0.25	0.66	0.51	0.69	0.54	
Uniform Delay, d1	39.1	42.4		16.7	11.4		35.7	39.0	12.0	27.6	28.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	5.0		8.1	0.4		1.5	6.4	0.5	7.2	1.9	
Delay (s)	39.4	47.4		24.8	11.8		37.3	45.4	12.4	34.8	30.5	
Level of Service	D	D		C	B		D	D	B	C	C	
Approach Delay (s)		46.7			19.7			22.3			32.1	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	105.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



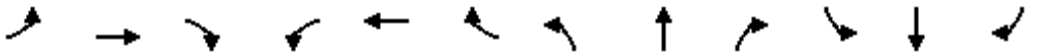
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Future Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00			1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1646	1716	1431	1589	1692			1719	1473	1662	1667	1466
Flt Permitted	0.12	1.00	1.00	0.54	1.00			0.87	1.00	0.22	1.00	1.00
Satd. Flow (perm)	208	1716	1431	908	1692			1520	1473	387	1667	1466
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)	289	367	294	22	544	100	161	283	244	122	28	383
RTOR Reduction (vph)	0	0	135	0	5	0	0	0	73	0	0	103
Lane Group Flow (vph)	289	367	159	22	639	0	0	444	171	122	28	280
Confl. Peds. (#/hr)			7	7								
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	1%	2%	0%	4%	1%	1%	0%	0%	1%	0%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	1	6		5	2			8			4	1
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)	67.8	60.6	60.6	49.1	46.9			36.6	36.6	36.6	36.6	52.5
Effective Green, g (s)	68.8	61.6	61.6	51.1	47.9			37.6	37.6	37.6	37.6	54.5
Actuated g/C Ratio	0.60	0.54	0.54	0.45	0.42			0.33	0.33	0.33	0.33	0.48
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5			2.0	2.0	2.0	2.0	3.0
Lane Grp Cap (vph)	337	924	770	424	708			499	484	127	547	749
v/s Ratio Prot	c0.13	0.21		0.00	c0.38						0.02	0.06
v/s Ratio Perm	0.39		0.11	0.02				0.29	0.12	c0.32		0.14
v/c Ratio	0.86	0.40	0.21	0.05	0.90			0.89	0.35	0.96	0.05	0.37
Uniform Delay, d1	27.6	15.5	13.7	17.8	31.1			36.4	29.2	37.7	26.2	19.1
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	18.9	0.2	0.1	0.1	14.8			17.0	0.2	67.1	0.0	0.3
Delay (s)	46.4	15.7	13.8	17.8	45.8			53.4	29.3	104.7	26.2	19.4
Level of Service	D	B	B	B	D			D	C	F	C	B
Approach Delay (s)		24.5			44.9			44.9			39.3	
Approach LOS		C			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	37.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	114.4	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.8%	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												
Traffic Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Future Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		1.00			1.00	0.98				1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00				1.00	1.00	
Frt		0.98			1.00	0.85				1.00	0.92	
Flt Protected		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (prot)		3196			1716	1436				1548	1467	
Flt Permitted		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (perm)		3196			1716	1436				1548	1467	
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	1313	170	0	835	55	0	0	0	775	0	264
RTOR Reduction (vph)	0	47	0	0	0	4	0	0	0	0	35	0
Lane Group Flow (vph)	0	1436	0	0	835	51	0	0	0	535	469	0
Confl. Peds. (#/hr)	2		1	1		2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type		NA			NA	pm+ov				Split	NA	
Protected Phases		2			6	4				4	4	
Permitted Phases						6						
Actuated Green, G (s)		62.6			62.6	110.0				47.4	47.4	
Effective Green, g (s)		63.6			63.6	112.0				48.4	48.4	
Actuated g/C Ratio		0.53			0.53	0.93				0.40	0.40	
Clearance Time (s)		5.0			5.0	5.0				5.0	5.0	
Vehicle Extension (s)		5.2			5.2	3.0				3.0	3.0	
Lane Grp Cap (vph)		1693			909	1436				624	591	
v/s Ratio Prot		0.45			c0.49	0.01				c0.35	0.32	
v/s Ratio Perm						0.02						
v/c Ratio		0.85			0.92	0.04				0.86	0.79	
Uniform Delay, d1		24.1			25.8	0.3				32.7	31.4	
Progression Factor		1.00			0.91	1.00				1.00	1.00	
Incremental Delay, d2		5.5			14.2	0.0				11.2	7.2	
Delay (s)		29.6			37.8	0.3				43.9	38.6	
Level of Service		C			D	A				D	D	
Approach Delay (s)		29.6			35.5			0.0			41.3	
Approach LOS		C			D			A			D	

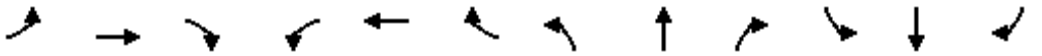
Intersection Summary			
HCM 2000 Control Delay	34.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Future Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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		0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	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	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1750	1488	1646	1458		3225	3018		1511	3115	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1750	1488	1646	1458		3225	3018		1511	3115	
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)	76	212	60	76	87	92	342	332	141	386	908	71
RTOR Reduction (vph)	0	0	50	0	35	0	0	33	0	0	4	0
Lane Group Flow (vph)	76	212	10	76	144	0	342	440	0	386	975	0
Confl. Peds. (#/hr)	1					1			4	4		
Heavy Vehicles (%)	2%	0%	0%	1%	9%	11%	0%	3%	7%	10%	6%	0%
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4	4	3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.2	19.8	19.8	7.2	19.8		20.1	37.7		34.3	51.9	
Effective Green, g (s)	8.2	20.8	20.8	8.2	20.8		21.1	39.7		35.3	53.9	
Actuated g/C Ratio	0.07	0.17	0.17	0.07	0.17		0.18	0.33		0.29	0.45	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	
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)	111	303	257	112	252		567	998		444	1399	
v/s Ratio Prot	c0.05	c0.12	0.01	0.05	0.10		c0.11	0.15		c0.26	c0.31	
v/s Ratio Perm												
v/c Ratio	0.68	0.70	0.04	0.68	0.57		0.60	0.44		0.87	0.70	
Uniform Delay, d1	54.6	46.7	41.3	54.6	45.5		45.6	31.5		40.2	26.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.73	0.42	
Incremental Delay, d2	16.1	6.9	0.1	15.1	3.1		1.8	1.4		13.3	1.2	
Delay (s)	70.7	53.6	41.4	69.7	48.6		47.4	32.9		42.6	12.3	
Level of Service	E	D	D	E	D		D	C		D	B	
Approach Delay (s)		55.2			54.9			39.0			20.9	
Approach LOS		E			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	33.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

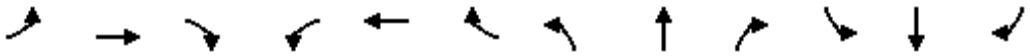
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Future Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
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	0.97		1.00	0.97		1.00	0.99		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)	1646	1682		1662	1688		1662	3187		1662	3205	
Flt Permitted	0.10	1.00		0.14	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	169	1682		244	1688		1662	3187		1662	3205	
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)	153	332	97	153	362	97	112	1321	112	143	1138	46
RTOR Reduction (vph)	0	7	0	0	7	0	0	4	0	0	2	0
Lane Group Flow (vph)	153	422	0	153	452	0	112	1429	0	143	1182	0
Confl. Peds. (#/hr)	3		5	5		3	4		1	1		4
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	2%	0%	3%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	50.0	40.0		48.0	39.0		12.3	68.0		13.0	68.7	
Effective Green, g (s)	52.0	41.0		50.0	40.0		13.3	69.0		14.0	69.7	
Actuated g/C Ratio	0.35	0.27		0.33	0.27		0.09	0.46		0.09	0.46	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	4.8		2.5	4.8	
Lane Grp Cap (vph)	166	459		175	450		147	1466		155	1489	
v/s Ratio Prot	c0.07	0.25		0.06	c0.27		0.07	c0.45		c0.09	0.37	
v/s Ratio Perm	0.25			0.23								
v/c Ratio	0.92	0.92		0.87	1.01		0.76	0.97		0.92	0.79	
Uniform Delay, d1	39.9	52.9		40.4	55.0		66.8	39.6		67.5	34.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	47.4	25.9		34.8	43.8		19.7	18.2		49.7	4.4	
Delay (s)	87.4	78.8		75.2	98.8		86.5	57.8		117.2	38.5	
Level of Service	F	E		E	F		F	E		F	D	
Approach Delay (s)		81.1			92.9			59.9			47.0	
Approach LOS		F			F			E			D	

Intersection Summary			
HCM 2000 Control Delay	63.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.1%	ICU Level of Service	G
Analysis Period (min)	15		

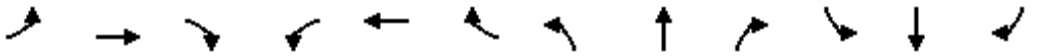
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Future Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.96		1.00	0.95		1.00	0.97		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)	1599	3151		1646	3093		1646	3169		1583	3235	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3151		1646	3093		1646	3169		1583	3235	
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)	312	880	312	370	599	271	245	974	260	344	995	109
RTOR Reduction (vph)	0	23	0	0	33	0	0	15	0	0	5	0
Lane Group Flow (vph)	313	1170	0	370	837	0	245	1219	0	344	1099	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	28.0	42.0		24.0	38.0		20.0	49.0		25.0	54.0	
Effective Green, g (s)	29.0	43.0		25.0	39.0		21.0	50.0		26.0	55.0	
Actuated g/C Ratio	0.18	0.27		0.16	0.24		0.13	0.31		0.16	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	289	846		257	753		216	990		257	1112	
v/s Ratio Prot	0.20	c0.37		c0.22	0.27		0.15	c0.38		c0.22	0.34	
v/s Ratio Perm												
v/c Ratio	1.08	1.38		1.44	1.11		1.13	1.23		1.34	0.99	
Uniform Delay, d1	65.5	58.5		67.5	60.5		69.5	55.0		67.0	52.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	76.9	179.9		218.6	68.1		102.1	113.0		176.3	23.9	
Delay (s)	142.4	238.4		286.1	128.6		171.6	168.0		243.3	76.1	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		218.4			175.6			168.6			115.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	169.9	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.33		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	127.2%	ICU Level of Service	H
Analysis Period (min)	15		

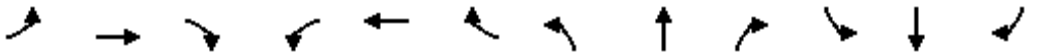
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Future Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
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	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	0.98		1.00	0.96		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)	1646	3375		1646	3274		1646	1661		1706	1669	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3375		1646	3274		1646	1661		1706	1669	
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)	207	1197	80	229	1074	176	117	378	138	346	564	80
RTOR Reduction (vph)	0	4	0	0	12	0	0	11	0	0	5	0
Lane Group Flow (vph)	207	1273	0	229	1238	0	117	505	0	346	639	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	11.0	38.0		12.0	39.0		7.0	28.0		17.0	38.0	
Effective Green, g (s)	12.0	39.0		13.0	40.0		8.0	29.0		18.0	39.0	
Actuated g/C Ratio	0.10	0.34		0.11	0.35		0.07	0.25		0.16	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	171	1144		186	1138		114	418		267	566	
v/s Ratio Prot	0.13	0.38		c0.14	c0.38		0.07	0.30		c0.20	c0.38	
v/s Ratio Perm												
v/c Ratio	1.21	1.11		1.23	1.09		1.03	1.21		1.30	1.13	
Uniform Delay, d1	51.5	38.0		51.0	37.5		53.5	43.0		48.5	38.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	136.7	63.2		141.8	54.0		91.5	114.0		158.0	78.8	
Delay (s)	188.2	101.2		192.8	91.5		145.0	157.0		206.5	116.8	
Level of Service	F	F		F	F		F	F		F	F	
Approach Delay (s)		113.4			107.2			154.8			148.2	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	124.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.20		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

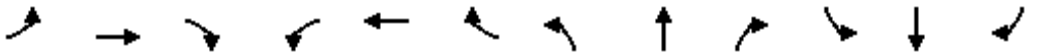
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Future Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		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	0.99		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)	1662	3166		1662	3231		1614	1733	1442	1662	1716	1448
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)	1662	3166		1662	3231		1614	1733	1442	1662	1716	1448
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)	305	1337	132	126	1095	63	142	221	121	111	300	268
RTOR Reduction (vph)	0	6	0	0	4	0	0	0	101	0	0	217
Lane Group Flow (vph)	305	1463	0	126	1154	0	142	221	20	111	300	51
Confl. Peds. (#/hr)	5		11	11		5	3		6	6		3
Heavy Vehicles (%)	0%	3%	4%	0%	2%	0%	3%	1%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	22.2	59.3		9.0	46.1		10.0	19.4	19.4	12.3	21.7	21.7
Effective Green, g (s)	23.2	60.3		10.0	47.1		11.0	20.4	19.4	13.3	22.7	22.7
Actuated g/C Ratio	0.19	0.50		0.08	0.39		0.09	0.17	0.16	0.11	0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	321	1590		138	1268		147	294	233	184	324	273
v/s Ratio Prot	0.18	c0.46		0.08	c0.36		c0.09	0.13		0.07	c0.17	
v/s Ratio Perm									0.01			0.04
v/c Ratio	0.95	0.92		0.91	0.91		0.97	0.75	0.08	0.60	0.93	0.19
Uniform Delay, d1	47.8	27.6		54.6	34.5		54.3	47.4	42.7	50.8	47.8	40.9
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	37.1	10.2		50.9	11.3		63.3	9.9	0.1	4.6	31.3	0.2
Delay (s)	84.9	37.8		105.5	45.7		117.7	57.3	42.9	55.5	79.1	41.1
Level of Service	F	D		F	D		F	E	D	E	E	D
Approach Delay (s)		45.9			51.6			71.4			60.2	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	52.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.7%	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												
Traffic Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Future Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
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)	359	734	266	240	474	62	318	625	297	208	953	349
RTOR Reduction (vph)	0	0	40	0	9	0	0	52	0	0	0	0
Lane Group Flow (vph)	359	734	226	240	528	0	318	870	0	208	953	349
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2									Free
Actuated Green, G (s)	19.0	27.7	44.8	16.2	24.9		17.1	33.0		13.1	29.0	110.0
Effective Green, g (s)	20.0	28.7	46.8	17.2	25.9		18.1	34.0		14.1	30.0	110.0
Actuated g/C Ratio	0.18	0.26	0.43	0.16	0.24		0.16	0.31		0.13	0.27	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	296	842	619	257	745		270	962		213	897	1467
v/s Ratio Prot	c0.22	c0.23	0.06	c0.15	0.17		c0.19	c0.28		0.13	c0.29	
v/s Ratio Perm			0.10									0.24
v/c Ratio	1.21	0.87	0.37	0.93	0.71		1.18	0.90		0.98	1.06	0.24
Uniform Delay, d1	45.0	38.9	21.5	45.8	38.6		46.0	36.4		47.8	40.0	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.21	0.59	1.00
Incremental Delay, d2	122.8	10.7	0.3	38.4	2.9		111.6	13.5		43.1	42.8	0.3
Delay (s)	167.8	49.6	21.8	84.2	41.5		157.6	49.9		101.0	66.3	0.3
Level of Service	F	D	C	F	D		F	D		F	E	A
Approach Delay (s)		75.4			54.7			77.5			55.8	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	66.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.04		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1495	195	245	1235	250	270
Future Volume (vph)	1495	195	245	1235	250	270
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	0.95	1.00	1.00	0.95	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	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3260	1458	1662	3260	1646	1488
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3260	1458	1662	3260	1646	1488
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1625	212	266	1342	272	293
RTOR Reduction (vph)	0	76	0	0	0	243
Lane Group Flow (vph)	1625	136	266	1342	272	50
Confl. Peds. (#/hr)					1	2
Heavy Vehicles (%)	2%	2%	0%	2%	1%	0%
Turn Type	NA	Perm	Prot	NA	Prot	Over
Protected Phases	2		1	6	8	1
Permitted Phases		2				
Actuated Green, G (s)	56.2	56.2	18.0	79.2	22.8	18.0
Effective Green, g (s)	57.2	57.2	19.0	80.2	23.8	19.0
Actuated g/C Ratio	0.51	0.51	0.17	0.72	0.21	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	5.0	5.0	2.6	5.0	2.6	2.6
Lane Grp Cap (vph)	1664	744	281	2334	349	252
v/s Ratio Prot	c0.50		c0.16	0.41	c0.17	0.03
v/s Ratio Perm		0.09				
v/c Ratio	0.98	0.18	0.95	0.57	0.78	0.20
Uniform Delay, d1	26.7	14.8	46.0	7.7	41.6	39.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	16.8	0.2	39.1	0.6	10.2	0.3
Delay (s)	43.6	15.0	85.1	8.2	51.8	40.2
Level of Service	D	B	F	A	D	D
Approach Delay (s)	40.3			20.9	45.8	
Approach LOS	D			C	D	

Intersection Summary			
HCM 2000 Control Delay	33.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.92		
Actuated Cycle Length (s)	112.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

USER REPORT FOR SITE

Project: 2040 TSP TPR

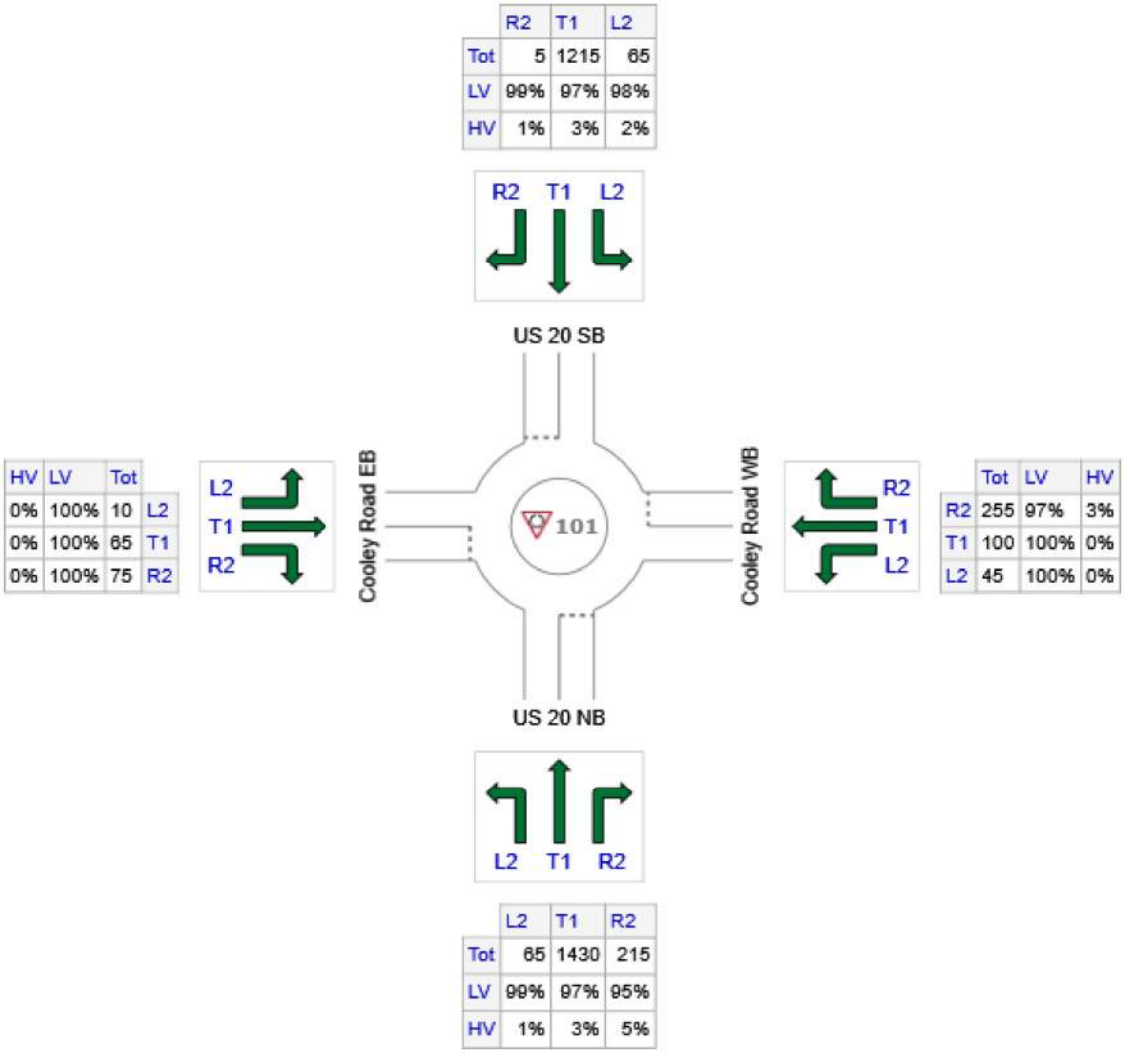
Template: Default Site User Report

Site: 101 [US 20/Cooley build]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	1710	1656	54
E: Cooley Road WB	400	392	8
N: US 20 SB	1285	1247	38
W: Cooley Road EB	150	150	0
Total	3545	3445	100

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	914	2.8	1138	0.803	100	18.6	LOS C	19.0	486.7	Full	1600	0.0	0.0
Lane 2[d]	965	3.5	1202	0.803	100	17.9	LOS C	17.9	461.0	Full	1600	0.0	0.0
Approach	1879	3.2		0.803		18.2	LOS C	19.0	486.7				
East: Cooley Road WB													
Lane 1	159	0.0	282	0.565	65[5]	30.9	LOS D	2.4	61.0	Full	1600	0.0	0.0
Lane 2[d]	280	3.0	325	0.863	100	57.2	LOS F	6.2	159.0	Full	1600	0.0	0.0
Approach	440	1.9		0.863		47.7	LOS E	6.2	159.0				
North: US 20 SB													
Lane 1	683	2.9	1060	0.644	100	12.5	LOS B	7.3	187.1	Full	1600	0.0	0.0
Lane 2[d]	729	3.0	1133	0.644	100	12.0	LOS B	7.0	179.9	Full	1600	0.0	0.0
Approach	1412	2.9		0.644		12.2	LOS B	7.3	187.1				
West: Cooley Road EB													
Lane 1	76	0.0	340	0.223	100	14.7	LOS B	0.7	18.5	Full	1600	0.0	0.0
Lane 2[d]	89	0.0	398	0.223	100	12.9	LOS B	0.7	18.5	Full	1600	0.0	0.0
Approach	165	0.0		0.223		13.7	LOS B	0.7	18.5				
Intersection	3896	2.8		0.863		19.2	LOS C	19.0	486.7				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

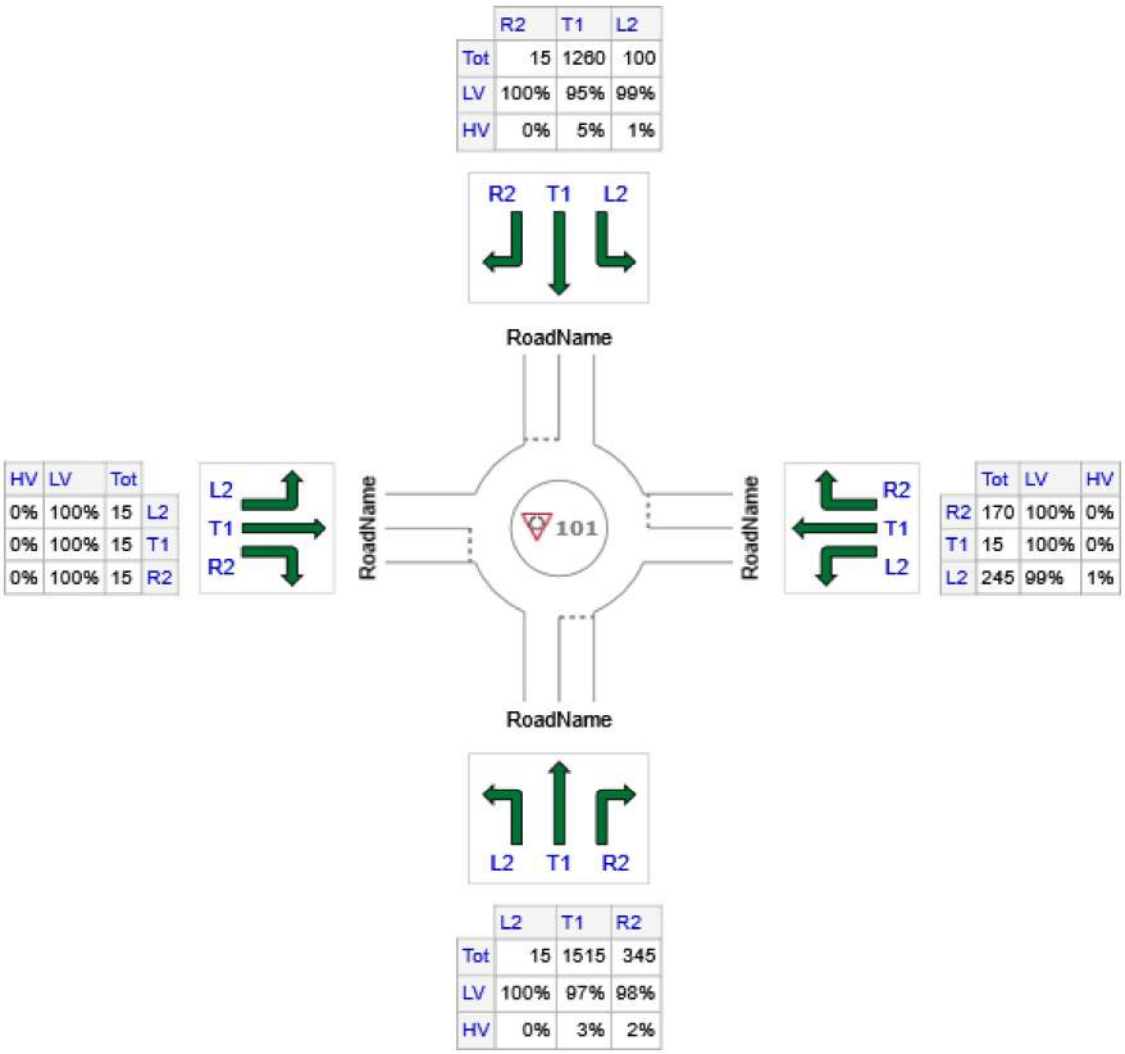
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Site: 101 [US 20/Robal build]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: RoadName	1875	1823	52
E: RoadName	430	428	2
N: RoadName	1375	1311	64
W: RoadName	45	45	0
Total	3725	3606	119

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: RoadName													
Lane 1	824	2.9	1147	0.719	100	14.3	LOS B	7.4	188.9	Full	1600	0.0	0.0
Lane 2[d]	876	3.0	1218	0.719	100	13.7	LOS B	6.5	165.8	Full	1600	0.0	0.0
Lane 3	383	2.0	1248	0.307	100	5.7	LOS A	1.5	37.4	Short	350	0.0	NA
Approach	2083	2.8		0.719		12.5	LOS B	7.4	188.9				
East: RoadName													
Lane 1	132	1.0	263	0.501	100	29.2	LOS D	2.0	50.0	Full	1600	0.0	0.0
Lane 2[d]	157	0.9	313	0.501	100	25.0	LOS C	2.0	51.2	Full	1600	0.0	0.0
Lane 3	189	0.0	321	0.589	100	29.1	LOS D	2.6	66.1	Short	450	0.0	NA
Approach	478	0.6		0.589		27.8	LOS D	2.6	66.1				
North: RoadName													
Lane 1	738	4.4	974	0.758	100	18.0	LOS C	13.6	351.7	Full	1600	0.0	0.0
Lane 2[d]	790	4.9	1042	0.758	100	17.2	LOS C	13.8	358.0	Full	1600	0.0	0.0
Approach	1528	4.7		0.758		17.6	LOS C	13.8	358.0				
West: RoadName													
Lane 1[d]	50	0.0	293	0.171	100	15.7	LOS C	0.5	13.2	Full	1600	0.0	0.0
Approach	50	0.0		0.171		15.7	LOS C	0.5	13.2				
Intersection	4139	3.2		0.758		16.2	LOS C	13.8	358.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

d Dominant lane on roundabout approach

Intersection	
Intersection Delay, s/veh	9.2
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	425	665	160	375
Demand Flow Rate, veh/h	429	672	162	380
Vehicles Circulating, veh/h	531	5	596	677
Vehicles Exiting, veh/h	526	753	364	0
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	10.3	8.0	6.3	11.1
Approach LOS	B	A	A	B

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LR	LTR
Assumed Moves	TR	LT	LR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	429	672	162	380
Cap Entry Lane, veh/h	889	1328	846	795
Entry HV Adj Factor	0.990	0.990	0.988	0.988
Flow Entry, veh/h	425	665	160	375
Cap Entry, veh/h	880	1315	835	785
V/C Ratio	0.483	0.506	0.192	0.478
Control Delay, s/veh	10.3	8.0	6.3	11.1
LOS	B	A	A	B
95th %tile Queue, veh	3	3	1	3

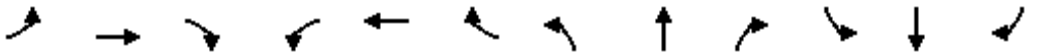
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Future Vol, veh/h	75	665	5	10	660	210	5	5	15	0	0	0
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	1	0	0	1	2	0	0	0	0	0	0
Mvmt Flow	75	665	5	10	660	210	5	5	15	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	871	0	0	671	0	0	1604	1710	669
Stage 1	-	-	-	-	-	-	819	819	-
Stage 2	-	-	-	-	-	-	785	891	-
Critical Hdwy	4.13	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	770	-	-	929	-	-	117	92	461
Stage 1	-	-	-	-	-	-	437	392	-
Stage 2	-	-	-	-	-	-	453	363	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	770	-	-	928	-	-	104	0	461
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	0	-
Stage 1	-	-	-	-	-	-	390	0	-
Stage 2	-	-	-	-	-	-	453	0	-

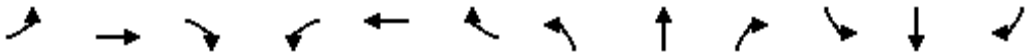
Approach	EB	WB	NB
HCM Control Delay, s	1	0.1	21.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	248	770	-	-	928	-	-
HCM Lane V/C Ratio	0.101	0.097	-	-	0.011	-	-
HCM Control Delay (s)	21.1	10.2	-	-	8.9	-	-
HCM Lane LOS	C	B	-	-	A	-	-
HCM 95th %tile Q(veh)	0.3	0.3	-	-	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Future Volume (vph)	0	595	70	30	340	0	0	0	0	430	0	615
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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
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)		1691		1630	1716						1662	1458
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1691		1630	1716						1662	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	595	70	30	340	0	0	0	0	430	0	615
RTOR Reduction (vph)	0	4	0	0	0	0	0	0	0	0	0	294
Lane Group Flow (vph)	0	661	0	30	340	0	0	0	0	0	430	321
Heavy Vehicles (%)	0%	2%	2%	2%	2%	0%	0%	0%	0%	0%	2%	2%
Turn Type		NA		Prot	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases										2		2
Actuated Green, G (s)		45.2		2.4	52.6						27.4	27.4
Effective Green, g (s)		46.2		3.4	53.6						28.4	28.4
Actuated g/C Ratio		0.51		0.04	0.60						0.32	0.32
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		868		61	1021						524	460
v/s Ratio Prot		c0.39		c0.02	0.20							
v/s Ratio Perm											0.26	0.22
v/c Ratio		0.76		0.49	0.33						0.82	0.70
Uniform Delay, d1		17.5		42.5	9.2						28.4	27.0
Progression Factor		1.00		1.27	0.63						1.00	1.00
Incremental Delay, d2		6.2		4.8	0.7						10.0	4.6
Delay (s)		23.7		58.8	6.4						38.4	31.6
Level of Service		C		E	A						D	C
Approach Delay (s)		23.7			10.7			0.0			34.4	
Approach LOS		C			B			A			C	

Intersection Summary			
HCM 2000 Control Delay	26.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	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												
Traffic Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Future Volume (vph)	300	725	0	0	325	290	45	0	50	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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				
Frt	1.00	1.00			0.94		1.00	0.85				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1646	1733			1614		1630	1458				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1646	1733			1614		1630	1458				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	300	725	0	0	325	290	45	0	50	0	0	0
RTOR Reduction (vph)	0	0	0	0	29	0	0	46	0	0	0	0
Lane Group Flow (vph)	300	725	0	0	586	0	45	4	0	0	0	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	3	8			4			6				
Permitted Phases							6					
Actuated Green, G (s)	22.4	73.1			45.7		6.9	6.9				
Effective Green, g (s)	23.4	74.1			46.7		7.9	7.9				
Actuated g/C Ratio	0.26	0.82			0.52		0.09	0.09				
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Lane Grp Cap (vph)	427	1426			837		143	127				
v/s Ratio Prot	c0.18	0.42			c0.36			0.00				
v/s Ratio Perm							c0.03					
v/c Ratio	0.70	0.51			0.70		0.31	0.03				
Uniform Delay, d1	30.1	2.4			16.4		38.5	37.6				
Progression Factor	0.86	1.01			1.00		1.00	1.00				
Incremental Delay, d2	3.4	0.8			4.8		1.3	0.1				
Delay (s)	29.2	3.3			21.2		39.8	37.7				
Level of Service	C	A			C		D	D				
Approach Delay (s)		10.9			21.2			38.7			0.0	
Approach LOS		B			C			D			A	

Intersection Summary			
HCM 2000 Control Delay	16.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	127.8%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	10

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	60	410	420	220	75	500
Future Vol, veh/h	60	410	420	220	75	500
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	4
Mvmt Flow	60	410	420	220	75	500

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	420	0	-	0	950	420
Stage 1	-	-	-	-	420	-
Stage 2	-	-	-	-	530	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1150	-	-	-	291	629
Stage 1	-	-	-	-	667	-
Stage 2	-	-	-	-	594	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1150	-	-	-	271	629
Mov Cap-2 Maneuver	-	-	-	-	271	-
Stage 1	-	-	-	-	622	-
Stage 2	-	-	-	-	594	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	28.4
HCM LOS			D

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1150	-	-	-	271	629
HCM Lane V/C Ratio	0.052	-	-	-	0.277	0.795
HCM Control Delay (s)	8.3	0	-	-	23.3	29.2
HCM Lane LOS	A	A	-	-	C	D
HCM 95th %tile Q(veh)	0.2	-	-	-	1.1	7.8

Intersection	
Int Delay, s/veh	26

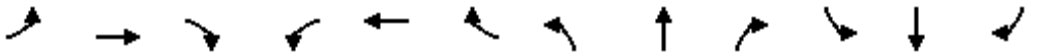
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Future Vol, veh/h	285	200	0	0	590	140	50	0	165	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	6	4	0	0	3	1	0	0	0	5	0	2
Mvmt Flow	285	200	0	0	590	140	50	0	165	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	730	0	-	-	-	0	1430	1500	200
Stage 1	-	-	-	-	-	-	770	770	-
Stage 2	-	-	-	-	-	-	660	730	-
Critical Hdwy	4.16	-	-	-	-	-	9.4	9.5	7.7
Critical Hdwy Stg 1	-	-	-	-	-	-	8.4	8.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	8.4	8.5	-
Follow-up Hdwy	2.254	-	-	-	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	856	-	0	0	-	-	~ 46	35	778
Stage 1	-	-	0	0	-	-	242	217	-
Stage 2	-	-	0	0	-	-	299	234	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	856	-	-	-	-	-	~ 29	0	778
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 29	0	-
Stage 1	-	-	-	-	-	-	151	0	-
Stage 2	-	-	-	-	-	-	299	0	-

Approach	EB	WB	NB
HCM Control Delay, s	6.6	0	157.8
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	29	778	856	-	-	-
HCM Lane V/C Ratio	1.724	0.212	0.333	-	-	-
HCM Control Delay (s)	$ 642.6	10.9	11.3	0	-	-
HCM Lane LOS	F	B	B	A	-	-
HCM 95th %tile Q(veh)	5.8	0.8	1.5	-	-	-

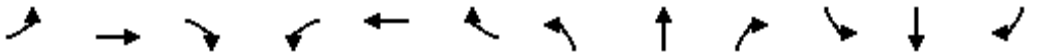
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Future Volume (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	0.99	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	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1707	1468		1677	1468	1662	3260	1451	1662	3224	
Flt Permitted		0.84	1.00		0.74	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1464	1468		1290	1468	1662	3260	1451	1662	3224	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	15	375	165	30	80	220	1020	170	35	1260	15
RTOR Reduction (vph)	0	0	278	0	0	66	0	0	42	0	0	0
Lane Group Flow (vph)	0	30	97	0	195	14	220	1020	128	35	1275	0
Confl. Peds. (#/hr)	1		1	1		1			2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		18.5	18.5		18.5	18.5	18.0	67.3	67.3	4.2	53.5	
Effective Green, g (s)		19.5	19.5		19.5	18.5	19.0	68.3	68.3	5.2	54.5	
Actuated g/C Ratio		0.19	0.19		0.19	0.18	0.18	0.65	0.65	0.05	0.52	
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	4.8	4.8	2.5	4.8	
Lane Grp Cap (vph)		271	272		239	258	300	2120	943	82	1673	
v/s Ratio Prot							c0.13	0.31		0.02	c0.40	
v/s Ratio Perm		0.02	0.07		c0.15	0.01			0.09			
v/c Ratio		0.11	0.36		0.82	0.05	0.73	0.48	0.14	0.43	0.76	
Uniform Delay, d1		35.5	37.3		41.0	36.0	40.6	9.3	7.0	48.5	20.1	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	0.6		18.5	0.1	8.4	0.8	0.3	2.6	3.3	
Delay (s)		35.7	37.9		59.5	36.0	49.1	10.1	7.3	51.0	23.4	
Level of Service		D	D		E	D	D	B	A	D	C	
Approach Delay (s)		37.7			52.7			15.9			24.2	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	24.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.7%	ICU Level of Service	E
Analysis Period (min)	15		

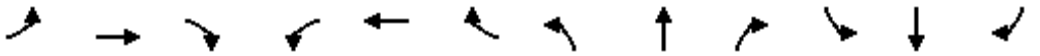
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	430	180	250	410	115	110	1170	135	140	740	50
Future Volume (vph)	170	430	180	250	410	115	110	1170	135	140	740	50
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	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	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
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)	1646	1733	1488	1646	1733	1458	1662	3206		1662	3139	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	430	180	250	410	115	110	1170	135	140	740	50
RTOR Reduction (vph)	0	0	111	0	0	79	0	7	0	0	4	0
Lane Group Flow (vph)	170	430	69	250	410	36	110	1298	0	140	786	0
Confl. Peds. (#/hr)	5					5	5		3	3		5
Heavy Vehicles (%)	1%	1%	0%	1%	1%	0%	0%	2%	0%	0%	5%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	17.3	27.9	27.9	21.1	31.7	31.7	9.7	42.0		9.0	41.3	
Effective Green, g (s)	18.3	28.9	28.9	22.1	32.7	32.7	10.7	43.0		10.0	42.3	
Actuated g/C Ratio	0.15	0.24	0.24	0.18	0.27	0.27	0.09	0.36		0.08	0.35	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	251	417	358	303	472	397	148	1148		138	1106	
v/s Ratio Prot	0.10	c0.25		c0.15	c0.24		0.07	c0.40		c0.08	0.25	
v/s Ratio Perm			0.05			0.02						
v/c Ratio	0.68	1.03	0.19	0.83	0.87	0.09	0.74	1.13		1.01	0.71	
Uniform Delay, d1	48.1	45.5	36.3	47.1	41.6	32.6	53.3	38.5		55.0	33.6	
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	7.1	52.3	0.3	16.5	15.5	0.1	18.1	70.1		80.5	3.9	
Delay (s)	55.1	97.9	36.5	63.6	57.1	32.7	71.4	108.6		135.5	37.4	
Level of Service	E	F	D	E	E	C	E	F		F	D	
Approach Delay (s)		74.4			55.6			105.8			52.2	
Approach LOS		E			E			F			D	

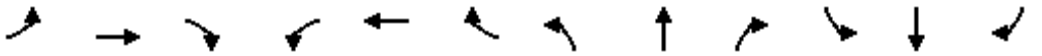
Intersection Summary			
HCM 2000 Control Delay	76.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	101.2%	ICU Level of Service	G
Analysis Period (min)	15		

c Critical Lane Group



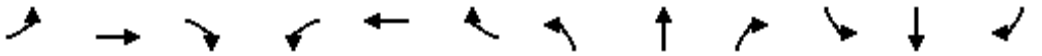
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Future Volume (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00						1.00	
Frpb, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00						0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)	1805	1827	1532	1805	1837						1505	
Flt Permitted	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (perm)	1805	1827	1532	1805	1837						1505	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	1085	540	460	1055	30	0	0	0	15	5	50
RTOR Reduction (vph)	0	0	164	0	1	0	0	0	0	0	42	0
Lane Group Flow (vph)	15	1085	376	460	1084	0	0	0	0	0	28	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			4			1						
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	0%	20%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA					Perm	NA	
Protected Phases	5	2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)	2.0	62.0	62.0	26.5	86.5						18.0	
Effective Green, g (s)	2.5	62.5	62.5	27.0	87.0						18.5	
Actuated g/C Ratio	0.02	0.52	0.52	0.22	0.72						0.15	
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)	37	951	797	406	1331						232	
v/s Ratio Prot	0.01	c0.59		c0.25	0.59							
v/s Ratio Perm			0.25								0.02	
v/c Ratio	0.41	1.14	0.47	1.13	0.81						0.12	
Uniform Delay, d1	58.0	28.8	18.3	46.5	11.1						43.7	
Progression Factor	1.00	1.00	1.00	0.98	1.47						1.00	
Incremental Delay, d2	7.1	76.2	2.0	76.3	3.2						1.0	
Delay (s)	65.1	104.9	20.3	121.7	19.5						44.8	
Level of Service	E	F	C	F	B						D	
Approach Delay (s)		76.7			49.9			0.0			44.8	
Approach LOS		E			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	63.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.96		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



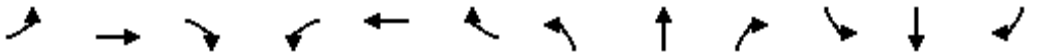
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Future Volume (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			*0.78	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97		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)	1646	1667			2676	1402		1636	1444			
Flt Permitted	0.06	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	107	1667			2676	1402		1636	1444			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	120	980	0	0	1285	240	260	5	555	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	63	0	0	95	0	0	0
Lane Group Flow (vph)	120	980	0	0	1285	177	0	265	460	0	0	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			3			1						
Heavy Vehicles (%)	1%	5%	0%	0%	2%	3%	2%	0%	3%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Actuated Green, G (s)	73.5	73.5			63.7	63.7		36.5	36.5			
Effective Green, g (s)	74.5	74.5			64.7	64.7		37.5	37.5			
Actuated g/C Ratio	0.62	0.62			0.54	0.54		0.31	0.31			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	2.5	5.2			5.2	5.2		2.5	2.5			
Lane Grp Cap (vph)	140	1034			1442	755		511	451			
v/s Ratio Prot	0.04	c0.59			0.48							
v/s Ratio Perm	0.49					0.13		0.16	c0.32			
v/c Ratio	0.86	0.95			0.89	0.23		0.52	1.02			
Uniform Delay, d1	43.0	21.0			24.5	14.6		33.8	41.2			
Progression Factor	1.03	1.02			1.00	1.00		1.00	1.00			
Incremental Delay, d2	4.8	2.6			7.9	0.4		0.7	47.6			
Delay (s)	49.0	24.0			32.4	14.9		34.5	88.8			
Level of Service	D	C			C	B		C	F			
Approach Delay (s)		26.7			29.7			71.3			0.0	
Approach LOS		C			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	38.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	1.01		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	100.0%	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												
Traffic Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
Future Volume (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
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	3.5	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95	1.00	0.97	0.95	
Frpb, ped/bikes	1.00	1.00		1.00	0.99		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	0.95		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3439		1752	1764		1752	3539	1583	3335	3386	
Flt Permitted	0.13	1.00		0.36	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	250	3439		665	1764		1752	3539	1583	3335	3386	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	190	300	60	345	485	225	75	920	225	1045	865	135
RTOR Reduction (vph)	0	14	0	0	13	0	0	0	54	0	10	0
Lane Group Flow (vph)	190	346	0	345	697	0	75	920	171	1045	990	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	4%	3%	3%	0%	3%	2%	2%	5%	5%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		1	6	7	5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	35.4	29.4		52.0	41.0		6.4	30.0	47.6	29.0	52.6	
Effective Green, g (s)	37.4	30.4		53.0	42.0		7.4	31.5	50.6	30.0	54.1	
Actuated g/C Ratio	0.30	0.24		0.42	0.33		0.06	0.25	0.40	0.24	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.5	5.0	5.0	5.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.8	2.5	2.5	4.8	
Lane Grp Cap (vph)	159	826		438	585		102	881	633	790	1448	
v/s Ratio Prot	c0.07	0.10		0.12	c0.39		0.04	c0.26	0.04	c0.31	0.29	
v/s Ratio Perm	0.29			0.21					0.07			
v/c Ratio	1.19	0.42		0.79	1.19		0.74	1.04	0.27	1.32	0.68	
Uniform Delay, d1	41.2	40.6		27.4	42.2		58.6	47.5	25.5	48.2	29.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	133.4	0.3		8.8	102.0		22.6	42.5	0.2	154.1	1.7	
Delay (s)	174.6	40.8		36.1	144.3		81.2	90.0	25.7	202.3	31.0	
Level of Service	F	D		D	F		F	F	C	F	C	
Approach Delay (s)		87.0			108.9			77.6			118.5	
Approach LOS		F			F			E			F	

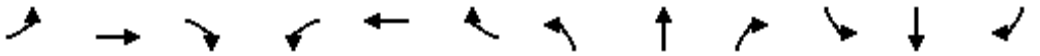
Intersection Summary			
HCM 2000 Control Delay	102.6	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	126.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	118.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Future Volume (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	5.0	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	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	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	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
Flt Permitted	0.32	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	562	1733	1449	1646	1733	1473	1630	3229		1630	3228	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	190	220	125	45	215	105	185	1115	65	235	1450	115
RTOR Reduction (vph)	0	0	70	0	41	88	0	3	0	0	0	55
Lane Group Flow (vph)	190	220	55	45	174	17	185	1177	0	235	1450	60
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	2%	3%	2%
Turn Type	pm+pt	NA	custom	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8 1			4						2
Actuated Green, G (s)	25.8	20.8	42.4	4.0	19.8	19.8	16.6	54.9		20.3	58.6	58.6
Effective Green, g (s)	27.8	21.8	43.4	5.0	20.8	19.8	17.6	55.9		21.3	59.6	59.6
Actuated g/C Ratio	0.23	0.18	0.36	0.04	0.17	0.17	0.15	0.47		0.18	0.50	0.50
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5		3.0	2.5	2.5	2.5	4.8		2.5	4.8	4.8
Lane Grp Cap (vph)	184	314	524	68	300	243	239	1504		289	1603	724
v/s Ratio Prot	c0.05	0.13		0.03	0.10		0.11	0.36		c0.14	c0.45	
v/s Ratio Perm	c0.19		0.04			0.01						0.04
v/c Ratio	1.03	0.70	0.11	0.66	0.58	0.07	0.77	0.78		0.81	0.90	0.08
Uniform Delay, d1	45.8	46.0	25.4	56.7	45.6	42.3	49.3	26.9		47.4	27.6	15.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.97	0.83		1.00	1.00	1.00
Incremental Delay, d2	75.2	6.4	0.1	21.6	2.2	0.1	10.1	3.0		15.5	8.8	0.2
Delay (s)	120.9	52.4	25.5	78.3	47.8	42.4	57.7	25.2		63.0	36.4	16.1
Level of Service	F	D	C	E	D	D	E	C		E	D	B
Approach Delay (s)		70.5			50.0			29.6			38.6	
Approach LOS		E			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	40.8	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.94		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.7%	ICU Level of Service	F
Analysis Period (min)	15		

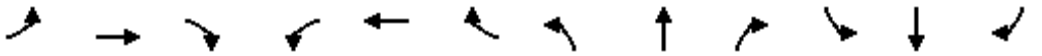
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Future Volume (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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			*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	0.98		1.00	0.97			1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1646	1687		1646	1689			3260			3228	1488
Flt Permitted	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (perm)	1646	1687		1646	1689			3260			3228	1488
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	520	75	10	300	50	10	0	835	80	0	1225	390
RTOR Reduction (vph)	0	4	0	0	6	0	0	5	0	0	0	69
Lane Group Flow (vph)	520	81	0	300	54	0	0	910	0	0	1225	321
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	0%	1%	1%	1%	1%	2%	2%	1%	3%	0%
Turn Type	Prot	NA		Prot	NA			NA			NA	pm+ov
Protected Phases	7	4		3	8			6			2	7
Permitted Phases												2
Actuated Green, G (s)	39.0	17.3		29.8	8.1			57.9			57.9	96.9
Effective Green, g (s)	40.0	18.3		30.8	9.1			58.9			58.9	98.9
Actuated g/C Ratio	0.33	0.15		0.26	0.08			0.49			0.49	0.82
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.8			4.8	3.0
Lane Grp Cap (vph)	548	257		422	128			1600			1584	1275
v/s Ratio Prot	c0.32	0.05		0.18	c0.03			0.28			c0.38	0.08
v/s Ratio Perm												0.13
v/c Ratio	0.95	0.31		0.71	0.42			0.57			0.77	0.25
Uniform Delay, d1	39.0	45.3		40.6	52.9			21.6			25.1	2.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.44	0.00
Incremental Delay, d2	25.9	0.7		5.6	2.2			1.5			2.0	0.1
Delay (s)	64.9	46.0		46.1	55.1			23.1			13.2	0.1
Level of Service	E	D		D	E			C			B	A
Approach Delay (s)		62.3			47.6			23.1			10.0	
Approach LOS		E			D			C			A	

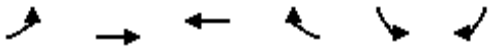
Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Future Volume (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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			1.00	0.99	1.00		0.98
Flpb, ped/bikes					1.00			1.00	1.00	1.00		1.00
Frt					0.99			1.00	0.85	1.00		0.85
Flt Protected					1.00			1.00	1.00	0.95		1.00
Satd. Flow (prot)					1706			1731	1460	1630		1455
Flt Permitted					1.00			1.00	1.00	0.95		1.00
Satd. Flow (perm)					1706			1731	1460	1630		1455
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	530	60	10	450	1060	160	0	620
RTOR Reduction (vph)	0	0	0	0	6	0	0	0	238	0	0	361
Lane Group Flow (vph)	0	0	0	0	584	0	0	460	822	160	0	259
Confl. Peds. (#/hr)	2					2	1		1	1		1
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	1%	1%	2%	0%	0%
Turn Type					NA		Split	NA	custom	Prot		Perm
Protected Phases		2			6		8	8	1	4		
Permitted Phases									2 8			4
Actuated Green, G (s)					51.3			31.0	82.3	22.7		22.7
Effective Green, g (s)					52.3			32.0	84.3	23.7		23.7
Actuated g/C Ratio					0.44			0.27	0.70	0.20		0.20
Clearance Time (s)					5.0			5.0	5.0	5.0		5.0
Vehicle Extension (s)					3.0			3.0	3.0	3.0		3.0
Lane Grp Cap (vph)					743			461	1074	321		287
v/s Ratio Prot					0.34			c0.27	c0.33	0.10		
v/s Ratio Perm									0.23			c0.18
v/c Ratio					0.79			1.00	0.77	0.50		0.90
Uniform Delay, d1					29.1			44.0	11.5	42.9		47.0
Progression Factor					0.55			1.00	1.00	1.00		1.00
Incremental Delay, d2					6.2			41.1	3.3	1.2		29.2
Delay (s)					22.1			85.0	14.8	44.1		76.2
Level of Service					C			F	B	D		E
Approach Delay (s)		0.0			22.1			36.0			69.6	
Approach LOS		A			C			D			E	

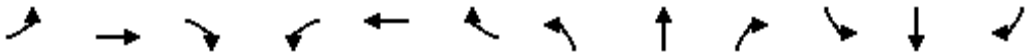
Intersection Summary			
HCM 2000 Control Delay	42.3	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	112.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	800	420	260	410	30	330
Future Volume (vph)	800	420	260	410	30	330
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	0.99	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)	1646	1716	1733	1452	1568	1473
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1646	1716	1733	1452	1568	1473
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	800	420	260	410	30	330
RTOR Reduction (vph)	0	0	0	105	0	286
Lane Group Flow (vph)	800	420	260	305	30	44
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	1%	2%	1%	1%	6%	1%
Turn Type	Prot	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	7	7	
Permitted Phases				6		7
Actuated Green, G (s)	63.9	96.0	28.1	44.1	16.0	16.0
Effective Green, g (s)	63.9	96.0	28.1	44.1	16.0	16.0
Actuated g/C Ratio	0.53	0.80	0.23	0.37	0.13	0.13
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)	876	1372	405	582	209	196
v/s Ratio Prot	c0.49	0.24	c0.15	c0.07	0.02	
v/s Ratio Perm				0.14		0.03
v/c Ratio	0.91	0.31	0.64	0.52	0.14	0.22
Uniform Delay, d1	25.5	3.2	41.4	29.7	45.9	46.5
Progression Factor	1.02	1.05	1.00	1.00	1.00	1.00
Incremental Delay, d2	9.0	0.3	7.6	3.4	1.4	2.6
Delay (s)	34.9	3.7	49.0	33.1	47.4	49.1
Level of Service	C	A	D	C	D	D
Approach Delay (s)		24.1	39.3		49.0	
Approach LOS		C	D		D	

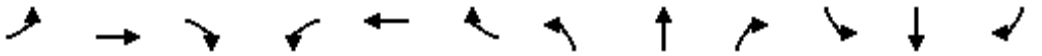
Intersection Summary			
HCM 2000 Control Delay	32.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	82.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group



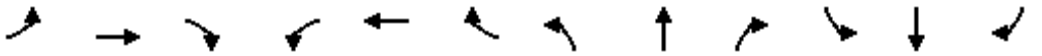
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Future Volume (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0		4.0			
Lane Util. Factor		0.95			0.95		1.00		1.00			
Frpb, ped/bikes		1.00			0.99		1.00		1.00			
Flpb, ped/bikes		1.00			1.00		1.00		1.00			
Frt		0.98			0.94		1.00		0.85			
Flt Protected		1.00			1.00		0.95		1.00			
Satd. Flow (prot)		3210			3048		1662		1488			
Flt Permitted		1.00			1.00		0.95		1.00			
Satd. Flow (perm)		3210			3048		1662		1488			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1680	220	0	645	450	165	0	160	0	0	0
RTOR Reduction (vph)	0	7	0	0	92	0	0	0	48	0	0	0
Lane Group Flow (vph)	0	1893	0	0	1003	0	165	0	112	0	0	0
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA		Prot		Perm			
Protected Phases		2			6		3					
Permitted Phases									8			
Actuated Green, G (s)		93.6			93.6		16.4		16.4			
Effective Green, g (s)		94.6			94.6		17.4		17.4			
Actuated g/C Ratio		0.79			0.79		0.14		0.14			
Clearance Time (s)		5.0			5.0		5.0		5.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2530			2402		240		215			
v/s Ratio Prot		c0.59			0.33		c0.10					
v/s Ratio Perm									0.08			
v/c Ratio		0.75			0.42		0.69		0.52			
Uniform Delay, d1		6.6			4.0		48.7		47.4			
Progression Factor		0.87			1.00		1.00		1.00			
Incremental Delay, d2		1.3			0.1		7.9		2.3			
Delay (s)		7.0			4.1		56.7		49.7			
Level of Service		A			A		E		D			
Approach Delay (s)		7.0			4.1			53.2			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	10.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	75.5%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



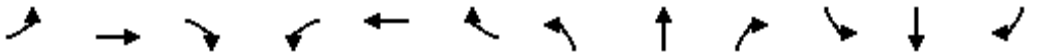
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Future Volume (vph)	225	265	25	355	475	115	120	225	125	150	640	160
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	6.0
Lane Util. Factor	1.00	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	0.99	1.00	1.00	0.99	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	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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	225	265	25	355	475	115	120	225	125	150	640	160
RTOR Reduction (vph)	0	0	19	0	0	79	0	0	105	0	0	116
Lane Group Flow (vph)	225	265	6	355	475	36	120	225	20	150	640	44
Confl. Peds. (#/hr)	1					1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	0%	0%	1%	6%	0%	5%	4%	0%	5%	7%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	18.8	27.5	27.5	28.1	36.8	36.8	10.7	19.2	19.2	24.2	32.7	32.7
Effective Green, g (s)	19.8	28.5	28.5	29.1	37.8	37.8	11.7	21.2	19.2	25.2	34.7	32.7
Actuated g/C Ratio	0.17	0.24	0.24	0.24	0.31	0.31	0.10	0.18	0.16	0.21	0.29	0.27
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	271	415	348	399	520	462	154	564	232	332	898	386
v/s Ratio Prot	0.14	0.15		c0.22	c0.29		c0.08	0.07		0.09	c0.21	
v/s Ratio Perm			0.00			0.02			0.01			0.03
v/c Ratio	0.83	0.64	0.02	0.89	0.91	0.08	0.78	0.40	0.09	0.45	0.71	0.11
Uniform Delay, d1	48.5	41.1	35.0	43.9	39.5	28.9	52.9	43.8	42.9	41.4	38.2	32.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.35	1.37	7.85	1.00	1.00	1.00
Incremental Delay, d2	19.0	3.2	0.0	20.7	20.5	0.1	20.3	2.0	0.7	1.0	2.7	0.1
Delay (s)	67.4	44.3	35.0	64.6	60.0	28.9	91.7	62.0	337.8	42.4	40.9	32.9
Level of Service	E	D	D	E	E	C	F	E	F	D	D	C
Approach Delay (s)		54.0			58.0			142.9			39.8	
Approach LOS		D			E			F			D	

Intersection Summary			
HCM 2000 Control Delay	65.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	80.4%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



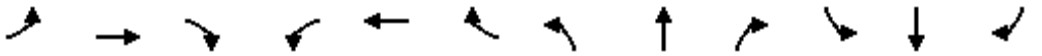
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Future Volume (vph)	15	135	15	595	110	275	45	205	545	175	275	5
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		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	0.98		1.00	0.89		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	1718		1658	1528		1662	1750	1462	1613	1745	
Flt Permitted	0.53	1.00		0.38	1.00		0.59	1.00	1.00	0.34	1.00	
Satd. Flow (perm)	934	1718		661	1528		1028	1750	1462	585	1745	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	135	15	595	110	275	45	205	545	175	275	5
RTOR Reduction (vph)	0	3	0	0	79	0	0	0	149	0	1	0
Lane Group Flow (vph)	15	147	0	595	306	0	45	205	396	175	279	0
Confl. Peds. (#/hr)			5	5					1	1		
Confl. Bikes (#/hr)						2			1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	1%	3%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA	
Protected Phases		8		7	4			6	7	5	2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	13.3	13.3		57.4	57.4		18.1	18.1	57.2	33.0	33.0	
Effective Green, g (s)	14.3	14.3		58.4	58.4		19.1	19.1	59.2	34.0	34.0	
Actuated g/C Ratio	0.14	0.14		0.58	0.58		0.19	0.19	0.59	0.34	0.34	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.5	2.5		3.0	4.0		5.2	5.2	3.0	3.0	5.2	
Lane Grp Cap (vph)	133	244		782	888		195	332	920	309	590	
v/s Ratio Prot		0.09		c0.30	0.20			0.12	0.17	c0.06	0.16	
v/s Ratio Perm	0.02			c0.14			0.04		0.10	c0.13		
v/c Ratio	0.11	0.60		0.76	0.34		0.23	0.62	0.43	0.57	0.47	
Uniform Delay, d1	37.5	40.4		14.3	11.0		34.4	37.3	11.3	25.3	26.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.3	3.5		4.4	0.3		1.4	5.1	0.3	2.4	1.3	
Delay (s)	37.8	43.9		18.7	11.3		35.8	42.4	11.7	27.7	27.5	
Level of Service	D	D		B	B		D	D	B	C	C	
Approach Delay (s)		43.3			15.8			20.9			27.6	
Approach LOS		D			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	21.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	100.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	83.6%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



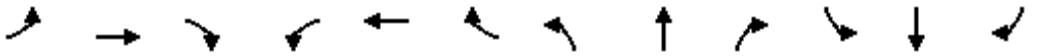
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Future Volume (vph)	260	330	265	20	490	90	145	255	220	110	25	345
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.96	1.00	1.00			1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1646	1716	1435	1590	1692			1719	1473	1662	1667	1466
Flt Permitted	0.18	1.00	1.00	0.56	1.00			0.87	1.00	0.26	1.00	1.00
Satd. Flow (perm)	319	1716	1435	940	1692			1522	1473	457	1667	1466
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	260	330	265	20	490	90	145	255	220	110	25	345
RTOR Reduction (vph)	0	0	120	0	5	0	0	0	75	0	0	128
Lane Group Flow (vph)	260	330	145	20	575	0	0	400	145	110	25	217
Confl. Peds. (#/hr)			7	7								
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	1%	2%	0%	4%	1%	1%	0%	0%	1%	0%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	1	6		5	2			8			4	1
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)	60.0	53.7	53.7	42.9	41.6			30.2	30.2	30.2	30.2	43.6
Effective Green, g (s)	61.0	54.7	54.7	44.9	42.6			31.2	31.2	31.2	31.2	45.6
Actuated g/C Ratio	0.61	0.55	0.55	0.45	0.43			0.31	0.31	0.31	0.31	0.46
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5			2.0	2.0	2.0	2.0	3.0
Lane Grp Cap (vph)	384	936	783	436	719			473	458	142	519	725
v/s Ratio Prot	c0.10	0.19		0.00	c0.34						0.02	0.04
v/s Ratio Perm	0.31		0.10	0.02				c0.26	0.10	0.24		0.10
v/c Ratio	0.68	0.35	0.18	0.05	0.80			0.85	0.32	0.77	0.05	0.30
Uniform Delay, d1	14.7	12.8	11.5	15.5	25.1			32.2	26.4	31.3	24.1	17.2
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	4.7	0.2	0.1	0.0	6.0			12.6	0.1	20.9	0.0	0.2
Delay (s)	19.4	13.0	11.6	15.5	31.1			44.8	26.5	52.3	24.1	17.5
Level of Service	B	B	B	B	C			D	C	D	C	B
Approach Delay (s)		14.5			30.6			38.3			25.8	
Approach LOS		B			C			D			C	

Intersection Summary			
HCM 2000 Control Delay	26.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	100.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	92.8%	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												
Traffic Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Future Volume (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		1.00			1.00	0.98				1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00				1.00	1.00	
Frt		0.98			1.00	0.85				1.00	0.92	
Flt Protected		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (prot)		3196			1716	1434				1548	1467	
Flt Permitted		1.00			1.00	1.00				0.95	0.98	
Satd. Flow (perm)		3196			1716	1434				1548	1467	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1195	155	0	760	50	0	0	0	705	0	240
RTOR Reduction (vph)	0	43	0	0	0	3	0	0	0	0	34	0
Lane Group Flow (vph)	0	1307	0	0	760	47	0	0	0	486	425	0
Confl. Peds. (#/hr)	2		1	1		2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type		NA			NA	pm+ov				Split	NA	
Protected Phases		2			6	4				4	4	
Permitted Phases						6						
Actuated Green, G (s)		67.5			67.5	110.0				42.5	42.5	
Effective Green, g (s)		68.5			68.5	112.0				43.5	43.5	
Actuated g/C Ratio		0.57			0.57	0.93				0.36	0.36	
Clearance Time (s)		5.0			5.0	5.0				5.0	5.0	
Vehicle Extension (s)		5.2			5.2	3.0				3.0	3.0	
Lane Grp Cap (vph)		1824			979	1434				561	531	
v/s Ratio Prot		0.41			c0.44	0.01				c0.31	0.29	
v/s Ratio Perm						0.02						
v/c Ratio		0.72			0.78	0.03				0.87	0.80	
Uniform Delay, d1		18.7			19.8	0.3				35.5	34.3	
Progression Factor		1.00			0.93	1.00				1.00	1.00	
Incremental Delay, d2		2.4			5.4	0.0				13.2	8.3	
Delay (s)		21.1			23.9	0.3				48.8	42.6	
Level of Service		C			C	A				D	D	
Approach Delay (s)		21.1			22.5			0.0			45.8	
Approach LOS		C			C			A			D	

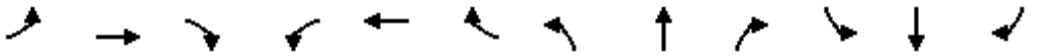
Intersection Summary			
HCM 2000 Control Delay	29.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	79.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Future Volume (vph)	70	195	55	70	80	85	315	305	130	355	835	65
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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		0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	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	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.96		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1750	1488	1646	1457		3225	3017		1511	3116	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1750	1488	1646	1457		3225	3017		1511	3116	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	195	55	70	80	85	315	305	130	355	835	65
RTOR Reduction (vph)	0	0	46	0	35	0	0	32	0	0	4	0
Lane Group Flow (vph)	70	195	9	70	130	0	315	403	0	355	896	0
Confl. Peds. (#/hr)	1					1			4	4		
Heavy Vehicles (%)	2%	0%	0%	1%	9%	11%	0%	3%	7%	10%	6%	0%
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4	4	3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.2	18.7	18.7	7.1	18.6		22.6	40.4		32.8	50.6	
Effective Green, g (s)	8.2	19.7	19.7	8.1	19.6		23.6	42.4		33.8	52.6	
Actuated g/C Ratio	0.07	0.16	0.16	0.07	0.16		0.20	0.35		0.28	0.44	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	
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)	111	287	244	111	237		634	1066		425	1365	
v/s Ratio Prot	c0.04	c0.11	0.01	0.04	0.09		c0.10	0.13		c0.23	c0.29	
v/s Ratio Perm												
v/c Ratio	0.63	0.68	0.04	0.63	0.55		0.50	0.38		0.84	0.66	
Uniform Delay, d1	54.4	47.2	42.2	54.5	46.1		42.9	29.0		40.5	26.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.75	0.42	
Incremental Delay, d2	11.1	6.3	0.1	11.1	2.6		0.6	1.0		10.9	0.9	
Delay (s)	65.5	53.4	42.2	65.6	48.7		43.5	30.0		41.1	12.1	
Level of Service	E	D	D	E	D		D	C		D	B	
Approach Delay (s)		54.2			53.7			35.7			20.3	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	66.5%	ICU Level of Service	C
Analysis Period (min)	15		

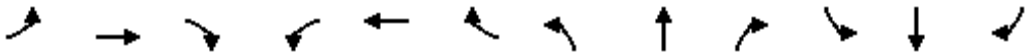
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Future Volume (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
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	0.97		1.00	0.97		1.00	0.99		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)	1646	1682		1662	1688		1662	3187		1662	3205	
Flt Permitted	0.10	1.00		0.15	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	169	1682		267	1688		1662	3187		1662	3205	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	150	325	95	150	355	95	110	1295	110	140	1115	45
RTOR Reduction (vph)	0	7	0	0	7	0	0	4	0	0	2	0
Lane Group Flow (vph)	150	413	0	150	443	0	110	1401	0	140	1158	0
Confl. Peds. (#/hr)	3		5	5		3	4		1	1		4
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	2%	0%	3%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	49.0	40.0		47.0	39.0		11.5	70.0		12.0	70.5	
Effective Green, g (s)	51.0	41.0		49.0	40.0		12.5	71.0		13.0	71.5	
Actuated g/C Ratio	0.34	0.27		0.33	0.27		0.08	0.47		0.09	0.48	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	4.8		2.5	4.8	
Lane Grp Cap (vph)	155	459		170	450		138	1508		144	1527	
v/s Ratio Prot	c0.06	0.25		0.05	0.26		0.07	c0.44		c0.08	0.36	
v/s Ratio Perm	c0.26			0.23								
v/c Ratio	0.97	0.90		0.88	0.99		0.80	0.93		0.97	0.76	
Uniform Delay, d1	40.4	52.5		42.9	54.7		67.5	37.1		68.3	32.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	61.9	23.2		37.4	38.9		25.7	11.5		66.2	3.6	
Delay (s)	102.4	75.7		80.3	93.7		93.2	48.6		134.5	35.7	
Level of Service	F	E		F	F		F	D		F	D	
Approach Delay (s)		82.7			90.3			51.8			46.4	
Approach LOS		F			F			D			D	

Intersection Summary			
HCM 2000 Control Delay	60.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.95		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.1%	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												
Traffic Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Future Volume (vph)	300	845	300	355	575	260	235	935	250	330	955	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.96		1.00	0.95		1.00	0.97		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)	1599	3151		1646	3093		1646	3169		1583	3235	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3151		1646	3093		1646	3169		1583	3235	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	300	845	300	355	575	260	235	935	250	330	955	105
RTOR Reduction (vph)	0	22	0	0	33	0	0	15	0	0	5	0
Lane Group Flow (vph)	300	1123	0	355	802	0	235	1170	0	330	1055	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	28.0	42.0		25.0	39.0		21.0	49.0		24.0	52.0	
Effective Green, g (s)	29.0	43.0		26.0	40.0		22.0	50.0		25.0	53.0	
Actuated g/C Ratio	0.18	0.27		0.16	0.25		0.14	0.31		0.16	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	289	846		267	773		226	990		247	1071	
v/s Ratio Prot	0.19	c0.36		c0.22	0.26		0.14	c0.37		c0.21	c0.33	
v/s Ratio Perm												
v/c Ratio	1.04	1.33		1.33	1.04		1.04	1.18		1.34	0.98	
Uniform Delay, d1	65.5	58.5		67.0	60.0		69.0	55.0		67.5	53.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	63.2	155.5		171.8	42.5		70.7	92.2		176.1	23.7	
Delay (s)	128.7	214.0		238.8	102.5		139.7	147.2		243.6	76.8	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		196.3			143.1			146.0			116.4	
Approach LOS		F			F			F			F	

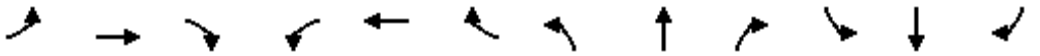
Intersection Summary			
HCM 2000 Control Delay	151.2	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.27		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	127.2%	ICU Level of Service	H
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Future Volume (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
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	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	0.98		1.00	0.96		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)	1646	3375		1646	3275		1646	1661		1706	1669	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3375		1646	3275		1646	1661		1706	1669	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	195	1125	75	215	1010	165	110	355	130	325	530	75
RTOR Reduction (vph)	0	4	0	0	12	0	0	11	0	0	5	0
Lane Group Flow (vph)	195	1196	0	215	1163	0	110	474	0	325	600	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	12.0	35.0		13.0	36.0		7.0	28.0		19.0	40.0	
Effective Green, g (s)	13.0	36.0		14.0	37.0		8.0	29.0		20.0	41.0	
Actuated g/C Ratio	0.11	0.31		0.12	0.32		0.07	0.25		0.17	0.36	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	186	1056		200	1053		114	418		296	595	
v/s Ratio Prot	0.12	0.35		c0.13	c0.36		0.07	c0.29		c0.19	0.36	
v/s Ratio Perm												
v/c Ratio	1.05	1.13		1.07	1.10		0.96	1.13		1.10	1.01	
Uniform Delay, d1	51.0	39.5		50.5	39.0		53.4	43.0		47.5	37.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	79.3	71.7		85.0	61.1		72.6	85.7		81.1	39.2	
Delay (s)	130.3	111.2		135.5	100.1		126.0	128.7		128.6	76.2	
Level of Service	F	F		F	F		F	F		F	E	
Approach Delay (s)		113.9			105.6			128.2			94.5	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	109.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.12		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.1%	ICU Level of Service	G
Analysis Period (min)	15		

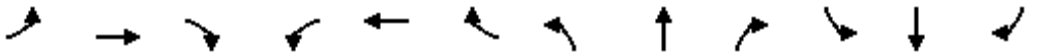
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Future Volume (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		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	0.99		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)	1662	3167		1662	3231		1614	1733	1442	1662	1716	1448
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)	1662	3167		1662	3231		1614	1733	1442	1662	1716	1448
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	290	1270	125	120	1040	60	135	210	115	105	285	255
RTOR Reduction (vph)	0	6	0	0	4	0	0	0	97	0	0	208
Lane Group Flow (vph)	290	1389	0	120	1096	0	135	210	18	105	285	47
Confl. Peds. (#/hr)	5		11	11		5	3		6	6		3
Heavy Vehicles (%)	0%	3%	4%	0%	2%	0%	3%	1%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	22.2	58.8		9.0	45.6		10.9	18.8	18.8	13.4	21.3	21.3
Effective Green, g (s)	23.2	59.8		10.0	46.6		11.9	19.8	18.8	14.4	22.3	22.3
Actuated g/C Ratio	0.19	0.50		0.08	0.39		0.10	0.17	0.16	0.12	0.19	0.19
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	321	1578		138	1254		160	285	225	199	318	269
v/s Ratio Prot	0.17	c0.44		0.07	c0.34		c0.08	0.12		0.06	c0.17	
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.90	0.88		0.87	0.87		0.84	0.74	0.08	0.53	0.90	0.18
Uniform Delay, d1	47.3	26.9		54.4	34.0		53.1	47.6	43.2	49.6	47.7	41.1
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	27.1	7.4		39.8	8.7		30.9	9.0	0.1	1.9	25.9	0.2
Delay (s)	74.4	34.3		94.2	42.6		84.0	56.6	43.3	51.5	73.6	41.3
Level of Service	E	C		F	D		F	E	D	D	E	D
Approach Delay (s)		41.2			47.7			61.3			57.2	
Approach LOS		D			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	48.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	88.7%	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												
Traffic Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Future Volume (vph)	345	705	255	230	455	60	305	600	285	200	915	335
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3228	1456	1646	3167		1646	3114		1662	3292	1467
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	345	705	255	230	455	60	305	600	285	200	915	335
RTOR Reduction (vph)	0	0	46	0	9	0	0	51	0	0	0	0
Lane Group Flow (vph)	345	705	209	230	506	0	305	834	0	200	915	335
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2									Free
Actuated Green, G (s)	20.0	26.8	44.9	17.2	24.0		18.1	32.6		13.4	27.9	110.0
Effective Green, g (s)	21.0	27.8	46.9	18.2	25.0		19.1	33.6		14.4	28.9	110.0
Actuated g/C Ratio	0.19	0.25	0.43	0.17	0.23		0.17	0.31		0.13	0.26	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	311	815	620	272	719		285	951		217	864	1467
v/s Ratio Prot	c0.21	c0.22	0.06	c0.14	0.16		c0.19	0.27		0.12	c0.28	
v/s Ratio Perm			0.09									0.23
v/c Ratio	1.11	0.87	0.34	0.85	0.70		1.07	0.88		0.92	1.06	0.23
Uniform Delay, d1	44.5	39.3	21.1	44.5	39.1		45.5	36.2		47.2	40.5	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.19	0.58	1.00
Incremental Delay, d2	83.7	10.4	0.2	20.5	2.9		73.2	11.2		34.0	44.2	0.3
Delay (s)	128.2	49.7	21.4	65.0	42.0		118.6	47.4		90.3	67.6	0.3
Level of Service	F	D	C	E	D		F	D		F	E	A
Approach Delay (s)		64.9			49.1			65.7			55.2	
Approach LOS		E			D			E			E	

Intersection Summary			
HCM 2000 Control Delay	59.6	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.9%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1495	195	245	1235	250	270
Future Volume (vph)	1495	195	245	1235	250	270
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	0.95	1.00	1.00	0.95	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	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3260	1458	1662	3260	1646	1488
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3260	1458	1662	3260	1646	1488
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1495	195	245	1235	250	270
RTOR Reduction (vph)	0	76	0	0	0	224
Lane Group Flow (vph)	1495	119	245	1235	250	46
Confl. Peds. (#/hr)					1	2
Heavy Vehicles (%)	2%	2%	0%	2%	1%	0%
Turn Type	NA	Perm	Prot	NA	Prot	Over
Protected Phases	2		1	6	8	1
Permitted Phases		2				
Actuated Green, G (s)	55.5	55.5	17.8	78.3	21.5	17.8
Effective Green, g (s)	56.5	56.5	18.8	79.3	22.5	18.8
Actuated g/C Ratio	0.51	0.51	0.17	0.72	0.20	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	5.0	5.0	2.6	5.0	2.6	2.6
Lane Grp Cap (vph)	1677	750	284	2354	337	254
v/s Ratio Prot	c0.46		c0.15	0.38	c0.15	0.03
v/s Ratio Perm		0.08				
v/c Ratio	0.89	0.16	0.86	0.52	0.74	0.18
Uniform Delay, d1	23.9	14.1	44.2	6.8	40.9	38.9
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	6.9	0.2	22.5	0.4	8.2	0.3
Delay (s)	30.8	14.3	66.7	7.2	49.1	39.2
Level of Service	C	B	E	A	D	D
Approach Delay (s)	28.9			17.1	44.0	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	26.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	109.8	Sum of lost time (s)	12.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

USER REPORT FOR SITE

Project: 2040 TSP TPR PHF 1.0

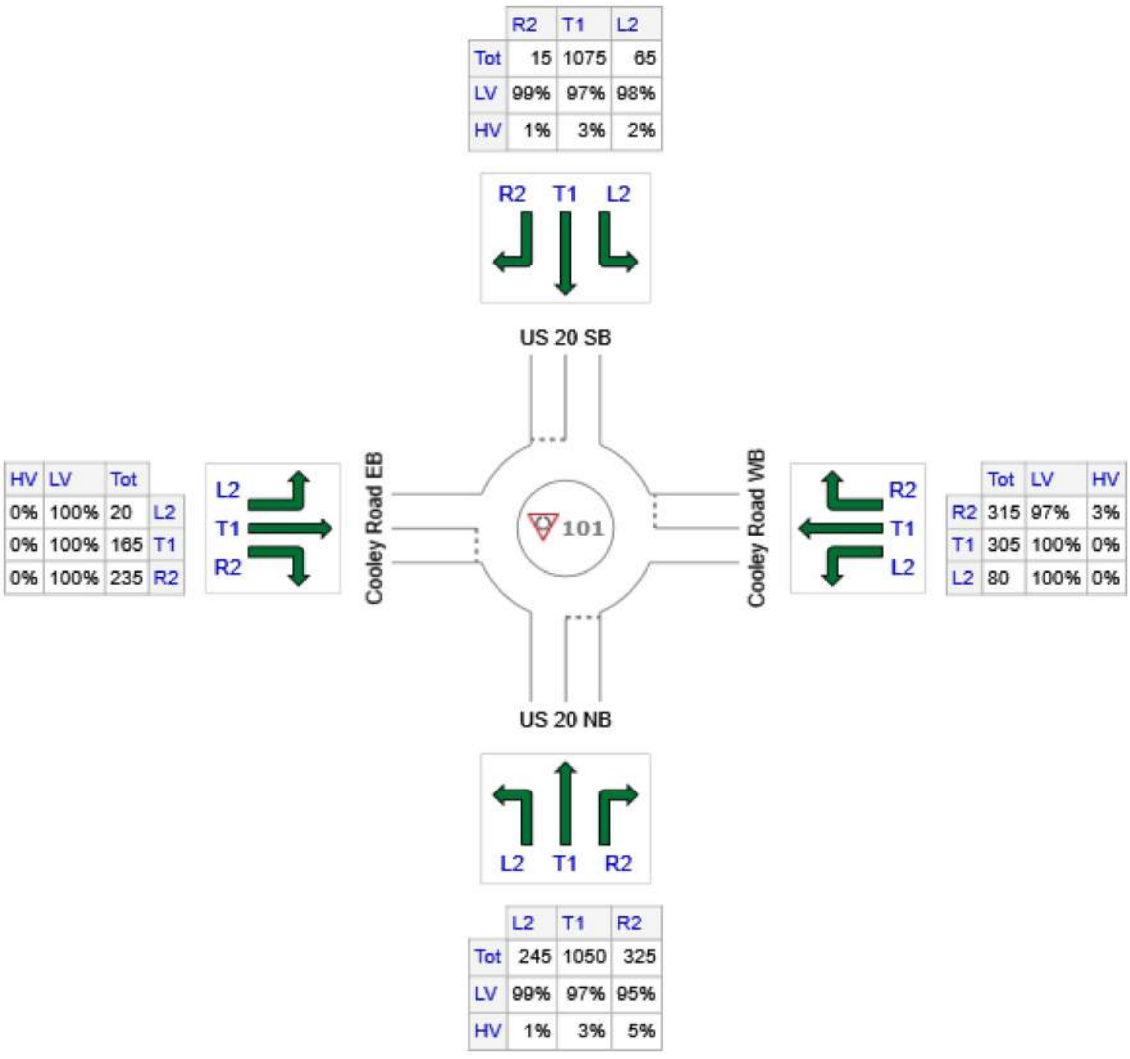
Template: Default Site User Report

Site: 101 [US 20/Cooley - TSP Project List]

New Site
Site Category: (None)
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	1620	1570	50
E: Cooley Road WB	700	691	9
N: US 20 SB	1155	1121	34
W: Cooley Road EB	420	420	0
Total	3895	3802	93

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	788	2.4	1046	0.753	100	16.9	LOS C	14.5	370.5	Full	1600	0.0	0.0
Lane 2[d]	832	3.8	1105	0.753	100	16.2	LOS C	14.4	370.6	Full	1600	0.0	0.0
Approach	1620	3.1		0.753		16.5	LOS C	14.5	370.6				
East: Cooley Road WB													
Lane 1	329	0.0	390	0.843	100	47.1	LOS E	6.9	172.0	Full	1600	0.0	0.0
Lane 2[d]	371	2.5	440	0.843	100	43.1	LOS E	7.1	181.1	Full	1600	0.0	0.0
Approach	700	1.4		0.843		45.0	LOS E	7.1	181.1				
North: US 20 SB													
Lane 1	550	2.9	733	0.750	100	21.9	LOS C	8.6	219.2	Full	1600	0.0	0.0
Lane 2[d]	605	3.0	806	0.750	100	20.3	LOS C	8.9	227.4	Full	1600	0.0	0.0
Approach	1155	2.9		0.750		21.1	LOS C	8.9	227.4				
West: Cooley Road EB													
Lane 1	185	0.0	426	0.434	90[5]	16.9	LOS C	1.9	47.9	Full	1600	0.0	0.0
Lane 2[d]	235	0.0	489	0.480	100	16.4	LOS C	2.3	56.9	Full	1600	0.0	0.0
Approach	420	0.0		0.480		16.6	LOS C	2.3	56.9				
Intersection	3895	2.4		0.843		23.0	LOS C	14.5	370.6				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

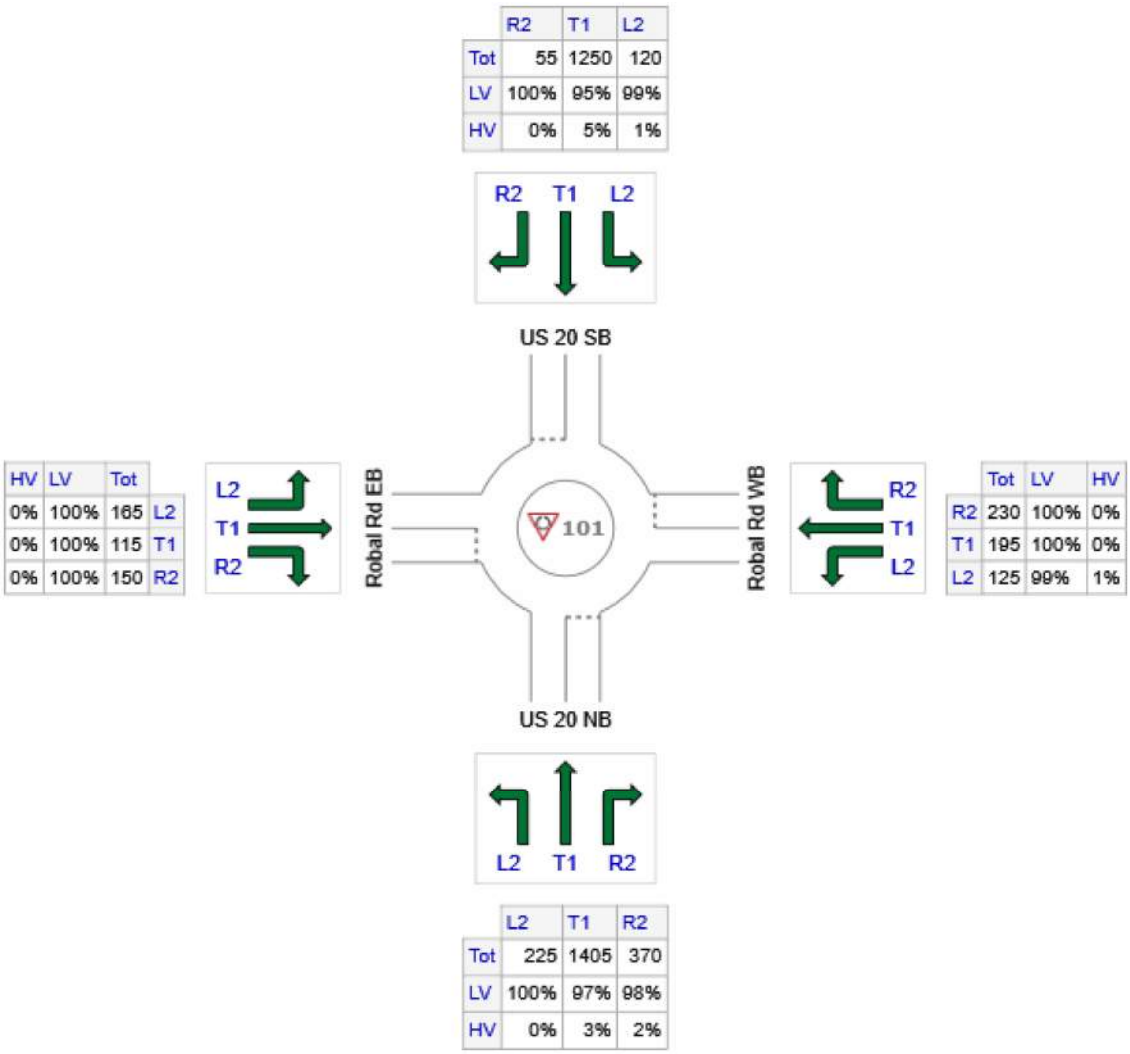
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Site: 101 [US 20/Robal - TSP Project List]

New Site
Site Category: 2040 30HV, PHF=1.0
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	2000	1950	50
E: Robal Rd WB	550	549	1
N: US 20 SB	1425	1361	64
W: Robal Rd EB	430	430	0
Total	4405	4291	115

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	786	2.1	914	0.861	100	27.0	LOS D	20.2	514.7	Full	1600	0.0	0.0
Lane 2[d]	844	3.0	980	0.861	100	25.7	LOS D	20.9	535.2	Full	1600	0.0	0.0
Lane 3	370	2.0	1139	0.325	100	6.3	LOS A	1.5	38.6	Short	350	0.0	NA
Approach	2000	2.5		0.861		22.6	LOS C	20.9	535.2				
East: Robal Rd WB													
Lane 1	125	1.0	247	0.507	77[5]	31.2	LOS D	2.0	49.8	Full	1600	0.0	0.0
Lane 2[d]	195	0.0	298	0.655	100	35.6	LOS E	3.1	76.8	Full	1600	0.0	0.0
Lane 3	230	0.0	361	0.638	100	29.2	LOS D	3.2	79.8	Short	450	0.0	NA
Approach	550	0.2		0.655		31.9	LOS D	3.2	79.8				
North: US 20 SB													
Lane 1	682	4.3	783	0.871	100	31.3	LOS D	16.5	426.2	Full	1600	0.0	0.0
Lane 2[d]	743	4.6	853	0.871	100	29.5	LOS D	17.2	447.2	Full	1600	0.0	0.0
Approach	1425	4.5		0.871		30.4	LOS D	17.2	447.2				
West: Robal Rd EB													
Lane 1[d]	280	0.0	377	0.743	100	36.2	LOS E	4.5	111.8	Full	1600	0.0	0.0
Lane 2	150	0.0	321	0.467	100	23.0	LOS C	1.9	48.2	Full	1600	0.0	0.0
Approach	430	0.0		0.743		31.6	LOS D	4.5	111.8				
Intersection	4405	2.6		0.871		27.2	LOS D	20.9	535.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Intersection	
Intersection Delay, s/veh	8.1
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	375	600	160	345
Demand Flow Rate, veh/h	379	606	162	349
Vehicles Circulating, veh/h	495	5	515	611
Vehicles Exiting, veh/h	465	672	359	0
Ped Vol Crossing Leg, #/h	0	0	0	0
Ped Cap Adj	1.000	1.000	1.000	1.000
Approach Delay, s/veh	8.8	7.3	5.8	9.5
Approach LOS	A	A	A	A

Lane	Left	Left	Left	Left
Designated Moves	TR	LT	LR	LTR
Assumed Moves	TR	LT	LR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.700	2.700	2.700	2.700
Critical Headway, s	4.100	4.100	4.100	4.100
Entry Flow, veh/h	379	606	162	349
Cap Entry Lane, veh/h	914	1328	900	836
Entry HV Adj Factor	0.990	0.990	0.988	0.990
Flow Entry, veh/h	375	600	160	345
Cap Entry, veh/h	905	1315	889	827
V/C Ratio	0.415	0.456	0.180	0.417
Control Delay, s/veh	8.8	7.3	5.8	9.5
LOS	A	A	A	A
95th %tile Queue, veh	2	2	1	2

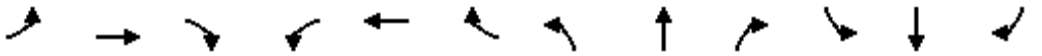
Intersection	
Int Delay, s/veh	0.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	65	600	0	10	595	190	5	5	15	0	0	0
Future Vol, veh/h	65	600	0	10	595	190	5	5	15	0	0	0
Conflicting Peds, #/hr	1	0	1	1	0	1	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	60	-	-	50	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	-	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	3	1	0	0	1	2	0	0	0	0	0	0
Mvmt Flow	65	600	0	10	595	190	5	5	15	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	786	0	0	601	0	0	1441	1537	601
Stage 1	-	-	-	-	-	-	731	731	-
Stage 2	-	-	-	-	-	-	710	806	-
Critical Hdwy	4.13	-	-	4.1	-	-	6.4	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	5.4	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.4	5.5	-
Follow-up Hdwy	2.227	-	-	2.2	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	828	-	-	986	-	-	148	117	504
Stage 1	-	-	-	-	-	-	480	430	-
Stage 2	-	-	-	-	-	-	491	398	-
Platoon blocked, %		-	-		-	-			
Mov Cap-1 Maneuver	828	-	-	985	-	-	135	0	504
Mov Cap-2 Maneuver	-	-	-	-	-	-	135	0	-
Stage 1	-	-	-	-	-	-	437	0	-
Stage 2	-	-	-	-	-	-	491	0	-

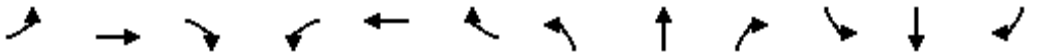
Approach	EB	WB	NB
HCM Control Delay, s	0.9	0.1	18.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR
Capacity (veh/h)	299	828	-	-	985	-	-
HCM Lane V/C Ratio	0.084	0.079	-	-	0.01	-	-
HCM Control Delay (s)	18.1	9.7	-	-	8.7	-	-
HCM Lane LOS	C	A	-	-	A	-	-
HCM 95th %tile Q(veh)	0.3	0.3	-	-	0	-	-



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	540	30	10	295	0	0	0	0	385	0	580
Future Volume (vph)	0	540	30	10	295	0	0	0	0	385	0	580
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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
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)		1703		1630	1716						1662	1458
Flt Permitted		1.00		0.95	1.00						0.95	1.00
Satd. Flow (perm)		1703		1630	1716						1662	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	540	30	10	295	0	0	0	0	385	0	580
RTOR Reduction (vph)	0	2	0	0	0	0	0	0	0	0	0	326
Lane Group Flow (vph)	0	568	0	10	295	0	0	0	0	0	385	254
Heavy Vehicles (%)	0%	2%	2%	2%	2%	0%	0%	0%	0%	0%	2%	2%
Turn Type		NA		Prot	NA					Perm	NA	Perm
Protected Phases		8		7	4						2	
Permitted Phases										2		2
Actuated Green, G (s)		46.9		0.8	52.7						27.3	27.3
Effective Green, g (s)		47.9		1.8	53.7						28.3	28.3
Actuated g/C Ratio		0.53		0.02	0.60						0.31	0.31
Clearance Time (s)		5.0		5.0	5.0						5.0	5.0
Vehicle Extension (s)		3.0		3.0	3.0						3.0	3.0
Lane Grp Cap (vph)		906		32	1023						522	458
v/s Ratio Prot		c0.33		0.01	c0.17							
v/s Ratio Perm											0.23	0.17
v/c Ratio		0.63		0.31	0.29						0.74	0.55
Uniform Delay, d1		14.8		43.5	8.8						27.5	25.6
Progression Factor		1.00		1.38	0.58						1.00	1.00
Incremental Delay, d2		3.3		4.7	0.6						5.4	1.5
Delay (s)		18.1		64.7	5.7						32.9	27.1
Level of Service		B		E	A						C	C
Approach Delay (s)		18.1			7.6			0.0			29.4	
Approach LOS		B			A			A			C	

Intersection Summary			
HCM 2000 Control Delay	22.3	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	116.4%	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												
Traffic Volume (vph)	270	655	0	0	285	275	20	0	30	0	0	0
Future Volume (vph)	270	655	0	0	285	275	20	0	30	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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				
Frt	1.00	1.00			0.93		1.00	0.85				
Flt Protected	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (prot)	1646	1733			1610		1630	1458				
Flt Permitted	0.95	1.00			1.00		0.95	1.00				
Satd. Flow (perm)	1646	1733			1610		1630	1458				
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	655	0	0	285	275	20	0	30	0	0	0
RTOR Reduction (vph)	0	0	0	0	28	0	0	28	0	0	0	0
Lane Group Flow (vph)	270	655	0	0	532	0	20	2	0	0	0	0
Heavy Vehicles (%)	1%	1%	0%	0%	2%	1%	2%	2%	2%	0%	0%	0%
Turn Type	Prot	NA			NA		Perm	NA				
Protected Phases	3	8			4			6				
Permitted Phases							6					
Actuated Green, G (s)	20.1	75.5			50.4		4.5	4.5				
Effective Green, g (s)	21.1	76.5			51.4		5.5	5.5				
Actuated g/C Ratio	0.23	0.85			0.57		0.06	0.06				
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0				
Vehicle Extension (s)	3.0	3.0			3.0		3.0	3.0				
Lane Grp Cap (vph)	385	1473			919		99	89				
v/s Ratio Prot	c0.16	0.38			c0.33			0.00				
v/s Ratio Perm							c0.01					
v/c Ratio	0.70	0.44			0.58		0.20	0.02				
Uniform Delay, d1	31.6	1.6			12.4		40.2	39.7				
Progression Factor	0.96	0.85			1.00		1.00	1.00				
Incremental Delay, d2	4.6	0.8			2.7		1.0	0.1				
Delay (s)	34.8	2.2			15.0		41.2	39.8				
Level of Service	C	A			B		D	D				
Approach Delay (s)		11.7			15.0			40.4			0.0	
Approach LOS		B			B			D			A	

Intersection Summary			
HCM 2000 Control Delay	13.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	116.4%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	7.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	55	370	380	200	65	450
Future Vol, veh/h	55	370	380	200	65	450
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	100	100	100	100	100	100
Heavy Vehicles, %	0	0	0	0	0	4
Mvmt Flow	55	370	380	200	65	450

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	380	0	-	0	860	380
Stage 1	-	-	-	-	380	-
Stage 2	-	-	-	-	480	-
Critical Hdwy	4.1	-	-	-	6.4	6.24
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	2.2	-	-	-	3.5	3.336
Pot Cap-1 Maneuver	1190	-	-	-	329	663
Stage 1	-	-	-	-	696	-
Stage 2	-	-	-	-	627	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1190	-	-	-	310	663
Mov Cap-2 Maneuver	-	-	-	-	310	-
Stage 1	-	-	-	-	656	-
Stage 2	-	-	-	-	627	-

Approach	EB	WB	SB
HCM Control Delay, s	1.1	0	20.9
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1190	-	-	-	310	663
HCM Lane V/C Ratio	0.046	-	-	-	0.21	0.679
HCM Control Delay (s)	8.2	0	-	-	19.7	21.1
HCM Lane LOS	A	A	-	-	C	C
HCM 95th %tile Q(veh)	0.1	-	-	-	0.8	5.3

Intersection	
Int Delay, s/veh	13.4

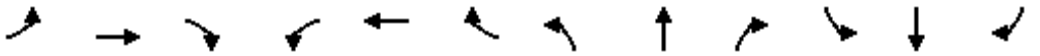
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	245	190	0	0	535	145	45	0	155	0	0	0
Future Vol, veh/h	245	190	0	0	535	145	45	0	155	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	6	4	0	0	3	1	0	0	0	5	0	2
Mvmt Flow	245	190	0	0	535	145	45	0	155	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	680	0	-	-	-	0	1288	1360	190
Stage 1	-	-	-	-	-	-	680	680	-
Stage 2	-	-	-	-	-	-	608	680	-
Critical Hdwy	4.16	-	-	-	-	-	9.4	9.5	7.7
Critical Hdwy Stg 1	-	-	-	-	-	-	8.4	8.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	8.4	8.5	-
Follow-up Hdwy	2.254	-	-	-	-	-	3.5	4	3.3
Pot Cap-1 Maneuver	894	-	0	0	-	-	62	48	792
Stage 1	-	-	0	0	-	-	288	257	-
Stage 2	-	-	0	0	-	-	330	257	-
Platoon blocked, %		-			-	-			
Mov Cap-1 Maneuver	894	-	-	-	-	-	~ 43	0	792
Mov Cap-2 Maneuver	-	-	-	-	-	-	~ 43	0	-
Stage 1	-	-	-	-	-	-	200	0	-
Stage 2	-	-	-	-	-	-	330	0	-

Approach	EB	WB	NB
HCM Control Delay, s	5.9	0	75.3
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	43	792	894	-	-	-
HCM Lane V/C Ratio	1.047	0.196	0.274	-	-	-
HCM Control Delay (s)	298	10.6	10.5	0	-	-
HCM Lane LOS	F	B	B	A	-	-
HCM 95th %tile Q(veh)	4.2	0.7	1.1	-	-	-

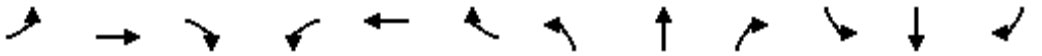
Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	15	360	155	30	80	215	910	165	35	1125	15
Future Volume (vph)	15	15	360	155	30	80	215	910	165	35	1125	15
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0	4.0		4.0	5.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	0.95	1.00	1.00	0.95	
Frpb, ped/bikes		1.00	0.99		1.00	0.99	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	1.00	1.00	
Frt		1.00	0.85		1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		0.98	1.00		0.96	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1707	1468		1678	1468	1662	3260	1451	1662	3223	
Flt Permitted		0.84	1.00		0.74	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)		1464	1468		1293	1468	1662	3260	1451	1662	3223	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	15	360	155	30	80	215	910	165	35	1125	15
RTOR Reduction (vph)	0	0	296	0	0	67	0	0	45	0	1	0
Lane Group Flow (vph)	0	30	64	0	185	13	215	910	120	35	1139	0
Confl. Peds. (#/hr)	1		1	1		1			2	2		
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Prot	NA	Perm	Prot	NA	
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4		4	8		8			2			
Actuated Green, G (s)		17.6	17.6		17.6	17.6	18.6	68.0	68.0	4.4	53.8	
Effective Green, g (s)		18.6	18.6		18.6	17.6	19.6	69.0	69.0	5.4	54.8	
Actuated g/C Ratio		0.18	0.18		0.18	0.17	0.19	0.66	0.66	0.05	0.52	
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	4.8	4.8	2.5	4.8	
Lane Grp Cap (vph)		259	260		229	246	310	2142	953	85	1682	
v/s Ratio Prot							c0.13	0.28		0.02	c0.35	
v/s Ratio Perm		0.02	0.04		c0.14	0.01			0.08			
v/c Ratio		0.12	0.25		0.81	0.05	0.69	0.42	0.13	0.41	0.68	
Uniform Delay, d1		36.3	37.2		41.5	36.7	39.9	8.6	6.7	48.3	18.6	
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	0.4		18.0	0.1	6.1	0.6	0.3	2.4	2.2	
Delay (s)		36.4	37.5		59.5	36.8	46.0	9.2	7.0	50.6	20.8	
Level of Service		D	D		E	D	D	A	A	D	C	
Approach Delay (s)		37.4			52.7			15.0			21.7	
Approach LOS		D			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	105.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	80.0%	ICU Level of Service	D
Analysis Period (min)	15		

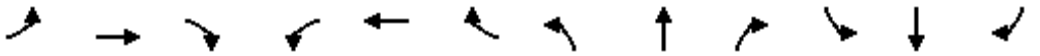
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	435	175	235	370	110	95	1115	110	120	710	45
Future Volume (vph)	170	435	175	235	370	110	95	1115	110	120	710	45
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	1.00	1.00	1.00	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	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99		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)	1646	1733	1488	1646	1733	1458	1662	3213		1662	3141	
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)	1646	1733	1488	1646	1733	1458	1662	3213		1662	3141	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	435	175	235	370	110	95	1115	110	120	710	45
RTOR Reduction (vph)	0	0	106	0	0	78	0	6	0	0	4	0
Lane Group Flow (vph)	170	435	69	235	370	32	95	1219	0	120	751	0
Confl. Peds. (#/hr)	5					5	5		3	3		5
Heavy Vehicles (%)	1%	1%	0%	1%	1%	0%	0%	2%	0%	0%	5%	0%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						
Actuated Green, G (s)	17.3	29.5	29.5	20.5	32.7	32.7	9.5	43.0		7.0	40.5	
Effective Green, g (s)	18.3	30.5	30.5	21.5	33.7	33.7	10.5	44.0		8.0	41.5	
Actuated g/C Ratio	0.15	0.25	0.25	0.18	0.28	0.28	0.09	0.37		0.07	0.35	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	251	440	378	294	486	409	145	1178		110	1086	
v/s Ratio Prot	0.10	c0.25		c0.14	c0.21		0.06	c0.38		c0.07	0.24	
v/s Ratio Perm			0.05			0.02						
v/c Ratio	0.68	0.99	0.18	0.80	0.76	0.08	0.66	1.03		1.09	0.69	
Uniform Delay, d1	48.1	44.6	35.0	47.2	39.5	31.7	53.0	38.0		56.0	33.7	
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	7.1	39.5	0.2	14.1	6.9	0.1	10.2	35.5		112.4	3.6	
Delay (s)	55.1	84.1	35.2	61.2	46.4	31.8	63.2	73.5		168.4	37.4	
Level of Service	E	F	D	E	D	C	E	E		F	D	
Approach Delay (s)		66.8			49.0			72.8			55.3	
Approach LOS		E			D			E			E	

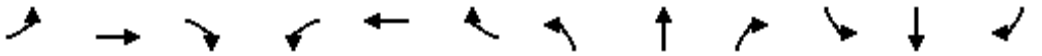
Intersection Summary			
HCM 2000 Control Delay	62.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.97		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	96.8%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group



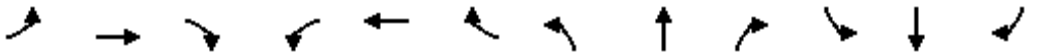
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	15	995	485	420	990	25	0	0	0	10	5	45
Future Volume (vph)	15	995	485	420	990	25	0	0	0	10	5	45
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0						4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00						1.00	
Frpb, ped/bikes	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	
Frt	1.00	1.00	0.85	1.00	1.00						0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (prot)	1805	1827	1532	1805	1838						1508	
Flt Permitted	0.95	1.00	1.00	0.95	1.00						0.99	
Satd. Flow (perm)	1805	1827	1532	1805	1838						1508	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	15	995	485	420	990	25	0	0	0	10	5	45
RTOR Reduction (vph)	0	0	161	0	1	0	0	0	0	0	38	0
Lane Group Flow (vph)	15	995	324	420	1014	0	0	0	0	0	22	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			4			1						
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	0%	20%	0%	12%
Turn Type	Prot	NA	Perm	Prot	NA					Perm	NA	
Protected Phases	5	2		1	6						4	
Permitted Phases			2							4		
Actuated Green, G (s)	2.0	62.0	62.0	26.5	86.5						18.0	
Effective Green, g (s)	2.5	62.5	62.5	27.0	87.0						18.5	
Actuated g/C Ratio	0.02	0.52	0.52	0.22	0.72						0.15	
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)	37	951	797	406	1332						232	
v/s Ratio Prot	0.01	c0.54		c0.23	0.55							
v/s Ratio Perm			0.21								0.01	
v/c Ratio	0.41	1.05	0.41	1.03	0.76						0.09	
Uniform Delay, d1	58.0	28.8	17.5	46.5	10.1						43.6	
Progression Factor	1.00	1.00	1.00	1.02	1.38						1.00	
Incremental Delay, d2	7.1	42.0	1.5	44.8	2.7						0.8	
Delay (s)	65.1	70.8	19.0	92.4	16.6						44.4	
Level of Service	E	E	B	F	B						D	
Approach Delay (s)		53.9			38.8			0.0			44.4	
Approach LOS		D			D			A			D	

Intersection Summary			
HCM 2000 Control Delay	46.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	89.8%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



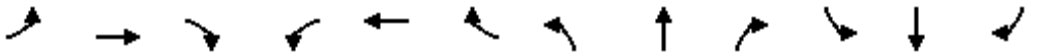
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	105	900	0	0	1205	215	230	0	505	0	0	0
Future Volume (vph)	105	900	0	0	1205	215	230	0	505	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0			
Lane Util. Factor	1.00	1.00			*0.78	1.00		1.00	1.00			
Frpb, ped/bikes	1.00	1.00			1.00	0.97		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)	1646	1667			2676	1402		1630	1444			
Flt Permitted	0.09	1.00			1.00	1.00		0.95	1.00			
Satd. Flow (perm)	150	1667			2676	1402		1630	1444			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	105	900	0	0	1205	215	230	0	505	0	0	0
RTOR Reduction (vph)	0	0	0	0	0	56	0	0	113	0	0	0
Lane Group Flow (vph)	105	900	0	0	1205	159	0	230	392	0	0	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)			3			1						
Heavy Vehicles (%)	1%	5%	0%	0%	2%	3%	2%	0%	3%	0%	0%	0%
Turn Type	pm+pt	NA			NA	Perm	Perm	NA	Perm			
Protected Phases	5	2			6			8				
Permitted Phases	2					6	8		8			
Actuated Green, G (s)	75.7	75.7			65.4	65.4		34.3	34.3			
Effective Green, g (s)	76.7	76.7			66.4	66.4		35.3	35.3			
Actuated g/C Ratio	0.64	0.64			0.55	0.55		0.29	0.29			
Clearance Time (s)	5.0	5.0			5.0	5.0		5.0	5.0			
Vehicle Extension (s)	2.5	5.2			5.2	5.2		2.5	2.5			
Lane Grp Cap (vph)	174	1065			1480	775		479	424			
v/s Ratio Prot	0.03	c0.54			0.45							
v/s Ratio Perm	0.35					0.11		0.14	c0.27			
v/c Ratio	0.60	0.85			0.81	0.21		0.48	0.92			
Uniform Delay, d1	37.9	17.0			21.8	13.5		34.8	41.1			
Progression Factor	0.96	0.84			1.00	1.00		1.00	1.00			
Incremental Delay, d2	0.5	0.8			4.1	0.3		0.6	25.8			
Delay (s)	36.7	15.1			25.9	13.8		35.4	66.9			
Level of Service	D	B			C	B		D	E			
Approach Delay (s)		17.4			24.0			57.0			0.0	
Approach LOS		B			C			E			A	

Intersection Summary			
HCM 2000 Control Delay	29.6	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.90		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
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												
Traffic Volume (vph)	155	275	60	360	450	175	85	950	265	905	850	110
Future Volume (vph)	155	275	60	360	450	175	85	950	265	905	850	110
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	3.5	4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	1.00		1.00	0.95	1.00	0.97	0.95	
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	0.96		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1805	3432		1752	1774		1752	3539	1583	3335	3394	
Flt Permitted	0.15	1.00		0.36	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	281	3432		664	1774		1752	3539	1583	3335	3394	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	155	275	60	360	450	175	85	950	265	905	850	110
RTOR Reduction (vph)	0	15	0	0	11	0	0	0	53	0	8	0
Lane Group Flow (vph)	155	320	0	360	614	0	85	950	212	905	952	0
Confl. Peds. (#/hr)	3					3						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	4%	3%	3%	0%	3%	2%	2%	5%	5%	1%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	3	8		7	4		1	6	7	5	2	
Permitted Phases	8			4					6			
Actuated Green, G (s)	31.0	26.0		48.0	38.0		9.7	32.0	49.0	30.0	52.3	
Effective Green, g (s)	33.0	27.0		49.0	39.0		10.7	33.5	52.0	31.0	53.8	
Actuated g/C Ratio	0.26	0.22		0.39	0.31		0.09	0.27	0.41	0.25	0.43	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.5	5.0	5.0	5.5	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	4.8	2.5	2.5	4.8	
Lane Grp Cap (vph)	146	738		415	551		149	944	655	823	1454	
v/s Ratio Prot	0.05	0.09		c0.12	c0.35		0.05	c0.27	0.05	c0.27	0.28	
v/s Ratio Perm	0.23			0.21					0.09			
v/c Ratio	1.06	0.43		0.87	1.11		0.57	1.01	0.32	1.10	0.65	
Uniform Delay, d1	44.2	42.6		31.0	43.2		55.2	46.0	24.9	47.2	28.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	91.9	0.3		17.0	73.7		4.3	30.9	0.2	62.2	1.4	
Delay (s)	136.0	42.9		48.0	116.9		59.5	76.9	25.1	109.5	29.9	
Level of Service	F	D		D	F		E	E	C	F	C	
Approach Delay (s)		72.4			91.7			65.2			68.5	
Approach LOS		E			F			E			E	

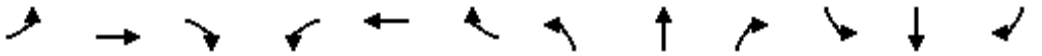
Intersection Summary			
HCM 2000 Control Delay	72.9	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.07		
Actuated Cycle Length (s)	125.5	Sum of lost time (s)	16.0
Intersection Capacity Utilization	108.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	170	195	115	20	200	95	160	1025	45	215	1320	105
Future Volume (vph)	170	195	115	20	200	95	160	1025	45	215	1320	105
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	5.0	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	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.98	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	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1646	1733	1449	1646	1733	1473	1630	3236		1630	3228	1458
Flt Permitted	0.30	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	525	1733	1449	1646	1733	1473	1630	3236		1630	3228	1458
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	170	195	115	20	200	95	160	1025	45	215	1320	105
RTOR Reduction (vph)	0	0	51	0	42	80	0	3	0	0	0	52
Lane Group Flow (vph)	170	195	64	20	158	15	160	1067	0	215	1320	53
Confl. Peds. (#/hr)			5	5					5	5		
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	2%	2%	1%	2%	3%	2%
Turn Type	pm+pt	NA	custom	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases	8		8 1			4						2
Actuated Green, G (s)	29.0	23.0	43.5	2.0	19.0	19.0	15.5	55.4		19.6	59.5	59.5
Effective Green, g (s)	31.0	24.0	44.5	3.0	20.0	19.0	16.5	56.4		20.6	60.5	60.5
Actuated g/C Ratio	0.26	0.20	0.37	0.02	0.17	0.16	0.14	0.47		0.17	0.50	0.50
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5		3.0	2.5	2.5	2.5	4.8		2.5	4.8	4.8
Lane Grp Cap (vph)	201	346	537	41	288	233	224	1520		279	1627	735
v/s Ratio Prot	c0.05	0.11		0.01	0.09		0.10	0.33		c0.13	c0.41	
v/s Ratio Perm	c0.17		0.04			0.01						0.04
v/c Ratio	0.85	0.56	0.12	0.49	0.55	0.06	0.71	0.70		0.77	0.81	0.07
Uniform Delay, d1	41.3	43.3	24.8	57.7	45.9	42.9	49.5	25.2		47.4	25.0	15.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.85		1.00	1.00	1.00
Incremental Delay, d2	26.5	1.7	0.1	8.9	1.7	0.1	7.4	2.1		11.9	4.5	0.2
Delay (s)	67.7	45.0	24.9	66.6	47.6	43.0	55.0	23.5		59.3	29.5	15.5
Level of Service	E	D	C	E	D	D	E	C		E	C	B
Approach Delay (s)		48.2			47.4			27.6			32.5	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	34.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	84.2%	ICU Level of Service	E
Analysis Period (min)	15		

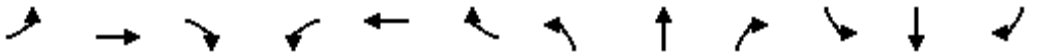
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	475	75	10	300	50	5	5	750	80	5	1090	360
Future Volume (vph)	475	75	10	300	50	5	5	750	80	5	1090	360
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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			*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	0.98		1.00	0.99			1.00			1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00			1.00			1.00	1.00
Satd. Flow (prot)	1646	1687		1646	1709			3259			3228	1488
Flt Permitted	0.95	1.00		0.95	1.00			0.95			0.95	1.00
Satd. Flow (perm)	1646	1687		1646	1709			3093			3073	1488
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	475	75	10	300	50	5	5	750	80	5	1090	360
RTOR Reduction (vph)	0	4	0	0	4	0	0	5	0	0	0	63
Lane Group Flow (vph)	475	81	0	300	51	0	0	830	0	0	1095	297
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	2%	0%	1%	1%	1%	1%	2%	2%	1%	3%	0%
Turn Type	Prot	NA		Prot	NA		Perm	NA		Perm	NA	pm+ov
Protected Phases	7	4		3	8			6			2	7
Permitted Phases							6			2		2
Actuated Green, G (s)	36.9	16.1		28.7	7.9			60.2			60.2	97.1
Effective Green, g (s)	37.9	17.1		29.7	8.9			61.2			61.2	99.1
Actuated g/C Ratio	0.32	0.14		0.25	0.07			0.51			0.51	0.83
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	5.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0			4.8			4.8	3.0
Lane Grp Cap (vph)	519	240		407	126			1577			1567	1278
v/s Ratio Prot	c0.29	c0.05		0.18	0.03							0.07
v/s Ratio Perm								0.27			c0.36	0.13
v/c Ratio	0.92	0.34		0.74	0.41			0.53			0.70	0.23
Uniform Delay, d1	39.5	46.3		41.6	53.0			19.7			22.4	2.3
Progression Factor	1.00	1.00		1.00	1.00			1.00			0.40	0.00
Incremental Delay, d2	20.8	0.8		6.8	2.1			1.3			1.8	0.1
Delay (s)	60.3	47.2		48.4	55.2			20.9			10.7	0.1
Level of Service	E	D		D	E			C			B	A
Approach Delay (s)		58.3			49.4			20.9			8.0	
Approach LOS		E			D			C			A	

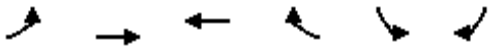
Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	78.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	485	55	10	415	965	145	0	575
Future Volume (vph)	0	0	0	0	485	55	10	415	965	145	0	575
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	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			1.00	0.99	1.00		0.98
Flpb, ped/bikes					1.00			1.00	1.00	1.00		1.00
Frt					0.99			1.00	0.85	1.00		0.85
Flt Protected					1.00			1.00	1.00	0.95		1.00
Satd. Flow (prot)					1706			1731	1460	1630		1455
Flt Permitted					1.00			1.00	1.00	0.95		1.00
Satd. Flow (perm)					1706			1731	1460	1630		1455
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	0	0	0	485	55	10	415	965	145	0	575
RTOR Reduction (vph)	0	0	0	0	5	0	0	0	221	0	0	371
Lane Group Flow (vph)	0	0	0	0	535	0	0	425	744	145	0	204
Confl. Peds. (#/hr)	2					2	1		1	1		1
Confl. Bikes (#/hr)						2						
Heavy Vehicles (%)	0%	0%	0%	0%	1%	0%	0%	1%	1%	2%	0%	0%
Turn Type					NA		Split	NA	custom	Prot		Perm
Protected Phases		2			6		8	8	1	4		
Permitted Phases									2 8			4
Actuated Green, G (s)					53.9			31.0	84.9	20.1		20.1
Effective Green, g (s)					54.9			32.0	86.9	21.1		21.1
Actuated g/C Ratio					0.46			0.27	0.72	0.18		0.18
Clearance Time (s)					5.0			5.0	5.0	5.0		5.0
Vehicle Extension (s)					3.0			3.0	3.0	3.0		3.0
Lane Grp Cap (vph)					780			461	1105	286		255
v/s Ratio Prot					0.31			c0.25	c0.31	0.09		
v/s Ratio Perm									0.20			c0.14
v/c Ratio					0.69			0.92	0.67	0.51		0.80
Uniform Delay, d1					25.7			42.8	8.9	44.7		47.4
Progression Factor					0.54			1.00	1.00	1.00		1.00
Incremental Delay, d2					4.0			23.9	1.6	1.4		16.3
Delay (s)					17.8			66.7	10.5	46.2		63.7
Level of Service					B			E	B	D		E
Approach Delay (s)		0.0			17.8			27.7			60.2	
Approach LOS		A			B			C			E	

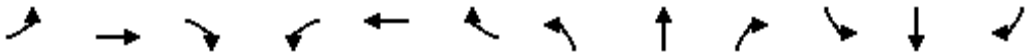
Intersection Summary			
HCM 2000 Control Delay	34.5	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	104.4%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	720	390	240	370	30	300
Future Volume (vph)	720	390	240	370	30	300
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	0.99	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)	1646	1716	1733	1453	1568	1473
Flt Permitted	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1646	1716	1733	1453	1568	1473
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	720	390	240	370	30	300
RTOR Reduction (vph)	0	0	0	114	0	255
Lane Group Flow (vph)	720	390	240	256	30	45
Confl. Bikes (#/hr)				2		
Heavy Vehicles (%)	1%	2%	1%	1%	6%	1%
Turn Type	Prot	NA	NA	pm+ov	Prot	Perm
Protected Phases	5	2	6	7	7	
Permitted Phases				6		7
Actuated Green, G (s)	59.5	94.0	30.5	48.5	18.0	18.0
Effective Green, g (s)	59.5	94.0	30.5	48.5	18.0	18.0
Actuated g/C Ratio	0.50	0.78	0.25	0.40	0.15	0.15
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)	816	1344	440	635	235	220
v/s Ratio Prot	c0.44	0.23	c0.14	c0.06	0.02	
v/s Ratio Perm				0.12		0.03
v/c Ratio	0.88	0.29	0.55	0.40	0.13	0.20
Uniform Delay, d1	27.1	3.6	38.7	25.5	44.2	44.7
Progression Factor	1.12	1.02	1.00	1.00	1.00	1.00
Incremental Delay, d2	8.1	0.4	4.8	1.9	1.1	2.1
Delay (s)	38.3	4.1	43.5	27.4	45.3	46.8
Level of Service	D	A	D	C	D	D
Approach Delay (s)		26.3	33.7		46.7	
Approach LOS		C	C		D	

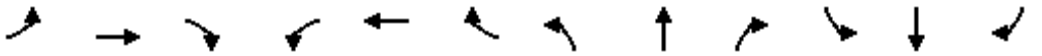
Intersection Summary			
HCM 2000 Control Delay	31.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	12.0
Intersection Capacity Utilization	74.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



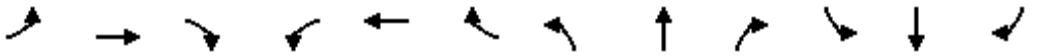
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1490	205	0	535	445	135	0	95	0	0	0
Future Volume (vph)	0	1490	205	0	535	445	135	0	95	0	0	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.0			4.0		4.0		4.0			
Lane Util. Factor		0.95			0.95		1.00		1.00			
Frpb, ped/bikes		1.00			0.99		1.00		1.00			
Flpb, ped/bikes		1.00			1.00		1.00		1.00			
Frt		0.98			0.93		1.00		0.85			
Flt Protected		1.00			1.00		0.95		1.00			
Satd. Flow (prot)		3208			3026		1662		1488			
Flt Permitted		1.00			1.00		0.95		1.00			
Satd. Flow (perm)		3208			3026		1662		1488			
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1490	205	0	535	445	135	0	95	0	0	0
RTOR Reduction (vph)	0	7	0	0	88	0	0	0	71	0	0	0
Lane Group Flow (vph)	0	1688	0	0	892	0	135	0	24	0	0	0
Confl. Peds. (#/hr)	2					2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	0%	0%	2%	0%	0%	0%	0%	0%	0%	0%
Turn Type		NA			NA		Prot		Perm			
Protected Phases		2			6		3					
Permitted Phases									8			
Actuated Green, G (s)		95.4			95.4		14.6		14.6			
Effective Green, g (s)		96.4			96.4		15.6		15.6			
Actuated g/C Ratio		0.80			0.80		0.13		0.13			
Clearance Time (s)		5.0			5.0		5.0		5.0			
Vehicle Extension (s)		3.0			3.0		3.0		3.0			
Lane Grp Cap (vph)		2577			2430		216		193			
v/s Ratio Prot		c0.53			0.29		c0.08					
v/s Ratio Perm									0.02			
v/c Ratio		0.65			0.37		0.62		0.12			
Uniform Delay, d1		4.9			3.3		49.4		46.1			
Progression Factor		0.67			1.00		1.00		1.00			
Incremental Delay, d2		1.0			0.1		5.5		0.3			
Delay (s)		4.3			3.4		55.0		46.4			
Level of Service		A			A		D		D			
Approach Delay (s)		4.3			3.4			51.4			0.0	
Approach LOS		A			A			D			A	

Intersection Summary			
HCM 2000 Control Delay	7.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.66		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	9.0
Intersection Capacity Utilization	66.6%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



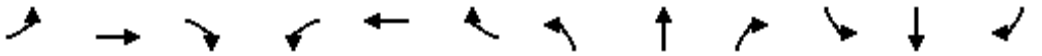
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	205	225	20	335	450	115	110	200	115	150	575	145
Future Volume (vph)	205	225	20	335	450	115	110	200	115	150	575	145
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	6.0	4.0	4.0	6.0
Lane Util. Factor	1.00	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	0.99	1.00	1.00	0.99	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	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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
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)	1646	1750	1468	1646	1651	1467	1583	3197	1453	1583	3107	1417
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	205	225	20	335	450	115	110	200	115	150	575	145
RTOR Reduction (vph)	0	0	16	0	0	79	0	0	94	0	0	104
Lane Group Flow (vph)	205	225	4	335	450	36	110	200	21	150	575	41
Confl. Peds. (#/hr)	1					1			1	1		
Confl. Bikes (#/hr)			1									
Heavy Vehicles (%)	1%	0%	0%	1%	6%	0%	5%	4%	0%	5%	7%	5%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	8		7	4		1	6		5	2	
Permitted Phases			8			4			6			2
Actuated Green, G (s)	18.1	25.5	25.5	28.8	36.2	36.2	10.5	21.6	21.6	23.1	34.2	34.2
Effective Green, g (s)	19.1	26.5	26.5	29.8	37.2	37.2	11.5	23.6	21.6	24.1	36.2	34.2
Actuated g/C Ratio	0.16	0.22	0.22	0.25	0.31	0.31	0.10	0.20	0.18	0.20	0.30	0.29
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	261	386	324	408	511	454	151	628	261	317	937	403
v/s Ratio Prot	0.12	0.13		c0.20	c0.27		c0.07	0.06		0.09	c0.19	
v/s Ratio Perm			0.00			0.02			0.01			0.03
v/c Ratio	0.79	0.58	0.01	0.82	0.88	0.08	0.73	0.32	0.08	0.47	0.61	0.10
Uniform Delay, d1	48.5	41.8	36.5	42.6	39.3	29.3	52.7	41.3	40.9	42.3	35.9	31.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.32	1.34	9.41	1.00	1.00	1.00
Incremental Delay, d2	14.3	2.2	0.0	12.5	16.1	0.1	15.3	1.3	0.6	1.1	1.2	0.1
Delay (s)	62.8	44.0	36.6	55.1	55.4	29.4	84.8	56.7	385.8	43.5	37.1	31.7
Level of Service	E	D	D	E	E	C	F	E	F	D	D	C
Approach Delay (s)		52.3			52.0			153.0			37.3	
Approach LOS		D			D			F			D	

Intersection Summary			
HCM 2000 Control Delay	63.4	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	75.3%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



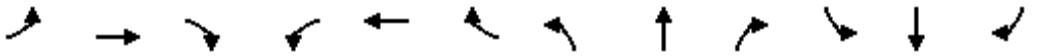
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	120	10	555	105	265	35	180	490	160	235	0
Future Volume (vph)	5	120	10	555	105	265	35	180	490	160	235	0
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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	1.00	
Frpb, ped/bikes	1.00	1.00		1.00	0.98		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	0.99		1.00	0.89		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1662	1726		1657	1527		1662	1750	1462	1613	1750	
Flt Permitted	0.54	1.00		0.42	1.00		0.61	1.00	1.00	0.39	1.00	
Satd. Flow (perm)	947	1726		730	1527		1072	1750	1462	666	1750	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	5	120	10	555	105	265	35	180	490	160	235	0
RTOR Reduction (vph)	0	3	0	0	78	0	0	0	183	0	0	0
Lane Group Flow (vph)	5	127	0	555	292	0	35	180	307	160	235	0
Confl. Peds. (#/hr)			5	5					1	1		
Confl. Bikes (#/hr)						2			1			
Heavy Vehicles (%)	0%	0%	0%	0%	0%	1%	0%	0%	1%	3%	0%	0%
Turn Type	Perm	NA		pm+pt	NA		Perm	NA	pm+ov	pm+pt	NA	
Protected Phases		8		7	4			6	7	5	2	
Permitted Phases	8			4			6		6	2		
Actuated Green, G (s)	12.0	12.0		52.6	52.6		17.1	17.1	52.7	33.2	33.2	
Effective Green, g (s)	13.0	13.0		53.6	53.6		18.1	18.1	54.7	34.2	34.2	
Actuated g/C Ratio	0.14	0.14		0.56	0.56		0.19	0.19	0.57	0.36	0.36	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Vehicle Extension (s)	2.5	2.5		3.0	4.0		5.2	5.2	3.0	3.0	5.2	
Lane Grp Cap (vph)	128	234		762	854		202	330	895	357	624	
v/s Ratio Prot		0.07		c0.28	0.19			c0.10	0.13	c0.06	0.13	
v/s Ratio Perm	0.01			c0.13			0.03		0.08	0.10		
v/c Ratio	0.04	0.54		0.73	0.34		0.17	0.55	0.34	0.45	0.38	
Uniform Delay, d1	36.0	38.6		14.4	11.5		32.6	35.1	11.0	22.4	22.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	2.0		3.5	0.3		0.9	3.4	0.2	0.9	0.9	
Delay (s)	36.1	40.7		17.9	11.8		33.5	38.5	11.2	23.3	23.7	
Level of Service	D	D		B	B		C	D	B	C	C	
Approach Delay (s)		40.5			15.5			19.3			23.6	
Approach LOS		D			B			B			C	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	95.8	Sum of lost time (s)	16.0
Intersection Capacity Utilization	77.6%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



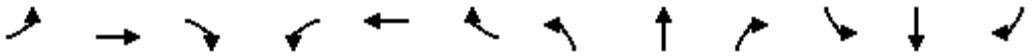
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	235	295	240	15	455	80	140	230	195	95	20	330
Future Volume (vph)	235	295	240	15	455	80	140	230	195	95	20	330
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00			1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	0.99	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	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00			0.98	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1646	1716	1437	1590	1694			1718	1473	1662	1667	1467
Flt Permitted	0.22	1.00	1.00	0.58	1.00			0.87	1.00	0.30	1.00	1.00
Satd. Flow (perm)	374	1716	1437	970	1694			1517	1473	521	1667	1467
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	235	295	240	15	455	80	140	230	195	95	20	330
RTOR Reduction (vph)	0	0	110	0	5	0	0	0	76	0	0	144
Lane Group Flow (vph)	235	295	130	15	530	0	0	370	119	95	20	186
Confl. Peds. (#/hr)			7	7								
Confl. Bikes (#/hr)												1
Heavy Vehicles (%)	1%	2%	0%	4%	1%	1%	0%	0%	1%	0%	5%	0%
Turn Type	pm+pt	NA	Perm	pm+pt	NA		Perm	NA	Perm	Perm	NA	pm+ov
Protected Phases	1	6		5	2			8			4	1
Permitted Phases	6		6	2			8		8	4		4
Actuated Green, G (s)	54.4	48.2	48.2	38.1	36.9			26.6	26.6	26.6	26.6	39.1
Effective Green, g (s)	55.4	49.2	49.2	40.1	37.9			27.6	27.6	27.6	27.6	41.1
Actuated g/C Ratio	0.61	0.54	0.54	0.44	0.42			0.30	0.30	0.30	0.30	0.45
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0			5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.0	2.5	2.5	3.0	2.5			2.0	2.0	2.0	2.0	3.0
Lane Grp Cap (vph)	416	927	776	442	705			460	446	158	505	727
v/s Ratio Prot	c0.08	0.17		0.00	c0.31						0.01	0.04
v/s Ratio Perm	0.26		0.09	0.01				c0.24	0.08	0.18		0.09
v/c Ratio	0.56	0.32	0.17	0.03	0.75			0.80	0.27	0.60	0.04	0.26
Uniform Delay, d1	12.0	11.6	10.6	14.4	22.5			29.2	24.0	27.0	22.4	15.5
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	1.8	0.1	0.1	0.0	4.3			9.3	0.1	4.4	0.0	0.2
Delay (s)	13.8	11.7	10.6	14.4	26.9			38.5	24.1	31.4	22.4	15.7
Level of Service	B	B	B	B	C			D	C	C	C	B
Approach Delay (s)		12.0			26.5			33.6			19.3	
Approach LOS		B			C			C			B	

Intersection Summary			
HCM 2000 Control Delay	22.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	91.0	Sum of lost time (s)	12.0
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												
Traffic Volume (vph)	0	1125	75	0	620	50	0	0	0	570	0	295
Future Volume (vph)	0	1125	75	0	620	50	0	0	0	570	0	295
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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		1.00			1.00	0.98				1.00	1.00	
Flpb, ped/bikes		1.00			1.00	1.00				1.00	1.00	
Frt		0.99			1.00	0.85				1.00	0.89	
Flt Protected		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (prot)		3225			1716	1434				1548	1435	
Flt Permitted		1.00			1.00	1.00				0.95	0.99	
Satd. Flow (perm)		3225			1716	1434				1548	1435	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	1125	75	0	620	50	0	0	0	570	0	295
RTOR Reduction (vph)	0	42	0	0	0	3	0	0	0	0	81	0
Lane Group Flow (vph)	0	1158	0	0	620	47	0	0	0	450	334	0
Confl. Peds. (#/hr)	2		1	1		2						
Confl. Bikes (#/hr)						1						
Heavy Vehicles (%)	0%	2%	2%	0%	2%	2%	0%	0%	0%	2%	0%	2%
Turn Type		NA			NA	pm+ov				Split	NA	
Protected Phases		2			6	4				4	4	
Permitted Phases						6						
Actuated Green, G (s)		68.2			68.2	110.0				41.8	41.8	
Effective Green, g (s)		69.2			69.2	112.0				42.8	42.8	
Actuated g/C Ratio		0.58			0.58	0.93				0.36	0.36	
Clearance Time (s)		5.0			5.0	5.0				5.0	5.0	
Vehicle Extension (s)		5.2			5.2	3.0				3.0	3.0	
Lane Grp Cap (vph)		1859			989	1434				552	511	
v/s Ratio Prot		0.36			c0.36	0.01				c0.29	0.23	
v/s Ratio Perm						0.02						
v/c Ratio		0.62			0.63	0.03				0.82	0.65	
Uniform Delay, d1		16.8			16.8	0.3				35.0	32.4	
Progression Factor		1.00			0.97	1.00				1.00	1.00	
Incremental Delay, d2		1.6			2.8	0.0				9.0	3.0	
Delay (s)		18.4			19.2	0.3				44.0	35.4	
Level of Service		B			B	A				D	D	
Approach Delay (s)		18.4			17.8			0.0			39.9	
Approach LOS		B			B			A			D	

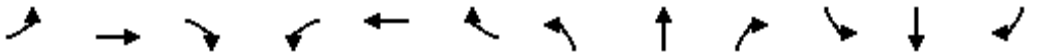
Intersection Summary			
HCM 2000 Control Delay	25.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	70.0%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	70	185	55	70	75	85	285	275	120	315	745	60
Future Volume (vph)	70	185	55	70	75	85	285	275	120	315	745	60
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	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		0.97	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	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	1.00	
Frt	1.00	1.00	0.85	1.00	0.92		1.00	0.95		1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1630	1750	1488	1646	1453		3225	3014		1511	3115	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1630	1750	1488	1646	1453		3225	3014		1511	3115	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	70	185	55	70	75	85	285	275	120	315	745	60
RTOR Reduction (vph)	0	0	46	0	38	0	0	32	0	0	5	0
Lane Group Flow (vph)	70	185	9	70	122	0	285	363	0	315	800	0
Confl. Peds. (#/hr)	1					1			4	4		
Heavy Vehicles (%)	2%	0%	0%	1%	9%	11%	0%	3%	7%	10%	6%	0%
Turn Type	Prot	NA	Prot	Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4	4	3	8		5	2		1	6	
Permitted Phases												
Actuated Green, G (s)	7.8	18.0	18.0	7.7	17.9		23.2	43.4		29.9	50.1	
Effective Green, g (s)	8.8	19.0	19.0	8.7	18.9		24.2	45.4		30.9	52.1	
Actuated g/C Ratio	0.07	0.16	0.16	0.07	0.16		0.20	0.38		0.26	0.43	
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	6.0		5.0	6.0	
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)	119	277	235	119	228		650	1140		389	1352	
v/s Ratio Prot	c0.04	c0.11	0.01	0.04	0.08		c0.09	0.12		c0.21	c0.26	
v/s Ratio Perm												
v/c Ratio	0.59	0.67	0.04	0.59	0.54		0.44	0.32		0.81	0.59	
Uniform Delay, d1	53.8	47.5	42.8	53.9	46.5		41.9	26.4		41.8	25.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		0.80	0.46	
Incremental Delay, d2	7.2	6.0	0.1	7.2	2.4		0.5	0.7		10.4	0.6	
Delay (s)	61.1	53.5	42.8	61.2	48.9		42.4	27.1		43.7	12.4	
Level of Service	E	D	D	E	D		D	C		D	B	
Approach Delay (s)		53.3			52.6			33.5			21.2	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM 2000 Control Delay	32.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.63		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	62.2%	ICU Level of Service	B
Analysis Period (min)	15		

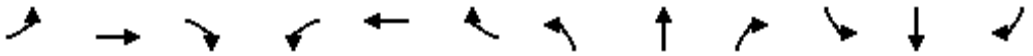
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	140	300	85	145	330	90	100	1205	105	135	1035	40
Future Volume (vph)	140	300	85	145	330	90	100	1205	105	135	1035	40
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95	
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	0.97		1.00	0.97		1.00	0.99		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)	1646	1684		1662	1687		1662	3186		1662	3206	
Flt Permitted	0.15	1.00		0.20	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	260	1684		354	1687		1662	3186		1662	3206	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	140	300	85	145	330	90	100	1205	105	135	1035	40
RTOR Reduction (vph)	0	7	0	0	7	0	0	4	0	0	2	0
Lane Group Flow (vph)	140	378	0	145	413	0	100	1306	0	135	1073	0
Confl. Peds. (#/hr)	3		5	5		3	4		1	1		4
Heavy Vehicles (%)	1%	0%	0%	0%	0%	0%	0%	3%	2%	0%	3%	3%
Turn Type	pm+pt	NA		pm+pt	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases	4			8								
Actuated Green, G (s)	50.1	40.2		49.9	40.1		13.1	66.5		13.5	66.9	
Effective Green, g (s)	52.1	41.2		51.9	41.1		14.1	67.5		14.5	67.9	
Actuated g/C Ratio	0.35	0.27		0.35	0.27		0.09	0.45		0.10	0.45	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.8		2.5	4.8		2.5	4.8		2.5	4.8	
Lane Grp Cap (vph)	191	462		216	462		156	1433		160	1451	
v/s Ratio Prot	c0.05	0.22		0.05	c0.25		0.06	c0.41		c0.08	0.33	
v/s Ratio Perm	0.20			0.18								
v/c Ratio	0.73	0.82		0.67	0.89		0.64	0.91		0.84	0.74	
Uniform Delay, d1	38.3	50.9		37.7	52.4		65.5	38.5		66.6	33.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.8	14.9		7.2	22.5		7.7	10.2		30.9	3.4	
Delay (s)	51.1	65.8		44.9	74.9		73.2	48.7		97.5	37.2	
Level of Service	D	E		D	E		E	D		F	D	
Approach Delay (s)		61.9			67.2			50.4			43.9	
Approach LOS		E			E			D			D	

Intersection Summary			
HCM 2000 Control Delay	52.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	94.5%	ICU Level of Service	F
Analysis Period (min)	15		

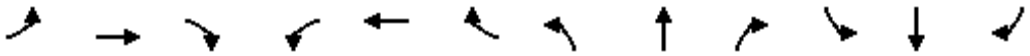
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	275	785	290	330	535	235	215	870	235	305	890	95
Future Volume (vph)	275	785	290	330	535	235	215	870	235	305	890	95
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
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	0.95		1.00	0.95		1.00	0.95		1.00	0.95	
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	0.96		1.00	0.95		1.00	0.97		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)	1599	3147		1646	3097		1646	3168		1583	3236	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1599	3147		1646	3097		1646	3168		1583	3236	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	275	785	290	330	535	235	215	870	235	305	890	95
RTOR Reduction (vph)	0	23	0	0	31	0	0	15	0	0	5	0
Lane Group Flow (vph)	275	1052	0	330	739	0	215	1090	0	305	980	0
Confl. Peds. (#/hr)	2		1	1		2	6		7	7		6
Heavy Vehicles (%)	4%	1%	1%	1%	1%	4%	1%	1%	1%	5%	1%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	7	4		3	8		1	6		5	2	
Permitted Phases												
Actuated Green, G (s)	27.0	42.0		25.0	40.0		21.0	48.0		25.0	52.0	
Effective Green, g (s)	28.0	43.0		26.0	41.0		22.0	49.0		26.0	53.0	
Actuated g/C Ratio	0.18	0.27		0.16	0.26		0.14	0.31		0.16	0.33	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.3		2.5	4.3		2.5	4.3		2.5	4.3	
Lane Grp Cap (vph)	279	845		267	793		226	970		257	1071	
v/s Ratio Prot	0.17	c0.33		c0.20	0.24		0.13	c0.34		c0.19	c0.30	
v/s Ratio Perm												
v/c Ratio	0.99	1.24		1.24	0.93		0.95	1.12		1.19	0.91	
Uniform Delay, d1	65.8	58.5		67.0	58.1		68.5	55.5		67.0	51.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	49.5	120.0		134.1	17.8		46.1	69.1		116.2	12.1	
Delay (s)	115.3	178.5		201.1	76.0		114.6	124.6		183.2	63.5	
Level of Service	F	F		F	E		F	F		F	E	
Approach Delay (s)		165.6			113.5			123.0			91.8	
Approach LOS		F			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	124.3	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.18		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	119.6%	ICU Level of Service	H
Analysis Period (min)	15		

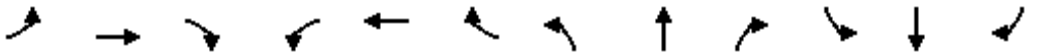
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	175	1035	70	200	935	155	95	325	115	305	485	70
Future Volume (vph)	175	1035	70	200	935	155	95	325	115	305	485	70
Ideal Flow (vphpl)	1750	1850	1850	1750	1800	1800	1750	1750	1750	1850	1750	1750
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	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	0.98		1.00	0.96		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)	1646	3374		1646	3274		1646	1663		1706	1668	
Flt Permitted	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (perm)	1646	3374		1646	3274		1646	1663		1706	1668	
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	175	1035	70	200	935	155	95	325	115	305	485	70
RTOR Reduction (vph)	0	4	0	0	12	0	0	11	0	0	5	0
Lane Group Flow (vph)	175	1101	0	200	1078	0	95	429	0	305	550	0
Confl. Peds. (#/hr)	2		5	5		2	7		2	2		7
Heavy Vehicles (%)	1%	3%	2%	1%	2%	1%	1%	1%	0%	3%	3%	0%
Turn Type	Prot	NA		Prot	NA		Prot	NA		Prot	NA	
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases												
Actuated Green, G (s)	11.0	36.0		13.0	38.0		6.0	27.0		19.0	40.0	
Effective Green, g (s)	12.0	37.0		14.0	39.0		7.0	28.0		20.0	41.0	
Actuated g/C Ratio	0.10	0.32		0.12	0.34		0.06	0.24		0.17	0.36	
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	4.7		2.4	4.7		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	171	1085		200	1110		100	404		296	594	
v/s Ratio Prot	0.11	0.33		c0.12	c0.33		0.06	c0.26		c0.18	0.33	
v/s Ratio Perm												
v/c Ratio	1.02	1.01		1.00	0.97		0.95	1.06		1.03	0.93	
Uniform Delay, d1	51.5	39.0		50.5	37.4		53.8	43.5		47.5	35.6	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	75.1	31.0		63.6	20.5		72.9	61.9		60.4	20.6	
Delay (s)	126.6	70.0		114.1	57.9		126.7	105.4		107.9	56.1	
Level of Service	F	E		F	E		F	F		F	E	
Approach Delay (s)		77.8			66.7			109.1			74.5	
Approach LOS		E			E			F			E	

Intersection Summary			
HCM 2000 Control Delay	77.7	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.03		
Actuated Cycle Length (s)	115.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	100.6%	ICU Level of Service	G
Analysis Period (min)	15		

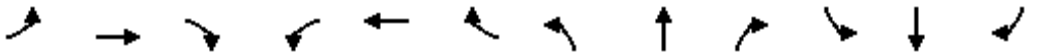
c Critical Lane Group



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	270	1175	115	105	960	55	125	200	105	100	260	235
Future Volume (vph)	270	1175	115	105	960	55	125	200	105	100	260	235
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0	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	1.00	1.00
Frpb, ped/bikes	1.00	1.00		1.00	1.00		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	0.99		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)	1662	3167		1662	3231		1614	1733	1442	1662	1716	1448
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)	1662	3167		1662	3231		1614	1733	1442	1662	1716	1448
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	270	1175	115	105	960	55	125	200	105	100	260	235
RTOR Reduction (vph)	0	6	0	0	3	0	0	0	89	0	0	193
Lane Group Flow (vph)	270	1284	0	105	1012	0	125	200	16	100	260	42
Confl. Peds. (#/hr)	5		11	11		5	3		6	6		3
Heavy Vehicles (%)	0%	3%	4%	0%	2%	0%	3%	1%	1%	0%	2%	1%
Turn Type	Prot	NA		Prot	NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases									8			4
Actuated Green, G (s)	21.5	58.1		10.0	46.6		11.4	18.5	18.5	13.4	20.5	20.5
Effective Green, g (s)	22.5	59.1		11.0	47.6		12.4	19.5	18.5	14.4	21.5	21.5
Actuated g/C Ratio	0.19	0.49		0.09	0.40		0.10	0.16	0.15	0.12	0.18	0.18
Clearance Time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	2.5	5.2		2.5	5.2		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	311	1559		152	1281		166	281	222	199	307	259
v/s Ratio Prot	0.16	c0.41		0.06	c0.31		0.08	c0.12		0.06	c0.15	
v/s Ratio Perm									0.01			0.03
v/c Ratio	0.87	0.82		0.69	0.79		0.75	0.71	0.07	0.50	0.85	0.16
Uniform Delay, d1	47.3	26.0		52.9	31.8		52.3	47.6	43.4	49.4	47.7	41.6
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	21.5	5.1		11.8	5.0		16.7	7.7	0.1	1.5	18.7	0.2
Delay (s)	68.8	31.1		64.6	36.8		69.0	55.3	43.5	50.9	66.3	41.9
Level of Service	E	C		E	D		E	E	D	D	E	D
Approach Delay (s)		37.6			39.4			56.4			54.1	
Approach LOS		D			D			E			D	

Intersection Summary			
HCM 2000 Control Delay	43.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.84		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	16.0
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												
Traffic Volume (vph)	325	645	240	210	415	60	285	550	270	185	835	310
Future Volume (vph)	325	645	240	210	415	60	285	550	270	185	835	310
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	0.95		1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00	0.99	1.00	1.00		1.00	0.99		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	0.98		1.00	0.95		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1630	3228	1457	1646	3162		1646	3110		1662	3292	1467
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1630	3228	1457	1646	3162		1646	3110		1662	3292	1467
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	325	645	240	210	415	60	285	550	270	185	835	310
RTOR Reduction (vph)	0	0	48	0	11	0	0	54	0	0	0	0
Lane Group Flow (vph)	325	645	192	210	464	0	285	766	0	185	835	310
Confl. Peds. (#/hr)	8		5	5		8	7		5	5		7
Heavy Vehicles (%)	2%	3%	1%	1%	3%	2%	1%	1%	1%	0%	1%	0%
Turn Type	Prot	NA	pm+ov	Prot	NA		Prot	NA		Prot	NA	Free
Protected Phases	5	2	3	1	6		3	8		7	4	
Permitted Phases			2									Free
Actuated Green, G (s)	20.0	26.9	46.4	16.0	22.9		19.5	34.4		12.7	27.6	110.0
Effective Green, g (s)	21.0	27.9	48.4	17.0	23.9		20.5	35.4		13.7	28.6	110.0
Actuated g/C Ratio	0.19	0.25	0.44	0.15	0.22		0.19	0.32		0.12	0.26	1.00
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Vehicle Extension (s)	2.5	5.2	2.5	2.5	2.5		2.5	2.5		2.5	2.5	
Lane Grp Cap (vph)	311	818	641	254	687		306	1000		206	855	1467
v/s Ratio Prot	c0.20	c0.20	0.06	c0.13	0.15		c0.17	0.25		0.11	c0.25	
v/s Ratio Perm			0.08									0.21
v/c Ratio	1.05	0.79	0.30	0.83	0.68		0.93	0.77		0.90	0.98	0.21
Uniform Delay, d1	44.5	38.3	19.9	45.1	39.5		44.1	33.6		47.5	40.4	0.0
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.19	0.55	1.00
Incremental Delay, d2	63.3	6.0	0.2	18.9	2.4		33.8	5.6		28.5	21.3	0.2
Delay (s)	107.8	44.3	20.1	64.0	41.9		77.9	39.2		85.2	43.3	0.2
Level of Service	F	D	C	E	D		E	D		F	D	A
Approach Delay (s)		56.5			48.7			49.2			39.1	
Approach LOS		E			D			D			D	

Intersection Summary			
HCM 2000 Control Delay	48.1	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.93		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	16.0
Intersection Capacity Utilization	91.2%	ICU Level of Service	F
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1385	180	220	1140	230	245
Future Volume (vph)	1385	180	220	1140	230	245
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	0.95	1.00	1.00	0.95	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	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (prot)	3260	1458	1662	3260	1646	1488
Flt Permitted	1.00	1.00	0.95	1.00	0.95	1.00
Satd. Flow (perm)	3260	1458	1662	3260	1646	1488
Peak-hour factor, PHF	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	1385	180	220	1140	230	245
RTOR Reduction (vph)	0	75	0	0	0	202
Lane Group Flow (vph)	1385	105	220	1140	230	43
Confl. Peds. (#/hr)					1	2
Heavy Vehicles (%)	2%	2%	0%	2%	1%	0%
Turn Type	NA	Perm	Prot	NA	Prot	Over
Protected Phases	2		1	6	8	1
Permitted Phases		2				
Actuated Green, G (s)	51.7	51.7	17.1	73.8	19.7	17.1
Effective Green, g (s)	52.7	52.7	18.1	74.8	20.7	18.1
Actuated g/C Ratio	0.51	0.51	0.17	0.72	0.20	0.17
Clearance Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	5.0	5.0	2.6	5.0	2.6	2.6
Lane Grp Cap (vph)	1659	742	290	2356	329	260
v/s Ratio Prot	c0.42		c0.13	0.35	c0.14	0.03
v/s Ratio Perm		0.07				
v/c Ratio	0.83	0.14	0.76	0.48	0.70	0.16
Uniform Delay, d1	21.7	13.4	40.6	6.1	38.5	36.3
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	4.2	0.2	10.4	0.3	6.0	0.2
Delay (s)	25.9	13.6	51.1	6.4	44.5	36.5
Level of Service	C	B	D	A	D	D
Approach Delay (s)	24.5			13.7	40.4	
Approach LOS	C			B	D	

Intersection Summary			
HCM 2000 Control Delay	22.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	103.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	79.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

USER REPORT FOR SITE

Project: 2040 TSP TPR PHF 1.0 AWD

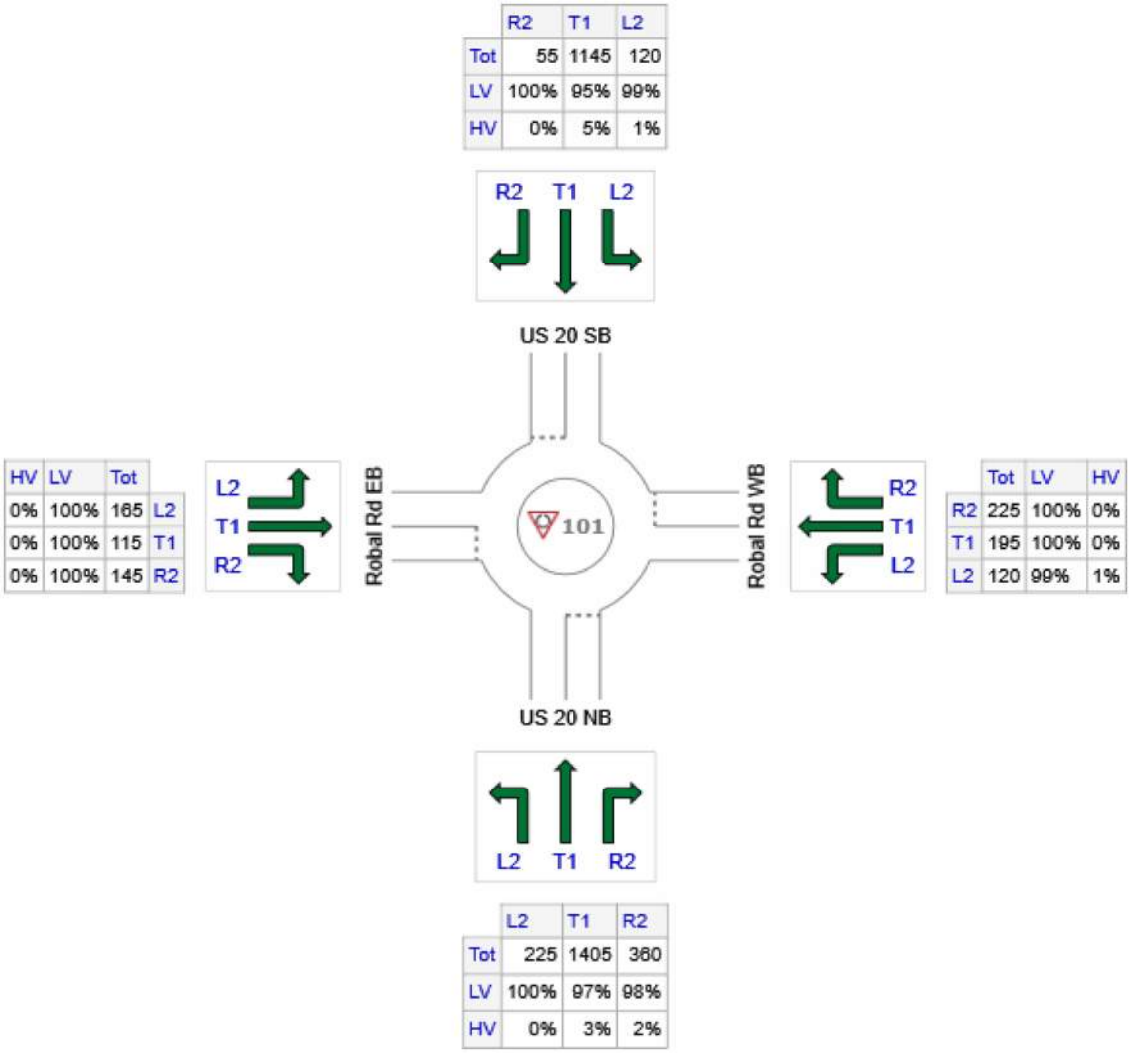
Template: Default Site User Report

Site: 101 [US 20/Robal - TSP Project List]

New Site
Site Category: 2040 AWD, PHF=1.0
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	1990	1941	49
E: Robal Rd WB	540	539	1
N: US 20 SB	1320	1262	58
W: Robal Rd EB	425	425	0
Total	4275	4166	109

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	786	2.1	914	0.861	100	27.0	LOS D	20.2	514.7	Full	1600	0.0	0.0
Lane 2[d]	844	3.0	980	0.861	100	25.7	LOS D	20.9	535.2	Full	1600	0.0	0.0
Lane 3	360	2.0	1139	0.316	100	6.2	LOS A	1.5	37.3	Short	350	0.0	NA
Approach	1990	2.5		0.861		22.7	LOS C	20.9	535.2				
East: Robal Rd WB													
Lane 1	120	1.0	247	0.487	74[5]	30.1	LOS D	1.9	47.0	Full	1600	0.0	0.0
Lane 2[d]	195	0.0	298	0.655	100	35.6	LOS E	3.1	76.8	Full	1600	0.0	0.0
Lane 3	225	0.0	361	0.624	100	28.3	LOS D	3.1	76.7	Short	450	0.0	NA
Approach	540	0.2		0.655		31.3	LOS D	3.1	76.8				
North: US 20 SB													
Lane 1	632	4.2	787	0.803	100	24.4	LOS C	12.0	309.0	Full	1600	0.0	0.0
Lane 2[d]	688	4.6	857	0.803	100	22.9	LOS C	12.4	321.5	Full	1600	0.0	0.0
Approach	1320	4.4		0.803		23.6	LOS C	12.4	321.5				
West: Robal Rd EB													
Lane 1[d]	280	0.0	416	0.673	100	28.1	LOS D	3.8	95.4	Full	1600	0.0	0.0
Lane 2	145	0.0	357	0.406	100	18.8	LOS C	1.6	40.9	Full	1600	0.0	0.0
Approach	425	0.0		0.673		24.9	LOS C	3.8	95.4				
Intersection	4275	2.5		0.861		24.3	LOS C	20.9	535.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

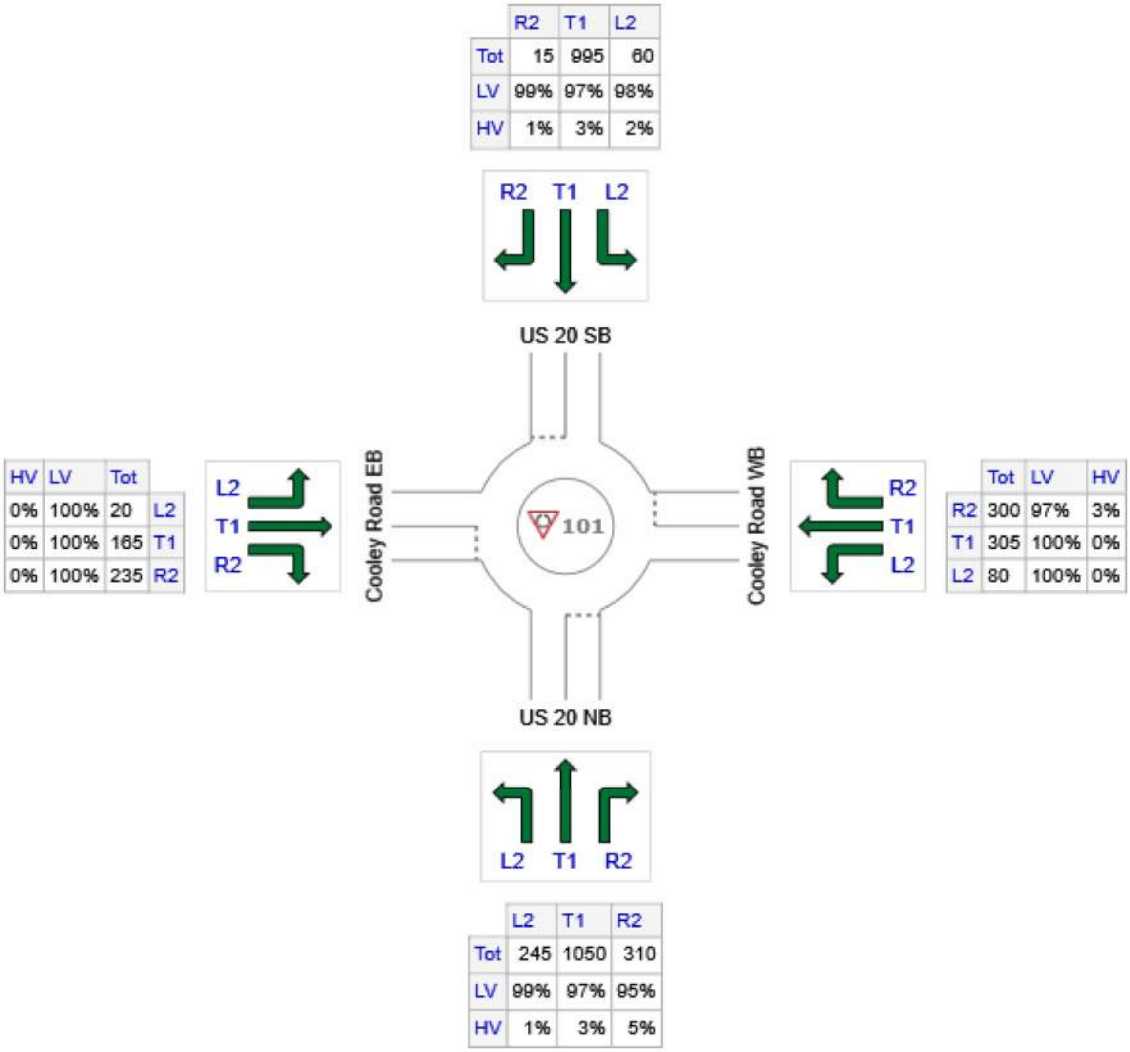
5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Site: 101 [US 20/Cooley - TSP Project List]

New Site
Site Category: 2040 AWD, PHF=1.0
Roundabout

Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: US 20 NB	1605	1556	49
E: Cooley Road WB	685	676	9
N: US 20 SB	1070	1039	31
W: Cooley Road EB	420	420	0
Total	3780	3690	90

Lane Use and Performance

	Demand Flows Total veh/h	HV %	Cap. veh/h	Deg. Satn v/c	Lane Util. %	Average Delay sec	Level of Service	95% Back of Queue Veh	Dist ft	Lane Config	Lane Length ft	Cap. Adj. %	Prob. Block. %
South: US 20 NB													
Lane 1	781	2.4	1051	0.743	100	16.3	LOS C	13.7	350.2	Full	1600	0.0	0.0
Lane 2[d]	824	3.8	1110	0.743	100	15.7	LOS C	13.5	348.8	Full	1600	0.0	0.0
Approach	1605	3.1		0.743		16.0	LOS C	13.7	350.2				
East: Cooley Road WB													
Lane 1	322	0.0	390	0.825	100	44.5	LOS E	6.4	160.1	Full	1600	0.0	0.0
Lane 2[d]	363	2.5	440	0.825	100	40.7	LOS E	6.6	168.1	Full	1600	0.0	0.0
Approach	685	1.3		0.825		42.5	LOS E	6.6	168.1				
North: US 20 SB													
Lane 1	510	2.9	733	0.695	100	18.8	LOS C	6.8	174.7	Full	1600	0.0	0.0
Lane 2[d]	560	2.9	806	0.695	100	17.5	LOS C	7.0	180.1	Full	1600	0.0	0.0
Approach	1070	2.9		0.695		18.1	LOS C	7.0	180.1				
West: Cooley Road EB													
Lane 1	185	0.0	462	0.401	90[5]	14.9	LOS B	1.7	43.7	Full	1600	0.0	0.0
Lane 2[d]	235	0.0	527	0.446	100	14.4	LOS B	2.1	52.2	Full	1600	0.0	0.0
Approach	420	0.0		0.446		14.6	LOS B	2.1	52.2				
Intersection	3780	2.4		0.825		21.2	LOS C	13.7	350.2				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: Same as Sign Control.
Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.
LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).
Roundabout Capacity Model: US HCM 6.
HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.
Gap-Acceptance Capacity: Traditional M1.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

5 Lane under-utilisation found by the program
d Dominant lane on roundabout approach

Appendix K - Planning Level Cost Estimates

Planning Level Cost Estimates

Project	Project Type	Prioritization	Cost	Cost Estimate Source	Note
C-1	Connectivity/Capacity	Near	$ 5,000,000	MTP	
C-2	Connectivity/Capacity	Near	$ 2,288,000	MTP	
C-3	Connectivity/Capacity	Near	$ 6,700,000	MTP	
C-4	Connectivity/Capacity	Near	$ 500,000	City Staff	
C-5	Connectivity/Capacity	Near	$13,500,000	Kittelson	Included in Appendix
C-6	Connectivity/Capacity	Near	$21,000,000	Kittelson	Included in Appendix
C-7	Connectivity/Capacity	Near	$ 430,000	Kittelson	Included in Appendix
C-8	Connectivity/Capacity	Near	$17,700,000	Kittelson	Included in Appendix
C-9	Connectivity/Capacity	Near	$ 8,500,000	Kittelson	Included in Appendix
C-10	Connectivity/Capacity	Near	$ 200,000	Kittelson	General estimate
C-11	Connectivity/Capacity	Near	$ 75,000	City Staff	
C-12	Connectivity/Capacity	Near	$ 4,800,000	MTP	
C-13	Connectivity/Capacity	Near	$ 1,000,000	ODOT	
C-14	Connectivity/Capacity	Near	$ 1,100,000	Kittelson	Included in Appendix
C-15	Connectivity/Capacity	Near	$ 3,700,000	Kittelson	Included in Appendix
C-16	Connectivity/Capacity	Near	$ 3,700,000	Kittelson	Included in Appendix
C-17	Connectivity/Capacity	Near	$ 650,000	MTP	
C-18	Connectivity/Capacity	Near	$10,000,000	MTP	
C-19	Connectivity/Capacity	Near	$ 50,000	Project Team	
C-20	Connectivity/Capacity	Near	$ 1,000,000	Kittelson	General estimate
C-21	Connectivity/Capacity	Near	$ 3,090,000	Kittelson	Included in Appendix
C-22	Connectivity/Capacity	Near	$ 5,000,000	SDC List	
C-23	Connectivity/Capacity	Mid	$ 7,800,000	SDC List	
C-24	Connectivity/Capacity	Mid	$ 2,400,000	Kittelson	Included in Appendix
C-25	Connectivity/Capacity	Mid	$ 2,300,000	SDC List	
C-26	Connectivity/Capacity	Mid	$ 1,000,000	Project Team	
C-27	Connectivity/Capacity	Mid	$ 7,000,000	Kittelson	Included in Appendix
C-28	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	Included in Appendix
C-29	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	Included in Appendix
C-30	Connectivity/Capacity	Mid	$ 2,100,000	Kittelson	Included in Appendix
C-31	Connectivity/Capacity	Mid	$41,800,000	Kittelson	Included in Appendix
C-32	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	Included in Appendix
C-33	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	Included in Appendix
C-34	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	Included in Appendix
C-35	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	
C-36	Connectivity/Capacity	Mid	$ 500,000	SDC List	
C-37	Connectivity/Capacity	Mid	$ 500,000	SDC List	
C-38	Connectivity/Capacity	Mid	$ 500,000	SDC List	
C-39	Connectivity/Capacity	Mid	$ 3,700,000	Kittelson	
C-40	Connectivity/Capacity	Mid	$ 3,000,000	City Staff	
C-41	Connectivity/Capacity	Mid	$ 2,000,000	City Staff	
C-42	Connectivity/Capacity	Mid	$ 3,500,000	City Staff	
C-43	Connectivity/Capacity	Mid	$16,800,000	Kittelson	Included in Appendix
C-44	Connectivity/Capacity	Mid	$25,000,000	City Staff	
C-45	Connectivity/Capacity	Mid	$ 1,900,000	MTP	
C-46	Connectivity/Capacity	Mid	$ 3,700,000	SDC List	

C-47	Connectivity/Capacity	Mid	$ 6,000,000	City Staff	
C-48	Connectivity/Capacity	Long	$ 5,400,000	MTP	
C-49	Connectivity/Capacity	Long	$13,800,000	MTP	
C-50	Connectivity/Capacity	Long	$ 2,700,000	KAI	
C-51	Connectivity/Capacity	Long	$ 1,000,000	MTP	
C-52	Connectivity/Capacity	Long	$ 6,100,000	MTP	
C-53	Connectivity/Capacity	Long	$ 8,600,000	MTP	
C-54	Connectivity/Capacity	Long	$13,700,000	SDC Methodology	Included in Appendix
C-55	Connectivity/Capacity	Long	$10,900,000	Kittelson	Included in Appendix
C-56	Connectivity/Capacity	Long	$ 1,000,000	SDC List	
C-57	Connectivity/Capacity	Long	$ 4,200,000	SDC List	
C-58	Connectivity/Capacity	Long	$15,000,000	Kittelson	
C-59	Connectivity/Capacity	Long	$ 3,800,000	Kittelson	Included in Appendix
C-60	Connectivity/Capacity	Long	$ 3,700,000	Kittelson	Included in Appendix
C-61	Connectivity/Capacity	Long	$ 3,700,000	Kittelson	Included in Appendix
C-62	Connectivity/Capacity	Long	$ 1,000,000	Kittelson	Included in Appendix
C-63	Connectivity/Capacity	Long	$ 3,700,000	Kittelson	Included in Appendix
C-64	Connectivity/Capacity	Long	$ 3,275,000	Kittelson	Included in Appendix
C-65	Connectivity/Capacity	Expansion Area	$ 4,700,000	MTP	
C-66	Connectivity/Capacity	Expansion Area	$ 2,400,000	MTP	
C-67	Connectivity/Capacity	Expansion Area	$ 9,500,000	MTP	
C-68	Connectivity/Capacity	Expansion Area	$ 1,100,000	MTP	
C-69	Connectivity/Capacity	Expansion Area	$ 4,000,000	MTP	
C-70	Connectivity/Capacity	Expansion Area	$ 10,200,000	MTP	
C-71	Connectivity/Capacity	Expansion Area	$ 7,100,000	MTP	
C-72	Connectivity/Capacity	Expansion Area	$ 4,300,000	MTP	
C-73	Connectivity/Capacity	Expansion Area	$ 2,500,000	MTP	
C-74	Connectivity/Capacity	Expansion Area	$ 5,300,000	MTP	
C-75	Connectivity/Capacity	Expansion Area	$ 2,500,000	MTP	
C-76	Connectivity/Capacity	Expansion Area	$ 10,900,000	MTP	
C-77	Connectivity/Capacity	Expansion Area	$ 3,900,000	MTP	
C-78	Connectivity/Capacity	Expansion Area	$ 4,000,000	Kittelson	Included in Appendix
C-79	Connectivity/Capacity	Expansion Area	$ 3,700,000	Kittelson	Included in Appendix
M-1	Pedestrian/Bicycle	Near	$ 3,900,000	SDC List	
M-2	Pedestrian/Bicycle	Near	$29,100,000	Kittelson	Included in Appendix
M-3	Pedestrian/Bicycle	Near	$ 210,000	Kittelson	Included in Appendix
M-4	Pedestrian/Bicycle	Near	$ 210,000	Kittelson	Included in Appendix
M-5	Pedestrian/Bicycle	Near	$ 210,000	Kittelson	Included in Appendix
M-6	Pedestrian/Bicycle	Near	$ 210,000	Kittelson	Included in Appendix
M-7	Pedestrian/Bicycle	Near	$ 210,000	Kittelson	Included in Appendix
M-8	Pedestrian/Bicycle	Near	$ 500,000	City Staff	
M-9	Pedestrian/Bicycle	Near	$24,000,000	Kittelson	Included in Appendix
M-10	Pedestrian/Bicycle	Near	$ 1,275,000	City Staff	
M-11	Pedestrian/Bicycle	Near	$ 500,000	Project Team	
M-12	Pedestrian/Bicycle	Near	$ 1,820,000	Kittelson	Included in Appendix
M-13	Pedestrian/Bicycle	Near	$ 980,000	Kittelson	Included in Appendix
M-14	Pedestrian/Bicycle	Near	$ 3,100,000	SDC List	
M-15	Pedestrian/Bicycle	Mid	$12,000,000	City Staff	

M-16	Pedestrian/Bicycle	Mid	$ 210,000	Kittelson	Included in Appendix
M-17	Pedestrian/Bicycle	Mid	$ 500,000	SDC List	
M-18	Pedestrian/Bicycle	Long	$ 14,500,000	Kittelson	Included in Appendix
M-19	Pedestrian/Bicycle	Long	$ 15,600,000	Kittelson	Included in Appendix
M-20	Pedestrian/Bicycle	Long	$ 700,000	SDC List	
M-21	Pedestrian/Bicycle	Long	$ 1,300,000	MTP	
M-22	Pedestrian/Bicycle	Long	$ 600,000	MTP	
M-23	Pedestrian/Bicycle	Long	$ 100,000	MTP	
M-24	Pedestrian/Bicycle	Long	$ 1,300,000	MTP	
M-25	Pedestrian/Bicycle	Long	$ 500,000	MTP	
M-26	Pedestrian/Bicycle	Long	$ 5,500,000	MTP	
M-27	Pedestrian/Bicycle	Long	$ 300,000	MTP	
M-28	Pedestrian/Bicycle	Expansion Area	$ 2,400,000	MTP	
M-29	Pedestrian/Bicycle	Expansion Area	$ 1,300,000	MTP	
M-30	Pedestrian/Bicycle	Expansion Area	$ 3,800,000	Kittelson	Included in Appendix
M-31	Pedestrian/Bicycle	Expansion Area	$ 2,600,000	Kittelson	Included in Appendix
M-32	Pedestrian/Bicycle	Expansion Area	$ 2,500,000	MTP	
M-33	Pedestrian/Bicycle	Expansion Area	$ 500,000	MTP	
M-34	Pedestrian/Bicycle	Expansion Area	$ 400,000	MTP	
M-35	Pedestrian/Bicycle	Expansion Area	$ 300,000	SDC List	
M-36	Pedestrian/Bicycle	Expansion Area	$ 400,000	MTP	
M-37	Pedestrian/Bicycle	Expansion Area	$ 1,100,000	MTP	
M-38	Pedestrian/Bicycle	Expansion Area	$ 1,100,000	MTP	
M-39	Pedestrian/Bicycle	Expansion Area	$ 1,900,000	MTP	
M-40	Pedestrian/Bicycle	Expansion Area	$ 200,000	MTP	
M-41	Pedestrian/Bicycle	Expansion Area	$ 200,000	MTP	
M-42	Pedestrian/Bicycle	Expansion Area	$ 400,000	SDC List	
M-43	Pedestrian/Bicycle	Expansion Area	$ 400,000	MTP	
T-1	Transit	Near	$ 2,000,000	Kittelson	General estimate
T-2	Transit	Near	$ 2,000,000	Kittelson	General estimate
T-3	Transit	Near	$ 7,500,000	Kittelson	General estimate
S-1	Safety	Near	$ 1,000,000	City Staff	
S-2	Safety	Near	$ 200,000	Kittelson	General estimate
S-3	Safety	Near	$ 3,700,000	TSAP	
S-4	Safety	Near	$ 100,000	TSAP	
S-5	Safety	Near	$ 100,000	TSAP	
S-6	Safety	Near	$ 3,100,000	TSAP	
S-7	Safety	Long	$ 107,000	SDC List	
R-1	Key Routes	Near	$ 4,227,000	City Staff	
R-2	Key Routes	Near	$ 3,425,000	City Staff	
R-3	Key Routes	Near	$ 4,492,000	City Staff	
R-4	Key Routes	Near	$ 220,000	City Staff	
R-5	Key Routes	Near	$ 1,962,000	City Staff	
R-7	Key Routes	Near	$ 640,000	City Staff	
R-8	Key Routes	Near	$ 4,815,000	City Staff	
R-12	Key Routes	Near	$ 4,358,000	City Staff	
Q-1	Reconstruction	Near	$ 25,000,000	City Staff	
Q-2	Reconstruction	Mid	$ 16,000,000	City Staff	
Q-3	Reconstruction	Long	$ 15,000,000	City Staff	

Bend TSP Cost Estimate

Project C-5 - Aune Road Extension	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	4165	$ 7,575,184.81
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 13,332,285.14

Bend TSP Cost Estimate

Project C-6 - Colorado Avenue Corridor Safety	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	1730	$ **3,146,475.32**
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)	1	$ **10,403,929.03**
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	2	$ **7,310,882.66**
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ **20,861,287.01**

Bend TSP Cost Estimate

Project C-7 - Colorado Avenue/US97 NB Ramp Intersection Safety & Capacity Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*	220	$ 328,278.60
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout	1	$ 3,886,494.89
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 4,214,773.49

Bend TSP Cost Estimate

Project C-8 - Portland Avenue Corridor Improvements (College Way to River)	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	7400	$ 13,458,911.78
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	2	$ 4,203,318.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 17,662,229.78

Bend TSP Cost Estimate

Project C-9 - Revere Avenue Interchange Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	3530	$ 6,420,264.67
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 8,521,923.67

Bend TSP Cost Estimate

Project C-14 - Reed Market Road/15th Street intersection safety and capacity improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct	1	$ 1,182,884.41
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 1,182,884.41

Bend TSP Cost Estimate

Project C-15 - Olney Avenue/8th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,655,441.33

Bend TSP Cost Estimate

Project C-16 - Revere Avenue/8th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,655,441.33

Bend TSP Cost Estimate

Project C-21 - Butler Market Interchange Frontage Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*	750	$ 1,198,083.89
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)	1300	$ 1,215,500.00
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection	1	$ 3,770,794.50
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 6,184,378.39

Bend TSP Cost Estimate

Project M-2 - Parrell Road Urban Upgrade	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	12000	$ 21,825,262.34
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	2	$ 7,310,882.66
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 29,100,000.00

Bend TSP Cost Estimate

Project M-3 - Onley Avenue/2nd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	$ 210,000.00

Bend TSP Cost Estimate

Project M-4 - Greenwood/2nd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	$ 210,000.00

Bend TSP Cost Estimate

Project M-5 - Franklin Avenue/2nd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	$ 210,000.00

Bend TSP Cost Estimate

Project M-6 - Franklin Avenue/4th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	**$ 210,000.00**

Bend TSP Cost Estimate

Project M-7 - Clay Avenue/3rd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	**$ 210,000.00**

Bend TSP Cost Estimate

Project M-9a - Greenwood Undercrossing Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*	1000	$ 1,492,175.47
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)	1	$ 10,403,929.03
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 12,000,000.00

Bend TSP Cost Estimate

Project M-9b: Hawthorne Overcrossing	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)	1300	$ **504,404.42**
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)	1	$ **8,500,000.00**
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 12,000,000.00**

Bend TSP Cost Estimate

Project M-12 - Olney Protected Bicycle Lanes	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	1000	$ 1,818,771.86
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 1,820,000.00

Bend TSP Cost Estimate

Project M-13 - 3rd Street Canal Crossing	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)	1	$ **977,113.42**
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ **980,000.00**

Bend TSP Cost Estimate

Project C-24 - Sisemore Street Extension	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*	1500	$ 2,396,167.78
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 2,396,167.78

Bend TSP Cost Estimate

Project C-27 - Butler Market Road Intersection Safety and Capacity Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct	1	$ 1,182,884.41
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 6,939,984.74

Bend TSP Cost Estimate

Project C-28 - Revere Avenue/4th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,655,441.33

Bens TSP Cost Estimate

Project C-29 - Onley Avenue/4th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 3,655,441.33**

Bend TSP Cost Estimate

Project C-30 - Greenwood/8th Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 2,101,659.00

Bend TSP Cost Estimate

Project C-31 - Empire Blvd/27th Street Corridor Capacity Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	21830	$ 39,703,789.75
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 41,805,448.75

Bend TSP Cost Estimate

C-32: Country Club Road/Murphy Road Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 3,700,000.00**

Bend TSP Cost Estimate

C-33: Country Club Road/Knott Road Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,700,000.00

Bend TSP Cost Estimate

C-34: Ferguson Road/15th Street Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,700,000.00

Bend TSP Cost Estimate

Project C-43 - 15th Street Corridor Safety and Capacity Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	7230	$ **13,149,720.56**
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ **3,655,441.33**
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ **16,805,161.89**

Bend TSP Cost Estimate

Project M-16 - Revere Avenue/2nd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB	1	$ 212,500.00
	TOTAL	$ 210,000.00

Bend TSP Cost Estimate

Project C-54 - 3rd Street Railroad Undercrossing Widening	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	1800	$ 3,273,789.35
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)	1	$ 10,403,929.03
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 13,677,718.38

Bend TSP Cost Estimate

C-55: Country Club Road Urban Upgrade from Knott Road to Murphy Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	5970	$ 10,858,068.02
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 10,900,000.00

Bend TSP Cost Estimate

ProjectC-58 - Ponderosa Street/China Hat Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*	1600	$ 2,387,480.74
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)	1	$ 10,403,929.03
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 15,000,000.00

Bend TSP Cost Estimate

Project C-59 - Hawthorne Avenue/3rd Street Intersection improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection	1	$ 3,770,794.50
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,770,794.50

Bend TSP Cost Estimate

Project C-60 - Century Drive/Skyline Ranch Road Intersection Safety and Capacity Intersection	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 3,655,441.33**

Bend TSP Cost Estimate

Project C-61 - Mt. Washington Dr/Metolius Dr Intersection Safety and Capacity Improvements	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 3,655,441.33**

Bend TSP Cost Estimate

Project C-62 - US 20/27th Street Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*	4000	$ 7,888,000.00
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)	1	$ 2,101,659.00
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 10,000,000.00

Bend TSP Cost Estimate

C-63: China Hat Road/Knott Road Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,700,000.00

Bend TSP Cost Estimate

Project C-64 - US 97 Frontage Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)	7000	$ 6,545,000.00
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 6,550,000.00

Bend TSP Cost Estimate

Project M-18 - Eagle Road Functional Classification Upgrade	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	7950	$ 14,459,236.30
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 14,500,000.00

Bend TSP Cost Estimate

M-19: Knott Road Urban Upgrade from China Hat Road to 15th Street	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	8550	$ 15,550,499.42
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 15,600,000.00

Bend TSP Cost Estimate

Project C-78 - Collector between Cooley Road & Robal Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*	2500	$ 3,993,612.97
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 4,000,000.00

Bend TSP Cost Estimate

Project C-79 - Cooley Road/Hunnell Road Intersection Improvement	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout	1	$ 3,655,441.33
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	**$ 3,700,000.00**

Bend TSP Cost Estimate

Project C-80 - Robal Road Extension	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*	1800	$ 2,875,401.33
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 2,900,000.00

Bend TSP Cost Estimate

M-30: Cooley Road rural Road upgrade from US 20 to Hunnell Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*		$ -
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*	2100	$ 3,819,420.91
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 3,800,000.00

Bend TSP Cost Estimate

M-31: Hunnell Road rural Road upgrade from Cooley Road to Loco Road	LINEAR FT	Total Cost
New 2 lane Collector/Arterial*		$ -
New 3 lane Collector/Arterial*	1600	$ 2,555,912.30
New 5 lane Arterial*		$ -
New Frontage Road (2 lane)		$ -
Upgrade 2 lane Collector/Arterial to 3 lane Collector/Arterial/Complete Street*		$ -
Upgrade 2 lane Arterial to 5 lane Arterial*		$ -
Upgrade 3 lane Arterial to 5 lane Arterial*		$ -
Sidewalk Infill and ADA Ramps (no Curb, no bike lane)		$ -
Bike Lane Infill (Buffered Lane by Restriping)		$ -
Bike Lane (Parking Protected by Restriping)		$ -
Shared Use Path Adjacent to Roadway		$ -
Neighborhood Greenway		$ -
	EACH	
Road Bridge New Road Bridge (over RR, Hwy, River or canal)		$ -
Footbridge (add bike-ped to existing canal bridge)		$ -
Footbridge New Bridge (over Deschutes River)		$ -
Footbridge New Bridge (over RR/Hwy)		$ -
New Single Lane Roundabout		$ -
New Multilane Roundabout		$ -
Single Lane Roundabout Reconstruct		$ -
Signal Modernization (poles, mast arms, controller, illumination, ADA ramps)		$ -
New Signal 5 x 3 lane with New Intersection		$ -
New Signal 3 x 3 lane with New Intersection		$ -
ADA Ramps		$ -
RRFB		$ -
	TOTAL	$ 2,600,000.00

Appendix L - Initial Funding Assessment

BEND'S TRANSPORTATION PLAN

Initial Funding Assessment

An interim report to inform Bend's Transportation Plan

Approved by the Bend Transportation Plan Steering Committee - January 30, 2019

Includes revisions from the Funding Work Group, CTAC, and the Steering Committee

CITY OF BEND

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Initial Funding Assessment

Purpose

The City of Bend is updating its transportation plan (the Bend Transportation Plan, or BTP) to identify and prioritize needed transportation system investments. The BTP will define capital projects, programs and policies that add system capacity, improve pedestrian and bicycle mobility and safety, and support new growth. The Plan will also determine operating and maintenance needs. The BTP will include a Funding Plan that describes how the prioritized projects and associated operating and maintenance costs are funded.

Developing a robust funding plan is essential for the success of Bend's Transportation Plan. Across the country, communities have found that declining federal and state funding sources do not meet growing transportation needs. Federal and state funding, generated primarily by fuel taxes, continue to decline as vehicles become more efficient (or electric). This leaves cities and regional governments seeking local revenue sources to fill growing gaps. The funding picture is particularly challenging in Bend. Bend has a relatively low permanent property tax rate, meaning that general fund revenues are very limited, and other funding tools must be used to generate sufficient funding for new capital, transit, and operations and maintenance needs. In order to ensure that priority needs can be funded, the BTP must closely consider funding approaches and develop an appropriate Funding Plan.

This Initial Funding Assessment (IFA) is an interim step in the development of the Funding Plan for the BTP. It documents what the Funding Work Group (FWG)[1] learned and supported through a series of meetings in which they reviewed technical information about existing funding dynamics and new funding tools that could be used to generate additional revenue for Bend's transportation needs. The FWG's draft recommendations were then further refined through input from the Citywide Technical Advisory Committee (CTAC), with subsequent finalization and approval by the Steering Committee. This document is the final, approved IFA that includes the refinements added by the Steering Committee on January 30, 2019.

The IFA informs Bend's ongoing discussion about project prioritization and Funding Plan development. The IFA identifies and evaluates a menu of potential funding and financing tools. It presents initial recommendations about what funding tools and funding strategies are appropriate to include the Funding Plan for the BTP, in addition to the existing funding tools. The purpose of the IFA is to:

- Document FWG discussions and decisions
- Present a preliminary comparison between funding needs[2] and funding capacity from existing funding tools
- Evaluate potential funding strategies for the BTP

[1] The Funding Work Group (FWG) advises the Citywide Transportation Advisory Group (CTAC) on transportation funding in Bend. The FWG works collaboratively with and provides guidance to City of Bend staff and the consultant project team as they prepare the Bend Transportation Funding Plan. The ultimate purpose of the FWG is to review, provide input on, and recommend a draft Funding Plan to CTAC.

[2] This initial comparison uses placeholder amounts for funding needs since the BTP process has not yet identified priority projects and programs.

- Identify foundational funding principles and tools, which are intended as the strategic direction for the Funding Plan
- Set the stage for further analysis; the strategic direction will be refined and used in 2019 after BTP priority projects and programs are identified and project costs are updated.

The IFA is "initial" because the project team developed this product during the first year of the two-year BTP process. It focuses on preliminary and foundational funding strategies in the form of funding principles and tools. The FWG and project team will revisit and update the findings and recommendations in 2019.

Overview of Analysis

Two primary analyses informed the Initial Funding Assessment: (1) Analysis of existing funding tools – tools that are already generating revenue for the City of Bend's transportation needs and will be available to implement the BTP; and (2) Analysis of funding tools that could be introduced or increased to fund needed transportation projects.

Existing Funding Tools and Need

ECONorthwest worked with City staff to project revenues that could be available from existing funding tools over the analysis period (FY2020 to FY2040). (Appendix D provides methods and more information.) These tools are:

- Surface Transportation Program
- State Highway Fund
- General Fund Subsidy
- Water and Sewer Franchise Fees
- Garbage Franchise Fees
- Transportation System Development Charges
- Other, or Miscellaneous, Tools

> **Updated Data**
>
> This section and accompanying details in Appendix D update a placeholder projection of existing funding tools and expected funding need that was used in earlier FWG conversations. This update replaces information presented in FWG packet #3 (Appendix C). **Updates are based on input and new information from the City of Bend and the FWG. This feedback allowed the team to modify some key assumptions originally held as proxies.** As a result, readers may see slight differences in numbers included in appendices. We have included footnotes here in the main body of the document to explain these differences where they occur.

One way of thinking about this projection is that it estimates the amount of revenue available for implementation if nothing changes in the future (e.g. no new funding tools, rates remain unchanged, etc.). Combined with an understanding of preliminary capital costs and operating/maintenance costs, the existing tools baseline helped the FWG understand how much additional revenue might be needed to meet Bend's transportation system needs over the analysis period.

Existing funding tools are forecast to generate approximately $582M over the planning period, with approximately $189M (or 33% of the total, see Figure 1 in Appendix D) available for capital costs and approximately $392M (or 67% of the total, see Figure 2 in Appendix D) for operating/maintenance (O&M) costs.

To inform the BTP process with a preliminary understanding of how much additional revenue may be needed, City of Bend staff developed an initial estimate of funding needs for both capital and operating/maintenance expenses. These initial estimates have limitations that will be addressed as the BTP process continues but serve as a starting place for understanding needs. Capital needs are based on cost estimates of unbuilt projects on current adopted plans and lists, such as the fiscally-constrained Transportation System Development Charge (TSDC)

project list, the fiscally-constrained Metropolitan Transportation Plan (MTP) project list, and the current Transportation System Plan (TSP), as well as other needs such as deferred maintenance that have become capital needs. In keeping with the existing TSP, this list does not include City funding for needs in Urban Growth Boundary (UGB) expansion areas. However, the FWG will consider this over the winter and spring 2019 (see Appendix C for more details). Maintenance needs were based on the previous funding levels for O&M, with consideration of historic underfunding, the maintenance of new capital projects, and other existing needs. Capital and O&M estimates amounts will be refined in the spring of 2019 as staff and consultants gather additional information and perform additional analysis.

Transit needs, potential revenues, and potential funding tools are not specifically included in the current analysis. The project team noted which funding tools could be used for transit (capital, operations, and/or maintenance) and has kept abreast of potential funding tools, such as revenues from House Bill 2017 and the possibility of special taxing districts included as part of House Bill 2745. Cascades East Transit (CET) is about to begin its regional transit plan, with a specific section focusing on transit in Bend. Needs and funding analysis will be a part of CET's planning process that will take place in winter and spring of 2019. The City and MPO will closely coordinate with CET to ensure that planning efforts are coordinated and that Bend's Transportation Plan and its Funding Plan are comprehensive of public transit.

While the needs (project costs) remain a placeholder, as a starting place, we anticipate that they may be approximately $412 million[3] for capital uses over the entire planning period. Accordingly, the estimated need for new funding tools is approximately $223M for capital uses (see Exhibit 1). Again, this does not currently include funding needs for UGB expansion areas.

The project team is still refining the gap analysis for operating/maintenance uses, and is using a working estimate of $17-19 million[4] (annual) as a starting place for O&M funding needs. This estimate does not include any additional O&M due to new capital projects and will be revised in winter/spring 2019. There will be a need for new tools to generate revenue for O&M as the project team gains information about needs as identified by the Streets Department at the City of Bend. Moreover, a sizable portion of O&M revenues (approximately 37%) come from General Fund. If new funding tools were available, these subsidies could be redirected towards other needs, such as public safety. As such, while we have a reasonable starting place estimate for revenue from existing tools that could be available for O&M, it is too early in the process to estimate a funding gap for O&M needs.

[3] We based capital costs on information from the City of Bend. In the FWG #3 packet (see Appendix C), we used $450 million as a placeholder for capital funding need. The City of Bend provided this estimate preliminarily for FWG #3, they based on project costs over a FY2018 to FY2040 analysis period. Subsequently, to provide a better starting place for the FY2020 to FY2040 analysis period, the City of Bend updated this analysis by calculating what the capital costs are in FY2018 and FY2019 so that these costs could be subtracted from the total funding need (because they are already funded and should not be included in a gap estimate). Capital costs in these two fiscal years totaled about $37,887,814. So, we subtracted about $37.9 million from the original capital cost estimate of $450 million. This gives us a new estimate for funding need for capital uses (about $412 million) over the FY2020 to FY2040 analysis period. For reference, the capital costs in FY2018 and FY2019 are for the following projects: Murphy, Empire, Neff and Purcell design, Galveston, 14th St, intersection safety improvements in various locations, and bicycle greenways.

[4] We based operating/maintenance costs on information from the City of Bend. In the FWG #3 packet (see Appendix C), we used $10 million (annual) as a placeholder for operating/maintenance need. After FWG #3, the City realized that $10 million did not hit the target of need. The annual O&M over the past 4 years is $15.6 million and the annual O&M over the past 2 years is $17.75 million. A bridge maintenance program and traffic signal program would cost an additional ~$1.3 million per year, putting the total anticipated need at $17-19 million per year (depending whether the 2- or 4- year period is used as a base). Figures depend, in part, on the target for the Pavement Condition Index (PCI). The City will continue to refine this estimate.

Exhibit 1. Analysis of Potential Capital Needs Funding "Gap"

	Capital (FY2020 - FY2040)
Preliminary Estimated Total Funding Need (project costs)	$412,113,000
Forecast of Existing Tools	$189,286,000
Est. need for new revenue tools for capital	**$222,827,000**

* Capital needs include projects on the SDC list, the financially-constrained MTP project list, the Deschutes County ITS plan, and the City of Bend five-year (2018-2023) Capital Improvement Program (CIP). Capital needs do not currently include any projects in the UGB expansion areas, in keeping with the current TSP. This will be considered in more detail in winter/spring 2019.
Source: ECONorthwest. See Appendix D for assumptions and methods.
Notes: Values round all values to the nearest thousand. Forecast of existing tools is in nominal dollars.

Our understanding of funding needs will continue to evolve as the project team refines funding need estimates and/or modifies assumptions. For purposes of the IFA document, this analysis offers a starting place for determining foundational strategies about new funding revenue.

Analysis of New Funding Tools

We conducted the analysis of new funding tools to provide the FWG with options to generate new revenue over the analysis period. Note that the tools under consideration did not include project-specific tools or potential grants; these types of tools are desirable when available and should be pursued, but they are too specific and uncertain to be factored into Bend's overall funding forecasts and plans. Appendix A and B (packets from FWG Meeting #1 and #2) describe the tools that were considered and provide more information explaining the process for determining which new funding tools are most appropriate in Bend. These considerations included the dimensions of equity, political acceptability, efficiency, legality, and magnitude. Appendix C provides more information explaining the methods and assumptions for projecting revenue capacity of new funding tools.

Updated Data

We updated projections of revenue for a new funding tool (seasonal fuel tax) between the materials provided at FWG #3 (in Appendix C) and this IFA document.

New data regarding fuel sales in Bend for 2017 became available from ODOT to inform our assumptions. This removed the need to estimate how much fuel is sold in Bend, as relied on in the previous forecast.

All other estimates of revenue from new funding tools are unchanged from the information contained in Appendix C.

The new tools that the Funding Work Group recommended for consideration are:

- General Obligation Bond
- Increased Transportation System Development Charges
- Urban Renewal
- Local Improvement District
- Targeted Sales Tax
- Transportation Utility Fee
- Local Option Levy (if used in conjunction with a GO Bond)
- County Vehicle Registration Fee
- Seasonal Fuel Tax

In summary and considering maximum potential revenue capacities over the 20-year analysis period, new funding tools could theoretically generate up to $672.9 million for capital uses and $23.8 million for operating/maintenance uses (see Exhibit 2).

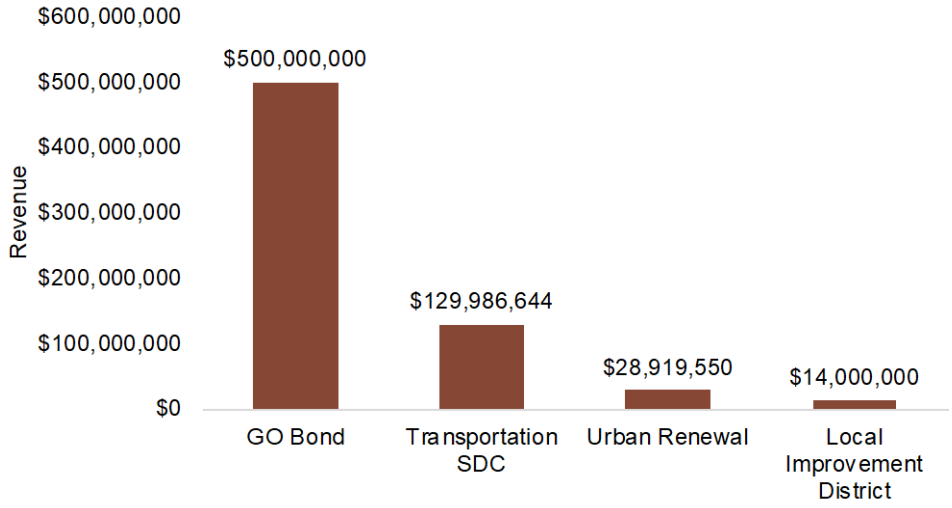
Based on Exhibit 1, the estimated need for new capital revenue produced is $189.2 million and the estimated need for new O&M revenue produced is still being determined (as mentioned previously, there will very likely be a need for new O&M funding tools).

Maximum Potential: Defined

"Maximum potential" means the upper limit of revenue that Bend can generate off a single funding tool. The upper limit is either legally or politically constrained in ways that may make it impractical to achieve, but it does provide useful 'sideboards' for the funding conversation.

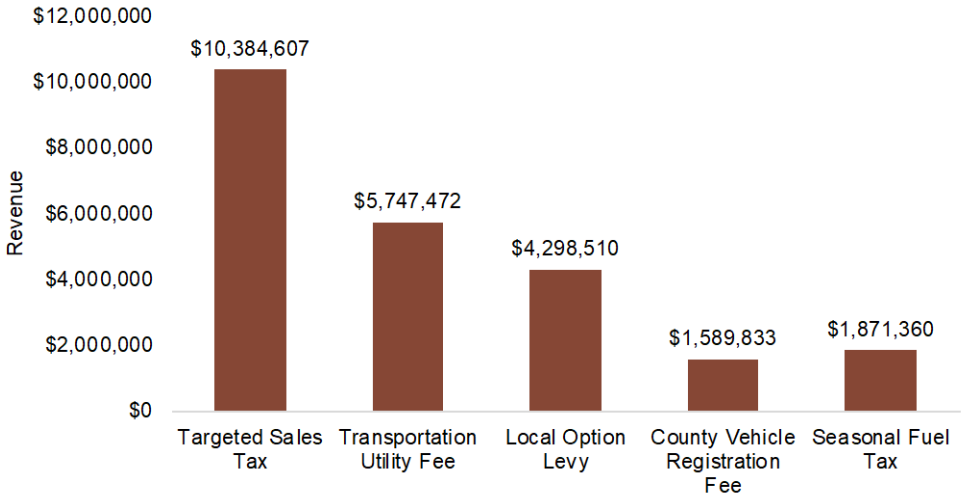
Knowledge of maximum theoretical revenue capacity for each new tool is necessary to know so that the City of Bend understands the limits of each tool. The extent that each tool can contribute to cost is variable, as illustrated in Exhibit 3 and 4.

Exhibit 2. Maximum Revenue Capacity in 2018 dollars, New Capital Funding Tools (FY2020 to FY2040)



Source: Calculated by ECONorthwest.

Exhibit 3. Maximum Potential Revenue Capacity in 2018 dollars, New O&M Funding Tools (annual)



Source: Calculated by ECONorthwest.

The City already has *existing* funding tools to fund about 46% of Bend's capital transportation needs and to meet Bend's operating/maintenance transportation needs based on currently known O&M costs and assumptions about continued general fund availability for O&M needs.[5] This means that while the City will need some new funding tools to cover the projects in the BTP, the City may not need to use all new tools to their maximum theoretical capacity. Further, this analysis shows that the City of Bend does not need to use all nine of the new funding tools under consideration; the City could limit the use of new tools levied or imposed. As such, because maximum revenue capacity for new tools is in excess of the BTP funding need, the City has some flexibility in determining which funding tools are ultimately selected for the Funding Plan.

Recommendations

This section provides the FWG's initial recommendations regarding the package of funding tools that should be pursued as the project team further develops the Funding Plan for the BTP. The section describes which tools the FWG believes are the best choices for the Funding Plan, which tools need additional study and consideration, and which tools appear less suitable for the Funding Plan.

The FWG began by considering detailed information about 17 potential funding tools and reviewing them according to how well each of the tools performed on four dimensions: legality, equity, efficiency, and political acceptability. Based on these criteria, the FWG developed a shortlist of nine funding tools that seemed most suitable for Bend (these tools are described later in this document and also in detail in Appendix B). These funding tools were targeted for further analysis and discussion.

There are a variety of ways that potential funding tools could be combined to address Bend's transportation funding needs. To provide a sense of how the funding tools could work in practice, and how tools could complement one another, the project team used the nine short-listed (most suitable) funding tools to develop four potential funding "packages". The packages were intended as examples of different approaches to meeting funding needs. Each of the funding packages uses different combinations of funding tools; the composition of each package was determined according to the package's theme: "Users Pay", "Simplicity", "Resilience", and "Balance". These packages are detailed in Appendix C, which includes a description of the advantages and risks of each package and its component tools.

After evaluating these packages, the FWG agreed that two of the four packages are not appropriate or are too risky to serve as the foundation for successful implementation of the BTP. Specifically:

- The "Simplicity" package relies almost entirely on a large General Obligation (GO) bond for capital expenses and a local option levy for operating and maintenance funds. The FWG eliminated this package because they found it too reliant on one payer (Bend's property owners are the ultimate payers of any bonds or levies) and too risky (both tools require a public vote so if one or both tools failed, the City would struggle to implement the BTP).
- The "Users Pay" package was also eliminated. The package intends to have system users, beneficiaries, and new growth as the primary funders; it relies heavily on increases to Transportation System Development Charges (TSDCs), the creation of Local Improvement Districts (LIDs), and the adoption of a Transportation Utility Fee (TUF) to fund new

[5] Currently the preliminary analysis of existing funding tools shows a surplus of O&M revenue to cover expenditures. However, the City identified additional O&M needs that do not yet have cost estimates. Once the City allocates these costs, the analysis will likely show a deficit of existing O&M funds. Further, about 37% of O&M revenues derive from General Fund subsidies. The availability of new funding tools could redirect this subsidy towards other needs, such as public safety.

transportation infrastructure. The package does not include a GO bond. While FWG members agreed that Bend's many visitors, commuters, and system users should contribute to funding transportation infrastructure, FWG members were concerned that this package generates insufficient total revenue to cover the initial target project costs. They were also concerned it relies heavily on funding tools that are contingent on new development occurring and on the concurrence of property owners to form LIDs. They pointed out that the timing of availability of revenue from these funding tools could create implementation challenges for early projects.

The FWG appreciated aspects of each of the two remaining packages ("Resilience" and "Balance"). Both packages included funding tools that derive from a range of payers (property owners, new development, visitors to Bend, commuters, and major employers). Both packages include some tools with significant revenue generating capacity and flexibility for use on a wide range of capital and operating and maintenance (O&M) projects (like a GO bond, a fuel tax, or a TUF). Both packages also include a range of tools that are focused on specific geographies or types of projects (like LIDs and urban renewal).

The principles and recommendations that follow build on the FWG's discussions of the benefits of each of the tools included in the above-referenced packages. Together, these principles and recommendations comprise initial strategies for funding transportation in Bend. They are a set of working conclusions from Phase 1 of the BTP and are subject to update as Bend works toward a Funding Plan in Phases 2 and 3 of the projects in 2019.

Funding Plan Principles

The FWG recommends the following foundational principles for the Funding Plan in the BTP.

- **Intentional Diversification.** Use a range of tools to achieve balance and resilience. The tools that comprise the Funding Plan will be diverse enough to generate revenues that are stable and flexible over the planning period, that generate revenue across economic market cycles, and that fund the full range of project types and programs.
- **Fairness.** Ensure visitors and commuters, new development, existing residents, and businesses (including property tax exempt businesses) pay their fair share for the transportation system that everyone uses.
- **Equity.** The Funding Plan must consider and respond to the impacts that funding packages may have on historically vulnerable socioeconomic groups, including low-income populations and underrepresented minorities.
- **Full Funding for Priority Projects and Associated Operations & Maintenance (O&M).** The Funding Plan in the BTP must generate sufficient capital and operations/maintenance revenue to cover the full life-cycle costs (from initial construction to on-going maintenance) of priority projects (including depreciation), programs, and needed staffing to manage and promote change.
- **Community Ownership.** The Funding Plan, like Bend's Transportation Plan as a whole, must be a community-driven strategy. Attaining community support for many of the new funding tools, especially those that require a public vote, will require public and stakeholder outreach, polling, an educational campaign, and a balanced approach to crafting the plan. In this context, "community" refers to Bend residents as well as other partners, like Deschutes County, the Oregon Department of Transportation, and the local business community.
- **Support Phased Implementation.** The projects described in the BTP will be implemented over a long term (20 years). As such, it will not require all of the funding to be available up front. The Funding Plan in the BTP should provide revenue to match the expected sequence of projects, with an explicit focus on near-term and priority projects.

- **Be flexible and adapt to the future.** Where possible and appropriate, the Funding Plan in the BTP should identify alternate tools (a "Plan B") for those that require public votes or that Bend does not fully control. The Funding Plan should recognize the technologies will change in ways that affect costs and also change the City's ability to monitor use and collect revenues. The Funding Plan should considering funding for innovation and adaptation/inclusion of new technologies that may become available over time.

Recommended Tools

The FWG recommends that the Funding Plan rely on a core set of tools that generate sufficient revenue to flexibly fund a wide range of projects, programs, and O&M costs. In addition, the plan should include a set of supplemental tools that may have more limited revenue capacity but play an important role in funding specific types of projects or projects in specific geographies.

Core Tools

The FWG recommends that the following tools be included as core components of the eventual BTP Funding Plan. These tools provide sufficient funds that can flexibly meet City-wide needs, such that they can reasonably serve as a foundation for the Funding Plan. The FWG recognizes that future discussions about rates and timing of implementation are necessary.

- **GO Bond.** The FWG broadly agreed that a GO bond would be a necessary component of any workable Funding Plan. If approved by voters, a GO bond can provide a large amount of upfront funding for a wide range of priority capital projects. More research is needed to understand the bond amount that voters might support; some members of the FWG suggested that a bond of approximately $100 million is a reasonable starting point.[6] Several members felt that higher bond amounts might be supportable with an attractive mix of projects and well-executed public outreach. The FWG noted that a GO bond must be paired with other core funding tools that can be used for operating and maintenance costs. The FWG expressed serious concern about building new projects without knowing upfront that they will have adequate revenue to cover on-going operations/maintenance over the life of the projects.
- **Transportation Utility Fee (TUF).** The FWG broadly supports the inclusion of a TUF in the Funding Plan. These fees are used to cover transportation costs in many communities in Oregon, can be used flexibly for O&M or capital costs, and can be structured so that even property-tax exempt system users contribute to funding key transportation infrastructure. A public vote is not required to introduce a TUF, although the City could choose to put the TUF to a public vote. More work is needed to determine the recommended rate for a TUF. Some FWG members suggested that the initial estimates of revenue capacity were too low, because higher rates and / or a different mix of payers (households and employees)[7] would be practical.[8]
- **Fuel Tax, with Seasonal Variation.** The FWG agreed that levying a fuel tax (either a seasonal fuel tax or a year-round fuel tax with seasonal variation) is a reasonable tool that should be included in the Funding Plan. Its revenue capacity is relatively high, and a fuel tax

[6] For a house with an assessed value of $400,000, annual payments in the first year for a $100M bond would be between $255 and $314, depending on loan terms. See Figure 27 on page 77 of Appendix C for details.

[7] In FWG Packet #3, three approaches to calculate revenue capacity are displayed: (1) rates of $2, $5, and $10/month levied on households and businesses, (2) rates of 2, $5, and $10/month levied on households and employees, and (3) rates of $0.10, $0.25, $0.50, and $1 per month levied on daily trips generated. Rates to determine initial revenue capacity estimates are based on the second approach and two placeholder rates: $10 per household and $2 per employee.

[8] Details of the TUF projections under various scenarios are included on page 79 of Appendix C. They range from about $400,000 up to almost $11M, depending on approach and rates used. FWG members' comments suggest that that higher end of this range may be possible.

can be used broadly for O&M and capital expenses for projects around the city. While it does require a public vote to enact, the FWG felt that including a fuel tax in the package would ease some concerns about voting for a GO bond, because a seasonal fuel tax would be aimed at ensuring that visitors to Bend (and commuters who work in Bend but live outside the City) would contribute to funding improvements to the transportation network along with current residents and property owners. More work is needed to consider how to approach this tax and to evaluate potential rates. As one example, the FWG discussed a rate of $.03 per gallon in off-seasons and shoulder seasons, and $.05 per gallon in peak season.[9] For the purposes of revenue forecasts, the analysis uses a maximum rate of $10 per household and $2 per employee. Additional scenarios that the FWG considered are included in Appendix C; higher rates could increase the potential revenue. Further analysis and refinement is needed once CTAC has developed a list of priority projects and needs.

Other Core Funding Tools that Require Additional Exploration

The FWG agreed that two other tools (an increase in TSDCs and a prepared food and beverage sales tax[10]) should be further explored in the coming months as core tools. Some members of the FWG had concerns or questions not yet fully resolved. These concerns and questions will require further consideration. The concerns are described below.

- **Increased TSDCs.** Unlike other tools described in the recommendations, the City already has a TSDC, and it is included in the estimate of existing sources. Regarding increasing those existing TSDC, several FWG members supported increases in TSDCs, over time, as a straightforward, City-controlled tool with substantial revenue capacity that is intended explicitly to fund growth. At the same time, others noted that TSDC revenues are volatile because they are dependent on new development (and therefore are subject to development cycles), that TSDCs were recently increased by 34% and that further increases may affect development feasibility and housing costs. They also pointed out that increases in City-wide TSDC rates might reduce the ability of the City to consider supplemental TSDCs (i.e. higher TSDC rates) as a funding tool in the Urban Growth Boundary (UGB) expansion areas where there may be a clearer nexus to new development and greater support from developers.[11] Further information and discussion are needed regarding supplemental TSDCs as a potential funding tool for expansion and/or opportunity areas.

  CTAC also emphasized that potential increases to citywide TSDC would need more information and further discussion.

- **Prepared Food and Beverage (i.e. "Restaurant") Sales Tax.** FWG members supported, in concept, the inclusion of a prepared food and beverage tax that generates revenue through the tourism economy. However, most members expressed concerns about describing and justifying the tool to voters who must approve it. Some felt that it would be challenging to communicate the logic or linkage between levying a sales tax on food/beverages and using that revenue for transportation projects. Some felt that a vehicle fuels tax was a more straightforward path toward getting voter approval for a tool that increases revenue generated by Bend's many visitors.

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[9] This would increase revenue projections from the $1.2M described in FWG packet #3 to $1.9M. See page 71 of Appendix C for details on the original analysis. Note that the project team has recently also received updated information regarding Bend's fuel sales that will further increase revenue projections. This new data will be included along with updated revenue projections in the BTP Funding Plan.

[10] A prepared food and beverage tax is applied to prepared foods purchased in restaurants; it does not impact groceries. Furthermore, it is not applied to alcoholic beverages.

[11] This kind of area-specific SDC is often called a 'supplemental SDC' and is used to fund the specific infrastructure needed to allow development to occur in that area. They are often negotiated with developers and property owners as part of master plan agreements for UGB expansion areas in Oregon.

Supplemental Tools

The FWG recommends the following tools to supplement the core tools described above. Each could play a niche supporting role in a complete funding package, and the City should continue to evaluate them as more is known about specific projects and costs.

- **Urban Renewal.** The FWG broadly agreed that urban renewal should be used to fund appropriate transportation projects in a potential new Urban Renewal Area (URA) in Bend's core area. In that geography, it will be among the most powerful tools available for funding infrastructure. However, because urban renewal dollars can only be spent inside a URA boundary, and only on projects that are identified in an adopted urban renewal plan, this tool is limited in application and better suited to supplement core tools in the Funding Plan.
- **Local Improvement District (LID).** The FWG agreed that LIDs should be part of the Funding Plan and recognized that they are best suited to funding infrastructure needs in UGB expansion areas, opportunity areas, and for neighborhood-focused walkability improvements. Because they require property owners to agree to them (and typically initiate them), broad geographic application of a LID is not likely to be successful. LIDs also carry an administrative burden and may require additional staff to support implementation.
- **County Vehicle Registration Fee.** Use of this tool is contingent on Deschutes County's willingness to pursue and impose a vehicle registration fee that will ultimately need to be approved by voters by a county-wide vote, which adds substantial risk to the certainty of this tool. However, FWG members felt there was real merit to exploring the County's willingness to use this fee, particularly as a regional tool to support projects on Highway 97 that have regional significance because they enhance services and/or fix problems for all residents in Deschutes County.
- **Local Option Levy.** The group identified a local option levy as a valuable tool to catch up on deferred street maintenance needs for all modes and viewed it as a valuable tool for one-time use (rather than for new capital or for ongoing O&M). Because it must be regularly renewed with a public vote, the FWG expressed concerns about using this tool as an ongoing revenue source throughout the 20-year implementation period. Clear messaging would be important for this tool to ensure that the public understands what it includes and how it is different from a GO bond.
- **Parking fees.** While the FWG broadly supported the use of parking fees to manage parking demand, the group did not recommend parking fees as a near-term funding source because its revenue generating capacity relative to other tools was less certain and smaller. The broader CTAC, however, was divided on this outcome, with a small majority (11 to 9) voting to keep parking fees as a potential supplemental funding tool. The CTAC's vote means that additional analysis will be completed better understand the revenue generating potential and the role that parking fees could play in a funding strategy. CTAC also acknowledged that parking fees may be considered later as a potential policy tool for transportation demand management.

While there are still many unknowns, collectively, the FWG recommendations point toward this eventual Funding Plan structure:

- A GO bond, perhaps paired with a phased City-wide TSDC increase or a TUF, would provide foundational revenue for City-wide capital costs, and are especially suited to large and highly visible projects that enhance system-wide service. These tools could then be paired with some combination of a TUF, seasonal fuel tax, and perhaps a prepared food and beverage tax to provide additional capital revenue and provide operating and maintenance funding.

- For specific geographies that need targeted investments (such as UGB expansion areas[12], opportunity areas, or parts of the City that need sidewalk investments), urban renewal, LIDs, and supplemental TSDCs are an option.
- A county vehicle registration fee could serve regional needs and a local option levy could serve targeted O&M needs serving all modes, especially for catching up on deferred maintenance projects.

The analysis completed to date suggests that the new funding tools in such a funding package, if successfully passed by voters and/or the City Council and combined with existing funding tools, would likely have sufficient total revenue capacity to cover both capital and O&M costs (though some tools would have to be stretched to their maximum revenue potential)[13]. Such a package would also be responsive to the other foundational principles that FWG discussions highlighted.

In addition to core and supplemental funding tools, the FWG affirms that the City and MPO should consider and pursue project-specific local and / or federal grants as applicable. This includes potential public and private funding that could fund capital, O&M, innovation, pilot projects, and other programs. CTAC affirmed this notion and emphasized that, if federal or other grants are pursued for specific projects, the City may need to have matching funding available. The FWG also recognizes that there may be other tools on the horizon that may not be feasible or practical now, such as vehicle-miles-traveled- (VMT) based fees.

In response to the funding principles regarding flexibility and adaptability of the funding packages, for tools that are on the horizon, CTAC and the Steering Committee have stressed the importance of beginning to understand and study how these tools (and enabling technology) could play a role in Bend. The groups have suggested near-term studies of tools like congestion or vehicle miles traveled pricing, as well as adaptive parking pricing, with a view to gain more understanding. The City will update the TSP approximately every five years. These updates provide an opportunity to revisit the funding plan and consider whether new tools might be suitable to introduce. Conducting a study regarding the applicability of emerging technologies in the near-term would prepare the City to consider new funding tools in future five-year updates.

Arriving at the Recommendations

The Initial Funding Assessment recommendations are the product of an iterative process involving technical analysis and FWG input during a series of meetings, described below. The FWG discussed and provided input on revenue projections (existing and new tools), approaches to funding, and funding packages comprised of various tools. Ultimately, these discussions helped to form the foundation of Initial Funding Assessment (IFA) and its recommendations.

Funding Work Group Meeting #1

Funding Work Group Meeting #1 took place on June 7, 2018. The following provides a summary of the technical content and meeting outcome.

[12] UGB expansion areas are not currently included as part of the funding needs, but this will be considered in winter/spring 2019 and may change.

[13] Note that transit needs, and funding will be considered as part of CET's regional planning process, which is currently set to take place in winter/spring of 2019. The Bend component of CET's planning will be included in Bend's Transportation Plan and funding needs and potential tools will be reflected in the Funding Plan.

Summary of Technical Content

The first meeting of the FWG included an overview about the landscape and challenges of transportation funding at the federal, state, and local levels (including transportation system development charges), as well as a review and discussion of Bend's previous transportation funding plans. The FWG also reviewed information about a variety of potential funding tools and discussed potential evaluation methods and criteria for comparing funding tools. See Appendix A for details.

Meeting Outcome

The group agreed that the broad criteria of efficiency, legality, equity, and political acceptability would be suitable dimensions to compare new funding tools, and that it would be most helpful if this information were presented through a visualization as well as a descriptive table. The staff and consultant team prepared the packet and materials for Meeting #2 according to these decisions.

Funding Work Group Meeting #2

Funding Work Group Meeting #2 took place on July 24, 2018 and was focused on identifying the new funding tools that are best suited to use in Bend.

Summary of Technical Content

AT FWG #2, the project team discussed individual funding tools and evaluation criteria, provided direction on tools to focus on / eliminate, and provided input about packaging funding options.

First, the consultant team presented a menu of 17 funding tools for the FWG to consider as opportunities to pay for projects and programs identified in Bend's Transportation Plan (see sidebar to the left). Appendix B, Funding Workgroup Packet #2, shows a matrix of these 17 funding tools with accompanying technical details.

Menu of New Funding Tools

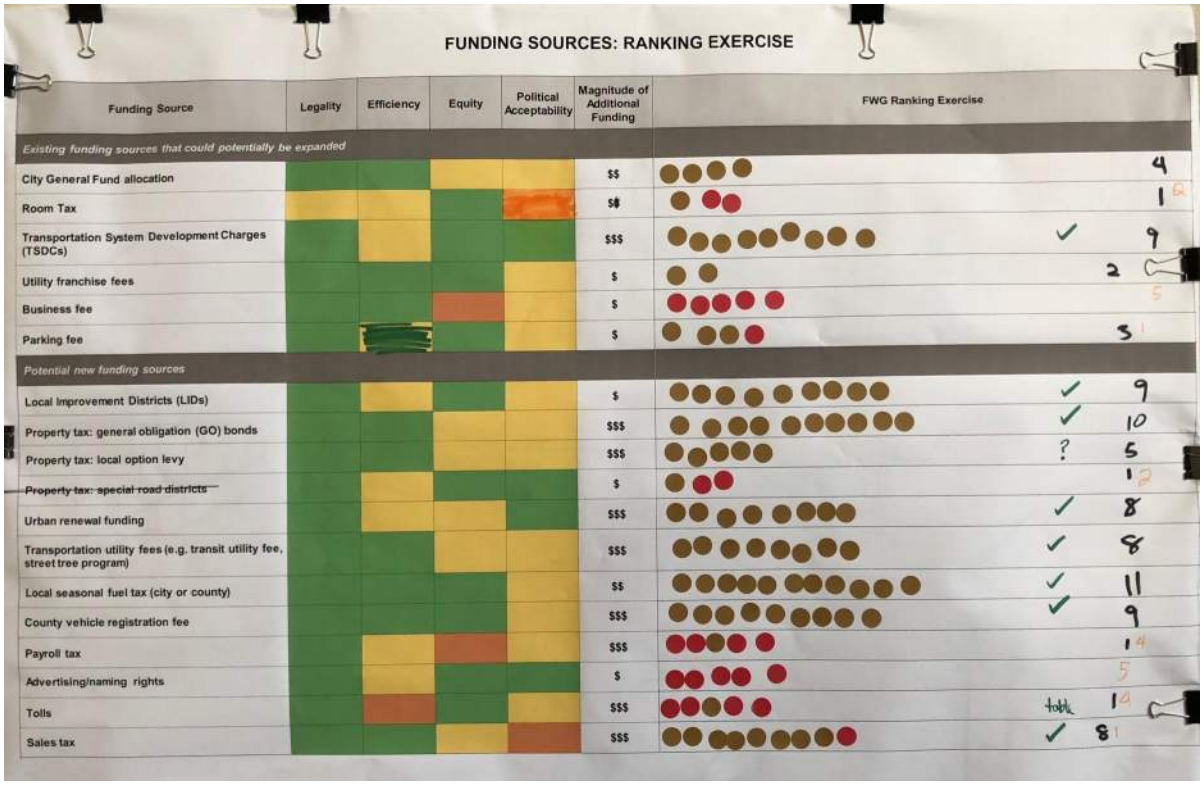
The original 17 funding tools under evaluation were: general fund allocations, room tax, **transportation system development charges**, **utility franchise fees,** business fee, parking fee, **local improvement districts, general obligation bonds, local option levy, urban renewal, transportation utility fees, seasonal fuel tax, county vehicle registration fees,** payroll tax, advertising/naming rights, tolls, and **targeted sales tax.**

Tools highlighted and bolded in green made it to the short-list.

The FWG reviewed an evaluation of these 17 funding tools to help them narrow to a short-list of funding tools for further consideration. The evaluation looked at each tool across several criteria: legality, efficiency, equity, political acceptability, and magnitude of additional funding. An initial and very preliminary indication of revenue capacity was also provided qualitatively.

Participating in their own ranking and evaluation exercise (see Exhibit 5), the FWG identified which funding tools they considered most suitable for funding Bend's needed transportation projects and priorities. Eight funding tools emerged as most suitable. The FWG also asked staff and the consultant team to consider a local option levy for operations costs if paired with a general obligation (GO) bond for capital costs.

Exhibit 4. Funding Tool Ranking Exercise



FUNDING SOURCES: RANKING EXERCISE

Funding Source	Legality	Efficiency	Equity	Political Acceptability	Magnitude of Additional Funding	FWG Ranking Exercise
Existing funding sources that could potentially be expanded						
City General Fund allocation					$$	4
Room Tax					$$	1
Transportation System Development Charges (TSDCs)					$$$	✓ 9
Utility franchise fees					$	2
Business fee					$	5
Parking fee					$	3
Potential new funding sources						
Local Improvement Districts (LIDs)					$	✓ 9
Property tax: general obligation (GO) bonds					$$$	✓ 10
Property tax: local option levy					$$$	? 5
~~Property tax: special road districts~~					$	12
Urban renewal funding					$$$	✓ 8
Transportation utility fees (e.g. transit utility fee, street tree program)					$$$	✓ 8
Local seasonal fuel tax (city or county)					$$	✓ 11
County vehicle registration fee					$$$	✓ 9
Payroll tax					$$$	14
Advertising/naming rights					$	5
Tolls					$$$	toll 14
Sales tax					$$$	✓ 8

Output from FWG#2 ranking exercise. Each member was given ten gold circles to allocate to funding tools that they believed to be most suitable for Bend based on the meeting packet they reviewed and the group discussion about it. They were also given red circles to allocate to tools that they did not believe to be suitable for further consideration at this stage. Results and outcomes are discussed below.

Meeting Outcome

Evaluating the menu of funding tools became the foundation for the next step of work. Nine tools ended up on a short-list of tools earmarked for more analysis. These tools are:

- Increased Transportation System Development Charges
- Local improvement districts
- Urban renewal
- Seasonal fuel tax
- Targeted sales tax
- General obligation bond
- County vehicle registration fees
- Transportation utility fees
- Local options levy

Funding Work Group Meeting #3

Funding Work Group Meeting #3 took place on September 20, 2018. The following provides a summary of the technical content and meeting outcome.

Summary of Technical Content

At FWG #3, the project team reviewed funding packages and more detailed information on the funding tools that comprised the packages.

Prior to this meeting, the FWG members received a packet of information that included an evaluation of individual funding tools across a set of dimensions that could limit or encourage each tool's use in one of four funding packages. For context, each funding package served as a preliminary (hypothetical) proposal of what a potential funding strategy could look like. Therefore, the evaluation of individual funding tools, see Figure 1 in Appendix C, is key technical detail because each package should:

- Meet all target funding needs.
- Support all project types earmarked in the BTP (i.e. O&M vs. capital; transit vs. roadway).
- Provide sufficient funds available for use across the geographic region, of which some areas of Bend would require more or less funds contingent on project locations.
- (Ideally) spread the financial burden across different groups (e.g. residents, property owners, businesses, commuters, tourists, etc.).
- (Ideally) not be overly problematic to implement, of which some funding tool possesses different logistical needs (e.g. public vote, renewal, council action, etc.).

The overview of funding tool dimensions and other information provided in the FWG packet gave the FWG a better understanding of each funding tools' nuances, advantages, and risks. Recognizing this was key to understanding the development and makeup of each package. In that, each tool played a different role; piecing tools together to form funding packages was demonstrative of an iterative process that took each of the tool's dimensions into consideration.

In addition to an overview of funding tool dimensions, the consultant team provided context for each tool's revenue capacity. This included information about (1) the legal, maximum revenue capacity generated from each tool and (2) revenue capacity given different imposed rates. Discussions about revenue projections stayed at a relatively high-level; the FWG did not go into detail discussing data sources, assumptions, or methods. That said, FWG members did receive this information in their packet, see Appendix C.

The compilation of these details allowed the FWG to have a robust discussion of the implications to using each tool and implications of each funding package. The FWG provided direction on how to refine the packages for inclusion in the IFA report and provided direction on the preliminary strategies for inclusion in the IFA report.

Meeting Outcome

Input given at FWG #3 centered on each of the funding tools individually, each of the funding packages individually, and general principles that the eventual Funding Plan should encompass. Regarding the funding tools, the group shared their thoughts about whether funding capacities seemed reasonable or overly burdensome. FWG members also discussed suitability of each of the tools from a messaging and optics standpoint, particularly for the tools that would require a public vote.

Based on the discussion during FWG meeting #3, the consultant team drafted recommendations for initial FWG review and approval. FWG members had the opportunity to review and provide comment on the draft recommendations, which the consultant team then revised and included as the key content in this IFA. These may be further revised after FWG #4.

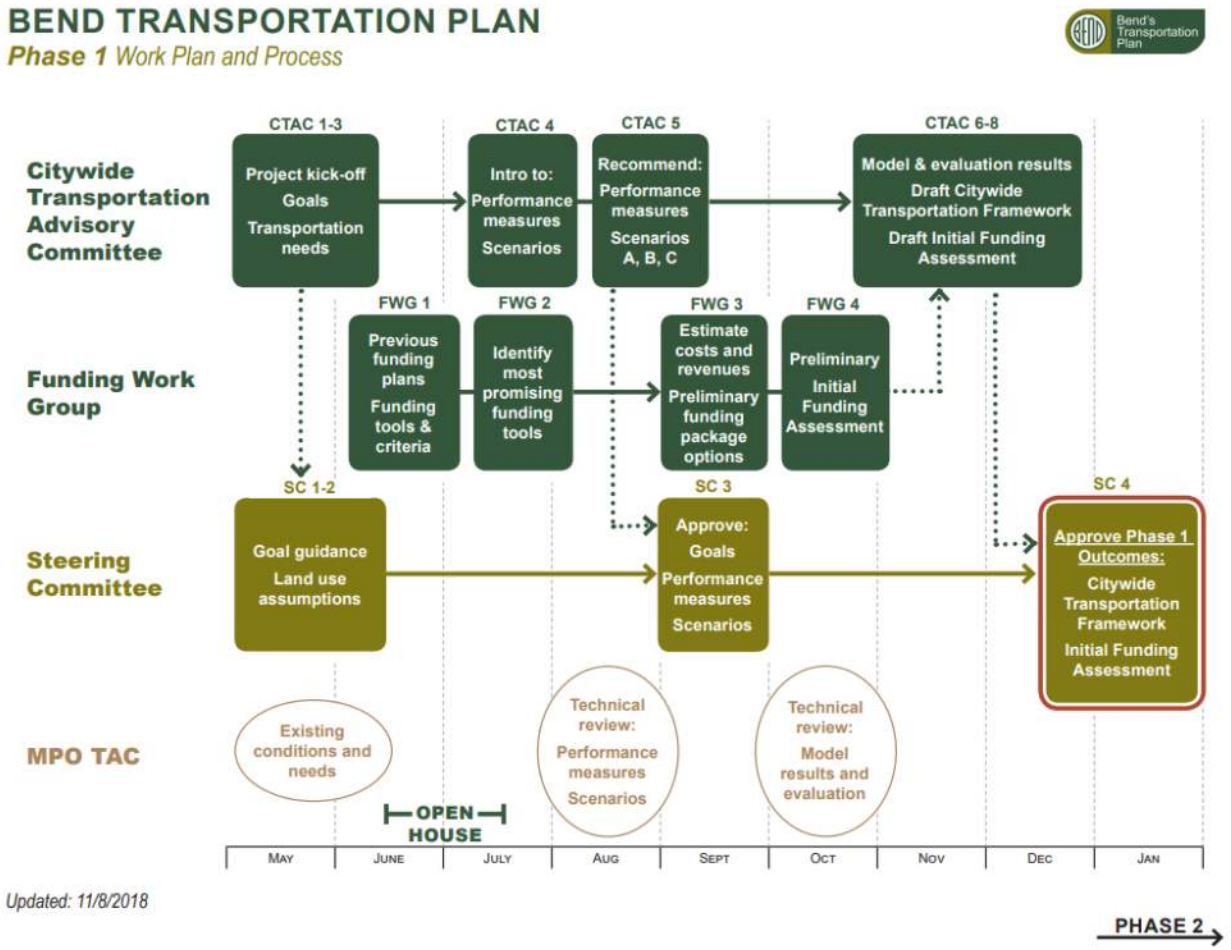
Next Steps

This Initial Funding Assessment report was recommended by the FWG and CTAC, and approved by the Steering Committee. The initial recommendations capture high-level strategies but do not include a detailed funding package; this will be developed and refined in 2019, with further input from the FWG, CTAC and the Steering Committee.

Analysis, findings, and recommendations captured in this IFA will feed into the second and third phases of the BTP, see next Exhibit. According to the current timeline, in spring and summer of 2019, CTAC will develop a list of priority projects and programs for Bend's Transportation Plan. Based on these projects and programs, the staff and consultant team will develop a more specific estimate of the full extent of project costs of Bend's Transportation Plan over the 20-year analysis period. With input from the FWG and CTAC, the staff and consultant team will continue to fine-tune projections for new funding tools and revenues. The FWG will then consider a refined funding package, which will be based on the initial recommendations in this IFA, using the updated cost and revenue estimates. The funding package will be described as part of a funding plan. Once the FWG has reached agreement on the funding plan, it will be presented to CTAC for input, then to the Steering Committee for approval.

This process will lead us to a funding plan that (1) considers the costs of needed projects and programs as identified by CTAC, and (2) identifies suitable new funding tools to cover funding needs that exceed the City's current funding capacity.

Exhibit 5. Phase 1 Work Plan, Leading to Phase 2



Appendix M - Changes to Functional Roadway Classifications

CHANGES TO ROADWAY FUNCTIONAL CLASSIFICATIONS

Roadway Name	Former Classification	Proposed Classification	Justification
East-West roadway at N end of Juniper Ridge	Major Collector	Minor Arterial	Upgraded to arterial to accommodate arterial spacing standards (one mile).
Cooley	Major Collector	Minor Arterial	The majority of Cooley Road is a minor arterial. The westernmost segment of Cooley was upgraded to match Cooley's minor arterial designation and to reflect changes in Hwy 20 and Hwy 97 intersections. Cooley is the northernmost east-west arterial in the City's network that spans the city UGB from west edge to east edge and connects to two principal highways 97 and 20. This route reflects ODOT and City investment in the north Hwy 97 project.
East west collector south of Cooley	-	Collector	This is a new road and therefore new designation. Commercial development requires an access direct to Hwy 20, but ODOT's highway access rules require any direct connection to a highway to be a collector or arterial level designation.
Robal	Major Collector	Minor Arterial	ODOT is building a roundabout at Hwy 20/Robal and connecting Robal directly to Hwy 97 to shift highway trips onto Robal to reduce reliance on the highway system. This new role that Robal will be taking on is that of an arterial rather than a collector, particularly because of the new highway connections on either end.
Hunnell	Minor Arterial	Collector	This route is not regional in nature and its purpose is to distribute trips from the arterial system to and from localized businesses.
Deschutes Market Road	Major Collector	Minor Arterial	Reflects arterial spacing (one mile) and function. Route is being prioritized as intercity route: Bend to Redmond. Creates route diversity parallel to Hwy 97 for emergency purposes.
Eagle Road	Local	Collector	Reflects collector spacing (0.5 mile) and function.

CHANGES TO ROADWAY FUNCTIONAL CLASSIFICATIONS

Roadway Name	Former Classification	Proposed Classification	Justification
College Way	Major Collector	Local	Segment of College Way north of Portland Avenue was downgraded to local road because of route continuity issues through the COCC campus.
Sonora	Major Collector		Segment of Sonora north of NW 9th Street was removed. City water system expansion prevented the route and a regional Hillside Park prevented a new route from being established.
Hawthorne	Major Collector	Local	Segment of Hawthorne east of Parkway/Hwy 97 was downgraded to a local to reflect its role as a local street in the grid. Hawthorne does not function as a collector in the network.
NE 4th	Minor Arterial	Collector	4th north of Franklin Avenue was downgraded to a collector to match function and spacing requirements.
NE 4th	Major Collector	Local	4th south of Franklin Avenue was downgraded to a local to match its current function and projected function in the area. Connection to small lot commercial businesses is its primary role.
Bear Creek	Major Collector	Minor Arterial	Bear Creek was upgraded to a minor arterial to better reflect its east-west people-moving role. Bear Creek is one of the only counts in Bend that spans from western UGB to eastern UGB. It will play a vital role as a key walking and bicycling route. Bear Creek plays a vital east-west carrying capacity role, more so than its direct access to businesses role.

CHANGES TO ROADWAY FUNCTIONAL CLASSIFICATIONS

Roadway Name	Former Classification	Proposed Classification	Justification
Collectors in KorPine		Collector	Process added two new collectors in a new infill opportunity area. The exact alignment will be established with site master planning, but the need to connect from Bond Street to 3rd Street via Aune Street and provide an alternate route to Wilson Avenue was shown through 2040 demand modeling. Volumes on these routes will exceed typical local street levels.
Colorado Extension to 3rd Street	Local and Major Collector	Minor Arterial	TSP modeling for demand and safety identified need for new route between 3rd Street and Colorado/Hwy 97 (Parkway) Interchange. This route is an extension of Colorado Avenue, which is a minor arterial, directly to 3rd Street.
Brookswood-Bond-Industrial Way	Major Collector	Minor Arterial	This route was upgraded to arterial to create route connectivity for through trips to reach Old Mill, Downtown, and emerging Box Factory/KorPine areas.
Poplar	Local	Collector	Change reflects collector access spacing and connectivity elements. This route connects to Hwy 97 and planned overpass for the Ponderosa/China Hat route. Connects a collector (Ponderosa/Lodgepole) to a minor arterial (Brookswood Blvd).
Ferguson	Major Collector	Minor Arterial	Meets arterial spacing standards. Route is key east – west route as a continuation of Murphy Road. Will serve similar east-west regional role as Reed Market Road.
Knott	Minor Arterial	Minor Arterial	Maintain as minor arterial. Trip projections to 2040 do not yet justify a major arterial.
Brosterhous-American Lane	Major Collector	Minor Arterial	Meets arterial access spacing. Reflects enhanced role in transportation network for through trips from Butler Market-8th-9th Streets. Serves as the area arterial west of the RR for SE Bend.

CHANGES TO ROADWAY FUNCTIONAL CLASSIFICATIONS

Roadway Name	Former Classification	Proposed Classification	Justification
Reed Market	Major Collector	Minor Arterial	A portion of Reed Market east of 27th Street was upgraded to a minor arterial because of volume projects that reflect DSL property development. This allows Reed Market to extend its regional traffic role eastward as the UGB expands east.
Stevens	Major Collector	Local	The old Stevens Road alignment has been relocated north to align directly with Reed Market Road across 27th Street. The angled portion of Stevens Road south of Reed Market Road up to the Reed Market extension is a local street.
Collectors in UGB Expansion Areas	Major Collector	Collector	New alignments for collectors in the Thumb, Elbow and SE Area UGB Expansion and Infill Opportunity Areas are the result of Area Planning. Refinement of the alignment for collector roadways within the DSL property will occur with Master Planning for that site, but the basic connection and function is established in this TSP.