



Larson Creek

Multi-Use Path Route Assessment

JULY 2007

Acknowledgements

City of Medford

Peter Mackprang (Project Manager)
Alex Georgevitch
Suzanne Myers
Pete Young

Alta Planning + Design

Steve Durrant, RLA, Project Manager
Michael Rose, RLA, Project Landscape Architect

Cogan Owens Cogan

Jim Owens, Principal
Teak Wall, Planner

OBEC Consulting Engineers

Jeff Bernardo, P.E.



July 2007

Table of Contents

Introduction.....	3
Background	3
Vision and Goals	4
The Study	5
Existing Conditions	9
Population Growth and Development	9
Demographics.....	9
Demand.....	9
Flooding and Natural Resources	10
Trail Access	10
Quail Point Golf Course	10
Opportunities and Constraints	11
Preferred Trail Alignment.....	25
Vision	25
Goals.....	25
Trail Alignment Alternatives	25
Trail Alignment Narrative by Option	30
Conclusion.....	32
Trail Design Elements	47
Typical Trail Cross-Section Design.....	47
Roadway Crossings.....	49
Bridges	52
Standard Crossing Features.....	52
Trail Access	53
Trail Amenities	54
Signing	55
Landscaping.....	56
Project Implementation	61
Phasing.....	61
Cost Estimates	61

Zoning, Permitting, and Natural Resources.....	62
Natural Resources	63
Funding Sources	63
Maintenance and Safety Recommendations	69
Trail Safety.....	69
Trail Watch Program	70
Corridor Maintenance.....	71

Introduction

Background

Vision and Goals

Phases of the Study

Introduction

Location

Larson Creek is a tributary of Bear Creek flowing largely through residential areas in the southern part of Medford. The proposed two-mile Larson Creek Multi-Use Path extends east from Bear Creek through primarily residential neighborhoods to North Phoenix Road when it will connect with the trail system under development in Southeast Medford. While portions of the creek are in a relatively natural state, several sections suffer from stream degradation due to non-native vegetation and erosion. There is a two-block section contained in a narrow concrete channel. Implementation of the recommendations in this study will provide a non-motorized transportation alternative to sidewalks and traffic lanes on Barnett Road, increase recreational opportunities, improve habitat and stabilize the streambank. The improvements will benefit the long-term health of the community, Larson Creek, and the associated wildlife and vegetation.

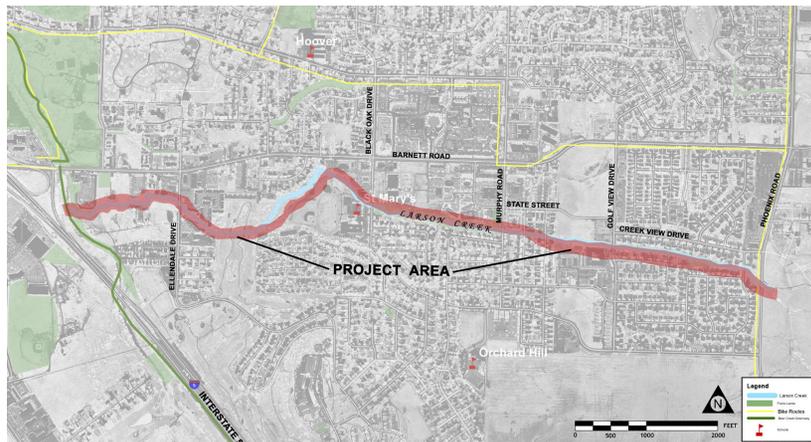


Figure 1. Location Map

Purpose

The purpose of the Larson Creek Multi-Use Path Route Assessment is two-fold:

- Develop a multi-use trail alignment that will link the Bear Creek Greenway to neighborhoods along Larson Creek.
- Establish the Larson Creek corridor as a greenway for future waterway restoration and rehabilitation projects, community open space, flood control and habitat preservation; and to restore portions that have suffered from environmental degradation.

The Larson Creek Multi-Use Path Route Assessment (the 'Plan') is a 'toolbox' containing the necessary nuts and bolts for successful trail development and implementation. The 'tools' include specific recommendations and guidelines for trail and greenway design, the list of required project permits or permitting agencies, the cost estimates and potential funding sources. The Plan is also a tool to use for seeking project funding. Funding organizations often require the type of information provided in the Plan to determine grant eligibility and project feasibility.

Background

Development of the corridor for trail purposes dates back to original platting and development when park and trail rights-of-way were established, and the first segment was built from Black Oak Drive to Murphy Road. The Medford Transportation System Plan (TSP), adopted in 2003, identified completion of the Larson Creek Multi-Use Path as a priority project. Subsequent recommendations by the Medford Bicycle Advisory Committee confirmed the corridor as a high priority project and noted its importance as a non-motorized travel alternative to Barnett Road. In the fall of 2006, the City of Medford retained Alta Planning + Design to prepare the Larson Creek Multi-Use Path Master Plan. Development of the Larson Creek Multi-Use Path Master Plan involved several steps: inventory,

public participation, alignment options and assessment, and design recommendations. The master planning work involved the following tasks:

- Identification of project goals and objectives.
- Preparation of base maps reflecting existing conditions including natural features, historical features and land uses, extensive photo documentation of the corridor, and review of existing plans and other relevant documents.
- Technical analysis of standards, regulations, and permitting requirements.
- Opportunities and constraints analysis for a trail alignment in the Larson Creek corridor.
- Conceptual trail alternatives analysis.
- Public review of trail alignment options and trail design features. Input was received from landowners adjacent to Larson Creek, agency stakeholders, community organizations and interested citizens at one public open house.
- Preparation of planning-level cost estimates and trail implementation plan.
- Completion of a Draft Larson Creek Multi-Use Path Route Assessment.

Vision and Goals

Greenways are interconnected corridors, usually along water bodies or between urban centers that are reserved for non-motorized uses and environmental preservation. Greenways provide direct connections for walkers and runners, bicyclists, and other non-motorized users to other networks, such as bicycle lanes and sidewalks on local roadways and other trail systems, as well as to parks and open spaces, schools, neighborhoods, shopping

and other destinations. They may also include stretches of 'quiet' minor roads designed to be more attractive for people on bikes or walking.

The overarching vision for the Larson Creek Multi-Use Path Master Plan is to designate the creek corridor as a greenway and develop a multi-use trail that provides a non-motorized travel alternative paralleling Barnett Road from North Phoenix Road to the Bear Creek Greenway while protecting and enhancing the biological, cultural and historic resources of the corridor.

Goals for the future Larson Creek Multi-Use Path were developed in consultation with the City of Medford to guide trail and greenway design and future trail development.

1. Increase the rate of bicycling and walking in Medford by providing a safe and inviting trail that connects key destinations within the communities.
2. Improve the water quality and aesthetic appeal of the Larson Creek corridor by removing non-native, invasive plants, trash, and other debris, rehabilitating the creek bank, and improving habitat for threatened fish species and other animals.
3. Work with property owners adjacent to Larson Creek to preserve and enhance the corridor as a greenway.
4. Develop trail design and development standards that are easy to maintain and access by maintenance, security, and emergency vehicles and minimize impact to the environment.
5. Develop and establish a comprehensive wayfinding system that enables people to use the trail without the use of a map.
6. Develop a trail master plan that will enable project partners to apply for grants to implement the trail.

The Study

This study included assessment of existing conditions including locations of existing trail segments, right-of-way, easements, environmentally sensitive areas, and safety hazards. Larger citywide and regional connections were identified as well as potential destinations and nearby user groups that are likely to use the trail.

Maps of alternative alignment options were created with opportunities and constraints noted. The evaluation included subjective criteria such as aesthetic appeal, and proximity to a desirable destinations as well as objective criteria such as directness and continuity of the routes, cost, and property ownership. More than 400 invitations were mailed to adjacent property owners and community input was taken in a community meeting discussing the merits of the alternatives. The input gathered was factored into the recommended alignment.

This report includes recommended alignments with descriptions of the design treatments along the trail, estimated costs, and recommended phasing.

Existing Conditions

Population Growth and Development

Demographics

Demand

Flooding and Natural Resources

Trail Access

Quail Point Golf Course

Opportunities and Constraints

Existing Conditions

Population Growth and Development

The population of the city of Medford has increased 33% in the last 15 years, from 46,951 people in 1990 to 73,960 in 2006¹. This kind of growth increases the use of the existing transportation systems and increases development in the



area. The South Medford Interchange is replacing the Barnett Road interchange to handle the new traffic generated by population growth and new development. The Larson Creek Multi-Use Path is envisioned as an alternative east-west corridor for travelers in South Medford. On the west end, the connection with the Bear Creek Greenway Trail makes it an ideal route to reach points north and south, including downtown Medford. On the east, connection to the extensive South East Medford greenway system ties this new community to the greater region. Infill development and redevelopment are underway along a few segments of Larson Creek. Without a plan in place for this greenway, future development can make completing this trail more physically difficult and expensive to implement.

¹ U.S. Census Bureau, 2005 Population Estimates, Census 2000, 1990 Census, <http://factfinder.census.gov>.

Demographics

In addition to the recreational benefits of the proposed trail, there are some demographic groups that benefit enormously from a multi-use, non-motorized trail like this. These are children, the elderly, and those without vehicles that depend on non-motorized transportation and transit. The percentage of the population in Medford over the age of 65 is 14.4% while the nationwide percentage is 12.1%.² The Larson Creek Multi-Use Path will serve nearby retirement communities, including the large Rogue Valley Manor, and a number of medical offices clustered between Black Oak Drive and Murphy Road. The proposed alignment connects St. Mary's School to the trail providing an excellent opportunity for the students to safely walk, bike, rollerblade, or skateboard to school. The proposed trail is also near Orchard Hill Elementary School and will provide improved walking and biking opportunities for those students.

Demand

The only continuous east-west route in the Larson Creek Area is Barnett Road. This road has a daily traffic volume of 38,000 vehicles in some areas, with speeds over 35 miles per hour. High volume streets like this are not the preferred routes of bicyclists and pedestrians. It is not anticipated that Barnett Road will be widened to include bicycle lanes in the long term due to extensive utility and right-of-way acquisition costs. The Larson Creek Multi-Use Path will provide an off-street alternative for bicycle commuters, and a safe alternative for recreational users. The existing segment between Black Oak Drive and Murphy Road is heavily used and currently provides a recreational reprieve for the employees and residents in the vicinity. Completing a connection to the larger trail network can make the trail into a viable transportation corridor.

² *ibid*

Flooding and Natural Resources

The available floodplain data do not show Larson Creek to be a significant flood hazard. However, care needs to be taken to develop the trail in a manner that will not increase the flood danger to surrounding properties. There are opportunities, particularly along the Murphy to Olympic segment, to remove parts of the concrete lined channel that contains the creek and restore the riparian habitat. This could provide additional flood storage and aid in lowering the flood level while improving wildlife habitat. This type of restoration could be part of any mitigation that may be required for other trail development. There is a mapped wetland along the creek west of St. Mary's School. Some potential trail alignments go through or near this wetland and will require wetland permitting, mitigation or elevated structures like boardwalks. A trail through a wetland near a school is also an excellent educational opportunity.



Trail Access

There are numerous locations along this trail for easy access. The endpoints for the study include connections to the proposed Bear Creek Greenway Trail at Highland Drive, and the South Fork Greenway at North Phoenix Road. Trail users will need to be



directed to a safe crossing of North Phoenix Road, a regional level major arterial street. Each street crossing represents an opportunity for access including, from west to east: Ellendale Drive, Black Oak Drive, Murphy Road, Morrison Avenue, Olympic Avenue, Golf View Drive, and Larson Creek Drive. In addition to the street crossings, access to the corridor exists at Hilldale Street. La Loma Drive, Sherbrook Avenue, and Yellowstone Avenue. A connection could also be made at the western end of the private Sun Oaks Drive near the RV storage yard.

Quail Point Golf Course

Existing 10-foot trail easements circle around the northern edge of the Quail Point Golf Course. Golf courses present unique opportunities and hazards for trail users.³ In this case, the proposed alignments bring the trail around the 3rd green and 4th tee on



the course. While trail users may distract golfers, a driven golf ball presents a hazard to trail users. Trail design needs to account for some protection and clear views of the likely direction of oncoming golf balls. There are a number of strategies for achieving this including planting, netting, fencing, earthen berms and signing. The alignment provides a unique opportunity for expansive views of the course, the pond and the distant terrain. The long-term master planning of the Rogue Valley Manor may include redevelopment of portions of the golf course, including the portion abutting the easement, offering an opportunity for re-examining the trail location.

³ "Trails and Golf Courses: Best Practices on Design and Management," Alta Planning + Design, July 2005.

Opportunities and Constraints

The following pages contain opportunities and constraints maps and accompanying tables for five segments of the proposed Larson Creek Multi-Use Path.



Segment 1: Bear Creek to Ellendale Drive
 OPPORTUNITIES & CONSTRAINTS

LEGEND	
BIKE ROUTE	--- (dashed red line)
ON STREET BIKE ROUTE	... (dotted red line)
PROPOSED BRIDGE	▭ (grey rectangle)
EXISTING EASEMENT	■ (yellow square)
PROPOSED CROSSWALK	--- (dashed red lines)
CONSULTANT COMMENTS	● (yellow circle)
PUBLIC COMMENTS	● (green circle)

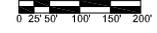


Number	Opportunity/Constraint
1a	Connection to street grid at Highland and Barnett
1b	Additional bridge adjacent to Highland Redundant to Bear Creek Trail
1c	Bear Creek Greenway (under construction in 2007)
1d	Highland Avenue (under construction in 2007)
1e	Connection to Bear Creek Greenway
1f	No bridges necessary Requires acquisition of an easement across residential property
1g	Two bridges necessary Avoids residential property Allows for simple wayfinding
1h	Ellendale Crossing <ul style="list-style-type: none"> ● busy collector ● bridge narrows roadway ● fish passage barrier ● driveway adjacent on east side of Ellendale, north of the creek

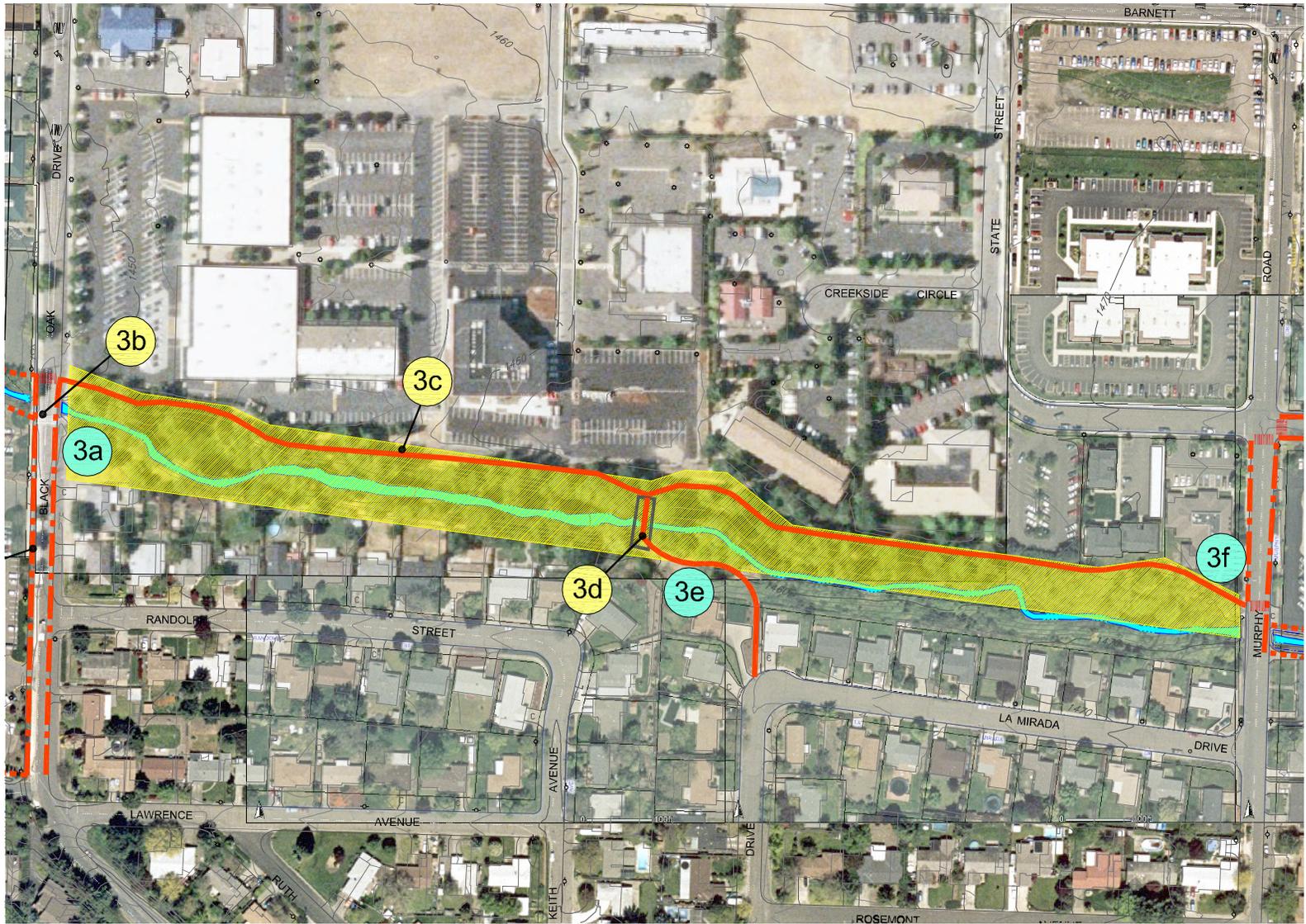


Segment 2: Ellendale Drive to Black Oak Drive
 OPPORTUNITIES & CONSTRAINTS

LEGEND	
BIKE ROUTE	--- (Blue line)
ON STREET BIKE ROUTE	--- (Red dashed line)
PROPOSED BRIDGE	--- (Black line)
EXISTING EASEMENT	--- (Yellow shaded area)
PROPOSED CROSSWALK	--- (Red dashed line)
CONSULTANT COMMENTS	2e (Yellow circle)
PUBLIC COMMENTS	2d (Green circle)



Number	Opportunity/Constraint
2a	<u>North Bank</u> : existing easement, tight building clearance, more complex diagonal crossing of Ellendale at driveway
2b	<u>South Bank</u> : large building setback, no existing easement, Ellendale crossing not involved with bridge
2c	Uses existing easement, necessitates a bridge further upstream, narrow clearance at buildings
2d	Riparian impact, trail away from creekside
2e	Alternative bridge location
2f	Coordinate trail development with future redevelopment plans for golf course
2g	Route adjacent to creek, trail does not use existing trail easements, direct and pleasant surroundings; no bridges
2h	Coordinate with potential rezone of golf course
2i	Existing easements at edge of golf course, less exposed to golf balls, less disruptive to golfers, existing easement width not adequate for trail development
2j	South and east of the end of Hilldale Ave.- reportedly the highest level of overflow from the creek flooding is into the center of woods and flood plain
2k	Exposes trail users to tee shots, more disruptive to golfers, shorter bridge, development agreement
2l	<u>North of creek</u> : shortest segment, avoids #4 fairway, avoids some wetlands, reduces school proximity, adjacent to residential lots
2m	Longest wetland impact, direct route
2n	<u>Clearing</u> : avoids wetland impacts, requires bridge or culvert at drainage ditch
2o	<u>North Bank</u> : avoids school property, 8 residential properties, limited alignment options, more manipulation of bank
2p	Impact on the riparian area can be avoided by placing a path high above the creek
2q	Riparian restoration community project (7th grade)
2r	School- problem with open access to campus, south alignment has less problem
2s	<u>Outfield</u> : more room and options to minimize stream impacts on school property
2t	<u>South Fence</u> : easy school isolation, change in drainage or a boardwalk, poor connection to the east, impacts wetland
2u	On-street bike lanes necessary if South Fence alignment is chosen
2v	Tight clearance around corner of building, service drive may need slight realignment, bridge connection to north bank reduces school exposure & crosswalk realignment
2w	<u>North Bank</u> : narrow alignment opportunities, better Black Oak crosswalk alignment
2x	<u>The Bend</u> : uses existing easements on commercial properties, avoids school property



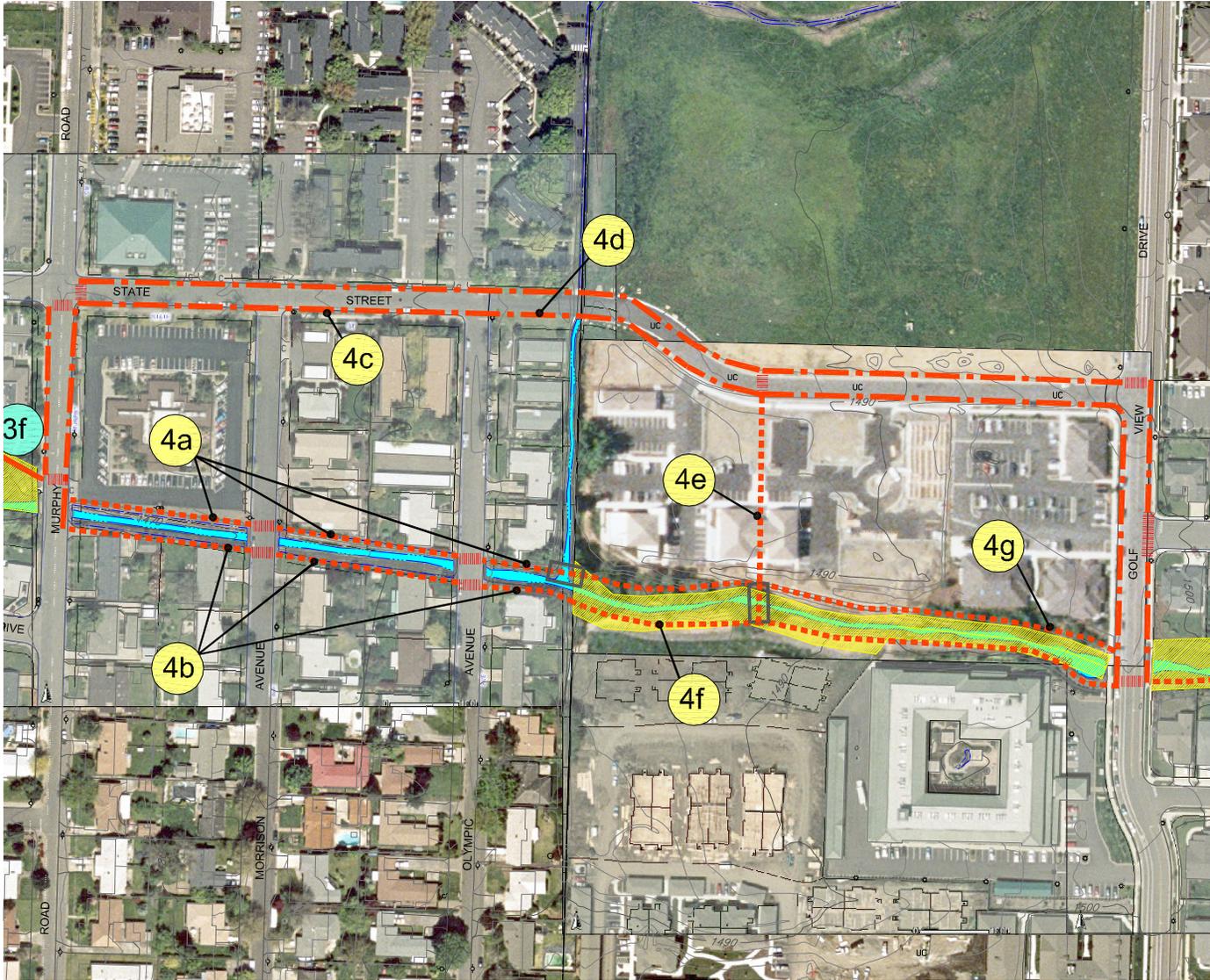
Segment 3: Black Oak Drive to Murphy Road
OPPORTUNITIES & CONSTRAINTS

LEGEND	
BIKE ROUTE	CONSULTANT COMMENTS 3e
ON STREET BIKE ROUTE	PUBLIC COMMENTS 3d
PROPOSED BRIDGE	
EXISTING EASEMENT	
PROPOSED CROSSWALK	

0 25' 50' 100' 150' 200'

N

Number	Opportunity/Constraint
3a	Crosswalk improvements
3b	Relocate existing crosswalk if north bank alignment is used Narrow sidewalks on bridge
3c	Existing trail: Narrow in some sections
3d	Trail connector: <ul style="list-style-type: none"> ● very narrow ● bridge and trail in disrepair ● not ADA accessible
3e	Existing trail broken up from tree roots
3f	Crosswalk improvements

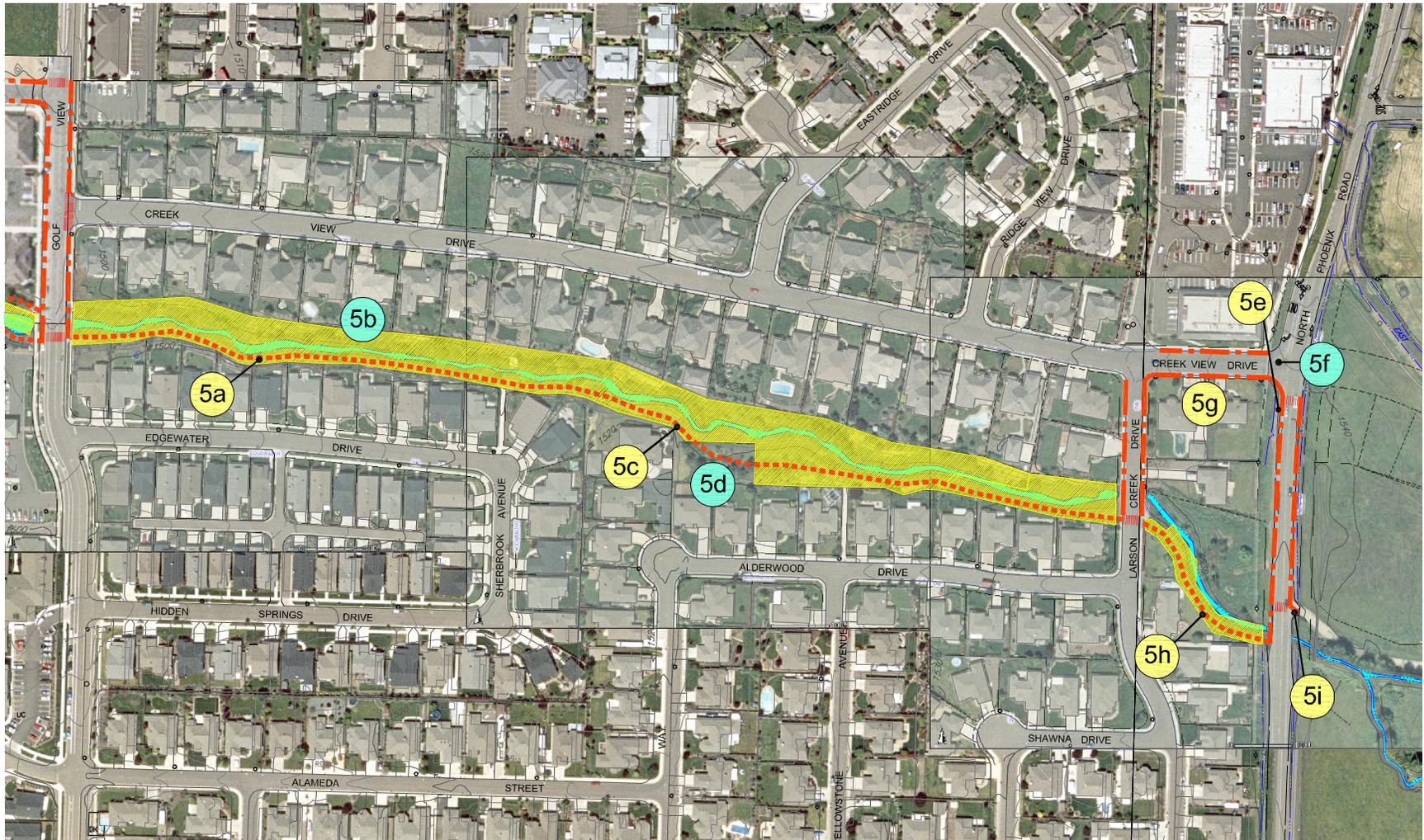


Segment 4: Murphy Road to Golf View Drive
OPPORTUNITIES & CONSTRAINTS

LEGEND	
BIKE ROUTE	
ON STREET BIKE ROUTE	
PROPOSED BRIDGE	
EXISTING EASEMENT	
PROPOSED CROSSWALK	
CONSULTANT COMMENTS	
PUBLIC COMMENTS	



Number	Opportunity/Constraint
4a	Murphy-Golf View (north): <ul style="list-style-type: none"> ● off-road connection ● channel restoration opportunity ● requires acquisition & demolition of 3 duplexes ● easement at parking lot and realignment of parking ● could cross stream at existing bridges to link segments
4b	Murphy-Golf View (south): <ul style="list-style-type: none"> ● channel restoration opportunity ● off-road connection ● requires acquisition & demolition of 5 duplexes ● no business impact ● diagonal connection across bridge at Murphy ● could cross stream at existing bridges to link segments
4c	State Street-Temporary Work Around: <ul style="list-style-type: none"> ● uses existing narrow sidewalks ● new bike lanes ● wayfinding required
4d	No existing sidewalk in this half-block
4e	Elderwood Connector: <ul style="list-style-type: none"> ● requires active cooperation of business park ● retail access for trail ● wayfinding required
4f	South Bank: <ul style="list-style-type: none"> ● unpaved alignment already improved but not connected to west ● requires duplex demolition ● culvert at bridge over ditch
4g	Elderwood North Bank: <ul style="list-style-type: none"> ● existing easement ● narrow corridor available ● requires business park connection (for work around) or duplex demolition



Segment 5: Golf View Drive to North Phoenix Road
 OPPORTUNITIES & CONSTRAINTS

LEGEND	
BIKE ROUTE	CONSULTANT COMMENTS 5e
ON STREET BIKE ROUTE	PUBLIC COMMENTS 5d
PROPOSED BRIDGE	
EXISTING EASEMENT	
PROPOSED CROSSWALK	



Number	Opportunity/Constraint
5a	Existing unpaved alignment, narrow in some places
5b	Very narrow, no bridges
5c	<ul style="list-style-type: none"> ● existing unpaved alignment ● expansive soil problems in some areas ● requires creek bank stabilization
5d	Deeded to the City on 2-7-07
5e	<p>North Phoenix Road:</p> <ul style="list-style-type: none"> ● no existing pedestrian or bicycle improvements both sides ● lacks safe crossing(s) ● warning and wayfinding lacking
5f	Potential new traffic signal
5g	<p>Creek View Drive:</p> <ul style="list-style-type: none"> ● requires safe pedestrian crossing ● wayfinding lacking
5h	<ul style="list-style-type: none"> ● existing unpaved trail ● requires creek bank stabilization
5i	<p>South Fork Larson Creek Greenway:</p> <ul style="list-style-type: none"> ● requires safe crossing of North Phoenix Road ● connection to southeast area greenways

Preferred Trail Alignment

Vision

Goals

Trail Alignment Alternatives

Trail Alignment Narrative by Option

Conclusion

Preferred Trail Alignment

Vision

The Larson Creek Multi-Use Path Master Plan will identify an off-street, non-motorized transportation alternative to Barnett Avenue, connecting the trail system in Southeast Medford to the Bear Creek Greenway.

Goals

Goals for the Larson Creek Multi-Use Path were developed in consultation with the City of Medford and through public input at an open house February 7, 2007. The goals listed below support the Larson Creek Multi-Use Path Master Plan vision and will guide trail and greenway design and future trail development.

- Increase the rate of bicycling and walking in Medford by providing an inviting continuous greenway experience that connects key destinations within the community.
- Develop trail design and development standards that are easy to maintain and access by maintenance, security, and emergency vehicles and minimize impact to the environment.
- Improve the water quality and aesthetic appeal of the Larson Creek corridor by removing non-native, invasive plants, trash, and other debris, rehabilitating the creek bank, and improving habitat for threatened fish species and other animals.
- Strive to develop a the trail design and development plan that enhances adjacent properties.
- Provide an enriching trail user experience through the incorporation of educational and historical interpretation opportunities along the trail.

Trail Alignment Alternatives

Evaluation Process

Two alternative trail alignments, indicated by the blue and green lines on the maps, were analyzed to determine which best met the vision and goals of the Larson Creek Multi-Use Path Master Plan. The alternatives were determined by performing an analysis that examined existing conditions, opportunities and constraints. Alignment 1 (Blue Route) prioritizes a more direct route that better serves the transportation goals of the project. This route follows Larson Creek more closely and requires more right-of-way acquisition. Alignment 2 (Green Route) is a less direct route, with more on-street segments and less property acquisition.

The two alignment alternatives were analyzed using the following criteria:

Safety and Liability

Based on conformance with state and federal standards and guidelines, input from experienced planners and engineers, and design of major roadway crossings.

Bikeway and Community Connections

Highest priority will be awarded to alternatives that provide the most direct and convenient access to other trails or bikeways, schools, parks, commercial or employment areas.

Functionality/Efficiency

Providing a positive user experience that reflects the need for access to the corridor and nearby destinations. The alignment and corridor should provide the opportunity to develop a cross section designed to accommodate the range and volume of path users.

Environmental Impacts

Alignments that minimize detrimental impacts to natural and cultural resources, or provide opportunities for resource enhancement, mitigation or creative design solutions and opportunities for pre-project mitigation receive higher evaluation.

Capital Cost

Cost estimation of alternatives, especially where crossing improvements, roadway revisions, bridges, fencing, or other infrastructure improvements are being considered. The Larson Creek Multi-Use Path will require a broad range of capital improvements that will vary between alternatives.

Roadway Crossings

Crossing options based on site conditions, traffic speed, visibility, and volume data, using ODOT, AASHTO, and other guidelines will be evaluated. Alignments with more on-grade crossings and crossing situations that present potential unavoidable hazards will receive lower scores.

Security

Review crash data, police reports, crime statistics, and other data to identify potential personal security hazards.

Consistency with Local Plans and Permitting

Evaluate local trail/bikeway plans and policies, and determine the compatibility/conflict with the proposed project.

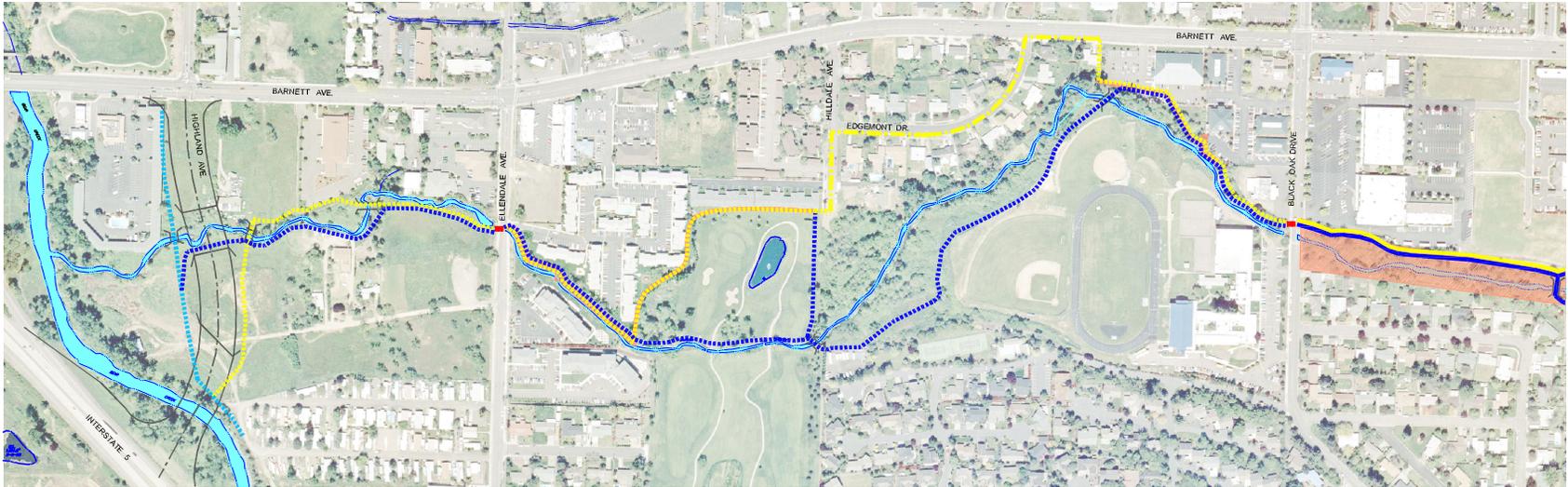
Multiple Users/Level of Use

Evaluate alternatives for compatibility with multiple users including: bicyclists, walkers, joggers, in-line skaters, people with mobility devices, maintenance vehicles, and security vehicles.

Private Property and Right-of-Way Acquisition

Identify impacts of alignments on private properties and opportunities to mitigate for those impacts. Evaluate alternatives in light of property acquisition requirements.

This page intentionally left blank.



Medford Larson Creek Greenway
ALIGNMENT ALTERNATIVES

ALIGNMENT 1		BRIDGE	
ALIGNMENT 2		CROSSWALK	
ON-STREET		EXISTING EASEMENT	
EXISTING TRAIL			

0 250' 500' 1000' 2000' 3000'

Criteria	Blue (Recommended)	Yellow
Safety and Liability		
Based on conformance with state and federal standards and guidelines, input from experienced planners and engineers, and design of major roadway crossings.	This alignment avoids all on street alignments resulting in minimal conflicts with automobiles. Score: 1	This alignment makes use of multiple on street routes to connect the pints along the trail, increasing the distance trail users are interacting with automobiles. Score: 0
Bikeway and Community Connections		
Highest priority will be awarded to alternatives that provide the most direct and convenient access to other trails or bikeways, schools, parks, commercial or employment areas.	Provides access points at Highland Ave., Hilldale Ave., St, Marys School, and three neighborhood spurs Score: 1	Provides access points at Hilldale Ave., St, Marys School, and three neighborhood spurs. Score: 0
Functionality/Efficiency		
Providing a positive user experience that reflects the need for access to the corridor and nearby destinations. The alignment and corridor should provide the opportunity to develop a cross section designed to accommodate the range and volume of path users.	The most direct route along the creek corridor. Right of way and easements exist for most of the alignment to accommodate the volume of users. Score: 1	Alignments uses many existing streets resulting in out of direction travel. This discourages use as an alternative transportation corridor to Barnett Rd. Score: 0
Environmental Impacts		
Alignments that minimize detrimental impacts to natural and cultural resources, or provide opportunities for resource enhancement, mitigation or creative design solutions and opportunities for pre-project mitigation receive higher evaluation.	Alignment avoids wetlands and requires restoration of riparian areas between Murphy and Olympic. Score: 1	Avoids wetland and riparian impact but does not include restoration of natural areas. Score: 0
Capital Cost		
Cost estimation of alternatives, especially where crossing improvements, roadway revisions, bridges, fencing, or other infrastructure improvements are being considered. The Larson Creek Multi-Use Path will require a broad range of capital improvements that will vary between alternatives.	The most expensive of the two alignments. Requires removal and restoration of the concrete lined channel near Murphy Score: 0	Use of existing streets makes this the lowest cost option. Score: 1
Roadway Crossings		
Crossing options based on site conditions, traffic speed, visibility, and volume data, using ODOT, AASHTO, and other guidelines will be evaluated. Alignments with more on-grade crossings and crossing situations that present potential unavoidable hazards will receive lower scores.	Both alignments have the same number of roadway crossings. Score: equal	Both alignments have the same number of roadway crossings. Score: equal
Security		
Review crash data, police reports, crime statistics, and other data to identify potential personal security hazards.	The existing segment of trail between Murphy and Black Oak is the most similar facility in the area. The crime incidents along the trail number fewer than the adjacent street and mall parking lot. Score: equal	The existing segment of trail between Murphy and Black Oak is the most similar facility in the area. The crime incidents along the trail number fewer than the adjacent street and mall parking lot. Score: equal
Consistency with Local Plans and Permitting		
Evaluate local trail/bikeway plans and policies, and determine the compatibility/conflict with the proposed project.	Both alignments are acceptable uses Score: equal	Both alignments are acceptable uses Score: equal
Multiple Users/Level of Use		
Evaluate alternatives for compatibility with multiple users including: bicyclists, walkers, joggers, in-line skaters, people with mobility devices, maintenance vehicles, and security vehicles.	The off street alignments better accommodate all users. Fewer interactions with automobiles also make it a safer option, particularly for young children. Score: 1	The on street segments can accommodate all users, but will be less appealing due to increased interaction with automobiles. Score: 0
Private Property and Right-of-Way Acquisition		
Identify impacts of alignments on private properties and opportunities to mitigate for those impacts. Evaluate alternatives in light of property acquisition requirements.	Alignment requires acquisition of three duplexes and easements from three other properties. Score: 0	Only requires 2 easements Score: 1

Total:

5

2

Trail Alignment Narrative by Option

Alignment 1: The Blue Route

This alignment begins just south of Larson Creek at the new Bear Creek Greenway Trail adjacent to the Highland Avenue extension. The proposed Larson Creek Multi-Use Path runs under the new Highland Avenue bridge over Larson Creek and continues on the south side of Larson Creek toward Ellendale Avenue. Right-of-way acquisition is required in this segment from the Highland Avenue right-of-way to Ellendale Avenue.

The trail crosses Ellendale Avenue at grade, providing a connection to the north bank of the creek where an existing trail right-of-way exists. Long-term redevelopment plans for the Quail Point Golf Course may include relocation of holes 3 and 4, which would allow the trail to stay near the creek through the existing golf course site. An important spur on this alignment connects to Hilldale Avenue, which will be another key access point for users from the north. Right-of-way acquisition is required in this segment on the south side of Larson Creek. (**Note:** A trail easement exists on the north side of the creek for much of this segment and is addressed in the Yellow Route.)

The Blue Route circles the outside of the playfields at St. Mary's School, staying to the north and west of the existing ball fields and behind the existing outfield fences. This avoids significant wetland and riparian area encroachments and keeps the trail from bisecting the school grounds. For extra security, the outfield fences could be



raised a few feet and gated on the ends to prevent access to the school grounds from the trail. This segment requires acquisition of right-of-way.

At the northernmost point of the school property a new bridge will cross Larson Creek to use existing trail easements. This alignment will require an additional easement from the Knights of Columbus on the north side of the creek to gain access to Black Oak Drive. The bridge and Knights of Columbus easement would provide a better crossing of Black Oak Drive and avoid greater exposure of the trail to the school, without significantly reducing student and parent access to the transportation benefits of the trail.

A trail exists from Black Oak to Murphy and this alignment follows that existing trail. Improvements to the existing trail should include root pruning, repaving, widening and increasing setback from fencing and improving access ramps from adjacent properties. The access pathway from the south at La Loma Drive requires regrading and repaving.

From Murphy to Morrison Avenue a route along the northern side of the creek provides the most direct crosswalk. This route requires right-of-way acquisition and



realignment of business parking. No parking capacity would be lost unless creek restoration was undertaken that required additional right-of-way.

Morrison Avenue is a street that does not connect through to arterials at either end making it a more suitable location to cross Larson Creek on the existing bridge. Across Morrison, the Blue Route is shown on the south side of the creek and does require acquisition of three duplexes properties (six residences). In addition to providing an off-street alignment for the trail, removal of these structures will create an opportunity for removal of the concrete channelization and creek restoration while providing parkland within these neighborhoods.

East of the duplexes there is ample room for the trail in existing trail right-of-way on the south side of the creek up to Golf View Drive.

From Golf View to Larson Creek Drive an alignment on the south bank of the creek has been shown on the plans of the developer of this community. This partially developed right-of-way includes paved connections into the neighborhood anticipating this alignment. There are some pinch points in the right-of-way that will require some engineering solutions. Other alignment options for this segment result in out of direction travel for more than a quarter of a mile.

This alignment terminates at North Phoenix Road at Larson Creek across from the Southeast Medford trail system. Due to the high speeds and increasing traffic volumes on North Phoenix Road an over- or undercrossing may be the safest alternative for crossing this street.

Alignment 2: The Yellow Route

The Yellow Route strives to avoid right-of-way acquisition and other major improvement costs for implementation. This approach results in a less direct route and includes several on-street segments.

Starting at a connection to the Bear Creek Greenway the trail will come northward to a bridge over Larson Creek next to the Highland Avenue Bridge. The Yellow Route then follows a route similar to the Blue Route to Ellendale Avenue. At Ellendale this alignment crosses to the north side of the creek to use existing easements adjacent to the apartments. The diagonal crossing of Ellendale on the bridge, and tight alignment with the apartment driveway make for a less than optimal situation.

The Yellow Route continues on existing easements around the northern edge of the Quail Point Golf Course. This easement is too narrow for trail development however and will require additional acquisition. Coordination with future redevelopment of the golf course is necessary to define the best trail alignment.

The Yellow Route then enters the east side of the Hilldale Avenue right-of-way and south side of the Edgemont Drive right-of-way to Barnett Avenue. Improvements in these rights-of-way will require crossing 14 driveways, regrading and sidewalk construction. Bikes will share the roadway. Some parking may be eliminated to improve visibility and on-street cycling safety.

Some or all of three parcels would be acquired on Barnett to



provide off-street access to the existing trail easement on the north side of Larson Creek. The trail will continue on existing easements on the north side of the creek eastward to the Knights of Columbus property where a new easement is required to access Black Oak Drive and finally connect to the existing segment ending at Murphy Road.

From Murphy, this alignment uses existing streets to avoid acquisition of right-of-way along the creek. First, northward on Murphy to State St. then east on State to Golf View Drive and finally south on Golf View and to Larson Creek and back east along the south side of the creek. Murphy Road and State Street will require a combination of bike lane striping, removal of parking and sidewalk modifications. Golf View currently has bike lanes adequate for this alignment.



The Yellow Route includes a total of approximately 3,500 feet of on-street bikeways with new and existing sidewalks for pedestrians.

From Golf View, the Yellow Route will follow the same alignment as the Blue Route on the south side of the creek to Larson Creek Drive and eastward to North Phoenix Road.

Conclusion

The Blue Route provides the most direct, entirely non-motorized trail experience, with fewer roadway and driveway crossings, and no on-road segments. The Blue Route requires less disruption of on-street parking. The Blue Route provides more opportunities for restoration

of channelized segments of Larson Creek.

The Yellow Route does not require as much right-of-way acquisition, and no demolition of existing structures. The Green Route would give wider berth to St. Mary's School.

These two alignments are not mutually exclusive, and a hybrid of segments is a possible outcome for interim and final alignments.

Recommended Improvements

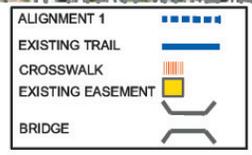
Recommended Improvements

Programmatic Recommendations

The following pages contain maps and corresponding tables listing recommended improvements for each segment of the proposed path.



Segment 1: Bear Creek to Ellendale Drive
RECOMMENDED ALIGNMENT



Segment#	Location	Recommended Improvement	Issues/Notes
Segment 1: Bear Creek To Ellendale Drive			
1	Connection to the Bear Creek Trail	Connect the Larson Creek Multi-Use Path and the Bear Creek Trail. Clearly sign the routes.	This is the beginning of the trail.
A	Area A	Build a 12-foot-wide concrete path from The Bear Creek Trail along the south side of Larson Creek to Ellendale Drive.	Easements will be required for the following tax lots: Map number: 371W32BA, tax lots numbered 1700,1800,1900,2100,2300
2	Crossing at Ellendale	Install an at-grade crossing at Ellendale. Use signage and ladder style crosswalks.	

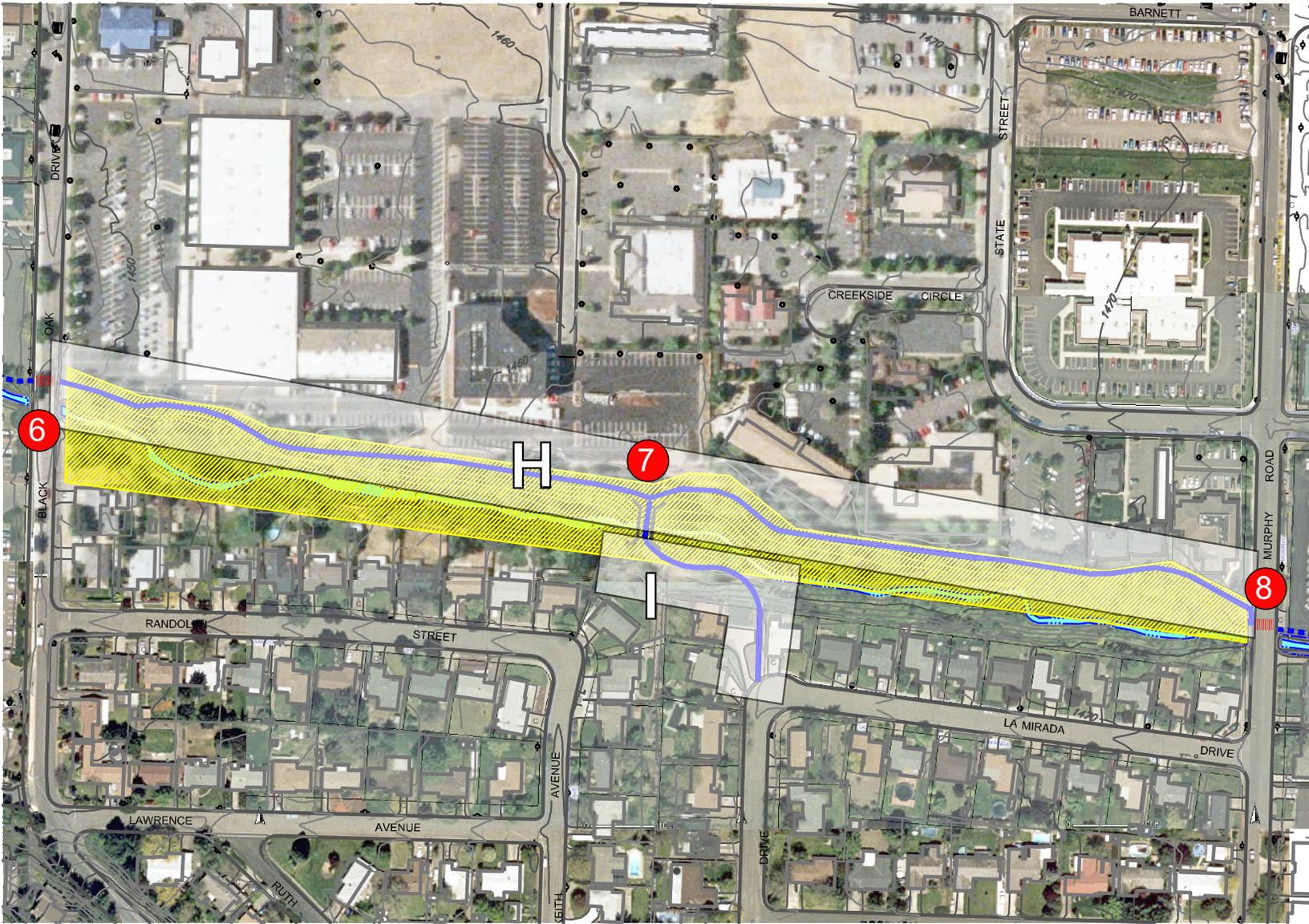


Segment 2: Ellendale Drive to Black Oak Drive
RECOMMENDED ALIGNMENT

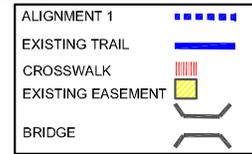
ALIGNMENT 1	-----
EXISTING TRAIL	-----
CROSSWALK	-----
EXISTING EASEMENT	-----
BRIDGE	-----

0 25 50 100 150 200'

Segment#	Location	Recommended Improvement	Issues/Notes
Segment 2: Ellendale Drive to Black Oak Drive			
2	Crossing at Ellendale	Install an at-grade crossing at Ellendale. Use signage and ladder style crosswalks.	
B	Area B	Build a 12-foot-wide concrete path on the north side of the creek from Ellendale Drive to the Quail Point Golf Course.	Easements are in place
C	Area C	Build a 12-foot-wide concrete trail on the circling around the golf course and connecting to Hilldale Road.	The current 10-foot easement needs to be widened to accommodate construction and maintenance of a 12-foot trail with two-foot shoulders.
D	Area D	Plan for future development of a preferred alignment adjacent to Larson Creek if this section of the golf course is redeveloped.	Acquisition/dedication of right-of-way required.
3	Bridge	Build a bridge with 12 feet clear width across Larson Creek.	
4	End of Hilldale Road	Install an access point including trail identification sign and removable bollards.	
E	Area E	Build a 12-foot-wide concrete path on the high ground behind the ball fields at St. Mary's School.	An easement from St. Mary's will be required. Tax lot number 371W32AA400
5	Bridge	Build a bridge with 14 feet clear width across Larson Creek.	
F	Area F	Build a 12-foot-wide concrete path on the north side of the creek.	Easements are in place, some structural reinforcement may be necessary.
G	Area G	Build a 12-foot-wide concrete path on the north side of the creek.	Easements will be required on tax lot 371W32AA300, some structural reinforcement may be necessary at the top of the bank.
6	Crossing at Black Oak	Install an at-grade crossing at Black Oak. Use signage and ladder style crosswalks.	



Segment 3: Black Oak Drive to Murphy Road
RECOMMENDED ALIGNMENT



Segment#	Location	Recommended Improvement	Issues/Notes
Segment 3: Black Oak Drive to Murphy Road			
6	Crossing at Black Oak	Install an at-grade crossing at Black Oak. Use signage and ladder style crosswalks.	
H	Area H	Resurface existing pathway	
I	Area I	Resurface existing pathway	
7	Bridge	Repair existing bridge	
8	Crossing at Murphy	Install an at-grade crossing at Murphy. Use signage and ladder style crosswalks.	

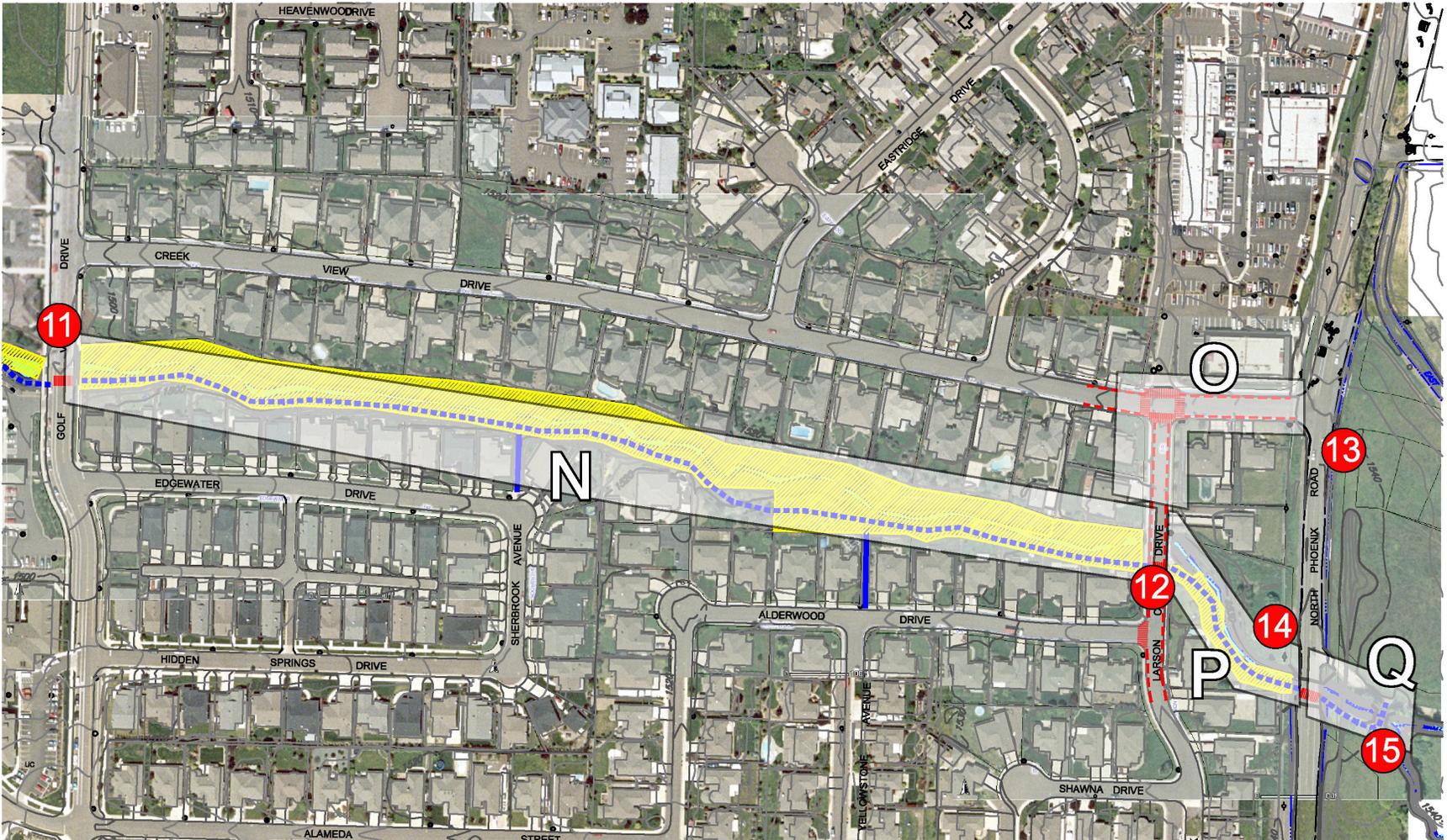


Segment 4: Murphy Road to Golf View Drive
RECOMMENDED ALIGNMENT

ALIGNMENT 1	
EXISTING TRAIL	
CROSSWALK	
EXISTING EASEMENT	
BRIDGE	



Segment#	Location	Recommended Improvement	Issues/Notes
Segment 4: Murphy Road to Golf View Drive			
8	Crossing at Murphy	Install an at-grade crossing at Murphy, using signage and ladder style crosswalks	
J	Area J	Build a 12-foot-wide asphalt pathway along the edge of the existing parking lot on the north side of the creek.	Easement will be necessary for use of tax lot 371W33BA2700
9	Crossing at Morrison	Install an at-grade crossing at Murphy, using signage and ladder style crosswalks. Use this crossing to cross to the south side of the creek.	
K	Area K	Remove the concrete channel on the south side of the creek and restore to native habitat. Build concrete pathway 12 feet wide along the south side of the creek.	Will require purchase and demolition or modifications to the existing duplexes on tax lots 371W33BA1800 and 371W33BA1600
10	Crossing at Olympic	Install an at-grade crossing at Murphy. Use signage and ladder style crosswalks.	
L	Area L	Build concrete pathway 12 feet wide along the south side of the creek.	Will require purchase and demolition or modifications to the existing duplex on tax lot 371W33BA700
M	Area M	Build concrete pathway 12 feet wide along the south side of the creek.	Trail can be built within existing easements
11	Crossing at Golf View	Install an at-grade crossing at Murphy. Use signage and ladder style crosswalks.	



Segment 5: Golf View Drive to Phoenix Road
RECOMMENDED ALIGNMENT

ALIGNMENT 1	-----
EXISTING TRAIL	=====
CROSSWALK	▬▬▬▬▬▬
EXISTING EASEMENT	▨▨▨▨▨▨
BRIDGE	⌒⌒⌒

0 25' 50' 100' 150' 200'

N

Segment #	Location	Recommended Improvement	Issues/Notes
Segment 5: Golf View Drive to North Phoenix Road			
11	Crossing at Golf View	Install an at-grade crossing at Murphy. Use signage and ladder style crosswalks	
N	Area N	Build a 12-foot-wide asphalt pathway along the south side of Larson Creek.	Easement will be necessary for use of tax lot 371W33A602 Easements exist along the rest of the alignment. Some areas are narrow and will require additional structure to support the trail.
12	Crossing at Larson Creek Drive	Install an at-grade crossing at Larson Creek Drive, using signage and ladder style crosswalks.	
O	Area O	Stripe six-foot bike lanes on Larson Creek Drive at a minimum from Alderwood Drive to Creek View Drive, and on Creek View Drive from 200 feet west of Larson Creek Drive to North Phoenix Road.	Parking may be reduced in some portions of this segment.
P (long term)	Area P	Build a 12-foot concrete trail on the south side of Larson Creek.	Public ownership exists on this segment. Some areas are narrow and may require additional structure to support the trail.
Q (long term)	Area Q	Build a 12-foot concrete trail on the south side of Larson Creek.	
13	Crossing at North Phoenix Road	Install traffic signals with crosswalks and pedestrian refuge.	Proposed relocation of a nearby traffic signal.
14 (long term)	Crossing of North Phoenix Road	Install a grade-separated crossing of North Phoenix Road	The projected traffic speeds and volumes warrant a grade-separated crossing for trail users. An underpass could be designed as part of future bridge replacement.
15 (long term)	Bridge	Build a bridge across the Larson Creek to connect with the existing greenway path system.	

Trail Design Elements

Typical Trail Cross-Section Design

Roadway Crossings

Bridges

Standard Crossing Features

Trail Access

Trail Amenities

Signing

Landscaping

Trail Design Elements

Typical Trail Cross-Section Design

The optimum recommended trail width is 12 feet and, based upon field reconnaissance work, this appears to be achievable along most of the Larson Creek corridor.

Much of the Larson Creek corridor will benefit from a concrete surface trail. Concrete is a better trail surface for wet areas and is not prone to buckling from tree roots or imperfections in the subgrade. Concrete is more expensive but is a better community investment as it lasts much longer than asphalt and is easier to maintain. When properly installed, concrete will last 25 years or longer and need virtually no maintenance.

Two-foot-wide soft shoulders should be provided on both sides of the trail. This provides a setback or “shy distance” from fixed objects along the trail edge and also serves as a tactile warning device for anyone inadvertently straying off the trail. Wood planer shavings or ¾-inch minus crushed aggregate are both suitable materials for the trail shoulders. Vertical clearance along the trail should be a minimum of 10 feet and horizontal clearance should extend two feet beyond the trail shoulders.

Table 1. Larson Creek Path Design Recommendations

Width	12 feet
Surface	Concrete
Soft Shoulder	Wood planer shavings or 3/4-in. crushed aggregate
Vertical Clearance	10 feet
Horizontal Clearance	2 feet
Maximum Slope	5%
Cross-Slope	2%

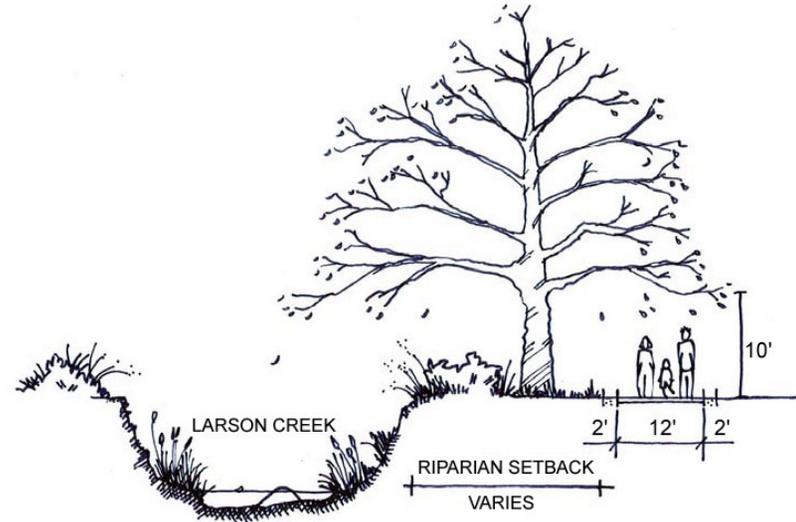


Figure 2. Larson Creek Path Standard

Structural Section and Surface

Trail construction will be conducted in a similar manner as roadway construction. Sub-base thickness will be determined by soil conditions. Expansive soil types require special structural sections. Use of geotextiles should be encouraged (depending on subsurface soil type and drainage) to provide stability and aid drainage to subsurface soils. Required concrete and subbase thickness should be determined by a



Figure 3. Concrete Trail in a Stream Corridor

geotechnical engineer, but four inches of concrete with four inches of subbase is typical for similar installations.

The trail should have a cross-slope of at least 2% to direct water to a subdrainage or swale which then directs the water to Larson Creek or the nearest water body. This will provide a pretreatment opportunity for storm water.

The concrete trail surface should be rough finished with a broom for traction and saw cut to reduce bumps. Concrete can be dyed any color to fit the surrounding environment, if desired.

Some trail sections along the eastern end of the trail may require retaining walls or more complex structural designs to accommodate the trail.

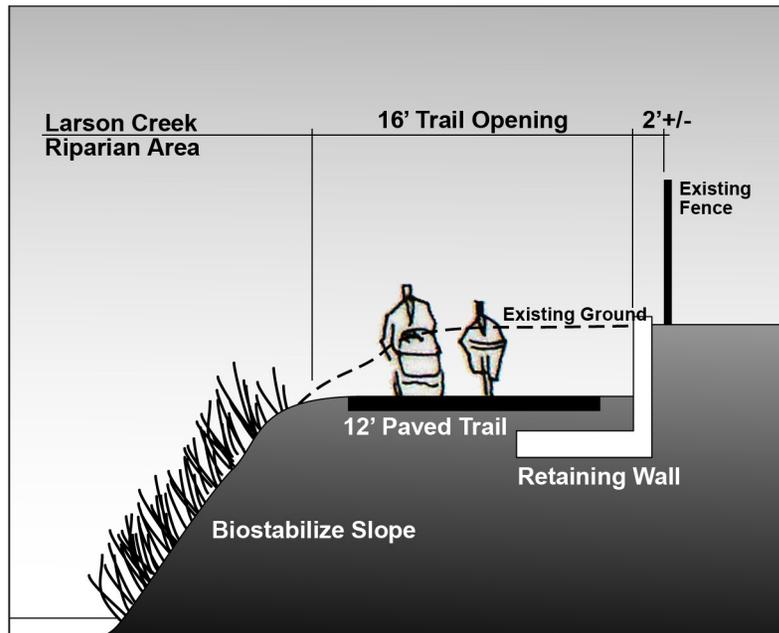


Figure 4. Retaining Wall Concept

Trail Setback and Greenway Recommendations

Development setbacks from streams are important for maintaining stream bank integrity, preserving habitat, and reducing the potential for erosion and sedimentation into the creek system.



Figure 5. Concrete Trail Transitions to a Boardwalk

In general, the larger the setback from the stream, the greater the benefit to the stream system. However, large setbacks are not always feasible in developed areas. Most stream protection ordinances specify setbacks for buildings because trail development is a relatively new occurrence. Jackson County requires setbacks ranging from 25 to 100 feet, depending on the width of the stream, for structural development near waterways and wetlands (Jackson County, 2004). The setback is determined by multiplying the average width of the stream channel by a factor of three, but the resulting buffer cannot exceed 100 feet or be less than 25 feet. Based on this formula, the estimated setback for Larson Creek would likely be approximately 45 feet, although the average stream width would need to be measured in the field.

There are a few areas along Larson Creek where trail development options are constrained by land ownership and where the preferred trail alignment is very near the top of the stream bank. While this does not preclude trail development, there are several considerations for developing a multi-use trail adjacent to the stream:

- Avoid or minimize grading.
- Avoid or minimize the removal of mature trees and shrubs.

- Restrict vegetation removal near the top of stream the bank.
- Use buffer averaging – increase the setback in other areas along the creek system to offset development adjacent to the stream.
- Shift arbitrary boundaries to provide a wider setback.
- Locate bridges at natural constrictions in the stream channel or at previously disturbed sections.
- Mitigate for impacts by planting native trees and thicket-forming shrubs along the stream bank to improve soil stability and prevent off-trail use.

Grades

The recommended maximum gradient is 5%. Steeper grades (8%) can be tolerated for short distances (up to about 500 feet). The Larson Creek corridor is nearly flat for most of the alignment and 5% is likely achievable for the entire alignment.

Roadway Crossings

The Larson Creek Multi-Use Path crosses nine roads, seven of which will be at-grade crossings. Roadway crossings represent one of the key challenges to trail implementation, especially when motorists do not expect to see bicyclists and pedestrians at midblock trail crossings. Most of the trail-roadway crossings have moderate traffic volumes and good visibility on the approaches, both from the trail user’s and the automobile driver’s points of view. In addition, the majority of the trail/roadway intersections will be designed to meet at a 90-degree angle, minimizing crossing distances and making the appropriate design treatments simple to implement.

An evaluation of crossings of the Larson Creek Multi-Use Path will involve analysis of traffic patterns of vehicles as well as trail users. This includes traffic speeds, street width, traffic volumes (average daily traffic and peak hour), line of sight, and trail user profile (age

distribution, destinations).

A Traffic Safety study will need to be completed as part of the detailed design of the proposed crossings to determine the most appropriate design features.

The proposed crossing treatments in this report are based on established standards, preliminary evaluation of the available data, and experience on similar existing facilities. Trail crossing types fall into three basic categories, described in Table 2 on the following page.

Table 2. Basic Crossing Prototypes

Crossing Type	Photo	Description
I. Unprotected		<p>Unprotected crossings include mid-block crossings of residential, collector, and sometimes major arterial streets.</p>
II. Signalized/Controlled		<p>Bikeway crossings that require signals or other control measures due to traffic volumes, speeds, and trail usage.</p>
III. Grade Separated		<p>Bridges or undercrossings provide the maximum level of safety but also generally are the most expensive and have right-of-way, maintenance, and other public safety considerations.</p>

Trail-Roadway Crossing Recommendations

For the Larson Creek Multi-Use Path, Type I is the preferred crossing type for all road crossings. A Type III underpass of Highland Drive is recommended at the crossing of North Phoenix Road, which is just outside the scope of the study. Table 3 presents a summary of trail-roadway intersections in the Larson Creek corridor and their respective treatments.

Table 3. Trail-Roadway Intersection Treatments for the Larson Creek Path

Road	ADT (Average Daily Traffic, 2004)	Recommended Crossing Type
Ellendale Drive	3200	Type I: Create new at-grade crosswalk with curb extensions
Black Oak Drive	4900	Type I: Enhance existing at-grade crosswalk with curb extensions
Murphy Road	4800	Type I: Create new at-grade crosswalk with curb extensions, or Type II: re-route to State Street (not recommended)
Morrison Avenue	Unknown	Type I: Create new at-grade crosswalk
Olympic Avenue	Unknown	Type I: Create new at-grade crosswalk with curb extensions
Golf View Drive	1900	Type I: Create new at-grade crosswalk with curb extensions
Larson Creek Drive	Unknown	Type I: Create new at-grade crosswalk
North Phoenix Road	7400	Type II: At new Creekview Drive intersection Type III: Create new grade separated crossing Volumes are currently low, but are projected to increase significantly

Type I or uncontrolled crossings (unsignalized, but with other traffic control devices) are recommended for streets where vehicles travel at speeds of less than 45 mph and are used by fewer than 10,000 vehicles per day.

Type II or new signalized crossings are recommended for crossings more than 250 feet from an existing signalized intersection, where 85th percentile travel speeds are 40 mi/h and above, and/or ADT exceeds 15,000 vehicles. ODOT recommends that trails receive a high level of crossing protection. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity, and safety.

Trail signals are normally activated by push buttons, but also may be triggered by motion detectors and magnetic loops. Many pedestrian signals are being installed with immediate response. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs. Typical costs for a signalized crossing range from \$150,000 to \$250,000.

Type III or grade-separated crossings may be needed where ADT exceeds 25,000 vehicles, and 85th percentile speeds exceed 45 mi/h. Safety is a major concern with both overcrossings and undercrossings. In both cases, trail users may be temporarily out of sight from public view and may have poor visibility themselves. Alignments for over- and undercrossings should provide clear sight lines and no hiding places.

Design and operation measures are available which can address trail user concerns. For example, an undercrossing can be designed to be spacious and well-lit, minimize flooding, and completely visible for its entire length prior to entering.

Bridges

There may be up to four bridges crossing Larson Creek at various points in the corridor. While bridges can be some of the most interesting features of a trail system, they also present challenges.

Bridges should be at least as wide as the trail. International Building Code and ADA guidelines require handrails no shorter than 42 inches and decking material that is firm and stable. Bridges should accommodate maintenance vehicles if necessary. Bridge structures should be out of the 100-year floodplain. Footings should be located on the outside of the stream channel at the top of the stream bank. The bridge should not impede fish passage or constrict the floodway. All bridges and footings in the Larson Creek corridor will need to be designed by a registered geotechnical or structural engineer. Cost, design and environmental compatibility will dictate which structure is best for the trail corridor.

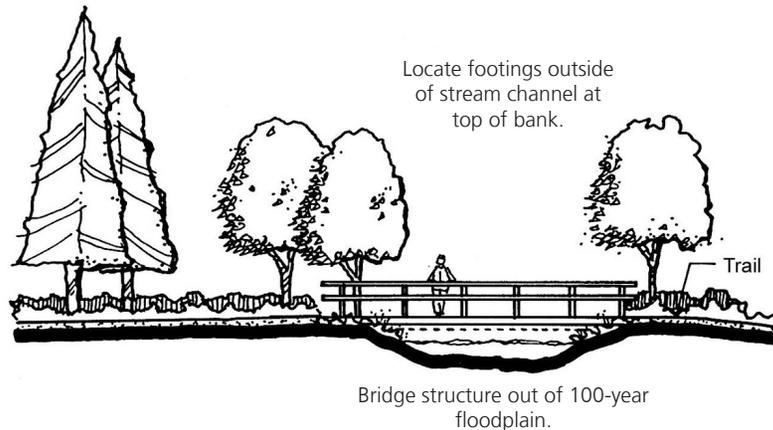


Figure 6. Crossing of Stream or Drainage

Standard Crossing Features

Signing

Crossing features for all roadways should include warning signs for both vehicles and trail users. Signing for trail users must include a standard "STOP" sign and pavement marking. The type, location, and other criteria are identified in the Manual for Uniform Traffic Control Devices (MUTCD).

Adequate warning distance must be created based on vehicle speeds and line of sight, with visibility of any signing absolutely critical. Catching the attention of motorists de-sensitized to roadway signs may require additional alerting devices such as roadway striping, pedestrian refuges, or in-ground flashing lights. Care must be taken not to place too many signs at crossings or they will result in sign clutter and will reduce their impact.

Directional signing may be useful for trail users and motorists alike. For motorists, a sign reading "Larson Creek Multi-Use Path Xing" along with a trail emblem or logo helps both warn and promote use of the trail itself. For trail users, directional signs and street names at crossings help direct people to their destinations. Table 4 on the following page displays the location, color, and designation of which type of sign to use in the trail corridor.

Table 4. Regulatory Signing

Item	Location	Color	AASHTO Designation	MUTCD Designation
No Motor Vehicles	Entrances to trail	B on W	R44A	R5-3
Use Ped Signal/Yield to Peds	At crosswalks; where sidewalks are being used	B on W	N/A	R9-5 , R9-6
Bike Lane Ahead: Right Lane Bikes Only	At beginning of bike lanes	B on W	N/A	R3-16, R3-17
STOP, YIELD	At trail intersections with roads	W on R	R1-2	R1-1, R1-2
Bicycle Crossing	For motorists at trail crossings	B on Y	W79	W11-1
Turns and Curves	At turns and curves which exceed 20 mph design specifications	B on Y	W1,2,3; W4,5,6,14 W56,57	W1-1,2 W1-4,5 W1-6
Trail Intersections	At trail intersections where no STOP or YIELD required, or sight lines limited	B on Y	W7,8,9	W2-1, W2-2 W2-3, W2-3 W2-4, W2-5
STOP Ahead	Where STOP sign is obscured	B,R on Y	W17	W3-1
Signal Ahead	Where signal is obscured	B,R,G	YW41	W3-3
Pedestrian Crossing	Where pedestrian walkway crosses trail	B on Y	W54	W11A-2
Directional Signs	At intersections where access to major destinations is available	W on G	G7, G8	D1-1b(r/l), D1-1c
Trail Regulations / Bikes Reduce Speed & Call Out Before Passing	All trail entrances	B on W	n/a	n/a
Multi-purpose Trail: Bikes Yield to Pedestrians	All trail entrances	n/a	n/a	n/a
Please Stay On Trail	In environmentally-sensitive areas or where the trail travels on private property	n/a	n/a	n/a
Trail Closed: No Entry Until Made Accessible & Safe for Public Use	Where trail or access points closed due to hazardous conditions	n/a	n/a	n/a

Striping

Standard striping patterns used to delineate trail crossings will be implemented on the Larson Creek Multi-Use Path. A centerline stripe on the trail approach to the intersection will help to align and warn trail users. The actual crosswalk striping may be accompanied by pavement treatments to help warn and slow motorists. In areas where motorists do not typically defer to pedestrians in crosswalks, additional measures may be required. While there is a general trend to remove unprotected crossings in transportation systems, the marked crossings serve a valuable function and warn motorists of the crossings.

Trail Access

The Larson Creek Multi-Use Path is a multi-use trail that will be used by pedestrians, bicyclists (both recreational and commuters), in-line skaters, and other non-motorized uses. The trail will be accessible to people in wheelchairs and senior citizens with walking aids who require a smooth surface for navigating.

Good access to the trail for all users is a key element to its future success. Simply put, if people cannot get to a trail easily, they will not use it. Neighborhood access will be achieved from all local

streets crossing the trail. Each street crossing will be identified and directional signage will be placed at street intersections, identifying destinations and distances along the trail and within the surrounding community. Table 5 shows potential trail access points.

Table 5. Trail Access Points

Barnett Road	Morrison Avenue
Ellendale Drive	Olympic Avenue
Hilldale Avenue	Golf View Drive
Bear Creek Greenway	Edgewater Drive
Black Oak Drive	Larson Creek Drive
Medical Center	North Phoenix Road
Murphy Road	

Potential Trailheads

Trailheads (formalized parking areas) serve all trail users. They provide information about the trail (i.e., maps) and may have trail user facilities like restrooms, trash receptacles, information kiosks, and benches. Trailhead locations should ideally be located every two to three miles along the trail. There are relatively few opportunities to create trailhead facilities for the Larson Creek Multi-Use Path. Two possible sites have been identified one along North Phoenix Road, just north of the proposed trail alignment (currently zoned for single-family residential development) and one at the dead end of Hilldale Avenue near the golf course. Use of these sites as public trailheads will require discussions with the managing agency of the site and neighbors living in the vicinity of the trailheads.

Trail Amenities

In order for the Larson Creek Multi-Use Path to be a successful community destination and resource, the trail should appeal to a wide variety of users. To achieve this, the Larson Creek

Multi-Use Path should be designed to provide a high level of user conveniences. The demographics of the surrounding communities include a high percentage of both elderly and young. These groups will use the trail more often if amenities are provided. Recommended trail amenities include:

- **Benches:** Utilize wood composites with metal detailing.
- **Covered Bench Areas:** Metal and wood composites should be encouraged. Structures that emulate the organic forms of the creek corridor and the history of the area should be mimicked.
- **Bike Racks:** Approved by the Oregon Bicycle and Pedestrian Plan.
- **Mile Post Markers:** Mileposts greatly increase use of the trail by joggers and cyclists looking for set workout distances. Incorporation of milepost markers onto fixed wood composite bollards is recommended. Signage should be consistent with other trail signage.
- **Restrooms:** Restrooms should be provided at any new trailhead. Signage should be provided to indicate these facilities.
- **Garbage Cans:** The trail should establish the National Park Service ethic of “pack it in, pack it out.” However, garbage cans may be provided at appropriate locations.



Figure 7. Information Kiosks Educate Trail Users on a Variety of Topics

- **Dog Waste Pickup Stations:** Dog waste pickup bag dispensers should be placed at trailheads and key neighborhood access points along the route. Signs should be placed along the trail notifying dog owners of the county ordinance requiring dog owners to pick up after their dogs.
- **Information Kiosks:** Trailhead stations should provide trail users with information about the ecology and history of the creek. Educating the public about the creek corridor will help reduce dumping, littering, and other abuses to the waterway. Involving school children, university students and civic organizations in the research, design, and construction of these kiosks would be an excellent community activity.

Materials used for amenities should receive approval from the future trail managing authority and the City of Medford. For recycling and maintenance purposes, the cities should use wood composite materials for amenities where wood is specified; wood composites have the aesthetic qualities of wood, but are better for park amenities. Local materials (wood felled for trail construction) could also be used for some trail amenities.

Signing

As a general rule, caution should be exercised to not “over sign” the trail. Incorporation of signage into planned trailside vertical elements such as bollards should be encouraged. This will avoid “visual pollution” of too many signs along the trail and an excessive number of sign poles.

Trailhead Access Signs

Since trailheads will serve as access points to people that may not be as familiar with the trail, information signing should be provided that includes a “You Are Here” map and trail etiquette signs. These should be placed on an information kiosk, designed to be reflective of the corridor or adjacent surroundings. Kiosks must be ADA compliant.

Trail Etiquette Signs

The trail etiquette sign will clearly spell out proper rules and customs for trail users based on national standards and accepted trail practices.

Directional Signs

Directional signs provide orientation to the trail user and emphasize the continuity of the trail. Street names, mileage markers, and place names are key elements that should be called out along the trail. Street names should be called out at all trail intersections with roadways. Mileage markers should be placed at quarter-mile increments. Directional signs should be used to call out key destinations along the trail route.



Trail directional sign

Interpretive Signs

Interpretive signs provide enrichment to the trail user experience, highlights the uniqueness of the local community, and provides educational opportunities. A key interpretive opportunity for this trail is environmental education about stream ecology, water quality, conservation, native plants, and riparian corridors. Key locations would include the west end of the St. Mary’s School site and the restoration locations between Murphy and Olympic.

Public Art

Public art along a trail provides an opportunity to add interest to the trail experience and, depending on the scale and form, can become

an “event” in itself and serve as a public draw. Public art can be aesthetic or functional, doubling as sitting or congregation areas. Local artists should be encouraged to produce artwork in a variety of materials for sites along the Larson Creek corridor.

Bollards

Posts or bollards at roadway/trail intersections and trail entrances may be necessary to keep vehicles from entering the Larson Creek Multi-Use Path. Posts should be designed to be visible to bicyclists and others, especially at night, with reflective materials and appropriate striping. Posts should also be designed to be removable by emergency and maintenance vehicles.

- **Fixed Bollards:** Should be used at roadway/trail intersections. Bollards should be metal or heavy timber structures and located on the trail centerline and adjacent to the trail tread.
- **Removable Bollards:** Install center removable bollards at intersections that can be keyed and locked to allow maintenance and emergency service vehicle access to the trail. Recommend use of metal.



Figure 8. Fixed and Removable Bollards

Landscaping

Vegetative Buffers

When possible, landscaping is the first choice for creating separation between the trail and adjacent properties. Vegetative buffers have the dual purpose of creating a natural privacy screen, providing habitat for some of the wildlife that live in the creek corridor (i.e. birds, small mammals), and stabilizing the creek bank. Landscaping can also be an effective barrier to unwanted access where needed.

Restoration Opportunities

Several restoration opportunities exist along Larson Creek. Many stream sections have been disturbed from past vegetation clearing, grading, and dumping of trash. One method of restoring some of the areas along the stream is re-establishing native vegetation to provide bank stabilization, stream shading to improve water quality, and riparian habitat for wildlife. Another restoration opportunity is removal of the concrete lined channel between Murphy and Olympic and restoration of the stream bank. New planting will create shade for the creek and keep water temperatures down which improves the habitat for fish.

Fencing

As a general policy, fencing will be the responsibility of the adjacent resident. Although the public often perceives fencing as a means of assuring safety by prevention of unwanted access, too much fencing can have the opposite effect by impairing informal trail surveillance. Inappropriate fencing can also degrade the experience of trail users, obscure views, and create a “tunnel” effect that makes users feel trapped.

Fencing of approximately four feet can provide a barrier sufficient to denote private property or deter most access.

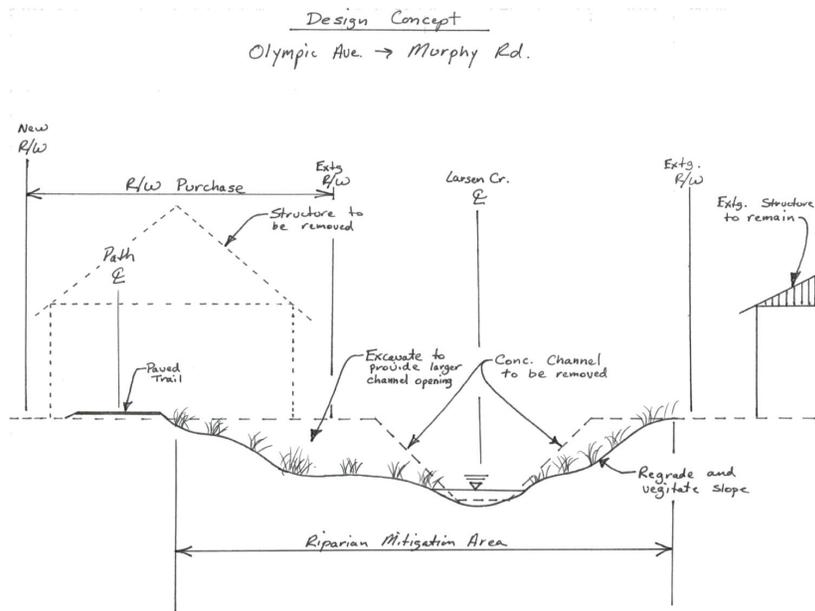


Figure 9. Design Concept for a Concrete Channel

Should adjacent property owners choose to build fences, a variety of fencing applications can be considered. Solid fencing that does not allow any visual access to the trail should be discouraged. Fencing that allows a balance between adjacent residents' privacy and informal surveillance of the trail should be encouraged. If fencing is desired purely for privacy reasons, vegetative buffers are recommended.



Figure 10. Trail Lighting

Lighting

The installation of lighting along the Larson Creek Multi-Use Path is

recommended as a means of deterring anti-social behavior and creating a safe and accessible facility. In general, lighting should be placed at trail access points and road crossings to increase safety. Light cut-offs should be used to minimize unwanted light spillage onto adjacent property and into the sky.

Project Implementation

Phasing

Cost Estimates

Zoning, Permitting, and Natural Resources

Natural Resources

Funding Sources

Project Implementation

Phasing

The primary purpose for a trail phasing plan is to ensure a logical sequence of implementation that provides a high degree of success as each phase is built, thereby building momentum for each future phase of the project. Success is directly correlated with a substantial level of use, strong public and political support, and proven effective management of the trail as each phase is implemented. Success of the first built phase is critical to securing future funding. The first phase must be well received by the public and become a model for all other future phases.

It is recommended to build the entire trail in one phase, but funding limitations often result in an approach of building what can be funded. In this case, first making connections to established recreation and commuter routes makes sense to have a high level of use and encourage completion of the project.

Phase I: Bear Creek to Black Oak Drive

Phase I represents just under one mile of trail, traversing the length from Bear Creek to Black Oak Drive and connecting to the existing Black Oak to Murphy segment. This phase would connect The Bear Creek Greenway to the neighborhoods and business along Larson Creek and connect to St. Mary's School. Use is likely to be high due to completion of a gap between Black Oak and the Bear Creek Greenway.

Phase II: Black Oak to North Phoenix Road

This Phase, just over a mile in length, completes the trail. This Phase should also include improvements and repairs to the existing segment of trail from Black Oak to Murphy. With the complete

trail in place, it becomes a viable alternative to Barnett Road for any non-motorized use.

Cost Estimates

The construction costs for the Larson Creek Multi-Use Path will depend on a number of factors, most specifically the final alignment and design of the trail segments. Preliminary estimates for construction are included based on unit costs and estimates needed for grading and paving a 12-foot-wide concrete trail and most recommended trail amenities. The total estimated cost for the preferred alignment of the Larson Creek Multi-Use Path is \$1.7 million.

The costs for Larson Creek do not include easement or property acquisition costs for greenway and trail development.

Table 6. Larson Creek Costs

Segment	Trail Construction	Amenities	Roadway Crossings	Bridges	Demo & Restoration	Design and CM (15%)	Contingency (20%)	TOTAL COST
1. Bear Creek to Ellendale Drive	\$83,856	\$11,040	\$1,200			\$14,414	\$19,219	\$129,730
2. Ellendale Drive to Black Oak Drive	\$208,810	\$15,180	\$2,400	\$188,750		\$62,271	\$83,028	\$560,439
3. Black Oak Drive to Murphy Road	\$23,200	\$9,600	\$2,400	\$25,000		\$9,030	\$12,040	\$81,270
4. Murphy Road to Golf View Drive	\$147,100	\$32,360	\$7,200		\$198,972	\$57,845	\$77,126	\$520,603
5. Golf View Drive to Phoenix Road	\$280,414	\$24,480	\$3,600			\$46,274	\$61,699	\$416,467
*TOTAL	\$743,380	\$92,660	\$16,800	\$213,750	\$198,972	\$189,834	\$253,112	\$1,708,509

*Does not include cost of property easement acquisition or crossing of North Phoenix Road.

Zoning, Permitting, and Natural Resources

Zoning and Permitting

Overall

- A trail in all segments would be consistent with the Comprehensive Plan, however updates would be required to the Regional Transportation Plan (RTP), Transportation System Plan (TSP), Capital Improvement Plan and the Park, Recreation and Leisure Services Plan to incorporate the selected alignment.
- If the entire trail is over five acres in size, an NPDES permit would be required.
- All segments would require building permits.

Segment 1

- The proposed trail would be consistent with residential zoning in this segment.
- A Conditional Use Permit (CUP) would be required to locate the

trail within 50 feet of the top of bank within a Riparian Area.

Segment 2

- The proposed trail would be consistent with that portion of this segment within a residential zone, however those sections within commercial zones would require either a CUP, if developed as a park, or a quasi-judicial amendment to the Transportation System Plan, if developed as a transportation facility.
- The creek crossings and location within a wetland in this segment would require federal Section 404 and state Removal/Fill permits, as well as an ESA Section 7 Consultation.
- A CUP would be required for building within 50 feet of the top of bank within a Riparian Area.

Segment 3

- The existing segment is approved within the commercial zone.

Segment 4

- The proposed trail would be consistent with that portion of this segment within a residential zone, however those sections within commercial zones would require either a CUP, if developed as a park, or a quasi-judicial amendment to the Transportation System, Plan, if developed as a transportation facility.
- A CUP would be required for building within 50 feet of the top of bank within a Riparian Area.

Segment 5

- A trail would be consistent with residential zoning in this segment.
- The creek crossing in this segment would require federal Section 404 and state Removal/Fill permits, as well as an ESA Section 7 Consultation .
- A CUP would be required for building within 50 feet of the top of bank within a Riparian Area.

Natural Resources

Fish

There are Coho Salmon in the lower sections of Larson Creek listed as threatened under the Endangered Species Act (ESA). There is also spawning and rearing habitat for summer steelhead that extends upstream in Larson Creek (Streamnet).

Endangered Species Act (ESA)

Stream crossings and stormwater treatment could be designed so the trail does not require consultation with National Oceanic and Atmospheric Administration (NOAA) Fisheries; however, the stream channel restoration east of Murphy will likely require consultation

with NOAA. The Roseburg NOAA office stated that similar stream re-location/enhancement projects recently fell under informal consultation because the proponent worked with NOAA on the design and they constructed the new channel before re-introducing the flows.

Trail Surface Materials

Stormwater treatment would not be required for a paved impervious trail if there are no motorized vehicles to be used on the trail - this includes maintenance vehicles.

Wetlands

The local wetland inventory maps wetland LA-WO1 at the eastern edge of the golf course on the St Mary's school property. This is a forested riparian wetland considered a significant wetland by the City of Medford. Therefore, there is a 50' riparian corridor that surrounds the wetland.

Riparian Corridor

In general, trail alignment should try to minimize and avoid tree removal in the riparian area in order to minimize impacts to fish and wildlife habitat. The trail is an allowed use in the Medford code with a conditional use permit with a mitigation plan for new sections of trail in the riparian corridor.

Funding Sources

Funding for implementation may include opportunities provided by the Federal Highway Administration's Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) program, which was enacted in 2005; and state and local transportation and recreation restoration programs. Grant amounts for greenway and multi-use trail projects similar to the Larson Creek

Multi-Use Path in the state have typically been in the \$1 million to \$3 million range.

Federal and State Funding Sources – Competitive Grants

- **Recreational Trails Grants** – Coordinated by Oregon State Parks. Funds can be used for construction. Annual funding cycle.
- **Land and Water Conservation Fund (LWCF)** – Federal funds coordinated by Oregon State Parks. Funds can be used for construction. Biannual funding cycle.
- **Measure 66 Funds** – Funds from Oregon State Lottery coordinated by Oregon State Parks. Funds can be used for construction. Biannual funding cycle.
- **Enhancement Projects** – Funded by federal transportation dollars and administered by Oregon Department of Transportation (ODOT). No funding cycle, when funds are available.
- **Oregon Bicycle / Pedestrian Grants** – Administered by ODOT's Bike Program. Project must be in a public right-of-way. Funding available every two years.
- **Community Development Block Grants** – Federal funds administered by the counties for areas with low and moderate income households. Bicycle and pedestrian projects are eligible.
- **Oregon Watershed Enhancement Board** – Grants are available annually for projects in the following categories: Land Acquisition, Restoration, Water Acquisition, Monitoring, Assessment, Education and Outreach, Technical Assistance and Small Grants. Information about specific opportunities can be found on OWEB's website: oregon.gov/OWEB/index

Local Funding Sources

- **System Development Charges** – Funded by fees from new development and administered by the City of Medford.
- **Local/Regional Bond Measures Approved by Voters** - Funds can be used for right-of-way acquisition, engineering, design, and trail construction.

Private Funding Sources – Volunteer Services

Local businesses can help defray some of the costs associated with trail and greenway development. Some examples include:

- Cash donations
- Donations of services, equipment, and labor
- Discounted materials
- Sponsorships
- Contribution of employee volunteer time
- Adopt-a-trail programs

Foundations

Many trail elements, particularly if they have a focus on health, education, civic issues, or the environment, can be funded through private foundations. Funding opportunities are better from local foundations and should be approached before national foundations. It is important to keep in mind that many foundations only solicit grant proposals from non-profit organizations. A Friends of Larson Creek Greenway group can be key grant applicants for trail funding.

Land Trusts

Land Trusts are local, regional, or statewide nonprofit conservation organizations directly involved in helping protect natural, scenic, recreational, agricultural, historic, or cultural property. Land trusts work to preserve open land that is important to the communities and regions where they operate.

Service Clubs

Community organizations have been very successful holding fundraisers and providing volunteer labor for trail building and maintenance activities. Local examples include Chamber of Commerce, 4-H, Boy Scouts of America, Rotary Club, Southern Oregon University service clubs, and others.

Individual Sponsors

Individuals, businesses, or corporations can contribute donations to sponsor sections of trail or project elements. Plaques or other forms of recognition are typically placed on constructed pieces in the trail corridor or at a prominent entry point. Sponsorship is a good way to fund trail elements, like benches, trash receptacles, interpretive areas, and conservation activities and events.

Sections of trail can also be sponsored through a “Buy a Foot” program. Community members and organizations can purchase a section of trail at a fixed cost per linear foot and have their names (or dedication) listed on a plaque, sign, or inscription.

Maintenance and Safety Recommendations

Trail Safety

Design Elements that Improve Trail Safety

Trail Watch Program

Corridor Maintenance

Maintenance and Safety Recommendations

Trail Safety

Trail safety is a concern of both trail users and those whose property is adjacent to the trail. Creating a safe trail environment goes beyond design and law enforcement and should involve the entire community. The most effective and most visible deterrent to illegal activity on the Larson Creek Multi-Use Path will be the presence of legitimate trail users. Getting as many “eyes on the corridor” as possible is a key deterrent to undesirable activity in the Larson Creek corridor. There are several components to accomplishing this as outlined below:

Provide Good Access to the Trail

Access ranges from providing conveniently located trailheads along the trail, to encouraging the construction of sidewalks to accommodate access from private developments adjacent to the trail. Access points should be inviting and signed so as to welcome the public onto the trail.

Good Visibility from Adjacent Neighbors

Neighbors adjacent to the trail can potentially provide 24-hour surveillance of the trail and can become an ally to the cities’ police departments. Though some screening and setback of the trail may be needed for privacy of adjacent neighbors, complete blocking out of the trail from neighborhood view should be discouraged. This eliminates the potential of neighbors’ “eyes on the trail,” and could result in a “tunnel effect” on the trail.

High Level of Maintenance

A well-maintained trail sends a message that the community cares about the public space. This message alone will discourage undesirable activity along the trail.

Programmed Events

Community events along the Larson Creek Multi-Use Path will help increase public awareness and thereby attract more people to use the trail. Various civic organizations can help organize public events along the trail, which will increase support for the trail. Events might include a day-long trail clean-up events or a series of short historical or nature walks led by longtime residents or a naturalist.

Community Projects

The support generated by the Larson Creek Multi-Use Path could be further capitalized by involving neighbors and friends of the trail in a community project. Ideas for community projects include volunteer planting events, art projects, interpretive research projects, scout troop projects, or even bridge-building events. These community projects are the strongest means of creating a sense of ownership along the trail that is perhaps the strongest single deterrent to undesirable activity along the trail.

Adopt-a-Trail Program

Nearby businesses, community institutions, and residential neighbors often see the benefit of their involvement in the trail development and maintenance. Businesses and developers may view the trail as an integral piece of their site planning and be willing to take on some level of responsibility for the trail. Creation of an adopt-a-trail program should be explored to capitalize on this opportunity and foster civic pride.

Design Elements that Improve Trail Safety

Below are common trail safety concerns and how thoughtful design treatments can prevent safety problems along the Larson Creek Multi-Use Path:

Table 7. Design Elements that Improve Trail Safety

Privacy of Adjacent Property Owners
Encourage the use of neighborhood friendly fencing and planting of landscape buffers. Clearly mark all trail access points. Post trail rules that encourage respect for neighboring property. Place lighting strategically, utilizing light shields to minimize unwanted light in adjacent homes.
Litter and Dumping
Post trail rules encouraging “pack it in, pack it out” etiquette. Place garbage receptacles at trailheads. Provide good visual access to the trail. Manage vegetation within the right-of-way to allow good visual surveillance of the trail from adjacent properties and from roadway/trail intersections. Encourage local residents to report incidents as soon as they occur. Remove dump sites as soon as possible. Encourage use of yard debris recycling service.
Trespassing
Clearly distinguish public trail right-of-way from neighboring property through the use of vegetative buffers and the use of good neighbor type fencing. Post trail rules that encourage respect for neighboring property.
Crime
Manage vegetation so that the corridor can be visually surveyed from adjacent streets and residences. Select shrubs that grow below three feet in height and trees that branch out greater than six feet in height. Place lights strategically and as necessary.

Place benches and other trail amenities at locations with good visual surveillance and high activity. Provide mileage markers at quarter-mile increments and clear directional signage for orientation. Create a “Trail Watch Program” involving local residents. Partner with local law enforcement to create a proactive enforcement plan. Design the trail so that police vehicles can access the entire corridor. If the police department includes bicycle officers, encourage them to add the trail to their patrols.
Intersection Safety
Require all trail users to stop at public roadway intersections by posting stop signs. Provide crosswalk striping and trail crossing warning signs for vehicle drivers. Put Larson Creek Multi-Use Path logo on warning signs. Manage vegetation at intersections to allow visual access at crossings.
Vandalism
Select benches, bollards, signage, and other site amenities that are durable, low maintenance, and resistant to vandalism. Respond through removal or replacement in a rapid manner. Keep a photo record of all vandalism and turn it over to local law enforcement. Encourage local residents to report vandalism. Create a trail watch program; maintain good surveillance of the corridor. Involve neighbors in trail projects to build a sense of ownership. Place amenities (benches, etc.) in well-used, highly visible areas.

Trail Watch Program

A trail watch program can provide an opportunity for local residents to become actively involved in crime prevention along the trail. Similar to Neighborhood Watch programs, residents are brought together to get to know their neighbors, and are educated on how to recognize and report suspicious activity.

Safety Inspections

Regular inspection of the trail and associated amenities is a key factor to trail safety. Periodic visual inspections should be conducted by Medford public works crews and can help identify and correct problems before they become an issue. A fallen tree or limb, for example, can be readily removed from the trail or coned off to divert trail users away from the hazard until such time as maintenance crews can remove the hazard. A written record of inspections is recommended and will help create a database of information that can assist the cities in several ways. Written records can reveal safety trends and use patterns that can assist the cities with prioritizing of maintenance dollars. Written records also can help protect the cities from potential liability issues, providing documentation of diligent maintenance practices targeted towards protection of the public. A typical inspection record should include:

- Inspection reports noting any hazards that have been found along the trail along with remedial action. This should note basic items such as debris found on the trail, wash outs, or other trail obstructions
- Monthly inspections should be conducted of the entire trail. These inspections should document the condition of the trail and notes should be made of any potential hazards on the trail (cracks, erosion, overhead vegetation, etc.). Corrective actions should be integrated into the next 30-day work plan.
- Quarterly visual and operational inspections should be made of all of the park amenities such as benches, signage, drinking fountains, bike racks, etc. Recommended corrective actions should be made and be integrated into a 3-month maintenance work plan.

The City should set up a resident response system so that problems with the trail can be systematically recorded if maintenance crews are unable to visit the trail daily.

Trail Closure

The Larson Creek Multi-Use Path should be closed if any heavy equipment is expected to use the trail, or when any maintenance or construction activities are occurring that could be injurious to the general public. The City of Medford should take appropriate measures to notify the public of closure of the segment of trail and arrange detours where appropriate.

Corridor Maintenance

A high level of trail maintenance is critical to the overall success and safety of the Larson Creek Multi-Use Path. It includes such activities as pavement stabilization, landscape maintenance, facility upkeep, sign replacement, fencing, mowing, litter removal, painting, and pest control. However, the effects of a good maintenance program are not limited to the physical and biological features of the trail:

- A high standard of maintenance is an effective way of helping advertise and promote the trail as a regional and state recreational resource;
- The psychological effects of good maintenance can be an effective deterrent to vandalism, litter, and encroachments;
- Good maintenance is necessary to preserve positive public relations between the adjacent land owners and government;
- Good maintenance can help make enforcement of regulations on the trail more efficient. Local clubs and interest groups will take pride in “their” trail and will be more apt to assist in protection of the Corridor.
- A proactive maintenance policy will help improve safety along the trail.

A successful maintenance program requires continuity and often times a high level of citizen involvement. Regular, routine maintenance on a year-round basis will not only improve trail safety,

but will also prolong the life of the trail. Maintenance activities required for safe trail operations should always receive top priority. The following should be part of the maintenance checklist:

Vegetation

In general, visibility between plantings at trailside should be maintained so as to avoid creating the feeling of an enclosed space. This will also give trail users good, clear views of their surroundings, which enhances the aesthetic experience of trail users. Understory vegetation along the trail corridor shall not be allowed to grow higher than 36 inches. Trees species selection and placement should be made that minimizes vegetative litter on the trail and root uplifting of pavement. Tree branching should be pruned up to a minimum of six feet.

Surfacing

Concrete is the recommended surface material for most of the the Larson Creek Multi-Use Path. Concrete was chosen for its low-maintenance characteristics and its ability to weather annual flood events. When properly cared for, concrete will last for many years.

Bridge structures will need to be kept clear of debris to prevent wash outs along the trail and maintain positive flow. Checks for erosion along the trail should be made periodically during the wet season, and immediately after any storm that brings flooding to the local area.

The trail surface should be kept free of debris, especially broken glass and other sharp objects, loose gravel, leaves and stray branches. Trail surfaces should be swept periodically.

Pest and Vegetation Management

Some basic measures should be taken to protect the trail investment. This includes a bi-annual mowing along both sides of the trail to prevent invasion of plants into the pavement area. Recommended time of year for mowing is in fall and in spring.

Trail runoff will enter Larson Creek, eventually joining Bear Creek. Use of chemical sprays for vegetation control should be avoided. Wherever possible, vegetation control should be accomplished by mechanical means or hand labor. Use of chemical sprays should be limited to use only on those plants that are harmful to the public such as poison oak. Effort should be made to eradicate invasive species found along Larson Creek. Volunteer removal via hand labor is recommended.

Vertical clearance along the trail should be periodically checked and any overhanging branches over the trail should be pruned to a minimum vertical clearance of 10 feet.

Litter and Illegal Dumping

Staff or volunteer effort should remove litter along the trail. Litter receptacles should be placed at access points such as trailheads. Litter should be picked up once a week and after any special events held on the trail.

Alternatively, the trail corridor could be signed “pack it in, pack it out.” This technique has been met with mixed results, but if maintenance funds are not available to meet trash removal needs it is best to remove trash receptacles.

Illegal dumping should be controlled by vehicle barriers, regulatory signage and fines as much as possible. When it does occur, it must be removed as soon as possible in order to prevent further dumping. Neighborhood volunteers, friends groups, student groups, alternative community service crews and inmate labor should be used in addition to maintenance staff.

Signage

Signage should be replaced along the trail on an as-needed basis. A monthly check on the status of signage should be performed with follow-up as necessary.

Flooding

Some portions of the trail are subject to flooding. Debris accumulated on the trail surface should be removed after each recession of water. In addition, debris should be periodically removed from the waterway under bridge structures.

Table 8 summarizes maintenance recommendations for the Larson Creek Multi-Use Path:

Table 8. Maintenance Recommendations

Item	Frequency
Sign replacement/repair	1-3 years
Pavement marking replacement	1-3 years
Planted Tree, Shrub, trimming/fertilization	6 months- 1 year
Clean drainage system	Annual
Pavement sweeping	Monthly
Shoulder mowing	Bi-Annual – Fall/Spring
Trash disposal	As needed, twice a week
Graffiti removal	As reported
Maintain benches, site amenities	1 year
Pruning to maintain vertical clearance	1-4 years
Remove fallen trees	As needed
Weed control	Monthly
Maintain emergency telephones	1 year
Irrigate/water plants	Weekly - as needed

Typical maintenance vehicles for the trail will be light pick up trucks and occasionally heavy dump trucks and tractors. A mechanical sweeper is recommended to keep the trail clear of loose gravel

and other debris. Care should be taken when operating heavier equipment on the trail to warn trail users and to avoid breaking the edge of the trail surface.

Maintenance Costs

The total estimated annual maintenance for the Larson Creek Multi-Use Path is about \$14,000 based on the estimated length of two miles. This maintenance cost is based on an industry standard of \$7,000 per mile of concrete bike path annually, based on similar trails in the state.

Maintenance costs cover labor, supplies, and amortized equipment costs for weekly trash removal, monthly sweeping, and bi-annual resurfacing and repair patrols includes cleaning and patching (if necessary) the concrete trail, repairs to crossings, cleaning drainage systems, trash removal, landscaping, underbrush and weed abatement (performed once in the late spring and again in mid-summer). These costs can be greatly reduced if volunteer crews are used or a local organization assumes some of the responsibilities.

