TECH MEMO #5: ALTERNATIVES ANALYSIS AND FUNDING PROGRAM

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To:	Larry Lewis and Kerry Kemp, City of Waldport David Helton, Oregon Department of Transportation
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Project:	Waldport Transportation System Plan (TSP) Update
Subject:	Tech Memo #5: Alternatives Analysis and Funding Program

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INTRODUCTION

This memorandum summarizes alternatives analysis and funding program for the Waldport Transportation System Plan (TSP) update. This memorandum includes information on projects that address identified deficiencies and needs in the City of Waldport. The information provided in this memorandum will serve as the basis for alternatives solutions packages for the TSP update.

AUTOMOBILE

This section identifies the alternatives developed to address deficiencies in the automobile system. This section includes an assessment of Crestline Drive, Industrial Park Access Road connections, and streetscape improvements for US 101 and OR 34.

CRESTLINE DRIVE

A indicated in *Tech Memo 3A: Existing Conditions Inventory*, the segment of Crestline Drive from Lint Slough Road to Willow Street is failing and needs to be repaired, replaced, or abandoned. The three alternatives considered for Crestline Drive include maintaining it as a two-way roadway, limiting it to one-way, or restricting vehicle traffic (i.e. limiting it to a ped/bike connection). The following provides an evaluation of the alternatives and potential impacts on traffic operations, safety, and connectivity.

Crestline Drive Traffic Operations

Traffic operations were evaluated at the OR 34/Crestline Drive, OR 34/Cedar Street, and Cedar Street/Crestline Drive intersections under year 2040 traffic conditions as indicated below.

- Two-Way – All vehicle traffic was as projected in the year 2040 no-build traffic conditions analysis.
- One-Way – All northbound (downhill) vehicle traffic was assumed to re-route via Cedar Street.
- Restrict Vehicles – All vehicle traffic was assumed to re-route via Cedar Street.

Table 1 summarizes the results of the intersection operations analysis. As shown, the traffic operations analysis results indicate that all study intersections are projected to operate acceptably under all alternatives. *Traffic operations results are provided in Attachment A*.

Table 1: Crestline Drive Alternatives Analysis – Year 2040 Weekday PM Peak Hour

Intersection Operations Analysis – Year 2040 Weekday PM Peak Hour					
Map ID	**Intersection**	**Crestline Drive Scenario**	**Level of Service**	**Delay (Sec)**	**Volume/Capacity**
5	OR 34/ Cedar Street	Two-Way	C	17.1	0.29
		One-Way	C	19.9	0.46
		Restrict Vehicles	C	22.7	0.50
6	OR 34/ Crestline Drive	Two-Way	B	12.5	0.14
		One-Way[1]	A	1.4	0.04
		Restrict Vehicles	N/A	N/A	N/A
8	Cedar Street/ Crestline Drive	Two-Way	B	10.6	0.09
		One-Way	B	10.4	0.15
		Restrict Vehicles	B	11.5	0.17

Synchro does not provide analysis results for this intersection with HCM 6th Edition. HCM 2000 result is shown.
Level of Service (LOS) = Intersection LOS (Signal), critical movement LOS (TWSC).
Delay = Intersection average vehicle delay (Signal), critical movement vehicle delay (TWSC).
Volume/Capacity (V/C) = Intersection V/C (Signal) critical movement V/C (TWSC).

Average Daily Traffic (ADT) along Cedar Street is expected to increase from 1,600 to 2,200 under the one-way alternative and from 1,600 to 2,700 under the restricted alternative; each of which is consistent with, or appropriate for, the collector street classification of Cedar Street.

Crestline Drive Safety

Crestline Drive is one of three streets that connect the lowland areas of Waldport to the upland areas; the other streets include Cedar Street located more than 1,500-feet to the west along OR 34 and Range Drive located more than 1.5 miles to the south along US 101. Crestline Drive, Cedar Street, and Range Drive each play a significant role in the city's safety network as both emergency access routes and evacuation routes. The following summarizes the potential impacts of the alternatives on emergency access and evacuation.

- Two-Way – this alternative would not impact emergency access or evacuation routes.
- One-Way – limiting Crestline Drive to one-way southbound (uphill) would increase vehicle emergency response times to areas east of downtown by approximately 1 minute (or 0.1 miles). Pedestrians and bicyclists would continue to be able to use Crestline drive for evacuation.
- Restrict Vehicles – limiting Crestline Drive to ped/bike access only would increase vehicle emergency response times to/from areas east of downtown by approximately 1 minute (or 0.1 miles). Pedestrians and bicyclists would continue to be able to use Crestline drive for evacuation.

Crestline Drive Connectivity

- Two-Way – This alternative requires the city to plan for reconstruction of the roadway, including retaining walls to stabilize the bank and prevent erosion.
- One-Way –This alternative requires less costly reconstruction and bank stabilization than the two-way alternative; however, it will likely still require some investment/improvement.
  - This alternative may also require a new east-west collector street at the foot of the hill.
- Restrict Vehicles –This alternative requires less costly reconstruction and bank stabilization that the two-way and on-way alternatives; however, it will likely still require some investment/improvement.
  - This alternative may also require a new east-west collector street at the foot of the hill.
  - The remaining roadway segment could still be used by vehicles in an emergency.
  - Designation of the roadway as a pedestrian/bicycle path does not preclude the need for a multi-use path/trail through the former school site (see below).

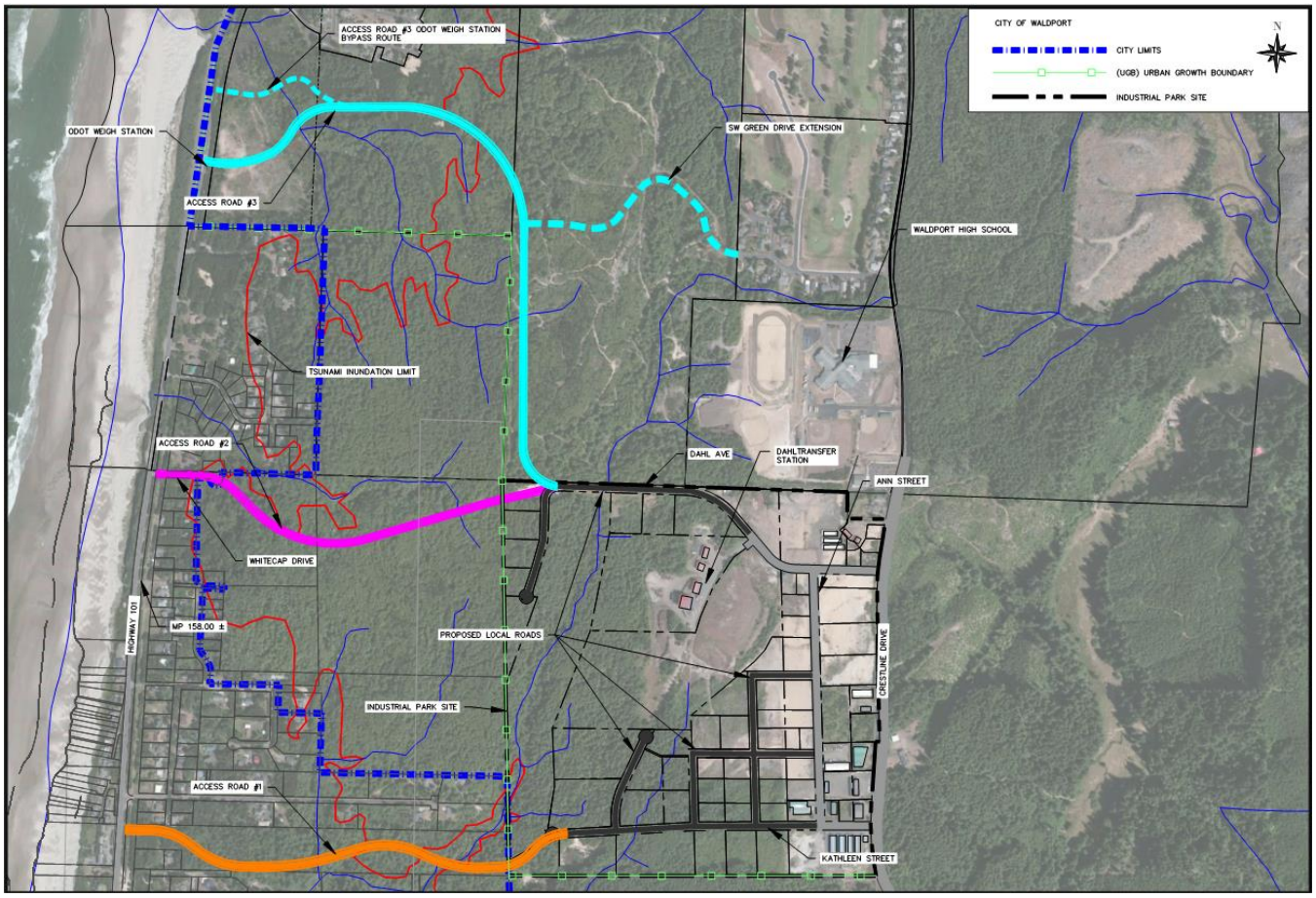
INDUSTRIAL PARK ACCESS ROAD

The Waldport Industrial Park Master Plan identifies three access road alternatives that connect US 101 to the Industrial Park along Crestline Drive. The purpose of the road is to provide more direct access to the Industrial Park and provide an additional access to the upland area. Exhibit 1 illustrates the following alternatives:

- Access Road #1 – this alternative connects to US 101 near SW Sitka Ridge Court and to the Industrial Park at an extension of SW Kathleen Street.
  - This alternative provides the most direct access to the Industrial Park however it is located almost entirely outside of the city limits and will require coordination with the County.

- Access Road #2 – this alternative connects to US 101 at SW Whitecap Drive and to the Industrial Park at an extension of SW Dahl Avenue.
  - This alternative was estimated to have the lowest cost however it has the steepest grades and potential sight distance issues at the intersection with US 101. Realigning the roadway to connect with SW Breakers Drive would address the sight distance issues.
- Access Road #3 – this alternative connects to US 101 at the weigh station and to the Industrial Park at an extension of SW Dahl Avenue.
  - This alternative was estimated to have the highest costs and has potential conflict with the ODOT truck weight station on US 101; however, it could also provide access to commercial zoned property located behind (east) of the weigh station and provide access to additional upland areas.

Exhibit 1: US 101 – Industrial Area Access Road Alternatives



– Access Road #3

– Access Road #2

– Access Road #1

The access road alternatives have varying alignments and grades, resulting in different property impacts, constructability, and cost. Exhibit 2 summarizes the key factors for the alternatives as shown in the Industrial Park Master Plan.

Exhibit 2: Access Road Alternatives Evaluation Summary

Screening Criteria	Access Road #1	Access Road #2	Access Road #3
Engineering and Construction Complexity			
Length	3,237'	2,952'	4,790'
Horizontal Alignment (225' radius min.)	7 Curves All >225'	4 Curves 485' each	4 Curves All > 225'
Vertical Alignment (12% - 15% max.)	0% to 12%	0% to 15%	0% to 12.3%
Drainage Infrastructure	1 Box Culverts & 3 Road Cross Culverts	4 Road Cross Culverts	2 Box Culverts & 2 Road Cross Culverts
Environmental Constraints			
Wetlands Impacts	Possible constraints	Possible constraints	Two Riparian Crossings
Creek Crossings	1 (Tributary to Little Creek)	NA	2 (Tributaries of Patterson Creek)
Flood and Erosion Considerations	X	X	X
Zoning/Land Use			
Existing Zoning	RR-2 I-P	R-1 RR-2 I-P	R-1 C-1 I-P
ROW Constraints	NA	215' ROW acquisition on developed lots	NA
ROW Acquisition	Required	Probable	Possible
Adjacent Land Constraints	Impact to 2 houses	NA	NA
Highway 101 Intersection			
Site View	NA	Possible constraints	NA
Access Management Spacing Standards	Possible exception required	Possible exception required	Possible exception required
Public Involvement Issues	Adjacent business concerns	Impact mostly to residential lots	ODOT concerns with weigh station
Industrial Site Constraints			
Lots	Lot #62 will lose some square footage	Lot #71 will be divided into 2 smaller lots	NA
COST	**$5,221,341**	**$4,534,417**	**$8,437,982**

US 101 STREETSCAPE ENHANCEMENTS

As indicated in *Tech Memo 3A: Existing Conditions Inventory* the segment of US 101 from Spring Street to Maple Street has a four-lane cross section with on-street parking and continuous sidewalks on both sides of the roadway. There are no on-street bike lanes or shoulders along this segment of US 101. However, as indicated in *Tech Memo 3B: Existing Conditions Analysis*, Bicycle Level of Traffic Stress along this segment of US 101 is relatively low, which reflects the relatively travel speeds along the roadway. The alternatives considered for US 101 are summarized below. These alternatives are generally consistent with those identified in the bicycle, pedestrian, and transit sections of this memorandum.

US 101 Bicycle enhancement Alternatives

- Install shared lane pavement markings (sharrows) on both sides of the roadway.
- Install 6-foot bike lanes on both sides of the roadway consistent with ODOT standards.
- Install 7-foot buffered bike lanes on both sides of the roadway.
- Install 6-foot separated bike lanes on both sides of the roadway.

Each of the bike lane alternatives includes reconfiguring the roadway with a three-lane cross section. Table 2 summarizes traffic operations at the US 101/Spring Street and US 101/OR 34 study intersections assuming a three-lane cross section. As shown, the study intersections are projected to operate acceptably per their mobility targets. *Traffic operations results are provided in Attachment B.*

Table 2: US 101 Alternatives Analysis – Year 2040 Weekday PM Peak Hour

Intersection Operations Analysis – Year 2040 Weekday PM Peak Hour					
Map ID	Intersection	Alternative	Level of Service	Delay (Sec)	Volume/Capacity
1	US 101/ Spring Street	Current Configuration	B	11.3	0.09
		Three-Lane Cross Section	B	13.8	0.12
2	US 101/OR 34	Current Configuration	C	24.1	0.65
		Three-Lane Cross Section	C	26.5	0.70

US 101 Pedestrian Enhancements

- Increase the physical buffer width from Spring Street to Willow Street to 10-feet by installing solid surface or landscape.
- Install pedestrian warning signs and arrows on both sides of the existing crossings on the backs of the existing pedestrian warning and arrow signs.
- Install Rectangular Rapid Flashing Beacons (RRFBs) on both sides of the existing crossings on the existing sign poles facing both directions with pushbuttons.
- Install pedestrian refuge islands within the center two-way left-turn lane, if installed.
- Install wayfinding signs, benches, planter boxes, and other pedestrian amenities as appropriate.

US 101 Transit Enhancements

- Install poles with bus stop signs, transit shelters, seating, trash cans, and lighting at existing transit stops as appropriate.

OR 34 STREETSCAPE ENHANCEMENTS

As indicated in *Tech Memo 3A: Existing Conditions Inventory* the segment of OR 34 from US 101 to Mill Street currently has a three-lane cross section with continuous sidewalks on both sides of the roadway. On-street parking is provided from US 101 to Alder Street and wide shoulders are provided further to the east. There are no on-street bike lanes along this segment of OR 34. However, as indicated in *Tech Memo 3B: Existing Conditions Analysis*, Bicycle Level of Traffic Stress along this segment of OR 34 is relatively low, which reflects the relatively low traffic volumes and travel speeds along the roadway. The alternatives considered for OR 34 are summarized below. These alternatives are generally consistent with those identified in the bicycle, pedestrian, and transit sections of this memorandum.

OR 34 Bicycle enhancement Alternatives

- Install priority shared lane pavement markings (sharrows) on both sides of the roadway.
- Install 6-foot shoulder/bike lanes on both sides of the roadway consistent with ODOT standards.
- Install 7-foot buffered bike lanes on both sides of the roadway.
- Install 6-foot separated bike lanes on both sides of the roadway.
- Install skip striping along OR 34 through the Cedar Street and Crestline Drive intersections with green paint in the conflict areas.
- Install an enhanced pedestrian/bicycle crossing at the OR 34/Crestline Drive intersection with supplemental signs and a median refuge island on OR 34 west of Crestline Drive.

OR 34 Pedestrian Enhancements

- Install 10-foot sidewalks on both sides of OR 34 from US 101 to Cedar Street with tree wells.
- Install 6-foot sidewalks on both sides of OR 34 from Cedar Street to Mill Street with 4-foot planted landscape strips.
- Install enhanced crossings at the Commerce Street, Broadway Street, and Crestline Drive intersections.
- Install pedestrian scale lighting on both sides of the roadway.
- Install wayfinding signs, benches, planter boxes, and other pedestrian amenities as appropriate.

OR 34 Transit Enhancements

- Install poles with bus stop signs, transit shelters, seating, trash cans, and lighting at existing transit stops as appropriate.

ACCESS MANAGEMENT AND SPACING

Access management describes a practice of managing the number, placement, and movements of intersections and driveways that provide access to adjacent land uses. Access management policies can be an important tool to improve transportation system efficiency by limiting the number of opportunities for turning movements on to or off of certain streets. In addition, well deployed access management strategies can help manage travel demand

by improving travel conditions for pedestrian and bicycles. Eliminating the number of access points on roadways allows for continuous sidewalk and bicycle facilities and reduces the number of potential interruptions and conflict points between pedestrians, bicyclists, and cars. Access management is typically adopted as a policy in development guidelines. It can be extremely difficult to implement an access management program once properties have been developed along a corridor. Cooperation among and involvement of relevant government agencies, business owners, land developers and the public is necessary to establish an access management plan that benefits all roadway users and businesses.

ACCESS MANAGEMENT ALTERNATIVES

The TSP should identify access management techniques and strategies that help to preserve transportation system investments and guard against deteriorations in safety and increased congestion. The City's approach to access management should balance the need for land use activities and property parcels to be served with appropriate access while preserving safe and efficient movement of traffic. Access management alternatives include:

- Establishing city-wide access spacing standards according to the functional classification plan;
- Defining a variance process for when the standard cannot be met, and;
- Establishing an approach for access consolidation over time to move in the direction of the standards at each opportunity.

Access Spacing Standards

As indicated in *Tech Memo 3B: Existing Conditions Analysis*, ODOT and the City of Waldport have adopted access spacing standards for study area roadways. ODOT's access spacing standards are defined in Oregon Administrative Rule (OAR) 734 Division 51 and apply to access points along US 101 and OR 34. The City's access spacing standards are defined in the current TSP. The current TSP identifies access spacing standards for collector streets as 300 feet minimum.

The city could update its access spacing standards to reflect the functional classification of the roadways as well as include standards for public streets and private access points. Table 3 identifies potential access spacing standards for the City.

Table 3: Access Spacing Standards

Access Spacing Standards						
	Mixed-use or Residential			Commercial or Industrial		
Functional Classification[1]	Max Block Size (Street to Street)[2]	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[3]	Max Block Size (Street to Street)1	Min Block Size (Street to Street)	Min Dwy Spacing (Street to Dwy & Dwy to Dwy)[3]
Collector	530 feet	300 feet	100 feet	530 feet	300 feet	150 feet
Local Street	530 feet	150 feet	50 feet	530 feet	150 feet	50 feet

1 Refer to OAR 734 Division 51 for access spacing standards along arterial streets (US 101 and OR 34).
2. If the maximum block size is exceeded, mid-block pedestrian and bicycle accessways must be provided at spacing of no more than 330 feet, unless the connection is impractical due to existing development, topography, or environmental constraints.
3. Single family and two-family dwellings are exempt from the driveway to driveway spacing standards.

Access Spacing Variances

Access spacing variances may be provided to parcels whose highway/street frontage, topography, or location would otherwise preclude issuance of a conforming permit and would either have no reasonable access or cannot

obtain reasonable alternate access to the public road system. In such a situation, a conditional access permit may be issued by ODOT or the City, as appropriate, for a connection to a property that cannot be accessed in a manner that is consistent with the spacing standards. The permit can carry a condition that the access may be closed at such time that reasonable access becomes available to a local public street. The approval condition might also require a given land owner to work in cooperation with adjacent land owners to provide either joint access points, front and rear cross-over easements, or a rear access upon future redevelopment.

The requirements for obtaining a deviation from ODOT's minimum spacing standards are documented in OAR 734-051-3050. For streets under the City's jurisdiction, the City may reduce the access spacing standards at the discretion of the City Engineer if the following conditions exist:

- Joint access driveways and cross access easements are provided in accordance with the standards;
- The site plan incorporates a unified access and circulation system in accordance with the standards;
- The property owner enters into a written agreement with the City that pre-existing connections on the site will be closed and eliminated after construction of each side of the joint use driveway; and/or,
- The proposed access plan for redevelopment properties moves in the direction of the spacing standards.

The City Engineer may modify or waive the access spacing standards for streets under the City's jurisdiction where the physical site characteristics or layout of abutting properties would make development of a unified or shared access and circulation system impractical, subject to the following considerations:

- Unless modified, application of the access standard will result in the degradation of operational and safety integrity of the transportation system.
- The granting of the variance shall meet the purpose and intent of these standards and shall not be considered until every feasible option for meeting access standards is explored.
- Applicants for variance from these standards must provide proof of unique or special conditions that make strict application of the standards impractical. Applicants shall include proof that:
  - Indirect or restricted access cannot be obtained;
  - No engineering or construction solutions can be applied to mitigate the condition; and,
  - No alternative access is available from a road with a lower functional classification than the primary roadway.

No variance shall be granted where such hardship is self-created. Consistency between access spacing requirements and exceptions in the TSP and the municipal code is an important regulatory solution to be addressed as part of this TSP update.

Access Consolidation

From an operational perspective, access management measures limit the number of redundant access points along roadways. This enhances roadway capacity, improves safety, and benefits circulation. Enforcement of the access spacing standards should be complemented with provision of alternative access points. Purchasing right-of-way and closing driveways without a parallel road system and/or other local access could seriously affect the viability of the impacted properties. Thus, if an access management approach is taken, alternative access should be developed to avoid "land-locking" a given property.

As part of every land use action, the City should evaluate the potential need for conditioning a given development proposal with the following items in order to maintain and/or improve traffic operations and safety along the arterial and collector roadways.

- Providing access only to the lower classification roadway when multiple roadways abut the property.
- Provision of crossover easements on all compatible parcels (considering topography, access, and land use) to facilitate future access between adjoining parcels.
- Issuance of conditional access permits to developments having proposed access points that do not meet the designated access spacing policy and/or have the ability to align with opposing driveways.
- Right-of-way dedications to facilitate the future planned roadway system in the vicinity of proposed developments.
- Half-street improvements (sidewalks, curb and gutter, bike lanes/paths, and/or travel lanes) along site frontages that do not have full build-out improvements in place at the time of development.

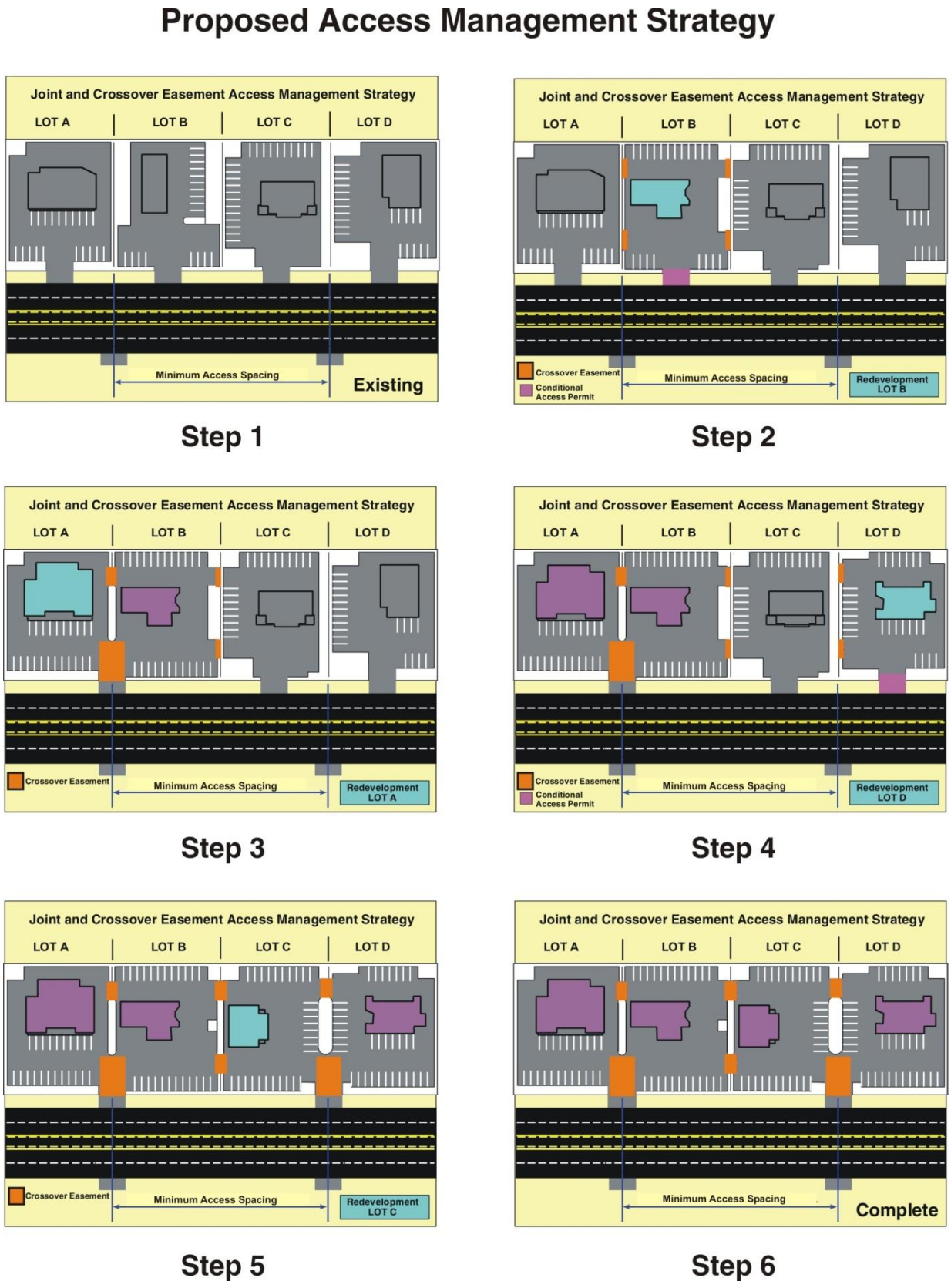
Exhibit 3 illustrates the application of cross-over easements and conditional access permits over time to achieve access management objectives. The individual steps are described in Table 4. As illustrated in the exhibit and supporting table, by using these guidelines, all driveways along the highways can eventually move in the overall direction of the access spacing standards as development and redevelopment occur along a given street.

Table 4: Example of Crossover Easement/Indenture/Consolidation

Example of Crossover Easement/Indenture/Consolidation	
Step	**Process**
1	EXISTING – Currently Lots A, B, C, and D have site-access driveways that neither meet the access spacing criteria of 500 feet nor align with driveways or access points on the opposite side of the highway. Under these conditions motorists are into situations of potential conflict (conflicting left turns) with opposing traffic. Additionally, the number of side-street (or site-access driveway) intersections decreases the operation and safety of the highway
2	REDEVELOPMENT OF LOT B – At the time that Lot B redevelops, the City would review the proposed site plan and make recommendations to ensure that the site could promote future crossover or consolidated access. Next, the City would issue conditional permits for the development to provide crossover easements with Lots A and C, and ODOT/City would grant a conditional access permit to the lot. After evaluating the land use action, ODOT/City would determine that LOT B does not have either alternative access, nor can an access point be aligned with an opposing access point, nor can the available lot frontage provide an access point that meets the access spacing criteria set forth for segment of highway.
3	REDEVELOPMENT OF LOT A – At the time Lot A redevelops, the City/ODOT would undertake the same review process as with the redevelopment of LOT B (see Step 2); however, under this scenario ODOT and the City would use the previously obtained cross-over easement at Lot B consolidate the access points of Lots A and B. ODOT/City would then relocate the conditional access of Lot B to align with the opposing access point and provide and efficient access to both Lots A and B. The consolidation of site-access driveways for Lots A and B will not only reduce the number of driveways accessing the highway,

Example of Crossover Easement/Indenture/Consolidation	
	but will also eliminate the conflicting left-turn movements the highway by the alignment with the opposing access point.
4	REDEVELOPMENT OF LOT D – The redevelopment of Lot D will be handled in same manner as the redevelopment of Lot B (see Step 2)
5	REDEVELOPMENT OF LOT C – The redevelopment of Lot C will be reviewed once again to ensure that the site will accommodate crossover and/or consolidated access. Using the crossover agreements with Lots B and D, Lot C would share a consolidated access point with Lot D and will also have alternative frontage access the shared site-access driveway of Lots A and B. By using the crossover agreement and conditional access permit process, the City and ODOT will be able to eliminate another access point and provide the alignment with the opposing access points.
6	COMPLETE – After Lots A, B, C, and D redevelop over time, the number of access points will be reduced and aligned, and the remaining access points will meet the access spacing standard.

Exhibit 3: Cross Over Easement



BICYCLE CONNECTIVITY

This section provides an overview of bicycle facilities that could be implemented within Waldport to improve access and circulation for bicyclists. This section also identifies the bicycle alternatives developed to address gaps and deficiencies in bicycle connectivity.

BICYCLE FACILITIES

Bicycle facilities are the elements of the transportation system that enable people to travel safely and efficiently by bicycle. These include facilities along key roadways (e.g. shared lane pavement markings, on-street bike lanes, buffered bike lanes, and separated bike lanes) and facilities at key crossing locations (e.g., enhanced bike crossings). These also include end of trip facilities (e.g. bike parking, changing rooms, and showers at worksites); however, these facilities are typically addressed through the development code. Each facility plays an important role in developing a comprehensive bicycle system.

Shared Lane Pavement Markings and signs

Shared lane pavement markings (often called "sharrows") are not a bicycle facility, but a tool designed to accommodate bicyclists on roadways where bike lanes are desirable but infeasible to construct. Sharrows indicate a shared roadway space for cyclists and motorists and are typically centered in the roadway or approximately four feet from the edge of the travel lane and are recommended to be spaced approximately 50 to 250-feet apart dependent on the levels of traffic volume. Sharrows are suitable on roadways with relatively low travel speeds (<25 mph) and low ADT (<2,500 ADT); however, they may also be used to transition between discontinuous bicycle facilities along roadways with higher speeds and volumes. Sharrows could be applied along a variety of streets within Waldport where room for on-street bike lanes is limited.

On-Street Bike Lanes

On-street bike lanes are striped lanes on the roadway dedicated for the exclusive use of cyclists. On-street bike lanes are typically placed at the outer edge of pavement (but to the inside of right-turn lanes and/or on-street parking). On-street bike lanes can improve safety and security of cyclists and (if comprehensive) can provide direct connections between origins and destinations. On-street bike lanes could be applied along a variety of streets within Waldport where space allows.

Buffered Bike Lanes

Buffered bike lanes are enhanced versions of conventional on-street bike lanes that include an additional striped buffer of typically 2-3 feet between the bike lane and the vehicle travel lane and/or between the bike lane and the vehicle parking lane. They are typically located along streets that require a higher level of separation to improve the comfort of bicycling.

Separated Bike Lanes

Separated bike lanes (often called "cycle tracks") are bike lanes that are physically separated from motor vehicle traffic by a vertical element such as a planter, flexible post, parked car, or a mountable curb. One-way separated bike lanes are typically found on each side of the street, like conventional bike lanes, while two-way separated bike lanes are typically found on one side of the street.

Enhanced Bicycle Crossings

Enhanced bicycle crossings enable cyclists to safely and efficiently cross streets and other transportation facilities. Planning for appropriate enhanced bicycle crossings requires the community to balance vehicular mobility needs with providing crossing locations along the desired routes of cyclists. Enhanced bicycle crossings include:

- Bike Boxes – designated space at an intersection that allows cyclists to wait in front of motor vehicles while waiting to turn or continue through the intersection.
- Two-Stage Left-turn Bike Boxes – designated space at a signalized intersection outside of the travel lane that provides cyclists with a place to wait while making a two-stage left-turn.
- Pavement markings through conflict areas – pavement markings that extend a bike lane through conflict areas, including turn lands and intersections.
- Bike Only Signals – A traffic signal that is dedicated for cyclists
- Bicycle Detection – Loop or intelligent transportation system (ITS) detection for bicycles

Wayfinding Signs

Wayfinding signs are physical signs or travel lane markings located along roadways or at intersections that direct cyclists between destinations along low-stress and comfortable bicycle routes. Wayfinding signs help inexperienced and/or less confident cyclists overcome perceived barriers by identifying lower speed and lower volume routes that do not require a bicycle facility. They typically include distances and average walk/cycle times. Wayfinding signs are generally used along bicycle routes and multi-use paths.

Bicycle Parking

Bicycle parking is a vital component of a city's bicycle system and can be provided in a variety of sizes, shapes, and unique pieces of infrastructure that resemble the city's character. Bicycle parking can generally be categorized into two types: short-term and long-term.

- **Short-term bicycle parking** is designed to meet the needs of cyclists visiting businesses, institutions, and other destinations where visits typically last up to two hours. Short-term bicycle parking must be readily accessible, visible, and self-explanatory.
- **Long-term bicycle parking** places an emphasis on security, weather protection and is designed to meet the needs of cyclists who may leave their bicycle unattended for several hours or more. Long-term bicycle parking is typically located at residences or apartment buildings, workplaces, transit centers, and other routinely visited destinations.

BICYCLE ALTERNATIVES

The bicycle alternatives were developed to enhance the existing bicycle system as well as address gaps and deficiencies in bicycle connectivity. Figure 1 illustrates the existing bicycle facilities. The alternatives are organized into three categories: street segments, intersections, and off-street bicycle facilities.

Street Segments

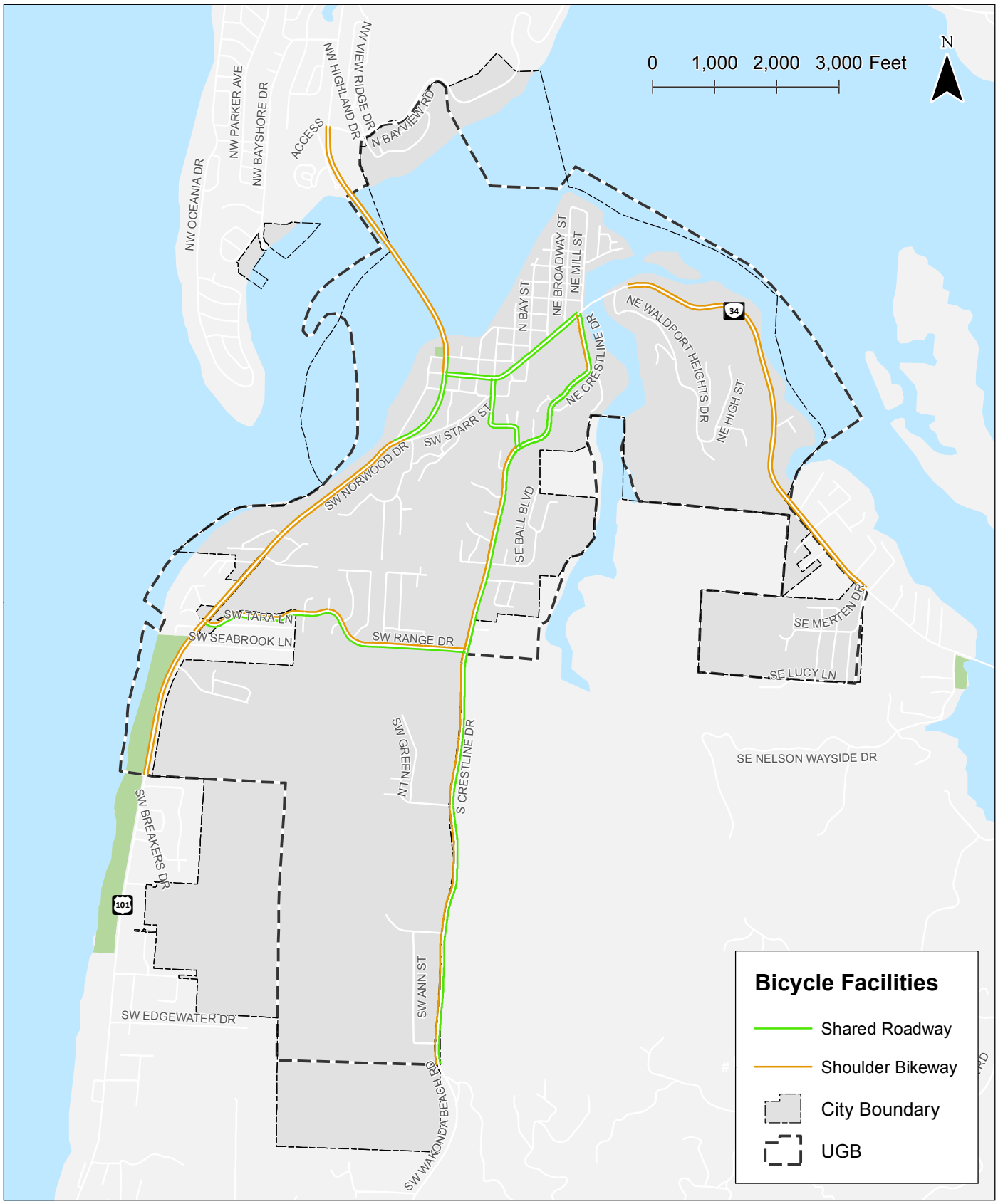
US 101

US 101 is a state-owned facility that runs north-south throughout the western part of the city. The Bicycle Level of Traffic Stress (BLTS) analysis indicates that most of US 101 is not suitable for most cyclists. This is primarily due to limited or no bicycle facilities, relatively high travel speeds, and lack of physical buffer. Therefore, the following alternatives are being considered along sections of US 101.

Alsea Bridge Section

This section of US 101 includes 6-foot shoulders/bike lanes on both sides of the roadway, which is consistent with ODOT standards. However, with relatively high travel speeds and lack of physical buffer, this section of US 101 may not be suitable for all cyclists. The alternatives include:

- Install 7-foot buffered bike lanes on both sides of the roadway by narrowing the travel lanes and re-evaluate travel speeds; a posted speed limit of 35 mph would achieve BLTS 2 along this segments of US 101. *The paved width of the bridge is 64-feet, which would allow for two 7-foot buffered bike lanes, four 11 1/2-foot travel lanes, and a 4-foot striped median.*
- Install 10-foot multi-use paths on both sides of the roadway by narrowing the shoulders, relocating the jersey barriers, and widening the sidewalks/multi-use paths *The combined width of the sidewalks and shoulders is 12-feet, which would allow for a 10-foot shared path with 2-feet of shy.*



Existing Bicycle Facilties
Waldport, Oregon

Figure
1

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KITTELSON & ASSOCIATES

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

Spring Street to Maple Street

This section of US 101 does not include shoulders or on-street bike lanes, which is not consistent with ODOT standards for an urban highway with a Special Transportation Area (STA) designation. However, with relatively low travel speeds, this segment of US 101 is suitable for most cyclists. The alternatives include:

- Install shared lane pavement markings (sharrows) on both sides of the roadway.
- Eliminate the outside travel lanes and install a center two-way left-turn lane, 6-foot bike lane on the west side of the roadway and shared lane pavement markings (sharrow) on the east side.
- Eliminate the outside travel lanes and install a center two-way left-turn lane and 6-foot bike lanes on both sides of the roadway consistent with ODOT standards.
- Eliminate the outside travel lanes and install a center two-way left-turn lane and 7-foot buffered bike lanes on both sides of the roadway.
- Eliminate the outside travel lanes and install a center two-way left-turn lane and 6-foot separated bike lanes on both sides of the roadway.

Starr Street to South City Limits

This section of US 101 includes 2 to 4-foot shoulders on both sides of the roadway, which is not consistent with ODOT standards. Also, with relatively high travel speeds and lack of physical buffers, this section of US 101 may not be suitable for all cyclists. The alternatives include:

- Install 6-foot shoulders/bike lanes on both sides of the roadway consistent with ODOT standards and re-evaluate travel speeds; a posted speed limit of 30 mph would achieve BLTS 2 along this segment of US 101.
- Install 7-foot buffered bike lanes on both sides of the roadway and re-evaluate travel speeds; a posted speed limit of 35 mph would achieve BLTS 2 along this segment of US 101.
- Install 6-foot separated bike lanes on both sides of the roadway.
- Install a 12-foot multi-use path on one side of the roadway.

Attachment C provides alternative cross sections for US 101.

OR 34

OR 34 is a state-owned facility that runs through downtown Waldport and serves as the main east-west route. The BLTS analysis indicates that most of OR 34 is suitable for most cyclists. The segment east of the Lint Slough bridge, however, may not be suitable for most cyclists due to limited or no bicycle facilities, relatively high travel speeds, and lack of physical buffers. Therefore, the following improvements are being considered.

US 101 to Cedar Street

This section of OR 34 does not include shoulders or on-street bike lanes, which is not consistent with ODOT standards for an urban highway with a STA designation. However, with relatively low travel speeds, this segment of OR 34 is suitable for most cyclists. The alternatives include:

- Install shared lane pavement markings (sharrows) on both sides of the roadway.
- Install 6-foot shoulder/bike lanes on both sides of the roadway consistent with ODOT standards.
- Install 7-foot buffered bike lanes on both sides of the roadway.
- Install 6-foot separated bike lanes on both sides of the roadway.

Cedar Street to Mill Street

The majority of this section of OR 34 does not include shoulders or on-street bike lanes (there is an 8-foot shoulder on the east side of OR 34 from Bay Street to Crestline Drive), which is not consistent with ODOT standards. However, with relatively low travel speeds, this segment of OR 34 is suitable for most cyclists. The alternatives include:

- Install shared lane pavement markings (sharrows) on both sides of the roadway.
- Install 6-foot shoulder/bike lanes on both sides of the roadway consistent with ODOT standards.
- Install 7-foot buffered bike lanes on both sides of the roadway.
- Install 6-foot separated bike lanes on both sides of the roadway.

Mill Street to East City Limits

This section of OR 34 includes 2 to 4-foot shoulders on both sides of the roadway, which is not consistent with ODOT standards. Also, with relatively high travel speeds and lack of physical buffers, this segment of OR 34 may not be suitable for most cyclists. The alternatives include:

- Install 6-foot shoulder/bike lanes on both sides of the roadway consistent with ODOT standards and re-evaluate travel speeds; a posted speed limit of 30 would achieve BLTS 2 along this segment of OR 34.
- Install 7-foot buffered bike lanes on both sides of the roadway and re-evaluate travel speeds; a posted speed limit of 35 mph would achieve BLTS 2 along this segment of OR 34.
- Install 6-foot separated bike lanes on both sides of the roadway.
- Install a 12-foot multi-use path on one side of the roadway.

Additional improvements that could increase cyclist comfort and perceived safety include wayfinding signage and lane markings that let drivers know they could expect bicyclists and street lighting to improve visibility.

Attachment C provides alternative cross sections for OR 34.

Crestline Drive

Crestline Drive is a city-owned facility that follows the westernmost north-south ridgeline. The BLTS analysis indicates that most of Crestline Drive is suitable for most cyclists. This is due to the low travel speeds and number of lanes per direction. One segment along Crestline Drive, however, may not be suitable for most cyclists due to steep topography. The alternatives include:

OR 34 to Lint Slough Road

This section of Crestline Drive includes a 4-foot shoulder along the west side of the roadway. However, with relatively low traffic volumes and travel speeds, this segment of Crestline Drive is suitable for most cyclists. The alternatives include:

- Install a 4-foot shoulder along the east side of the roadway consistent with City standards.
- Install 6-foot bike lanes on both sides of the roadway.

Lint Slough Road to Cedar Street

This section of Crestline Drive does not include shoulders or on-street bike lanes. However, with relatively low traffic volumes and travel speeds, this segment of Crestline Drive is suitable for some cyclists. The alternatives include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install shared lane pavement markings (sharrows) and signs on both sides of the roadway.
- Install shared lane pavement markings (sharrows) and signs in the northbound (downhill) direction and install a 6-foot bike lane in the southbound (uphill) direction.
- Install 6-foot bike lanes on both sides of the roadway.

The final configuration of this section of Crestline Drive as a two-way, one-way, or ped/bicycle only facility will inform the final bicycle facilities.

Cedar Street to South City Limits

This section of Crestline Drive includes 2 to 4-foot shoulders on both sides of the roadway. However, with relatively low traffic volumes and travel speeds, this section of Crestline Drive is suitable for most cyclists. The alternatives include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install 6-foot bike lanes on both sides of the roadway.

Cedar Street

Cedar Street is a city-owned facility that runs north and south connecting OR 34 to Crestline Drive. The BLTS analysis indicates that most of Cedar Street is not be suitable for most cyclists. This is due to a lack of bicycle facilities and steep topography. The alternatives include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install shared lane pavement markings (sharrows) and signs on both sides of the roadway.
- Install shared lane pavement markings (sharrows) and signs in the northbound (downhill) direction and install a 6-foot bike lane in the southbound (uphill) direction.
- Install 6-foot bike lanes on both sides of the roadway.

Range Drive

Range Drive is city-owned street that runs east and west connecting US 101 to Crestline Drive. The BLTS analysis indicates that most of Range Drive is suitable for most cyclists. This is due to low traffic volumes and travel speeds. The alternatives include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install 6-foot bike lanes on both sides of the roadway.

Other Streets

Other streets such as local and private streets play an important role in providing bicycle connectivity within Waldport. The following streets have been identified as playing a critical role in providing connectivity to essential destinations. The types of treatments considered along these roadways include shared lane pavement markings (sharrows) and signs, including wayfinding signs that direct cyclists to essential destinations.

- Spring Street, from US 101 to OR 34
- Willow Street, from Maple Street to Cedar Street
- Maple Street, from Hemlock Street to US 101
- Starr Street, from US 101 to Cedar Street
- Broadway Street, from OR 34 to Port Street

Attachment C provides alternative cross sections that reflect the potential improvements identified above. These cross sections will be refined based on input from the PMT, advisory committees, and general public.

Intersections

US 101/OR 34

The US 101/OR 34 intersection does not have enhanced crossings treatments to facilitate bicycle movement through the intersection. The following alternatives have been identified for the intersection:

- Install skip striping along US 101 through the intersection with green paint in the conflict areas.
- Install a two-stage left-turn box for bicyclists travelling west on OR 34 to US 101 South.

US 101/Starr Street

The US 101/Starr Street intersection does not have enhanced crossings treatments to facilitate bicycle movement through the intersection. The following alternatives have been identified for the intersection:

- Install advance warning signage to alert motorist of bicyclist crossing.
- Install skip striping along US 101 through the intersection with green paint in the conflict areas.
- Install an enhanced bicycle crossing with median refuge island on US 101 east of Maple Street.

US 101/Range Drive

The US 101/Range Drive intersection does not have enhanced crossings treatments to facilitate bicycle movement through the intersection. The following alternatives have been identified for the intersection:

- Install advance warning signage to alert motorist of bicyclist crossing.
- Install an enhanced bicycle crossing with median refuge island on US 101 south of Range Drive.
- Reduce the curb radius at the northeast and southwest corners of the intersection.

OR 34/Cedar Street

The OR 34/Cedar Street intersection does not have enhanced crossings treatments to facilitate bicycle movement through the intersection. The following alternatives have been identified for the intersection:

- Install skip striping along OR 34 through the intersection with green paint in the conflict areas.

- Install an enhanced bicycle crossing with supplemental signs.
- Install curb extensions to the northeast and southeast corners of the intersection.

OR 34/Crestline Drive

The OR 34/Crestline Drive intersection does not have enhanced crossings treatments to facilitate bicycle movement through the intersection. The following alternatives have been identified for the intersection:

- Install skip striping along OR 34 through the intersection with green paint in the conflict areas.
- Install an enhanced bicycle crossing with a median refuge island on OR 34 west of Crestline Drive.

Off-Street Bicycle Facilities

Off-street bicycle facilities, such as short- and long-term bicycle parking can encourage cycling. Other facilities, such as a bike hub, offer bike rentals, bike repairs, shower facilities and tourist and travel information. Bike hubs should be considered in locations where there are multimodal connections and/or access to places that generate and attract residents and tourists.

PEDESTRIAN CONNECTIVITY

This section provides an overview of pedestrian facilities that could be implemented within Waldport to improve access and circulation for pedestrians. This section also identifies the pedestrian alternatives developed to address gaps and deficiencies in pedestrian connectivity.

PEDESTRIAN FACILITIES

Pedestrian facilities are the elements of the transportation system that enable people to walk safely and efficiently between neighborhoods, retail centers, employment areas, and transit stops. These include facilities for pedestrian movement along key roadways (e.g., sidewalks, multi-use paths, and trails) and for safe roadway crossings (e.g., crosswalks, flashing beacons, pedestrian refuge islands). Each facility plays an important role in developing a comprehensive pedestrian system.

Sidewalks

Sidewalks are the fundamental building blocks of the pedestrian system. They enable people to walk comfortably, conveniently, and safely from place to place. They also provide an important means of mobility for people with disabilities, families with strollers, and others who may not be able to travel on an unimproved roadside surface. Sidewalks are usually 6 to 8-feet wide and constructed from concrete. They are also frequently separated from the roadway by a curb, landscaping, and/or on-street parking. Sidewalks are widely used in urban and suburban settings.

Ideally, sidewalks could be provided on both sides of the roadway; however, some areas with physical or right-of-way constraints may require that sidewalk be located on only one side.

Multi-use Paths and Trails

Given their ability to improve connectivity for pedestrian and cyclists, multi-use paths and trails are addressed separately below

Enhanced Pedestrian Crossings

Enhanced pedestrian crossings enable pedestrians to safely cross streets, railroad tracks, and other transportation facilities. Planning for appropriate pedestrian crossings requires the community to balance vehicular mobility needs with providing crossing locations along the desired routes of walkers. Enhanced pedestrian crossing treatments include geometric features such as curb extensions and raised median islands as well as crosswalk signing and striping, flashing beacons, pedestrian signals, pedestrian countdown heads, and leading pedestrian intervals. Many of these treatments can be applied simultaneously to further alert drivers of the presence of pedestrians in the roadway.

PEDESTRIAN ALTERNATIVES

The pedestrian alternatives were developed to enhance the existing pedestrian system as well as address gaps and deficiencies in pedestrian connectivity. Figure 2 illustrates the existing pedestrian facilities. Similar to the bicycle alternatives, the pedestrian alternatives are organized into three categories: street segments and intersections. Off-street pedestrian facilities are addressed separately.

Street Segments

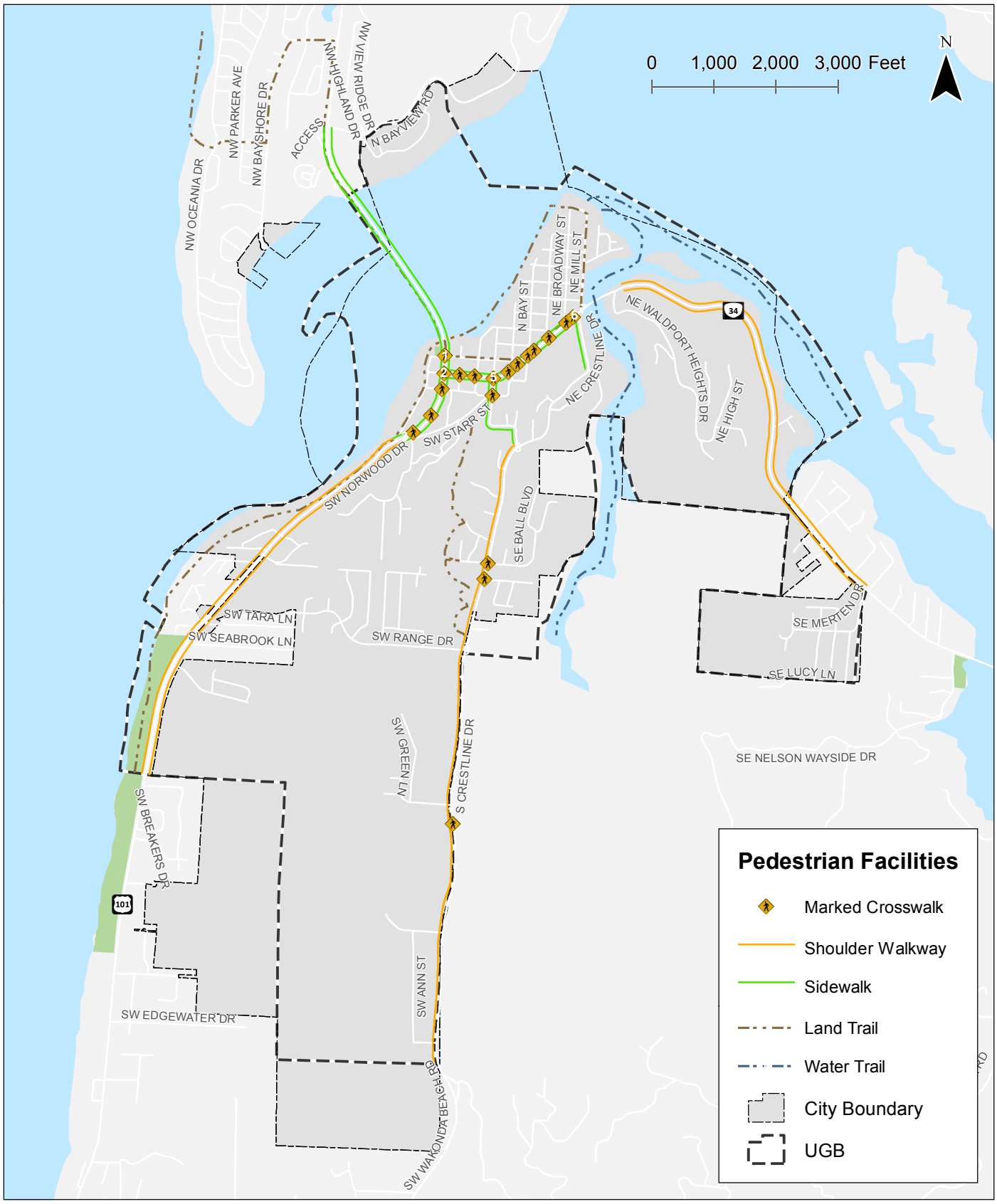
US 101

US 101 is a state-owned facility that runs north-south throughout the western part of the city. The Pedestrian Level of Traffic Stress (PLTS) analysis indicates that most of US 101 is not suitable for most pedestrians. This is primarily due to limited or no pedestrian facilities and lack of physical buffer. Therefore, the following alternatives are being considered along sections of US 101:

Alsea Bridge Section

This section of US 101 includes 5-foot sidewalks on both sides of the roadway, which is consistent with ODOT standards. It also includes jersey barriers and 6-foot shoulders that separate the sidewalks from the adjacent travel lanes. However, with relatively narrow buffers, this section of US 101 may not be suitable for all pedestrians. The alternatives include:

- Increase total buffer width to 10-feet by narrowing the travel lanes.
- Install multi-use paths on both sides of the roadway by narrowing the shoulders, relocating the jersey barriers, and widening the sidewalks/multi-use paths.



Exsting Pedestrian Facilities
Waldport, Oregon

Figure
2

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KITTELSON & ASSOCIATES

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

Spring Street to Willow Street

This section of US 101 includes 10-foot sidewalks on both sides of the roadway, which is consistent with ODOT standards for an urban highway with an STA designation; However, with limited buffer width along the east side of the roadway (due to a lack of on-street parking), this section of US 101 may not be suitable for all pedestrians. The alternatives include:

- Increase the physical buffer width to 10-feet by installing solid surface or landscape. Street furniture, street trees, and planters can also be considered.

Starr Street to South City Limits

This section of US 101 includes 2 to 4-foot shoulders on both sides of the roadway, which is not consistent with ODOT standards. Also, with a lack of physical buffers, this segment of US 101 may not be suitable for all pedestrians. The alternatives considered include:

- Install 6-foot shoulders on both sides of the roadway consistent with ODOT rural standards.
- Install 6-foot sidewalks on both sides of the roadway consistent with ODOT urban standards.
- Install a 12-foot multi-use path on one side of the roadway.
- Install street lighting at regular intervals.

OR 34

OR 34 is a state-owned facility that runs through downtown Waldport and serves as the main east-west route. The PLTS analysis indicates that most of OR 34 is suitable for most pedestrians. The segment east of the Lint Slough bridge, however, may not be suitable for most pedestrians due to limited or no pedestrian facilities and lack of physical buffers. Therefore, the following improvements are being considered.

Mill Street to East City Limits

This section of OR 34 includes 2 to 4-foot shoulders on both sides of the roadway, which is not consistent with ODOT standards. Also, with a lack of physical buffers, this segment of OR 34 may not be suitable for most pedestrians. The alternatives include:

- Install 6-foot shoulders on both sides of the roadway consistent with ODOT rural standards.

- Install 6-foot sidewalks on both sides of the roadway consistent with ODOT urban standards.
- Install a 12-foot multi-use path on one side of the roadway.
- Install street lighting at regular intervals.

Crestline Drive

Crestline Drive is a city-owned facility that follows the westernmost north-south ridgeline. The PLTS analysis indicates that most of this section may not be suitable for most pedestrians. This is primarily due to a lack of pedestrian facilities. The alternatives include:

OR 34 to Lint Slough Road

This section of Crestline Drive includes a 6-foot sidewalk and 4-foot shoulder along the west side of the roadway, which is suitable for most pedestrians. However, the east side lacks sidewalks and a physical buffer. Therefore, the following alternatives are being considered:

- Install a 4-foot shoulder along the east side of the roadway consistent with City standards.
- Install a 6-foot sidewalk along the east side of the roadway with appropriate buffers.
- Install street lighting at regular intervals.

Lint Slough Road to Cedar Street

This section of Crestline Drive does not include shoulder or sidewalks. Therefore, this section of Crestline Drive may not be suitable for most pedestrians. The alternatives include:

- Install 4-foot shoulders along both sides of the roadway consistent with City standards.
- Install 6-foot sidewalks along one or two sides of the roadway with appropriate buffers.
- Install street lighting at regular intervals.

The final configuration of this section of Crestline Drive as a two-way, one-way, or ped/bicycle only facility will inform the final the pedestrian facilities.

Cedar Street to South City Limits

This section of Crestline Drive includes 2 to 4-foot shoulders on both sides of the roadway. Therefore, this section of Crestline Drive may not be suitable for most pedestrians. The alternatives considered include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install 6-foot sidewalks along one or two sides of the roadway with appropriate buffers.
- Install street lighting at regular intervals.

Cedar Street

Cedar Street is a city-owned facility that runs north and south connecting OR 34 to Crestline Drive. The PLTS analysis indicates that most of Cedar Street may not be suitable for most pedestrians. This is due to a lack of pedestrian facilities and steep topography. The following improvements are being considered:

- Install a 4-foot shoulder along the east side of the roadway consistent with City standards.
- Install a 6-foot sidewalk along the east side of the roadway with appropriate buffers.
- Install street lighting at regular intervals.

Range Drive

Range Drive is city-owned street that runs east and west connecting US 101 to Crestline Drive. The PLTS analysis indicates that most of Range Drive may not be suitable for most pedestrians. This is due to lack of pedestrian facilities. The alternatives include:

- Install 4-foot shoulders on both sides of the roadway consistent with City standards.
- Install 6-foot sidewalks along one or two sides of the roadway with appropriate buffers.
- Install street lighting at regular intervals.

Intersections

US 101/Mid-block Crossing (2-locations)

The mid-block crossings located along US 101 adjacent to the Waldport Inn and the Flea Market currently provide curb extensions, pavement markings and signs, and street lights. The following alternatives have been identified to further enhance the crossings:

- Install pedestrian warning signs and arrows on both sides of the crossings on the backs of the existing pedestrian warning and arrow signs.
- Install Rectangular Rapid Flashing Beacons (RRFBs) on both sides of the crossings on the existing sign poles facing both directions with pushbuttons.
- Install pedestrian refuge islands within the center two-way left-turn lane, if installed.

OR 34/Verbena Street/John Street/Cedar Street

The OR 34/Verbena Street, OR 34/John Street, and OR 34/Cedar Street intersections include marked crosswalks on the east and west legs of the intersections. The following alternatives have been identified to further enhance the crossings:

- Install high visibility pedestrian crossing signs on both sides of the crossings and in both directions,
- Install curb extensions on both sides of the crossings as feasible.

OR 34/Bay Street

The OR 34/Bay Street intersection includes marked crosswalks on the east and west legs, off-set from the intersection. The following alternatives have been identified to further enhance the crossings:

- Install high visibility pedestrian crossing signs on both sides of the crossings and in both directions.

OR 34/Commerce Street

The OR 34/Commerce Street intersection has a marked crosswalk on the north leg of the intersection. The following alternatives have been identified to further enhance the crossing:

- Install high visibility pavement markings and signs along OR 34 at the east leg of the intersection.
- Install curb extensions on both sides of the crossing with ADA accessible curb-ramps.
- Install a pedestrian refuge island in the center two-way left-turn lane, as feasible.

OR 34/Broadway Street

The OR 34/Broadway Street intersection has a marked crosswalk on the north leg of the intersection. The following alternatives have been identified to further enhance the crossing:

- Install high visibility pavement markings and signs along OR 34 at the east leg of the intersection.
- Install curb extensions on both sides of the crossing with ADA accessible curb-ramps.
- Install a pedestrian refuge island in the center two-way left-turn lane, as feasible.

OR 34/Crestline Drive

The OR 34/Crestline Drive intersection has a marked crosswalk on the west leg of the intersection. The following alternatives have been identified to further enhance the crossing:

- Install high visibility pedestrian crossing signs on both sides of the crossings and in both directions.

MULTI-USE PATHS AND TRAILS

This section identifies the multi-use paths and trails that could be implemented within Waldport to augment and support the bicycle and pedestrian systems.

MULTI-USE PATHS AND TRAILS

Multi-use paths and trails are improved (i.e. paved) and unimproved (i.e. dirt and gravel) facilities that serve pedestrians and bicyclists. Multi-use paths and trails can be constructed adjacent to roadways where topography, right-of-way, or other issues don't allow for the construction of sidewalks and bike facilities. A minimum width of 10 feet is recommended in areas with low levels of pedestrian/bicycle traffic (8-feet on constrained areas); 12 feet should be considered in areas with moderate to high levels of pedestrian/bicycle traffic. Multi-use paths and trails 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.

MULTI-USE PATH AND TRAIL ALTERNATIVES

There are several existing multi-use paths and trails located throughout Waldport that augment and support the pedestrian and bicycle systems. The following identifies the location of several potential new multi-use paths and trails as identified in the Waldport Parks, Recreation & Trails Master Plan and the Yaquina John Point Land use and Transportation Plan.

The following multi-use paths and trails are identified in the Waldport Parks, Recreation & Trails Master Plan. The Bridgeview Trail, Lint Slough Trail, and Waziyata Beach Trail are identified in the plan as planned and funded and therefore are not included below. Exhibit 4 (below) illustrates the located and orientation of the multi-use paths and trails.

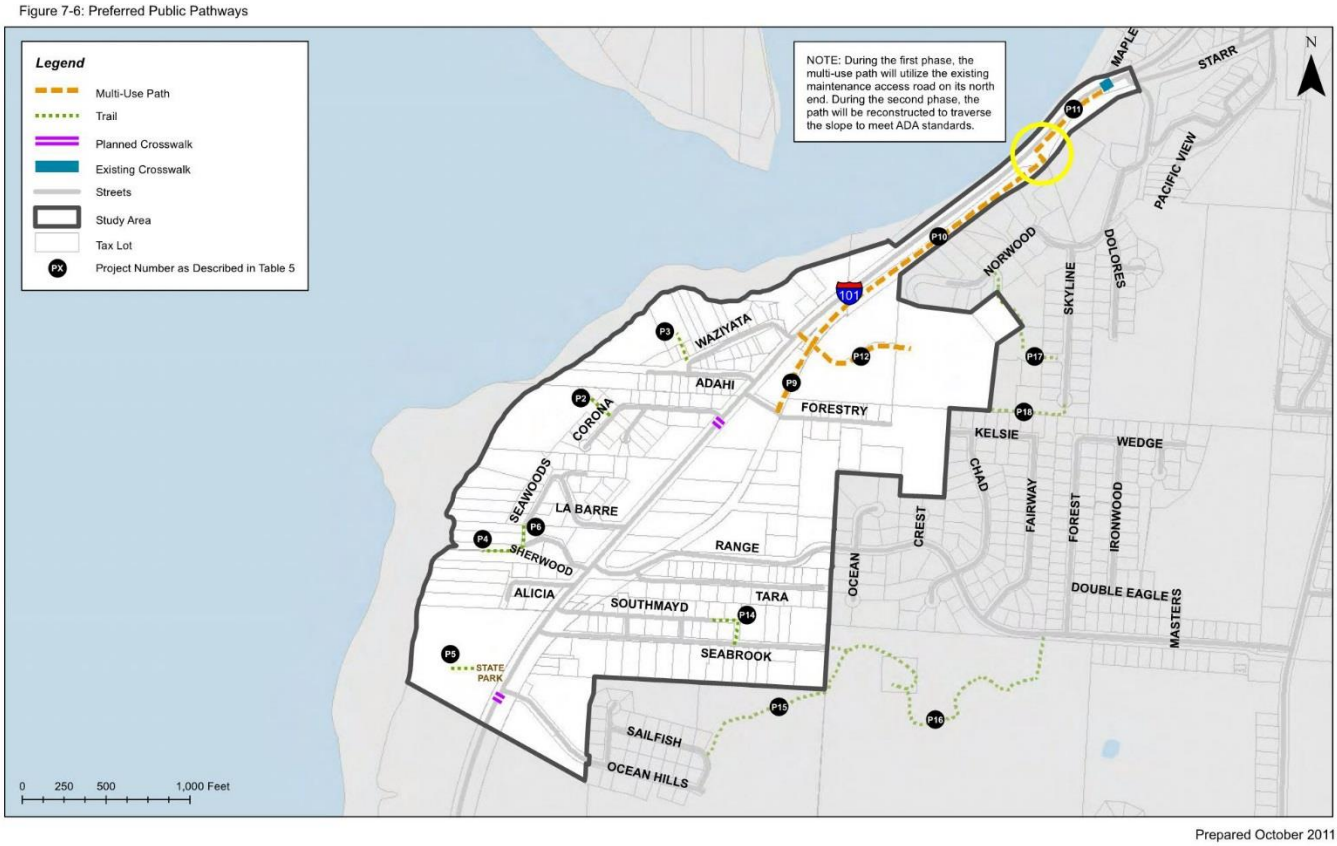
- Install a multi-use path or trail along the west side of Crestline Drive that connects the Waldport School campus to Range Drive.
- Install a multi-use path or trail west of the Crestview Golf Club that connects the Waldport School campus to Range Drive.
- Install east-west oriented multi-use paths or trails south of Range Drive that connect US 101 to the trail between the Waldport School campus and Range Drive.
- Extend the Lint Slough Trail south.
- Install multi-use path or trail connections from the Lint Slough Trail west to Crestline Drive between Cedar Street and Crestline Park, to Range Drive, and to Crestline Drive near the Waldport School campus.
- Install a multi-use path or trail from the Lint Slough Trail to the east.
- Install a multi-use path or trail from the school campus south along the Little Creek Tributary.
- Install trails east from the Bridgeview Trail and along Forestry Lane per the Yaquina John Point Land Use & Transportation Plan.
- Install Trails connecting the Woodland Trail to Range Drive through the Land & Sea and Cedar Heights Park subdivisions.
- Install a multi-use path or trail connecting OR 34 to Crestline Drive through the open space site (former high school property).

Exhibit 4: Waldport Parks, Recreation & Trails Master Plan Exhibit 10

The following multi-use paths and trails are identified in the Yaquina John Point Land use and Transportation Plan. Exhibit 5 illustrates the location and orientation of the multi-use paths and trails.

- Improve/sign existing access trail to beach from Corona Court.
- Improve/sign existing access trail to beach from Waziyata Avenue.
- Improve/sign existing access trail to beach from Sherwood Lane.
- Improve/sign existing access trail to beach from state park.
- Improve/sign existing trail from Seawoods Terrace to Sherwood Lane.
- Construct multi-use path to connect with Norwood Drive extension to US 101 slightly north of Waziyata.
- Improve existing trail on city easement from eastern terminus of Southmayd Lane to Seabrook Lane.
- Improve/sign existing nature trail from Sailfish Loop to Seabrook Lane.
- Improve/sign existing nature trail from Seabrook Lane to Range Drive.
- Improve/sign existing nature trail from Skyline Drive to Norwood Drive.
- Skyline Drive Trail – Improve existing nature trail from Skyline Drive south terminus to 500' westward.

Exhibit 5: Yaquina John Point Land use and Transportation Plan Figure 7-6



One additional multi-use path or trail opportunity was identified to improve connectivity, including:

- A multi-use path or trail connecting Clover Lane to Merten Drive.

TRANSIT

This section provides an overview of transit facilities and services that could be implemented within Waldport to improve access and circulation by transit. This section also identifies the transit alternatives developed to address gaps and deficiencies in transit connectivity.

TRANSIT FACILITIES AND SERVICES

Public transit provides important connections to destinations for people that do not drive or bike and can provide an additional option for all transportation system users for certain trips. Public transit links to walking, bicycling, or driving trips: users can walk to and from transit stops and their homes, shopping or work places, people can drive to park-and-ride locations to access a bus, or people can bring their bikes on transit vehicles and bicycle from a transit stop to their final destination.

Providing transit service in smaller cities is typically led by a local or regional transit agency. The Lincoln County Transit Service District (LCTSD) provides fixed-route transit service within Lincoln County with multiple stops in Waldport along US 101 and OR 34.

Fixed-Route Service

Fixed-route service refers to transit service that runs on regular, scheduled routes, with designated transit stops. Fixed-route service is typically characterized by the service frequency (the time between arrivals), service hours (the number of hours service is provided throughout the day), and service coverage (the amount of the population, households, and jobs served by transit).

Transit Stops

Transit stops are designated locations where residents can access local transit service. Transit stops are normally located at major intersections. The types of amenities provided at each transit stop (i.e. pole, bench, shelter, ridership information, trash receptacles) tend to reflect the level of usage.

- Pole and bus stop sign – All bus stops require a pole and bus stop sign to identify the bus stop location. Some transit agencies prefer the bus stop signs to be provided on a separate dedicated pole instead of an existing utility pole, column, or other location.
- Bus stop shelters – Shelters are typically provided at stops with 50 or more boardings per day but may be considered at stops served by infrequent service (headways greater than 17 minutes) such as in Waldport with fewer boardings per day.
- Seating – Seating can be considered at any stop as long as it is accessible and as long as the, safety and accessibility of the adjacent sidewalk or other facility are not compromised by seating placement.
- Trash cans – Trash cans can be considered at any stop; however, they are most commonly located at stops with shelters and/or seating. Trash cans will require pick-up from the local garbage company.
- Lighting – Lighting is an important amenity for bus stops as it provides visibility and increased security for transit users waiting, boarding, and aligning transit service.

Park-and-Rides

Park-and-rides provide parking for people who wish to transfer from their personal vehicle to public transportation or carpools/vanpools. Park-and-rides are frequently located near major intersections, at commercial centers, or on express and commuter bus routes. It is Oregon state policy to encourage the development and use of park-and-rides at appropriate urban and rural locations adjacent to or within the highway right-of-way. Park-and-rides can provide an efficient method to provide transit service to low density areas such as Waldport, connecting people to jobs, and providing an alternate mode to complete long-distance commutes.

Park-and-rides may be either shared-use, such as at a school or shopping center, or exclusive-use. Shared-use facilities are generally designated and maintained through agreements reached between the local public transit agency or rideshare program operator and the property owner. Shared-use lots can save the expense of building a new parking lot, increase the utilization of existing spaces, and avoid utilization of developable land for surface parking. In the case of shopping centers, the presence of a shared-use park-and-ride has frequently been shown to be mutually beneficial, as park-and-riders tend to patronize the businesses in the center.

TRANSIT ALTERNATIVES

This section summarizes the alternatives developed to address the gaps and deficiencies in the transit facilities and services provided in Waldport.

Fixed-Route Service

Fixed-route transit service is provided in Waldport by LCTSD's South County Route (Newport to Yachats). LCTSD's 2018 Transit Development Plan (TDP) identified several potential improvements to the South County Route as well as other transit facilities and services in Waldport, including short-term actions (five-year horizon, 2023) and medium-term actions (ten-year horizon, 2028).

New Routes & Existing Route Changes

The TDP's short-term actions include modifications to the South County Route and medium-term actions include potential dial-a-ride service.

South County Route modifications include a route spur for connectivity to Newport's Oregon Coast Community College (OCCC) campus. The modification would allow Waldport residents to travel to the campus without transferring to the Newport City Loop. In addition, the plan notes to coordinate with the City of Waldport to identify options and monitor the need to serve Crestline Drive as essential services continue to relocate to the upland area. Related to this, a new roadway connection from US 101 to Crestline Drive would provide the opportunity for transit connection to these services, including OCCC's South Campus, Waldport High School, and Crestview Heights School.

For new services, the TDP recommends extending dial-a-ride to new service areas within Lincoln County based on LCTSD and community recommendations and available funding. The TDP notes that funding partnerships with cities newly served by dial-a-ride would make the service feasible and provides the total cost per year as $216,800 with a capital cost of two vehicles.

Service Frequency, Hours, & Coverage

The TDP's medium-term actions also include increases to service frequency and service hours on the South County Route. This action is recommended to relieve the need for dial-a-ride services, as Waldport has greater densities of older adults compared to other parts of the County.

Transit Stops

Existing Transit Stop Improvements

The TDP collected origin and destination information via rider survey for the South County Route. Some riders provided the stop where they boarded. Of these, Waldport Post Office had more than ten boardings a day and is therefore considered a major stop, which merits consideration for a higher level of improvement (relative to the base level amenities found at all bus stops), such as a shelter or information case. A shelter is already provided at this stop. As other stops reach ten boarding per day, these could be upgraded. Bus shelters typically range from $7,000 to $10,000 depending on materials, lighting, information boards/screens, and the installation conditions. Additionally, the TDP notes benches should be considered for stops with three or more boarding per day. In Waldport, this includes Espresso 101, Hi-School Pharmacy, Ray's Market, and Lakeside Market. Installed benches vary in price from $500 to $1,500, depending on materials, the quality of the product, and the installation conditions.

New Transit Stops

Currently there is a 'northbound Yachats to Newport' stop at Dollar General and a 'southbound Newport to Yachats' stop at the Waldport Library. There is a desire by some to move the Waldport Library stop to Dollar General (1/2 block away).

As essential services are relocated to the upland area, new bus stops may be needed. Areas for consideration include the industrial-zoned lands, schools, and Crestview Golf Club. The cost for a new bus stop signage and pole, installed, can range from $300 to $1,000, depending on the material and the installation conditions.

Other

In addition to the alternatives described above, the City can plan for transit-supportive land use patterns and support future transit viability by designing and building streets that will comfortably accommodate transit stops and include the right-of-way that could allow for transit stops to be located as close as possible to important destinations.

INTERMODAL ROUTE CONNECTIVITY

The existing transit network was overlaid with existing bicycle and pedestrian facilities to understand intermodal route connectivity. Bicycle and pedestrian facilities generally connect Waldport's arterial street network to bus stops. However, there are several gaps and areas for improvement, including:

- **US 101: Alsea Bay Bridge to SW Starr Street** – This segment serves several stops for the South County Route and Caravan Airport Shuttle. This segment includes continuous sidewalks but does not include on-street bike lanes or other bicycle facilities. Improvements to the bicycle facilities would improve access to transit.
- **US 101**: **SW Starr Street to South City Limits** – This segment connects several residential and commercial areas to the Waldport Clinic stops as well as stops in downtown Waldport. This segment includes paved shoulders

with some gaps in connectivity. Improvements to the existing bicycle/pedestrian facilities would improve access to transit.

- **OR 34: NE Mill Street to NE Waldport Heights Drive** – This segment serves stops for the South County Route. This segment includes a gap in the network at the Lint Slough Bridge that disconnects western and eastern Waldport. Improvements to the existing bicycle/pedestrian facilities would improve access to transit.
- **OR 34**: **NE Waldport Heights Drive to East City Limits** – This segment connects residential and commercial areas to several bus stops. This segment includes paved shoulders with some gaps in connectivity. Improvements to the existing bicycle/pedestrian facilities would improve access to transit.
- **Crestline Drive**: **Lint Slough Road to Cedar Street** – This segment connects upland areas to the downtown area. This segment includes paved shoulders with some gaps in connectivity and limited sidewalks. Improvements to the existing bicycle and pedestrian facilities would improve access to transit.
- **Cedar Street: OR 34 to Crestline Drive** – This segment connects upland areas to the downtown area. This segment provides a continuous sidewalk along the west side. Improvements to the bicycle facilities would improve access to transit.
- **SW Range Drive**: US 101 to Crestline Drive – This segment serves stops for the South County Route. This segment includes paved shoulders with some gaps in connectivity. Improvements to the bicycle/pedesrian facilities would improve access to transit.
- **Woodland Trail & SW Starr Street** – The Woodland Trail provides connectivity from the upland areas to the lowland areas. Pavement improvements to the trail would provide an alternative to Crestline Drive and Cedar Street for bicycle and pedestrian access to transit.

SAFE ROUTES TO SCHOOLS

Safe Routes to School (SRTS) plans make it safer for students to walk, bike, or take public transit to school. Safer routes encourage more walking and biking and provide convenient and accessible options to and from school and in surrounding neighborhoods. SRTS programs include six components known as the Six E's: evaluation, education, encouragement, engineering, enforcement, and equity. This section provides a summary of the Six E's and identifies alternatives to be considered for the City of Waldport.

SAFE ROUTES TO SCHOOL – SIX E'S

Education

The education component provides students and residents with information such as transportation options and the benefits of walking and biking to school. Education strategies for SRTS programs include identifying who needs to receive the information, what information needs to be shared, and how to convey the messages. Education components could include:

- Educational videos
- Structured skill practice training
- Lessons integrated into classroom subjects
- Media: radio, newspaper articles, and television features

Encouragement

The encouragement component is most closely linked to the education component of a SRTS program. Encouragement strategies generate excitement and interest in walking and biking through events and activities. The encouragement component rewards participation and is used to increase the number of students who walk and bike to school. Encouragement strategies can be used to garner support for other SRTS components such as installing sidewalk. Encouragement components could include:

- Walking school bus
- Mileage clubs and contests/frequent walker punch card

Engineering

The engineering component of a SRTS program identifies design, implementation, operations and maintenance of physical improvements aimed at addressing specific needs which make walking and biking to school safer, more comfortable and convenient. An evaluation of the school environment is necessary to identify engineering problems and solutions. Engineering components could include:

- Pedestrian and bicycle facilities: crossings, sidewalks, bike lanes, bicycle racks, curb ramps
- Enhanced crosswalks
- Pedestrian and bicyclist signage and signals
- Reduce crossing distance: curb extensions, crossing islands

Enforcement

Enforcement is included as part of a SRTS program to reinforce the objectives of the program and deter unsafe traffic behaviors and encourage all road users to obey traffic laws and share the road safely. Enforcement strategies involve a network of community members who promote safe walking, biking and driving. Enforcement components could include:

- Enforcing no parking in drop-off and pick-up areas
- School safety patrol
- Speed trailers and active monitoring

Evaluation

The evaluation component assesses which strategies and approaches are successful. Evaluation of SRTS programs ensure that initiatives support equitable outcomes, identify unintended consequences or opportunities to improve effectiveness and ensure there are adequate resources to implement all components of a SRTS program. Evaluation components could include:

- Data collection; surveys, observations
- Information sharing
- Walkability assessment
- Records of citations
- Quiz

Equity

Equity in a SRTS program ensures that program initiatives are benefiting all demographic groups. This component is especially important to ensuring safe, healthy, and fair opportunities for low-income students, students of color, students of all genders, students with disabilities and others. Incorporating equity efforts into all components of a SRTS could include:

- Assessing whether the recipient of education efforts reflect larger demographic patterns of the community
- Ensuring encouragement activities are available to low-income students and students of color
- Ensuring policy and physical improvements are implemented in low-income communities and communities of color
- Ensuring law enforcement officers build trust with communities and do not target students of color, low-income students, or other community residents
- Initiating efforts that decrease health disparities

SAFE ROUTES TO SCHOOL ALTERNATIVES

Waldport does not have a SRTS program; however, there are elements of a SRTS plan in place, such as pedestrian and bicycle facilities along Crestline Drive, Range Drive and other roadways around local schools and active monitoring of traffic conditions. The City could work with the Lincoln County School District and local schools to develop and implement other elements of a SRTS plan, including:

- Develop education and encouragement programs that provide students and residents with information on transportation options and generate excitement and interest in walking and biking.
- Continue to implement physical improvements to the transportation system aimed at addressing specific needs which make walking and biking to school safer, more comfortable and convenient.
    - Several alternatives are identified within the pedestrian and bicycle sections of this memorandum that could help the city further enhance the transportation system around school.
- Develop an evaluation program that assesses which strategies and approaches are successful, ensures that initiatives support equitable outcomes, and identifies unintended consequences or opportunities.
- Develop an equity program that ensures that program initiatives are benefiting all demographic groups.

TSUNAMI EVACUATION ROUTES

As indicated in *Tech Memo 3A: Existing Transportation Inventory*, tsunami evacuation routes and assembly areas have been established for downtown Waldport, the Yaquina John Point area, and the east side of town. Further evaluation of the evacuation routes conducted by the Oregon Department of Geology and Mineral Industries as part of their Beat the Way initiative, indicates that most of the Yaquina John Point area, downtown Waldport, and the east side of town are located within a slow walk (0-1.4 mph) or walk (1.4-2.7 mph) distance of a safety destination. Nevertheless, two trail connections identified in the pedestrian alternatives would increase improve access to the safety destinations. The trail connections include:

- A multi-use path or trail connecting OR 34 to Crestline Drive through the open space site (former high school property). This potential trail connection could also provide redundancy to Crestline Drive should it fail during an earth quake.
- A multi-use path or trail connecting Clover Lane to Merten Drive.

The need for tsunami evacuation routes may influence the types of improvements along other transportation facilities, including Crestline Drive, Range Drive, and the potential new east-west road in South Waldport connecting US 101 and Crestline Drive.

- Crestline Drive serves as a critical connection for emergency access and tsunami evacuation. Maintaining the roadway as a two-way connection or as a one-way southbound (lowland to upland) connection would benefit tsunami evacuation.
- Range Drive also serves as a critical connection for emergency access and tsunami evacuation. Improvements along Range Drive, including the elimination or mitigation of curves and provision of pedestrian and bicycle facilities on both sides of the street would promote faster emergency response times and tsunami evacuation.
- A new east-west road to the industrial park in South Waldport, connecting US 101 and Crestline Drive would provide an additional evacuation route.

FREIGHT

As indicated in *Tech Memo 3A: Existing Conditions Inventory*, there are no designated freight routes in Waldport. The majority of freight activity occurs as through traffic on US 101 and OR 34. However, commercial businesses within the downtown area and the industrial park in the uplands area generate freight traffic. Therefore, freight trucks can be seen circulating within the downtown area and traveling along Range Drive and Crestline Drive, south of Range Drive. Therefore, the following alternatives were developed to address potential issues with freight traffic:

- The City could establish designated freight routes within the City that identify where freight trucks can and cannot travel.
- The City could develop policies related to maintenance along designated freight routes to ensure the facilities to not become degraded over time.
- The City could develop policies related to pedestrian and bicycle facilities along designated freight routes to ensure greater separation of travel modes.
- The city could establish truck loading zones within the downtown area and develop policies related to the use of the truck loading zones.

SAFETY

Traffic safety plays an important role in developing the most appropriate alternatives for a given gap or deficiency, particularly in areas where real or perceived safety risks may prevent people from using more active travel modes, such as walking, biking, and taking transit. The real or perceived safety risks may reflect the crash history of an area or the physical and/or operational characteristics of the roadways (narrow travel lanes, winding curves, steep grades, high traffic volumes, high travel speeds, excessive heavy vehicles, etc.). Several methodologies have been

developed to analyze and identify alternatives for addressing traffic safety within an area. Many of which are documented in the Highway Safety Manual (HSM) as well as several other resources developed by ODOT for addressing safety along roadway segments, at intersections, and for pedestrian and bicyclists.

COUNTERMEASURES

This section summarizes the countermeasures considered for implementation within Waldport to address traffic safety along roadway segments, at intersections, and for pedestrians and bicyclists. Note: many of the countermeasures overlap, which illustrates how some countermeasures address multiple safety issues.

Roadway Segments

There are a variety of potential safety alternatives that can be applied within Waldport to address systemic crashes that occur along roadway segments, such as head-on collisions, sideswipes, and run off the road crashes as well as general speeding and other driver behaviors.

- Enhanced signs and pavement markings for curves (with and without flashing beacons)
- Rumble strips (e.g. centerline, shoulder line, and edge line)
- Tree/vegetation removal
- Traffic calming
- Enhanced enforcement
- Reconfigure the roadway (road diet)

Intersections

There are a variety of potential safety alternatives that can be applied within Waldport to address systemic crashes that occur at intersections, such as angled crashes, turning movement crashes, rear-end crashes, and crashes that involve other travel modes (pedestrian, and bicycles).

- Enhanced signs and pavement markings (e.g. stop signs, warning signs, and/or beacons)
- Application of traffic control devices (signs, markings and signals)
- Signal improvements (e.g. signal timing, signal phasing)
- Reflectorized backplates on signal heads
- Left-turn phasing (e.g. permitted, protected, permitted-protected)
- Enhanced enforcement
- Pedestrian and bicycle improvements (see below)
- Intersection lighting
- Traffic calming

Pedestrian and Bicycle

There are a variety of potential safety alternatives that can be applied within Waldport to address pedestrian and bicycle safety. The following provides a summary of the alternatives by traffic control.

Signalized Intersections

Pedestrian Safety Alternatives

- Street lighting
- Right-turn channelization
- Countdown pedestrian heads
- Leading pedestrian interval
- Left-turn phasing
- Vehicle turning movement restrictions
- Curb extensions (bulb-outs, neck downs)

Bicycle Safety Alternatives

- Street lighting
- Bicycle signal
- Bicycle detection
- Pavement markings
- Right-turn channelization
- Leading bicycle interval
- Left-turn phasing
- Vehicle turning movement restrictions
- Protected intersection design
- Forward bicycle queueing area (bike box)

Unsignalized intersection

Pedestrian Safety Alternatives

- Street lighting
- Enhanced crossing treatments
- Reduced curb radii
- Pedestrian refuge island or median
- Speed reduction treatments
- Vehicle turning movement restrictions
- Raised crosswalks

Bicycle Safety Alternatives

- Street lighting
- Enhanced crossing treatments
- Reduced curb radii
- Skip Striping
- Supplemental signs and markings
- Bicycle boulevards
- Longitudinal bike stencil
- Speed reduction treatments
- Vehicle turning movement restrictions
- Stripe bike lanes
- Raised crossings

Roadway segment – No traffic control

Pedestrian Safety Alternatives

- Street lighting
- In-roadway warning lights
- Pedestrian-activated warning beacons
- Access management
- Sidewalks Street lighting
- Enhanced mid-block crossing treatments
- Reconfigure the roadway (road diet)
- Pedestrian refuge island or median

Bicycle Safety Alternatives

- Access management
- Bicycle route signage
- Longitudinal bike stencil
- Separated bike lanes
- Dynamic warning signs
- Enhanced mid-block crossing treatments
- Street lighting
- Restrict on-street parking
- Reconfigure the roadway (road diet)
- Refuge Island or median

SAFETY ALTERNATIVES

This section summarizes the alternatives developed to address traffic safety within Waldport. It is important to note that no trends or patterns were identified in the crash data at the study intersections or study segments evaluated as part of the existing and future conditions analyses that warranted further review. Therefore, the alternatives identified below were developed based on feedback from the PMT and PAC.

US 101

The segment of US 101 located within downtown Waldport experienced a number of rear-end and turning movement crashes over the last several years as well as a number of pedestrian and bicycle related crashes. Therefore, the following alternatives were developed for the roadway:

- Reconfigure US 101 through downtown to provide one travel lane in each direction, a center two-way left-turn lane, and on-street bike lanes – this is consistent with the alternative identified in the pedestrian section.
  - The center two-way left-turn lane could reduce rear-end crashes by providing a place for slowed or stopped vehicles to wait while turning from US 101 and it could reduce turn-movement crashes by providing the ability for vehicles to make two-stage left-turns onto the highway.
  - The on-street bike lanes could reduce the potential for bicycle related crashes along US 101 by providing a separate space for cyclists. Installing skip striping through key intersections, such as the US 101/OR 34 intersection could reduce the potential for bicycle related crashes at intersections.
- Install additional pedestrian warning signs and Rectangular Rapid Flash Beacons (RRFB) on the existing crosswalk signs along US 101 – this is consistent with the alternatives identified in the pedestrian section.
  - The additional signs and RRFBs could reduce the potential for pedestrian related crashes by increasing the awareness of pedestrians along the corridor.

OR 34

The segment of OR 34 within downtown Waldport experienced a number of pedestrian and bicycle related crashes over the last several years. Therefore, the following alternatives were developed for the roadway:

- Install on-street bike lanes along OR 34 – this is consistent with the alternative identified in the bicycle section.
  - The on-street bike lanes could reduce the potential for bicycle related crashes along OR 34 by providing a separate space for cyclists. Installing skip striping through key intersections, such as the Cedar Street/OR 34 and Crestline Drive/OR 34 intersections could reduce the potential for bicycle related crashes at intersections.
- Install additional pedestrian warning signs and Rectangular Rapid Flash Beacons (RRFB) on the existing crosswalk signs along OR 34 – this is consistent with the alternatives identified in the pedestrian section.
  - The additional signs and RRFBs could reduce the potential for pedestrian related crashes by increasing the awareness of pedestrians along the corridor.

The OR 34/Mill Street-Crestline Drive intersection was identified as having potential operational/safety issues. Therefore, the following alternatives were developed for the intersection:

- Widen OR 34 east of Mill Street and reconfigure the median striping to provide a continuous two-way left-turn lane along OR 34 through the intersection. This project could be coordinated with the Lint Slough Bridge replacement project.
- Restrict the southbound through, southbound left, and northbound through movements by installing a raised median along OR 34 on the east leg of the intersection.
- Close Mill Street South of Pine Street and redirect all southbound traffic to Broadway Street.

The segment of OR 34 located outside the downtown area experienced a number of fixed-object crashes over the last several years. Therefore, the following alternatives were developed for the roadway:

- Install 6-foot shoulders on both sides of the roadway - this is consistent with the alternative identified in the bicycle section.
- Install enhanced signs and pavement markings for curves (with and without flashing beacons).
- Install rumble strips (e.g. centerline, shoulder line, and edge line) on both sides of the roadway.

LOCAL STREET CONNECTIVITY AND EXTENSION PLAN

Most streets within Waldport are classified as local streets. The local streets within downtown Waldport and throughout most of the lowlands were built on a grid system, while the local streets in the uplands were built on a network of cul-de-sacs and stub streets, which limits the potential for future connections. These streets can be desirable to residents because they tend to have lower traffic volumes and travel speeds; however, cul-de-sacs and stub streets result in longer trip distances, increased reliance on arterials and collectors for local trips, and limited options for people to walk and bike to the places they want to go.

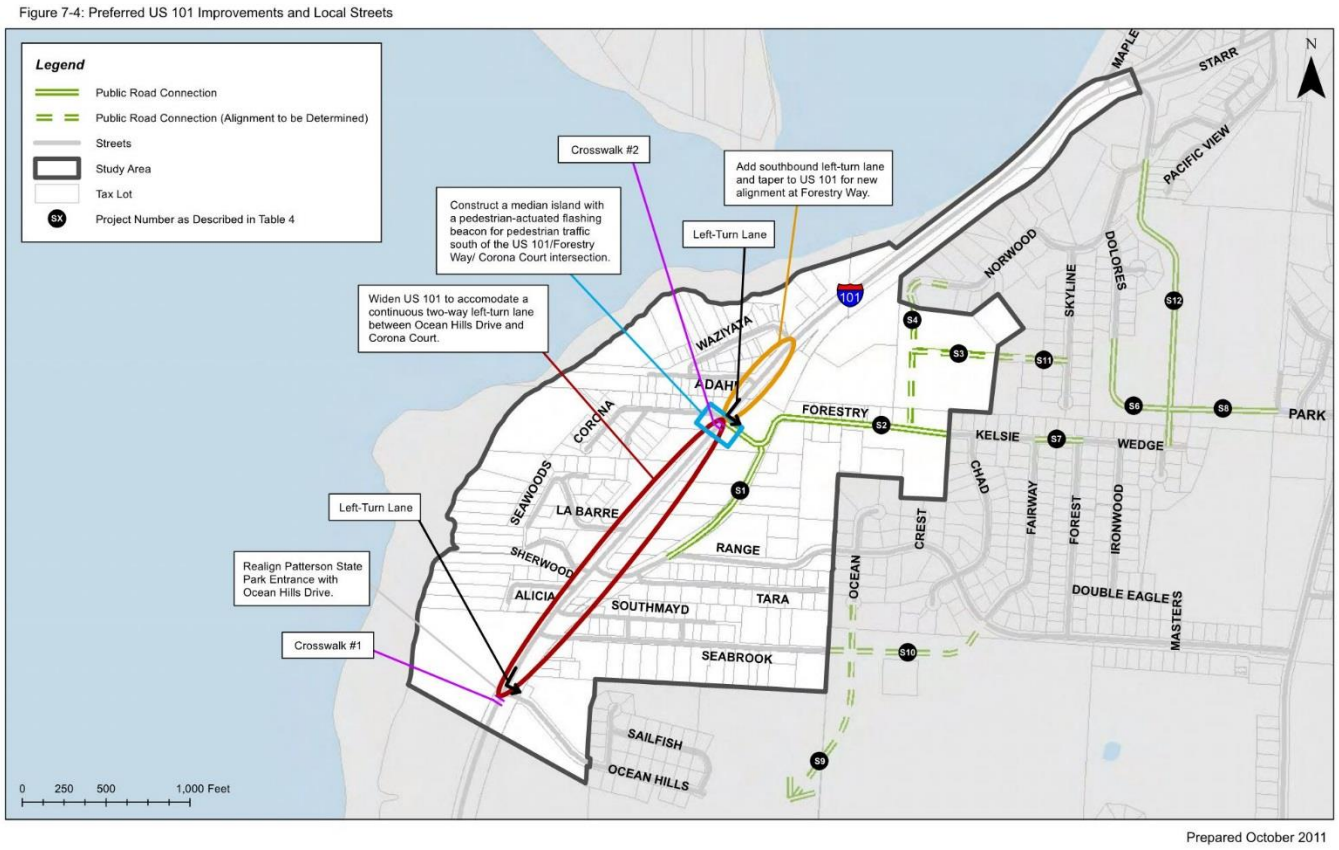
Incremental improvements to the street system can be planned carefully to provide route choices for motorists, bicyclists, and pedestrians while accounting for potential neighborhood impacts. In addition, the quality of the transportation system can be improved by making connectivity improvements to the pedestrian and bicycle system separate from street connectivity, as discussed in the previous sections. The following summarizes the potential local street connection and extension opportunities within Waldport.

LOCAL STREET CONNECTIONS

The following local street connections are identified in the Yaquina John Point Land Use and Transportation Plan. Exhibit 6 illustrates the location and orientation of the local street connections.

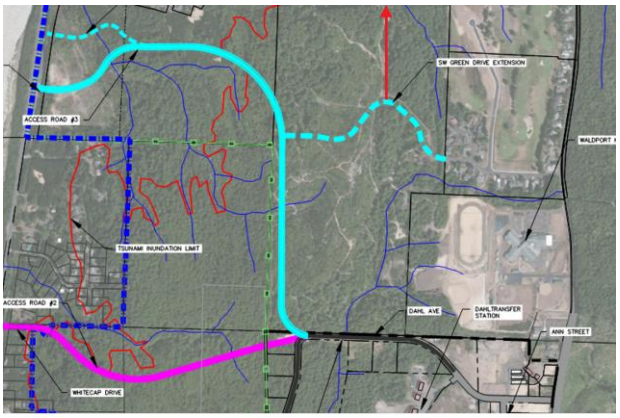
- Provide a new 20-foot alley "backage road" for adjacent property access from Range Drive to new Kelsie Lane-Forestry Way extension.
- Provide a new local street connection from the Norwood Drive extension to Skyline Terrace.
- Provide the eastern portion of the connection from Norwood Drive to Skyline Terrace.
- Provide a new local street connection from Norwood Drive to Wedge Drive.

Exhibit 6: Yaquina John Point Land Use and Transportation Plan Figure 7-4



Three additional local street connection opportunities were identified to improve residential connectivity. These connections include:

- Provide a new local street connection from Bay Street to Crestline Drive.
- Provide a new local street connection from the Green Street extension (See Industrial Park Master Plan Access Road #3 Alternative) north to Range Drive.



STREET EXTENSIONS

The following street extensions are identified in the Yaquina John Point Land Use and Transportation Plan. Figure 7-4 *illustrates the located and orientation of the local street connections.*

- Extend Kelsie Lane from its current western terminus westward via Forestry Way to intersection with US 101 directly opposite Corona Court.
- Extend Norwood Drive from its current southern terminus south to the new Kelsie Lane-Forestry Way extension.
- Extend Dolores Drive from its current southern terminus south and east to new north-south street local connection between Norwood Drive and Wedge Street.
- Extend Park Drive westward to new north-south street local connection between Norwood Drive and Wedge Street.
- Extend Ocean Terrace Southward to vacant undeveloped land to south.
- Extend Seabrook Lane eastward to connect to Range Drive opposite Fairway Drive.

Four additional street extension opportunities were identified to improve residential connectivity. These extensions include:

- Extend Spruce Street west to NW Verbena Street.
- Extend NW Verbena Street north to Spruce Street.
- Extend Huckleberry Street west to NW John Street.
- Extend NW John Street north to Huckleberry Street.

In addition to the local street connections and street extensions described above, there are several parking lots within the downtown area that serve a similar function to local streets, such as the parking area located along Willow Street between John Street and Cedar Street. As redevelopment occurs, these parking areas could be converted to local streets to improve local street connectivity.

PARKING

Parking is provided within downtown Waldport along both sides of most streets, including US 101 and OR 34. Parking is also provided in several public and private off-street parking lots. The are no limitations or restrictions on the on-street or off-street parking stalls, in terms of who can park there or for how long. A study conducted in 2002 found that parking occupancy (the percent of parked cars versus parking stalls) is well below capacity during peak time periods; the area with the highest occupancy rates (on-street and off-street) are located along US 101. The following summarizes the alternatives considered for the City of Waldport.

- Update the City's parking management plan.
- Develop an event parking management plan.
- Establish truck loading zones, taxi zones, valet zones, or transitional spaces.
- Implement time limits (2-hours on-street, 4-hours off-street).
- Implement on-street parking restrictions on RV parking, trucks with trailers, and other large vehicles.

- Provide wayfinding signs to off-street public parking facilities, including signs that provide guidance for RV, trucks with trailers, etc. to parking.
- Implement regular enforcement of parking regulations.
- Work with local business owners to establish public/private partnerships, parking collaboratives, etc.
- Encourage employers to identify designated parking areas for employees.
- Include off-street public parking facilities on downtown area maps.
- Update development code to allow shared parking.
- Update development code to encourage development within the downtown area

FUNDING PROGRAMS

Transportation revenue in Waldport primarily consists of state revenue from the state gas tax, which was recently changed by House Bill (HB) 2017, and local revenue from Road District property taxes. Waldport does not have a transportation system development charge (SDC). The following summarizes current and potential future funding sources for transportation improvements.

CURRENT TRANSPORTATION FUNDING SOURCES

State Revenue

The primary state revenue source is the state gas tax. State gas taxes are comprised of proceeds from excise taxes imposed by the state and federal government to generate revenue for transportation funding. The proceeds from these taxes are distributed to Oregon counties and cities in accordance with Oregon Revised Statute (ORS) 366.764, by county registered vehicle number, and ORS 366.805, by city population. The Oregon Constitution states that revenue from the state gas tax is to be used for the construction, reconstruction, improvement, maintenance, operation and use of public highways, roads, streets, and roadside rest areas.

Local Revenue

The primary local revenue source is from Road District property taxes. Road districting is a technique used to localize road construction or maintenance to a portion of a county and to place financial responsibility within the localized area.

POTENTIAL TRANSPORTATION FUNDING SOURCES

Based on the current transportation funding sources identified above, Waldport will likely need to identify additional funding sources that can be dedicated to transportation-related capital improvement projects over the next 22 years. The City will likely rely upon transportation improvements grants, partnerships with regional and state agencies, and other funding sources to help implement future transportation-related improvements. A list of potential grant sources and partnering opportunities for the City are identified below.

Federal Sources

Fixing America's Surface Transportation (FAST) Act

Fixing America's Surface Transportation (FAST) Act funds surface transportation programs, including, but not limited to, federal-aid highways. The FAST Act is the first long-term surface transportation authorization enacted in a decade that provides long-term funding certainty for surface transportation. Non-motorized transportation, as a

mode of surface transportation, are eligible for funding through the FAST Act. The FAST Act improves mobility on highways by establishing and funding new programs to support critical transportation projects to ease congestion and facilitate the movement of freight on the interstate system and other major roads. The FAST Act authorizes $226.3 billion in federal funding for FY 2016 through 2020 for road, bridge, bicycling, and walking improvements.

More information is available at: https://www.fhwa.dot.gov/fastact/summary.cfm

Surface Transportation Block Grant (STBG)

In 2015, the FAST Act amended the Surface Transportation Program (STP) and changed the program name to the Surface Transportation Block Grant Program (STBG). STBG funds are flexible funding sources for jurisdictions and are eligible to be used for non-motorized transportation projects. STBG funds are contract authority. STBG funds are available for obligation for a period of three years after the last day of the fiscal year for which the funds are authorized. Therefore, funds are available for obligation for up to four years. The federal share is generally 80 percent and 90 percent for projects on the Interstate System unless the project adds lanes that are not high-occupancy-vehicle or auxiliary lanes. For projects that add single occupancy vehicle capacity, that portion of the project will revert to 80 percent. Safety improvements may have a Federal share of 100 percent.

More information is available at: https://www.fhwa.dot.gov/fastact/factsheets/stbgfs.cfm

Congestion Mitigation and Air Quality (CMAQ)

The Congestion Mitigation and Air Quality (CMAQ) program provides funding for projects located within the containment area, or urban growth boundary, of an incorporated city that help reduce emissions and meet national air quality standards, such as transportation demand management programs, bicycle and pedestrian improvements, transit projects, diesel retrofits, and vehicle emissions reductions programs. All types of non-motorized transportation projects are eligible for CMAQ funding. States are required to provide a non-federal match for program funds (which has not been the case historically for Federal lands highway funding). Estimated CMAQ funding for FY 2018-19 will be $2.4 billion and will stretch to nearly $2.5 billion by FY 2020-21.

More information is available at: https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm

Highway Safety Improvement Program (HSIP)

The Highway Safety Improvement Program (HSIP) is a core federal-aid program with the purpose of achieving a significant reduction in traffic facilities and serious injuries on all public roads, including non-state-owned public roads and roads on tribal lands. The HSIP requires a data-driven, strategic approach to improving highway safety on all public roads that focuses on performance. Highway safety improvement projects can be either infrastructure or non-infrastructure projects. ODOT administers HSIP funding through the All Roads Transportation Safety (ARTS) program described below. The HSIP program requires a local match for projects where HSIP funding will be used. For Oregon, this local match is 7.78 percent of the project cost.

More information on the HSIP Program is available at: https://www.fhwa.dot.gov/fastact/factsheets/hsipfs.cfm

State Sources

All Roads Transportation Safety (ARTS)

The All Roads Transportation Safety (ARTS) program (formerly known as Jurisdictionally Blind Safety Program) is intended to address safety needs on all public roads in Oregon. By working collaboratively with local jurisdictions, ODOT expects to increase awareness of safety on all roads, promote best practices for infrastructure safety, compliment behavioral safety efforts and focus limited resources to reduce fatal and serious injury crashes in the

state of Oregon. The program is data driven to achieve the greatest benefits in crash reduction and should be blind to jurisdiction. The ARTS program primarily uses federal funds from the HSIP with a required local match of 7.78 percent of the project cost.

More information is available at: https://www.oregon.gov/ODOT/Engineering/Pages/ARTS.aspx

Connect Oregon

Connect Oregon invests in air, rail, marine, bicycle, and pedestrian infrastructure across the state to ensure that Oregon's transportation system is strong across all modes of transport. Connect Oregon funding cannot go to projects that are eligible for funding through the state highway fund or related funding sources. Projects that are submitted for Connect Oregon grant funding are eligible to receive up to 70 percent of the project costs. Seven percent of funding for Connect Oregon Parts One and Two are dedicated to non-motorized transportation projects. With the passage of HB 2017, several important changes have been made to the Connect Oregon program:

- Public transit projects can no longer be funded through Connect Oregon
- New funding sources include a vehicle dealer privilege fee and a $15 bicycle excise tax. Funds from the bicycle excise tax can only be used on bicycle or pedestrian projects.
- The Oregon Transportation Commission has directed $60 million in Connect Oregon funding to be distributed to four specific projects for the 2017-2019 biennium. After the four projects have been funded, and if funding is available, a competitive grant process may occur in the 2019-2021 or 2021-2023 biennia.

More information is available at: https://www.oregon.gov/ODOT/Programs/Pages/ConnectOregon.aspx

Statewide Transportation Improvement Program

The Statewide Transportation Improvement Program (STIP) is ODOT's four-year transportation capital improvement program. It is the document that identifies the funding for, and scheduling of, transportation projects and programs. It includes projects on the federal, state, city, and county transportation systems, multimodal projects (highway, passenger rail, freight, public transit, bicycle and pedestrian), and projects in the National Parks, National Forests, and Indian tribal lands. STIP project lists are developed through the coordinated efforts of ODOT, federal and local governments, Area Commissions on Transportation, tribal governments, and the public.

The STIP is divided into two broad categories: Fix-It and Enhance. The Enhance category funds activities that enhance, expand, or improve the transportation system. The project selection process for the Enhance category has undergone significant changes in the last few years and reflects ODOT's goal to become a more multimodal agency and make investment decisions based on the system as a whole, instead of for each mode or project type separately. The agency has requested assistance from its local partners in developing Enhance projects that assist in moving people and goods through the transportation system. The projects are selected through a competitive application process. The Fix-it category funds activities that fix or preserve the transportation system. These projects are developed mainly from ODOT management systems that help identify needs based on technical information for things like pavement and bridges. Non-Highway programs, a separate part of the STIP, funds non-motorized transportation projects, and Area Commissions on Transportation will help recommend these projects to ODOT.

More information is available at: https://www.oregon.gov/ODOT/STIP/Pages/About.aspx

Safe Routes to School

ODOT's Safe Routes to School (SRTS) programs are focused on providing grants to make is safer for children to walk and bike to school, providing opportunity through investments in infrastructure and non-infrastructure. ODOT's grant funding for infrastructure programs help create and improve safe walking and biking routes to school, while its grant funding for non-infrastructure programs help raise awareness by focusing on education and outreach. Non-motorized transportation projects related to getting children to school safely, such as closing gaps in the sidewalk and bicycle networks, are eligible for infrastructure program funding. HB 2017 reestablished dedicated funding to SRTS programs. The current funding cycle is focused on projects that address a safety risk factor, include a 20 percent cash match, and are within one mile of a Title I school.

More information is available at: https://www.oregon.gov/ODOT/Programs/Pages/SRTS.aspx

House Bill (HB) 2017 Transportation Investments

In August 2017, Governor Kate Brown signed an eight-year transportation tax increase to raise roughly $5 billion for roads, bridges, mass transit, electric vehicles, and other transit options. House Bill (HB) 2017 affects drivers, bicyclists and payroll employees by increasing the gas tax, weight-mile tax, and other transportation-related fees such as excise tax on the sale of bicycles, new vehicles, and instituting a statewide payroll tax for transit equivalent to 1/10th of 1 percent of wages, deducted by employer from payment to employee. Though this funding source is one that can be used to finance multitude of project types, some cities have indicated that additional funds received from HB 2017 will be primarily allocated to maintenance of existing transportation facilities and operations.

More information is available at: http://www.oregon.gov/ODOT/Documents/HB2017-FAQ.pdf

Small City Allotment

The Small City Allotment is an annual allocation of state funds for local transportation projects. Through an agreement between the League of Oregon Cities and ODOT, ODOT sets aside $5,000,000 each year (half from city gas tax revenue and half from the State Highway Fund) for cities under 5,000 residents. The Small City Advisory Committee (SCAC), consisting of representative from each ODOT Region, reviews applications submitted under the Small City Allotment Program and makes recommendations for funding to the director.

Local Sources

Economic Improvement Districts (EIDs)

Transportation improvements can often be included as part of larger efforts aimed at business improvement and retail district beautification. Economic Improvement Districts collect assessments or fees on businesses in order to fund improvements that benefit businesses and improve customer access within the district. Adoption of a mutually agreed upon ordinance establishing guidelines and setting necessary assessments or fees to be collected from property owners is essential to ensuring a successful EID.

Local Improvement Districts (LID)

Local Improvement Districts (LIDs) are most often used to construct projects such as streets, sidewalks, or bikeways. Through the LID process, the costs of local improvements are generally spread out among a group of property owners within a specified area. The cost can be allocated based on property frontage or other methods such as trip generation. The costs of an LID project are borne primarily by property owners, moderate administrative costs must be factored in, and the public involvement process must still be followed. If the cost of the local improvement is not 100 percent funded by property owners, the City is required to contribute the remaining unfunded portion of the improvement.

Urban Renewal District

Urban Renewal Districts are separate taxing districts created to remove blight within a district. Each Urban Renewal Plan has identified actions that will remove the blight within the District. Those actions are funded by debt financing (e.g., bonds) using the incremental tax revenue generated from improvements on private property that increase the tax assessable value of that property that then create additional property tax revenue. The additional tax revenue (i.e., tax increment) is then directed to the Urban Renewal District to be used for blight removal. This public finance method is referred to as Tax Increment Financing (TIF) and is limited to Urban Renewal in the State.

The City of Waldport established an Urban Renewal Agency in 1981 to address blighted areas in Old Town and the commercial district along US 101. The City's first Urban Renewal Plan was successfully concluded in 2011. The current Urban Renewal Plan (Plan #2), was adopted by the City in 2005 to create new property values, stimulate economic growth, accelerate development of vacant, underutilized land, and modernize public facilities.

More information is available at: https://www.oregon.gov/DOR/forms/FormsPubs/urban-renewal-circular_504-623.pdf

Local Bond Measures

Local bond measures, or levies, are usually initiated by voter-approved general obligation bonds for specific projects. Bond measures are typically limited by time, based on the debt load of the local government or the project under focus. Funding from bond measures can be used for right-of-way acquisition, engineering, design, and construction of transportation facilities. Transportation-specific bond measures have passed in other communities throughout Oregon. Though this funding source is one that can be used to finance a multitude of project types, it must be noted that the accompanying administrative costs are high and voter approval must be gained. In addition, local bonds for transportation improvements will compete with local bonds for other public needs, such as fire and rescue, parks and recreation, schools, libraries, etc.

Local Fuel Tax

While every state collects an excise tax on fuel, Oregon is one of only nine states that permits cities and counties to impose a local fuel tax in order to pay for street operation, maintenance and preservation activities. The taxes are paid to the City monthly by distributors of fuel. Voters would need to pass the tax, and the process for presenting such a tax to voters will need to be consistent with Oregon State law as well as the laws of the City. Nearly 30 cities and counties throughout Oregon impose a local fuel tax, including Astoria ($0.03 per gallon), Newport ($0.03 per gallon Jun 1st – Oct 31st; $0.01 per gallon Nov 1st – May 31st), Reedsport ($0.03 per gallon May 1st – Oct 31st; $0.01 per gallon Nov 1st – May 31st)Canby (three cents per gallon), Warrenton ($0.03 per gallon), and Tillamook (0.015 per gallon).

User Fees

Fees tied to the annual registration of a vehicle to pay for improvements, expansion, and maintenance to the street system. This may be a more equitable assessment given the varying fuel efficiency of vehicles. Regardless of fuel efficiency, passenger vehicles do equal damage to the street system. The cost of implementing such a system could be prohibitive given the need to track the number of vehicle miles traveled in every vehicle. Additionally, a user fee specific to a single jurisdiction does not account for the street use from vehicles registered in other jurisdictions.

Street Utility Fees/Road Maintenance Fee

The fee is based a flat fee charged to each property, on the number of trips a particular land use generates, or some combination of both and is usually collected through a regular utility bill. For the communities in Oregon that have adopted this approach, it provides a stable source of revenue to pay for street maintenance allowing for safe and efficient movement of people, goods, and services.

Table 5 summarizes the potential funding sources and identifies the intended use of the funds and any applicable pedestrian and bicycle project types.

Table 5: Current and Potential Funding Source Summary

Current and Potential Funding Source Summary		
Funding Source	**Intended Use**	**Applicable Pedestrian and Bicycle Project Types**
Federal Sources		
FAST Act	Dedicates funding to road, bridge, bicycling, and pedestrian improvements	Sidewalks, bikeways, crossing improvements, multi-use paths
Surface Transportation Program/ Surface Transportation Block Grant	Preserves and improves surface transportation investments from a flexible funding source	Sidewalks, bikeways, crossing improvements, multi-use paths
Congestion Mitigation and Air Quality (CMAQ)	Supports programs that reduce emissions from transportation-related activities	Sidewalks, bikeways, crossing improvements, multi-use paths
Highway Safety Improvement Program	Uses limited funds to make the highest-impact safety improvements on roads and highways	Crossing improvements
State Sources		
All Roads Transportation Safety	Uses limited funds to make the highest-impact safety improvements on roads and highways	Sidewalks, crossing improvements
Connect Oregon	Invests in a multimodal transportation system across Oregon	Sidewalks, bikeways, crossing improvements, multi-use paths
Statewide Transportation Improvement Program	Establishes multi-year, statewide, intermodal program of transportation projects to fund	Sidewalks, bikeways, crossing improvements
Safe Routes to School	Focuses on infrastructure and non-infrastructure programs to improve access and safety for children to walk or bike to school	Sidewalks, bikeways, crossing improvements
Keep Oregon Moving (HB 2017)	Creates a steady funding stream for statewide transportation improvements	Sidewalks, bikeways, crossing improvements, multi-use paths, and transit
Small City Allotment	Provides transportation funding for small cities	Sidewalks, bikeways, crossing improvements
Local Sources[1]		
Economic Improvement Districts (EIDs)	Pools funds from area businesses to make improvements in the business district.	Potential for sidewalks, bikeways, crossing improvements

Local Improvement Districts (LIDs)	Pools funds from property owners to make local transportation improvements	Potential for sidewalks, bikeways, crossing improvements
Urban Renewal/Tax Increment Financing	Raises revenue from increased property values in an area to fund localized improvements	Potential for sidewalks, bikeways, crossing improvements, multi-use paths
Local Bond Measures	Asks voters for bond funding to finance a set list of infrastructure investments	Potential for sidewalks, bikeways, crossing improvements, multi-use paths
Local Fuel Tax	Adds a tax on top of gasoline costs that support street operation, maintenance, and preservation	Potential for sidewalks, bikeways, crossing improvements
Street Utility Fee/Road Maintenance Fee	Calculates trips generated for land uses and charges owners a fee relative to the number of trips	Potential for sidewalks, bikeways, crossing improvements

[1]Waldport does not currently use any of these local funding sources for transportation purposes, so it is possible to set up these programs to fund pedestrian and bicycle projects.

DEVELOPMENT CODE AMENDMENTS

The City of Waldport is undertaking an update of the 1999 Transportation System Plan (TSP) consistent with the requirements of Statewide Planning Goal 12 - Transportation. The Transportation Planning Rule (TPR), Oregon Administrative Rule 660, Division 12, defines the necessary elements of a local TSP and how to implement Goal 12. The overall purpose of the TPR is to provide and encourage a safe, convenient, and economic transportation system. The rule also implements provisions of other statewide planning goals related to transportation planning in order to plan and develop transportation facilities and services in close coordination with urban and rural development. The TPR directs TSPs to integrate comprehensive land use planning with transportation needs and to promote multi-modal systems that make it more convenient for people to walk, bicycle, use transit and drive less. Waldport's TSP must be consistent with the current TPR, which was amended most recently in 2010.

The TPR requires cities to prepare local TSPs that are consistent with the Oregon Transportation Plan (OTP); Technical Memorandum #2 (Plans and Policy Review) addresses the OTP and other background documents that will be referenced in updating the Waldport TSP. This section focuses on the extent to which the City of Waldport meets the requirements of the TPR. Table 6 describes how city development requirements, codified in the Waldport Development Code (Municipal Code Title 16), meet particular TPR sections. The Table provides a list of recommended Development Code amendments, recommended modifications that may be necessary to implement the updated TSP or where local requirements could be strengthened to be more consistent with the TPR. To the extent necessary, suggested draft code language will be prepared at the implementation phase of the TSP update project that supports the policies and recommendations of the draft TSP.

TPR COMPLIANCE REVIEW

Table 6: Waldport Development Code TPR Compliance Review

Requirement	Development Code References and Recommendations
OAR 660-012-0045 – Implementation of the Transportation System Plan	
(1) Each local government shall amend its land use regulations to implement the TSP.	
(a) The following transportation facilities, services and improvements need not be subject to land use regulations except as necessary to implement the TSP and, under ordinary circumstances do not have a significant impact on land use: *(A) Operation, maintenance, and repair of existing transportation facilities identified in the TSP, such as road, bicycle, pedestrian, port, airport and rail facilities, and major regional pipelines and terminals;* *(B) Dedication of right-of-way, authorization of construction and the construction of facilities and improvements, where the improvements are consistent with clear and objective dimensional standards;* *(C) Uses permitted outright under ORS 215.213(1)(m) through (p) and 215.283(1)(k) through (n), consistent with the provisions of 660-012-0065; and* *(D) Changes in the frequency of transit, rail and airport services.* *(b) To the extent, if any, that a transportation facility, service, or improvement concerns the application of a comprehensive plan provision or land use regulation, it may be allowed without further land use review if it is permitted outright or if it is subject to standards that do not require interpretation or the exercise of factual, policy or legal judgment.*	The purpose of this provision is to allow for certain transportation uses, such as operation, maintenance, and repair of transportation facilities identified in the TSP, without being subject to land use regulations. Currently transportation uses are not included in the list of permitted uses in the zone chapters, nor is there a general provision indicating that transportation uses consistent with the adopted transportation system plan do not require a separate land use review. **This TPR provision is not met.** **Recommendation**: The City should amend the code to allow transportation improvements in all zones, provided that the proposed improvements implement the Transportation System Plan and/or can be shown to be consistent with adopted policy. Alternatively, the City could include specific language as a stand-alone code section in lieu of amending individual zone chapters.
(c) In the event that a transportation facility, service or improvement is determined to have a significant impact on land use or requires interpretation or the exercise of factual, policy or legal judgment, the local government shall provide a review and approval process that is consistent with 660-012-0050. To facilitate implementation of the TSP, each local government shall amend regulations to provide for consolidated review of land use decisions required to permit a transportation project.	This TPR Section references project development and implementation - how a transportation facility or improvement authorized in a TSP is designed and constructed (660-012-0050). Project development may or may not require land use decision-making. The TPR directs that during project development, projects authorized in an acknowledged TSP will not be subject to further justification with regard to their need, mode, function, or general location. To this end, the TPR calls for consolidated review of land use decisions and proper noticing requirements for affected transportation facilities and service providers. Section 16.108.101 states that "City action on a consolidated application is subject to the time limitations provided in ORS 227.178 and Section 16.108.040 of this chapter." **Recommendation:** Amend the Development Code to include a provision that requires notification to affected transportation service providers, including ODOT.

Requirement	Development Code References and Recommendations
(2) Local governments shall adopt land use or subdivision ordinance regulations, consistent with applicable federal and state requirements, to protect transportation facilities corridors and sites for their identified functions. Such regulations shall include:	
(a) Access control measures, for example, driveway and public road spacing, median control and signal spacing standards, which are consistent with the functional classification of roads and consistent with limiting development on rural lands to rural uses and densities;	Section 16.100.040 addresses access management, private and public road, and cul-de-sac requirements. o Section 16.100.040.4, has access requirements for when roads must be provided. o Section 16.100.040.5 lists restrictions and limitations on locations and access for private roads. o Section 16.100.040.6, details public street standards, including standard street width requirements and other street design elements. It also includes provisions for cul-de-sac standards. o Section 16.100.040.7, Public Access Way, includes cul-de-sac access requirements. o Section 16.100.040.8. has requirements for minimum widths of flag lots/parcels and requires all parcels to abut public street or private road. **Recommendation:** The TSP update process will assess the adequacy of existing standards to meet current and future needs and may result in new or updated roadway and access management standards. Section 16.100.040 should be updated to reflect these changes, or should reference the requirements in the TSP.
(b) Standards to protect the future operations of roads, transitways and major transit corridors	The transportation system plan update will evaluate the adequacy of current roadway standards and the planned transit system to provide for the City's future needs. A traffic impact study or analysis requirement is an effective tool to ensure that decision-makers are provided with adequate information by which to determine the impacts of a land use decision on the transportation system. The Development Code has no provisions currently requiring a traffic impact analysis or study. **Recommendation:** As part of TSP implementation, revise the Development Code language to include thresholds for requiring a transportation impact analysis. The TSP update process will explore appropriate thresholds for requiring the analysis and submittal requirements that the City may want to formalize, either through ordinance language or written procedures.
(c) Measures to protect public use airports by controlling land uses within airport noise corridors and imaginary surfaces, and by limiting physical hazards to air navigation;	Wakonda Beach State Airport is located approximately 3 miles southwest of the City of Waldport. Airport regulation/protection zones do not extend into Waldport's jurisdictional boundaries. **This TPR provision is not applicable.**
(d) A process for coordinated review of future land use decisions affecting transportation facilities, corridors or sites;	See response to -0045(1)(c).
(e) A process to apply conditions to development proposals in order to minimize impacts and protect transportation facilities, corridors or sites;	The Conditional Use permit process notwithstanding, the Development Code does not have provisions that expressly allow the City to condition development approval. For

Requirement	Development Code References and Recommendations
	transportation improvements, this allowance is often found in the transportation impact analysis or similar transportation analysis requirements. **Recommendation:** Amend the Development Code to include traffic impact analysis requirements that articulate the City's ability to condition approval, where a development proposal's expected impacts will necessitate transportation improvements.
(f) Regulations to provide notice to public agencies providing transportation facilities and services, MPOs, and ODOT of: *(A) Land use applications that require public hearings;* *(B) Subdivision and partition applications;* *(C)Other applications which affect private access to roads; and* *(D)Other applications within airport noise corridor and imaginary surfaces which affect airport operations.*	Two sections of the Development Code have provisions that require notice. In Section 16.108.020, general review procedures, states "Upon determination that the application is complete, the city planner may refer the application to affected districts, local, state or federal agencies for comments." Section 16.100.050, Procedure for subdividing, partitioning or replatting land, requires proposals with access from a State highway or County road must receive a permit issued by ODOT or Lincoln County Road Department. **This TPR provision is met.**
(g) Regulations assuring amendments to land use designations, densities, and design standards are consistent with the functions, capacities and performance standards of facilities identified in the TSP.	Section 16.104 of the Development Code addresses rezoning, map and text amendments. There is no indication in code language that approval criteria for proposed amendments include consistency with the functions, capacities, and performance standards of transportation facilities, as planned for in the adopted TSP. **Recommendation**: Add language in Section 16.104 of the Land Development Ordinance that ensures land use map and ordinance amendments are consistent with the planned transportation system. See recommendation for TPR Section -0060.
(3) Local governments shall adopt land use or subdivision regulations for urban areas and rural communities as set forth below.	
(a) Bicycle parking facilities as part of new multi-family residential developments of four units or more, new retail, office and institutional developments, and all transit transfer stations and park-and-ride lots.	There are no bicycle parking provisions in the Waldport Development Code. **Recommendation:** The City should consider implementing bicycle parking standards for the City. At a minimum, bicycle parking facilities should be a requirement for multi-family residential (4 units or more), new retail, office, and institutional developments, and at any planned transit stations to ensure compliance with the TPR.
(b) On-site facilities shall be provided which accommodate safe and convenient pedestrian and bicycle access from within new subdivisions, multi-family developments, planned developments, shopping centers, and commercial districts to adjacent residential areas and transit stops, and to neighborhood activity centers within one-half mile of the development.	**On-site circulation and connections:** Currently, City development and subdivision standards do not include pedestrian or bicycle circulation standards. **Parking Lots**: Section 16.72.020, off-street parking and off-street loading requirements do not have any provisions related to pedestrian circulation or safety in the off-street

Requirement	Development Code References and Recommendations
Single-family residential developments shall generally include streets and accessways. Pedestrian circulation through parking lots should generally be provided in the form of accessways. *(A) "Neighborhood activity centers" includes, but is not limited to, existing or planned schools, parks, shopping areas, transit stops or employment centers;* *(B) Bikeways shall be required along arterials and major collectors. sidewalks shall be required along arterials, collectors and most local streets in urban areas except that sidewalks are not required along controlled access roadways, such as freeways;* *(C) Cul-de-sacs and other dead-end streets may be used as part of a development plan, consistent with the purposes set forth in this section;* *(D) Local governments shall establish their own standards or criteria for providing streets and accessways consistent with the purposes of this section. Such measures may include but are not limited to: standards for spacing of streets or accessways; and standards for excessive out-of-direction travel;* *(E) Streets and accessways need not be required where one or more of the following conditions exist:* *(i) Physical or topographic conditions make a street or accessway connection impracticable. Such conditions include but are not limited to freeways, railroads, steep slopes, wetlands or other bodies of water where a connection could not reasonably be provided;* *(ii) Buildings or other existing development on adjacent lands physically preclude a connection now or in the future considering the potential for redevelopment; or* *(iii) Where streets or accessways would violate provisions of leases, easements, covenants, restrictions or other agreements existing as of May 1, 1995, which preclude a required street or accessway connection.*	parking areas. However, the Downtown District zone includes some pedestrian circulation and parking lot location standards that encourage a favorable pedestrian environment. **Bikeways and sidewalks**: The street spacing standards for all local streets includes sidewalks; for collectors and business streets it also includes bike lane in the shoulder. Standard street sections may be altered with approval from the Waldport Public Works Department. Since these are standard street sections, bikeway and sidewalk inclusion is implied. **Cul-de-sacs:** Section 16.100.040 has a length limitation (400 feet), but does not limit the use of cul-de-sacs to constrained conditions. There is a requirement to provide public access ways "when necessary for public convivence and safety" and these must connect to cul-de-sacs. **Street and accessway layout**: The only street connectivity and block formation provision is the maximum block length provision of 1,200 feet in length that applies only to subdivisions. **Recommendations:** Clarify the applicability of connectivity and circulation standards, ensuring they apply to all subdivisions, multifamily developments, planned developments, shopping centers, and commercial centers with Neighborhood Activity Centers in the area. Consider limiting cul-de-sacs to only constrained sites. The TSP update will reflect the need for multimodal connections to 'Neighborhood Activity Centers'; consider codifying the need to provide transportation improvements to these areas as part of the development approval process. Add a compliance standard for off-site pedestrian and bicycle routes – this can be a reference to the Comprehensive Plan and TSP.
(c) Where off-site road improvements are otherwise required as a condition of development approval, they shall include facilities accommodating convenient pedestrian and bicycle and pedestrian travel, including bicycle ways on arterials and major collectors	Section 16.100 addresses development approval procedures for land division but does not specifically stipulate that off-site road improvements include facilities that accommodate bicycle/pedestrian travel.

Requirement	Development Code References and Recommendations
	Recommendation: Include code language that states where off-site road improvements are a condition of approval, they must also accommodate pedestrian and bicycle travel.
(d) For purposes of subsection (b) "safe and convenient" means bicycle and pedestrian routes, facilities and improvements which: *(A) Are reasonably free from hazards, particularly types or levels of automobile traffic which would interfere with or discourage pedestrian or cycle travel for short trips;* *(B) Provide a reasonably direct route of travel between destinations such as between a transit stop and a store; and* *(C) Meet travel needs of cyclists and pedestrians considering destination and length of trip; and considering that the optimum trip length of pedestrians is generally 1/4 to 1/2 mile.*	Connectivity standards are addressed in Section 16.100.040. They do not specifically mention "safe and convenient" bicycle and pedestrian routes pursuant to this section of the TPR. **Recommendation:** Include additional language in City connectivity standards that specifies acceptable ways to accommodate on-site pedestrian and bicycle routes, consistent with this TPR provision to ensure "safe and convenient" bicycle and pedestrian routes.
(e) Internal pedestrian circulation within new office parks and commercial developments shall be provided through clustering of buildings, construction of accessways, walkways and similar techniques.	Within the Downtown District (D-D) zone new land divisions and developments with parking courts are required to have pedestrian pathways from the street right-of-way to the interior park, building entrances and off-street parking (Section 16.30.050). The D-D zone also requires corner lot buildings to be oriented to the street. **Recommendation**: Internal pedestrian circulation standards should be enhanced and integrated into the code to apply to all new office parks and commercial development, not just within the D-D zone. This new standard could be incorporated into Section 16.72, which applies to all zones, rather than change individual zones.
(4) To support transit in urban areas containing a population greater than 25,000, where the area is already served by a public transit system or where determination has been made that a public transit system is feasible, local governments shall adopt land use and subdivisions as provided in (a)-(g) below.	
(a) Transit routes and transit facilities shall be designed to support transit use through provision of bus stops, pullouts and shelters, optimum road geometrics, on-road parking restrictions and similar facilities, as appropriate	Transit services in Waldport are limited. Lincoln County Transit provides a loop route from Yachats to Newport, which passes through Waldport. There is one fixed-route stop in Waldport, located at Ray's Market. There are also a few call for service stops located in Waldport (i.e. Waldport Clinic and Library). The Development Code does not have any provisions related to transit facilities or routes. However, the updated TSP will review potential future transit routes and will ensure that standards for these facilities are consistent with this section of the TPR. **Recommendation:** Identify design requirements of transit routes and transit facilities through the TSP update process and in coordination with Lincoln County Transit.

Requirement	Development Code References and Recommendations
(b) New retail, office and institutional buildings at or near major transit stops shall provide for convenient pedestrian access to transit through the measures listed in (A) and (B) below. *(A) Walkways shall be provided connecting building entrances and streets adjoining the site;* *(B) Pedestrian connections to adjoining properties shall be provided except where such a connection is impracticable. Pedestrian connections shall connect the on site circulation system to existing or proposed streets, walkways, and driveways about the property. Where adjacent properties are undeveloped or have potential for redevelopment, streets, accessways and walkways on site shall be laid out or stubbed to allow for extension to the adjoining property;* *(C) In addition to (A) and (B) above, on sites at major transit stops provide the following:* *(i) Either locate buildings within 20 feet of the transit stop, a transit street or an intersecting street or provide a pedestrian plaza at the transit stop or street intersection;* *(ii) A reasonably direct pedestrian connection between the transit stop and building entrances on the site* *(iii) A transit passenger landing pad accessible to disabled persons* *(iv) An easement or dedication for a passenger shelter if requested by the transit provide; and* *(v) Lighting at the transit stop.*	There are no specific requirements for development near major transit stops in the Development Code today. There is minimal transit services in the City today, but a local desire to see enhances service within the 20-year planning horizon. **Recommendation:** With the intent that transit service will be expanded in the future, the City should consider amending the Development Code to include requirements consistent with TPR 0045(4)(b)(C) for development proposals that are within a certain distance from a major transit stop. How "major" is defined and the locations of these stops can be addressed through the TSP update process or may be determined through a future transit planning process.
(c) Local governments may implement 4(b)A) and (B) above through the designation of pedestrian districts and adoption of appropriate implementing measures regulating development within pedestrian districts. Pedestrian districts must comply with the requirement of (4)(b)(C) above.	The City of Waldport does not currently have pedestrian district designations. Identifying and determining the requirements related to a specific pedestrian district or districts that include existing or planned major transit routes is not an anticipated outcome of the TSP planning project.
(d) Designated employee parking areas in new developments shall provide preferential parking for carpools and vanpools	Section 16.72.020 addresses off-street parking requirement and loading but does not include requirements for carpools and vanpools. **Recommendation:** The City should consider requiring that new developments with planned designated employee

Requirement	Development Code References and Recommendations
	parking areas provide preferential parking for employee carpools and vanpools. A typical local code requirement is requiring employers with more than a specific number of employees to dedicate a percentage of the required parking spaces for car/vanpools. Alternatively, code provisions could provide optional incentives for reduction in the overall number of required parking spaces for a development where transit or car/vanpools are accommodated.
(6) In developing a bicycle and pedestrian circulation plan as required by 660-012-0020(2)(d), local governments shall identify improvements to facilitate bicycle and pedestrian trips to meet local travel needs in developed areas. Appropriate improvements should provide for more direct, convenient and safer bicycle or pedestrian travel within and between residential areas and neighborhood activity centers (i.e., schools, shopping, transit stops). Specific measures include, for example, constructing walkways between cul-de-sacs and adjacent roads, providing walkways between buildings, and providing direct access between adjacent uses.	The TSP update will make recommendations to the bicycle and pedestrian plan that are consistent with TPR -0020. This TPR requirement is currently addressed in the following areas: • Walkways between cul-de-sacs and adjacent roads – See response and recommendations related to cul-de-sacs, Section -0045(3)(b). • Walkways between buildings – See response and recommendations related to accessways, Section -0045(3)(b). • Access between adjacent uses – See response and recommendations related to accessways, Section -0045(3)(b). **Recommendation:** This requirement will be addressed by the TSP update planning process and can be met by requiring improvements in developing areas consistent with adopted code provisions.
(7) Local governments shall establish standards for local streets and accessways that minimize pavement width and total ROW consistent with the operational needs of the facility. The intent of this requirement is that local governments consider and reduce excessive standards for local streets and accessways in order to reduce the cost of construction, provide for more efficient use of urban land, provide for emergency vehicle access while discouraging inappropriate traffic volumes and speeds, and which accommodate convenient pedestrian and bicycle circulation. Notwithstanding section (1) or (3) of this rule, local street standards adopted to meet this requirement need not be adopted as land use regulations.	Street standards are located in Section 16.100.100. Local streets are required to have a 56' ROW with 28' pavement width. The standard local street width is wider than the recommended widths illustrated in the Transportation Growth Management Neighborhood Street Design Guidelines (listed below). *Pavement ROW* *No On-Street Parking 20' 42-48'* *Parking on One Side 24' 47-52'* *Parking on Two Sides 28' 52-56'* **Recommendation:** Through the TSP update process the City can reevaluate whether local street width standards can be reduced, or if there are areas or circumstances where a narrower standard may be appropriate.
OAR 660-12-0060	
Amendments to functional plans, acknowledged comprehensive plans, and land use regulations that significantly affect an existing or planned transportation facility shall assure that allowed land uses are consistent with the identified	Text amendments and zoning map amendments are addressed in Section 16.104 of the Development Code, which does not contain a specific provision that ensures proposed land uses are consistent with planned facilities within the TSP.

Requirement	Development Code References and Recommendations
function, capacity, and performance standards of the facility.	**Recommendation**: Add language to the Development Code to be consistent with -0060 language. Consider adding language to indicate that changes to land use regulations which may significantly affect the transportation system are required to ensure consistency with the identified function, capacity, and performance standards within the TSP.

ATTACHMENTS

- **A.** Crestline Drive Operations
- **B.** US 101 Operations
- **C.** Alternative Cross Sections

ATTACHMENT A: CRESTLINE DRIVE OPERATIONS

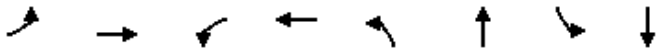
Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	50	505	21	0	625
Future Vol, veh/h	0	50	505	21	0	625
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	30	26	25	0	21
Mvmt Flow	0	56	567	24	0	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	296	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.5	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.6	-	-	-	-
Pot Cap-1 Maneuver	0	624	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	624	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	624	-
HCM Lane V/C Ratio	-	-	0.09	-
HCM Control Delay (s)	-	-	11.3	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.3	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	44	208	167	9	561	261	419
v/c Ratio	0.23	0.38	0.76	0.47	0.03	0.71	0.57	0.25
Control Delay	58.6	56.3	60.5	13.6	14.4	36.6	17.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.6	56.3	60.5	13.6	14.4	36.6	17.5	13.2
Queue Length 50th (ft)	14	25	133	9	2	166	83	66
Queue Length 95th (ft)	48	73	#279	78	11	273	172	146
Internal Link Dist (ft)		512		727		1208		194
Turn Bay Length (ft)	125		125		75		200	
Base Capacity (vph)	192	227	430	474	474	1379	535	1972
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.19	0.48	0.35	0.02	0.41	0.49	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
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	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.86		1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1179	1364		1319	1144		1451	2498		1308	2862	
Flt Permitted	0.95	1.00		0.95	1.00		0.51	1.00		0.29	1.00	
Satd. Flow (perm)	1179	1364		1319	1144		774	2498		403	2862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	36	8	208	16	151	9	399	162	261	407	12
RTOR Reduction (vph)	0	6	0	0	121	0	0	31	0	0	1	0
Lane Group Flow (vph)	22	38	0	208	46	0	9	530	0	261	418	0
Confl. Peds. (#/hr)	5		18	18		5	6		4	4		6
Heavy Vehicles (%)	41%	11%	80%	26%	23%	31%	14%	24%	32%	27%	16%	0%
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases							6			2		
Actuated Green, G (s)	6.5	6.5		21.0	21.0		35.8	34.9		63.6	58.2	
Effective Green, g (s)	6.5	6.5		21.0	21.0		35.8	34.9		63.6	58.2	
Actuated g/C Ratio	0.06	0.06		0.20	0.20		0.34	0.33		0.61	0.55	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	6.0		2.5	6.0	
Lane Grp Cap (vph)	72	84		263	228		269	829		452	1584	
v/s Ratio Prot	0.02	c0.03		c0.16	0.04		0.00	c0.21		c0.13	0.15	
v/s Ratio Perm							0.01			0.22		
v/c Ratio	0.31	0.46		0.79	0.20		0.03	0.64		0.58	0.26	
Uniform Delay, d1	47.1	47.6		40.0	35.1		23.0	29.8		11.7	12.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.8		14.4	0.3		0.0	2.7		1.5	0.3	
Delay (s)	48.9	50.4		54.4	35.4		23.0	32.5		13.2	12.5	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		49.9			45.9			32.3			12.8	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	105.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	62.8%	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)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.98	0.99		0.99	1.00		0.99
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	1190	1600	1600	1395	1436	1436	1559	1422	1422	1381	1532	1532
Adj Flow Rate, veh/h	22	36	8	208	16	151	9	399	162	261	407	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	41	11	11	26	23	23	14	24	24	27	16	16
Cap, veh/h	83	90	20	291	25	239	369	617	247	380	1357	40
Arrive On Green	0.07	0.07	0.07	0.22	0.22	0.22	0.01	0.33	0.33	0.15	0.47	0.47
Sat Flow, veh/h	1134	1232	274	1329	116	1091	1485	1878	752	1316	2886	85
Grp Volume(v), veh/h	22	0	44	208	0	167	9	286	275	261	205	214
Grp Sat Flow(s),veh/h/ln	1134	0	1505	1329	0	1207	1485	1351	1279	1316	1455	1516
Q Serve(g_s), s	1.5	0.0	2.3	11.8	0.0	10.2	0.3	14.7	15.0	10.0	7.1	7.1
Cycle Q Clear(g_c), s	1.5	0.0	2.3	11.8	0.0	10.2	0.3	14.7	15.0	10.0	7.1	7.1
Prop In Lane	1.00		0.18	1.00		0.90	1.00		0.59	1.00		0.06
Lane Grp Cap(c), veh/h	83	0	110	291	0	264	369	444	420	380	684	713
V/C Ratio(X)	0.27	0.00	0.40	0.72	0.00	0.63	0.02	0.64	0.66	0.69	0.30	0.30
Avail Cap(c_a), veh/h	208	0	277	488	0	444	625	828	783	662	891	928
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	36.1	29.5	0.0	28.9	17.9	23.3	23.5	15.5	13.3	13.3
Incr Delay (d2), s/veh	1.3	0.0	1.7	2.4	0.0	1.9	0.0	5.6	6.2	1.7	0.9	0.9
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	0.4	0.0	0.9	3.9	0.0	3.0	0.1	5.2	5.1	2.9	2.3	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	0.0	37.9	32.0	0.0	30.8	17.9	28.9	29.6	17.1	14.2	14.2
LnGrp LOS	D	A	D	C	A	C	B	C	C	B	B	B
Approach Vol, veh/h		66			375			570			680	
Approach Delay, s/veh		37.6			31.4			29.1			15.3	
Approach LOS		D			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	43.4		22.4	17.0	31.8		10.5				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	15.0	50.0		30.0	30.0	50.0		15.0				
Max Q Clear Time (g_c+I1), s	2.3	9.1		13.8	12.0	17.0		4.3				
Green Ext Time (p_c), s	0.0	7.2		1.2	0.5	9.8		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		24.4	
HCM 6th LOS		C	

Notes

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

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	19	486	29	22	490
Future Vol, veh/h	24	19	486	29	22	490
Conflicting Peds, #/hr	1	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	30	25	27	12	21	18
Mvmt Flow	27	21	540	32	24	544

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	556	0	0	572	0
Stage 1	556	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.7	6.45	-	-	4.31	-
Critical Hdwy Stg 1	5.7	-	-	-	-	-
Critical Hdwy Stg 2	5.7	-	-	-	-	-
Follow-up Hdwy	3.77	3.525	-	-	2.389	-
Pot Cap-1 Maneuver	193	489	-	-	913	-
Stage 1	522	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	489	-	-	913	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	481	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.3	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	255	913	-
HCM Lane V/C Ratio	-	-	0.187	0.027	-
HCM Control Delay (s)	-	-	22.3	9.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	56	431	38	73	414
Future Vol, veh/h	18	56	431	38	73	414
Conflicting Peds, #/hr	2	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	350	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	29	29	28	29	19	17
Mvmt Flow	20	61	468	41	79	450

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1099	489	0	0	509	0
Stage 1	489	-	-	-	-	-
Stage 2	610	-	-	-	-	-
Critical Hdwy	6.69	6.49	-	-	4.29	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.561	-	-	2.371	-
Pot Cap-1 Maneuver	209	528	-	-	974	-
Stage 1	564	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	192	528	-	-	974	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	974	-
HCM Lane V/C Ratio	-	-	0.217	0.081	-
HCM Control Delay (s)	-	-	17.4	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.3	-

Intersection	
Int Delay, s/veh	5.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	318	43	44	230	1	56	10	120	2	6	11
Future Vol, veh/h	6	318	43	44	230	1	56	10	120	2	6	11
Conflicting Peds, #/hr	17	0	8	8	0	17	14	0	0	0	0	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	60	28	26	16	34	100	10	14	19	0	0	18
Mvmt Flow	7	346	47	48	250	1	61	11	130	2	7	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	401	0	0	762	756	378	818	779	282
Stage 1	-	-	-	-	-	-	392	392	-	364	364	-
Stage 2	-	-	-	-	-	-	370	364	-	454	415	-
Critical Hdwy	4.7	-	-	4.26	-	-	7.2	6.64	6.39	7.1	6.5	6.38
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Follow-up Hdwy	2.74	-	-	2.344	-	-	3.59	4.126	3.471	3.5	4	3.462
Pot Cap-1 Maneuver	1024	-	-	1086	-	-	312	323	633	297	330	720
Stage 1	-	-	-	-	-	-	617	586	-	659	627	-
Stage 2	-	-	-	-	-	-	634	603	-	589	596	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1007	-	-	1078	-	-	284	299	628	216	306	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	284	299	-	216	306	-
Stage 1	-	-	-	-	-	-	608	577	-	644	589	-
Stage 2	-	-	-	-	-	-	581	567	-	455	587	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.4	19.9	13.9
HCM LOS			C	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	441	1007	-	-	1078	-	-	426
HCM Lane V/C Ratio	0.458	0.006	-	-	0.044	-	-	0.048
HCM Control Delay (s)	19.9	8.6	-	-	8.5	-	-	13.9
HCM Lane LOS	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	2.4	0	-	-	0.1	-	-	0.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	304	14	43	213	0	0
Future Volume (Veh/h)	304	14	43	213	0	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	334	15	47	234	0	0
Pedestrians				2	2	
Lane Width (ft)				12.0	0.0	
Walking Speed (ft/s)				3.5	3.5	
Percent Blockage				0	0	
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			351		672	346
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			351		672	346
tC, single (s)			4.4		6.7	6.5
tC, 2 stage (s)						
tF (s)			2.5		3.7	3.6
p0 queue free %			96		100	100
cM capacity (veh/h)			1046		368	631

Direction, Lane #	EB 1	WB 1	WB 2
Volume Total	349	47	234
Volume Left	0	47	0
Volume Right	15	0	0
cSH	1700	1046	1700
Volume to Capacity	0.21	0.04	0.14
Queue Length 95th (ft)	0	4	0
Control Delay (s)	0.0	8.6	0.0
Lane LOS		A	
Approach Delay (s)	0.0	1.4	
Approach LOS			

Intersection Summary			
Average Delay		0.6	
Intersection Capacity Utilization		35.6%	ICU Level of Service A
Analysis Period (min)		15	

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	278	190	4	15	66
Future Vol, veh/h	26	278	190	4	15	66
Conflicting Peds, #/hr	1	0	0	1	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	17	30	34	0	42	36
Mvmt Flow	29	305	209	4	16	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	214	0	-	0	577	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.27	-	-	-	6.82	6.56
Critical Hdwy Stg 1	-	-	-	-	5.82	-
Critical Hdwy Stg 2	-	-	-	-	5.82	-
Follow-up Hdwy	2.353	-	-	-	3.878	3.624
Pot Cap-1 Maneuver	1272	-	-	-	418	750
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	406	749
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	648
HCM Lane V/C Ratio	0.022	-	-	-	0.137
HCM Control Delay (s)	7.9	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	3.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	46	92	29	6	94
Future Vol, veh/h	55	46	92	29	6	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	29	0	12	29	50	22
Mvmt Flow	63	53	106	33	7	108

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	245	123	0	0	139	0
Stage 1	123	-	-	-	-	-
Stage 2	122	-	-	-	-	-
Critical Hdwy	6.69	6.2	-	-	4.6	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.3	-	-	2.65	-
Pot Cap-1 Maneuver	688	933	-	-	1197	-
Stage 1	840	-	-	-	-	-
Stage 2	841	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	684	933	-	-	1197	-
Mov Cap-2 Maneuver	684	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	836	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.4	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	779	1197	-
HCM Lane V/C Ratio	-	-	0.149	0.006	-
HCM Control Delay (s)	-	-	10.4	8	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.5	0	-

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	50	43	110	98	55
Future Vol, veh/h	63	50	43	110	98	55
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles, %	58	59	59	55	54	59
Mvmt Flow	86	68	59	151	134	75
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.9	11.6	10.9
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	28%	56%	0%
Vol Thru, %	72%	0%	64%
Vol Right, %	0%	44%	36%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	153	113	153
LT Vol	43	63	0
Through Vol	110	0	98
RT Vol	0	50	55
Lane Flow Rate	210	155	210
Geometry Grp	1	1	1
Degree of Util (X)	0.332	0.252	0.312
Departure Headway (Hd)	5.703	5.866	5.363
Convergence, Y/N	Yes	Yes	Yes
Cap	629	610	669
Service Time	3.758	3.927	3.417
HCM Lane V/C Ratio	0.334	0.254	0.314
HCM Control Delay	11.6	10.9	10.9
HCM Lane LOS	B	B	B
HCM 95th-tile Q	1.5	1	1.3

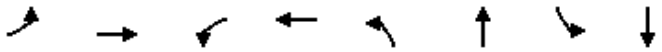
Intersection	
Int Delay, s/veh	0.5

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	50	505	21	0	625
Future Vol, veh/h	0	50	505	21	0	625
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	30	26	25	0	21
Mvmt Flow	0	56	567	24	0	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	296	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	7.5	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.6	-	-	-	-
Pot Cap-1 Maneuver	0	624	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	624	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.3	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	624	-
HCM Lane V/C Ratio	-	-	0.09	-
HCM Control Delay (s)	-	-	11.3	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.3	-



Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	22	44	208	167	9	561	261	419
v/c Ratio	0.23	0.38	0.76	0.47	0.03	0.71	0.57	0.25
Control Delay	58.6	56.3	60.5	13.6	14.4	36.6	17.5	13.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	58.6	56.3	60.5	13.6	14.4	36.6	17.5	13.2
Queue Length 50th (ft)	14	25	133	9	2	166	83	66
Queue Length 95th (ft)	48	73	#279	78	11	273	172	146
Internal Link Dist (ft)		512		727		1208		194
Turn Bay Length (ft)	125		125		75		200	
Base Capacity (vph)	192	227	430	474	474	1379	535	1972
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.11	0.19	0.48	0.35	0.02	0.41	0.49	0.21

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
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	5.0		4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	0.99		1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.97		1.00	0.86		1.00	0.96		1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1179	1364		1319	1144		1451	2498		1308	2862	
Flt Permitted	0.95	1.00		0.95	1.00		0.51	1.00		0.29	1.00	
Satd. Flow (perm)	1179	1364		1319	1144		774	2498		403	2862	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	36	8	208	16	151	9	399	162	261	407	12
RTOR Reduction (vph)	0	6	0	0	121	0	0	31	0	0	1	0
Lane Group Flow (vph)	22	38	0	208	46	0	9	530	0	261	418	0
Confl. Peds. (#/hr)	5		18	18		5	6		4	4		6
Heavy Vehicles (%)	41%	11%	80%	26%	23%	31%	14%	24%	32%	27%	16%	0%
Turn Type	Split	NA		Split	NA		pm+pt	NA		pm+pt	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases							6			2		
Actuated Green, G (s)	6.5	6.5		21.0	21.0		35.8	34.9		63.6	58.2	
Effective Green, g (s)	6.5	6.5		21.0	21.0		35.8	34.9		63.6	58.2	
Actuated g/C Ratio	0.06	0.06		0.20	0.20		0.34	0.33		0.61	0.55	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	5.0		4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	6.0		2.5	6.0	
Lane Grp Cap (vph)	72	84		263	228		269	829		452	1584	
v/s Ratio Prot	0.02	c0.03		c0.16	0.04		0.00	c0.21		c0.13	0.15	
v/s Ratio Perm							0.01			0.22		
v/c Ratio	0.31	0.46		0.79	0.20		0.03	0.64		0.58	0.26	
Uniform Delay, d1	47.1	47.6		40.0	35.1		23.0	29.8		11.7	12.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.8	2.8		14.4	0.3		0.0	2.7		1.5	0.3	
Delay (s)	48.9	50.4		54.4	35.4		23.0	32.5		13.2	12.5	
Level of Service	D	D		D	D		C	C		B	B	
Approach Delay (s)		49.9			45.9			32.3			12.8	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	28.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	105.1	Sum of lost time (s)	18.5
Intersection Capacity Utilization	62.8%	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)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.88	1.00		0.98	0.99		0.99	1.00		0.99
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	1190	1600	1600	1395	1436	1436	1559	1422	1422	1381	1532	1532
Adj Flow Rate, veh/h	22	36	8	208	16	151	9	399	162	261	407	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	41	11	11	26	23	23	14	24	24	27	16	16
Cap, veh/h	83	90	20	291	25	239	369	617	247	380	1357	40
Arrive On Green	0.07	0.07	0.07	0.22	0.22	0.22	0.01	0.33	0.33	0.15	0.47	0.47
Sat Flow, veh/h	1134	1232	274	1329	116	1091	1485	1878	752	1316	2886	85
Grp Volume(v), veh/h	22	0	44	208	0	167	9	286	275	261	205	214
Grp Sat Flow(s),veh/h/ln	1134	0	1505	1329	0	1207	1485	1351	1279	1316	1455	1516
Q Serve(g_s), s	1.5	0.0	2.3	11.8	0.0	10.2	0.3	14.7	15.0	10.0	7.1	7.1
Cycle Q Clear(g_c), s	1.5	0.0	2.3	11.8	0.0	10.2	0.3	14.7	15.0	10.0	7.1	7.1
Prop In Lane	1.00		0.18	1.00		0.90	1.00		0.59	1.00		0.06
Lane Grp Cap(c), veh/h	83	0	110	291	0	264	369	444	420	380	684	713
V/C Ratio(X)	0.27	0.00	0.40	0.72	0.00	0.63	0.02	0.64	0.66	0.69	0.30	0.30
Avail Cap(c_a), veh/h	208	0	277	488	0	444	625	828	783	662	891	928
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	35.8	0.0	36.1	29.5	0.0	28.9	17.9	23.3	23.5	15.5	13.3	13.3
Incr Delay (d2), s/veh	1.3	0.0	1.7	2.4	0.0	1.9	0.0	5.6	6.2	1.7	0.9	0.9
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	0.4	0.0	0.9	3.9	0.0	3.0	0.1	5.2	5.1	2.9	2.3	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	37.0	0.0	37.9	32.0	0.0	30.8	17.9	28.9	29.6	17.1	14.2	14.2
LnGrp LOS	D	A	D	C	A	C	B	C	C	B	B	B
Approach Vol, veh/h		66			375			570			680	
Approach Delay, s/veh		37.6			31.4			29.1			15.3	
Approach LOS		D			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.4	43.4		22.4	17.0	31.8		10.5				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	15.0	50.0		30.0	30.0	50.0		15.0				
Max Q Clear Time (g_c+I1), s	2.3	9.1		13.8	12.0	17.0		4.3				
Green Ext Time (p_c), s	0.0	7.2		1.2	0.5	9.8		0.1				

Intersection Summary			
HCM 6th Ctrl Delay		24.4	
HCM 6th LOS		C	

Notes

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

Intersection	
Int Delay, s/veh	1.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	24	19	486	29	22	490
Future Vol, veh/h	24	19	486	29	22	490
Conflicting Peds, #/hr	1	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	30	25	27	12	21	18
Mvmt Flow	27	21	540	32	24	544

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1149	556	0	0	572	0
Stage 1	556	-	-	-	-	-
Stage 2	593	-	-	-	-	-
Critical Hdwy	6.7	6.45	-	-	4.31	-
Critical Hdwy Stg 1	5.7	-	-	-	-	-
Critical Hdwy Stg 2	5.7	-	-	-	-	-
Follow-up Hdwy	3.77	3.525	-	-	2.389	-
Pot Cap-1 Maneuver	193	489	-	-	913	-
Stage 1	522	-	-	-	-	-
Stage 2	501	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	185	489	-	-	913	-
Mov Cap-2 Maneuver	185	-	-	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	481	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	22.3	0	0.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	255	913	-
HCM Lane V/C Ratio	-	-	0.187	0.027	-
HCM Control Delay (s)	-	-	22.3	9.1	0
HCM Lane LOS	-	-	C	A	A
HCM 95th %tile Q(veh)	-	-	0.7	0.1	-

Intersection	
Int Delay, s/veh	1.9

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	56	431	38	73	414
Future Vol, veh/h	18	56	431	38	73	414
Conflicting Peds, #/hr	2	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	350	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	29	29	28	29	19	17
Mvmt Flow	20	61	468	41	79	450

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1099	489	0	0	509	0
Stage 1	489	-	-	-	-	-
Stage 2	610	-	-	-	-	-
Critical Hdwy	6.69	6.49	-	-	4.29	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.561	-	-	2.371	-
Pot Cap-1 Maneuver	209	528	-	-	974	-
Stage 1	564	-	-	-	-	-
Stage 2	494	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	192	528	-	-	974	-
Mov Cap-2 Maneuver	192	-	-	-	-	-
Stage 1	564	-	-	-	-	-
Stage 2	453	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	17.4	0	1.4
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	370	974	-
HCM Lane V/C Ratio	-	-	0.217	0.081	-
HCM Control Delay (s)	-	-	17.4	9	-
HCM Lane LOS	-	-	C	A	-
HCM 95th %tile Q(veh)	-	-	0.8	0.3	-

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	6	304	57	87	230	1	56	10	120	2	6	11
Future Vol, veh/h	6	304	57	87	230	1	56	10	120	2	6	11
Conflicting Peds, #/hr	17	0	8	8	0	17	14	0	0	0	0	14
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	200	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	60	28	26	16	34	100	10	14	19	0	0	18
Mvmt Flow	7	330	62	95	250	1	61	11	130	2	7	12

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	268	0	0	400	0	0	847	841	369	904	872	282
Stage 1	-	-	-	-	-	-	383	383	-	458	458	-
Stage 2	-	-	-	-	-	-	464	458	-	446	414	-
Critical Hdwy	4.7	-	-	4.26	-	-	7.2	6.64	6.39	7.1	6.5	6.38
Critical Hdwy Stg 1	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.2	5.64	-	6.1	5.5	-
Follow-up Hdwy	2.74	-	-	2.344	-	-	3.59	4.126	3.471	3.5	4	3.462
Pot Cap-1 Maneuver	1024	-	-	1087	-	-	273	288	640	260	291	720
Stage 1	-	-	-	-	-	-	624	592	-	587	570	-
Stage 2	-	-	-	-	-	-	563	547	-	595	597	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1007	-	-	1079	-	-	239	255	635	183	257	699
Mov Cap-2 Maneuver	-	-	-	-	-	-	239	255	-	183	257	-
Stage 1	-	-	-	-	-	-	615	583	-	573	511	-
Stage 2	-	-	-	-	-	-	492	491	-	461	588	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	2.4	22.7	15
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	402	1007	-	-	1079	-	-	380
HCM Lane V/C Ratio	0.503	0.006	-	-	0.088	-	-	0.054
HCM Control Delay (s)	22.7	8.6	-	-	8.7	-	-	15
HCM Lane LOS	C	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	2.7	0	-	-	0.3	-	-	0.2

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	26	278	190	4	15	66
Future Vol, veh/h	26	278	190	4	15	66
Conflicting Peds, #/hr	1	0	0	1	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	91	91	91	91	91	91
Heavy Vehicles, %	17	30	34	0	42	36
Mvmt Flow	29	305	209	4	16	73

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	214	0	-	0	577	212
Stage 1	-	-	-	-	212	-
Stage 2	-	-	-	-	365	-
Critical Hdwy	4.27	-	-	-	6.82	6.56
Critical Hdwy Stg 1	-	-	-	-	5.82	-
Critical Hdwy Stg 2	-	-	-	-	5.82	-
Follow-up Hdwy	2.353	-	-	-	3.878	3.624
Pot Cap-1 Maneuver	1272	-	-	-	418	750
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	622	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1271	-	-	-	406	749
Mov Cap-2 Maneuver	-	-	-	-	406	-
Stage 1	-	-	-	-	716	-
Stage 2	-	-	-	-	621	-

Approach	EB	WB	SB
HCM Control Delay, s	0.7	0	11.4
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1271	-	-	-	648
HCM Lane V/C Ratio	0.022	-	-	-	0.137
HCM Control Delay (s)	7.9	0	-	-	11.4
HCM Lane LOS	A	A	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

Intersection	
Int Delay, s/veh	4.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	46	92	29	63	94
Future Vol, veh/h	55	46	92	29	63	94
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	87	87	87	87	87	87
Heavy Vehicles, %	29	0	12	29	50	22
Mvmt Flow	63	53	106	33	72	108

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	375	123	0	0	139	0
Stage 1	123	-	-	-	-	-
Stage 2	252	-	-	-	-	-
Critical Hdwy	6.69	6.2	-	-	4.6	-
Critical Hdwy Stg 1	5.69	-	-	-	-	-
Critical Hdwy Stg 2	5.69	-	-	-	-	-
Follow-up Hdwy	3.761	3.3	-	-	2.65	-
Pot Cap-1 Maneuver	576	933	-	-	1197	-
Stage 1	840	-	-	-	-	-
Stage 2	731	-	-	-	-	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	539	933	-	-	1197	-
Mov Cap-2 Maneuver	539	-	-	-	-	-
Stage 1	840	-	-	-	-	-
Stage 2	684	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.5	0	3.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBL	SBT
Capacity (veh/h)	-	-	667	1197	-
HCM Lane V/C Ratio	-	-	0.174	0.06	-
HCM Control Delay (s)	-	-	11.5	8.2	0
HCM Lane LOS	-	-	B	A	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2	-

Intersection	
Intersection Delay, s/veh	11.2
Intersection LOS	B

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	63	50	43	110	98	55
Future Vol, veh/h	63	50	43	110	98	55
Peak Hour Factor	0.73	0.73	0.73	0.73	0.73	0.73
Heavy Vehicles, %	58	59	59	55	54	59
Mvmt Flow	86	68	59	151	134	75
Number of Lanes	1	0	0	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	1	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	1	0	1
HCM Control Delay	10.9	11.6	10.9
HCM LOS	B	B	B

Lane	NBLn1	EBLn1	SBLn1
Vol Left, %	28%	56%	0%
Vol Thru, %	72%	0%	64%
Vol Right, %	0%	44%	36%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	153	113	153
LT Vol	43	63	0
Through Vol	110	0	98
RT Vol	0	50	55
Lane Flow Rate	210	155	210
Geometry Grp	1	1	1
Degree of Util (X)	0.332	0.252	0.312
Departure Headway (Hd)	5.703	5.866	5.363
Convergence, Y/N	Yes	Yes	Yes
Cap	629	610	669
Service Time	3.758	3.927	3.417
HCM Lane V/C Ratio	0.334	0.254	0.314
HCM Control Delay	11.6	10.9	10.9
HCM Lane LOS	B	B	B
HCM 95th-tile Q	1.5	1	1.3

ATTACHMENT B: US 101 OPERATIONS

Intersection	
Int Delay, s/veh	0.6

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	0	50	505	21	0	625
Future Vol, veh/h	0	50	505	21	0	625
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Stop	-	None	-	None
Storage Length	-	0	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	89	89	89	89	89	89
Heavy Vehicles, %	0	30	26	25	0	21
Mvmt Flow	0	56	567	24	0	702

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	-	579	0	0	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-
Critical Hdwy	-	6.5	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-
Follow-up Hdwy	-	3.57	-	-	-	-
Pot Cap-1 Maneuver	0	466	-	-	0	-
Stage 1	0	-	-	-	0	-
Stage 2	0	-	-	-	0	-
Platoon blocked, %			-	-		-
Mov Cap-1 Maneuver	-	466	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	466	-
HCM Lane V/C Ratio	-	-	0.121	-
HCM Control Delay (s)	-	-	13.8	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.4	-

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	22	44	208	167	9	399	162	261	419
v/c Ratio	0.25	0.42	0.77	0.48	0.02	0.78	0.35	0.59	0.47
Control Delay	65.3	63.5	64.1	14.1	12.8	44.2	11.8	17.6	16.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.3	63.5	64.1	14.1	12.8	44.2	11.8	17.6	16.8
Queue Length 50th (ft)	15	26	143	9	2	257	23	86	154
Queue Length 95th (ft)	51	79	273	80	11	436	82	171	344
Internal Link Dist (ft)		512		727		1208			194
Turn Bay Length (ft)	125		125		75		75	200	
Base Capacity (vph)	116	140	460	492	370	848	702	481	1096
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.31	0.45	0.34	0.02	0.47	0.23	0.54	0.38

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (vph)	20	33	7	191	15	139	8	367	149	240	374	11
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	5.0	5.0	4.5	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frpb, ped/bikes	1.00	0.99		1.00	0.97		1.00	1.00	0.97	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		0.99	1.00	1.00	1.00	1.00	
Frt	1.00	0.97		1.00	0.86		1.00	1.00	0.85	1.00	1.00	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1179	1363		1319	1132		1450	1411	1095	1308	1506	
Flt Permitted	0.95	1.00		0.95	1.00		0.52	1.00	1.00	0.32	1.00	
Satd. Flow (perm)	1179	1363		1319	1132		790	1411	1095	438	1506	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	22	36	8	208	16	151	9	399	162	261	407	12
RTOR Reduction (vph)	0	6	0	0	121	0	0	0	70	0	1	0
Lane Group Flow (vph)	22	38	0	208	46	0	9	399	92	261	418	0
Confl. Peds. (#/hr)	5		18	18		5	6		4	4		6
Heavy Vehicles (%)	41%	11%	80%	26%	23%	31%	14%	24%	32%	27%	16%	0%
Turn Type	Split	NA		Split	NA		pm+pt	NA	Perm	pm+pt	NA	
Protected Phases	8	8		4	4		1	6		5	2	
Permitted Phases							6		6	2		
Actuated Green, G (s)	6.0	6.0		21.9	21.9		43.8	43.0	43.0	68.9	63.6	
Effective Green, g (s)	6.0	6.0		21.9	21.9		43.8	43.0	43.0	68.9	63.6	
Actuated g/C Ratio	0.05	0.05		0.20	0.20		0.40	0.39	0.39	0.62	0.57	
Clearance Time (s)	4.5	4.5		4.5	4.5		4.5	5.0	5.0	4.5	5.0	
Vehicle Extension (s)	2.5	2.5		2.5	2.5		2.5	6.0	6.0	2.5	6.0	
Lane Grp Cap (vph)	63	73		260	223		317	547	424	440	864	
v/s Ratio Prot	0.02	c0.03		c0.16	0.04		0.00	c0.28		c0.11	0.28	
v/s Ratio Perm							0.01		0.08	0.25		
v/c Ratio	0.35	0.52		0.80	0.21		0.03	0.73	0.22	0.59	0.48	
Uniform Delay, d1	50.5	51.0		42.4	37.2		20.4	28.9	22.7	12.4	13.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	2.4	5.1		15.6	0.3		0.0	6.8	0.7	1.8	1.2	
Delay (s)	53.0	56.1		57.9	37.5		20.4	35.7	23.4	14.2	15.1	
Level of Service	D	E		E	D		C	D	C	B	B	
Approach Delay (s)		55.1			48.8			32.0			14.8	
Approach LOS		E			D			C			B	

Intersection Summary			
HCM 2000 Control Delay	29.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.70		
Actuated Cycle Length (s)	110.8	Sum of lost time (s)	18.5
Intersection Capacity Utilization	66.9%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Future Volume (veh/h)	20	33	7	191	15	139	8	367	149	240	374	11
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.84	1.00		0.96	1.00		0.99	1.00		0.99
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	1190	1600	1600	1395	1436	1436	1559	1422	1313	1381	1532	1532
Adj Flow Rate, veh/h	22	36	8	208	16	151	9	399	162	261	407	12
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	41	11	11	26	23	23	14	24	32	27	16	16
Cap, veh/h	65	70	16	294	25	238	350	528	410	347	743	22
Arrive On Green	0.06	0.06	0.06	0.22	0.22	0.22	0.01	0.37	0.37	0.14	0.50	0.50
Sat Flow, veh/h	1134	1221	271	1329	114	1075	1485	1422	1104	1316	1480	44
Grp Volume(v), veh/h	22	0	44	208	0	167	9	399	162	261	0	419
Grp Sat Flow(s),veh/h/ln	1134	0	1492	1329	0	1189	1485	1422	1104	1316	0	1523
Q Serve(g_s), s	1.7	0.0	2.5	12.9	0.0	11.3	0.3	21.8	9.6	10.2	0.0	16.8
Cycle Q Clear(g_c), s	1.7	0.0	2.5	12.9	0.0	11.3	0.3	21.8	9.6	10.2	0.0	16.8
Prop In Lane	1.00		0.18	1.00		0.90	1.00		1.00	1.00		0.03
Lane Grp Cap(c), veh/h	65	0	86	294	0	263	350	528	410	347	0	765
V/C Ratio(X)	0.34	0.00	0.51	0.71	0.00	0.64	0.03	0.76	0.40	0.75	0.00	0.55
Avail Cap(c_a), veh/h	121	0	159	500	0	447	425	935	725	507	0	1309
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	0.00	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.3	0.0	40.7	32.0	0.0	31.4	17.2	24.5	20.6	17.2	0.0	15.2
Incr Delay (d2), s/veh	2.2	0.0	3.5	2.3	0.0	1.9	0.0	7.7	2.2	2.8	0.0	2.2
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	0.5	0.0	1.0	4.2	0.0	3.3	0.1	8.2	2.7	3.1	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	42.5	0.0	44.2	34.4	0.0	33.3	17.2	32.2	22.9	20.0	0.0	17.4
LnGrp LOS	D	A	D	C	A	C	B	C	C	B	A	B
Approach Vol, veh/h		66			375			570			680	
Approach Delay, s/veh		43.6			33.9			29.3			18.4	
Approach LOS		D			C			C			B	

Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.5	49.7		24.2	17.2	38.1		9.6				
Change Period (Y+Rc), s	4.5	5.0		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	5.5	76.5		33.5	23.5	58.5		9.5				
Max Q Clear Time (g_c+I1), s	2.3	18.8		14.9	12.2	23.8		4.5				
Green Ext Time (p_c), s	0.0	8.4		1.3	0.5	9.2		0.1				

Intersection Summary		
HCM 6th Ctrl Delay		26.5
HCM 6th LOS		C

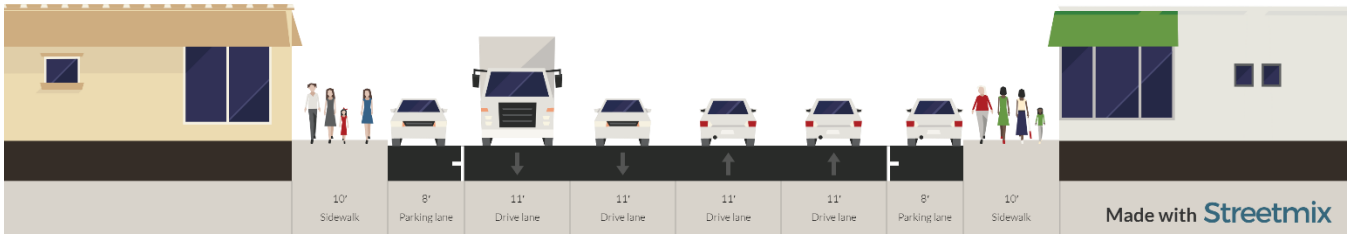
Notes

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

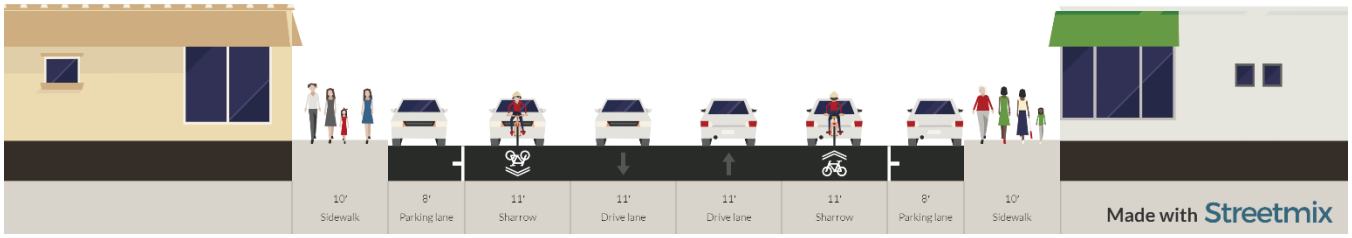
ATTACHMENT C: ALTERNATIVE CROSS SECTIONS

US 101 CROSS SECTIONS

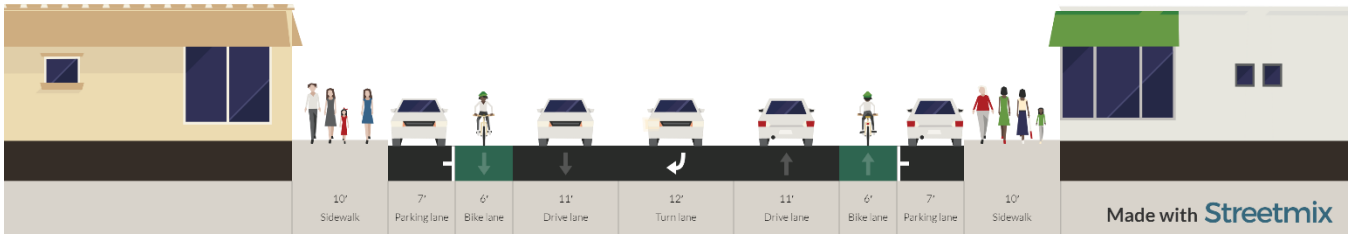
US 101 Downtown - Existing Cross Section



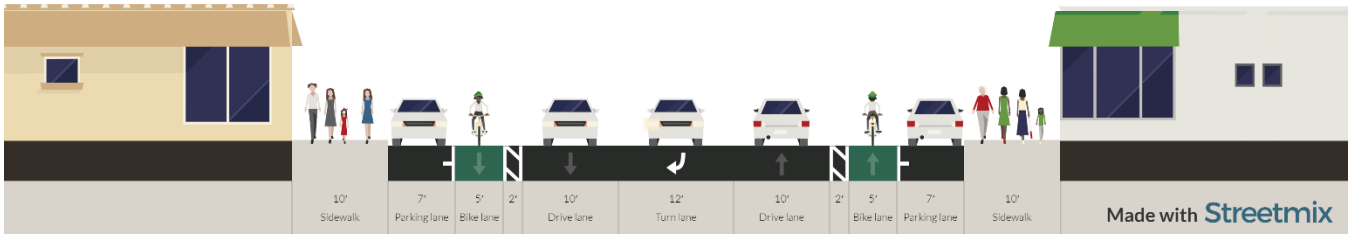
US 101 Downtown –Sharrows



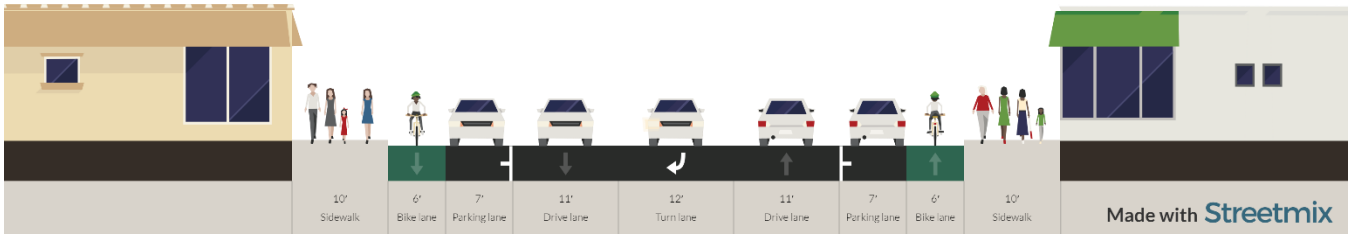
US 101 Downtown – Bike Lanes



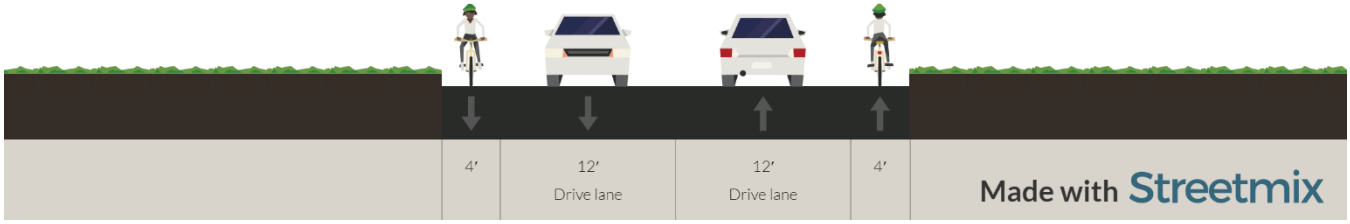
US 101 Downtown – Buffered Bike Lanes



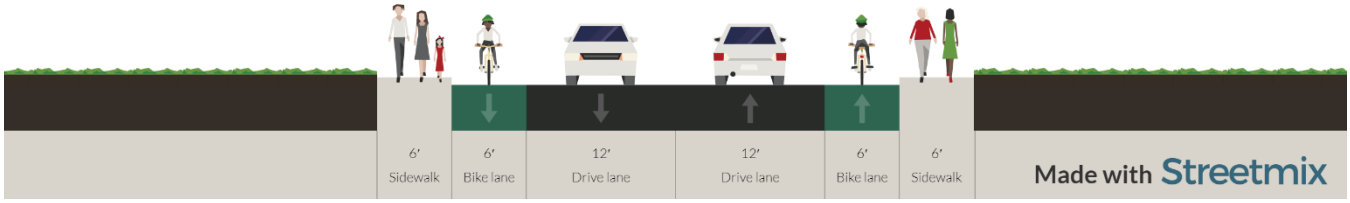
US 101 Downtown – Separated Bike Lanes (Cycle Tracks)



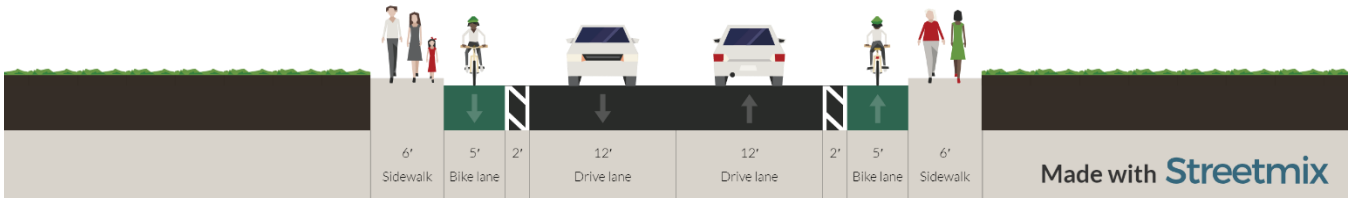
US 101 South of Downtown – Existing Cross Section



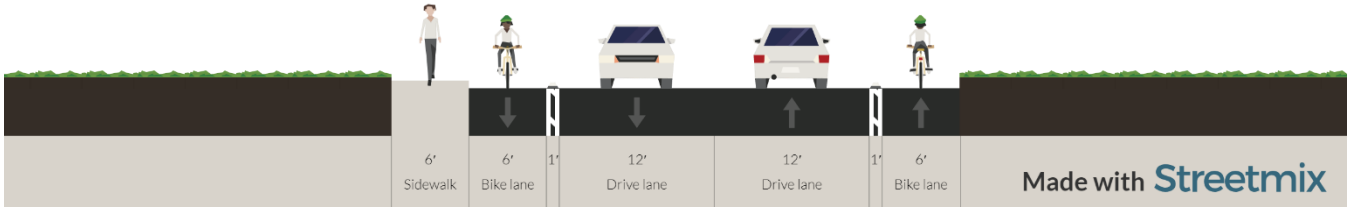
US 101 South of Downtown – Shoulders/Bike Lanes



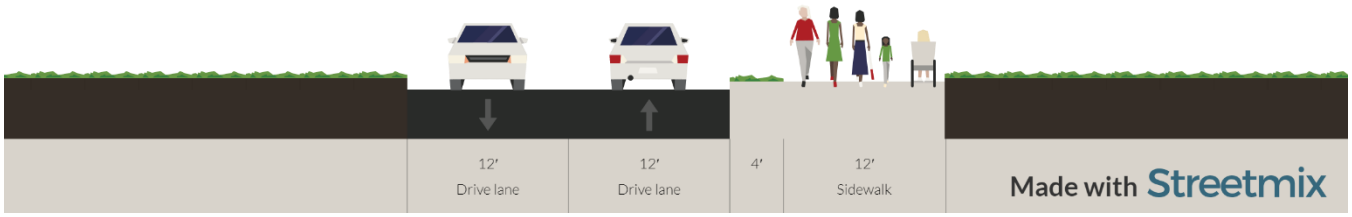
US 101 South of Downtown – Buffered Bike Lanes



US 101 South of Downtown – Separated Bike Lanes (Cycle Tracks)



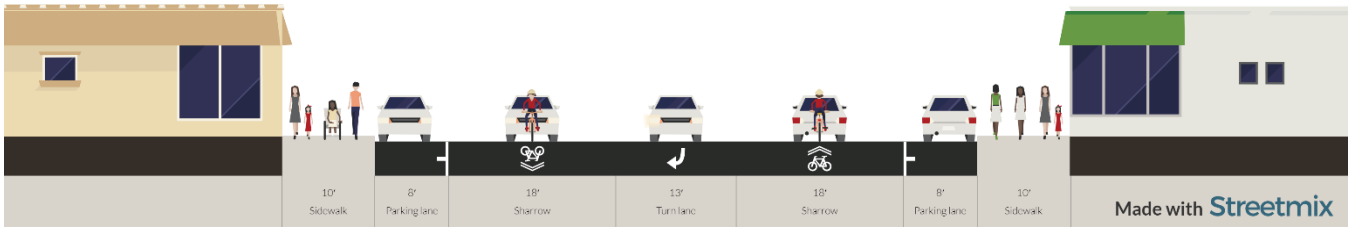
US 101 South of Downtown - Shared-use Path



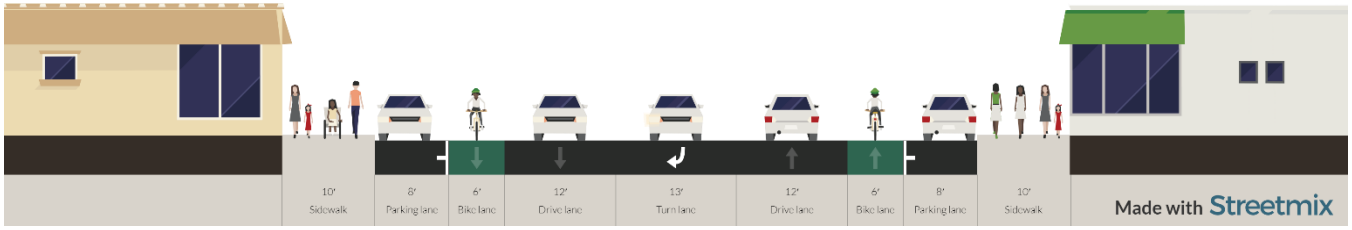
OR 34 CROSS SECTIONS

A. OR 34 Downtown - Existing Cross Section

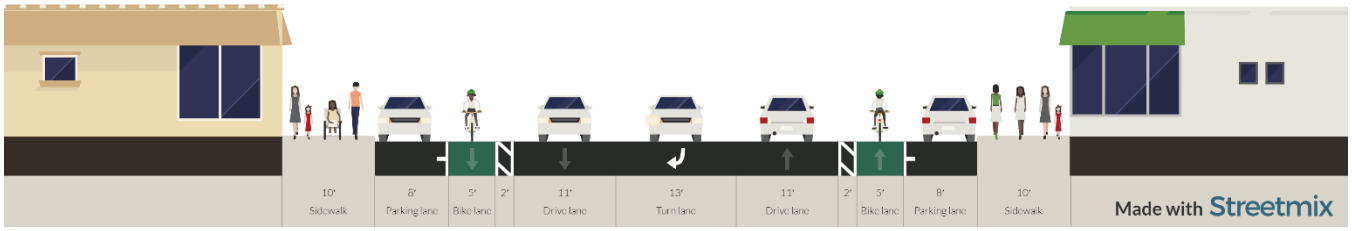
B. OR 34 Downtown – Sharrows



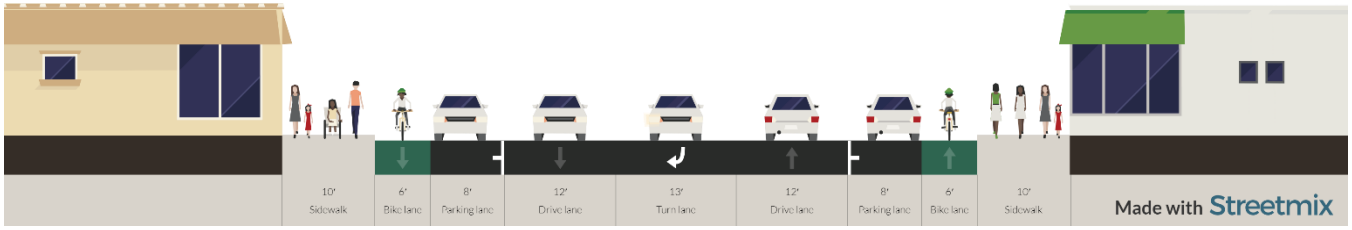
C. OR 34 Downtown – Bike Lanes



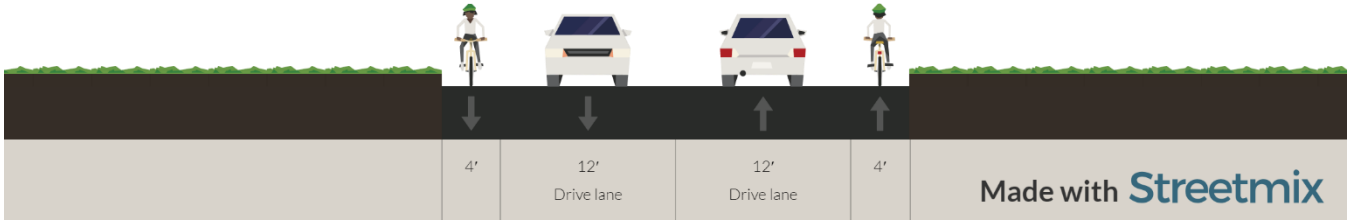
D. OR 34 Downtown – Buffered Bike Lanes



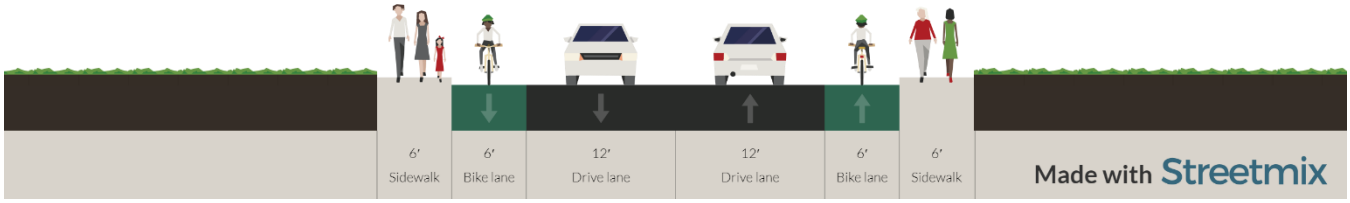
E. OR 34 Downtown – Separated Bike Lanes (Cycle Tracks)



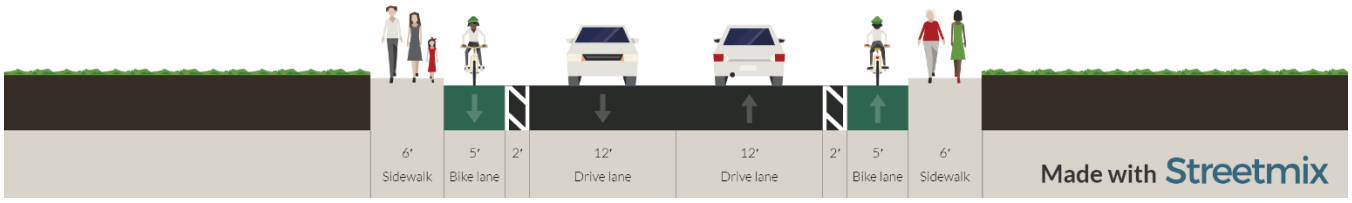
OR 34 East of Downtown – Existing Cross Section



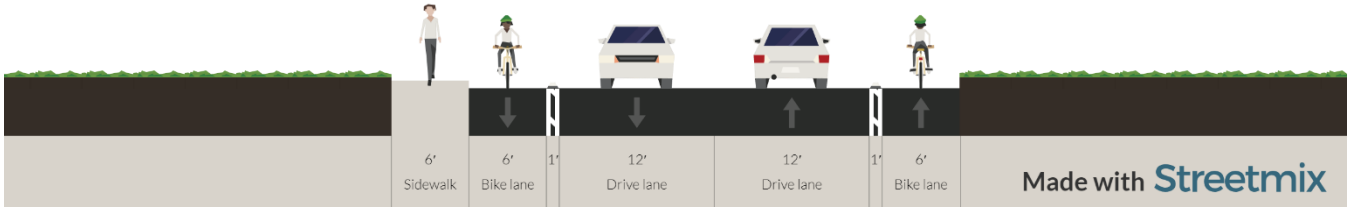
OR 34 East of Downtown – Shoulders/Bike Lanes



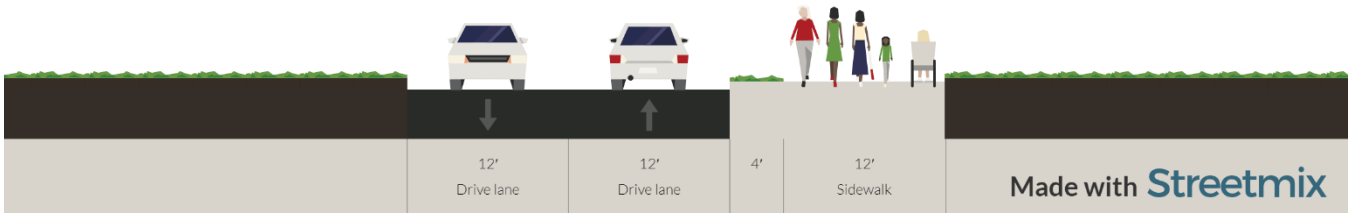
OR 34 East of Downtown – Buffered Bike Lanes



OR 34 East of Downtown – Separated Bike Lanes (Cycle Tracks)

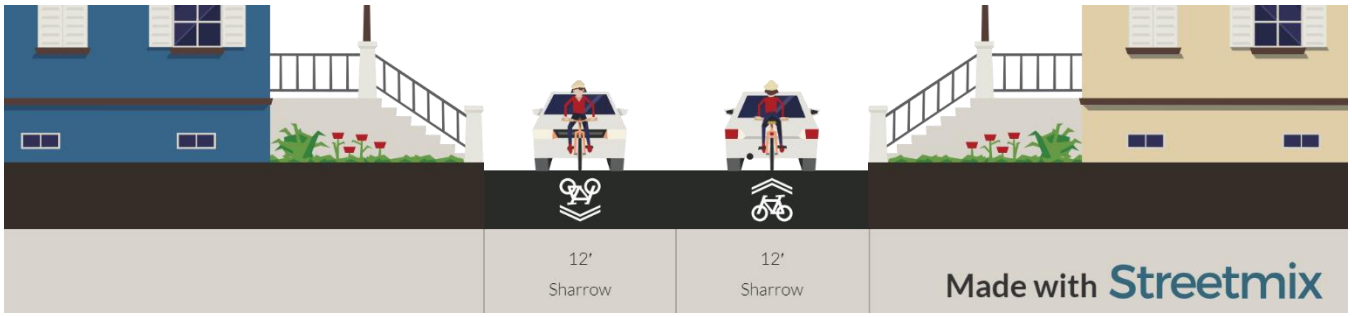


OR 34 East of Downtown - Shared-use Path

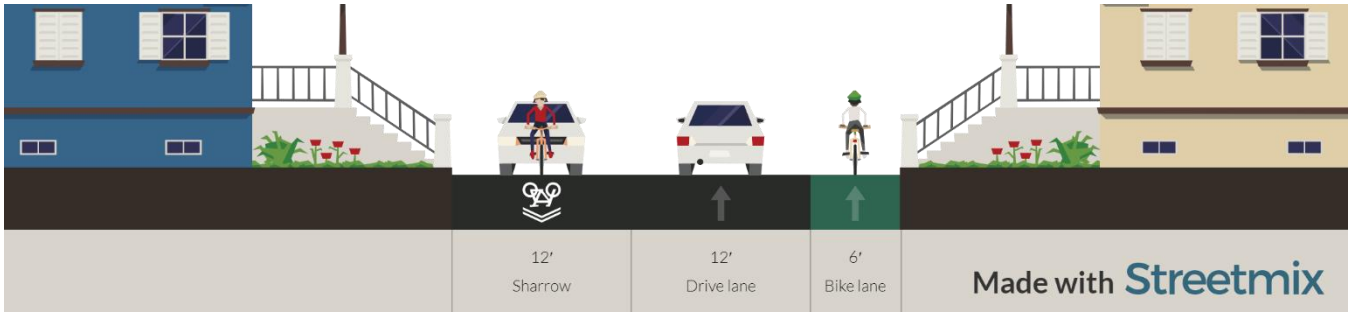


CRESTLINE DRIVE CROSS SECTIONS

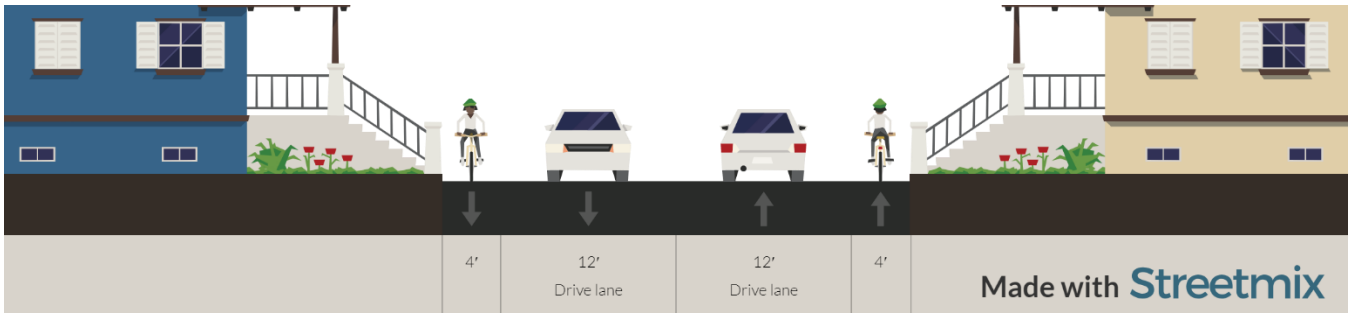
Crestline Drive – Shared Roadway



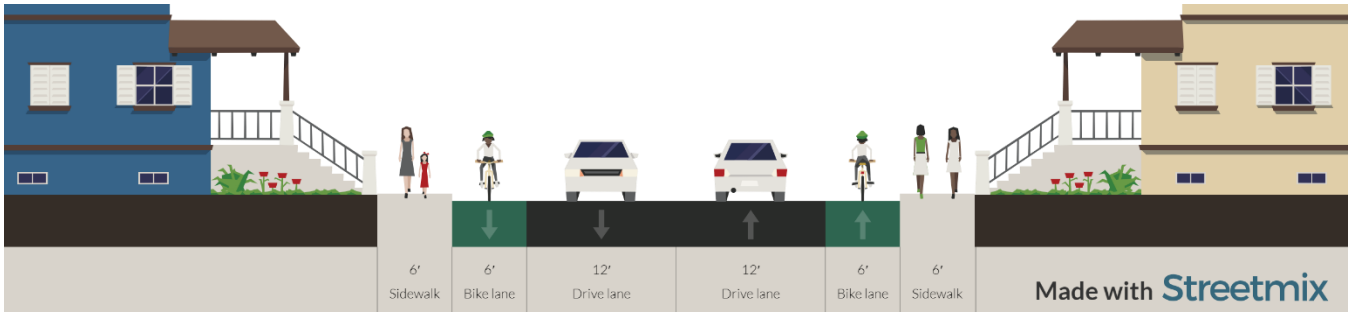
Crestline Drive – Shared Roadway/Uphill Bike Lane



Crestline Drive – Shoulders

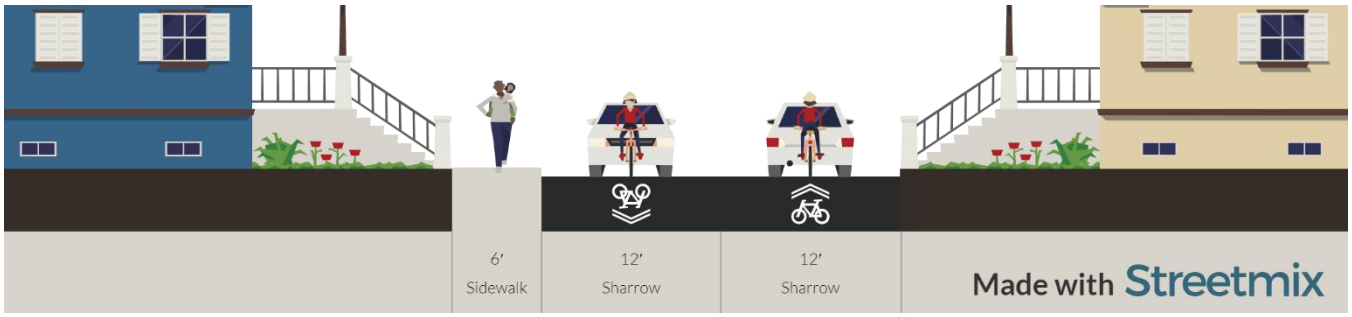


Crestline Drive – Bike Lanes/Sidewalks

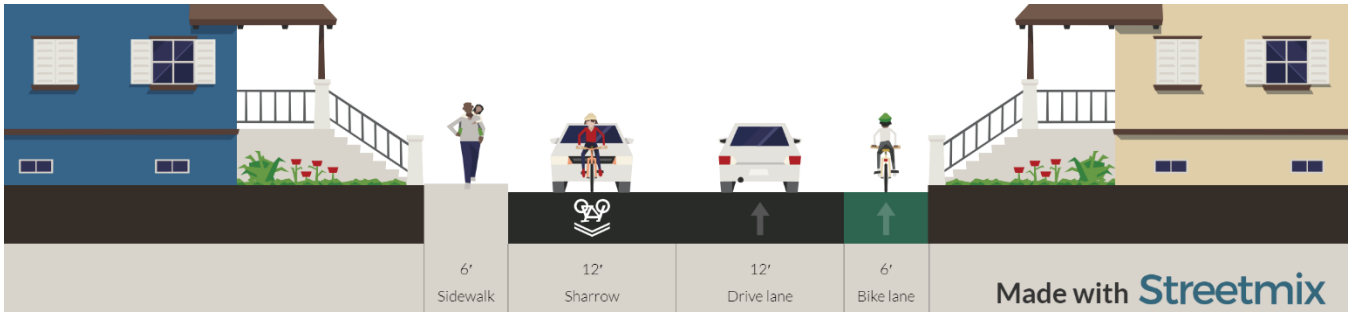


CEDAR STREET CROSS SECTIONS

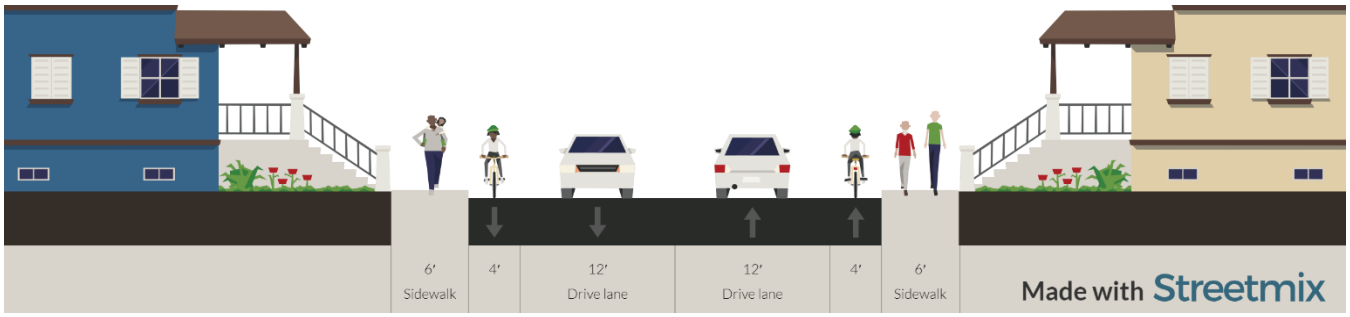
Cedar Street – Shared Roadway



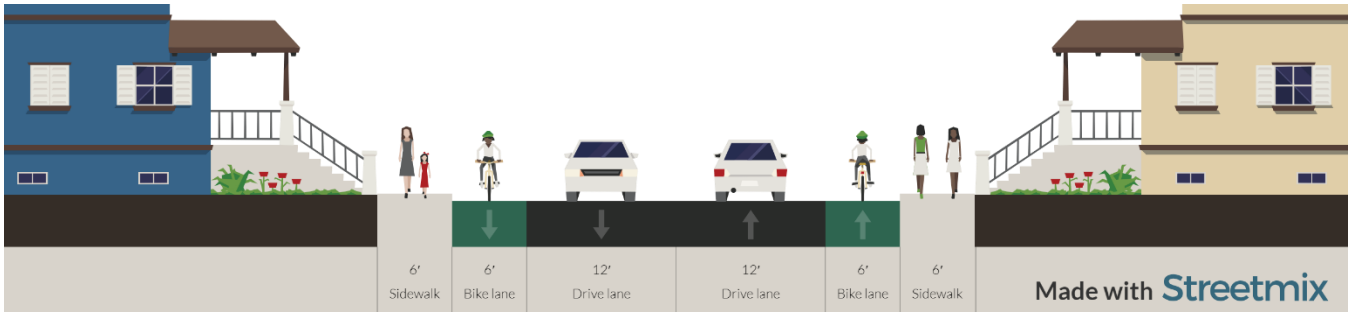
Cedar Street – Shared Roadway/Uphill Bike Lane



Cedar Street – Shoulders

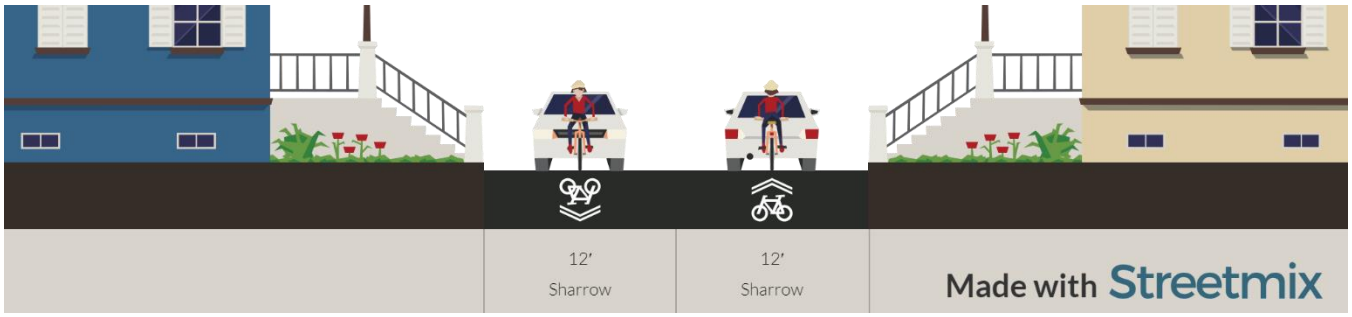


Crestline Drive – Bike Lanes/Sidewalks

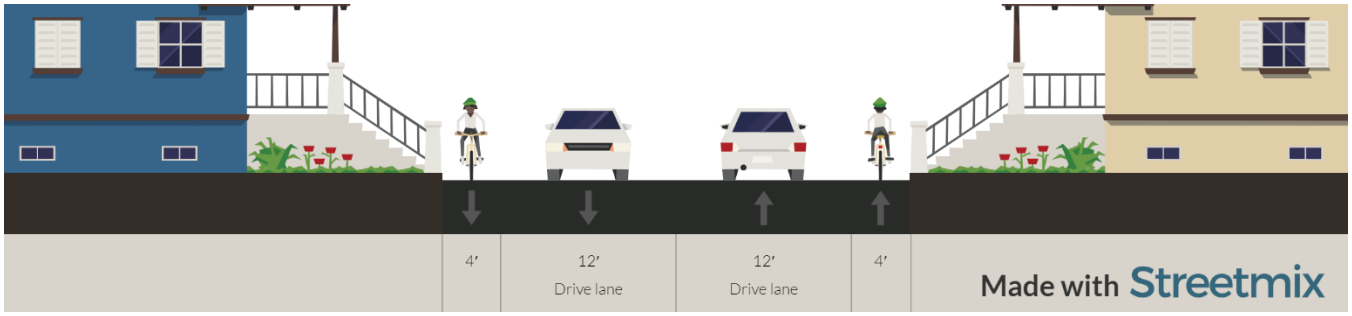


RANGE DRIVE CROSS SECTIONS

Range Drive – Shared Roadway



Range Drive – Shoulders



Range Drive – Bike Lanes/Sidewalks