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MEMORANDUM

Date:	June 10, 2020	Project #: 23858
To:	Project Management Team	
From:	Mark Heisinger, EIT, Zachri Jensen, EIT, Russ Doubleday, Nick Foster, AICP, RSP, and Matt Hughart, AICP	
Project:	City of Ontario, Active Transportation Update and East Idaho Avenue Refinement Area Plan	
Subject:	Technical Memo #2: Baseline Transportation Assessment	

The City of Ontario is updating its 2006 Transportation System Plan (TSP) to include: 1) an updated active transportation element; and 2) a refinement plan for the East Idaho Avenue corridor. This memorandum provides an assessment of existing conditions for each of these two project areas. It is organized as follows:

1. **Citywide Active Transportation Plan** - An inventory and assessment of the City's bicycle, pedestrian, and transit systems. *Attachment A* includes a toolbox of potential pedestrian and bicycle design treatments that will be considered when identifying projects in the next phase of the project.
2. **East Idaho Avenue Refinement Area Plan** - An analysis of traffic operations and safety for existing conditions along the East Idaho Avenue corridor.

The purpose of this inventory and performance evaluation is to document the baseline transportation system conditions within the project area. Supporting data has been obtained from the City, the Oregon Department of Transportation (ODOT), and field reviews by the project team. The findings summarized in this memorandum will form the basis for the recommended projects, policies, programs, and studies that will make up the Active Transportation Update and East Idaho Avenue Refinement Area Plan, herein referred to as " the project." Figure 1 illustrates the project study areas.

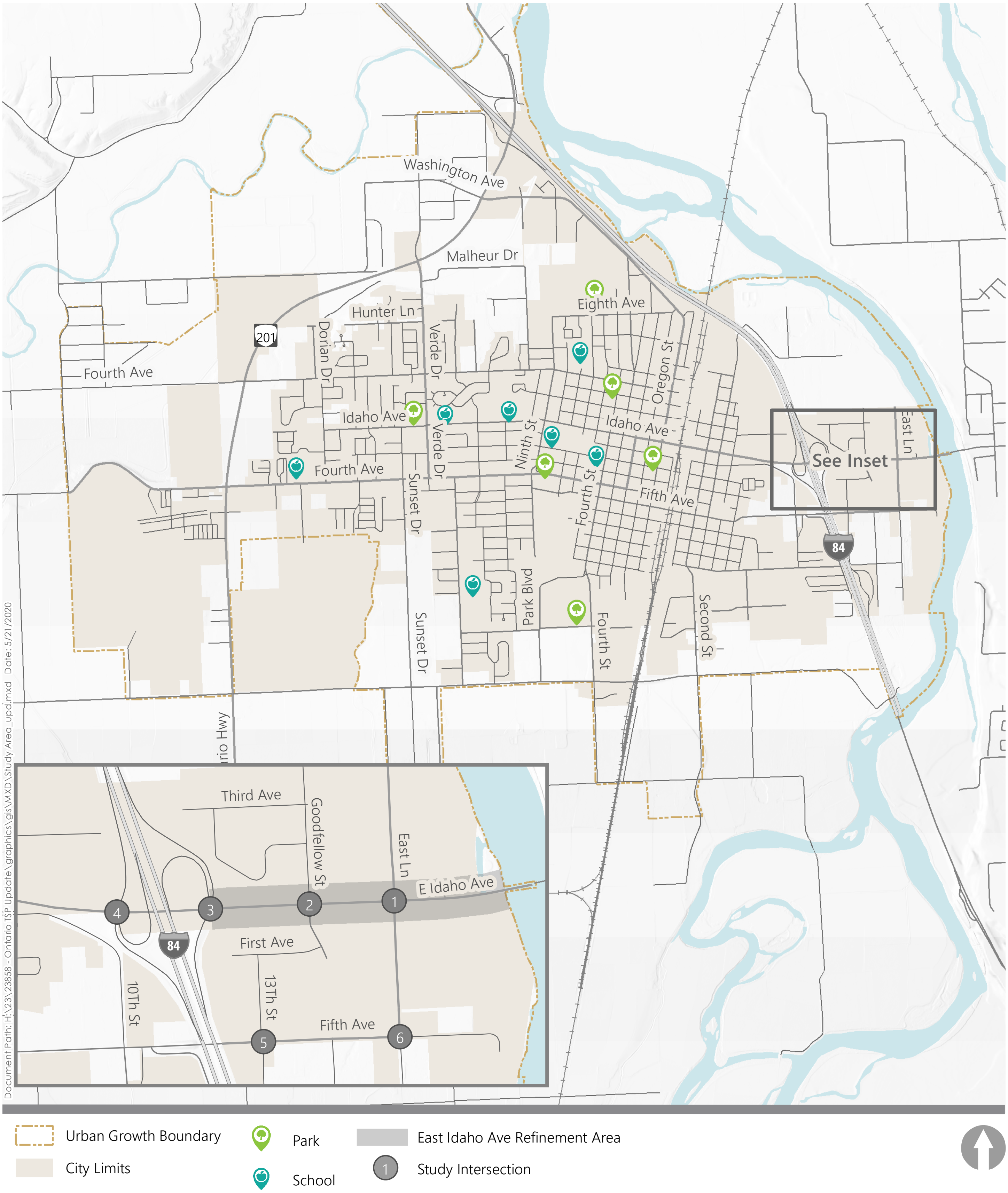

Figure 1

Project Study Area

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CITYWIDE ACTIVE TRANSPORTATION PLAN

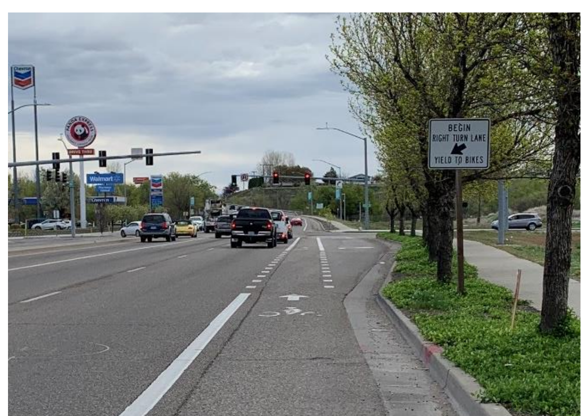
The first component of the project is an active transportation plan covering the City's Urban Growth Boundary (UGB). The overall goal of the active transportation update is to improve multimodal transportation options within the community, thereby creating opportunities that support a healthy lifestyle. This update will reflect current City goals, conditions that have changed since the 2006 TSP, and incorporate recent planning efforts, including the City's 2018 Parks and Recreation Master Plan. The following sections provide a current inventory and assessment of the City's bicycle, pedestrian, and transit systems.

Existing Bicycle System

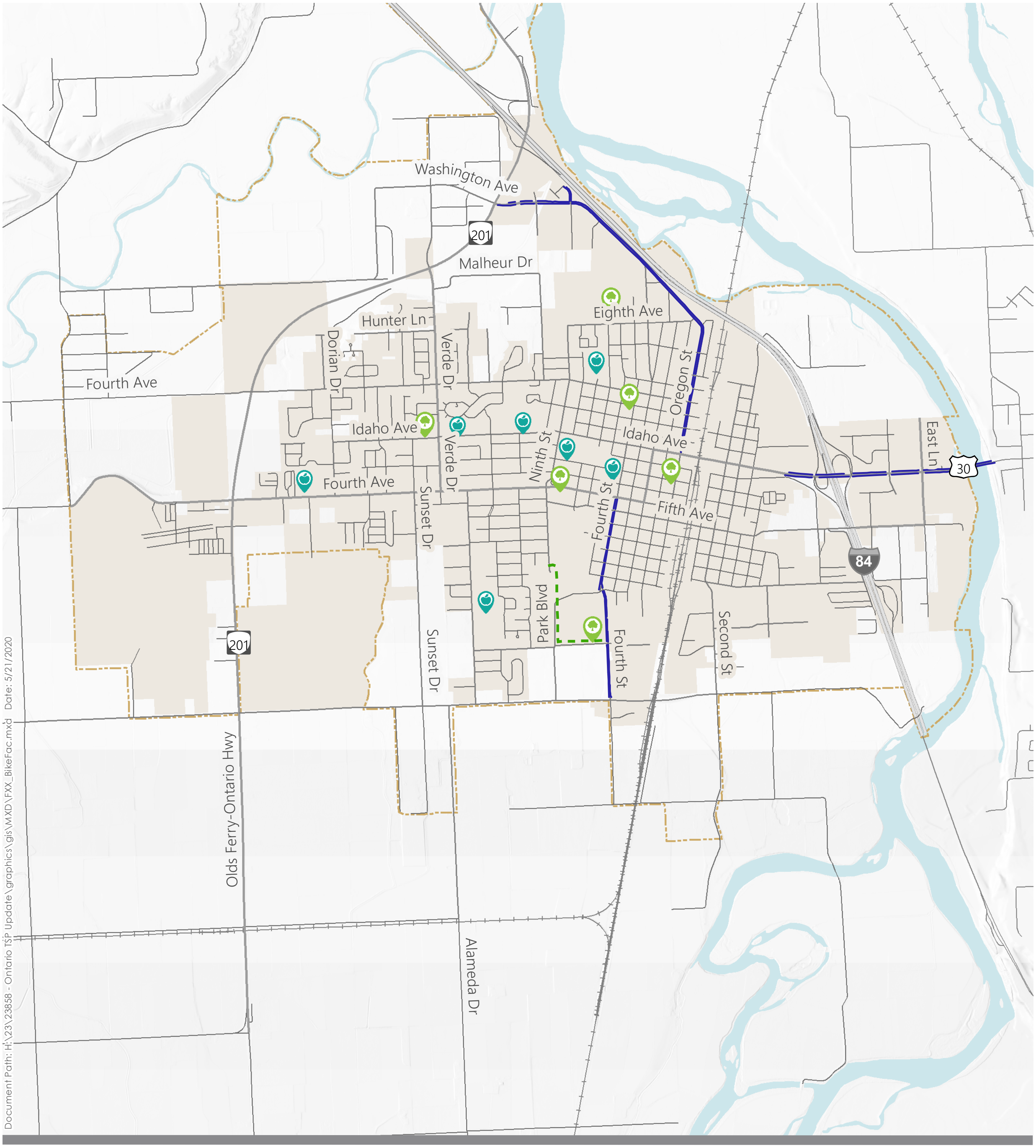
The following section describes the existing bicycle system. The City provided geographic information system (GIS) data that included the location of existing bike lanes within Ontario. The project team updated this data from field observations of the City's street network. Figure 2 illustrates the existing bicycle system within the City.

The City's designated bicycling network consists entirely of bike lanes. Bike lanes are designed to provide a designated space for bicyclists outside the path of motor vehicles, parallel to the travel lane and are typically marked with a standard bike lane symbol. The City standard for bike lane width is five feet from the edge of the travel lane to the face of curb The ODOT standard for bike lane width is six feet, with a minimum width of four feet on open shoulders or five feet from the face of curb, guardrail, or parked cars. Bike lanes are most appropriate along roadways with moderate traffic volumes and speeds (arterials and some collectors). Bike lanes may also be provided on rural roadways near urban areas, where there is high bicycle use. To enhance the experience for bicyclists along these types of roadways, a marked buffer area may be striped for more separation between the vehicular travel lane and the bicycle lane.

Bike lane on SW 4th Street



Bike lane on E Idaho Ave



Urban Growth Boundary

City Limits

Park

School

Bike Lane

Multi-Use Path (Under Construction)

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Figure 2

Existing Bike Network

The existing network of bike lanes in Ontario is intermittent and does not provide continuous connections for people biking to local amenities, such as commercial destinations, recreational areas, places of worship, or institutional facilities. Most of the existing bike lanes are located along the E Idaho Avenue, Oregon Street, and 4th Street corridors. Additional connections from these bike lanes to other destinations may be possible through low-speed and low-volume local roads; however, there are currently not any designated routes.

There is also a multi-use pathway under construction on the southwest side of the Treasure Valley Community College.

Existing Pedestrian System

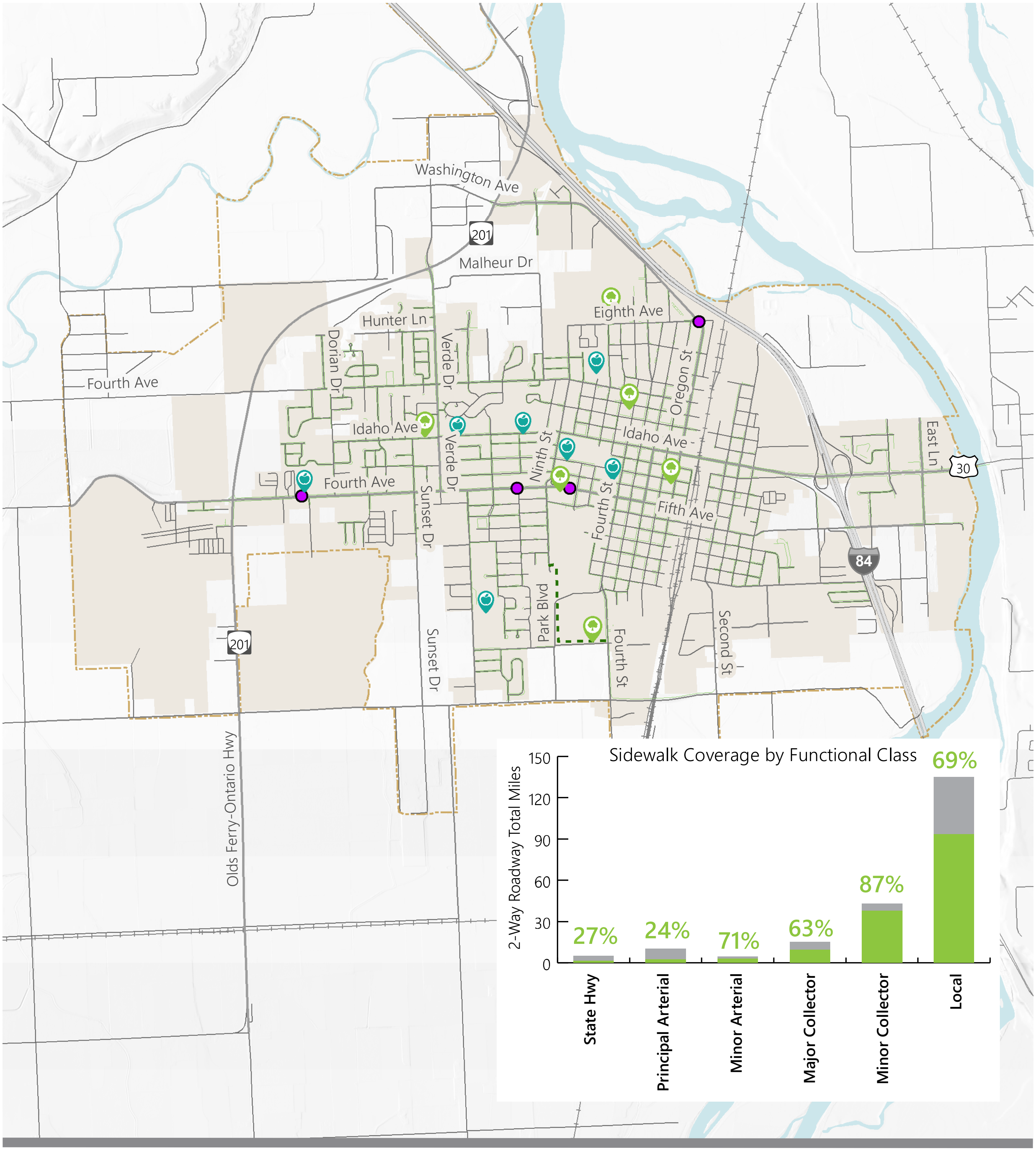
The following section describes the existing walking system. Data collection for existing walking facilities was conducted in a similar manner to bicycle facilities, with information on the type and location of sidewalks obtained from City GIS data. The GIS data was updated to include field observations made by the project team. The existing walking system within the City consists of an intermittent network of sidewalks, marked crosswalks, and signalized crossings. Figure 3 illustrates the existing walking system.

Sidewalks

Sidewalks are the most fundamental element of the pedestrian system. Sidewalks are typically constructed of concrete and separated from the roadway by a curb and gutter, landscaping strip, and/or on-street parking. The unobstructed travel way for people walking on a sidewalk should be clear of utilities, signposts, fire hydrants, vegetation, and street furnishings. Typically, a buffering of the pedestrian space and vehicular travel lane increases the comfort of the pedestrian experience. The City standard for a sidewalk width is six feet, with a five- or six-feet wide buffer on arterials and collectors. The ODOT standard for a sidewalk width is six feet, with a minimum width of five feet acceptable on local streets.

Buffered sidewalk on SW 4th Street

Curb-tight sidewalk on SW 4th Avenue



Urban Growth Boundary
City Limits
Park
School
Rectangular Rapid Flashing Beacon
Sidewalks
Multi-Use Path (Under Construction)

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Figure 3

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Existing Walking Network

Most local and collector streets in the City have sidewalks. However, they are absent from most arterials and highways where the need for them is the greatest. Further, the presence of a sidewalk does not guarantee it is accessible to all or that it provides a complete connection to a destination. Some sidewalks are also in disrepair and may not be suitable for individuals with disabilities. In some cases, existing sidewalks abruptly end, which causes people to have to walk in the street or on the shoulder, if one is provided.

Damaged sidewalk with no curb ramps on SW 2nd Street

Sidewalk with no continuation on SW 4th Street

Crosswalks

Marked crosswalks serve as a designated space for people to walk across the roadway. Crosswalks are present in two forms in the City. The majority are "transverse" crosswalks, meaning they consist of two parallel white lines that stretch from one curb to the other. The minority are "continental" or "zebra" crosswalks, which consist of a series of parallel or diagonal lines. Many crosswalks are not equipped with a curb ramp or tactile warning pads, making them non-compliant with Americans with Disabilities Act (ADA) standards.

Transverse crosswalk striping at NE 4th St/E Idaho Ave

Continental crosswalk striping at SW 4th St/SW 14th Ave

Enhanced Crossings

Enhanced crossings provide additional safety for people walking at mid-block or unsignalized crossings by attracting motorists' attention and alerting them to people crossing the roadway. As shown in Figure

3, there are four enhanced crossings in the City that feature a rectangular rapid flashing beacon (RRFB). These crossings are located on the SW 4th Ave and N Oregon St corridors.

RRFB near Saint Alphonsus Medical Center


RRFB with pedestrian refuge near Lions Park

Existing Public Transportation System

The following section describes the existing public transportation services available in Ontario, including transit services, ridership trends, and ridership patterns.

Transit Service

Transit services within Ontario are provided by the Malheur Council on Aging and Community Services (MCOACS) and Snake River Transit (SRT). Figure 4 shows the existing transit service routes.

SRT-Malheur Express

Operated by MCOACS, the SRT-Malheur Express is a fixed-route bus line that provides local service within Ontario. The service is available to the general public on weekdays and on the first Saturday of every month. The fixed route begins and ends at the Walmart on NE East Lane in Ontario and runs a one-hour loop with 16 stops throughout the city. A connection with the SRT bus line is provided every hour at the Walmart, which allows riders to transfer and connect to the Fruitland and Payette areas.

Snake River Transit

Snake River Transit is a flex-route bus line that provides intercity service between Ontario, Fruitland, and Payette. The service is available to the general public on weekdays only. The route begins and ends at the Walmart on NE East Lane in Ontario and runs a one-hour loop with seven stops in Fruitland and twelve stops in Payette. Like a demand-response service, the SRT bus will stop for patrons anywhere along the fixed route that is within a ¾-mile deviation. However, door-to-door service is not available.

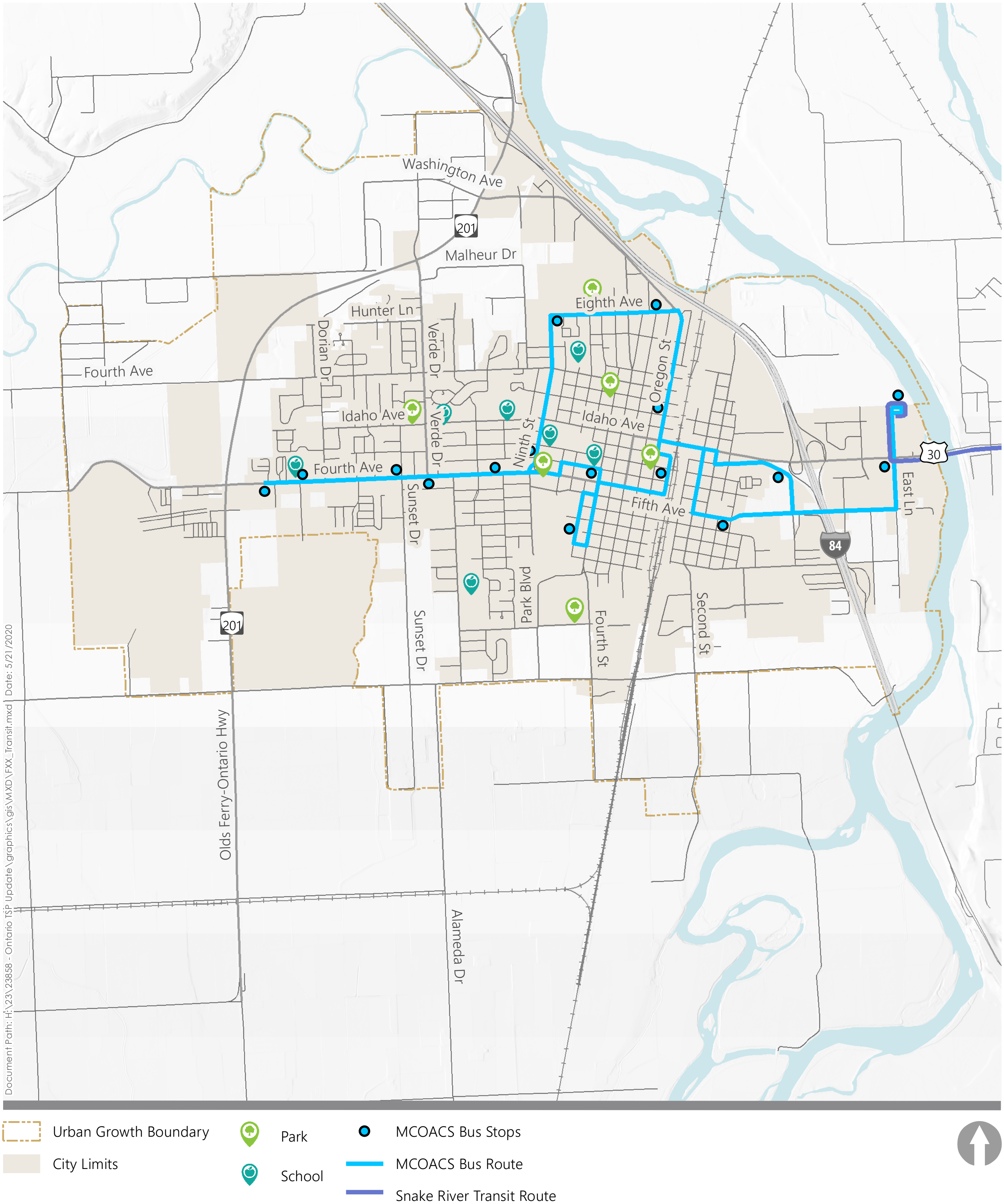

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Figure 4

Transit Routes

Ridership Trends

Figure 5 shows historic annual transit ridership for the SRT-Malheur Express and Snake River Transit fixed-route bus lines. In Fiscal Year (FY) 2019, the SRT-Malheur Express had approximately 19,500 riders and Snake River Transit had approximately 16,500 riders. The SRT-Malheur Express has experienced an overall decline in ridership since FY 2015, but has seen an increase in ridership from FY 2017 to FY 2019. Snake River Transit saw a decline in ridership from FY 2018 to FY 2019.

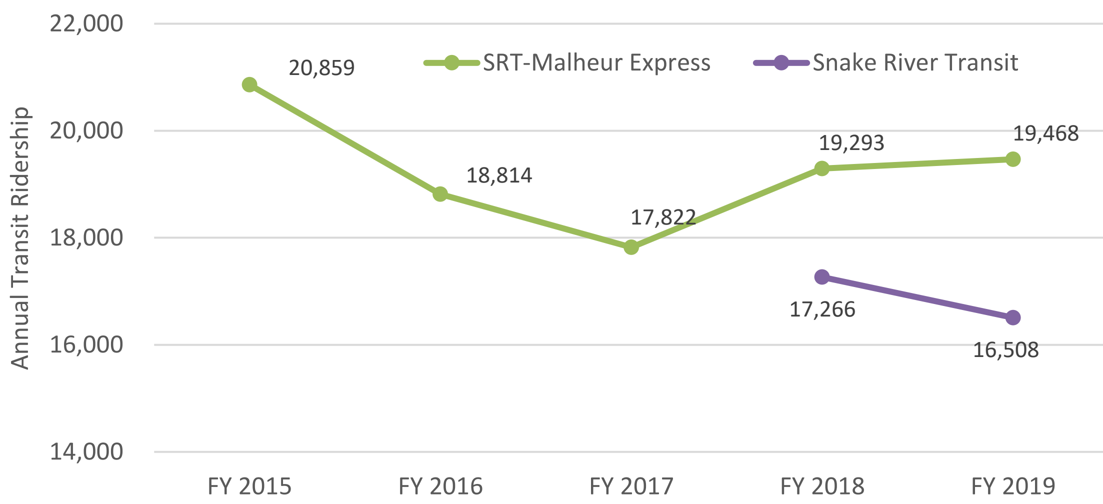


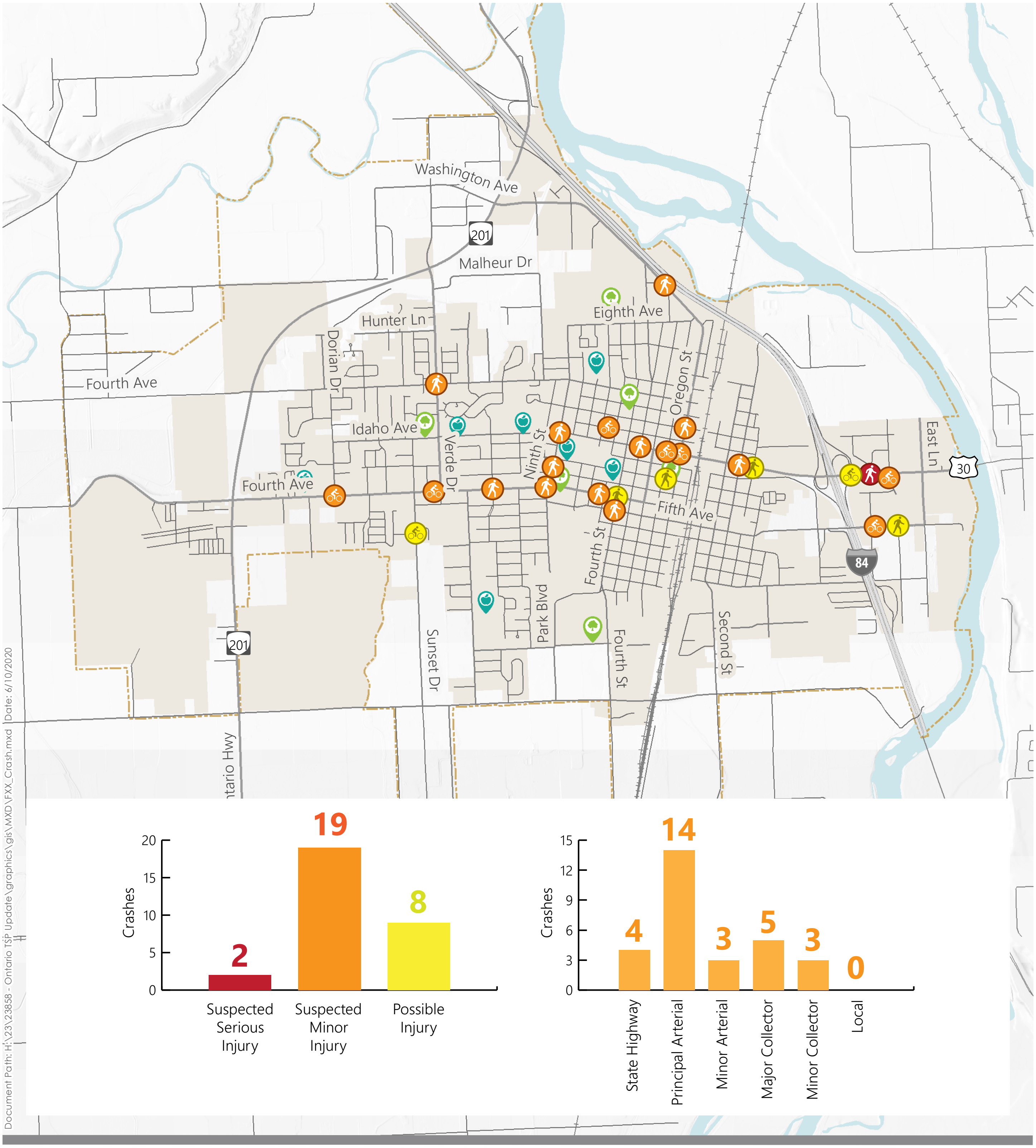
Figure 5 Annual Transit Ridership

Crash Data Analysis

A safety analysis has been conducted by reviewing historical crash data, as described in the following sections.

Crash Data

City-wide crash records were obtained from ODOT for the most recent five-year period for which data was available (January 1, 2013 through December 31, 2017). As shown in Table 1, there were 29 reported crashes involving pedestrians or bicyclists that occurred over the five-year period within the city. Figure 6 maps the pedestrian and bicycling-related crash data, and *Attachment B* provides the crash data summary sheets.



Urban Growth Boundary

City Limits

Park

School

Bicycle/Pedestrian Crash Types

Bicycle, Possible Injury

Bicycle, Suspected Minor Injury

Bicycle, Suspected Serious Injury

Pedestrian, Possible Injury

Pedestrian, Suspected Minor Injury

Pedestrian, Suspected Serious Injury

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Figure 6

Bicycle and Pedestrian Crashes (2013-2017)

Table 1 Reported Pedestrian and Bicycle Crashes by Severity (2013 – 2017)

Crash Type	Crash Severity					Total Number of Crashes
	Fatal	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	
Bicycle	0	1	7	4	0	*12*
Pedestrian	0	1	12	4	0	*17*
Total	***0***	***2***	***19***	***8***	***0***	***29***

Bicycle Crashes

There was a total of 12 crashes involving people biking over the five-year period analyzed. Most of these crashes (eight total) occurred along the 4th Avenue and Idaho Avenue corridors, which are the primary roadways connecting the east and west sides of the city. There are no bike lanes present on most of these corridors except for the segment of Idaho Ave east of Interstate 84. No other observable trends in the crashes were identified.

Pedestrian Crashes

There was a total of 17 crashes involving people walking over the five-year period analyzed. Like the bicycle crashes, roughly half of pedestrian crashes (nine total) occurred along the 4th Avenue corridor, the Idaho Avenue corridor, and other arterials. The remaining crashes occurred at roadway intersections. No other observable trends in the crashes were identified.

Multimodal Conditions Assessment

The multimodal assessment includes an evaluation of bicycle level of traffic stress, pedestrian level of traffic stress, and a qualitative multimodal assessment of the existing transit systems. The multimodal assessment is used to identify system gaps and deficiencies in the existing bicycling and walking networks.

A gap is defined as a missing link in the network, such as an identified key route that is missing a sidewalk or designated bicycle facility. A deficiency is defined as a facility that does not meet the standard or is insufficient to meet the users' needs. Examples of deficiencies include:

- Locations with documented pedestrian and bicycle crash histories
- On-street connection that has a Bicycle Level of Traffic Stress rating greater than 2
- On-street connection that has a Pedestrian Level of Traffic Stress rating greater than 2
- Roadway crossings where enhancement may be warranted

Potential solutions to address these issues will be the focus of the next phase of this project.

Bicycle Level of Traffic Stress

Ontario's roadways were evaluated with respect to their suitability for bicycling. The ODOT Analysis Procedures Manual (APM) (Reference 1) provides a methodology for evaluating bicycle facilities called Bicycle Level of Traffic Stress (BLTS). As applied by ODOT, this methodology classifies four levels of traffic stress that a cyclist can experience on the roadway, ranging from BLTS 1 (little traffic stress) to BLTS 4 (high traffic stress). A road segment that is rated BLTS 1 generally has low traffic volumes and travel speeds and is suitable for all cyclists, including older children. A road segment that is rated BLTS 4 generally has high traffic volumes and travel speeds and is perceived as unsafe by most adults. The BLTS score is determined based on the vehicular speed and volume, number of travel lanes, presence and width of an on-street bicycle facility and/or adjacent parking lane, and at intersections, crossing related factors, such as the presence of turn lanes or a median refuge island. Per the APM, BLTS 2 is considered a reasonable target for bicycle facilities due to its acceptability for most adults. Table 2 provides a detailed description of each BLTS rating.

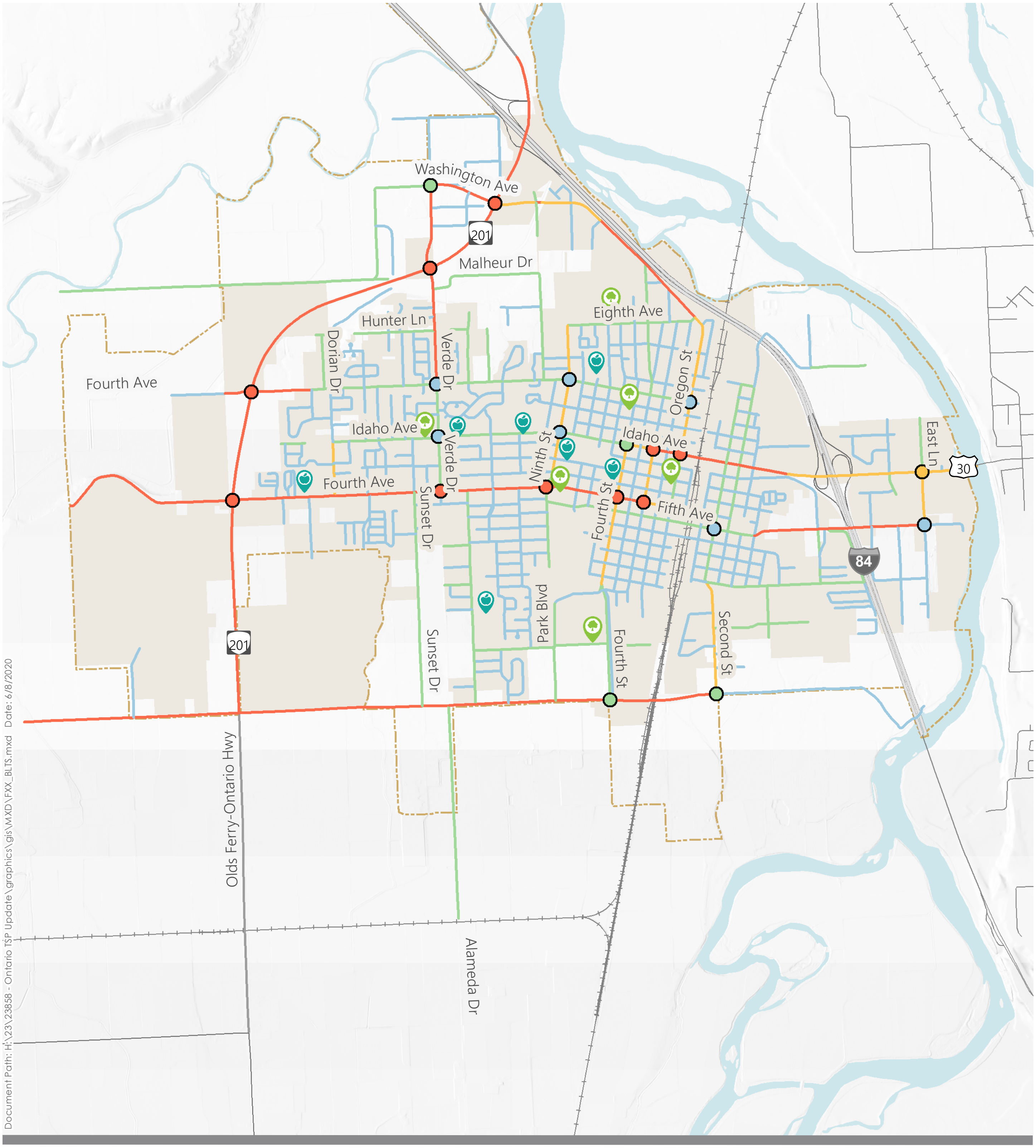
Table 2 Bicycle Level of Traffic Stress (BLTS) Description

BLTS Rating	Description of BLTS Segment, Suitability and Condition[1]
1	Represents little to no traffic stress, suitable for all cyclists. This includes children that are trained to safely cross intersections alone and supervising riding parents of younger children. Traffic speeds and volumes are low. Also includes paths and lanes that are physically separated from motor vehicle traffic.
2	Represents little traffic stress but requires more attention that young children can handle, so is suitable for teen and adult cyclists with adequate bike handling skills. Traffic speeds and volumes are slightly higher than LTS 1 streets, but speed differentials are still low.
3	Represents moderate stress and suitable for most observant adult cyclists. Traffic speeds and volumes are moderate.
4	Represents high stress and suitable for experienced and skilled cyclists. Traffic speeds and volumes are high.

[1]Descriptions for BTLS ratings were sourced from Chapter 14 of ODOT APM Volume 2.

Figure 7 shows the results of the BLTS evaluation. All roadway segments within the city were evaluated. Intersections between arterial and major collector roadways were also evaluated.

Most local roads and minor collectors within the city have a BLTS 1 or BLTS 2 rating. These roadways typically do not have dedicated bicycle facilities but tend to have low traffic speeds and low traffic volumes. These streets may be suitable for most adults for bicycling as they are today, so long as uncontrolled (e.g., unsignalized) crossings are addressed appropriately. Therefore, crossings are the primary focus when examining these streets for designation as a bike route.



Urban Growth Boundary

City Limits

Park

School

Intersection BLTS

1

2

3

4

Segment BLTS

1

2

3

4

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Figure 7

Bicycle Level of Traffic Stress

Roadways that have BLTS 3 or BLTS 4 rating tend to have four to five-lane cross-sections, narrow or no bike lanes, and/or high vehicle speeds. Roadways within the study area that have a BLTS 3 or BLTS 4 rating are gaps in the bicycling network for children and most adults. Some of these locations are:

- N Oregon Street (OR 201 to Idaho Avenue)
- Fourth Avenue (OR 201 to SW 1st Street)
- Fifth Avenue (S Oregon Street to East Lane)
- Idaho Avenue (SW 2nd Street to Snake River)
- SW 18th Avenue (OR 201 to Second Street)

Most signalized intersections have BLTS 3 or BLTS 4 ratings due to a lack of bike lanes and higher vehicle speeds on the intersection approaches. Most unsignalized intersections have BLTS 1 or BLTS 2 ratings because they are on roadways with narrower cross-sections (e.g., two or three lanes) and lower vehicle speeds.

Other barriers to people biking in Ontario include I-84, the railroad, and crossing Fourth Avenue. There are only two roads that cross both I-84 and the railroad (Idaho Avenue and Fifth Avenue), and those roadways have BLTS 3 or BLTS 4 ratings at the crossing locations. From OR 201 to SW Second Street, Fourth Avenue has a five-lane cross-section, high vehicle speeds and volumes, and BLTS 4 ratings on all its intersections.

Pedestrian Level of Traffic Stress

The ODOT APM provides a similar analysis method for evaluating walking conditions, called Pedestrian Level of Traffic Stress (PLTS). This methodology classifies four levels of traffic stress that a pedestrian can experience on the roadway, ranging from PLTS 1 (little traffic stress) to PLTS 4 (high traffic stress). Per the APM, PLTS 2 is considered a reasonable target for most pedestrian facilities due to its acceptability for most people. Table 3 provides a detailed description of each PLTS rating.

Table 3 Pedestrian Level of Traffic Stress (PLTS) Descriptions

PLTS Rating	Description of PLTS Segment, Suitability and Condition[1]
1	Represents little to no traffic stress, suitable for all users including children 10 years or younger, groups of people and people using wheeled mobility devices. Provides a separated facility with a buffer between the pedestrian and vehicular traffic.
2	Represents little traffic stress but requires more attention to the traffic situation than of which young children may be capable. Suitable for children over 10, teens, and adults. Provides sidewalks in good condition; roadways may have higher speeds and volumes
3	Represents moderate stress and is suitable for adults. An able-bodied adult would feel uncomfortable but safe using this facility. Includes higher speed roadways with smaller or no buffers. Small areas in this facility may be impassable for a person using a wheeled mobility device. Some users are willing to use this facility
4	Represents high traffic stress. Only able-bodied adults with limited route choices would use this facility. Traffic speeds are moderate to high with narrow or no pedestrian facilities provided. Only the most confident users are willing to use this facility.

[1]Descriptions for PTLS ratings were sourced from Chapter 14 of ODOT APM Volume 2.

The PLTS score is based on four criteria, including sidewalk condition, physical buffer type, total buffering width, and general land use. All four criteria are scored from 1-4 and the highest score determines the overall score for the road segment.

Figure 8 shows the results of the PLTS evaluation on the city's roadway facilities. All roadway segments within the city were evaluated, and both sides of these roadway segments were analyzed. Intersections between arterial and major collector roadways, the same intersections in the BLTS evaluation, were also evaluated.

Many roads were rated as PLTS 4. In general, this was driven by incomplete or non-existent sidewalks along a segment, such as in neighborhoods to the north of Idaho Avenue/west of Oregon Street and south of Idaho Avenue/east of the railroad tracks, or along multilane roadways where there was little buffering distance between the sidewalk and traffic, such as on SW Fourth Avenue. If no sidewalk is present, then the segment automatically receives a PLTS 4 rating, per the APM.

A PLTS 2 rating was common in areas with lower speed, two-lane roads with residential or commercial land uses. These are common in and around Ontario's central business district and in the residential neighborhoods north of Fourth Avenue and west of Ninth Street.

Most intersections received a PLTS 2 or PLTS 3 rating. While all of these intersections had pedestrian signals and marked crosswalks, permissive left and right turns were allowed at many locations, and some intersections did not have adequate lighting.

Other barriers to people walking in Ontario include I-84 and the railroad. There are only two roads that cross both I-84 and the railroad (Idaho Avenue and Fifth Avenue), and those roadways have PLTS 3 or PLTS 4 ratings at the crossing locations. Additionally crossing SW 4th Avenue can be stressful away from signalized intersections and as such presents itself as a barrier for people walking from the residential areas north of the street to commercial destinations on the south side of the street.

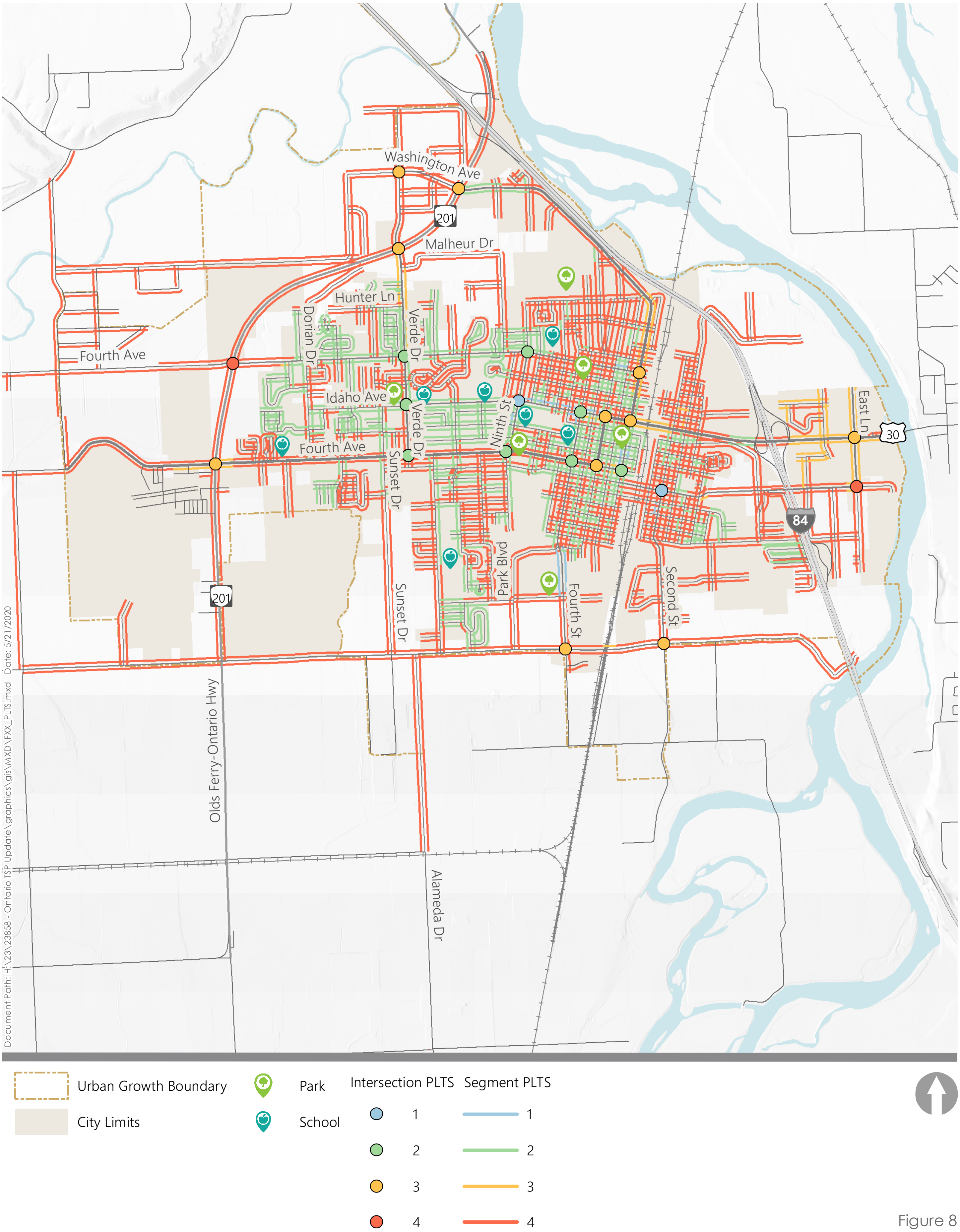

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Figure 8

Pedestrian Level of Traffic Stress

Transit Assessment

The APM provides a methodology for evaluating transit service, called the Qualitative Multimodal Assessment (QMA). It provides a high-level network evaluation of multimodal facilities and services to highlight areas for potential improvements. The methodology is based on principles of the 2010 Highway Capacity Manual and uses context-based subjective ratings of *Excellent*, *Good*, *Fair*, and *Poor*. The QMA methodology was used to evaluate the transit facilities and services in Ontario to identify potential areas to be addressed as part of this work.

The following factors are considered for the Transit QMA:

- Frequency and on-time reliability
- Schedule speed/travel times
- Transit stop amenities
- Connecting pedestrian/bike network

Table 4 outlines the methodology used for determining transit QMA within the City of Ontario.

Table 4 Transit QMA Methodology

Category	Excellent	Good	Fair	Poor
Frequency and on-time reliability	<15-minute headways	15 to 30-minute headways	30 to 60-minute headways	60+ minute headways
Schedule speed/travel times	<20% slower than driving	20% to 40% slower than driving	40% to 60% slower than driving	>60% slower than driving
Transit stop amenities	Shelter	Bench	Sign with waiting area	No waiting area and/or no sign
Connecting pedestrian/bike network	BLTS and PLTS 2 or better and crossing	BLTS and PLTS 2 or better with no crossing	BLTS or PLTS >2 and no crossing	BLTS and PLTS >2 and no crossing

Table 5 shows the results of the QMA for the SRT-Malheur Express. The Snake River Transit fixed-route line did not undergo a QMA as it only has one stop in the City of Ontario. As shown in Table 5, the SRT-Malheur Express has a "Poor" QMA rating due to its travel time compared to driving.

Table 5 Transit QMA Results

Route	Frequency & On-Time Reliability	Schedule Speed & Travel Time	Transit Stop Amenities	Connection to Bicycle and Pedestrian Network	Overall Transit QMA Rating
SRT-Malheur Express	Bus line has 60-minute headways – ***Fair***	Travel across town with the bus (from the Walmart bus stop to the Grocery Outlet bus stop) is over 100% slower than driving – ***Poor***	Varies by stop. Some stops have a shelter, while some stops only have a sign.	Varies by stop. See LTS results in Figure 7 and Figure 8.	***Poor***[1]

[1]The poor rating assigned to the Schedule Speed and Travel Time category is the worst-case rating and will determine the Overall Transit QMA Rating, regardless of the other ratings

Planned Infrastructure Improvements

The City's 2006 TSP and 2018 Parks and Recreation Master Plan contain projects to improve walking and biking in Ontario. The projects include sidewalks, off-street trails, and bike lanes. These projects are shown in *Attachment C*.

EAST IDAHO AVENUE REFINEMENT AREA

The second component of this memo is an assessment of existing traffic and safety conditions in the East Idaho Avenue Refinement Area. This assessment will be used as the baseline for the East Idaho Avenue Refinement Plan, which will address active transportation connectivity, vehicle circulation, and streetscape improvements in the area.

Study Area

The Refinement Area consists of East Idaho Avenue between I-84 and the Snake River Idaho Bridge. The study area is shown in Figure 9. The existing conditions assessment of the area will focus on traffic and safety conditions at the six study intersections shown in Figure 9.

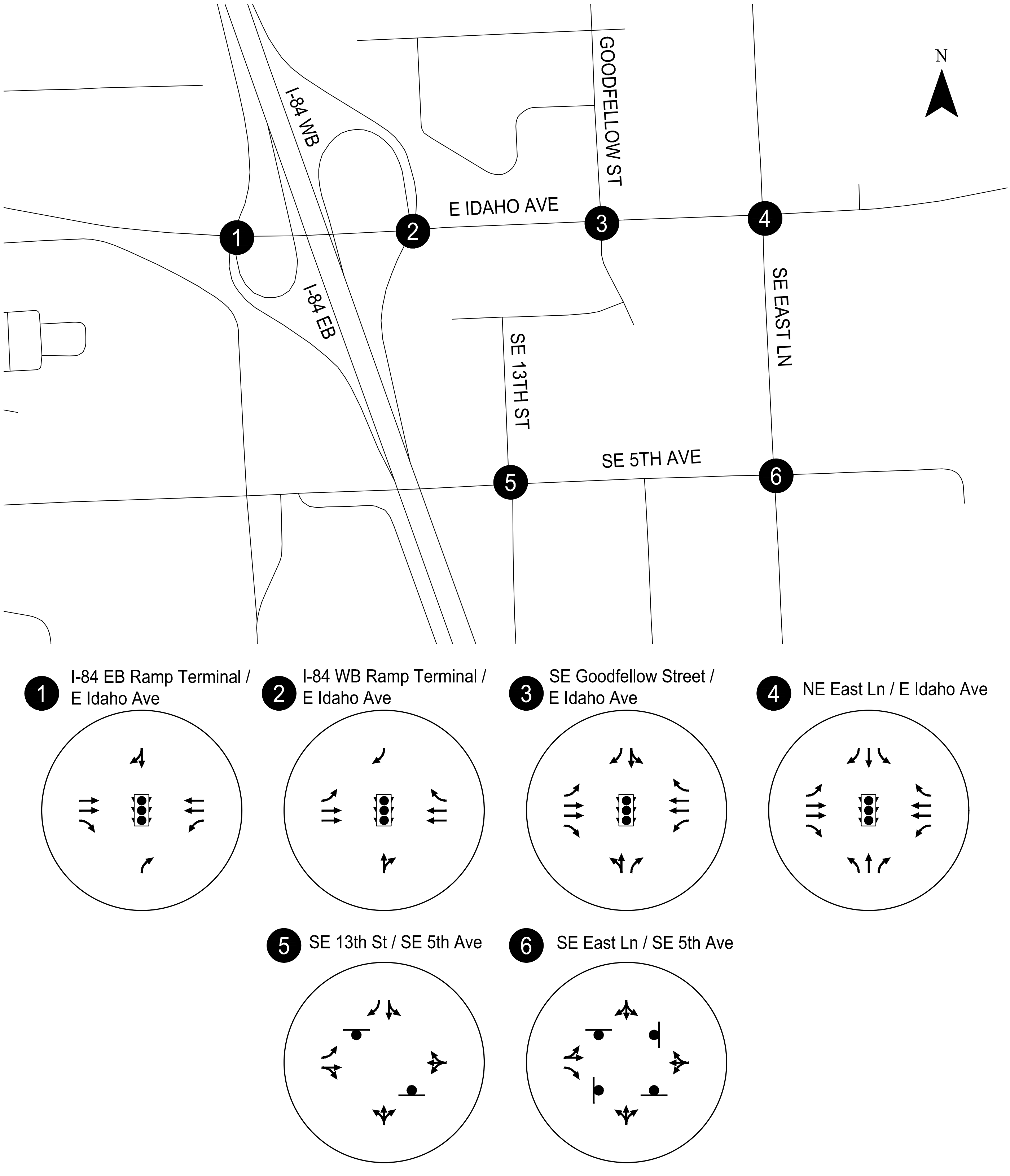
Roadway Facilities

Figure 9 shows the study intersection lane configurations. Table 1 shows the basic characteristics of the roadways within the East Idaho Refinement Area, including ownership, functional classification, and freight route designation. Roadways in the study area are owned and maintained by the City or by ODOT. East Idaho Avenue and the I-84 On and Off-Ramps are the only designated freight routes in the study area.

Table 6 Existing Transportation Facilities and Roadway Designations

Roadway	Existing Roadway Ownership	Functional Classification[1]	Cross Section	Posted Speed (MPH)	Designated Freight Route?[2]
E Idaho Ave (US 30)	ODOT	District Highway (E of I-84) State Highway (W of I-84)	5 lanes	35	OHP Freight Route (west of I-84, only), Reduction Review Route, and National Network State Freight Route
Goodfellow St	City	Minor Collector	2 lanes	Not Posted	No
SE 13th St	City	Local Road	2 lanes	Not Posted	No
East Ln	City	Minor Arterial	2 lanes	25	No
SE 5th Ave	City	Minor Arterial	2 lanes	35	No

[1]ODOT Functional Classifications are from the *Oregon Highway Plan (*Reference 2) and City functional classifications are from the *City of Ontario Transportation System Plan* (Reference 3) [2]Data for ODOT facilities is from ODOT TransGIS website (Reference 4)



LEGEND

- Study Intersections
- Stop Sign
- Lane Movement

Existing Lane Configurations
East Idaho Ave Refinement Area
Ontario, OR

Figure 9

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Analysis Methodology

The Highway Capacity Manual, 6th Edition (HCM 6) methodology was used to analyze traffic operations at all the study intersections. Synchro 10 software produced HCM 6 reports for all intersections that summarize the intersection level-of-service and delay. Intersection volume-to-capacity (V/C) ratios were manually calculated using the HCM 6 methodology.

Performance Measures

Intersection operations along E Idaho Avenue (US 30) are assessed against the mobility targets presented in the OHP. The OHP provides different target V/C ratios depending on the roadway type and whether the roadway is in a metro area.

The Ontario TSP (Reference 3) presents a level of service (LOS) standard for intersection operations on City roadways (i.e., SE 5th Avenue). The City LOS standard is LOS 'D' for signalized intersections and LOS 'E' for unsignalized intersections, though signal warrants should be checked if the critical movement at an unsignalized intersection operates at LOS 'E.'

Performance measures for the study intersections are shown in Table 7.

Table 7 Study Intersection Performance Measures

Intersection	OHP Mobility Target or City LOS Standard
I-84 EB Ramp Terminal / E Idaho Ave	0.85
I-84 WB Ramp Terminal / E Idaho Ave	0.85
SE Goodfellow St / E Idaho Ave	0.95
NE East Lane / E Idaho Ave	0.95
SE 13th St / SE 5th Ave	LOS E (if signal warrants are not met), LOS D (if signal warrants are met)
SE East Ln / SE 5th Ave	LOS E (if signal warrants are not met), LOS D (if signal warrants are met)

Traffic Volumes

Manual traffic counts were conducted by ODOT at the study intersections along E Idaho Ave on a Monday in June 2018 from 6:00 a.m. to 10:00 p.m. The City of Ontario collected traffic counts at the SE 5th Ave/SE East Ln and SE 13th St/S 5th Ave intersections on March 3rd, 2020 (a Tuesday) from 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m.

30th Hour Volumes (30 HV) were developed by applying seasonal factors to the traffic counts. The ATR Characteristic Table Method, described in the APM, was used. A seasonal adjustment factor of 1.02 was applied to the traffic counts collected in June and a seasonal adjustment factor of 1.09 was applied to the traffic counts collected in March.

The East Idaho Avenue traffic counts conducted in year 2018 were adjusted to year 2020 by using the cumulative growth method based on infill development. Table 8 shows the estimated trip generation of development built after the year 2018 traffic counts. The total trips shown in Table 8 were assigned to the study intersections based on the existing distribution of traffic at the study intersections.

Table 8 Infill Development Trip Generation

Land Use	ITE Code[1]	Units	Daily	Weekday AM Peak Hour			Weekday PM Peak Hour		
				Total	In	Out	Total	In	Out
Marijuana Dispensary	882	2,000 sf	506	21	12	9	44	22	22
Car Wash and Detail Center	949	9 Wash Stalls	972	78	49	29	122	60	62
Used Automobile Sales	841	3,000 sf	81	6	5	1	11	5	6
Department Store	875	40,000 sf	915	23	15	8	78	39	39
Mini-Warehouse Storage	151	52 units	79	5	3	2	9	4	5
Total:			**2,553**	**133**	**84**	**49**	**264**	**130**	**134**

[1]ITE Codes and trip generation rates are from Trip Generation Manual 10th Edition (Reference 5)

The year 2020 traffic volumes for the a.m. and p.m. peak hours are shown in Figure 10 and Figure 11, respectively.

Existing Traffic Operations Analysis Results

Traffic operations at the study intersections under existing traffic conditions are shown Figure 10 and Figure 11 for the a.m. and p.m. peak hours, respectively. All intersections meet the target performance measures shown in Table 7. Traffic operations worksheets are shown in *Attachment D*.

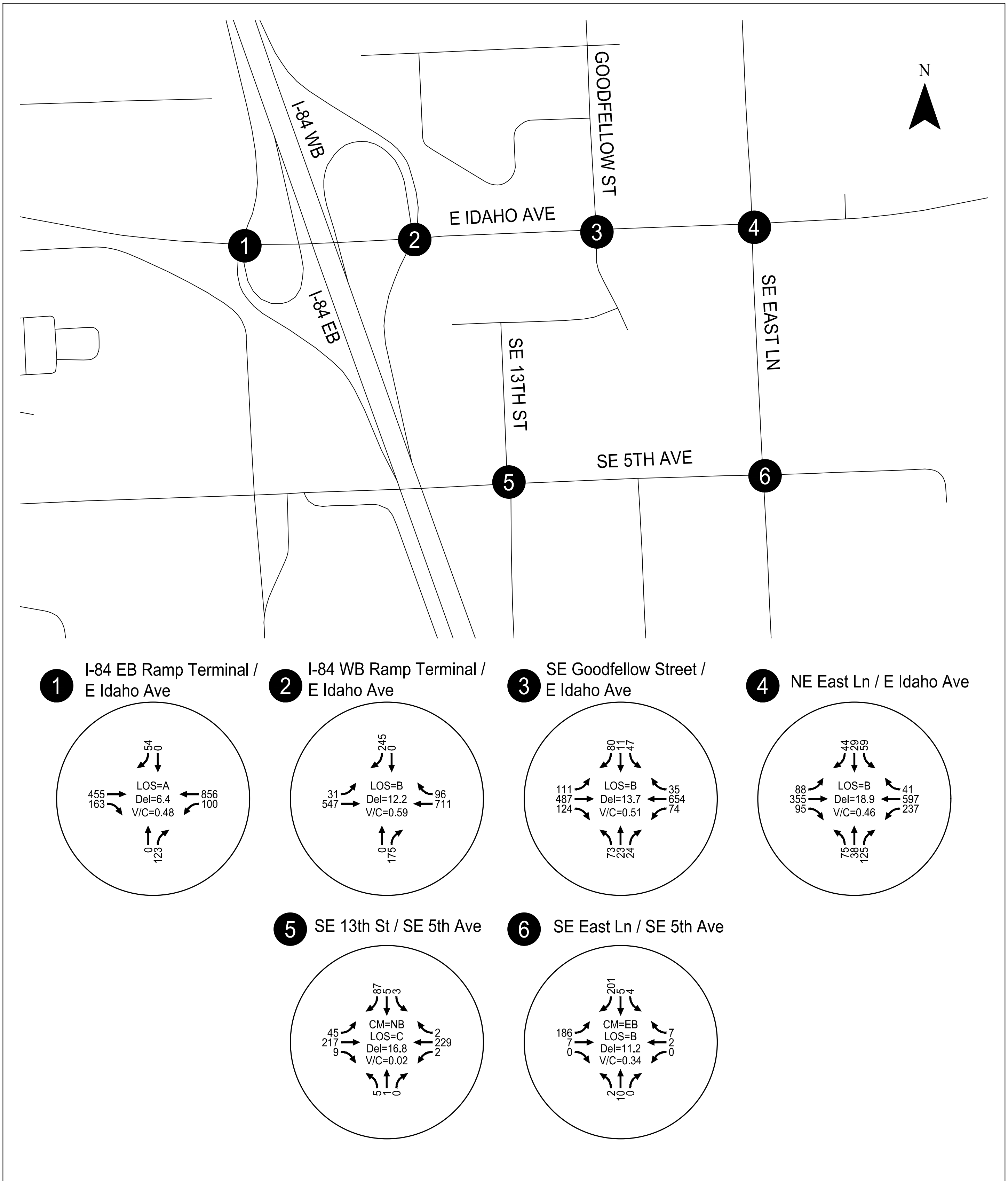
Crash Analysis

Crash records for the East Idaho Avenue Refinement Area were obtained from ODOT for the most recent five-year period for which data was available (January 1, 2013 through December 31, 2017). A summary of the crash activity at each intersection is shown in Table 9.

Table 9 Summary of Crash Activity at East Idaho Avenue Study Intersections

Intersection	# of Crashes	Crash Severity			Crash Type						Crash Rate[1]
		PDO	Injury	Fatal	Rear-End	Turning	Angle	Sideswipe	Bike/Ped	Other	
E Idaho Ave / I-84 EB Ramps	28	12	16	0	19	7	1	1	0	0	0.52
E Idaho Ave / I-84 WB Ramps	33	14	19	0	23	7	1	0	2	0	0.62
E Idaho Ave / Goodfellow St	45	27	18	0	23	10	7	1	2	2	***0.89***
E Idaho Ave / East Ln	57	27	30	0	41	9	1	3	0	3	***1.00***
SE 13th St / SE 5th Ave	4	1	3	0	0	3	0	0	1	0	0.22
SE East Ln / SE 5th Ave	2	0	2	0	0	1	0	0	0	1	0.21

[1]Crash rate per million entering vehicles. Crash rates **bolded**, *italicized*, and shaded red are above the 90th percentile crash rates of similar intersections.

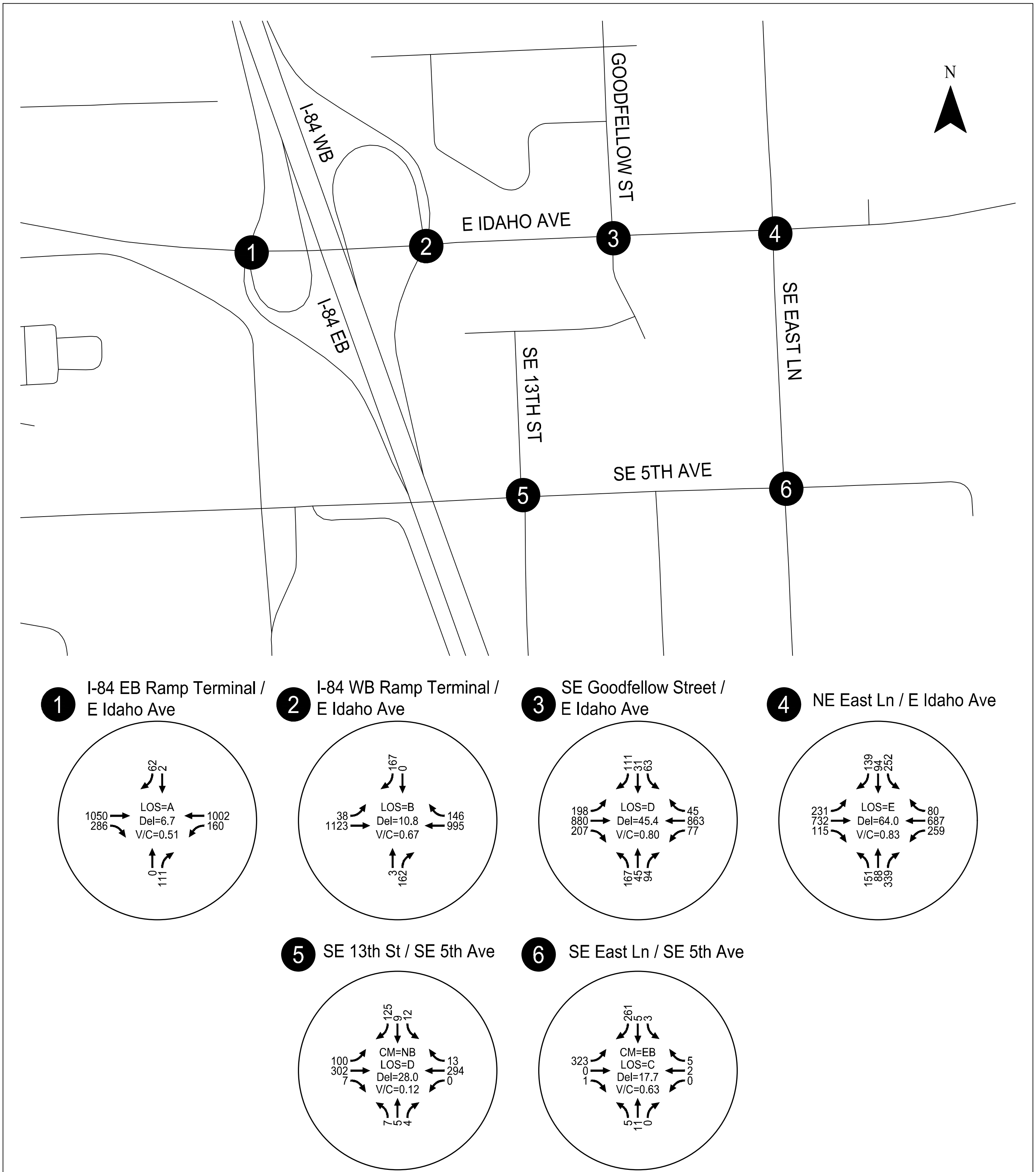


\# - Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio

Existing AM Peak Hour Operations
East Idaho Ave Refinement Area
Ontario, OR

Figure 10

KITTELSON & ASSOCIATES



- Study Intersections
CM - Critical Movement
LOS - Level of Service
Del - Vehicle Delay (s)
V/C - Volume-To-Capacity Ratio

Existing PM Peak Hour Operations
East Idaho Ave Refinement Area
Ontario, OR

Figure 11

H:\23\23858 - Ontario TSP Update\graphics\dwgs\23858_E Idaho Ave_Figures.dwg May 21, 2020 - 5:28pm - mheisinger Layout Tab: Fig3_ExistingPM

The 90th percentile crash rate at 4-leg signalized and stop-controlled intersections in Oregon is 0.86 crashes/MEV and 0.41 crashes/MEV, respectively, as per the ODOT APM (Reference 1). The East Idaho Avenue/Goodfellow Street and East Idaho Avenue/East Lane intersections both have crash rates higher than the 90th percentile crash rate and are also noted as intersections in the 90th to 95th percentile category of the ODOT Safety Priority Index System (SPIS). These intersections will be evaluated further in the next phase of the project.

Approximately 65% of all crashes in the East Idaho Refinement Area are rear-ends. There is currently no coordination between the traffic signals on East Idaho Avenue, which could contribute to congestion on the corridor and an increase in rear-end related crashes. Other key crash data findings for study intersections on East Idaho Avenue are as follows:

- East Idaho Avenue/I-84 EB Ramps
  - 4 of the turning crashes were between vehicles turning left onto the I-84 EB Ramp and vehicles going straight on East Idaho Avenue
- East Idaho Avenue/I-84 WB Ramps
  - 5 of the turning crashes were between vehicles turning left onto the I-84 WB Ramp and vehicles going straight on East Idaho Avenue
  - 9 rear-ends on south approach
  - 2 bike crashes on south side of intersection
- East Idaho Avenue/Goodfellow Street
  - 7 of the turning crashes were between straight and turning vehicles from opposite directions
  - Crash activity primarily in center of intersection (angle/turning) and on east/west approaches (rear-ends)
  - The majority of injury crashes (56%) are turning/angle related
- East Idaho Avenue/East Lane
  - Highest amount of crashes and highest crash rate in East Idaho Avenue Refinement Area
  - The highest number of rear-end crashes (18) are on the EB approach
  - The majority of injury crashes (83%) are rear-end crashes

Bicycle and Pedestrian Activity in the East Idaho Avenue Refinement Area

The following section describes bicycle and pedestrian counts at the East Idaho Avenue study intersections and provides an inventory of existing bicycle and pedestrian facilities in the East Idaho Avenue Refinement Area.

Bicycle and Pedestrian Counts

Pedestrian counts were included in the 16-hour traffic counts at the East Idaho Avenue study intersections. Bicycle counts were included in the 16-hour traffic counts at the East Idaho

Avenue/Goodfellow Street and East Idaho Avenue/East Lane intersections. Figure 12 shows the 16-hour bicyclist and pedestrian counts at the East Idaho Avenue study intersections.

Figure 12 Bicycle and Pedestrian Counts on East Idaho Avenue

Pedestrian crossing volumes are the highest at the Goodfellow Street intersection with similar amounts of activity across all four legs of the intersection. Crossings of E Idaho Avenue are similar at the Goodfellow Street and East Lane intersections. There is little recorded bicyclist activity at all study intersections. Generators of pedestrian activity in the area include restaurants, motels, the Greyhound bus station and transit center, and other commercial businesses.

Bicycle and Pedestrian Facilities

Bicycle and pedestrian facilities within the Refinement Area are shown in Figure 2 and Figure 3. East Idaho Avenue has bike lanes and full sidewalk coverage within the study area. There are marked pedestrian crossings on all signalized intersection legs, with the exceptions of the east leg of the East Idaho Avenue / I-84 WB Ramp Terminal intersection and the west leg of East Idaho Avenue / I-84 EB Ramp Terminal intersection.

There are some gaps in sidewalk coverage and no bike lanes on Goodfellow Street, East Lane, and SE 13th Street within the East Idaho Avenue Refinement Area. The majority of SE 5th Avenue does not have sidewalk coverage.

REFERENCES

1. Oregon Department of Transportation. *Analysis Procedures Album*. 2019.
2. Oregon Department of Transportation. *Oregon Highway Plan.* 2015.
3. City of Ontario. *Transportation System Plan*. 2006.
4. Oregon Department of Transportation. *TransGIS Website*. https://gis.odot.state.or.us/transgis/. Accessed in March 2020.
5. Institute of Transportation Engineers. *Trip Generation Manual 10th Edition*. 2017.

Attachment A
Active Transportation and Transit Toolbox

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This document provides a compilation of active transportation treatments including bicycle, pedestrian and transit development features that could potentially be considered for implementation within the Ontario Active Transportation Plan Update study area. This toolbox provides illustrative examples of design elements, including text explanations of the pros and cons for use within the Study Area, and outlines the approximate right-of-way (ROW) as well as other factors to consider in development of alternatives.

ACTIVE TRANSPORTATION TREATMENTS

The treatments are organized into the following categories:

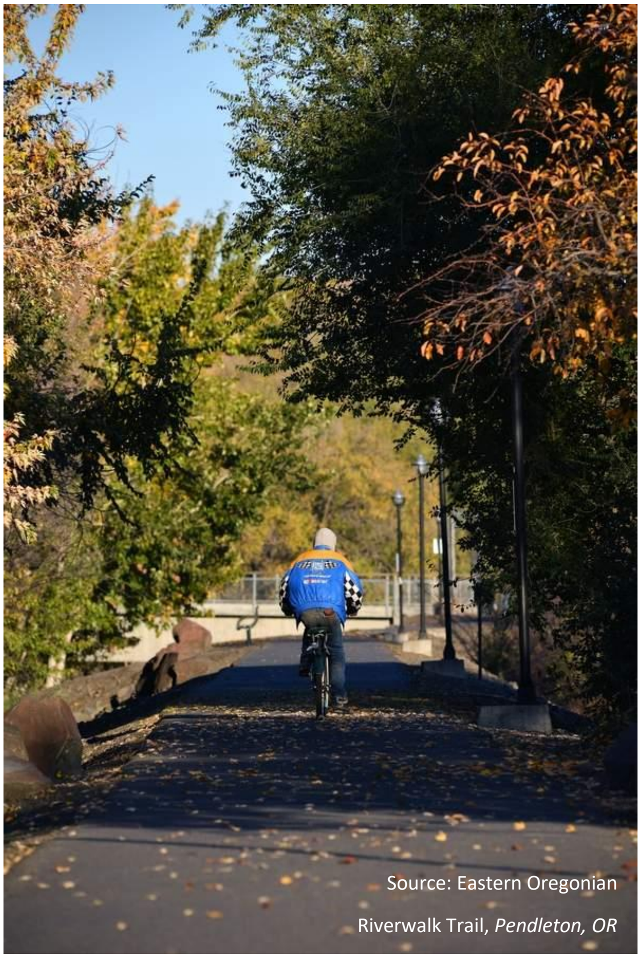
- Bicycle Facilities & Amenities
- Pedestrian Facilities & Amenities
- Transit Facilities & Amenities

Headers and footers indicate the categories. Where applicable, the treatments are organized from highest level of protection to lowest level of protection. Typically, the treatments that provide the most protection will have the highest appeal to a wide variety of users. For example, bicycle treatments are commonly categorized by the level of separation they provide bicyclists from motor vehicles. Separated facilities have been found to attract more bicyclists of a variety of ages and abilities and are generally considered “lower stress” facilities. However, separated facilities must be carefully designed to allow for safe crossings and turning movements for both motor vehicles and bicyclists at intersections. As another example, treatments for pedestrian mid-block crossings range from a high-level of protection with a pedestrian signal to a lower level of protection with a high-visibility crosswalk. Intermediary levels of protection can be provided with a pedestrian hybrid beacon or rectangular rapid flashing beacon.

Each treatment page also includes a section with resources for additional guidance on that treatment. The ODOT Blueprint for Urban Design can also be used as a resource for identifying appropriate treatment types based on a performance based, context sensitive, and practical design approach to accommodate all modes of transportation.

MULTI-USE PATH

Cost: $$$



Source: Eastern Oregonian

Riverwalk Trail, *Pendleton, OR*

Powder River Trail, *Baker City, OR*

Multi-use paths are paved, bi-directional, trails away from roadways that can serve both pedestrians and bicyclists. Multi-use paths can be used to create longer-distance links within and between communities and provide regional connections. They play an integral role in recreation, commuting, and accessibility due to their appeal to users of all ages and skill levels.

Benefits

- Provides facility for both pedestrians and bicyclists in less space than separate facilities.
- Separation from motor vehicles can attract users of all levels.

Constraints

- May be unsafe in areas with frequent crossings or driveways.
- When parallel to roadways, requires substantial space for buffer.
- Potential for conflicts between bicyclists and pedestrians due to shared facility.
- Isolated paths may introduce personal security concerns.

Typical Applications

- Medium- to long-distance links within and between communities that also serve as recreational facilities.
- Parallel to roads in rural areas where sidewalks and on-street facilities are not present.

Design Considerations

- Best suited in areas where roadway crossings can be minimized (such as parallel to travel barriers such as highways, railroad tracks, rivers, shorelines, natural areas, etc.).
- Necessitate high-visibility treatments for crossings.
- A minimum width of 10 feet is recommended for low-pedestrian/bicycle-traffic contexts; 12 to 20 feet should be considered in areas with moderate to high levels of bicycle and pedestrian traffic.
- Pavement markings can be used to indicate distinct space for pedestrian and bicycle travel.

Additional Guidance

- AASHTO Guide for the Development of Bicycle Facilities
- ODOT Highway Design Manual

BUFFERED BIKE LANE

Cost: $-$$$

Bend, OR

Source: movingahead.org

Buffered bicycle lanes are on-street lanes that include an additional striped buffer of typically 2-3 feet between the bicycle lane and the vehicle travel lane and/or between the bicycle lane and the vehicle parking lane.

Benefits

- A parking-edge buffer on streets with on-street parking can reduce the likelihood of "dooring."
- Increased separation from motor vehicles (over standard bicycle lanes) can increase bicyclist comfort.

Constraints

- Does not provide physical protection and therefore may not attract bicyclists of all levels.
- The additional width provided by the buffer may invite motorists to illegally park in the lane if not adequately signed and enforced.

Typical Applications

- Long-distance links within and between communities.
- Streets with sufficient pavement width to provide a buffer.
- Widely applicable in both urban and rural settings.
- Segments of the bicycle network with moderate vehicle speeds or volumes.

Design Considerations

- Typical buffer width is 2-3 feet, in addition to standard bicycle lane width of 5-6 feet, but a combined width of 6 feet is acceptable.
- Green pavement markings or striping can add visibility and awareness in "conflict areas" or intersections where bicycle and vehicle travel paths cross.
- Buffer space can have markings or rumble strips to deter vehicles from traveling or parking in the space.

Additional Guidance

- AASHTO Guide for the Development of Bicycle Facilities
- NACTO Urban Bikeway Design Guide
- ODOT Highway Design Manual
- ODOT Bicycle and Pedestrian Design Guide

ONE-WAY SEPARATED BIKE LANE

Cost: $-$$$

Portland, OR

Portland, OR

Boise, ID

A one-way separated bike lane (SBL), also known as a cycle track or protected bike lane, is a bicycle facility within the street right-of-way separated from motor vehicle traffic by a buffer and a physical barrier, such as planters, flexible posts, parked cars, or a mountable curb. On two-way streets, a one-way SBL would be found on each side of the street, like a standard bike lane.

Benefits

- Provides physical separation from motor vehicle traffic, which can attract users of all levels.
- Buffer can provide opportunities for landscaping.
- Reduced risk of "dooring" when parked cars are present.

Constraints

- Requires additional right-of-way over standard bike lane.
- Construction may be more expensive than standard bike lane.
- May introduce street maintenance considerations, depending on buffer type.

Typical Applications

- Roadway segments with sufficient right-of-way or where a "road diet" (vehicle lane reduction) can be implemented.
- Key segments of the bicycle network where more protection is desirable, such as areas with higher traffic volumes or speeds, or routes to common destinations, like schools.
- Roadways with infrequent driveways and side street accesses.

Design Considerations

- Intersections must be designed to ensure visibility of bicyclists using the facility. Treatments include separate signal phases for bicyclists and high visibility pavement markings.
- Buffer type can vary depending on context, presence of parking, and available right-of-way.
- Green pavement markings or striping can add visibility and awareness in "conflict areas" or intersections where bicycle and vehicle travel paths cross.

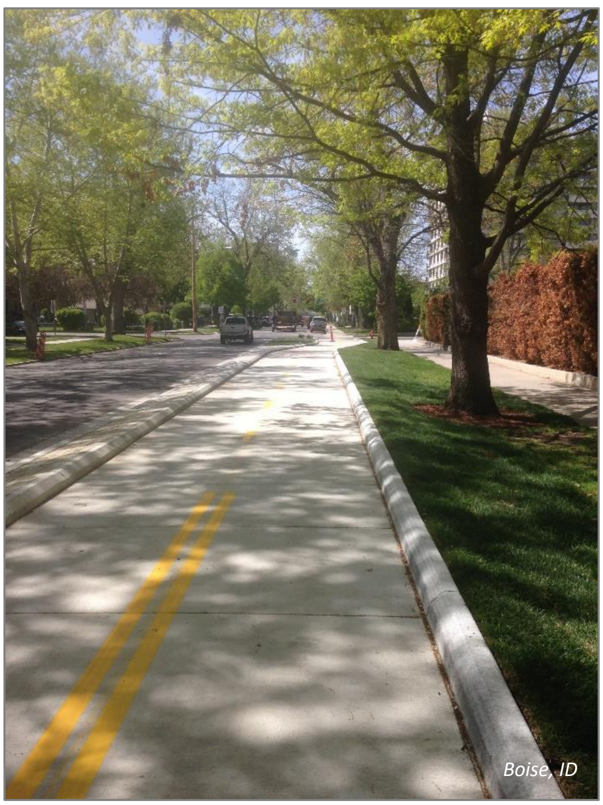
Additional Guidance

- NACTO Urban Bikeway Design Guide
- CROW Design Manual for Bicycle Traffic
- ODOT Highway Design Manual
- ODOT Bicycle and Pedestrian Design Guide
- FHWA Separated Bike Lane Planning and Design Guide

TWO-WAY SEPARATED BIKE LANE

Cost: $-$$$


Klamath Falls, OR


Boise, ID

A two-way separated bike lane (SBL), also known as a two-way cycle track or protected bike lane, is a facility within the street right-of-way separated from motor vehicle traffic by a buffer and a physical barrier, such as planters, flexible posts, parked cars, or a mountable curb. Two-way SBLs serve bi-directional bicycle travel within the facility on one side of the street.

Benefits

- Requires less right-of-way than a one-way SBL, due to the need for only one buffer.
- Provides physical separation from motor vehicle traffic, which can attract users of all levels.
- Reduced risk of "dooring" when parked cars are present.

Constraints

- May be less intuitive due to apparent "wrong-way" travel on one side of street.
- Concern about crashes in areas with frequent crossings or driveways.
- Construction may be more expensive than standard bike lane.
- May introduce street maintenance considerations, depending on buffer type.

Typical Applications

- On-street connections between off-street multi-use paths.
- Roadways with infrequent driveways and side street accesses.
- Key segments of the bicycle network where more protection is desirable, such as areas with higher traffic volumes or speeds or routes to common destinations, like schools.
- On one-way streets where two-way bicycle travel is desirable.

Design Considerations

- Intersections must be designed to ensure visibility of bicyclists using the facility. Treatments include separate signal phases for bicyclists and high visibility pavement markings.
- Buffer type can vary depending on context, presence of parking, and available right-of-way.
- Green pavement markings or striping can add visibility and awareness in "conflict areas" or intersections where bicycle and vehicle travel paths cross.

Additional Guidance

- Same as for one-way SBLs

STANDARD BIKE LANE

Cost: $-$$$

A standard bike lane is an on-street facility that provides space designated for bicyclists, separated from vehicles by pavement markings.

Heppner, OR

Redmond, OR

Benefits

- Provides a designated facility for bicyclists using the minimum pavement width.
- Provides increased visibility for bicyclists.
- Relatively inexpensive treatment when pavement width is available.

Constraints

- Can position bicyclists in the “door zone” if located adjacent to parked vehicles without a buffer.
- Motorists may illegally park in the lane if not adequately signed and enforced.
- Does not provide physical protection or horizontal buffer from vehicles and therefore does not attract bicyclists of all levels.

Typical Applications

- Arterials, collectors, and other non-local streets with speeds higher than 25 mph or over 3,000 average daily motorized traffic volumes.
- Streets without sufficient right-of-way or pavement width for buffered bike lanes or separated bike lanes (SBLs).

Design Considerations

- Typical bike lane width is 6 feet, with 5 feet in constrained locations. A minimum 4-foot width can be used on constrained segments where on-street parking is not present.
- Green pavement markings or striping can add visibility and awareness in “conflict areas” or intersections where bicycle and vehicle travel paths cross.

Additional Guidance

- AASHTO Guide for the Development of Bicycle Facilities
- NACTO Urban Bikeway Design Guide
- ODOT Highway Design Manual
- ODOT Bicycle and Pedestrian Design Guide

PAVED SHOULDER

Cost: $-$$

Tucson, AZ

Irrigon, OR

A paved road shoulder can serve as a bicycle facility that provides space separated from motor vehicle traffic in rural areas.

Benefits

- Provides a space separated from motorists.
- Requires less right-of-way than a separated multi-use path.

Constraints

- Does not provide physical protection from vehicles and may not attract bicyclists of all levels.
- Shoulders serving other uses, such as broken-down vehicles, may force bicyclists into travel lanes.

Typical Applications

- Typically applied on rural roadways.
- Also used as an interim treatment in urbanizing areas.

Design Considerations

- A 6-foot width is preferred to accommodate bicycle travel, with a 4-foot minimum in constrained areas. Greater widths can be used in higher-speed locations.
- Rumble strips or profiled striping can be used to enhance safety and minimize motorists encroaching on the shoulder.

Additional Guidance

- AASHTO Guide for the Development of Bicycle Facilities
- ODOT Highway Design Manual
- ODOT Bicycle and Pedestrian Design Guide

Bicycle Facilities

SHARED LANE ROADWAYS

Cost: <$

Prince George's County, MD

Portland, OR

Boise, ID

Shared lane roadways include roadways without separate bicycle facilities on which bicycle travel is not prohibited. Most roadways, with the exception of some limited access freeways, are "shared lane roadways" if they do not have a different type of bicycle facility. Shared lane roadways that are part of a designated bicycle network may include shared lane markings ("sharrows") or signage to indicate the legal presence of bicyclists in the travel lane.

Benefits

- Allows for bicycle travel when other treatments are not feasible.
- Low- to no-cost.

Constraints

- Does not provide any separation from vehicles.
- Without additional traffic-calming treatments, it is likely to attract only strong and fearless bicyclists.

Typical Applications

- Rural roadways without shoulders often use "share the road" signage to indicate to road users that bicyclists may be present.
- Sharrows are typically used in urban or suburban locations on bicycle network links where other facilities are not present.

Design Considerations

- Sharrows should be placed at least 4 feet from the edge of the curb or on-street parking.

Additional Guidance

- ODOT Bicycle and Pedestrian Design Guide
- ODOT Highway Design Manual
- Manual on Uniform Traffic Control Devices (MUTCD)

BICYCLE PARKING

Cost: $

Baker City, OR

Boise, ID

Devices and/or areas that allow secure bicycle parking, often located at areas of high bicycle and pedestrian traffic such as bus stations, shopping centers, schools, and multi-use trails.

Benefits

- Provides a secure location to store and lock bicycles.
- Relatively inexpensive and easy installation.
- Encourages community bicycle use and makes local attractions/businesses more accessible to bicyclists.

Constraints

- Requires space in potentially busy areas, such as sidewalks.
- May remove on-street parking space if located on the roadway.

Typical Applications

- Typically provided at areas of high bicycle and pedestrian traffic such as bus stations, shopping centers, schools, and multi-use trails.

Design Considerations

- The size and design of the bicycle rack can vary based on the estimated number of users and available space.
- Covered bicycle parking can provide protection from the weather for parked bicycles and people as they lock and unlock bikes. Bike lockers can provide additional security.
- If possible, bicycle racks should be placed immediately adjacent to the entrance/location they serve.
- Rack should not be placed to block the entrance of a building or inhibit pedestrian flow.
- Racks should be easy to find, convenient, and secure.

Additional Guidance

- APBP Bicycle Parking Guidelines

PEDESTRIAN PATH (SIDEPATH)

Cost: $$

Heppner, OR

Portland, OR

A pedestrian path is a hard-surface path adjacent to the roadway in lieu of a sidewalk in areas where other bicycle facilities exist. Similar to a multi-use path, pedestrian paths are narrower in width and generally do not invite bicycle travel.

Benefits

- Provides a hard surface for pedestrians buffered from the roadway.
- Requires less right-of-way than a multi-use path.
- Lower cost than construction of a full sidewalk with curb and gutter.

Constraints

- May also attract bicyclists, creating the potential for conflicts between pedestrians and bicyclists.

Typical Applications

- In constrained rural areas where sidewalks are not present and multi-use paths cannot be accommodated.
- As an interim treatment in urbanizing areas to make connections between sidewalk facilities.

Design Considerations

- Typically 5- to 8-foot wide asphalt surface.
- Pedestrian paths are typically separated from the roadway by a gravel or vegetated buffer instead of a curb and gutter.
- Should follow ADA standards to allow for universal access.
- Though not intended for bicyclists, pedestrian paths may attract bicyclists if a separate bicycle facility is not provided.

Additional Guidance

- FHWA Designing Sidewalks and Trails for Access
- ODOT Highway Design Manual

SIDEWALK

Cost: $$$

Boise, ID

Heppner, OR

A sidewalk is a dedicated pedestrian facility adjacent to the roadway and separated from traffic by a curb.

Benefits

- Provides pedestrians with a dedicated physically-separated space.
- Provides means of mobility for people using wheelchairs, people with strollers, or others who may not be able to travel on an unpaved surface.

Constraints

- Adding a concrete curb and sidewalk to streets adds a substantial expense to the overall construction cost.
- Stormwater drainage needs to be considered when retrofitting existing streets.

Typical Applications

- Typically provided on urban (non-rural) and residential streets, with the exception of limited access freeways.
- Typically added to streets in urbanizing areas as development occurs.

Design Considerations

- Typically 6 to 8 feet wide. Sidewalks should be constructed at least 5 feet wide, with a minimum of 4 feet of clear width, excluding a shy distance of 1.5 feet from the curb and any adjacent obstructions.
- A landscaped buffer is preferable in residential areas and in locations with higher traffic speeds and volumes.
- Wider sidewalks of 12 to 20 feet can be beneficial in commercial or "town center" areas in order to accommodate higher pedestrian volumes, street furniture, pedestrian scale lighting, business signage, bike parking, transit stops, and other amenities.

Additional Guidance

- ODOT Highway Design Manual.
- ODOT Bicycle and Pedestrian Design Guide
- AASHTO Green Book
- NACTO Urban Streets Design Guide

Pedestrian Facilities

SHOULDER PEDESTRIAN FACILITY

Cost: $-$$

Portland, OR

Boise, ID

A paved shoulder facility provides access for pedestrians on a hard surface in rural areas where sidewalks are not present.

Benefits

- Provides a hard surface space separated from motorists.
- Requires less right-of-way than a separated multi-use path.
- More cost-effective than installing sidewalks.

Constraints

- Does not provide physical protection of a curb and may not be comfortable for all users.
- Shoulders serving other uses, such as broken-down vehicles, may force pedestrians into travel lanes.

Typical Applications

- Typically applied on rural roadways.
- Also used as an interim treatment in urbanizing areas.

Design Considerations

- A 6-foot width is preferred to accommodate pedestrian travel, with a 4-foot minimum of paved surface in constrained areas. Greater widths can be used in higher-speed locations.
- Rumble strips or profiled striping can be used to enhance safety and minimize motorists encroaching on the shoulder.

Additional Guidance

- ODOT Highway Design Manual
- AASHTO Green Book

PEDESTRIAN HYBRID BEACON

Cost: $$$-$$$$

Juneau, AK


Boise, ID

A pedestrian hybrid beacon (sometimes called a HAWK signal) is a pedestrian activated signal that is unlit when not in use. It begins with a yellow light alerting drivers to slow, and then displays a solid red light requiring drivers to remain stopped while pedestrians cross the street. Finally, the beacon shifts to flashing red lights to signal that motorists may proceed after pedestrians have completed their crossing.

Benefits

- Has nearly 100 percent rate of motorist yielding behavior at crossing locations.
- Improves pedestrian safety and reduces pedestrian-involved crashes.
- Less delay to motor vehicle drivers than a signal.

Constraints

- Must be activated by pedestrians.
- More costly than other crossing treatments.

Typical Applications

- Midblock crossings with high pedestrian or bicycle demand and/or high traffic volumes.
- At locations where multi-use paths intersect with roadways.

Design Considerations

- The push button to activate the pedestrian hybrid beacon should be easily accessible by pedestrians, wheelchair users, and bicyclists (if applicable).

Additional Guidance

- Manual on Uniform Traffic Control Devices (MUTCD)
- NACTO Urban Street Design Guide
- NCHRP Report 562 Improving Pedestrian Safety at Unsignalized Crossings
- http://safety.fhwa.dot.gov/provencountermeasures/

RECTANGULAR RAPID FLASHING BEACON (RRFB)

Cost: $$-$$$

Pendleton, OR

Irrigon, OR

Bend, OR

These crossing treatments include signs that have a pedestrian-activated "strobe-light" flashing pattern to attract motorists' attention and provide awareness of pedestrians and/or bicyclists that are intending to cross the roadway.

Benefits

- Provides a visible warning to motorists at eye level.
- Increases motorists yielding behavior at crossing locations over round yellow flashing beacons (80 to 100 percent compliance).
- Allows motorists to proceed after yielding to pedestrians and bicyclists.

Constraints

- Flashing beacons must be activated by pedestrians.
- Motorists may not understand the flashing lights of the RRFB, so compliance may be lower than with a traffic signal.

Typical Applications

- Midblock crossings with medium to high pedestrian or bicycle demand and/or medium to high traffic volumes.
- Locations where multi-use paths intersect with roadways.

Design Considerations

- The push button to activate the RRFB should be easily accessible by pedestrians, wheelchair users, and bicyclists (if applicable).
- Consider adding a push button in the median island for crossings of multi-lane facilities.

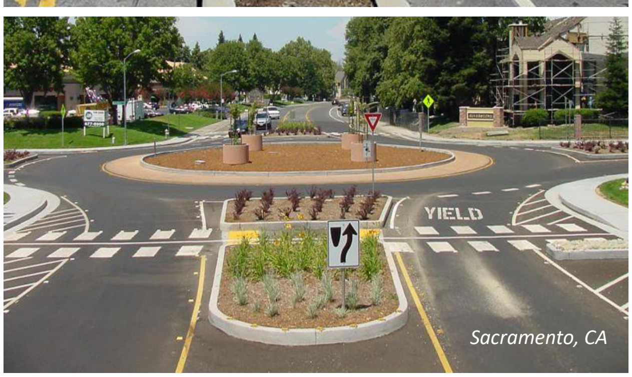
Additional Guidance

- Manual on Uniform Traffic Control Devices (MUTCD)
- NACTO Urban Street Design Guide
- NCHRP Report 562 Improving Pedestrian Safety at Unsignalized Crossings
- ODOT Bicycle and Pedestrian Design Guide

CROSSING ISLAND (PEDESTRIAN REFUGE)

Cost: $-$$


Bend, OR



Sacramento, CA

A crossing island in the median provides a protected area in the middle of a crosswalk for pedestrians to stop while crossing the street. Also called pedestrian refuge islands or median refuges, they can be used at intersections or mid-block crossings.

Benefits

- Reduces pedestrian exposure at marked and unmarked crosswalks.
- Requires shorter gaps in traffic to cross the street.
- Allows pedestrians to cross in two phases.
- Proven safety countermeasure.

Constraints

- Streets with constrained right-of-way may not have sufficient width to allow for a crossing island.

Typical Applications

- Preferred treatment for crossings of multi-lane streets.
- Often used in areas with high levels of vulnerable pedestrian users, such as near schools or senior centers/housing.
- Often applied in areas with high traffic volumes or with a pedestrian crash history.

Design Considerations

- Must have at least 6 feet of clear width to accommodate people using wheelchairs.
- At crossing locations where bicyclists are anticipated, a width of 10 feet or greater is desirable to accommodate bicycles with trailers or groups of bicyclists.
- Can be applied in conjunction with other traffic control treatments.

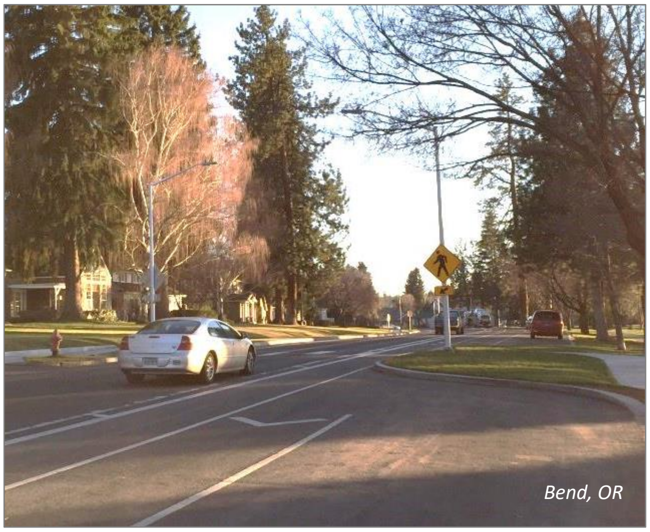
Additional Guidance

- ODOT Bicycle and Pedestrian Design Guide
- NACTO Urban Streets Design Guide
- NCHRP Report 562 Improving Pedestrian Safety at Unsignalized Crossings
- http://safety.fhwa.dot.gov/provencountermeasures/

BULB-OUT/CURB EXTENSIONS

Cost: $$

Heppner, OR



Bend, OR

An extension of the curb or the sidewalk into the street (in the form of a bulb), usually at an intersection, that narrows the vehicle path, inhibits fast turns, and shortens the crossing distance for pedestrians.

Benefits

- Shortens crossing distances for pedestrians.
- Reduces motorist turning speeds.
- Increases visibility between motorists and pedestrians.
- Enables permanent parking
- Enables tree and landscape planting and water runoff treatment.

Constraints

- Can only be used on streets with unrestricted on-street parking.
- Physical barrier can be exposed to traffic.
- Greater cost and time to install than standard crosswalks.
- Can present turning radius problems to large vehicles.

Typical Applications

- Mid-block or intersection pedestrian crossings on streets with unrestricted on-street parking.
- Streets with on-street parking where pedestrian volumes ≥ 20 pedestrians per hour, ADT ≥ 1,500 vehicles per day, and average right-turn speeds ≥ 15 mph.

Design Considerations

- Include a narrow passage for bicyclists to prevent conflict with vehicles.
- Provide accessible curb ramps and detectible warnings.
- Include landscaping on the curb extension to differentiate path for pedestrian travel, especially for pedestrians with vision impairments.

Additional Guidance

- ITE/FHWA Report Traffic Calming: State of the Practice
- FHWA Designing Sidewalks and Trails for Access *Part II of II: Best Practices Design Guide*

RAISED PEDESTRIAN CROSSING

Cost: $$

Raised pedestrian crossings bring the level of the roadway even with the sidewalk, providing a level pedestrian path and requiring vehicles to slow. Raised crossings can be used at midblock crosswalks or intersections.

Benefits

- Provides a better view for pedestrians and motorists
- Slows down motorists.

Constraints

- Can be difficult to navigate for busses, large trucks, snow plows, and low ground clearance vehicles.
- Relatively expensive.
- Forces emergency vehicles to slow down

Typical Applications

- Raised crosswalks are typically provided at midblock crossings on two-lane roads where pedestrian volumes ≥ 50 pedestrians per hour and speed control is needed.
- Raised crosswalks may be provided at intersections where low-volume streets intersect with high-volume streets or where a roadway changes character (such as from commercial to residential).
- Raised crosswalks should not be used on transit routes or where there are steep grades or curves.

Design Considerations

- Raised crosswalks should be even with the sidewalk in height and at least as wide as the crossing or intersection.
- Provide detectable warnings for pedestrians where they cross from the sidewalk in to the crossing area.
- Consider drainage needs and provide appropriate treatments.
- Use colored asphalt as opposed to brick or decorative surface materials to make the crossing smoother for those with mobility impairments.

Additional Guidance

- ITE/FHWA Report Traffic Calming: State of the Practice
- FHWA Designing Sidewalks and Trails for Access *Part II of II: Best Practices Design Guide*

HIGH VISIBILITY CROSSWALK

Cost: $

Heppner, OR

Boise, ID

High visibility crosswalks consist of reflective roadway markings and accompanying signage at intersections and priority pedestrian crossing locations.

Benefits

- Communicates potential for pedestrian crossings to motorists.
- Designates a preferred crossing location for pedestrians.
- Motorists are required to stop for pedestrians entering crosswalks.
- Low cost.

Constraints

- Can be more effective with other types of traffic control (signals, stop signs).
- At uncontrolled locations (midblock), motorist compliance is not as high as with other treatments.

Typical Applications

- High visibility crosswalks are typically applied at intersections of arterials, collectors, and/or other facilities with moderate to high vehicle volumes and speeds.
- Can be applied at mid-block locations, especially in conjunction with other treatments.

Design Considerations

- Crosswalk striping can vary, and may include continental striping (top photo), ladder striping, zebra striping (middle photo), etc.
- Can be constructed with paint or thermoplastic material.
- Minimum width is 6 feet, but wider crossings are preferred in areas with high number of pedestrians.

Additional Guidance

- NCHRP Report 562 Improving Pedestrian Safety at Unsignalized Crossings
- ODOT Bicycle and Pedestrian Design Guide

STREET FURNITURE AND LIGHTING

Cost: $-$$$

Austin, TX

Ft Lauderdale, FL

Street furniture includes pedestrian seating, information/ wayfinding structures, and trash cans. Street furniture and lighting can be used to enhance the pedestrian experience and encourage pedestrian activity on a street.

Benefits

- Encourages walking and sense of comfort and security for pedestrians.
- Street furniture can be relatively inexpensive and easy installation.
- Encourages foot traffic and can make local attractions/ businesses inviting.

Constraints

- Requires space in potentially busy areas, such as sidewalks.
- Can reduce the pedestrian travel spaces on narrower sections.

Typical Applications

- Typically provided at areas of high bicycle and pedestrian traffic such as bus stations, shopping centers, schools, and multi-use trails.
- Street furniture and pedestrian-scale lighting is usually provided on corridors with commercial activity and anticipated high-pedestrian use.

Design Considerations

- Street furniture should not be placed to block the entrance of a building or inhibit pedestrian flow.
- The type and size of street furniture should be based on the available space and anticipated demand.
- Street furniture should be accessible to all users.

Additional Guidance

- AASHTO Roadway Lighting Design Guide

Transit Facilities/Service Types

BUS STOP

Cost: $$$

Molalla, OR

Pendleton, OR

Transit stop shelters help protect passengers waiting to load the bus from the elements and provides a great level of comfort. They also increase the visibility of transit stops and attractiveness for riders.

Benefits

- Provides protection from the elements and a place to sit for people waiting for transit.
- Provides a prominent visual cue about where the transit stop is located.

Constraints

- Require sufficient space along the street for bus to safely pull over and stop.
- Sign poles and stop amenities require maintenance

Typical Applications

- Install bus stops at locations with potential or existing transit demand
- Inclusion of amenities such as shelters and seating can be determined based upon daily boardingsor market served (e.g. bus stop at senior center probably needs seating)

Design Considerations

- The style of the transit stop shelter can depend on the preferences of the local jurisdiction.
- At stops with a high number of daily boardings (i.e. over 100), a larger shelter or multiple shelters should be considered.
- Shelters should be cleaned and maintained regularly.
- Shelters should have transparent sides for greater visibility and panels should be resistant to fading or clouding.

Additional Guidance

- TCRP Report 19: Guidelines for the Location and Design of Bus Stops
- Transit in Small Cities: A Primer for Planning, Siting and Designing Transit Facilities in Oregon

Transit Facilities/Service Types

PARK-AND-POOL OR PARK-AND-RIDE

Cost: $

A park-and-ride facility with parking, lighting and shelters for waiting passengers

People meet at a park-and-pool facility to commute by vanpool

Application to Ontario

Park-and-pool may be a low-cost option for organizing rides between Ontario and common work, shopping, and service destinations such as Caldwell, Nampa, Meridian, and Boise. Park-and-pool locations could be upgraded to transit stops depending on future demand.

Park-and-pool or park-and-ride facilities allow travelers to drive to a parking facility, park, and use transit or carpool to their eventual destination. Park-and-ride or park-and-pool lots may be owned by a city, transit agency, or by a business that has excess parking during typical work hours.

Benefits

- Reduces the need for parking in downtown areas and activity centers
- Reduces single-occupant vehicle travel, which supports environmental goals
- Saves money by reducing gas costs for individual commuters

Constraints

- Requires agreement with property owners to allow shared parking between users

Typical Applications

- These programs work well in rural or suburban areas where fixed-route transit is limited, and in communities with long commutes and common work destinations.
- They may be located in a downtown area, at the edge of a downtown, or within a neighborhood.

Design Considerations

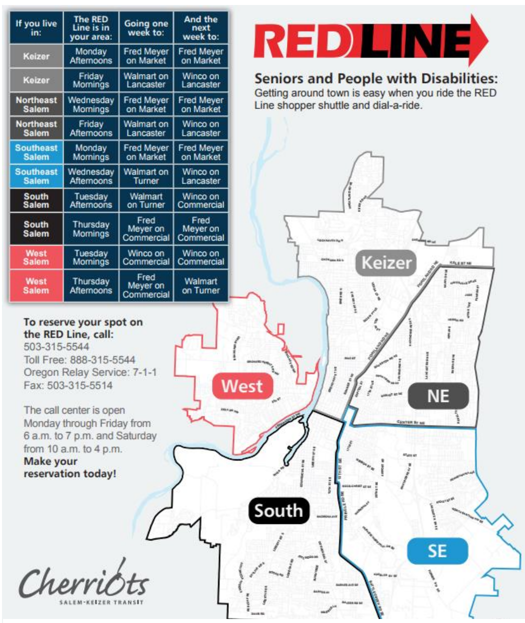
- Integrate park-and-ride/park-and-pool lots into existing downtowns to provide a central meeting point for people to meet and pool or take transit
- Add aesthetic treatments such as landscaping to integrate the parking area into the surrounding neighborhood.
- Provide adequate signage visible from the street indicating that parking is available, at what times, and at what (if any) cost. Ensure signage clearly states that park-and-ride/park-and-pool users are allowed to park

Additional Guidance

- TCRP Report 19: Guidelines for the Location and Design of Bus Stops
- Transit in Small Cities: A Primer for Planning, Siting and Designing Transit Facilities in Oregon

DEMAND-RESPONSE SERVICE

Cost: $$$



Cherriots RED Line is an example of both a shopper shuttle and zone service

Demand-response services pick-up and drop-off passengers at their door or at the curb. Transit vehicles providing demand-response service do not follow a fixed route, but travel throughout the community transporting passengers according to their specific requests. Passengers must call ahead to book a trip.

Benefits

- High level of service for those with mobility challenges

Constraints

- Demand-response typically has low productivity, carrying 2-3 passengers per hour compared to other transit services
- Passengers must schedule service in advance

Typical Applications

- Works well in low-density areas without a strong market for fixed-route transit
- Often used to serve markets that have mobility challenges

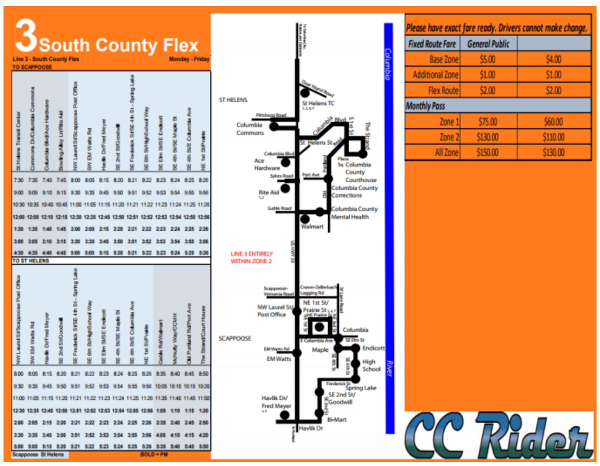
Service Variations

- *Shopper Shuttle* - A shopper shuttle caters to shopping trips. Shopper shuttles may be provided daily or periodically, connecting passengers from their home to a major shopping destination.
- *Zone Service* – In rural or suburban communities, transit agencies may provide service in a particular neighborhood or zone during days of the week
- *Taxi Vouchers* – Public agencies may subsidize taxi fares as a way of providing demand-response service using existing general public taxi services. Passengers may either buy vouchers in advance at a discounted rate or pay the fare and submit for reimbursement.
- *Volunteer Programs* – Volunteers may subsidize taxi fares as a way of providing demand-response service using existing general public taxi services. Passengers may either buy vouchers in advance at a discounted rate or pay the fare and submit for reimbursement.
- *Vanpools* – Vanpools are a prearranged ridesharing service in which a number of people travel together on a regular basis in a van. Vanpools may be publicly operated, employer operated, individually owned, or leased.

Transit Facilities/Service Types

FLEX SERVICE

Cost: $$



CC Rider's Route 3 provides flex service between Scappoose and St. Helen's. Riders can call in advance to schedule a pick-up no more than ½ mile from the published route.

Flex service is a hybrid service type that combines the structure of a fixed-route with the flexibility of demand-response service. There are many models of flex service, ranging from those that are primarily fixed routes but offer limited deviations upon request, to those that are primarily demand-response zones but offer fixed time points.

Benefits

- In lower demand areas where deviations can be accommodated, both fixed-route and ADA paratransit service can be provided with one vehicle
- Meets ADA paratransit requirements as long as schedule builds in additional time for deviations and service is open to the general public

Constraints

- Deviations add travel time and may discourage choice riders
- In rural areas with disconnected road networks, accommodating out-and-back deviations may add significant travel time

Typical Applications

- Flex service works in areas with low to medium densities where deviations to pick-up passengers can be supported while maintaining service along advertised routes.

Service Variations

- <u>*Point-Deviated Service*</u> – Point deviated routes have several fixed timepoints, and passengers who live between the time points may call to request a curbside pick-up. The driver takes the most direct route between time points to pick-up each passenger.
- <u>*Deviated Service*</u> – Deviated service operates via a set route. Passengers may call ahead to request a deviation from that route, and as long as the pickup allows the bus to stay on schedule, the driver will deviate from the route to pick-up a passenger in front of their destination. Deviations are "out-and-back," meaning the bus returns back to the same point at which it started the deviation.

Transit Facilities/Service Types

FIXED-ROUTE

Cost: $$

Fixed-route service means that transit vehicles run along a set route during a set schedule. Typically, fixed-route service is characterized by designated bus stops where passengers board and alight, and is supported with service information (maps and timetables).

Service Variations

Local Route

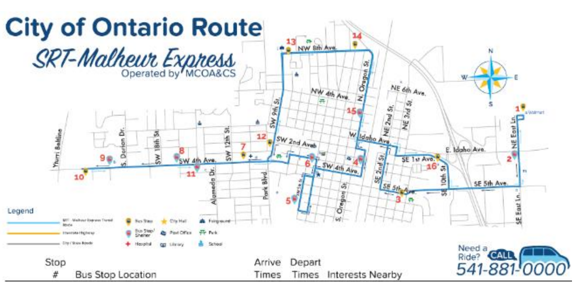
Transit Service that involves frequent stops that circulate passengers within a community

Intercity

Intercity transit routes provide direct service along major travel corridors with limited stops. These routes typically service longer distances than local fixed-routes. Between destinations, intercity services typically operate on arterials or interstate roadways.

Commuter

Commuter service is specifically designed to bring people from residential areas to employment centers. These routes may look similar to intercity routes, but only operate during employment peak hours.



The SRT-Malheur Express and Snake River Transit services provide a mix of local and intercity service between Ontario, Fruitland and Payette.

Benefits

- Predictable service that riders can access by following the schedule and map
- Cost effective (cost per rider) when serving high ridership corridors
- Can provide fairly direct travel times competitive with driving, making service more attractive to choice riders

Constraints

- Not well suited to serving large service areas or dispersed origins and destination
- Requires ADA complementary paratransit service (demand-response) within ¾ mile of fixed route, operating during the same days and hours

Typical Applications

- Connects origins and destinations within a community or between communities

Service Variations

- *Point-Deviated Service* – Point deviated routes have several fixed timepoints, and passengers who live between the time points may call to request a curbside pick-up. The driver takes the most direct route between time points to pick-up each passenger.
- *Deviated Service* – Deviated service operates via a set route. Passengers may call ahead to request a deviation from that route, and as long as the pickup allows the bus to stay on schedule, the driver will deviate from the route to pick-up a passenger in front of their destination. Deviations are “out-and-back,” meaning the bus returns back to the same point at which it started the deviation.

Attachment B
Crash Data

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE - INJURY COUNTS ON PARTICIPANTS

Ontario Bicycle-Involved Crashes with Counts of Bicyclists Killed or Injured
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017													
SIDESWIPE - OVERTAKING	0	1	0	1	0	1	1	0	1	0	0	0	0
2017 TOTAL	0	1	0	1	0	1	1	0	1	0	0	0	0
YEAR: 2016													
ANGLE	0	3	0	3	0	3	3	0	3	0	2	0	1
TURNING MOVEMENTS	0	1	0	1	0	1	1	0	1	0	1	0	0
2016 TOTAL	0	4	0	4	0	4	4	0	4	0	3	0	1
YEAR: 2015													
TURNING MOVEMENTS	0	4	0	4	0	4	4	0	4	0	3	0	0
2015 TOTAL	0	4	0	4	0	4	4	0	4	0	3	0	0
YEAR: 2013													
ANGLE	0	2	0	2	0	2	2	0	1	1	2	0	0
TURNING MOVEMENTS	0	2	0	2	0	2	2	0	2	0	1	0	0
2013 TOTAL	0	4	0	4	0	4	4	0	3	1	3	0	0
FINAL TOTAL	0	13	0	13	0	13	13	0	12	1	9	0	1

Effective 2015, “Property damage only” (PDO) was discontinued as a “crash severity” option for Pedestrian and Pedalcycle-Involved motor vehicle crashes. There is no legal requirement, nor option, for bicyclists and pedestrians to report when they’re involved in a crash. In the absence of formal reporting from these participants, a decision had to be made regarding their injury severity. It was determined that, as vulnerable road users, bicyclists and pedestrians must receive at least a “possible injury” in collisions with motor vehicles. Expect data for this Injury category to increase.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes East Ln & SE 5th Ave
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR:														
TOTAL														
FINAL TOTAL														

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes SE 13th St & SE 5th Ave
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2017 TOTAL	0	1	0	1	0	1	0	1	0	1	0	1	0	0
FINAL TOTAL	0	1	0	1	0	1	0	1	0	1	0	1	0	0

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TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes at US30, Ontario Spur (493) & East Ln
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	1	1	2	0	1	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	1	2	3	0	1	0	3	0	1	2	3	0	0
2017 TOTAL	0	2	3	5	0	2	0	4	1	2	3	5	0	0
YEAR: 2016														
REAR-END	0	3	2	5	0	3	0	5	0	4	1	5	0	0
SIDESWIPE - OVERTAKING	0	1	0	1	0	3	0	1	0	1	0	1	0	0
2016 TOTAL	0	4	2	6	0	6	0	6	0	5	1	6	0	0
YEAR: 2015														
REAR-END	0	9	2	11	0	11	0	10	1	9	2	11	0	0
2015 TOTAL	0	9	2	11	0	11	0	10	1	9	2	11	0	0
YEAR: 2014														
BACKING	0	0	1	1	0	0	1	1	0	1	0	1	0	0
REAR-END	0	2	3	5	0	2	1	3	2	5	0	5	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2014 TOTAL	0	2	5	7	0	2	2	5	2	7	0	7	0	0
YEAR: 2013														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
BACKING	0	0	1	1	0	0	0	1	0	1	0	1	0	0
REAR-END	0	1	1	2	0	1	0	2	0	1	1	2	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2013 TOTAL	0	3	2	5	0	3	0	5	0	4	1	5	0	0
FINAL TOTAL	0	20	14	34	0	24	2	30	4	27	7	34	0	0

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes at US30, Ontario Spur (493) & Goodfellow St
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	0	1	1	0	0	0	1	0	1	0	1	0	0
REAR-END	0	0	2	2	0	0	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	2	0	2	0	5	0	2	0	1	1	2	0	0
2017 TOTAL	0	2	3	5	0	5	0	5	0	4	1	5	0	0
YEAR: 2016														
ANGLE	0	0	1	1	0	0	0	1	0	1	0	1	0	0
REAR-END	0	1	3	4	0	1	0	4	0	3	1	4	0	0
TURNING MOVEMENTS	0	1	1	2	0	2	0	1	1	2	0	2	0	0
2016 TOTAL	0	2	5	7	0	3	0	6	1	6	1	7	0	0
YEAR: 2015														
ANGLE	0	3	2	5	0	4	0	5	0	4	1	5	0	0
REAR-END	0	1	3	4	0	1	0	4	0	3	1	4	0	0
TURNING MOVEMENTS	0	1	2	3	0	3	0	3	0	2	1	3	0	0
2015 TOTAL	0	5	7	12	0	8	0	12	0	9	3	12	0	0
YEAR: 2014														
REAR-END	0	1	2	3	0	1	0	3	0	2	1	3	0	0
TURNING MOVEMENTS	0	2	0	2	0	2	0	2	0	2	0	2	0	0
2014 TOTAL	0	3	2	5	0	3	0	5	0	4	1	5	0	0
YEAR: 2013														
ANGLE	0	1	0	1	0	1	0	1	0	0	1	1	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2013 TOTAL	0	1	1	2	0	1	0	2	0	1	1	2	0	0
FINAL TOTAL	0	13	18	31	0	20	0	30	1	24	7	31	0	0

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TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes at US30, Ontario Spur (493) & NB I-84 Ramps, Old Oregon Trail Hwy (006)
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	0	1	1	0	0	1	0	1	0	1	1	0	0
REAR-END	0	1	1	2	0	1	0	2	0	2	0	2	0	0
2017 TOTAL	0	1	2	3	0	1	1	2	1	2	1	3	0	0
YEAR: 2016														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	3	0	3	0	5	0	2	1	2	1	3	0	0
2016 TOTAL	0	4	0	4	0	6	0	3	1	3	1	4	0	0
YEAR: 2015														
REAR-END	0	5	1	6	0	15	0	5	1	5	1	6	0	0
TURNING MOVEMENTS	0	1	1	2	0	1	1	0	2	1	1	2	0	0
2015 TOTAL	0	6	2	8	0	16	1	5	3	6	2	8	0	0
YEAR: 2014														
REAR-END	0	0	2	2	0	0	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	2	2	4	0	2	3	3	1	4	0	4	0	0
2014 TOTAL	0	2	4	6	0	2	3	5	1	6	0	6	0	0
YEAR: 2013														
ANGLE	0	1	0	1	0	1	0	1	0	1	0	1	0	0
REAR-END	0	4	1	5	0	4	0	5	0	5	0	5	0	0
TURNING MOVEMENTS	0	1	0	1	0	3	1	1	0	1	0	1	0	0
2013 TOTAL	0	6	1	7	0	8	1	7	0	7	0	7	0	0
FINAL TOTAL	0	19	9	28	0	33	6	22	6	24	4	28	0	0

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OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Intersectional Crashes at US30, Ontario Spur (493) & SB I-84 Ramps, Old Oregon Trail Hwy (006)
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	1	1	2	0	1	1	2	0	1	1	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	1	1	0	0	1	1	0	0
2017 TOTAL	0	1	2	3	0	1	2	3	0	1	2	3	0	0
YEAR: 2016														
REAR-END	0	2	0	2	0	6	0	1	0	2	0	2	0	0
TURNING MOVEMENTS	0	1	2	3	0	1	1	2	0	3	0	3	0	0
2016 TOTAL	0	3	2	5	0	7	1	3	0	5	0	5	0	0
YEAR: 2015														
REAR-END	0	3	1	4	0	4	0	4	0	3	1	4	0	0
TURNING MOVEMENTS	0	1	0	1	0	1	0	1	0	1	0	1	0	0
2015 TOTAL	0	4	1	5	0	5	0	5	0	4	1	5	0	0
YEAR: 2014														
ANGLE	0	1	0	1	0	2	0	1	0	1	0	1	0	0
REAR-END	0	1	1	2	0	1	0	1	1	1	1	2	0	0
TURNING MOVEMENTS	0	1	0	1	0	2	0	1	0	1	0	1	0	0
2014 TOTAL	0	3	1	4	0	5	0	3	1	3	1	4	0	0
YEAR: 2013														
REAR-END	0	2	0	2	0	3	0	2	0	2	0	2	0	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	1	0	0
2013 TOTAL	0	2	1	3	0	3	0	3	0	3	0	3	0	0
FINAL TOTAL	0	13	7	20	0	21	3	17	1	16	4	20	0	0

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

A higher number of crashes may be reported as of 2011 compared to prior years. This does not necessarily reflect an increase in annual crashes. The higher numbers may result from a change to an internal departmental process that allows the Crash Analysis and Reporting Unit to add previously unavailable, non-fatal crash reports to the annual data file. Please be aware of this change when comparing pre-2011 crash statistics. For all disclaimers, see https://www.oregon.gov/ODOT/Data/documents/Crash_Data_Disclaimers.pdf.

OREGON DEPARTMENT OF TRANSPORTATION - TRANSPORTATION DEVELOPMENT DIVISION
TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT
CRASH SUMMARIES BY YEAR BY COLLISION TYPE - INJURY COUNTS ON PARTICIPANTS

Ontario Pedestrian-Involved Crashes with Counts of Pedestrians Killed or Injured
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017													
PEDESTRIAN	0	1	0	1	0	1	0	1	1	0	1	0	0
2017 TOTAL	0	1	0	1	0	1	0	1	1	0	1	0	0
YEAR: 2016													
PEDESTRIAN	0	5	0	5	0	6	5	0	4	1	1	0	2
REAR-END	0	1	0	1	0	1	0	1	0	1	0	0	0
2016 TOTAL	0	6	0	6	0	7	5	1	4	2	1	0	2
YEAR: 2015													
PEDESTRIAN	0	5	0	5	0	5	3	2	3	2	4	0	1
2015 TOTAL	0	5	0	5	0	5	3	2	3	2	4	0	1
YEAR: 2014													
PEDESTRIAN	0	2	0	2	0	2	2	0	0	2	2	0	0
2014 TOTAL	0	2	0	2	0	2	2	0	0	2	2	0	0
YEAR: 2013													
PEDESTRIAN	0	4	0	4	0	4	4	0	4	0	3	0	0
2013 TOTAL	0	4	0	4	0	4	4	0	4	0	3	0	0
FINAL TOTAL	0	18	0	18	0	19	14	4	12	6	11	0	3

Effective 2015, “Property damage only” (PDO) was discontinued as a “crash severity” option for Pedestrian and Pedalcycle-Involved motor vehicle crashes. There is no legal requirement, nor option, for bicyclists and pedestrians to report when they’re involved in a crash. In the absence of formal reporting from these participants, a decision had to be made regarding their injury severity. It was determined that, as vulnerable road users, bicyclists and pedestrians must receive at least a “possible injury” in collisions with motor vehicles. Expect data for this Injury category to increase.

TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Crashes on Mainline US 30, Ontario Spur 493, Idaho Ave from MP 27.65 to 28.39
January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
ANGLE	0	0	2	2	0	0	1	1	1	1	1	2	0	0
REAR-END	0	5	8	13	0	7	0	10	3	11	2	6	0	0
SIDESWIPE - OVERTAKING	0	1	0	1	0	2	0	1	0	1	0	0	1	0
TURNING MOVEMENTS	0	3	3	6	0	6	0	6	0	3	3	5	0	0
2017 TOTAL	0	9	13	22	0	15	1	18	4	16	6	13	1	0
YEAR: 2016														
ANGLE	0	0	1	1	0	0	0	1	0	1	0	1	0	0
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	1	0	0	1	0	0	1
REAR-END	0	8	11	19	0	14	1	18	1	16	3	13	3	0
SIDESWIPE - OVERTAKING	0	1	1	2	0	3	0	2	0	2	0	1	0	0
TURNING MOVEMENTS	0	2	2	4	0	3	1	2	1	4	0	4	0	0
2016 TOTAL	0	11	16	27	0	20	2	24	2	23	4	19	3	1
YEAR: 2015														
ANGLE	0	3	2	5	0	4	0	5	0	4	1	5	0	0
BACKING	0	0	1	1	0	0	0	1	0	1	0	0	1	0
PEDESTRIAN	0	1	0	1	0	3	0	1	0	1	0	0	0	0
REAR-END	0	17	10	27	0	27	0	23	4	22	5	20	6	0
TURNING MOVEMENTS	0	3	5	8	0	5	1	6	2	6	2	6	1	0
2015 TOTAL	0	24	18	42	0	39	1	36	6	34	8	31	8	0
YEAR: 2014														
BACKING	0	0	1	1	0	0	1	1	0	1	0	1	0	0
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	0	1	0	0	1
REAR-END	0	2	5	7	0	2	1	5	2	5	2	6	1	0
TURNING MOVEMENTS	0	5	1	6	0	6	2	6	0	6	0	6	0	0
2014 TOTAL	0	8	7	15	0	9	4	13	2	12	3	13	1	1
YEAR: 2013														
ANGLE	0	2	0	2	0	2	0	2	0	2	0	2	0	0
REAR-END	0	9	6	15	0	10	0	14	1	14	1	8	0	0
SIDESWIPE - OVERTAKING	0	1	1	2	0	1	0	1	1	2	0	0	0	0
TURNING MOVEMENTS	0	2	2	4	0	4	1	4	0	4	0	4	0	0
2013 TOTAL	0	14	9	23	0	17	1	21	2	22	1	14	0	0
FINAL TOTAL	0	66	63	129	0	100	9	112	16	107	22	90	13	2

Disclaimers: *Effective 2016,* ***collection of "Property Damage Only" (PDO) crash data elements was reduced for vehicles and participants.*** *Age, Gender, License, Error and other elements are no longer available for PDO crash reporting. Please keep this in mind when comparing 2016 PDO crash data to prior years.*

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TRANSPORTATION DATA SECTION - CRASH ANALYSIS AND REPORTING UNIT

CRASH SUMMARIES BY YEAR BY COLLISION TYPE

Crashes on Mainline US 30, Ontario Spur 493, Idaho Ave from MP 27.65 to 28.39 **Excludes all Intersectional Crashes**

January 1, 2013 through December 31, 2017

COLLISION TYPE	FATAL CRASHES	NON-FATAL CRASHES	PROPERTY DAMAGE ONLY	TOTAL CRASHES	PEOPLE KILLED	PEOPLE INJURED	TRUCKS	DRY SURF	WET SURF	DAY	DARK	INTER-SECTION	INTER-SECTION RELATED	OFF-ROAD
YEAR: 2017														
REAR-END	0	4	3	7	0	6	0	5	2	6	1	0	0	0
SIDESWIPE - OVERTAKING	0	1	0	1	0	2	0	1	0	1	0	0	1	0
TURNING MOVEMENTS	0	0	1	1	0	0	0	1	0	1	0	0	0	0
2017 TOTAL	0	5	4	9	0	8	0	7	2	8	1	0	1	0
YEAR: 2016														
FIXED / OTHER OBJECT	0	0	1	1	0	0	0	1	0	0	1	0	0	1
REAR-END	0	0	6	6	0	0	1	6	0	6	0	0	3	0
SIDESWIPE - OVERTAKING	0	0	1	1	0	0	0	1	0	1	0	0	0	0
2016 TOTAL	0	0	8	8	0	0	1	8	0	7	1	0	3	1
YEAR: 2015														
BACKING	0	0	1	1	0	0	0	1	0	1	0	0	1	0
PEDESTRIAN	0	1	0	1	0	3	0	1	0	1	0	0	0	0
REAR-END	0	3	4	7	0	3	0	4	3	6	1	0	6	0
TURNING MOVEMENTS	0	0	2	2	0	0	0	2	0	2	0	0	1	0
2015 TOTAL	0	4	7	11	0	6	0	8	3	10	1	0	8	0
YEAR: 2014														
FIXED / OTHER OBJECT	0	1	0	1	0	1	0	1	0	0	1	0	0	1
REAR-END	0	0	1	1	0	0	0	0	1	0	1	0	1	0
2014 TOTAL	0	1	1	2	0	1	0	1	1	0	2	0	1	1
YEAR: 2013														
REAR-END	0	2	5	7	0	2	0	6	1	7	0	0	0	0
SIDESWIPE - OVERTAKING	0	1	1	2	0	1	0	1	1	2	0	0	0	0
2013 TOTAL	0	3	6	9	0	3	0	7	2	9	0	0	0	0
FINAL TOTAL	0	13	26	39	0	18	1	31	8	34	5	0	13	2

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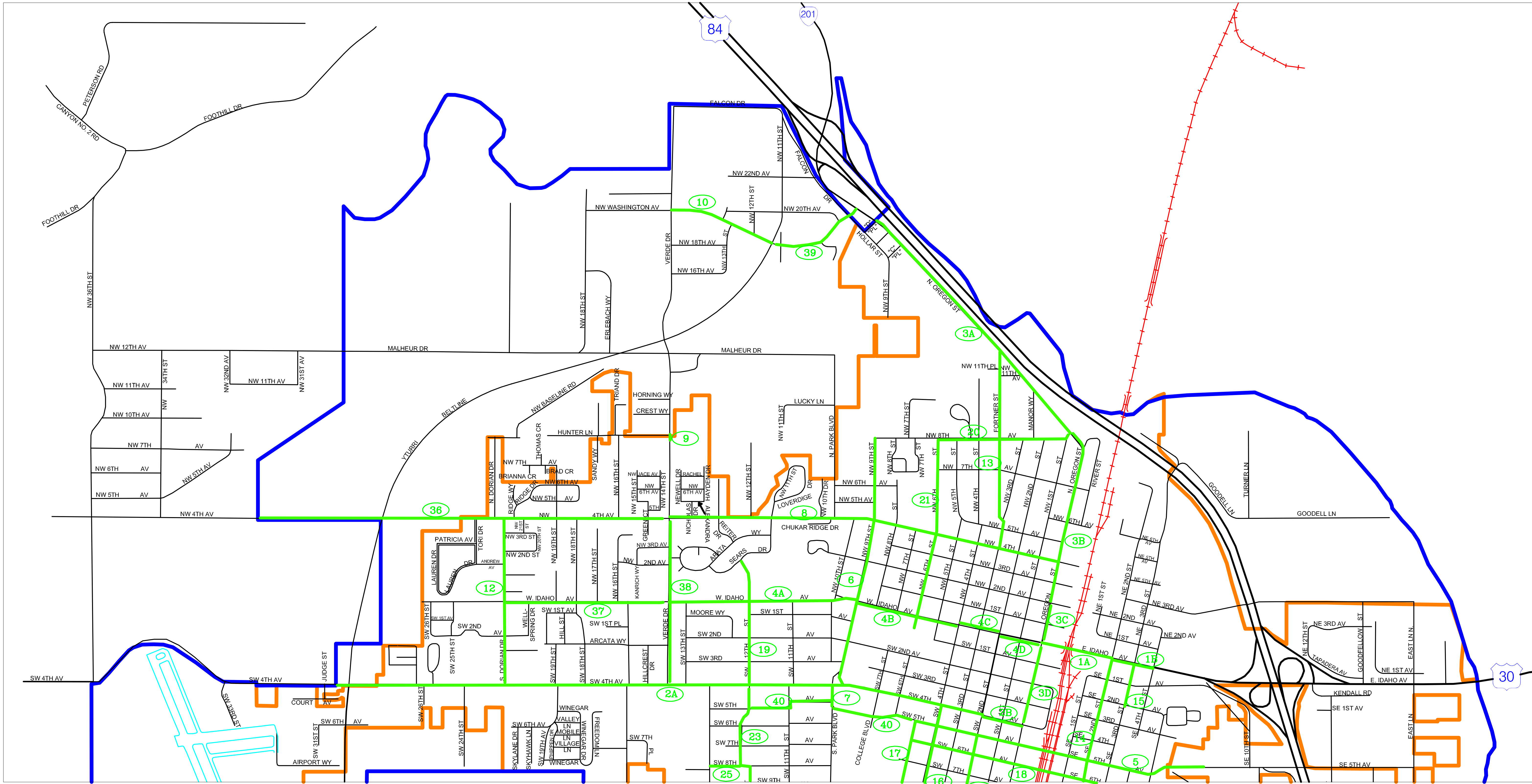
Attachment C
2016 TSP and 2018 Parks and Recreation Master Plan Projects



City of Ontario Transportation System Plan

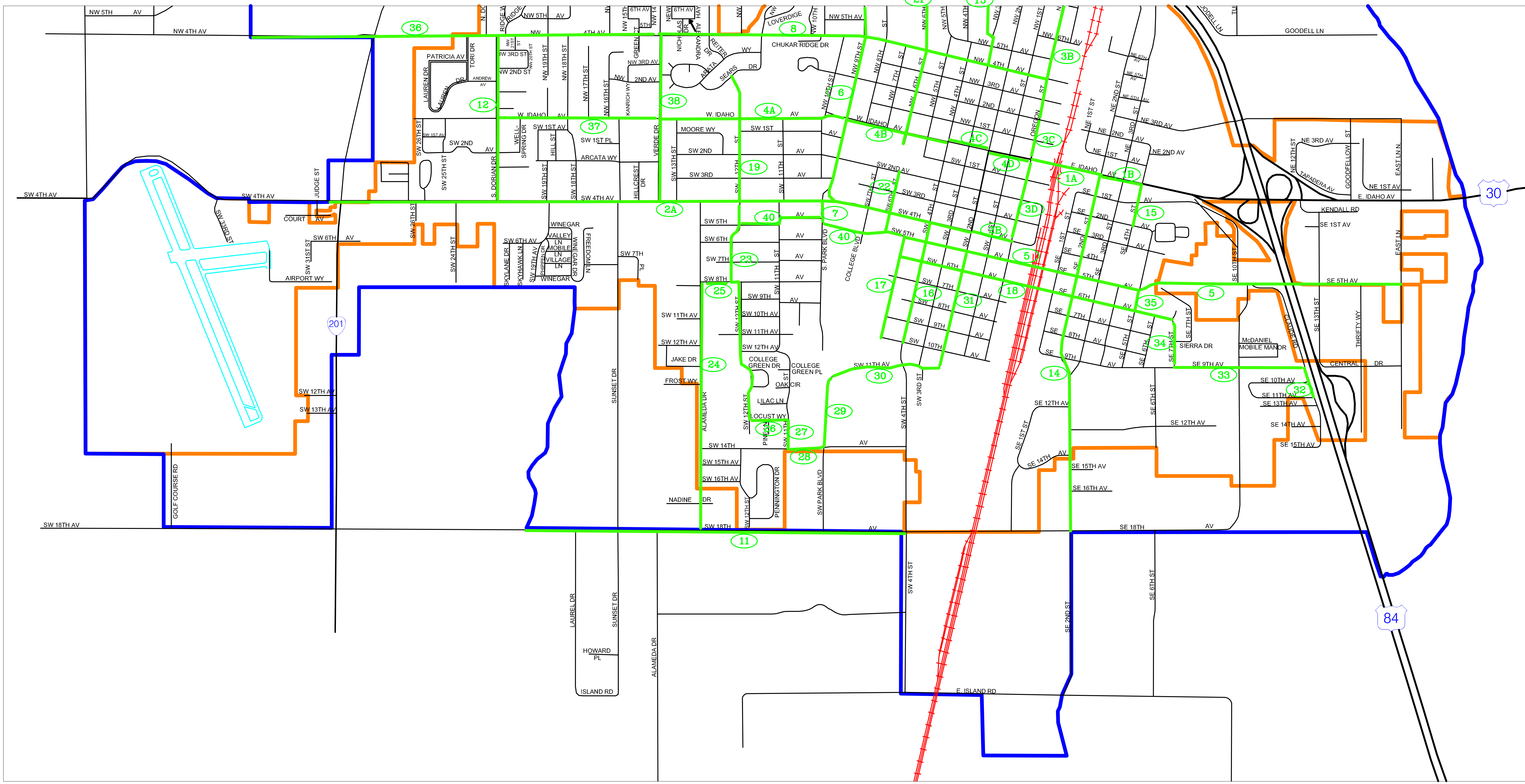
LEGEND

Improvement

NOT TO SCALE

Figure 7-14a

Bicycle and Pedestrian Improvement Project Locations



City of Ontario Transportation System Plan

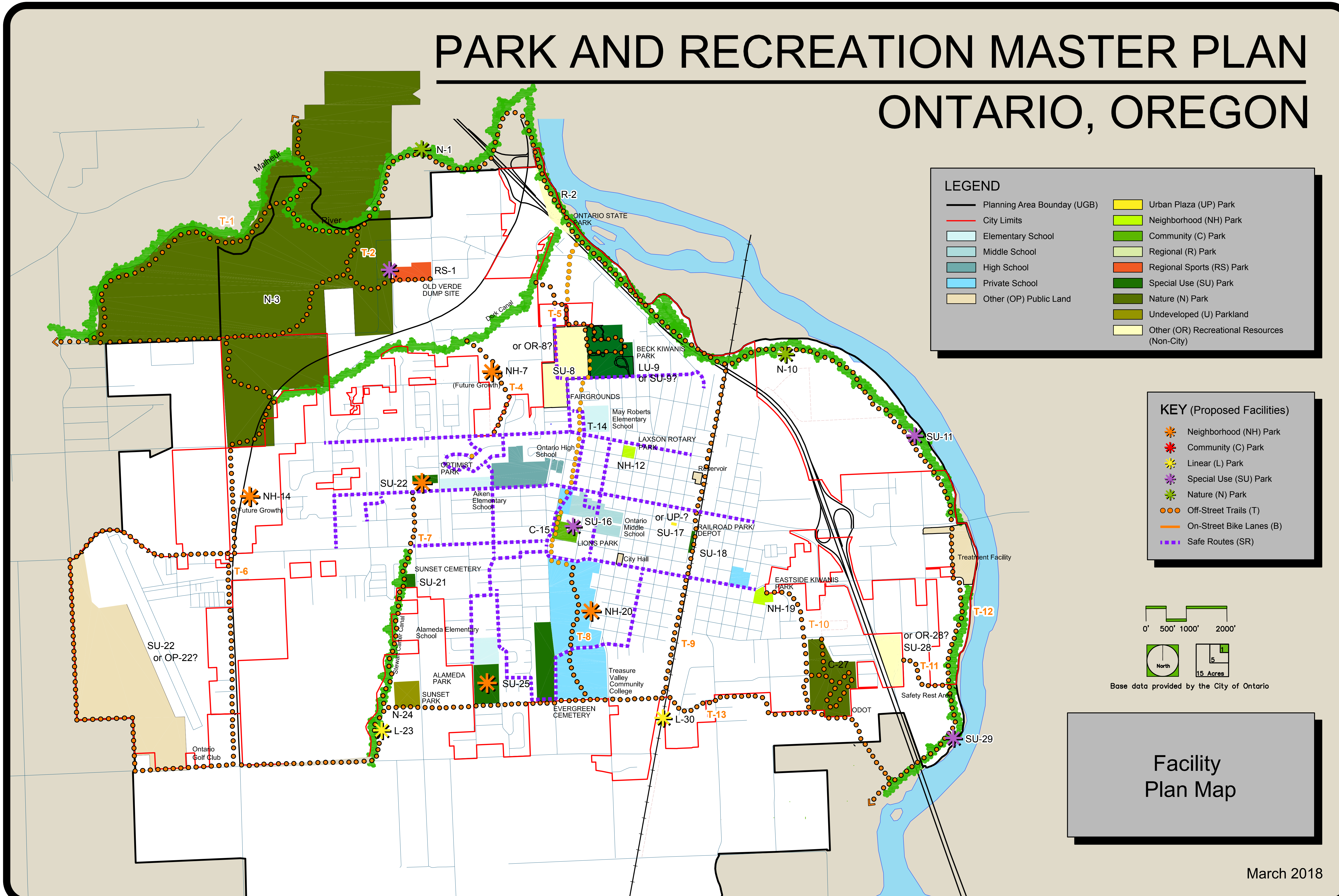
Figure 7-14b

Bicycle and Pedestrian Improvement Project Locations

LEGEND

Improvement

NOT TO SCALE


PARK AND RECREATION MASTER PLAN
ONTARIO, OREGON
LEGEND
Planning Area Bounday (UGB)
City Limits
Elementary School
Middle School
High School
Private School
Other (OP) Public Land
Urban Plaza (UP) Park
Neighborhood (NH) Park
Community (C) Park
Regional (R) Park
Regional Sports (RS) Park
Special Use (SU) Park
Nature (N) Park
Undeveloped (U) Parkland
Other (OR) Recreational Resources (Non-City)
KEY (Proposed Facilities)
Neighborhood (NH) Park
Community (C) Park
Linear (L) Park
Special Use (SU) Park
Nature (N) Park
Off-Street Trails (T)
On-Street Bike Lanes (B)
Safe Routes (SR)
0' 500' 1000' 2000'
North
15 Acres
Base data provided by the City of Ontario
Facility Plan Map
March 2018
N-1
Malheur River
T-1
T-2
RS-1
OLD VERDE DUMP SITE
N-3
R-2
ONTARIO STATE PARK
Dork Canal
T-5
or OR-8?
SU-8
NH-7
(Future Growth)
T-4
BECK KIWANIS PARK
LU-9
or SU-9?
FAIRGROUNDS
N-10
May Roberts Elementary School
T-14
LAXSON ROTARY PARK
NH-12
Ontario High School
OPTIMIST PARK
SU-22
Reservoir
SU-11
NH-14
(Future Growth)
Aiken Elementary School
C-15
SU-16
Ontario Middle School
LIONS PARK
or UP-?
SU-17
RAILROAD PARK/ DEPOT
SU-18
T-7
City Hall
Treatment Facility
T-6
SUNSET CEMETERY
SU-21
EASTSIDE KIWANIS PARK
NH-19
NH-20
T-10
T-12
Stewart Cutler Canal
Alameda Elementary School
T-8
T-9
or OR-28?
SU-28
SU-22
or OP-22?
C-27
T-11
ALAMEDA PARK
SU-25
Treasure Valley Community College
Safety Rest Area
SUNSET PARK
N-24
EVERGREEN CEMETERY
ODOT
L-23
L-30
T-13
SU-29
Ontario Golf Club

Attachment D
Intersection Operations Worksheets

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	455	163	100	856	0	0	0	123	0	0	54
Future Volume (vph)	0	455	163	100	856	0	0	0	123	0	0	54
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5				4.5		4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95				1.00		1.00	
Frt		1.00	0.85	1.00	1.00				0.85		0.86	
Flt Protected		1.00	1.00	0.95	1.00				1.00		1.00	
Satd. Flow (prot)		3050	1282	1554	3197				1430		1211	
Flt Permitted		1.00	1.00	0.38	1.00				1.00		1.00	
Satd. Flow (perm)		3050	1282	623	3197				1430		1211	
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	523	187	115	984	0	0	0	141	0	0	62
RTOR Reduction (vph)	0	0	93	0	0	0	0	0	129	0	57	0
Lane Group Flow (vph)	0	523	94	115	984	0	0	0	12	0	5	0
Heavy Vehicles (%)	0%	9%	16%	7%	4%	0%	0%	0%	4%	0%	0%	25%
Turn Type		NA	Perm	pm+pt	NA				Perm		NA	
Protected Phases		2		1	6			8			4	
Permitted Phases			2	6					8			
Actuated Green, G (s)		22.2	22.2	31.5	31.5				3.8		3.8	
Effective Green, g (s)		22.2	22.2	31.5	31.5				3.8		3.8	
Actuated g/C Ratio		0.50	0.50	0.71	0.71				0.09		0.09	
Clearance Time (s)		4.5	4.5	4.5	4.5				4.5		4.5	
Vehicle Extension (s)		4.8	4.8	2.5	4.8				2.5		2.5	
Lane Grp Cap (vph)		1528	642	543	2273				122		103	
v/s Ratio Prot		0.17		0.02	c0.31						0.00	
v/s Ratio Perm			0.07	0.13					c0.01			
v/c Ratio		0.34	0.15	0.21	0.43				0.10		0.05	
Uniform Delay, d1		6.7	5.9	2.3	2.7				18.7		18.6	
Progression Factor		1.00	1.00	1.00	1.00				1.00		1.00	
Incremental Delay, d2		0.3	0.2	0.1	0.3				0.3		0.2	
Delay (s)		6.9	6.2	2.4	2.9				18.9		18.7	
Level of Service		A	A	A	A				B		B	
Approach Delay (s)		6.7			2.9			18.9			18.7	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	5.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	44.3	Sum of lost time (s)	13.5
Intersection Capacity Utilization	37.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	455	163	100	856	0	0	0	123	0	0	54
Future Volume (veh/h)	0	455	163	100	856	0	0	0	123	0	0	54
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	0	1627	1532	1654	1695	0	0	1750	1695	0	1750	1750
Adj Flow Rate, veh/h	0	523	187	115	984	0	0	0	141	0	0	62
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	9	16	7	4	0	0	0	4	0	0	0
Cap, veh/h	0	1304	548	526	1986	0	0	217	178	0	0	184
Arrive On Green	0.00	0.42	0.42	0.06	0.62	0.00	0.00	0.00	0.12	0.00	0.00	0.12
Sat Flow, veh/h	0	3173	1298	1576	3306	0	0	1750	1437	0	0	1483
Grp Volume(v), veh/h	0	523	187	115	984	0	0	0	141	0	0	62
Grp Sat Flow(s),veh/h/ln	0	1546	1298	1576	1611	0	0	1750	1437	0	0	1483
Q Serve(g_s), s	0.0	4.1	3.4	1.2	5.8	0.0	0.0	0.0	3.3	0.0	0.0	1.3
Cycle Q Clear(g_c), s	0.0	4.1	3.4	1.2	5.8	0.0	0.0	0.0	3.3	0.0	0.0	1.3
Prop In Lane	0.00		1.00	1.00		0.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	0	1304	548	526	1986	0	0	217	178	0	0	184
V/C Ratio(X)	0.00	0.40	0.34	0.22	0.50	0.00	0.00	0.00	0.79	0.00	0.00	0.34
Avail Cap(c_a), veh/h	0	3167	1329	901	3299	0	0	1035	850	0	0	877
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.0	6.8	4.5	3.7	0.0	0.0	0.0	14.8	0.0	0.0	13.9
Incr Delay (d2), s/veh	0.0	0.4	0.7	0.2	0.4	0.0	0.0	0.0	5.8	0.0	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.9	0.7	0.2	0.7	0.0	0.0	0.0	2.8	0.0	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	7.4	7.5	4.7	4.0	0.0	0.0	0.0	20.6	0.0	0.0	14.7
LnGrp LOS	A	A	A	A	A	A	A	A	C	A	A	B
Approach Vol, veh/h		710			1099			141			62	
Approach Delay, s/veh		7.4			4.1			20.6			14.7	
Approach LOS		A			A			C			B	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	6.7	19.1		8.8		25.9		8.8				
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s	10.5	35.5		20.5		35.5		20.5				
Max Q Clear Time (g_c+I1), s	3.2	6.1		3.3		7.8		5.3				
Green Ext Time (p_c), s	0.1	8.4		0.2		13.5		0.3				

Intersection Summary			
HCM 6th Ctrl Delay			6.7
HCM 6th LOS			A

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	31	547	0	0	711	96	0	0	175	0	0	245
Future Volume (vph)	31	547	0	0	711	96	0	0	175	0	0	245
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0			5.0	5.0		4.5				4.5
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00				1.00
Frt	1.00	1.00			1.00	0.85		0.86				0.85
Flt Protected	0.95	1.00			1.00	1.00		1.00				1.00
Satd. Flow (prot)	1108	3197			3167	1365		1402				1417
Flt Permitted	0.26	1.00			1.00	1.00		1.00				1.00
Satd. Flow (perm)	309	3197			3167	1365		1402				1417
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)	36	629	0	0	817	110	0	0	201	0	0	282
RTOR Reduction (vph)	0	0	0	0	0	53	0	176	0	0	0	246
Lane Group Flow (vph)	36	629	0	0	817	57	0	25	0	0	0	36
Heavy Vehicles (%)	50%	4%	0%	0%	5%	9%	0%	0%	8%	0%	0%	5%
Turn Type	pm+pt	NA			NA	Perm		NA				Perm
Protected Phases	5	2			6			8			4	
Permitted Phases	2					6						4
Actuated Green, G (s)	30.0	30.0			23.3	23.3		5.7				5.7
Effective Green, g (s)	30.0	30.0			23.3	23.3		5.7				5.7
Actuated g/C Ratio	0.66	0.66			0.52	0.52		0.13				0.13
Clearance Time (s)	4.5	5.0			5.0	5.0		4.5				4.5
Vehicle Extension (s)	2.5	4.8			4.8	4.8		2.5				2.5
Lane Grp Cap (vph)	243	2121			1632	703		176				178
v/s Ratio Prot	0.01	c0.20			c0.26			0.02				
v/s Ratio Perm	0.09					0.04						c0.03
v/c Ratio	0.15	0.30			0.50	0.08		0.14				0.20
Uniform Delay, d1	3.1	3.2			7.2	5.5		17.6				17.7
Progression Factor	1.00	1.00			1.00	1.00		1.00				1.00
Incremental Delay, d2	0.2	0.2			0.5	0.1		0.3				0.4
Delay (s)	3.3	3.3			7.6	5.6		17.9				18.1
Level of Service	A	A			A	A		B				B
Approach Delay (s)		3.3			7.4			17.9			18.1	
Approach LOS		A			A			B			B	

Intersection Summary			
HCM 2000 Control Delay	8.6	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.45		
Actuated Cycle Length (s)	45.2	Sum of lost time (s)	14.0
Intersection Capacity Utilization	47.7%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	31	547	0	0	711	96	0	0	175	0	0	245
Future Volume (veh/h)	31	547	0	0	711	96	0	0	175	0	0	245
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1068	1695	0	0	1682	1627	0	1750	1750	0	1750	1682
Adj Flow Rate, veh/h	36	629	0	0	817	110	0	0	201	0	0	282
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	50	4	0	0	5	9	0	0	0	0	0	5
Cap, veh/h	284	1880	0	0	1464	632	0	0	324	0	382	311
Arrive On Green	0.03	0.58	0.00	0.00	0.46	0.46	0.00	0.00	0.22	0.00	0.00	0.22
Sat Flow, veh/h	1017	3306	0	0	3279	1379	0	0	1483	0	1750	1425
Grp Volume(v), veh/h	36	629	0	0	817	110	0	0	201	0	0	282
Grp Sat Flow(s),veh/h/ln	1017	1611	0	0	1598	1379	0	0	1483	0	1750	1425
Q Serve(g_s), s	0.8	4.9	0.0	0.0	8.9	2.3	0.0	0.0	5.9	0.0	0.0	9.3
Cycle Q Clear(g_c), s	0.8	4.9	0.0	0.0	8.9	2.3	0.0	0.0	5.9	0.0	0.0	9.3
Prop In Lane	1.00		0.00	0.00		1.00	0.00		1.00	0.00		1.00
Lane Grp Cap(c), veh/h	284	1880	0	0	1464	632	0	0	324	0	382	311
V/C Ratio(X)	0.13	0.33	0.00	0.00	0.56	0.17	0.00	0.00	0.62	0.00	0.00	0.91
Avail Cap(c_a), veh/h	580	2347	0	0	2328	1004	0	0	324	0	382	311
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	6.8	5.2	0.0	0.0	9.5	7.7	0.0	0.0	17.0	0.0	0.0	18.3
Incr Delay (d2), s/veh	0.1	0.2	0.0	0.0	0.7	0.3	0.0	0.0	3.2	0.0	0.0	28.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.1	1.1	0.0	0.0	2.5	0.6	0.0	0.0	2.0	0.0	0.0	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.0	5.4	0.0	0.0	10.1	7.9	0.0	0.0	20.2	0.0	0.0	46.3
LnGrp LOS	A	A	A	A	B	A	A	A	C	A	A	D
Approach Vol, veh/h		665			927			201			282	
Approach Delay, s/veh		5.5			9.9			20.2			46.3	
Approach LOS		A			A			C			D	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		33.0		15.0	6.0	27.0		15.0				
Change Period (Y+Rc), s		5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s		35.0		10.5	15.5	35.0		10.5				
Max Q Clear Time (g_c+I1), s		6.9		11.3	2.8	10.9		7.9				
Green Ext Time (p_c), s		8.2		0.0	0.0	11.1		0.2				

Intersection Summary			
HCM 6th Ctrl Delay			14.4
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	487	124	74	654	35	73	23	24	47	11	80
Future Volume (vph)	111	487	124	74	654	35	73	23	24	47	11	80
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0	5.0	4.5	5.0	5.0		4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.96	1.00
Satd. Flow (prot)	1568	3167	1430	1599	3107	1488		1534	1488		1681	1377
Flt Permitted	0.27	1.00	1.00	0.47	1.00	1.00		0.74	1.00		0.70	1.00
Satd. Flow (perm)	449	3167	1430	783	3107	1488		1176	1488		1221	1377
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)	116	507	129	77	681	36	76	24	25	49	11	83
RTOR Reduction (vph)	0	0	66	0	0	18	0	0	22	0	0	72
Lane Group Flow (vph)	116	507	63	77	681	18	0	100	3	0	60	11
Heavy Vehicles (%)	6%	5%	4%	4%	7%	0%	13%	0%	0%	0%	0%	8%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	26.3	26.3	26.3	27.4	26.9	26.9		6.9	6.9		6.9	6.9
Effective Green, g (s)	26.3	26.3	26.3	27.4	26.9	26.9		6.9	6.9		6.9	6.9
Actuated g/C Ratio	0.49	0.49	0.49	0.51	0.50	0.50		0.13	0.13		0.13	0.13
Clearance Time (s)	4.5	5.0	5.0	4.5	5.0	5.0		4.5	4.5		4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8	4.8		2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	345	1545	697	499	1550	742		150	190		156	176
v/s Ratio Prot	0.04	c0.16		0.02	c0.22							
v/s Ratio Perm	0.13		0.04	0.06		0.01		c0.09	0.00		0.05	0.01
v/c Ratio	0.34	0.33	0.09	0.15	0.44	0.02		0.67	0.02		0.38	0.06
Uniform Delay, d1	8.1	8.4	7.4	7.2	8.7	6.8		22.4	20.5		21.6	20.7
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	0.4	0.2	0.1	0.1	0.4	0.0		9.7	0.0		1.1	0.1
Delay (s)	8.5	8.7	7.5	7.3	9.1	6.9		32.1	20.6		22.7	20.8
Level of Service	A	A	A	A	A	A		C	C		C	C
Approach Delay (s)		8.4			8.8			29.8			21.6	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	53.9	Sum of lost time (s)	14.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	111	487	124	74	654	35	73	23	24	47	11	80
Future Volume (veh/h)	111	487	124	74	654	35	73	23	24	47	11	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1668	1682	1695	1695	1654	1750	1750	1750	1750	1750	1750	1641
Adj Flow Rate, veh/h	116	507	129	77	681	36	76	24	25	49	11	83
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	6	5	4	4	7	0	0	0	0	0	0	8
Cap, veh/h	280	1045	470	464	1251	590	135	24	332	140	17	312
Arrive On Green	0.08	0.33	0.33	0.14	0.40	0.40	0.22	0.22	0.22	0.22	0.22	0.22
Sat Flow, veh/h	1589	3195	1437	1615	3143	1483	0	105	1483	0	75	1391
Grp Volume(v), veh/h	116	507	129	77	681	36	100	0	25	60	0	83
Grp Sat Flow(s),veh/h/ln	1589	1598	1437	1615	1572	1483	105	0	1483	75	0	1391
Q Serve(g_s), s	2.7	5.9	3.1	0.0	7.8	0.7	0.0	0.0	0.6	0.0	0.0	2.3
Cycle Q Clear(g_c), s	2.7	5.9	3.1	0.0	7.8	0.7	10.5	0.0	0.6	10.5	0.0	2.3
Prop In Lane	1.00		1.00	1.00		1.00	0.76		1.00	0.82		1.00
Lane Grp Cap(c), veh/h	280	1045	470	464	1251	590	159	0	332	156	0	312
V/C Ratio(X)	0.41	0.49	0.27	0.17	0.54	0.06	0.63	0.00	0.08	0.38	0.00	0.27
Avail Cap(c_a), veh/h	510	2387	1073	600	2348	1108	159	0	332	156	0	312
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.2	12.6	11.7	14.7	10.8	8.7	21.0	0.0	14.3	20.6	0.0	15.0
Incr Delay (d2), s/veh	0.7	0.7	0.6	0.1	0.7	0.1	7.0	0.0	0.1	1.1	0.0	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.9	1.9	0.9	0.6	2.3	0.2	1.3	0.0	0.2	0.7	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.9	13.3	12.3	14.8	11.6	8.8	28.0	0.0	14.4	21.7	0.0	15.3
LnGrp LOS	B	B	B	B	B	A	C	A	B	C	A	B
Approach Vol, veh/h		752			794			125			143	
Approach Delay, s/veh		13.4			11.8			25.3			18.0	
Approach LOS		B			B			C			B	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	11.5	20.3		15.0	8.2	23.6		15.0
Change Period (Y+Rc), s	5.0	* 5		4.5	4.5	5.0		4.5
Max Green Setting (Gmax), s	10.5	* 35		10.5	10.5	35.0		10.5
Max Q Clear Time (g_c+I1), s	2.0	7.9		12.5	4.7	9.8		12.5
Green Ext Time (p_c), s	0.1	7.4		0.0	0.1	8.8		0.0

Intersection Summary	
HCM 6th Ctrl Delay	13.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	88	355	95	237	597	41	75	38	125	59	29	44
Future Volume (vph)	88	355	95	237	597	41	75	38	125	59	29	44
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	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)	1614	3197	1403	1630	3260	1444	1583	1699	1390	1568	1577	1458
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)	1614	3197	1403	1630	3260	1444	1583	1699	1390	1568	1577	1458
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	99	399	107	266	671	46	84	43	140	66	33	49
RTOR Reduction (vph)	0	0	77	0	0	27	0	0	122	0	0	44
Lane Group Flow (vph)	99	399	30	266	671	19	84	43	18	66	33	5
Heavy Vehicles (%)	3%	4%	6%	2%	2%	3%	5%	3%	7%	6%	11%	2%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	7.9	19.7	19.7	16.9	28.7	28.7	9.3	9.3	9.3	6.7	6.7	6.7
Effective Green, g (s)	7.9	19.7	19.7	16.9	28.7	28.7	9.3	9.3	9.3	6.7	6.7	6.7
Actuated g/C Ratio	0.11	0.28	0.28	0.24	0.40	0.40	0.13	0.13	0.13	0.09	0.09	0.09
Clearance Time (s)	4.5	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8	4.8	2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	179	885	388	387	1315	582	207	222	181	147	148	137
v/s Ratio Prot	0.06	0.12		c0.16	c0.21		c0.05	0.03		c0.04	0.02	
v/s Ratio Perm			0.02			0.01			0.01			0.00
v/c Ratio	0.55	0.45	0.08	0.69	0.51	0.03	0.41	0.19	0.10	0.45	0.22	0.03
Uniform Delay, d1	29.9	21.2	19.0	24.7	15.9	12.8	28.4	27.6	27.2	30.5	29.8	29.3
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	2.9	0.7	0.2	4.6	0.6	0.0	0.9	0.3	0.2	1.6	0.6	0.1
Delay (s)	32.9	21.9	19.1	29.3	16.5	12.9	29.3	27.9	27.4	32.0	30.3	29.3
Level of Service	C	C	B	C	B	B	C	C	C	C	C	C
Approach Delay (s)		23.2			19.8			28.1			30.8	
Approach LOS		C			B			C			C	

Intersection Summary			
HCM 2000 Control Delay	22.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	71.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑	↱	↰	↑↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (veh/h)	88	355	95	237	597	41	75	38	125	59	29	44
Future Volume (veh/h)	88	355	95	237	597	41	75	38	125	59	29	44
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1709	1695	1668	1723	1723	1709	1682	1709	1654	1668	1600	1723
Adj Flow Rate, veh/h	99	399	107	266	671	46	84	43	140	66	33	49
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	3	4	6	2	2	3	5	3	7	6	11	2
Cap, veh/h	140	794	348	324	1172	519	222	237	195	116	117	107
Arrive On Green	0.09	0.25	0.25	0.20	0.36	0.36	0.14	0.14	0.14	0.07	0.07	0.07
Sat Flow, veh/h	1628	3221	1414	1641	3273	1448	1602	1709	1402	1589	1600	1460
Grp Volume(v), veh/h	99	399	107	266	671	46	84	43	140	66	33	49
Grp Sat Flow(s),veh/h/ln	1628	1611	1414	1641	1637	1448	1602	1709	1402	1589	1600	1460
Q Serve(g_s), s	3.2	5.7	3.3	8.4	8.9	1.1	2.6	1.2	5.1	2.2	1.1	1.7
Cycle Q Clear(g_c), s	3.2	5.7	3.3	8.4	8.9	1.1	2.6	1.2	5.1	2.2	1.1	1.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	140	794	348	324	1172	519	222	237	195	116	117	107
V/C Ratio(X)	0.71	0.50	0.31	0.82	0.57	0.09	0.38	0.18	0.72	0.57	0.28	0.46
Avail Cap(c_a), veh/h	771	2095	919	777	2129	942	461	492	404	458	461	420
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.9	17.4	16.5	20.7	14.0	11.5	21.1	20.5	22.2	24.1	23.6	23.9
Incr Delay (d2), s/veh	4.8	1.0	1.0	3.9	0.9	0.1	0.8	0.3	3.7	3.2	1.0	2.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.3	2.0	1.0	3.2	2.9	0.3	1.0	0.5	1.8	0.9	0.4	0.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.7	18.4	17.5	24.6	14.8	11.6	21.8	20.7	25.9	27.3	24.6	26.2
LnGrp LOS	C	B	B	C	B	B	C	C	C	C	C	C
Approach Vol, veh/h		605			983			267			148	
Approach Delay, s/veh		19.9			17.3			23.8			26.3	
Approach LOS		B			B			C			C	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	15.1	18.3		8.4	9.1	24.3		12.0				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	25.5	35.0		15.5	25.5	35.0		15.5				
Max Q Clear Time (g_c+I1), s	10.4	7.7		4.2	5.2	10.9		7.1				
Green Ext Time (p_c), s	0.5	5.5		0.3	0.2	8.3		0.5				

Intersection Summary			
HCM 6th Ctrl Delay			19.6
HCM 6th LOS			B

Notes

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	2.5

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	45	217	9	2	229	2	5	1	0	3	5	87
Future Vol, veh/h	45	217	9	2	229	2	5	1	0	3	5	87
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	120	-	-	-	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	88	88	88	88	88	88	88	88	88	88	88	88
Heavy Vehicles, %	8	8	8	8	8	8	8	8	8	8	8	8
Mvmt Flow	51	247	10	2	260	2	6	1	0	3	6	99

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	262	0	0	257	0	0	672	620	252	620	624	261
Stage 1	-	-	-	-	-	-	354	354	-	265	265	-
Stage 2	-	-	-	-	-	-	318	266	-	355	359	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.18	6.58	6.28	7.18	6.58	6.28
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.58	-	6.18	5.58	-
Follow-up Hdwy	2.272	-	-	2.272	-	-	3.572	4.072	3.372	3.572	4.072	3.372
Pot Cap-1 Maneuver	1268	-	-	1274	-	-	361	396	772	392	394	763
Stage 1	-	-	-	-	-	-	651	620	-	727	679	-
Stage 2	-	-	-	-	-	-	681	678	-	650	617	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1268	-	-	1274	-	-	301	379	772	379	377	763
Mov Cap-2 Maneuver	-	-	-	-	-	-	301	379	-	379	377	-
Stage 1	-	-	-	-	-	-	625	595	-	698	678	-
Stage 2	-	-	-	-	-	-	587	677	-	623	592	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	1.3	0.1	16.8	10.8
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	312	1268	-	-	1274	-	-	378	763
HCM Lane V/C Ratio	0.022	0.04	-	-	0.002	-	-	0.024	0.13
HCM Control Delay (s)	16.8	8	-	-	7.8	0	-	14.8	10.4
HCM Lane LOS	C	A	-	-	A	A	-	B	B
HCM 95th %tile Q(veh)	0.1	0.1	-	-	0	-	-	0.1	0.4

Intersection	
Intersection Delay, s/veh	9.8
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	186	7	0	0	2	7	2	10	0	4	5	201
Future Vol, veh/h	186	7	0	0	2	7	2	10	0	4	5	201
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Heavy Vehicles, %	6	6	6	6	6	6	6	6	6	6	6	6
Mvmt Flow	211	8	0	0	2	8	2	11	0	5	6	228
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	11.3	7.6	8.1	8.7
HCM LOS	B	A	A	A

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	17%	96%	0%	0%	2%
Vol Thru, %	83%	4%	100%	22%	2%
Vol Right, %	0%	0%	0%	78%	96%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	12	193	0	9	210
LT Vol	2	186	0	0	4
Through Vol	10	7	0	2	5
RT Vol	0	0	0	7	201
Lane Flow Rate	14	219	0	10	239
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.019	0.345	0	0.013	0.274
Departure Headway (Hd)	4.97	5.67	5.186	4.487	4.128
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	719	638	0	794	871
Service Time	3.007	3.37	2.886	2.537	2.146
HCM Lane V/C Ratio	0.019	0.343	0	0.013	0.274
HCM Control Delay	8.1	11.3	7.9	7.6	8.7
HCM Lane LOS	A	B	N	A	A
HCM 95th-tile Q	0.1	1.5	0	0	1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1050	286	160	1002	0	0	0	111	0	2	62
Future Volume (vph)	0	1050	286	160	1002	0	0	0	111	0	2	62
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)		4.5	4.5	4.5	4.5			4.5			4.5	
Lane Util. Factor		0.95	1.00	1.00	0.95			1.00			1.00	
Frt		1.00	0.85	1.00	1.00			0.86			0.87	
Flt Protected		1.00	1.00	0.95	1.00			1.00			1.00	
Satd. Flow (prot)		3260	1390	1614	3228			1442			1214	
Flt Permitted		1.00	1.00	0.18	1.00			1.00			1.00	
Satd. Flow (perm)		3260	1390	313	3228			1442			1214	
Peak-hour factor, PHF	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Adj. Flow (vph)	0	1094	298	167	1044	0	0	0	116	0	2	65
RTOR Reduction (vph)	0	0	123	0	0	0	0	107	0	0	60	0
Lane Group Flow (vph)	0	1094	175	167	1044	0	0	9	0	0	7	0
Heavy Vehicles (%)	0%	2%	7%	3%	3%	0%	0%	0%	5%	0%	0%	26%
Turn Type		NA	Perm	pm+pt	NA			NA			NA	
Protected Phases		2		1	6			8			4	
Permitted Phases			2	6								
Actuated Green, G (s)		36.1	36.1	47.6	47.6			4.9			4.9	
Effective Green, g (s)		36.1	36.1	47.6	47.6			4.9			4.9	
Actuated g/C Ratio		0.59	0.59	0.77	0.77			0.08			0.08	
Clearance Time (s)		4.5	4.5	4.5	4.5			4.5			4.5	
Vehicle Extension (s)		4.8	4.8	2.5	4.8			2.5			2.5	
Lane Grp Cap (vph)		1913	815	390	2498			114			96	
v/s Ratio Prot		c0.34		0.05	c0.32			c0.01			0.01	
v/s Ratio Perm			0.13	0.28								
v/c Ratio		0.57	0.21	0.43	0.42			0.08			0.07	
Uniform Delay, d1		7.9	6.0	3.6	2.3			26.2			26.2	
Progression Factor		1.00	1.00	1.00	1.00			1.00			1.00	
Incremental Delay, d2		0.6	0.3	0.6	0.2			0.2			0.2	
Delay (s)		8.5	6.3	4.2	2.5			26.4			26.4	
Level of Service		A	A	A	A			C			C	
Approach Delay (s)		8.0			2.8			26.4			26.4	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	7.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	61.5	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.8%	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 (veh/h)	0	1050	286	160	1002	0	0	0	111	0	2	62
Future Volume (veh/h)	0	1050	286	160	1002	0	0	0	111	0	2	62
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	0	1723	1654	1709	1709	0	0	1750	1750	0	1750	1750
Adj Flow Rate, veh/h	0	1094	298	167	1044	0	0	0	116	0	2	65
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	2	7	3	3	0	0	0	0	0	0	0
Cap, veh/h	0	1835	786	392	2345	0	0	0	148	0	4	144
Arrive On Green	0.00	0.56	0.56	0.07	0.72	0.00	0.00	0.00	0.10	0.00	0.10	0.10
Sat Flow, veh/h	0	3359	1402	1628	3333	0	0	0	1483	0	44	1445
Grp Volume(v), veh/h	0	1094	298	167	1044	0	0	0	116	0	0	67
Grp Sat Flow(s),veh/h/ln	0	1637	1402	1628	1624	0	0	0	1483	0	0	1490
Q Serve(g_s), s	0.0	11.2	6.0	1.9	6.7	0.0	0.0	0.0	3.9	0.0	0.0	2.1
Cycle Q Clear(g_c), s	0.0	11.2	6.0	1.9	6.7	0.0	0.0	0.0	3.9	0.0	0.0	2.1
Prop In Lane	0.00		1.00	1.00		0.00	0.00		1.00	0.00		0.97
Lane Grp Cap(c), veh/h	0	1835	786	392	2345	0	0	0	148	0	0	149
V/C Ratio(X)	0.00	0.60	0.38	0.43	0.45	0.00	0.00	0.00	0.78	0.00	0.00	0.45
Avail Cap(c_a), veh/h	0	2299	985	611	2345	0	0	0	601	0	0	604
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	7.3	6.2	6.0	2.9	0.0	0.0	0.0	22.2	0.0	0.0	21.4
Incr Delay (d2), s/veh	0.0	0.6	0.6	0.5	0.3	0.0	0.0	0.0	6.6	0.0	0.0	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.9	1.4	0.4	0.9	0.0	0.0	0.0	1.5	0.0	0.0	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	0.0	7.9	6.8	6.6	3.1	0.0	0.0	0.0	28.9	0.0	0.0	23.0
LnGrp LOS	A	A	A	A	A	A	A	A	C	A	A	C
Approach Vol, veh/h		1392			1211			116			67	
Approach Delay, s/veh		7.7			3.6			28.9			23.0	
Approach LOS		A			A			C			C	

Timer - Assigned Phs	1	2		4		6		8				
Phs Duration (G+Y+Rc), s	8.2	32.8		9.5		41.0		9.5				
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s	10.5	35.5		20.5		35.5		20.5				
Max Q Clear Time (g_c+I1), s	3.9	13.2		4.1		8.7		5.9				
Green Ext Time (p_c), s	0.2	15.2		0.2		14.2		0.4				

Intersection Summary			
HCM 6th Ctrl Delay			7.2
HCM 6th LOS			A

Notes

User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	38	1123	0	0	995	146	0	3	162	0	0	167
Future Volume (vph)	38	1123	0	0	995	146	0	3	162	0	0	167
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0			5.0	5.0		4.5			4.5	
Lane Util. Factor	1.00	0.95			0.95	1.00		1.00			1.00	
Frt	1.00	1.00			1.00	0.85		0.87			0.86	
Flt Protected	0.95	1.00			1.00	1.00		1.00			1.00	
Satd. Flow (prot)	1397	3228			3260	1390		1453			1376	
Flt Permitted	0.17	1.00			1.00	1.00		1.00			1.00	
Satd. Flow (perm)	255	3228			3260	1390		1453			1376	
Peak-hour factor, PHF	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Adj. Flow (vph)	43	1262	0	0	1118	164	0	3	182	0	0	188
RTOR Reduction (vph)	0	0	0	0	0	72	0	97	0	0	162	0
Lane Group Flow (vph)	43	1262	0	0	1118	92	0	88	0	0	26	0
Heavy Vehicles (%)	19%	3%	0%	0%	2%	7%	0%	33%	4%	0%	0%	10%
Turn Type	pm+pt	NA			NA	Perm		NA			NA	
Protected Phases	5	2			6			8			4	
Permitted Phases	2					6						
Actuated Green, G (s)	40.4	40.4			32.5	32.5		7.9			7.9	
Effective Green, g (s)	40.4	40.4			32.5	32.5		7.9			7.9	
Actuated g/C Ratio	0.70	0.70			0.56	0.56		0.14			0.14	
Clearance Time (s)	4.5	5.0			5.0	5.0		4.5			4.5	
Vehicle Extension (s)	2.5	4.8			4.8	4.8		2.5			2.5	
Lane Grp Cap (vph)	245	2256			1833	781		198			188	
v/s Ratio Prot	0.01	c0.39			c0.34			c0.06			0.02	
v/s Ratio Perm	0.11					0.07						
v/c Ratio	0.18	0.56			0.61	0.12		0.45			0.14	
Uniform Delay, d1	4.1	4.3			8.4	5.9		22.9			21.9	
Progression Factor	1.00	1.00			1.00	1.00		1.00			1.00	
Incremental Delay, d2	0.3	0.5			0.8	0.1		1.2			0.2	
Delay (s)	4.3	4.8			9.2	6.1		24.1			22.2	
Level of Service	A	A			A	A		C			C	
Approach Delay (s)		4.8			8.8			24.1			22.2	
Approach LOS		A			A			C			C	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.60		
Actuated Cycle Length (s)	57.8	Sum of lost time (s)	14.0
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	38	1123	0	0	995	146	0	3	162	0	0	167
Future Volume (veh/h)	38	1123	0	0	995	146	0	3	162	0	0	167
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1491	1709	0	0	1723	1654	0	1300	1300	0	1750	1750
Adj Flow Rate, veh/h	43	1262	0	0	1118	164	0	3	182	0	0	188
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	19	3	0	0	2	7	0	33	33	0	0	0
Cap, veh/h	282	2071	0	0	1707	731	0	3	207	0	0	282
Arrive On Green	0.03	0.64	0.00	0.00	0.52	0.52	0.00	0.19	0.19	0.00	0.00	0.19
Sat Flow, veh/h	1420	3333	0	0	3359	1402	0	18	1086	0	0	1483
Grp Volume(v), veh/h	43	1262	0	0	1118	164	0	0	185	0	0	188
Grp Sat Flow(s),veh/h/ln	1420	1624	0	0	1637	1402	0	0	1104	0	0	1483
Q Serve(g_s), s	0.7	12.7	0.0	0.0	13.7	3.5	0.0	0.0	9.0	0.0	0.0	6.5
Cycle Q Clear(g_c), s	0.7	12.7	0.0	0.0	13.7	3.5	0.0	0.0	9.0	0.0	0.0	6.5
Prop In Lane	1.00		0.00	0.00		1.00	0.00		0.98	0.00		1.00
Lane Grp Cap(c), veh/h	282	2071	0	0	1707	731	0	0	210	0	0	282
V/C Ratio(X)	0.15	0.61	0.00	0.00	0.66	0.22	0.00	0.00	0.88	0.00	0.00	0.67
Avail Cap(c_a), veh/h	631	2071	0	0	2074	889	0	0	210	0	0	282
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00
Uniform Delay (d), s/veh	7.3	5.9	0.0	0.0	9.6	7.2	0.0	0.0	21.8	0.0	0.0	20.7
Incr Delay (d2), s/veh	0.2	0.7	0.0	0.0	0.9	0.3	0.0	0.0	31.9	0.0	0.0	5.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	3.0	0.0	0.0	4.0	0.9	0.0	0.0	4.0	0.0	0.0	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	7.4	6.7	0.0	0.0	10.5	7.5	0.0	0.0	53.7	0.0	0.0	26.2
LnGrp LOS	A	A	A	A	B	A	A	A	D	A	A	C
Approach Vol, veh/h		1305			1282			185			188	
Approach Delay, s/veh		6.7			10.1			53.7			26.2	
Approach LOS		A			B			D			C	

Timer - Assigned Phs		2		4	5	6		8				
Phs Duration (G+Y+Rc), s		40.2		15.0	6.4	33.8		15.0				
Change Period (Y+Rc), s		5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s		35.0		10.5	15.5	35.0		10.5				
Max Q Clear Time (g_c+I1), s		14.7		8.5	2.7	15.7		11.0				
Green Ext Time (p_c), s		14.1		0.2	0.0	13.1		0.0				

Intersection Summary			
HCM 6th Ctrl Delay			12.4
HCM 6th LOS			B

Notes
User approved pedestrian interval to be less than phase max green.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	198	880	207	77	863	45	167	45	94	63	31	111
Future Volume (vph)	198	880	207	77	863	45	167	45	94	63	31	111
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0	5.0	4.5	5.0	5.0		4.5	4.5		4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00		1.00	1.00		1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85		1.00	0.85		1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00		0.96	1.00		0.97	1.00
Satd. Flow (prot)	1599	3197	1473	1662	3228	1377		1646	1473		1671	1444
Flt Permitted	0.17	1.00	1.00	0.31	1.00	1.00		0.71	1.00		0.50	1.00
Satd. Flow (perm)	293	3197	1473	550	3228	1377		1210	1473		871	1444
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)	204	907	213	79	890	46	172	46	97	65	32	114
RTOR Reduction (vph)	0	0	98	0	0	25	0	0	80	0	0	95
Lane Group Flow (vph)	204	907	115	79	890	21	0	218	17	0	97	19
Heavy Vehicles (%)	4%	4%	1%	0%	3%	8%	1%	7%	1%	2%	0%	3%
Turn Type	pm+pt	NA	Perm	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA	Perm
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6		6	8		8	4		4
Actuated Green, G (s)	33.9	33.9	33.9	29.5	29.0	29.0		10.7	10.7		10.7	10.7
Effective Green, g (s)	33.9	33.9	33.9	29.5	29.0	29.0		10.7	10.7		10.7	10.7
Actuated g/C Ratio	0.54	0.54	0.54	0.47	0.46	0.46		0.17	0.17		0.17	0.17
Clearance Time (s)	4.5	5.0	5.0	4.5	5.0	5.0		4.5	4.5		4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8	4.8		2.5	2.5		2.5	2.5
Lane Grp Cap (vph)	345	1728	796	331	1493	636		206	251		148	246
v/s Ratio Prot	0.08	c0.28		0.02	c0.28							
v/s Ratio Perm	0.23		0.08	0.10		0.02		c0.18	0.01		0.11	0.01
v/c Ratio	0.59	0.52	0.14	0.24	0.60	0.03		1.06	0.07		0.66	0.08
Uniform Delay, d1	9.2	9.2	7.2	10.3	12.5	9.2		26.0	21.8		24.3	21.9
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	2.3	0.5	0.2	0.3	0.9	0.0		78.9	0.1		9.0	0.1
Delay (s)	11.5	9.8	7.3	10.5	13.4	9.2		104.9	21.9		33.2	22.0
Level of Service	B	A	A	B	B	A		F	C		C	C
Approach Delay (s)		9.6			13.0			79.4			27.1	
Approach LOS		A			B			E			C	

Intersection Summary			
HCM 2000 Control Delay	19.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.71		
Actuated Cycle Length (s)	62.7	Sum of lost time (s)	14.0
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 (veh/h)	198	880	207	77	863	45	167	45	94	63	31	111
Future Volume (veh/h)	198	880	207	77	863	45	167	45	94	63	31	111
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1695	1695	1736	1750	1709	1641	1654	1654	1736	1750	1750	1709
Adj Flow Rate, veh/h	204	907	213	79	890	46	172	46	97	65	32	114
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	4	4	1	0	3	8	7	7	1	0	0	3
Cap, veh/h	352	1497	684	383	1432	613	116	0	279	108	31	274
Arrive On Green	0.12	0.46	0.46	0.08	0.44	0.44	0.19	0.19	0.19	0.19	0.19	0.19
Sat Flow, veh/h	1615	3221	1471	1667	3247	1391	0	0	1471	0	164	1448
Grp Volume(v), veh/h	204	907	213	79	890	46	218	0	97	97	0	114
Grp Sat Flow(s),veh/h/ln	1615	1611	1471	1667	1624	1391	0	0	1471	164	0	1448
Q Serve(g_s), s	4.7	11.6	5.0	0.0	11.7	1.1	0.0	0.0	3.2	0.0	0.0	3.8
Cycle Q Clear(g_c), s	4.7	11.6	5.0	0.0	11.7	1.1	10.5	0.0	3.2	10.5	0.0	3.8
Prop In Lane	1.00		1.00	1.00		1.00	0.79		1.00	0.67		1.00
Lane Grp Cap(c), veh/h	352	1497	684	383	1432	613	116	0	279	139	0	274
V/C Ratio(X)	0.58	0.61	0.31	0.21	0.62	0.08	1.88	0.00	0.35	0.70	0.00	0.42
Avail Cap(c_a), veh/h	468	2032	928	557	2049	877	116	0	279	139	0	274
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.0	11.1	9.3	15.9	11.9	9.0	27.7	0.0	19.5	24.5	0.0	19.8
Incr Delay (d2), s/veh	1.1	0.8	0.5	0.2	0.9	0.1	425.8	0.0	0.6	13.2	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	3.5	1.4	0.8	3.7	0.3	15.2	0.0	1.0	1.7	0.0	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	14.1	11.8	9.8	16.1	12.8	9.1	453.5	0.0	20.1	37.8	0.0	20.5
LnGrp LOS	B	B	A	B	B	A	F	A	C	D	A	C
Approach Vol, veh/h		1324			1015			315			211	
Approach Delay, s/veh		11.9			12.9			320.0			28.5	
Approach LOS		B			B			F			C	

Timer - Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	9.7	30.8		15.0	11.0	29.5		15.0
Change Period (Y+Rc), s	5.0	* 5		4.5	4.5	5.0		4.5
Max Green Setting (Gmax), s	10.5	* 35		10.5	10.5	35.0		10.5
Max Q Clear Time (g_c+I1), s	2.0	13.6		12.5	6.7	13.7		12.5
Green Ext Time (p_c), s	0.1	12.1		0.0	0.2	10.8		0.0

Intersection Summary	
HCM 6th Ctrl Delay	47.3
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	231	732	115	259	687	80	151	88	339	252	94	139
Future Volume (vph)	231	732	115	259	687	80	151	88	339	252	94	139
Ideal Flow (vphpl)	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750	1750
Total Lost time (s)	4.5	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	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	3228	1473	1630	3260	1444	1630	1716	1458	1630	1577	1403
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	3228	1473	1630	3260	1444	1630	1716	1458	1630	1577	1403
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)	254	804	126	285	755	88	166	97	373	277	103	153
RTOR Reduction (vph)	0	0	71	0	0	59	0	0	323	0	0	129
Lane Group Flow (vph)	254	804	55	285	755	29	166	97	50	277	103	24
Heavy Vehicles (%)	1%	3%	1%	2%	2%	3%	2%	2%	2%	2%	11%	6%
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Split	NA	Perm	Split	NA	Perm
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			2			6			8			4
Actuated Green, G (s)	19.7	31.6	31.6	21.3	33.2	33.2	13.6	13.6	13.6	15.7	15.7	15.7
Effective Green, g (s)	19.7	31.6	31.6	21.3	33.2	33.2	13.6	13.6	13.6	15.7	15.7	15.7
Actuated g/C Ratio	0.20	0.31	0.31	0.21	0.33	0.33	0.14	0.14	0.14	0.16	0.16	0.16
Clearance Time (s)	4.5	5.0	5.0	4.5	5.0	5.0	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	2.5	4.8	4.8	2.5	4.8	4.8	2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	322	1012	462	344	1074	476	220	231	196	254	245	218
v/s Ratio Prot	0.15	c0.25		c0.17	0.23		c0.10	0.06		c0.17	0.07	
v/s Ratio Perm			0.04			0.02			0.03			0.02
v/c Ratio	0.79	0.79	0.12	0.83	0.70	0.06	0.75	0.42	0.26	1.09	0.42	0.11
Uniform Delay, d1	38.5	31.6	24.6	38.0	29.4	23.1	41.9	39.9	39.0	42.5	38.4	36.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.7	5.0	0.2	14.8	2.6	0.1	13.0	0.9	0.5	82.8	0.8	0.2
Delay (s)	50.2	36.5	24.8	52.7	32.0	23.2	55.0	40.8	39.5	125.3	39.2	36.7
Level of Service	D	D	C	D	C	C	D	D	D	F	D	D
Approach Delay (s)		38.2			36.5			43.8			83.2	
Approach LOS		D			D			D			F	

Intersection Summary			
HCM 2000 Control Delay	45.6	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	100.7	Sum of lost time (s)	18.5
Intersection Capacity Utilization	71.6%	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 (veh/h)	231	732	115	259	687	80	151	88	339	252	94	139
Future Volume (veh/h)	231	732	115	259	687	80	151	88	339	252	94	139
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1736	1709	1736	1723	1723	1709	1723	1723	1723	1723	1600	1668
Adj Flow Rate, veh/h	254	804	126	285	755	88	166	97	373	277	103	153
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	3	1	2	2	3	2	2	2	2	11	6
Cap, veh/h	287	1004	455	317	1077	477	256	268	227	256	249	220
Arrive On Green	0.17	0.31	0.31	0.19	0.33	0.33	0.16	0.16	0.16	0.16	0.16	0.16
Sat Flow, veh/h	1654	3247	1471	1641	3273	1448	1641	1723	1460	1641	1600	1414
Grp Volume(v), veh/h	254	804	126	285	755	88	166	97	373	277	103	153
Grp Sat Flow(s),veh/h/ln	1654	1624	1471	1641	1637	1448	1641	1723	1460	1641	1600	1414
Q Serve(g_s), s	14.9	22.6	6.4	16.9	20.0	4.3	9.5	5.0	15.5	15.5	5.8	10.2
Cycle Q Clear(g_c), s	14.9	22.6	6.4	16.9	20.0	4.3	9.5	5.0	15.5	15.5	5.8	10.2
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	287	1004	455	317	1077	477	256	268	227	256	249	220
V/C Ratio(X)	0.89	0.80	0.28	0.90	0.70	0.18	0.65	0.36	1.64	1.08	0.41	0.69
Avail Cap(c_a), veh/h	424	1142	518	420	1151	509	256	268	227	256	249	220
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.2	31.5	26.0	39.2	29.1	23.8	39.4	37.6	42.0	42.0	37.9	39.8
Incr Delay (d2), s/veh	12.7	4.5	0.6	16.9	2.3	0.4	5.2	0.6	307.0	80.4	0.8	8.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	6.9	9.2	2.3	8.1	7.9	1.5	4.2	2.2	25.0	12.0	2.3	4.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	36.0	26.6	56.1	31.4	24.2	44.6	38.2	349.0	122.4	38.7	48.3
LnGrp LOS	D	D	C	E	C	C	D	D	F	F	D	D
Approach Vol, veh/h		1184			1128			636			533	
Approach Delay, s/veh		38.6			37.1			222.2			85.0	
Approach LOS		D			D			F			F	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	23.7	35.8		20.0	21.8	37.7		20.0				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	25.5	35.0		15.5	25.5	35.0		15.5				
Max Q Clear Time (g_c+I1), s	18.9	24.6		17.5	16.9	22.0		17.5				
Green Ext Time (p_c), s	0.4	6.2		0.0	0.4	6.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay			78.8									
HCM 6th LOS			E									
Notes												

User approved pedestrian interval to be less than phase max green.

Intersection	
Int Delay, s/veh	3.9

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	100	302	7	0	294	13	7	5	4	12	9	125
Future Vol, veh/h	100	302	7	0	294	13	7	5	4	12	9	125
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	120	-	-	-	-	-	-	-	-	-	-	0
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	77	77	77	77	77	77	77	77	77	77	77	77
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	130	392	9	0	382	17	9	6	5	16	12	162

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	399	0	0	401	0	0	1135	1056	397	1053	1052	391
Stage 1	-	-	-	-	-	-	657	657	-	391	391	-
Stage 2	-	-	-	-	-	-	478	399	-	662	661	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1160	-	-	1158	-	-	179	225	652	204	227	658
Stage 1	-	-	-	-	-	-	454	462	-	633	607	-
Stage 2	-	-	-	-	-	-	568	602	-	451	460	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1160	-	-	1158	-	-	118	200	652	181	202	658
Mov Cap-2 Maneuver	-	-	-	-	-	-	118	200	-	181	202	-
Stage 1	-	-	-	-	-	-	403	410	-	562	607	-
Stage 2	-	-	-	-	-	-	420	602	-	391	408	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	2.1	0	28	14.4
HCM LOS			D	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	177	1160	-	-	1158	-	-	189	658
HCM Lane V/C Ratio	0.117	0.112	-	-	-	-	-	0.144	0.247
HCM Control Delay (s)	28	8.5	-	-	0	-	-	27.2	12.3
HCM Lane LOS	D	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.4	0.4	-	-	0	-	-	0.5	1

Intersection	
Intersection Delay, s/veh	14.3
Intersection LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	323	0	1	0	2	5	5	11	0	3	5	261
Future Vol, veh/h	323	0	1	0	2	5	5	11	0	3	5	261
Peak Hour Factor	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84	0.84
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	385	0	1	0	2	6	6	13	0	4	6	311
Number of Lanes	0	1	1	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	2	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	2	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	2
HCM Control Delay	17.7	8.2	8.9	10.7
HCM LOS	C	A	A	B

Lane	NBLn1	EBLn1	EBLn2	WBLn1	SBLn1
Vol Left, %	31%	100%	0%	0%	1%
Vol Thru, %	69%	0%	0%	29%	2%
Vol Right, %	0%	0%	100%	71%	97%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	16	323	1	7	269
LT Vol	5	323	0	0	3
Through Vol	11	0	0	2	5
RT Vol	0	0	1	5	261
Lane Flow Rate	19	385	1	8	320
Geometry Grp	2	7	7	5	2
Degree of Util (X)	0.03	0.62	0.002	0.012	0.406
Departure Headway (Hd)	5.582	5.8	4.592	5.091	4.56
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	634	615	768	707	788
Service Time	3.676	3.599	2.39	3.091	2.603
HCM Lane V/C Ratio	0.03	0.626	0.001	0.011	0.406
HCM Control Delay	8.9	17.7	7.4	8.2	10.7
HCM Lane LOS	A	C	A	A	B
HCM 95th-tile Q	0.1	4.3	0	0	2

Signalized Intersection V/C Calculations

crtical flow ratio

The critical intersection v/c ratio is then calculated using the HCM 6 equation:
Xc = Sum of critical flow ratios * C/(C-L) = 0.87 * 110/(110-16) = 1.02

E Idaho Ave / I-84 EB Ramp Terminal

AM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	523	3173	0.16
WBT	984	3306	0.30
WBL	115	1576	0.07
NBT	141	1437	0.10
SBT	62	1483	0.04
		Sum of Critical Flow Ratios:	**0.40**

Cycle Length	80
Lost time per phase	4.50
Total lost time	13.5

Xc	**0.48**
HCS 2000	0.45

PM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	1094	3359	0.33
WBT	1044	3333	0.31
WBL	167	1628	0.10
NBT	116	1483	0.08
SBT	67	1445	0.05
		Sum of Critical Flow Ratios:	**0.51**

Cycle Length	80
Lost time per phase	4.50
Total lost time	13.5

Xc	**0.61**
HCS 2000	0.52

E Idaho Ave / I-84 WB Ramp Terminal

AM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	629	3306	0.19
EBL	36	1017	0.04
WBT	817	3279	0.25
NBT	201	1483	0.14
SBT	282	1425	0.20
		Sum of Critical Flow Ratios:	**0.48**

Cycle Length	75
Lost time per phase	4.50
Total lost time	13.5

Xc	**0.59**
HCS 2000	0.45

PM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	1262	3333	0.38
EBL	43	1420	0.03
WBT	1118	3359	0.33
NBT	185	1086	0.17
SBT	188	1483	0.13
		Sum of Critical Flow Ratios:	**0.55**

Cycle Length	75
Lost time per phase	4.50
Total lost time	13.5

Xc	**0.67**
HCS 2000	0.6

E Idaho Ave / Goodfellow St

HCS 2000 Output - Errors in HCM 6th Edition Output

AM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	507	3195	0.16
EBL	116	1589	0.07
WBT	681	3143	0.22
WBL	77	1615	0.05
NBT	100	1176	0.09
SBT	60	1221	0.05
		Sum of Critical Flow Ratios:	**0.37**

Cycle Length	70
Lost time per phase	4.75
Total lost time	19.0

Xc	**0.51**
HCS 2000	0.48

PM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	907	3221	0.28
EBL	204	1615	0.13
WBT	890	3247	0.27
WBL	79	1667	0.05
NBT	218	1210	0.18
SBT	97	871	0.11
		Sum of Critical Flow Ratios:	**0.58**

Cycle Length	70
Lost time per phase	4.75
Total lost time	19.0

Xc	**0.80**
HCS 2000	0.71

E Idaho Ave / East Ln

AM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	399	3221	0.12

PM Peak Hour

Crtical Movements	Adj Flow	Sat Flow	Critical Flow Ratio
EBT	804	3247	0.25

EBL	99	1628	0.06
WBT	671	3273	0.21
WBL	266	1641	0.16
NBL	84	1602	0.05
SBL	66	1589	0.04
		Sum of Critical Flow Ratios:	**0.38**

Cycle Length	110
Lost time per phase	4.63
Total lost time	18.5

Xc	**0.46**
HCS 2000	0.56

EBL	254	1654	0.15
WBT	755	3273	0.23
WBL	285	1641	0.17
NBL	166	1641	0.10
SBL	277	1641	0.17
		Sum of Critical Flow Ratios:	**0.69**

Cycle Length	110
Lost time per phase	4.63
Total lost time	18.5

Xc	**0.83**
HCS 2000	0.85