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Final Technical Memorandum #3- Alternatives Analysis

Project #: 18974

Date: October 30, 2015

To: Technical Advisory Committee & Citizen Advisory Committee

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Subject: Klamath Falls Urban Trail Master Plan – Alternatives Analysis

This memorandum provides an assessment of project alternatives to be included in the Klamath Falls Urban Trail Master Plan. The preliminary recommendations from the draft version of this memorandum have been reviewed with the Technical Advisory Committee (TAC) and Citizen Advisory Committee (CAC). This final version of the memo includes modifications made to the project team's preliminary recommendations based on the feedback from the CAC and TAC. The recommended projects in this memorandum will be advanced to the draft master plan.

BACKGROUND

The Klamath Falls Urban Trail Master Plan will identify and coordinate opportunities to create seamless connections between the urban trails and nearby attractions as well as nearby pedestrian and bicycle facilities. The intent of the Klamath Falls Urban Trail Plan is to identify key pedestrian and bicycle connections to the existing trail system and to identify key gaps and deficiencies of the trail system. The Plan is not a full pedestrian and bicycle plan; gaps in the pedestrian and bicycle system that do not relate to trail access are not included in this study.

PLAN ELEMENTS

The final Klamath Falls Urban Trail Master Plan will include the following elements, which will be prioritized in the final Plan:

- **Projects** – capital investment made to improve the existing trail system and the bicycle and pedestrian system that connect to it. Examples include new shared-use paths, bicycle lanes, sidewalks, and crosswalks. In some cases, these projects could be implemented as pilot, or test, projects for a certain time period and then modified based on the evaluation during this period for final implementation.
- **Policies** – statements adopted in the Klamath Falls Urban Trail Plan that are intended to influence and guide decisions and actions related to pedestrian and bicycle planning. As an example, policies could relate to requirements for new developments to incorporate bicycle parking or provide pedestrian and bicycle facilities.

- **Programs** – plans of action aimed at accomplishing an identified County or City goal(s) that commonly include details on what work is to be done, by whom, when, and the intended outcome of the action. An example is implementing a program to install wayfinding signage at all trail crossings and trailheads.
- **Future Studies** – research and investigation to be completed after the Klamath Falls Urban Trail Master Plan is completed. Such studies will not be done during the Urban Trail Master Plan process due to lack of available data, a need for guidance and/or analysis from responsible agencies, and/or the need for a focused public involvement and analysis process beyond the Urban Trail Master Plan scope of work and budget.

Note that the term "project" is used throughout this memorandum to refer to plan elements for ease and brevity. For example, the "projects" for evaluation described in the next section include all elements of the Plan, including capital projects, policies, programs, and future studies.

ALTERNATIVES EVALUATION

Projects have been developed to address the gaps and deficiencies identified in Technical Memorandum #2. These gaps and deficiencies were identified from feedback from the general public and project advisory committees and the project team's evaluation. In many instances, multiple alternative projects for a single gap or deficiency are presented in this memorandum, along with the project team's assessment of the options. Project alternatives are based on feedback from the advisory committee and the general public, the 2012 Klamath Falls Urban Area Transportation System Plan, and the project team's experience with developing bicycle and pedestrian projects.

The project team's recommendations include specific projects (e.g. stripe a bicycle lane, add beacons to a crosswalk) whenever possible. However, there are instances when more information is needed that is beyond the scope of this area-wide plan and the recommendation is for further study.

The recommendations were selected based on the overall project goal of identifying low-cost, easy to implement solutions that provide comfortable and convenient access to the trail system for a wide range of people and feedback from the advisory committees. For instance, the recommended projects for improving the bicycle system are only those types of facilities that most adults would feel comfortable bicycling on (i.e. Level of Traffic Stress 1 or 2). Table 1 summarizes the potential types of bike facilities that would be required to meet this objective on different types of roads. Note that the table provides general guidelines and site specific characteristics (e.g., number and type of driveways, traffic volumes) are also considered in our recommendations.

Table 1 Bicycle Facility Suitability Matrix

Speed Limit	# of Lanes	Suitable Bike Facility Types				
		Shared Lane[1]	Bike Lane	Buffered Bike Lane	Protected Bike Lane	Shared-use Path
<=25 MPH	2-3	Y	Y	Y	Y	Y
	>3	-	-	Y	Y	Y
30 MPH	2-3	M[2]	Y	Y	Y	Y
	>3	-	-	Y	Y	Y
35 MPH[3]	2-3	-	-	Y	Y	Y
	>3	-	-	Y	Y	Y
>=40 MPH[3]	2-3	-	-	-	Y	Y
	>3	-	-	-	Y	Y

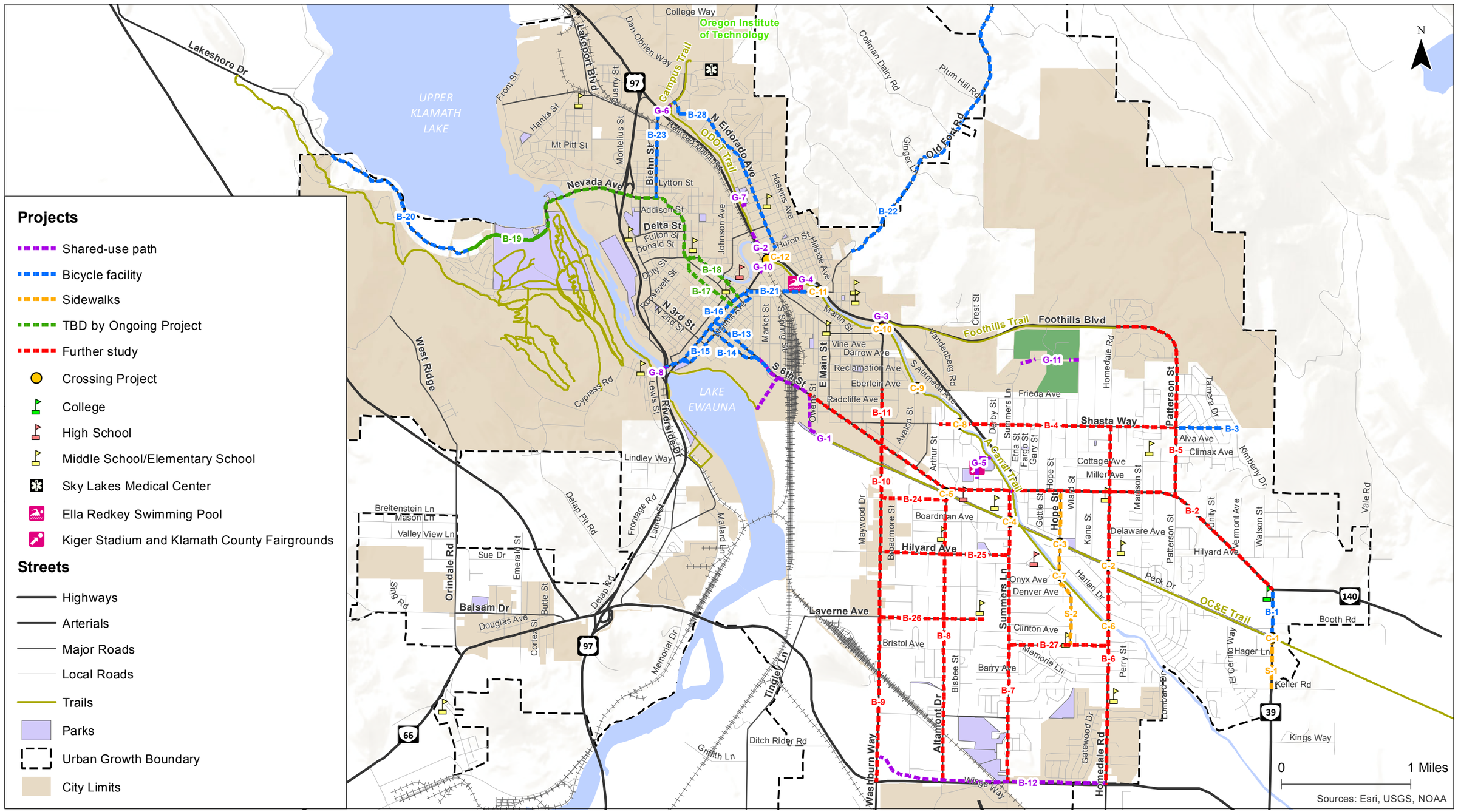
[1]Includes streets with sharrows
[2]Suitable treatment only if traffic volumes are low and there is no centerline on the roadway
[3]On higher speed roadways where a protected bike lane is not feasible and/or desirable, the best option may be to provide a parallel route on lower speed roadways

Further, whenever possible, the lowest cost means to implement a project is recommended. This consideration typically occurs when evaluating how to install some type of bike lane or provide an enhanced crossing. Restriping a roadway to provide a bike lane, as opposed to widening the roadway, is generally recommended. Instances where restriping may necessitate the removal of a motor vehicle travel lane or center turn lane will likely require further study and detailed public involvement before they can be implemented.

PROPOSED PROJECT LIST

Table 2 summarizes the project list. The locations of each project are shown in Figure 1. The complete evaluation matrix, which includes all alternatives that were considered, is provided in *Attachment A*. The columns in the table below describe:

- **ID:** unique identifying number assigned to each proposed project, corresponding to the need identified in Technical Memorandum #2.
- **Location Name/Description:** general description of the location of the issue, including the boundary of the issue.
- **Issue:** description of the issue (gap, deficiency, etc.)
- **Project Description:** a description of the proposed project with key elements identified
- **Category:** projects are classified into general categories based on plan element type, with capital projects further categorized into shared-use path, crossing, bicycle facility, and sidewalk.
- **Benefits:** a brief discussion of the benefits of the proposed project.
- **Cost estimate:** planning-level cost estimate, intended to provide a sense of magnitude.
- **Considerations:** other site-specific characteristics or factors that warrant unique consideration in the project development phase.



Recommended Projects
Klamath Falls, Oregon

Figure **1**

Coordinate System: NAD 1983 StatePlane Oregon South FIPS 3602 Feet Intl
Data Source: Delete if there isn't one.

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Table 2 Recommended Project List

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
Trail System Gaps						
G-1	End of the OC&E Trail to Downtown Klamath Falls	Trail ends without obvious connection to downtown.	Connect the trail via 6th Street bridge by widening sidewalk to provide for shared-use path. Provide a connection to the soon to be constructed Lake Ewauna trail. (Note: Lake Ewauna trail connection alignment is not confirmed; cost estimate does not include this connection.)	Lower cost and easier to implement than dedicated bridge.	$507,000	May require the crossing of 6th Street and ramps on/off the bridge. Requires trail users to travel to 6th Street. More work will be needed to determine if the bridge can accommodate the additional concrete weight. By routing the trail connection through the Klamath Works property, the trail will connect to the future pedestrian crossing being installed at SW 6th Street/Adams Street.
G-2	Connecting the "A" Canal Trail to the ODOT Trail	There is currently a ¼-mile gap between these two trails and a crossing of Crater Lake Parkway.	Connect the trail using Crater Lake Parkway by widening the sidewalks to provide for a shared-use path.	Lower cost to implement and maintain.	$68,000	Requires crossing Crater Lake Highway. Requires a trail crossing of Esplanade Avenue. Requires widening the sidewalk on the bridge to connect the "A" Canal Trail to the signalized intersection.
G-3	Connecting the "A" Canal Trail to the Foothills Trail	The Foothills Trail ends at the intersection of Foothills Boulevard/ Crater Lake Parkway, and there is a gap between the intersection and the "A" Canal trail.	Widen the sidewalk on the east side of the bridge to provide a shared use path between the intersection and the "A" Canal trail. Tighten the curb radius for NB right-turns onto Crater Lake Parkway.	This option uses the existing signalized crossing as well as sidewalks and bike lanes south of OR 39 to complete the transition. By expanding the sidewalk to a path on the east side, it allows southbound bicyclists to continue from the Foothills Trail to the "A" Canal trail eastbound with only one crossing. Project could be phased in. Tightening the curb radius will slow down right-turn making the crossing more comfortable.	$60,000	Accommodating the shared-use path on the bridge may require either removing the bike lanes or lane width reductions. Requires a trail crossing of Washburn Way.
G-4	Connecting the "A" Canal Trail to the Ella Redkey Swimming Pool	The trail is grade separated from the pool.	Connect the trail by installing a shared-use path between the parking lot/front entrance to the pool and the existing "A" Canal Trail.	Low cost, short trail connection needed.	$15,000	May require right-of-way or an easement.
G-5	Connecting the "A" Canal Trail to the Kiger Stadium and Klamath County Fairgrounds	The trail is grade separated from these locations.	Pave the existing informal service road from the "A" Canal Trail to the Kiger Stadium Parking lot. Install a shared use path along the west side of Crest Street from the Kiger Stadium Parking lot to the Fairgrounds.	Provides facility for both pedestrians and bicyclists. Separates pedestrians and bicyclists from vehicles at Kiger Stadium.	$105,000	May require right-of-way or an easement to reach Crest Street. More costly than only connecting to the Stadium.
G-6	Campus Trail to Biehn Street Connection	There is a gap between the Campus Trail and the bike lane on Biehn Street, which connects to Oregon Avenue and downtown Klamath Falls.	Widen the sidewalk on the south side of Campus Drive to complete the shared-use path connection. Possible modifications to the Crater Lake Parkway intersection.	This connection would also connect with the ODOT trail. Uses the existing intersection of Crater Lake Parkway/Biehn Street to complete the highway crossing.	$47,000	Southbound cyclists coming from the Campus Trail would use the crosswalks at the signalized intersection to transition to bike lanes. Modifications to the Crater Lake Parkway intersection may be required to create a comfortable crossing.
G-7	Connecting the ODOT Trail to Kit Carson Park	The ODOT Trail travel adjacent to the park, but a fence separates the park from the trail.	Construct a connection between the trail and the parking lot or existing sidewalk connecting the street to the park.	Low cost, short trail connection needed.	$18,000	May require right-of-way or an easement.
G-8	Veteran's Park Trail Connections	There are no bicycle connections between Veteran's Park and the Link River Trail.	Widen the sidewalk on the north side of Main Street to provide for a shared use path to connect Veteran's Park with the Link River Trail. Install a crossing across Main Street west of the park road's access to Main Street to connect Veteran's Park with the path. Sharrows may work as an interim solution.	Provides a separated facility for pedestrians and bicyclists between two popular destinations.	$51,000	Lanes will have to be narrowed on the bridge to accommodate the shared-use path. An additional crossing of Main Street may be needed on the west side of the bridge. Ultimate configuration should be determined with redesign of interchange area.
G-9	"A" Canal Trail to Crossing at SW 6th Street	The trail crosses SW 6th Street approximately 40 feet east of the crosswalk at the signalized intersection of Summers Lane/SW 6th Street.	Widen the sidewalk on the south side of SW 6th Street to better accommodate bicyclists connecting to the signalized crossing.	Low cost; requires minimal out of direction travel.	$7,000	Will need to verify there is sufficient right-of-way.
G-10	"A" Canal Trail Connection to Klamath Union High School	There is no connection for bicyclists between the "A" Canal Trail and the high school.	Widen the sidewalk on the north side of Esplanade Avenue to provide a shared-use path to the high school. Coordinate with school for completing the connection.	There appears to be adequate width available under the railroad bridge to complete the widening. Provides connection for bicyclists between the trail and high school.	$127,000	Coordination with the school will be required.

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
G-11	Southern Connection to Steen Sports Park	There is no connection to Steens Sports Park from the south without using Homedale Road and Foothills Boulevard.	Formalize connections between Summers Lane and/or Wiard Street and Steens Sports Park	Will create a more direct access to the south of the park.	$40,000	May require right-of-way or an easement to complete the connection.
Crossings						
C-1	OR 39: OC&E Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	TBD by ongoing ODOT and Oregon Parks study			
C-2	Homedale Road: OC&E Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is a crosswalk.	TBD by ongoing ODOT and Oregon Parks study			
C-3	Hope Street: OC&E Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install striped crosswalk and appropriate signage.	Low cost.	$2,000	Consider installing illumination at the crossing as well (it is currently located nearby but not at the crossing).
C-4	Summers Lane: OC&E Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	TBD by ongoing ODOT and Oregon Parks study			
C-5	Altamont Drive: OC&E Trail Crossing		TBD by ongoing ODOT and Oregon Parks study			
C-6	Homedale Road: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install marked crosswalk, appropriate signage, and raised median island.	Low cost.	$8,000	Consider installing illumination at the crossing as well (there is not existing illumination on Homedale Road in the crossing vicinity).
C-7	Hope Street: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install marked crosswalk and appropriate signage.	Low cost.	$2,000	Consider installing illumination at the crossing as well (there is no existing illumination in the vicinity). Sight distance from the south should be verified.
C-8	Shasta Way: A Canal Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	Further study required to determine final treatment. Active crossing treatments recommended. See Alternatives Evaluation Matrix for options.	Improved crossing opportunities.	TBD	A median island would require removing the left-turn lane.
C-9	Eberlein Avenue: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Further study required to determine final treatment. Active crossing treatments recommended. See Alternatives Evaluation Matrix for options.	Improved crossing opportunities.	TBD	Close proximity of Avalon Street may present issues

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
C-10	Washburn Way: A Canal Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	Further study required to determine final treatment. Active crossing treatments recommended. See Alternatives Evaluation Matrix for options.	Improved crossing opportunities.	TBD	A median island would impact left-turn lane storage. Close proximity to Crater Lake Parkway.
C-11	Main Street: A Canal Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is an Active/Enhanced Crossing.	Further study required to determine final treatment. Active crossing treatments recommended. See Alternatives Evaluation Matrix for options.	Improved crossing opportunities.	TBD	Queuing from the Crater Lake Parkway intersection may block the crossing at times. Free right-turn from Crater Lake Parkway onto Main Street may need to be modified.
C-12	Esplanade Avenue: A Canal Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is an Active/Enhanced Crossing.	Further study required to determine final treatment. Active crossing treatments recommended. See Alternatives Evaluation Matrix for options.	Improved crossing opportunities.	TBD	A median island would impact left-turn lane storage. Close proximity to Crater Lake Parkway. Queuing from the Crater Lake Parkway intersection may block the crossing at times.
On-Street Bicycle Connections						
B-1	OR 39 (OC&E Trail to OR 140)	This segment has a LTS of 3. There are no existing bicycle lanes.	Install protected or buffered bike lanes.	Potentially a low cost improvement.	$12,000	May require additional pavement. Project will primarily serve future development in the area.
B-2	6th Street (Railroad Bridge to OR 39)	This segment has a LTS of 4. This is a four-lane road with a center turn lane. There are no bike lanes.	Identify if there are parallel routes that would provide similar connectivity but greater comfort	Low volume, low speed local roads can provide comfortable alternatives to high-speed, high volume arterials	TBD	Access to specific destinations on 6th Street will need to be considered. Local street connectivity is fragmented in locations. Use trails whenever possible.
B-3	Shasta Way (Patterson Street to Kimberly Drive)	This segment has a LTS of 4. It Is currently a two-lane road with a marked centerline and pavement width of approximately 22 feet.	Install sharrows and traffic calming.	Width is not sufficient for bike lanes. Appears to be relatively low-volume street. The sharrows would alert vehicles that bicyclists share the road. Does not require roadway widening.	$43,000	Sharrows alone will not do much for the comfort of people bicycling. Traffic calming will also be required to lower the speed people are driving.
B-4	Shasta Way (Patterson Street to Crater Lake Parkway)	This segment has a LTS of 4. No bike lanes are present, and the existing pavement width is approximately 37' wide with one travel lane in each direction and center turn lanes throughout.	Look for opportunities for alternate routes or for traffic calming measures on Shasta Way	Low volume, low speed local roads can provide comfortable alternatives to high-speed, high volume arterials	TBD	Local street connectivity is fragmented in locations.
B-5	Patterson Street (6th Street to Foothills Boulevard)	The segment has a LTS of 4. There are no existing bicycle lanes.	Further study required to determine final treatment. Candidates include buffered bike lanes or a shared-use path.	TBD	TBD	Needs to tie into Foothills Trail
B-6 – B-11	North-South Routes in SE Klamath Falls	These routes all have an LTS of 3 or 4.	Further study required to determine which routes will be designated for bicycle travel and what the treatment is.	TBD	TBD	Parallel routes may be an option in certain locations.
B-12	OR 140 (Washburn Way to Homedale Road)	This segment has a LTS of 4.	Install shared-use path.	Installing it along the north side of the road would minimize the number of bicycle crossings of OR 140. Provides physical separation between bikes and vehicles. Provides facility for pedestrians too.	$820,000	One crossing of the railroad is involved. Requires some type of transition between OR 140 and Washburn Way (which is connected by on/off ramps). May require purchasing right-of-way. Treatments may be needed at crossings with minor streets.

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
B-13	6th Street (Market Street to Main Street)	This segment has a LTS of 3. There are no existing bicycle facilities on the road. The road is one-way with two travel lanes and a total pavement width of 46 feet. In the downtown area there are turn lanes and on-street parking.	Install bike lane.	No roadway widening is required.	$8,000	One side of on-street parking may need to be removed.
B-14	5th Street (Main Street to 6th Street)	This segment has a LTS of 4. There are no existing bicycle facilities on the road. The road is one-way with two travel lanes and a total pavement width of 45 feet. In the downtown area there are turn lanes and on-street parking.	Install bike lane.	No roadway widening is required.	$9,000	
B-15	Klamath Avenue (Conger Avenue to Commercial Street)	This segment has a LTS of 3. This is a one-way eastbound segment with no bike lanes.	Install bike lanes. *Coordinate with the Blue Zones project.*	No roadway widening is required.	$15,000	May require the removal of on-street parking on at least one side of the road to accommodate the bike lane width.
B-16	Main Street (Esplanade Avenue to Mill Street)	This segment has a LTS of 3. This is a one-way westbound segment with no bike lanes.	Install bike lanes. *Coordinate with the Blue Zones project.*	No roadway widening is required.	$15,000	
B-17	9th Street (Klamath Avenue to Prospect Street)	This segment has a LTS of 3. There are no bicycle lanes; the 2-way roadway has a minimum pavement width of 26 feet.	TBD by ongoing project			
B-18	N 11th Street (Oregon Avenue to Klamath Avenue)	This segment has a LTS of 3. There are no bicycle lanes. The 2-lane roadway has a minimum pavement width of 25 feet.	TBD by ongoing project			
B-19	Oregon Avenue (Moore Park to Upham Street)	The segment has a LTS of 3. Although there are bike lanes, they are narrow. Actual traffic speeds are expected to be higher than posted.	TBD by ongoing project			
B-20	Lakeshore Drive (Lynnewood Blvd to West UGB)	The segment has a LTS of 3. There are no shoulders or bike lanes.	Widen the pavement to accommodate shoulders or bike lanes.	Provides a facility for bicyclists.	$1,860,000	The road will need to be widened to accommodate paved shoulders, and the some earthwork is likely to be needed with the widening. There may be some ROW impacts associated with roadway widening.

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
B-21	Main Street (Esplanade Avenue to Crater Lake Parkway)	The segment has an LTS of 4. The eastern portion of the corridor is 4 lanes and 58-60 feet wide. Aerial images indicate this area is also used for on-street parking. The western portion of the corridor is approximately 54 feet wide and has two travel lanes with two sides of on-street parking.	Install bike lanes.	Provides a facility for bicyclists.	$19,000	Between Spring Street and Crater Lake Parkway, elimination of the on-street parking or a road diet would be required to accommodate the bike lanes. The eastbound bike lane would require a transition treatment where E Main Street turns off of Main Street. The pavement width is not adequate for adding a bicycle lane under the railroad, so the sidewalk would need to be widened to accommodate bikes. A transition between the bike lanes and sidewalks would also be needed.
B-22	Old Fort Road (Loma Linda Drive to UGB)	The LTS is 4. The road is higher speed and lacks bike lanes and shoulders. This is a popular recreational route.	Widen the road to add paved shoulders or bike lanes.	The road appears to have some gravel shoulders today, so the additional widening may be minimal.	$2,668,000	This is a long distance to pave (high cost).
B-23	Biehn Street (Crater Lake Parkway to Oregon Avenue)	The road is part of an important link between OIT and downtown. The existing bike lanes are narrow.	Widen the bike lanes by restriping the roadway.	No pavement widening is required. Narrowing the motor vehicle travel lanes may also calm traffic.	$22,000	
B-24 – B-27	East-West Routes in Southeast Klamath Falls	These streets connect neighborhoods to the north-south routes that connect to the trail system.	Further study required to identify which should receive shared lane markings, wayfinding, and/or traffic calming.	Low cost improvements that could enhance comfort for people bicycling and increase the use of the trail system.	TBD	Further neighborhood outreach and speed studies may be necessary to identify specific treatments.
B-28	N Eldorado Avenue	This road lacks bicycle facilities and sidewalks on one side of the road. This road is a popular commute route to the hospital, and also connects student apartments to the campus.	Install sharrows and traffic calming.	Posted speed limit indicates that a shared-roadway would be sufficient. The sharrows would alert vehicles that bicyclists share the road. No roadway widening is required.	$23,000	This project does not provide any new pedestrian facilities, but sidewalks exist on one side of the road.
Sidewalks						
S-1	OR 39 (OC&E trail to Keller Road)	There are no sidewalks.	Install sidewalks on both sides of the road.		$396,000	May require ROW.
S-2	Hope Street (Bristol Avenue to SW 6th Street)	There are no sidewalks on Hope Street, with the exception of those around Denver Avenue.	Install sidewalks on both sides of the road.	Provides connection for pedestrians between Peterson Elementary school and the OC&E and A Canal trails. The bridge over the canal already includes sidewalks.	$1,170,000	May require ROW.
Policies/Programs						
P-1	Trail Signing/Wayfinding	Wayfinding and trail signs are generally absent, including near the OC&E trailheads. Signage provides an opportunity to increase awareness and use of the trail system for residents and visitors.	Develop a program to install and maintain wayfinding signage at all trailheads and trail crossings of public streets.	Signage provides an opportunity to increase awareness and use of the trail system for residents and visitors.	--	Will need to determine who is responsible for the signs.
P-2	Bicycle Parking	Bicycle parking is absent from many destinations, including some parks.	Develop policy that requires bicycle parking to be provided at key locations and pursue grant funding to provide it at key locations where it is missing.	The policy would help future developments or redevelopment locations obtain bicycle parking. Pursuing grant funding for existing locations in need will help fill-in existing gaps.	--	

ID*	Location	Issue	Project Description	Benefits	Cost Estimate^	Considerations
P-3	Local Street Trail Crossings	The "A" Canal trail and the OC&E trails cross many local streets. There is a desire for consistent crossings.	Develop guidelines for how to evaluate trail crossings and determine the appropriate treatment for the City and County to use in applying consistent treatment at crossings for local streets.	Guidance would encourage consistent crossings on all roads throughout the trail system.	--	
P-4	Trail Illumination	Most of the trail system does not have illumination.	Evaluate the feasibility of installing illumination along the trail system, including type of illumination, priority locations, and cost/maintenance.	The study will allow engagement with nearby property owners. The illumination may help reduce crime.	--	

*The prefix on the ID numbers refers to the category of the issue: "G-" refers to general gaps or deficiencies in the trail system; "B-" refers to segments that were identified due to having a bicycle Level of Traffic Stress (LTS) greater than 2; "C-" refers to locations with crossings that were identified for improvements; and "S-" refers to gaps in the sidewalk system; "P-" refers to policies and programs.
^Please note the costs outlined above are for 2015 and are planning level estimates only that do not include right-of-way. An annual inflation rate of 3 to 5 percent should be applied when projecting costs to the future.

Locations for Further Study

Several locations were identified for further study. These are described below.

'A' Canal Trail Crossings

The 'A' Canal Trail crosses Washburn Way, Main Street, and Esplanade Avenue in close proximity to the Crater Lake Parkway (OR 39). None of these crossings are currently marked and require trail users to divert to the nearest signal or other location to use a marked crossing. The close proximity of the trail to the Crater Lake Parkway can present the following challenges to installing a direct crossing at the trail location:

- The crossing may require shortening the left-turn lane for traffic turning onto the highway from the street being crossed, which could cause queues of left-turning traffic to block the through travel lane.
- Right-turning traffic from the highway onto the street being crossed may be traveling at a relatively high speed and not expecting to have to stop for a person crossing the road. This is particularly a concern at Main Street, where the right-turn from the highway is channelized and not controlled by the signal.

For these locations, especially Main Street, the ideal solution would be a grade-separated crossing (e.g. a bridge over the roadway). This is our ultimate recommendation for these crossings. However, we recognize that building these grade separated crossings is likely cost-prohibitive in the near or intermediate terms and that there is a near-term desire for better crossings.

Our preliminary recommendations for the interim period originally included providing enhanced at-grade crossings, generally crossings with a median refuge island and rectangular rapid flash beacons (RRFBs) with accompanying features designed to mitigate the two challenges above. These features include advanced RRFB beacons to alert turning traffic the crossing is being used, potentially reconfiguring the free right-turn onto Main Street, and studying the locations further to determine what impact the refuge island may have on left-turn storage and whether the impact can be mitigated with signal timing modifications.

The advisory committees expressed some concern about the impacts that a refuge island may have on motor vehicle traffic operations and whether a direct at-grade crossing would be safe at some of these locations. Based on this feedback, we recommend that these crossings, as well as the "A" Canal Trail crossings of Eberlein Avenue and Shasta Way, undergo a more detailed study, similar to the current OC&E Trail crossings project that ODOT and the Oregon Parks and Recreation Department (OPRD) are undertaking. These studies could include more detailed traffic operations and engineering review, as well as focused public involvement.

S 6th Street and Shasta Way

Both of these streets have speed limits of 35 MPH. 6th Street has four travel lanes, a center turn lane, and a number of commercial driveways. It will likely only be a comfortable route for people to bicycle on if its character is significantly changed through access management, providing protected bike lanes, and possibly removing travel lanes. Based on comments from the advisory committees, such a make-over of the road is not likely to occur. Therefore we do not recommend any improvements for 6th Street and that access to 6th Street from the trail system be considered as part of a future effort considering wayfinding in the area.

Shasta Way has two travel lanes and a center turn lane. Because of its 35 MPH speed limit, it is not likely to be a comfortable route for most people to bicycle on without a buffered or protected bike lane. The only way to provide such a facility would be to either expand the road or to remove the center turn lane. Advisory committee members generally preferred that other options be explored, such as looking for alternate routes or traffic calming along Shasta Way.

Southeast Klamath Falls

Southeastern Klamath Falls (i.e., the area roughly bounded by OR 140 to the south, Washburn Way to the west, Homedale Road to the east, and the OC&E Trail to the north) is generally recommended for further study to identify which north-south and east-west routes are optimal for providing bicycle routes to the trail system.

North-south collector roads generally have three lanes and 35 MPH speed limits. Providing buffered or protected bike lanes would be the recommendation for these routes to provide a comfortable bicycle facility for most people. However, this would require either widening the roadways or removing center turn lanes. In certain cases, parallel local roads (e.g., Bisbee Street) could be used to provide the connection. Therefore, we recommend further study including public involvement to determine which north-south routes are the most appropriate for bicycle travel in this area.

In instances where a parallel route is determined to be the most desirable way forward, wayfinding signage should be used to direct trail users to the route and to destinations along the route. Appropriate crossings of major streets should also be provided. Enhancing the route for bicycle travel through traffic calming and/or diversion measures should also be considered.

East-west routes were not analyzed in Technical Memorandum #2 primarily because these routes do not provide direct trail connections. At the request of Advisory Committee members, we have reviewed the major east-west routes in this area, shown as projects B-24 through B-27 in Figure 1, for this memorandum. These streets generally have one travel lane in each direction, sidewalks, and posted speed limits of 25 MPH. Given these conditions, these streets are likely to operate comfortably for many adults as shared streets for bicycling. Shared lane markings (i.e., sharrows) along with wayfinding signage would be an appropriate treatment for these routes. Traffic calming measures (e.g., bulb-outs,

chicanes) could also be deployed on these streets if people are driving faster than the posted 25 MPH speed limit.

NEXT STEPS

The project team revised this memorandum and the project list based on feedback from the CAC and TAC. These projects will be advanced into the draft version of the Urban Trail Master Plan. This plan will be reviewed with both committees at the next project meeting and the general public at an open house, currently scheduled for December 9, 2015. The recommended projects will be refined based on feedback received from these meetings, as well as from ongoing coordination with other projects in the area, in particular the Blue Zones project, before they are advanced into the final plan.

Attachment A Alternatives Evaluation Matrix

ID	Location	Issue	Potential Project	Benefits	Cost Estimate	Considerations	Recommended Project	Recommended for Further Analysis
G-1	End of OC&E Trail to Downtown Klamath Falls	Trail ends without obvious connection to downtown	Extend the trail over RR tracks to downtown, as planned for in 2012 TSP	Direct connection	$5.5 Million (TSP)	High Cost	Connect the trail via 6th Street bridge by widening sidewalk to provide for shared-use path. Provide a connection to the soon to be constructed Lake Ewauna trail. (Note: Lake Ewauna trail connection alignment is not confirmed; cost estimate does not include this connection.)	
				Keeps trail users separate from high-speed/high-volume streets				
			Connect the trail via 6th Street bridge by widening sidewalk to provide for shared-use path. Provide a connection to the soon to be constructed Lake Ewauna trail. (Note: Lake Ewauna trail connection alignment is not confirmed; cost estimate does not include this connection.)	Lower cost and easier to implement than dedicated bridge	$507,000	May require crossings of 6th Street and ramps on/off bridge.		
						Requires trail users to travel on 6th Street. More work will be needed to determine if the bridge can accommodate the additional concrete weight. By routing the trail connection through the Klamath Works property, the trail will connect to the future pedestrian crossing being installed at SW 6th Street/Adams Street.		
			Connect the trail via Main Street undercrossing	Lower cost and easier to implement than dedicated bridge	$107,000	Out-of-direction to most of downtown.		
				Only interaction with 6th Street is a signalized crossing		Requires trail users to ride in traffic under the railroad bridge or use sidewalk too narrow for people biking and walking to comfortably share.		
						Main Street does not have bicycle lanes. The width would allow it, but it requires the removal of on-street parking.		
G-2	Connecting the "A" Canal Trail to the ODOT Trail	There is currently a ¼-mile gap between these two trails and a crossing of Crater Lake Parkway.	Connect the trail via Crater Lake Parkway by widening the sidewalks to provide for shared-use path.	Lower cost to implement and maintain.	$68,000	Requires crossing Crater Lake Parkway.	Connect the trail via Crater Lake Parkway by widening the sidewalks to provide for shared-use path	
						Requires a trail crossing of Esplanade Avenue.		
						Requires widening the sidewalk on the bridge for a shared-use path to connect the A Canal trail to the intersection of Esplanade Avenue/Crater Lake Parkway.		
			Connect the trail by constructing a new shared-use path along the railroad tracks.	Requires fewer conflicts with local streets than using the Crater Lake Parkway sidewalks.	$819,000	Would require separate bridge at the river crossing.		
				The crossing of Crater Lake Parkway would occur at the signal of Esplanade Avenue/Crater Lake Parkway.		Requires a trail crossing of Esplanade Avenue.		
				Provides a connection to the school ballfields area.		Requires expanding the sidewalk to accommodate a shared-use path under the railroad tracks.		
						Would likely require ROW or an easement from the railroad.		
			Connect the "A" Canal trail to the school using the school's canal bridge and a new shared-use trail connect, and then connect to Upham Street and Crescent Street.	Provides a connection to the school.	$206,000	Requires expanding the sidewalk to accommodate a shared-use path under the railroad tracks.		
				Uses an existing bridge to cross the canal.		Requires a trail crossing of Esplanade Avenue.		
				Uses the crossing of Crater Lake Highway at Portland Street to complete the connection to the ODOT Trail, but may also provide a connection to the bike lanes on Oregon Avenue via Upham Street.		May require ROW from the school.		
G-3	Connecting the "A" Canal Trail to the Foothills Trail	The Foothills Trail ends at the intersection of Foothills Boulevard/Crater Lake Parkway, and there is a gap between the intersection and the "A" Canal trail south of the canal.	Widen the sidewalk on the east side of the bridge to provide a shared use path between the intersection and the "A" Canal trail. Tighten the curb radius for NB right-turns onto Crater Lake Parkway.	This option uses the existing signalized crossing as well as sidewalks and bike lanes south of OR 39 to complete the transition. By expanding the sidewalk to a path on the east side, it allows southbound bicyclists to continue from the Foothills Trail to the "A" Canal trail eastbound with only one crossing.	$60,000	Accommodating the shared-use path on the bridge may require either removing the bike lanes or lane width reductions	Widen the sidewalk on the east side of the bridge to provide a shared use path between the intersection and the "A" Canal trail. Tighten the curb radius for NB right-turns onto Crater Lake Parkway.	
				Project could be phased in.		Requires a trail crossing of Washburn Way.		
				Tightening the curb radius will slow down right-turns making the crossing more comfortable		Would require out-of-direction travel if the sidewalk is not widened to a shared-use path		
G-4	Connecting the "A" Canal Trail to the Ella Redkey Swimming Pool	The trail is grade separated from the pool.	Connect the trail by installing a shared-use path between the parking lot/front entrance to the pool and the existing "A" Canal Trail.	Would provide a direct connection between the trail and a popular destination	$15,000	May require right-of-way or an easement.	Connect the trail by installing a shared-use path between the parking lot/front entrance to the pool and the existing "A" Canal Trail.	
G-5	Connecting the "A" Canal Trail to the Kiger Stadium and Klamath County Fairgrounds	The trail is grade separated from these locations.	Pave the existing informal service from from the “A” Canal Trail to the Kiger Stadium Parking lot. Install a shared use path along the west side of Crest Street from the Kiger Stadium Parking lot to the Fairgrounds.	Provides facility for both pedestrians and bicyclists.	$105,000	May require right-of-way or an easement to reach Crest Street	Pave the existing informal service from from the “A” Canal Trail to the Kiger Stadium Parking lot. Install a shared use path along the west side of Crest Street from the Kiger Stadium Parking lot to the Fairgrounds.	
				Separates pedestrians and bicyclists from vehicles at Kiger Stadium.		More costly than connecting to only the stadium		
	Campus Trail to Biehn Street	There is a gap between the Campus Trail and the bike lane on Biehn	Widen the sidewalk on the south side of Campus Drive to complete the shared-use path connection. Possible modifications to the Crater Lake Parkway intersection.	This connection would also connect with the ODOT trail.	$47,000	Southbound cyclists coming from the Campus Trail would use the crosswalks at the signalized intersection to transition to bike lanes.	Widen the sidewalk on the south side of Campus Drive to complete the	
				Uses the existing intersection of Crater Lake Parkway/Biehn Street to complete the highway crossing.		Modifications of the Crater Lake Parkway intersection may be required to create a comfortable crossing		

ID	Location	Issue	Potential Project	Benefits	Cost Estimate	Considerations	Recommended Project	Recommended for Further Analysis
G-6	~~Campus Trail to Bicm Street~~ Connection	Street, which connects to Oregon Avenue and downtown Klamath Falls.	Provide bike lanes on Campus Drive. Possible modifications to the Crater Lake Parkway intersection.	Same as above	$4,000	Modifications of the Crater Lake Parkway intersection may be required to create a comfortable crossing	shared-use path connection. Possible modifications to the Crater Lake Parkway intersection.	
						Requires southwest-bound bicyclists to transition from the shared use path to the bicycle lane, likely at the intersection with Dahlia Street.		
						The bike lanes would need to be buffered or protected to bring the LTS below 3.		
G-7	Connecting the ODOT Trail to Kit Carson Park	The ODOT Trail is adjacent to the park, but a fence separates the park from the trail.	Construct a connection between the trail and the parking lot or existing sidewalk connecting the street to the park.	Low cost, short trail connection needed.	$18,000	May require right-of-way or an easement.	Construct a connection between the trail and the parking lot or existing sidewalk connecting the street to the park.	
G-8	Veteran's Park Trail Connections	There are no bicycle connections between Veteran's Park and the Link River Trail.	Widen the sidewalk on the north side of Main Street to provide for a shared use path to connect Veteran's Park with the Link River Trail. Install a crossing across Main Street west of the park road's access to Main Street to connect Veteran's Park with the path. Sharrows may work as an interim solution.	Provides a separated facility for pedestrians and bicyclists between two popular destinations	$51,000	Lanes will have to be narrowed on the bridge to accommodate the shared-use path.	Widen the sidewalk on the north side of Main Street to provide for a shared use path to connect Veteran's Park with the Link River Trail. Install a crossing across Main Street west of the park road's access to Main Street to connect Veteran's Park with the path. Sharrows may work as an interim solution.	Ultimate configuration should be determined with redesign of interchange area.
						An additional crossing of Main Street may be needed on the west side of the bridge.		
G-9	"A" Canal Trail to Crossing at SW 6th Street	The trail crosses SW 6th Street approximately 40 feet east of the crosswalk at the signalized intersection of Summers Lane/SW 6th Street.	Widen the sidewalk on the south side of SW 6th Street to better accommodate bicyclists connecting to the signalized crossing.	Low cost; requires minimal out of direction travel.	$7,000	Will need to verify there is sufficient right-of-way.	Widen the sidewalk on the south side of SW 6th Street to better accommodate bicyclists connecting to the signalized crossing.	
G-10	"A" Canal Trail Connection to Klamath Union High School	There is no connection for bicyclists between the "A" Canal Trail and the high school.	Widen the sidewalk on the north side of Esplanade Avenue to provide a shared-use path to the high school. Coordinate with school for completing the connection.	Provides connection for bicyclists between the trail and high school.	$127,000	Should be completed in conjunction with the crossing in project C-12.	Widen the sidewalk on the north side of Esplanade Avenue to provide a shared-use path to the high school. Coordinate with school for completing the connection.	
				There appears to be adequate width available under the railroad bridge to complete the widening.		Coordination with the school will be required.		
G-11	Southern Connection to Steen Sports Park	There is no connection to Steens Sports Park from the south without using Homedale Road and Foothills Boulevard.	Formalize connections between Summers Lane and/or Wiard Street and Steens Sports Park.	Will create a more direct access to the south of the park.	$40,000	May require right-of-way or an easement to complete the connection.	Formalize connections between Summers Lane and/or Wiard Street and Steens Sports Park	
C-1	OR 39: OC&E Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	TBD by ongoing ODOT and Oregon Parks study.				TBD by ongoing ODOT and Oregon Parks study.	
C-2	Homedale Road: OC&E Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is a crosswalk.	TBD by ongoing ODOT and Oregon Parks study.				TBD by ongoing ODOT and Oregon Parks study.	
C-3	Hope Street: OC&E Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install striped crosswalk and appropriate signage.	Low cost.	$2,000	Consider installing illumination at the crossing as well (it is currently located nearby but not at the crossing).	Install striped crosswalk and appropriate signage.	
C-4	Summers Lane: OC&E Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	TBD by ongoing ODOT and Oregon Parks study.				TBD by ongoing ODOT and Oregon Parks study.	
C-5	Altamont Drive: OC&E Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	TBD by ongoing ODOT and Oregon Parks study.				TBD by ongoing ODOT and Oregon Parks study.	
C-6	Homedale Road: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install marked crosswalk, appropriate signage, and raised median.	Low cost.	$8,000	Consider installing illumination at the crossing as well (there is not existing illumination on Homedale Road in the crossing vicinity).	Install marked crosswalk, appropriate signage, and raised median.	
C-7	Hope Street: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install marked crosswalk and appropriate signage.	Low cost.	$2,000	Consider installing illumination at the crossing as well (there is no existing illumination in the vicinity).	Install marked crosswalk and appropriate signage.	
						Sight distance from the south should be verified.		
C-8	Shasta Way: A Canal Trail Crossing	This crossing is currently only marked with a sign. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	Install refuge island and RRFBs where the trail crosses.	Provides a refuge for people crossing the road	$46,000	Would likely require closing the westbound left-turn lane into Crest Street		Further study required to determine final treatment. Active crossing treatments recommended.
				Direct crossing				
				Existing pavement width would accommodate the refuge.				
			Install marked pedestrian crossing with RRFBs at the intersection of Shasta Way/Crest Street.	May permit the westbound left-turn lane to remain.	$40,000	Requires out of direction travel. Greater exposure without the refuge island.		
				Lower cost		Sidewalks between crossing and trail may need to be widened to accommodate pedestrians and bicyclists.		
C-9	Eberlein Avenue: A Canal Trail Crossing	This crossing is currently marked with a sign. The NCHRP 562 treatment recommendation is a crosswalk.	Install marked crosswalk, appropriate signage, and RRFB.	Low cost.	$40,000	Sight distance may be an issue. Closing the eastern Avalon Street connection to Eberlein Avenue could be considered.		Further study required to determine final treatment. Active crossing treatments recommended.
C-10	Washburn Way: A Canal Trail Crossing	This crossing is currently only marked with a sign. However, it is in close proximity to a traffic signal. The NCHRP 562 treatment recommendation is an Active/Enhanced crossing.	Install enhanced crossing with refuge island and RRFBs at the trail crossing.	Direct crossing	$56,000	Would restrict the length of the northbound left-turn lane at the intersection of Washburn Way/OR 39 if a pedestrian refuge island is installed.		Further study required to determine final treatment. Active crossing treatments recommended.
						Advanced RRFBs may installed to warn vehicles turning onto Washburn Way when a pedestrian has activated the RRFB.		
			Install grade-separated crossing of Washburn Way.	Provides separation between vehicles and bicyclists/pedestrians without requiring out of direction travel.	$800,000	High cost.		

ID	Location	Issue	Potential Project	Benefits	Cost Estimate	Considerations	Recommended Project	Recommended for Further Analysis
			Provide connections to the traffic signal to encourage crossing there.	Provides a protected crossing without restricting the left-turn lane at the intersection.	$36,000	Requires out of direction travel of approximately 500 feet. May require a fence/gate to direct people to the correct location.		
						Would require widening the sidewalks to accommodate shared-use paths (for 2-way bike travel) between the trail and the intersection.		
C-11	Main Street: A Canal Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is an Active/Enhanced Crossing.	Install activated crossing with refuge island at the trail crossing.	Direct crossing	$56,000	The 4-lane cross section is approximately 60-ft of pavement, which may provide adequate width to widen for a refuge island.		Further study required to determine final treatment. Active crossing treatments recommended.
				Island provides the potential for a two-stage crossing		Queuing from the intersection of Main Street/OR 39 may block the crossing at times.		
						Advanced RRFBs may be installed to warn vehicles turning from Crater Lake Parkway onto Main Street when a pedestrian has activated the RRFB. Or the free right-turn onto Main Street could be modified to be stop-controlled.		
			Install grade-separated crossing of Main Street.	Provides separation between vehicles and bicyclists/pedestrians without requiring out of direction travel.	$800,000	High cost.		
			Provide connections to the traffic signal to encourage crossing there.	Would not impact or be impacted by the intersection queuing.	$46,000	Requires out of direction travel. May require a fence/gate to direct people to the correct location.		
						May require sidewalk widening to accommodate transporting bicyclists and pedestrians to the signalized crossing.		
C-12	Esplanade Avenue: A Canal Trail Crossing	This crossing is currently not marked or signed. The NCHRP 562 treatment recommendation is an Active/Enhanced Crossing.	Install activated crossing with refuge island at the trail crossing.	Direct crossing	$56,000	Advanced RRFBs may be needed on OR 39.		Further study required to determine final treatment. Active crossing treatments recommended.
				Island provides the potential for a two-stage crossing		Queuing from the intersection of Esplanade Avenue/OR 39 may block the crossing at times.		
						The left-turn lane on Esplanade Avenue may need to be shortened to accommodate a refuge island.		
			Install grade-separated crossing of Esplanade Avenue.	Provides separation between vehicles and bicyclists/pedestrians without requiring out of direction travel.	$800,000	High cost.		
			Provide connections to the traffic signal to encourage crossing there.	Would not impact or be impacted by the intersection queuing.	$0	Requires out of direction travel. May require a fence/gate to direct people to the correct location.		
						May require sidewalk widening to accommodate transporting bicyclists and pedestrians to the signalized crossing.		
B-1	OR 39 (OC&E Trail to OR 140)	This segment has a LTS of 3. There are no existing bicycle lanes.	Install buffered bicycle lanes or protected bicycle lanes.	By widening existing shoulders and narrowing lanes/center turn lanes, sufficient width for bicycle lanes may exist using existing pavement. However, additional pavement may be needed for buffered bike lane or protected bike lanes.	$12,000	Additional treatments such as colored pavement markings should be considered at the junction of OR 140/OR 39.	Install protected or buffered bike lanes.	
B-2	6th Street (Railroad Bridge to OR 39)	This segment has a LTS of 4. This is a four-lane road with a center turn lane. There are no bike lanes.	Install buffered or protected bicycle lanes in both directions.	The buffered facility would provide separation between bicyclists and vehicles.	$72,000	There are many driveways along this corridor, and access will need to be maintained with the buffered bike lanes.		Identify if there are parallel routes that would provide similar connectivity but greater comfort
				All of the major roads that are crossed by 6th Street are controlled with a signal.		The existing pavement width is not wide enough to install protected bike lanes without widening the road or removing an existing lane(s). Widening may not be possible due to existing building locations. A buffered bike lane may be possible. Existing inside lanes are approximately 12' wide, with a 16' center turn lane. The outer travel lanes are approximately 15' wide. No additional shoulders exist.		
			Widen existing sidewalk on both sides of the road to become a shared-use path and accommodate pedestrians and bicyclists.	Provides a separated facility for bicyclists.	$3,240,000	Creates a potential conflict area between pedestrians and bicyclists.		
						Requires additional treatments at driveways and minor street intersections		
						May still require narrowing of lanes to fit extra path width. Alternatively, ROW impacts may exist if the City builds the paths away from the street.		
						The 6th Street bridge over the canal is approximately 87' wide, including two left turn lanes and approximately 5' sidewalks on both sides. Installing a shared use path on this bridge without removing a lane is challenging.		
			Identify if there are parallel routes that would provide similar connectivity but greater comfort	Low volume, low speed local roads can provide comfortable alternatives to high-speed, high volume arterials	TBD	Some bicyclists may continue to use 6th Street if it is more direct.		
						Access to specific destinations on 6th Street will need to be considered. Local street connectivity is fragmented in locations. Use trails whenever possible.		

ID	Location	Issue	Potential Project	Benefits	Cost Estimate	Considerations	Recommended Project	Recommended for Further Analysis
B-3	Shasta Way (Patterson Street to Kimberly Drive)	This segment has a LTS of 4. It Is currently a two-lane road with a marked centerline and pavement width of approximately 22 feet.	Install sharrows and traffic calming.	Width is not sufficient for bike lanes. Appears to be relatively low-volume street. The sharrows would alert vehicles that bicyclists share the road.	$43,000	Sharrows alone will not do much for the comfort of people bicycling. Traffic calming will also be required to lower the speed people are driving.	Install sharrows and traffic calming	Outreach to neighborhood to determine support for traffic calming measures.
				Does not require roadway widening.				
B-4	Shasta Way (Patterson Street to Crater Lake Parkway)	This segment has a LTS of 4. No bike lanes are present, and the existing pavement width is approximately 37' wide with one travel lane in each direction and center turn lanes throughout.	Look for opportunities for alternate routes or for traffic calming measures on Shasta Way	Low volume, low speed local roads can provide comfortable alternatives to high-speed, high volume arterials	TBD	Local street connectivity is fragmented in locations.		Look for opportunities for alternate routes or for traffic calming measures on Shasta Way
			Remove the center turn lane and provide buffered or protected bicycle lanes	Provides on-street bicycle facility that does not require out-of-direction travel by cyclists.	$50,000	The removal of the center turn lane could increase motor vehicle crashes at driveways and intersections and increase delay for people driving		
				Fewer right-of-way impacts				
B-5	Patterson Street (6th Street to Foothills Boulevard)	This segment has a LTS of 4. There are no existing bicycle lanes. The pavement width is approximately 38' for most of the segment, and the cross section is one-lane in each direction with a center turn lane. When the road reduces to two lanes (and transitions to Foothills Blvd), it has paved shoulders of approximately 7 feet in width.	Install buffered or protected bicycle lanes by restriping to remove center turn lane.	Provides a comfortable space for people to bicycle in	$37,000	Even if the center turn lane is removed, some additional widening may be needed to provide protected or buffered bike lanes. Because the posted speed limit is 35 mph, installing a bike lane with no buffer will not bring the LTS below 3.		Further study required to determine final treatment. Candidates include buffered bike lanes or a shared-use path.
				Pedestrians are acommodated using the sidewalks on Patterson Street between 6th Street and Church Hill Drive, and then pedestrians must use the residential neighborhood streets to connect west to Homedale Road.				
			Widen one side sidewalk to accommodate shared-use path, and install shared use path on north end where the sidewalk ends to connect to Foothills trail.	Provides separated bicycle facility.	$247,000	The bicycle facilities need to connect with the end of the Foothills Trail, which would require a transition from one path, to bike lanes, and back to another path, unless the Patterson Street path continued all the way around the corner, increasing the cost of the project.		
				Could connect with Foothills trail without crossing any major roads.		The intersections with local streets on the corridor would need treatments to alert drivers of potential cyclists from either direction.		
						Creates potential conflicts between bicyclists and pedestrians on the path.		
						Will likely have ROW impacts since widening will likely have to be done away from the road, and the northern section of trail will likely have ROW impacts.		
B-6	Homedale Road (OR 140 to Shasta Way)	This segment has a LTS of 4. The 3-lane cross section is approximately 37' wide throughout.	Install protected or buffered bicycle lanes by removing the center turn lane.	The existing bridges have adequate width if the center turn lane is dropped at the bridge.	$88,000	Installing bicycle lanes here may be done in conjunction with signage to direct vehicles to other routes. (prioritizing bikes on this road and vehicles on other roads)		Further study required to determine which routes will be designated for bicycle travel and what the treatment is.
				Roadway can be restriped with 7.5' buffered or protected bike lane and 11' travel lanes.				
B-7	Summers Lane (OR 140 to SW 6th Street)	This segment has a LTS of 4. The 3-lane cross section is approximately 37' wide throughout.	Alternate/parallel route.	Providing east-west connections to Homedale Road and prioritizing improvements on Homedale Road may serve as an alternate route for Summers Lane.	TBD after further study of best parallel routes	Some cyclists would likely continue using this route due to convenience.		Further study required to determine which routes will be designated for bicycle travel and what the treatment is.
						Signage would be needed to encourage cyclists to use the parallel routes.		
			Install protected or buffered bicycle lanes by removing the center turn lane.	The existing canal bridge is wide enough to support bike lanes (potentially not buffered on the bridge) if the center turn lane is removed here.	$72,000	Would require roadway widening or removal of center turn lane.		
B-8	Altamont Drive (OR 140 to OC&E Trail)	This segment has a LTS of 4. The pavement width is approximately 28' with two travel lanes.	Install buffered or protected bike lanes by widening the roadway.	Separates bicyclists from vehicles.	$3,273,000	Would require roadway widening and may have ROW impacts.		Further study required to determine which routes will be designated for bicycle travel and what the treatment is.
			Parallel routes	Parallel low volume/low speed routes could be comfortable as a shared space	TBD after further study of best parallel routes	Would need to further consider the route and crossing treatments		
B-9	Washburn Way (Crosby Avenue to OR 140)	This segment has a LTS of 4. Five-foot wide bike lanes are present and the cross section is 5-lanes. The pavement width is 70' wide.	Encourage Altamont Drive as alternate/parallel route.		TBD after further study of best parallel routes	Some cyclists would likely continue using this route due to convenience.	Buffered/Protected Bicycle Lane or Parallel Routes	Further study required to determine which routes will be designated for bicycle travel and what the treatment is.
			Install buffered or protected bicycle lanes in both directions by	Provides separated bicycle facility.	$2,353,000	Requires some type of transition between OR 140 and Washburn Way (which is connected by on/off ramps), dependent upon treatment for OR 140 too.		
						Would likely require roadway widening. The existing travel lanes and sidewalks likely cannot be reduced in width.		

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			widening the road..			The bridge over the railroad is constrainted and would not accommodate buffered bike lanes and sidewalks. This would likely need to have the sidewalk widened on both sides to create paths but there is very limited width to do so.		
B-10	Washburn Way (OC&E Trail to Crosby Avenue)	This segment has a LTS of 3. Five-foot wide bike lanes are present and the cross section is 5-lanes. The pavement width is 68' wide.	Connect Maywood drive north to the OC&E Trail, and promote Maywood drive as an alternate route north of Hilyard Avenue.	Removes bicyclists from the 5-lane busy road.	$124,000	Some cyclists may continue using Washburn Way.	Buffered/protected bicycle lane or parallel Routes, including using Crosby to connect to Altamont drive	Further study to evaluate trade-offs of protected/buffered bicycle lane impacts and parallel routes.
						Would likely require ROW or an easement to complete the new trail connection.		
			Widen existing sidewalk to become shared-use path.	Provides separated bicycle facility.	$102,000	This project should be consistent with L-9.		
						Driveways along the corridor would need treatment.		
			Install buffered or protected bicycle lanes in both directions by restriping to remove the center turn lane.	Provides separated bicycle facility.	$8,000	This project should be consistent with L-9. Further evaluation of impacts associated with removing the center turn lane is needed.		
B-11	Washburn Way (Eberlein Avenue to OC&E Trail)	This segment has a LTS of 3. South of OR 39, bike lanes exist. North of OR 39, bike lanes end, and the section is 5-lanes wide (60' of pavement).	Install buffered or protected bicycle lanes in both directions by restriping to remove the center turn lane.	Provides separation between vehicles and bicyclists.	$19,000	Driveways and local streets access may need treatments.	Buffered or protected bike lanes, or parallel routes.	Further study required to determine which routes will be designated for bicycle travel and what the treatment is.
				Would provide continuity between the existing bike lanes south of OR 39 and north of Eberlein.				
			Parallel routes to connect to Altamont Drive.	Removes bicyclists from the 5-lane busy road.	Further study needed to determine best route.	Some cyclists would likely continue using this route due to convenience.		
B-12	OR 140 (Washburn Way to Homedale Road)	This segment has a LTS of 4.	Install buffered or protected bicycle lanes in both directions by widening the existing shoulders.	Provides some separation between vehicles and bikes.	$1,279,000	One crossing of the railroad is involved.	Shared-use path	
						Requires some type of transition between OR 140 and Washburn Way (which is connected by on/off ramps).		
						Requires widening, which may have ROW impacts.		
			Installed shared-use path.	Installing it along the north side of the road would minimize the number of bicycle crossings of OR 140.	$820,000	One crossing of the railroad is involved.		
				Provides physical separation between bikes and vehicles.		Requires some type of transition between OR 140 and Washburn Way (which is connected by on/off ramps).		
				Provides facility for pedestrians too.		Requires widening, which may have ROW impacts.		
						Treatments may be needed at crossings with minor streets.		
B-13	6th Street (Market Street to Main Street)	This segment has a LTS of 3. There are no existing bicycle facilities on the road. The road is one-way with two travel lanes and a total pavement width of 46 feet. In the downtown area there are turn lanes and on-street parking.	Install bicycle lane.	No roadway widening is required.	$8,000	One side of on-street parking may need to be removed.	Bike Lane	
B-14	5th Street (Main Street to 6th Street)	This segment has a LTS of 4. There are no existing bicycle facilities on the road. The road is one-way with two travel lanes and a total pavement width of 45 feet. In the downtown area there are turn lanes and on-street parking.	Install bicycle lane.	No roadway widening is required.	$9,000		Bike Lane	
B-15	Klamath Avenue (Conger Avenue to Commercial Street)	This segment has a LTS of 3. This is a one-way eastbound segment with no bike lanes.	Install bike lanes.	No roadway widening is required.	$15,000	Would require consideration of on-street parking impacts in the design.	Bike Lane; Coordinate with Blue Zones project	
						May require the removal of on-street parking or a travel lane to accommodate the bike lane width.		
B-16	Main Street (Esplanade Avenue to Mill Street)	This segment has a LTS of 3. This is a one-way westbound segment with no bike lanes.	Install bike lanes.	No roadway widening is required.	$15,000		Bike Lane; Coordinate with Blue Zones project	
B-17	9th Street (Klamath Avenue to Prospect Street)	This segment has a LTS of 3. There are no bicycle lanes; the 2-way roadway has a minimum pavement width of 26 feet.	TBD by ongoing study.				TBD by ongoing project.	TBD by ongoing project
B-18	N 11th Street (Oregon Avenue to Klamath Avenue)	This segment has a LTS of 3. There are no bicycle lanes. The 2-lane roadway has a minimum pavement width of 25 feet.	TBD by ongoing study.				TBD by ongoing project.	TBD by ongoing project
B-19	Oregon Avenue (Moore Park to Upham Street)	The segment has a LTS of 3. Although there are bike lanes, they are narrow. Actual traffic speeds are expected to be higher than posted.	TBD by ongoing study.				TBD by ongoing project.	TBD by ongoing project
B-20	Lakeshore Drive (Lynnewood Blvd to West UGB)	The segment has a LTS of 3. There are no shoulders or bike lanes.	Widen the pavement to accommodate shoulders or bike lanes.	Provides a facility for bicyclists.	$1,860,000	The road will need to be widened to accommodate paved shoulders, and the some earthwork is likely to be needed with the widening.	Bike Lanes	
						There may be some ROW impacts associated with roadway widening.		
B-21	Main Street (Esplanade Avenue to Crater Lake Parkway)	The segment has an LTS of 4. The eastern portion of the corridor is 4 lanes and 58-60 feet wide. Aerial images indicate this area is also used for on-street parking. The western portion of the corridor is approximately 54 feet wide and has two travel lanes with two sides of on-street parking. (This is also a potential connection that is relevant to project G-1. The undercrossing below the railroad tracks requires cyclists to ride in the lanes or use the narrow tunnel.)	Install bike lanes	Provides a facility for bicyclists.	$19,000	The on-street parking may need to be reconfigured between Spring Street and Esplanade Avenue to accommodate the bike lane.	Bike lanes	
						Between Spring Street and Crater Lake Parkway, elimination of the on-street parking or a road diet would be required to accommodate the bike lanes.		
						The eastbound bike lane would require a transition treatment where E Main Street turns off of Main Street.		
						The pavement width is not adequate for adding a bicycle lane under the railroad, so the sidewalk would need to be widened to accommodate bikes. A transition between the bike lanes and sidewalks would also be needed.		
B-22	Old Fort Road (Loma Linda Drive to UGB)	The LTS is 4. The road is higher speed and lacks bike lanes and shoulders. This is a popular recreational route	Widen the road to add paved shoulders or bike lanes.	The road appears to have some gravel shoulders today, so the additional widening may be minimal.	$2,668,000	This is a long distance to pave (high cost).	Bike lanes	
			Install a shared-use path			May require ROW.		

ID	Location	Issue	Potential Project	Benefits	Cost Estimate	Considerations	Recommended Project	Recommended for Further Analysis
		recreational route.	to accommodate cyclists and pedestrians.		$1,710,000	The number of pedestrians in this area is likely very low.		
B-23	Biehn Street (Crater Lake Parkway to Oregon Avenue)	The road is part of an important link between OIT and downtown. The existing bike lanes are narrow.	Widen the bike lanes by restriping the roadway.	No pavement widening is required. Narrowing the motor vehicle travel lanes may also calm traffic.	$22,000		Widen the bike lanes	
B-24	Crosby Avenue (Washburn Way - Altamont Drive)	Connects neighborhoods to the north-south routes that connect to the trail system.	Shared lane markings, wayfinding, and/or traffic calming	Low cost improvements that could enhance comfort for people bicycling and increase the use of the trail system.	TBD	Further neighborhood outreach and speed studies may be necessary to identify specific treatments.		Further study required to identify which should receive shared lane markings, wayfinding, and/or traffic calming.
B-25	Hillyard Avenue (Washburn Way - Summers Lane)	Connects neighborhoods to the north-south routes that connect to the trail system.	Shared lane markings, wayfinding, and/or traffic calming	Low cost improvements that could enhance comfort for people bicycling and increase the use of the trail system.	TBD	Further neighborhood outreach and speed studies may be necessary to identify specific treatments.		Further study required to identify which should receive shared lane markings, wayfinding, and/or traffic calming.
B-26	Laverne Avenue (Washburn Way - Crest Street)	Connects neighborhoods to the north-south routes that connect to the trail system.	Shared lane markings, wayfinding, and/or traffic calming	Low cost improvements that could enhance comfort for people bicycling and increase the use of the trail system.	TBD	Further neighborhood outreach and speed studies may be necessary to identify specific treatments.		Further study required to identify which should receive shared lane markings, wayfinding, and/or traffic calming.
B-27	Bristol Avenue (Summers Lane - Homedale Road)	Connects neighborhoods to the north-south routes that connect to the trail system.	Shared lane markings, wayfinding, and/or traffic calming	Low cost improvements that could enhance comfort for people bicycling and increase the use of the trail system.	TBD	Further neighborhood outreach and speed studies may be necessary to identify specific treatments.		Further study required to identify which should receive shared lane markings, wayfinding, and/or traffic calming.
B-28	N Eldorado Avenue	This road lacks bicycle facilities and sidewalks on one side of the road. This road is a popular commute route to the hospital, and also connects student apartments to the campus.	Install sharrows and traffic calming.	Posted speed limit indicates that a shared-roadway would be sufficient. The sharrows would alert vehicles that bicyclists share the road. No roadway widening is required.	$23,000	This project does not provide any new pedestrian facilities, but sidewalks exist on one side of the road.	Install sharrows and traffic calming.	
S-1	OR 39 (OC&E trail to Keller Road)	There are no sidewalks.	Install sidewalks on both sides of the road.		$396,000	May require ROW.	Sidewalks	
S-2	Hope Street (Bristol Avenue to SW 6th Street)	There are no sidewalks on Hope Street, with the exception of those around Denver Avenue.	Install sidewalks on both sides of the road.	Provides connection for pedestrians between Peterson Elementary school and the OC&E and A Canal trails. The bridge over the canal already includes sidewalks.	$1,170,000	May require ROW.	Sidewalks	
P-1	Trail Signing/Wayfinding	Wayfinding and trail signs are generally absent, including near the OC&E trailheads. Signage provides an opportunity to increase awareness and use of the trail system for residents and visitors.	Develop a program to install and maintain wayfinding signage at all trailheads and trail crossings of public streets.	Signage provides an opportunity to increase awareness and use of the trail system for residents and visitors.	Program	Will need to determine who is responsible for the signs.	Develop a program to install and maintain wayfinding signage at all trailheads and trail crossings of public streets.	
P-2	Bicycle Parking	Bicycle parking is absent from many destinations, including some parks.	Develop policy that requires bicycle parking to be provided at key locations when new development or redevelopment occurs and pursue grant funding to provide it at key locations where it is missing.	The policy would help future developments or redevelopment locations obtain bicycle parking. Pursuing grant funding for existing locations in need will help in-fill existing gaps.	Policy/Program		Develop policy that requires bicycle parking to be provided at key locations when new development or redevelopment occurs and pursue grant funding to provide it at key locations where it is missing.	
P-3	Local Street Trail Crossings	The “A” Canal trail and the OC&E trails cross many local streets. There is a desire for consistent crossings.	Develop guidelines for how to evaluate trail crossings and determine the appropriate treatment for the City and County to use in applying consistent treatment at crossings for local streets.	Guidance would encourage consistent crossings on all roads throughout the trail system.	Policy			
P-4	Trail Illumination	Most of the trail system does not have illumination.	Evaluate the feasibility of installing illumination along the trail system, including type of illumination, priority locations, and cost/maintenance.	The study will allow engagement with nearby property owners. The illumination may help reduce crime.	Policy			