

---

*Draft Design Acceptance Package  
For Review*

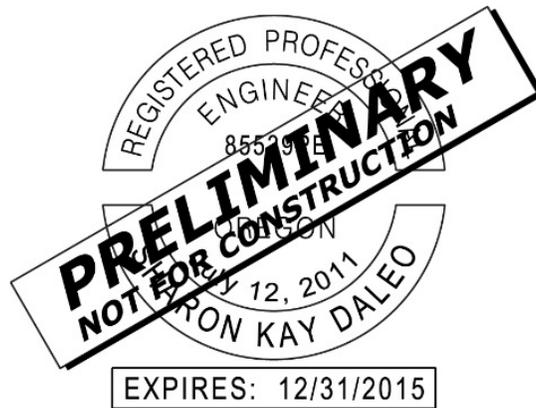
**Historic Columbia River Highway  
State Trail:  
Lindsey Creek to Starvation Creek  
Trailhead (Segment D)**

**The Columbia River Highway  
Hood River County, Oregon  
WFLHD Project OR DOT CRGNSA 100(1)  
ODOT Region 1**

Prepared for  
**Western Federal Lands Highway Division  
Oregon Department of Transportation**

May 2014

Prepared by  
**CH2MHILL®**



This report has been prepared under the direction of a registered engineer.

# Executive Summary

---

This Design Acceptance Package (DAP) has been prepared to document the Historic Columbia River Highway (HCRH) State Trail: Lindsey Creek to Starvation Creek Trailhead project (“Segment D” as identified in the HCRH State Trail Plan, 2010). The purpose of the project is to improve recreational connectivity by connecting intact and abandoned segments of the HCRH, as called for in the 1986 Columbia River Gorge National Scenic Area (CRGNSA) Act. Portions of the HCRH have been abandoned, removed, and segmented by the construction of Interstate-84 (I-84). The CRGNSA Management Plan specifically calls for the following within the Special Management Area (SMA):

“Intact and usable highway segments should be connected with recreation trails to create a continuous route through the Columbia River Gorge that links local, state, and federal recreation and historic sites” (CRGC 2007).

The proposed project consists of Segment D of the HCRH State Trail. It begins at the Lindsey Creek area and meanders eastward along the south side of I-84. This segment of trail terminates at Starvation Creek Trailhead where it matches into an existing trail. The route of the proposed project would pass through land owned by the State of Oregon (ODOT right of way and Oregon Parks and Recreation Department), and federal land managed by the USDA Forest Service. The proposed project will follow the HCRH State Trail Guidelines (ODOT 2011), and includes the following components:

- Grading, base, paving and drainage for a paved 3.93-mile-long pedestrian/bicycle path, 12 feet wide with 2-foot shoulder on each side.
- Grades up to 5%.
- Incorporation of remnant sections of the HCRH.
- Rock fall protection.
- Retaining walls.
- Traffic barriers to separate the proposed trail from adjacent I-84.
- New pedestrian/bicycle bridge over Warren Creek.
- Viewing areas and scenic spur trails.
- Landscaping and site amenities.

Funding for the project from Lindsey Creek to Warren Creek is provided through Oregon’s Transportation Enhancement/Oregon Pedestrian and Bicycle Program, with a budget of \$1.1 million. Funding for the project from Warren Creek to Starvation Creek Trailhead is provided through the Federal Lands Access Program for the amount of \$1.4 million. With the combined funding, the total project budget for this segment is \$2.5 million.

The final design will begin in 2014. Construction is scheduled to begin in early to mid 2015. Design Plans are located in Appendix A.

The estimated construction cost for the project is \$2,640,542. The cost estimate includes a 25% contingency. Final project costs will vary from those presented in this document and will depend on actual labor and material costs, competitive market conditions, and final project scope, among other variables.

# Contents

Section	Page
<b>Introduction.....</b>	<b>1-1</b>
1.1 Purpose and Need and Project Description.....	1-1
1.2 Project Funding.....	1-2
1.3 Summary of Existing Conditions .....	1-3
1.3.1 Existing Conditions.....	1-3
1.4 Outline of Project Constraints .....	1-4
1.5 Report Organization.....	1-4
<b>Design Approach and Development .....</b>	<b>2-1</b>
2.1 Design Approach.....	2-1
2.1.1 Design Philosophy.....	2-1
2.1.2 Design Approach.....	2-1
2.1.3 Design Development.....	2-2
2.1.4 Community and Stakeholder Acceptance .....	2-4
2.2 Design Criteria for Selected Alternative .....	2-5
2.2.1 Project Guidelines.....	2-5
<b>Proposed Design .....</b>	<b>3-7</b>
3.1 Design Exception Discussion.....	3-7
3.2 Horizontal Alignments .....	3-7
3.2.1 HCRH Trail.....	3-7
3.2.2 Typical Trail Sections.....	3-8
3.3 Vertical Alignment .....	3-8
3.3.1 HCRH Trail.....	3-8
3.4 Access Roads/Turnarounds.....	3-9
3.4.1 Maintenance/Trail Turnaround .....	3-9
3.4.2 BPA Access Road.....	3-9
3.5 Geotechnical .....	3-9
3.6 Structures.....	3-10
3.6.1 Warren Creek Bridge .....	3-10
3.6.2 Retaining Walls .....	3-10
3.7 Pavement Design and Pavement Typical Sections .....	3-12
3.8 Right-of-Way.....	3-12
3.9 Traffic.....	3-13
3.9.1 Construction Staging and Temporary Protection .....	3-13
3.10 Stormwater and Erosion Control .....	3-13
3.10.1 Stormwater .....	3-13
3.10.2 Temporary Erosion and Sediment Control Practices.....	3-14
3.11 Utility Conflict Analysis .....	3-15
3.12 Environmental Impacts and Mitigation Measures .....	3-16
3.12.1 Environmental Design Considerations.....	3-16
3.13 Construction Cost Estimate Summary .....	3-23

3.14	Project Schedule .....	3-23
<b>Items for Consideration.....</b>		<b>4-1</b>
4.1	Tree Clearing.....	4-1
4.2	Construction Footprint .....	4-1
4.3	Railing Types .....	4-1
4.4	Trail Medallion Markers.....	4-2
4.5	Landscaping and Amenities Concepts .....	4-2
<b>References.....</b>		<b>5-3</b>

**Appendixes**

Appendix A	Design Plans
Appendix B	Cost Estimate Detail Spreadsheet
Appendix C	Geotechnical Exploration Report
Appendix D	Stormwater Management Plan
Appendix E	Landscape Plan

**Figures**

1- 1	Project Vicinity Map
------	----------------------

**Tables**

2-1	Proposed Design Standards
3-1	Preliminary Pavement Sections by Project Segment
3-2	Existing and Proposed Drainage Crossings
3-3	Utility Company Contact Information
3-4	Anticipated Permits

# Introduction

---

## 1.1 Purpose and Need and Project Description

The HCRH State Trail Plan outlines multiple trail segments to provide a reconnection of the Historic Columbia River Highway (HCRH) between existing sections of abandoned highway. When all segments are completed the trail will provide a bicycle/pedestrian route from Wyeth Campground to Hood River. Several segments have already been completed. This project will construct a 1.25 mile section of the HCRH State Trail from Lindsey Creek to Starvation Creek Trailhead (Segment D) where it will connect to the existing trail that continues east to Viento Trailhead.

The proposed project is a key component of the Oregon Department of Transportation's (ODOT) resolution to provide an interconnected trail system from Troutdale to Hood River. ODOT's resolution considers the construction of the remaining segments to be "of statewide and national significance."

The proposed project will primarily follow the HCRH State Trail Guidelines (ODOT 2011), and includes the following components:

- Grading, base, paving and drainage for a paved 1.26-mile-long pedestrian/bicycle path, 12 feet wide with 2-foot shoulder on each side
- Grades up to 5%
- Incorporation of remnant sections of the HCRH
- Rock fall protection.
- Retaining walls
- Traffic barriers to separate the proposed trail from adjacent I-84
- New pedestrian/bicycle bridge over Warren Creek.
- Viewing areas and scenic spur trails
- Landscaping and site amenities

The Project Area of Potential Effects (APE) consists of the total 6,646 feet of trail that will be constructed within the Columbia River Gorge National Scenic Area (CRGNSA). The project APE also includes side-paths, pull-offs, and temporary construction areas. In total, the Project consists of approximately 5.6 acres. The Project will extend from an area near the existing Lindsey Creek culvert on the south side of I-84 to the existing Starvation Creek Trailhead near I-84 Milepost 54.

The Project is located in Township 2 North, Range 9 East, Sections 4 and 5, Willamette Meridian at an elevation of approximately 110 feet above mean sea level. It consists of the 12 foot wide trail which will be situated along the south side of the I-84 corridor. The Project will be designed to fully comply with the State Trail Design Guidelines, the I-84 Corridor Design Strategy, and the ODOT Highway Design Manual (HDM).

The final design will begin in 2014. Construction is scheduled to begin in 2015. Design Plans are located in Appendix A.

## 1.2 Project Funding

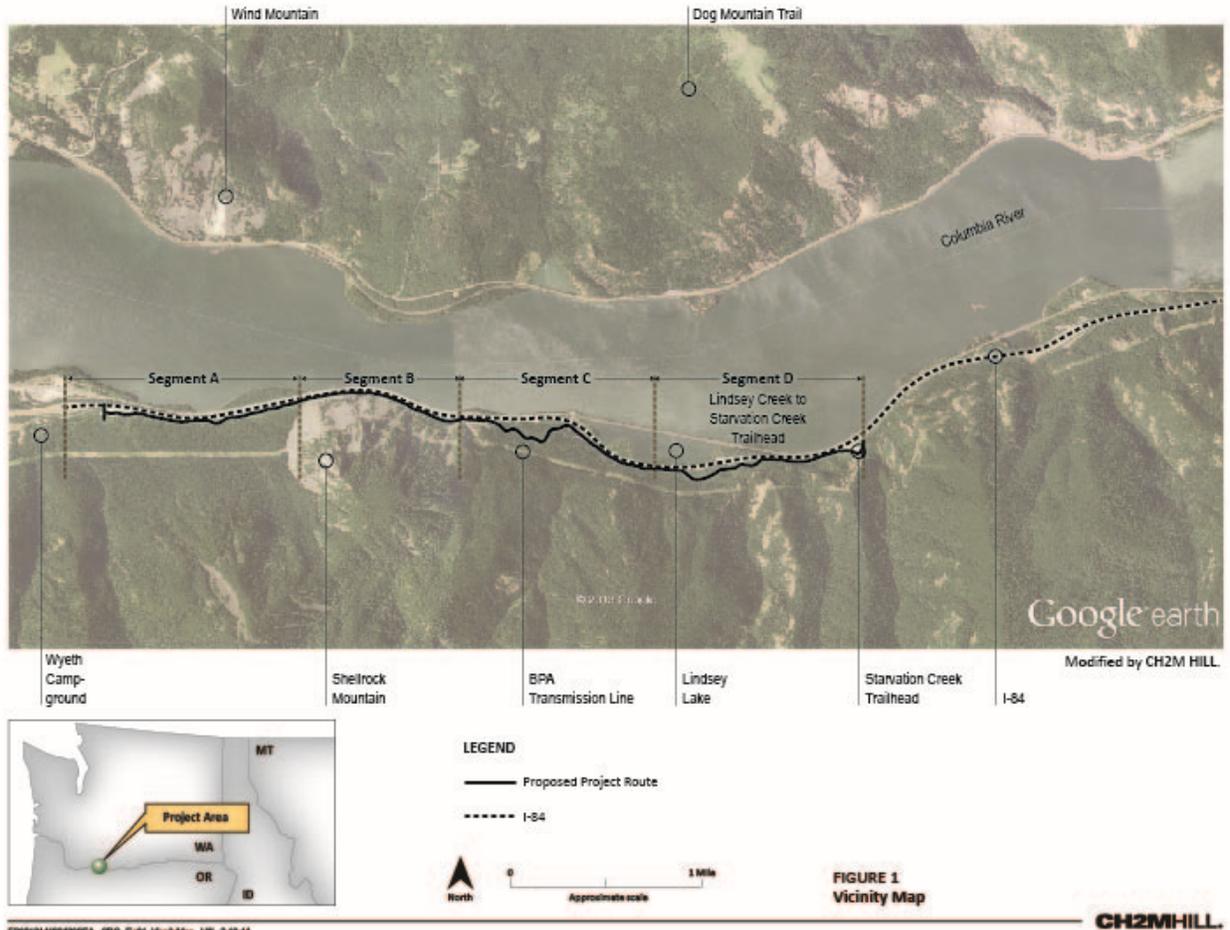
Funding for the project from Lindsey Creek to Warren Creek is provided through Oregon's Transportation Enhancement/Oregon Pedestrian and Bicycle Program. The project budget for this segment is \$1.1 million. Funding for the project from Warren Creek to Starvation Creek Trailhead is provided through the Federal Lands Access Program for the amount of \$1.4 million. With the combined funding the total project budget for this segment is \$2.5 million.

## 1.3 Summary of Existing Conditions

### 1.3.1 Existing Conditions

The HCRH State Trail – Lindsey Creek to Starvation Creek Trailhead project vicinity map and study area is shown on Figure 1-1.

FIGURE 1-1  
 Project Vicinity Map



The project is located along the south side of I-84 between Cascade Locks and Hood River in the Columbia River Gorge National Scenic Area, Oregon. At the west end of the project is Lindsey Creek, and at the east end is the Starvation Creek Trailhead. The terrain is generally rolling to mountainous and the trail will be adjacent to several wetlands and cross active streams. The trail will traverse Douglas-fir and mixed conifer forest as it meanders away from the I-84 shoulder. Habitats along the trail include riparian area, cliff, and talus slope. There is a short section of existing HCRH that will be a featured part of the trail alignment.

## 1.4 Outline of Project Constraints

The project corridor contains several important project constraints that shape the project scope and design. These constraints include topography, environmental, right-of-way, and cost.

The topography of the project area would generally be described as rolling to mountainous terrain. The first 2,000 feet of the trail is a gently rolling longitudinal grade with the right side of the trail running at the base of an existing slope with grades up to ¾ H:1V. The close proximity of the steep side slope creates a topographic as well as a design constraint to avoid cutting into the slope. As the trail veers away from the I-84 shoulder, the existing terrain steepens as the trail follows grades rolling up and back down at 5%. The terrain flattens as the trail reaches an existing segment of the HCRH.

The trail width is constrained west of the connection to the historic highway. Looking up stationing, there is an existing historic masonry wall to be avoided on the left side and steep slope on the right side. From the historic highway to the Starvation Creek Trailhead, the trail width is constrained between the existing I-84 exit ramp to Starvation Creek Trailhead and a steep 1H:1V slope that transitions into a rockfall catchment berm.

Environmental constraints are set by laws and regulations, most notably the Clean Water Act, Endangered Species Act, and USDA Forest Service administrative rules, and Hood River County Zoning Ordinance. Environmental constraints are further addressed in the Environmental section (Section 3.12).

The project budget is fixed at \$2.5 million in federal and state funds. The estimated construction cost for the project is \$2,642,542 which exceeds the project budget. The primary cost elements consist of the capital cost of construction and a 25% contingency for unknowns at this stage. Proposed landscaping and amenities are not included in this estimate. Any utility relocation costs are not included in this estimate. Ways to reduce the cost estimate will be explored as design is refined.

## 1.5 Report Organization

This report is organized as follows:

- **Executive Summary:** Proposed design for approval.
- **Section 1 – Introduction:** Introduces the reader to the project location, purpose and need, funding sources, existing conditions, project constraints, and DAP organization.
- **Section 2 – Design Approach:** Describes the approach used to evaluate and select a preferred alternative; discusses public involvement, area management, and proposed project design criteria.
- **Section 3 – Proposed Design:** Provides a detailed description of the proposed project design.
- **Section 4 – Items for Consideration:** Discusses tree clearing, construction footprint, railing types, trail medallion markers, landscaping, and amenities.
- **Section 5 - References**
- **Appendix A –Design Plans**

- **Appendix B – Cost Estimate Detail Spreadsheet**
- **Appendix C – Geotechnical Exploration Report**
- **Appendix D – Stormwater Management Plan**
- **Appendix E – Landscape Plans**



# Design Approach and Development

---

## 2.1 Design Approach

### 2.1.1 Design Philosophy

The project is located in the CRGNSA. The design philosophy that was developed in the 2011 State Trail Plan (STP) endures and is the same design philosophy being carried forward as the project goes into final design. The key ideas include:

**Capture the Beauty:** The CRGNSA offers countless opportunities for spectacular views including the River, Northwest forest, waterfalls and mountain ranges.

**Respect the Design of the Early Highway Designers:** Create a design that creates a feel similar to that of the original highway.

**Consider the Users Experience:** Create a design that takes advantage of the opportunities for viewpoints and overlooks, and provides separation from the I-84 shoulder to the extent possible.

### 2.1.2 Design Approach

As the design was refined, the project team participated in coordination meetings to review and discuss the revisions as they were made. The coordination meetings included project stakeholders involved in the design and maintenance of the trail, including representatives from Federal Highway Administration (FHWA), ODOT, Oregon Parks and Recreation Department (OPRD), US Forest Service (USFS), and the HCRH Advisory Committee. The goal of the initial stage of the preliminary design was to develop a preliminary set of plans that included plan, profile and cross sections of the alignments discussed and reviewed in the project team meetings. Upon initial design consensus by the project team, the alignment was staked and a detailed field review held to assess the location of the trail and the impacts.

Preliminary design for the HCRH State Trail, Lindsey Creek to Starvation Creek Trailhead, began with evaluating the conceptual horizontal alignment developed in the 2011 STP. The project team conducted a field review of the 2011 conceptual alignment and alternatives were discussed:

**Lindsey Creek Area:** The 2011 concept showed the trail swinging south off the highway shoulder and crossing Lindsey Creek on a new bridge before turning back towards the highway shoulder. It has since been determined that the area proposed for the new bridge crossing is in a low area that would be prone to flooding. The decision was made to keep the trail along the I-84 shoulder for an at-grade crossing over the existing box culvert under I-84.

The 2011 concept alignment provided an opportunity for trail users to view the Lindsey Creek Waterfall and the revised alignment would eliminate this direct access. It was determined that an unpaved footpath with a small resting area at the waterfall would be proposed as an access to view the waterfall.

**I-84 Shoulder Area:** Between the Lindsey Creek crossing and the Warren Creek Area, the trail stays along the I-84 shoulder similar to the 2011 STP.

**Warren Creek Area:** Similar to the 2011 STP, the trail veers away from the I-84 shoulder just west of an existing access road. The trail then crosses Wonder and Warren Creeks and a revised alignment location was discussed during the initial field review.

There are numerous large conifer trees and the alternatives developed were to navigate around the trees to the extent possible. The Warren Creek Area provided the best opportunity to develop an alignment with the character of the historic highway. This aspect is evidenced by the more curving alignment with scenic opportunities.

**Historic Highway Segment:** After a short distance slightly separated from the I-84 shoulder, the trail will match into and utilize a segment of existing historic highway. Pavement treatment options for the historic highway segment were discussed during the initial field review.

**Starvation Creek Trailhead:** Field review discussions of the 2011 STP yielded a decision to closely follow the existing paved trail behind the Starvation Creek Exist Ramp and to then to swing wide around the back of the existing trailhead parking lot before matching into the existing trail on the east side.

A vertical alignment was not included with the 2011 STP; however, contours had been studied and proposed conceptual grades were noted. The trail concept proposed grades of up to 8%. At the onset of preliminary design, the 8% grades were still considered an option but the project stakeholders agreed the goal should be to keep to 5% except in areas where the impacts to the surrounding environment would be greater than the impacts of the challenging grade for the user. Key initial alignment drivers within the project limits include the bridge crossing at Warren Creek, several cultural resource areas, and preserving the historic highway alignment.

The initial discussions of the project team were to allow for cuts and fills up to 30 feet in width. After the initial model was developed, the team reviewed the resulting toes of slope and agreed the impacts to significant natural resources and buffers were too great. The trail alignments were then adjusted to reduce the impacts.

At grades necessitated by topography to be steeper than 5%, it was agreed to adhere to the length restrictions in the State Trail Guidelines along with the provision of pullouts for resting areas. A key goal of the project is to lay lightly on the land and the provision for up to 8% grades serves to reduce project impacts. The resulting profile included three grades exceeding 5%—two were at 6% for lengths of 250 feet and 350 feet, and the third was at 6.2% for 67' where the trail matches into the existing trail at Starvation Creek Trailhead. The lengths were all shorter than the 400-foot limit per the State Trail Design Guidelines and it was agreed that opportunities for landing areas would be sought as design progressed.

### 2.1.3 Design Development

After five months of design development and five coordination meetings, the revised alignment was staked and Initial Plans distributed to the project team. The project team conducted a field review of the staked alignment in July 2013. An assessment of impacts to the natural and built environments was conducted and various design changes recommended to reduce the impacts.

**Lindsey Creek Area:** The decision to move the trail to the I-84 shoulder was reviewed and it was agreed to keep the design as shown in the Initial Plans. The preliminary plans provide for the side-path to the falls as previously discussed; however, the area around Lindsey Creek is a stream buffer and may be subject to avoidance criteria. The side-path concept will be feasible

only if less environmentally-damaging alternatives are unavailable. This will be evaluated further during final design.

Per the field review, the alignment within 200 feet east of Lindsey Creek was shifted left to avoid notable trees. Although this is a riparian area, it may be feasible to utilize it for construction staging and then restore the area after construction is complete.

**I-84 Shoulder Area:** The initial alignment focused on providing separation from I-84 by cutting into the existing side slope. The field review group, including the geotechnical team, determined the trail should be shifted closer to I-84 to eliminate any cut into the existing and potentially unstable side slope in this area.

The alignment shift would result in the trail filling over the existing I-84 ditch necessitating a longitudinal culvert to perpetuate the flow of the existing ditch. The DAP plans include this longitudinal culvert; however, initial analysis of the existing ditch flowline indicates that water is actually flowing away from the ditch at the beginning and end of where the trail fills over the ditch. The culvert will be further assessed during final design.

The alignment shift also resulted in fill slopes spilling onto the I-84 shoulder and the need to add a fill wall was anticipated. The design team began working on the alignment revisions in this area and was successful in adjusting the horizontal and vertical alignments to eliminate the need for retaining walls in this area. The proposed design will construct new shoulder barrier along I-84 from the Lindsey Creek area to where the trail veers off the shoulder at the access road approximately 1,800 feet to the east. The proposed design was reviewed with ODOT and it was agreed the area behind the barrier could be filled provided the barrier was pinned. The DAP plans reflect the construction of 32-inch barrier for the full length. The fill slope limits will be further developed during final design to determine if 42-inch barrier is required to hold the fill slope at any location.

**Warren Creek Area:** As previously noted, the initial alignment was developed to navigate around the trees to the extent possible. The Warren Creek area has numerous large fir trees some of which are tightly spaced enough that the trail footprint cannot meander through without impact to root zones. The trees were examined in detail during the field review to make a determination on where the alignment should be shifted to conserve the trees considered the most valuable. As a result, the horizontal and vertical alignments were completely revisited and tweaked to meander around the most desirable healthy trees and the historic railroad grade, as noted in the field review. Side slopes and walls were also adjusted as necessary.

Early discussions had included an interest in creating a “bridge feel” at the location where the trail crosses the original Warren Creek location (Warren Creek was diverted during the early highway construction). The remnant drainage remains a jurisdictional waterway. The concept was to raise the profile just enough to be a couple feet above grade and provide handrails for a short 50-60 foot length to make the user feel as though they are crossing a bridge. The elevated profile at this area contributed to two of the 6% grades noted above. The project team re-evaluated the design of the area as it related to the design philosophy established for the project. It was determined the attention to the original Warren Creek crossing was less important than maintaining a grade of less than 5%. The profile was then adjusted to a maximum grade of 5%.

Although the grades were reduced to 5%, they are fairly sustained for lengths of 740 and 650 feet. The area has multiple items of notable interest for which several pullouts and side-paths

are proposed to provide access. The pullout areas also offer a resting place in the vicinity of the 5% grades. The first pullout area is at the Wonder Creek Waterfall where several side pull-offs are proposed. After crossing Warren Creek, a side-path to a picnic area looking to Hole-in-the-Wall Falls is proposed.

As the trails exits the Warren Creek Area and veers back toward the I-84 shoulder, the trail alignment was developed to provide an overlook with Interpretive Signs for the Historic Ovens. The trail profile is elevated and a rail will be placed to prevent trail users from having direct access to the cultural resource area. The overlook area also coincides with a curve in the alignment near the base of the 650-foot-long 5% grade and will provide an ideal resting location.

**Historic Highway Segment:** An existing HCRH Masonry Wall begins approximately 60 feet prior to where the proposed trail matches into the HCRH pavement. The initial trail alignment impacted the wall and options to avoid impacts were discussed during the field review. The revisions made to eliminate the impacts to the historic wall include: revised horizontal and vertical alignments, reduced cross section (10-foot wide trail with 1-foot paved shoulders), and the inclusion of a rockery wall on the right side of the trail.

The DAP plans propose a 2-inch overlay of the existing historic highway pavement. The pavement was re-examined during follow-up field reviews and it was noted that the pavement is uneven in some places. Further review during final design may include the need for a leveling course.

**Starvation Creek Trailhead:** The geotechnical team noted rockfall potential in the area approaching and south of the Starvation Creek Trailhead. The initial trail alignment showed the trail swinging approximately 50 feet south of the existing parking lot. It was noted during the July 2013 field review that this alignment put the trail within the likely rockfall zone and also impacted an existing utility pedestal and jurisdictional drainage. The decision was made to shift the trail north to avoid these impacts. The proposed trail now extends along the existing sidewalk with a trailhead area incorporated into the grading. The revised alignment makes it possible to connect the proposed trail to the existing trail sooner, thereby eliminating the final grade that exceeded 5%.

## 2.1.4 Community and Stakeholder Acceptance

*Note to Reviewers: ODOT is leading the Public Involvement Process. Additional information can be added to this section per direction and receipt of information from ODOT.*

On August 24, 2010, an open house was held to share plans and receive comments on the last 11-mile segment of the proposed Historic Columbia River Highway State Trail between Wyeth and Hood River. To provide updates and gather feedback during this project development phase, a series of meetings with community members have been held.

An ODOT-hosted website is also being used to provide project information.

The project was presented to the HCRH Advisory Committee in October 2013 and the Committee approved of the current design and the changes that had been made. A tour with Friends of the Gorge was completed and the plans were well-received.

A Pre-Application meeting with Hood River County was held October 31, 2013.

ODOT is setting up a blog page to keep information flowing to the public. Visual simulations and other information will be posted. Information is being disseminated through the quarterly newsletter. A video will be prepared to take to interest groups (Rotary, local councils, etc).

## 2.2 Design Criteria for Selected Alternative

This project is categorized as Trail New Construction. It consists of new paved trail construction, access road realignments, new bridge construction, and new wall construction. Project design criteria are specified in this section.

### 2.2.1 Project Guidelines

The *ODOT State Trail Guidelines, 2011* (STG) establishes design criteria intended to facilitate a design that can incorporate certain aspects of the historic highway design, consider the user experience and maintain grades less than 5% to the extent possible without significant impacts to the project constraints previously discussed.

The *I-84 Corridor Design Strategy Guidelines, 2005* identifies design guidelines for project elements within the I-84 Corridor. The purpose of the guidelines is to provide options for the construction of improvements that are in accordance with the CRGNSA.

The *ODOT Highway Design Manual, 2012* (HDM) defines design standard policies and processes for work on ODOT facilities. The manual was utilized for any proposed work impacting I-84.

The American Association of State Highway and Transportation Officials (AASHTO) *Guide for the Development of Bicycle Facilities (GDBF), 2012* provides guidance for shared use path and bicycle facilities. The document includes details information related to the horizontal and vertical alignments to sight distance and comfort for the 85<sup>th</sup> percentile user. Although The AASHTO GDBF document was utilized during the design development, the State Trail Guidelines provide the controlling guidelines for this project.

Table 2-1 lists the project design features and the respective standards to be applied, the sources of the standards, and any design exceptions. Not all design standards listed for these classifications will be addressed in the actual design, for reasons of excessive cost and physical limitations. Design exceptions are discussed in Section 3, Proposed Design.

TABLE 2-1  
 Proposed Design Standards

Design Feature	Standard	Design	Source	Exception
<b>Classification</b>				
Existing I-84 (The Columbia River Highway)	Interstate Highway		Oregon Highway Plan	--
<b>Design Speed</b>				
Trail	V=18 mph (Grades < 2%) Curve dependent (Grades > 2%)		AASHTO GDBF (page 36)	--
<b>Minimum Horizontal Radius</b>				

Design Feature	Standard	Design	Source	Exception
Trail	R <sub>min</sub> =100 feet (level areas) 200 feet (long downhills)		STG (page 21)	--
<b>Stopping Sight Distance</b>				
Trail	140 feet	N/A	STG (page 21)	--
<b>Maximum Grade</b>				
Trail	5% (preferred) 8% (acceptable with landings)	5%	STG (page 21)	--
<b>Pedestrian/Bicycle Rail</b>				
Trail				
<b>42" height on straight segments</b>	Used where:		STG (page 40)	--
<b>48" height on tighter curves and steeper downgrades</b>	- Slopes are greater than 1:2			--
<b>54" height adjacent to dangerous locations</b>	- Hazard at bottom of slope  - Bridge ends			--
<b>Barrier/Guardrail</b>				
Existing I-84 (The Columbia River Highway)				
	Used where:			--
	- Clear zone cannot be achieved		HDM, § 5.8 AASHTO (Roadside Design Guide, Figure 5.1b)	--
	ODOT facilities require 2 feet of shy distance for right side shoulders	2 feet	HDM, § 5.4	Yes
<b>Clear Zone</b>				
Existing I-84 (The Columbia River Highway)	30 feet	30 feet	HDM, Figure 5-9	--

<b>Cross-Section Width</b>			
Trail	12' preferred 10' minimum	12 feet 10' minimum	STG (page 21)

**SECTION 3**

# Proposed Design

---

This section presents the proposed project design. Design considerations discussed are horizontal and vertical alignment, geotechnical, structures, pavement design and typical sections, right-of-way, staged construction and traffic control, stormwater and erosion control, utility relocation and environmental considerations. Project costs and schedule are also addressed at the end of this section.

## 3.1 Design Exception Discussion

The proposed design of the HCRH State Trail Lindsey Creek – Starvation Creek project will not require any design exceptions. There are two sustained grades of 5% and lengths of 740 feet and 645 feet. The long steep grades were necessary to avoid or reduce extensive impacts to fir trees, stream buffers and salamander habitats within this area. The STG recommends a landing is to be provided for all grades that exceed 5% with landings provided at the top and bottom of steep grades and every 200 feet along sustained grades. Although the proposed grades for this project are not exceeding 5%, a key consideration throughout the design is the trail user experience. Several landings have been incorporated into the design in this area and are shown in the plans in Appendix A.

The trail cross section from Station 208+75 to 216+50 is comprised of a 10-foot paved width with a 2-foot wide shoulder on the right side and a varying width shoulder on the left side. The left side shoulder maintains a 1 foot minimum width with the exception of several pinch points that result in lengths of up to 30 feet long where the left side shoulder is reduced to less than 1 foot. The area is constrained by the existing Starvation Creek Exist Ramp barrier on the left side and a rock catchment berm on the right side. A Design Exception Request is not recommended since the 2-foot shoulder is maintained on the right side and the lengths of left-side shoulder with widths less than 1-foot wide are short.

## 3.2 Horizontal Alignments

### 3.2.1 HCRH State Trail

The proposed horizontal alignment for HCRH State Trail begins on a 161-foot long tangent to cross over the existing Lindsey Creek box culvert. The alignment closely follows the I-84 shoulder for the next 540 feet before it slightly curves away from I-84 on a 180-foot radius horizontal curve. The alignment curves back toward I-84 on a 140-foot radius horizontal curve and gradually approaches the I-84 shoulder. The alignment then follows the I-84 shoulder again for 750 feet before it curves away with a 160-foot radius horizontal curve.

As the alignment exits this curve it intersects on a skew with the existing Bonneville Power Administration (BPA) Access Road before beginning a meandering alignment to Warren Creek. The trail alignment is curvilinear passing through curves with radii of 200, 235 and 190-foot before turning left on a 120-foot radius curve to provide a tangential crossing of Warren Creek. After crossing Warren Creek,

the trail alignment continues to meander through conifer forest for the next 1,500 feet. The radii of the horizontal curves through this area range between 116-foot and 310-foot.

After the trail alignment emerges from the Warren Creek area, the horizontal alignment gradually curves toward the I-84 shoulder. The alignment slightly meanders for the next 570 feet through several curves with radii of 1000-feet, 1100-feet and 1000-feet until it matches into a segment of historic highway. The trail alignment is on the existing historic highway alignment for 707 feet. Over the next 300 feet the horizontal alignment curves back toward the I-84 shoulder first on a 1010-foot radius horizontal curve and then an 850-foot radius horizontal curve. The alignment then follows the existing barrier along the I-84 Exit Ramp to Starvation Creek. The horizontal alignment terminates after wrapping behind the existing parking lot and matches into the existing trail.

### 3.2.2 Typical Trail Sections

The proposed trail section is 12-foot asphalt with 2-foot unpaved shoulders on each side. There is a 75 foot section from Station 172+35 to 173+10 where the trail narrows to an 11 foot paved width with the 2-foot shoulders on each side. The trail section widens at the Warren Creek Bridge to provide 16 foot clear distance between the bridge balusters. The trail is narrowed again in the area behind the existing barrier at the Starvation Creek Exit Ramp. The trail narrows to a 10-foot paved width from the beginning of the existing barrier until the trail reaches the Starvation Creek Trailhead, a distance of 800 feet.

The cross slope of the trail is 1.0% except in the area from where the trail departs the existing historic highway until it reaches the section behind the existing barrier. The trail cross slope in this section is 2.0%. The 2% cross slope is proposed to provide a better fit with the terrain.

The maximum cut/fill slope from the back of the proposed trail sections will be 1 foot vertical, 2 foot horizontal (1V:2H).

## 3.3 Vertical Alignment

### 3.3.1 HCRH State Trail

The proposed HCRH State Trail profile is designed to closely match the existing terrain to lessen impact to the natural surroundings. The proposed profile will be at existing grade as it crosses Lindsey Creek and is generally flat with grades of less than 2 percent as the trail follows the I-84 shoulder for 1,700 feet. As the trail alignment diverges from the I-84 shoulder the vertical profiles follows the existing terrain at downward grades of less than 4 percent. The profile reaches the end of an existing bench, enters a 150' sag curve and begins climbing up at a 2 percent tangential grade crossing of Warren Creek.

Approximately 200 feet after the Warren Creek Bridge, the profile begins a 430-foot long 4 percent grade followed by a 250-foot long 6 percent grade upward to the top of an existing area populated with old-growth fir trees. The profile enters a 180-foot long crest vertical curve and continues back down the existing slope at grades of 5 percent for 270 feet and then 6 percent for 350 feet as the trail alignment approaches the I-84 shoulder. Several constraints necessitate the two 6 percent grades in this area. The bridge crossing of Warren Creek sets the elevation near the beginning of the ascending grades to the east. It is necessary to follow the existing terrain at the top of the grade in order to preserve large trees to the extent possible and also to provide a vertical separation from an identified cultural resource area. It is necessary for the trail profile to then continue at the 6 percent grade to ensure the walls along the I-84 shoulder do not exceed 12-feet high. The wall height restriction is dictated by the I-84 Corridor Strategy Design Guidelines. Several landing areas have been incorporated into the design both prior to and within the limits of the steeper grades. There will be an opportunity for trail users to pull off from

the main trail and rest at landings at both the west and east ends of the 5-6% grades and also just west of the 180-foot long crest vertical curve at the top of the grades.

Once back on the I-84 shoulder, the trail continues at a relatively flat grade for 500 feet before matching into a segment of existing Historic Highway. The trail will follow along the historic highway and away from the I-84 shoulder for 707 feet before entering sag vertical curve and climbing a short 215-foot long 5 percent grade to align with a narrow existing footpath behind existing barrier along the Starvation Creek Exit Ramp. The vertical alignment continues to its termination at Starvation Creek Trailhead with grades of less than 2 percent.

## 3.4 Access Roads/Turnarounds

This section summarizes the access additions and modifications triggered by the project.

### 3.4.1 Maintenance/Trail Turnaround

The trail will dead-end at Lindsey Creek until Segment C of the HCRH State Trail is constructed. In the interim a turnaround has been provided at Station 154+00. The turnaround area will serve as a place for both trail users and maintenance vehicles to stop and turn around. Signage will be developed to notify trail users of the trail end condition ahead with direction to the pullout area.

### 3.4.2 BPA Access Road

The Bonneville Power Administration (BPA) has an existing access that crosses the proposed trail alignment at Station 171+00. This project will relocate the existing access gate and regrade the access road from the I-84 shoulder to where the access road intersects with the trail alignment. The BPA Access Road will share the trail for approximately 70 feet before reconnecting with the existing Access Road alignment. An asphalt transition will be provided at both intersection points to ensure the trail is not damaged with the BPA Maintenance vehicles crossing it. Signage will be posted to alert trail users to look for vehicles crossing.

## 3.5 Geotechnical

A geotechnical exploration program including 18 test pits and 4 borings is planned to be completed for Segment D in summer of 2014. The objective of the exploration program is to characterize near-surface overburden materials for the design of retaining walls, rockeries, cut slopes, and embankment fills. Deeper borings would be completed at either abutment of the proposed Warren Creek Bridge. An exploration plan for Segments A through D of the alignment (Wyeth Campground to Starvation Creek Trailhead) is attached in Appendix C. The exploration program outlines Phase 1, 2, and 3 explorations. Phases 1 and 2 are planned for summer 2014. A preliminary geotechnical report for segments A through D of the trail alignment is included in Appendix C. The recommendations in the report are based on information gathered during a review of existing information and a surface reconnaissance.

Published geologic maps and a surface reconnaissance suggest that overburden soils will consist primarily of vegetated talus material. Vegetated talus observed at the ground surface typically consists of silty, sandy gravel with varying amounts of cobbles and boulders. Bedrock is anticipated to consist of various flows of the Grande Ronde Basalt Group. Laboratory testing will be completed on samples of overburden and bedrock recovered during explorations. Testing is anticipated to consist largely of index

tests. Groundwater conditions along the alignment appear to vary by location. Piezometers will be installed at several locations to measure groundwater levels.

The trail will use low-side mechanically stabilized earth (MSE) walls to provide grade separation when it parallels I-84. MSE walls are also planned at the abutments of the Warren Creek Bridge. These walls are typically less than 6 feet tall. An MSE wall up to 12 feet high (not including embedment) is planned near Station 192+00 to provide a pedestrian pullout area. Rockeries are planned for the low-side and high-side of the trail in areas where it is not adjacent to I-84. It is anticipated that all MSE walls and rockeries would be founded on undisturbed talus material or embankment fill placed during the original I-84 construction. In areas where retaining structures are not required to fit trail improvements within the approved corridor, conventional embankment fills would be used. In general, embankments would be less than 10 feet above existing grade, and would utilize slopes up to 2 Horizontal to 1 Vertical (2H:1V). A 10-foot-tall, 1H:1V vegetated reinforced soil slope is proposed near Station 192+00.

Spread footings bearing on native talus material have been proposed to support the Warren Creek Bridge. Foundation subgrade would be set below the maximum anticipated scour elevation established by hydraulic modeling.

Segment D includes three areas with an identified rockfall hazard that may require mitigation measures to be constructed. These locations include the Starvation Creek Trailhead, the slope near Station 205+00, and the slope above the Historic Ovens. Corridor and permit restrictions will limit the type and size of mitigation measures that can be constructed at these locations. Changes to trail alignment and grade, construction of fallout ditches, and low-visibility upslope barriers and berms will be evaluated as potential mitigation measures at these locations.

## 3.6 Structures

The structures for the proposed project include a new bridge over Warren Creek, and several retaining walls at the bridge abutments and along the proposed trail alignment.

A brief summary of the proposed bridge and retaining walls is provided below. The drawings are included in Appendix A and construction cost estimates for the proposed structures are included in Appendix F.

### 3.6.1 Warren Creek Bridge

The proposed Warren Creek Bridge provides a trail crossing over the existing Warren Creek. The proposed Warren Creek Bridge is 47 feet long with one span. The bridge is located on a tangent horizontal alignment crossing over the existing Warren Creek at approximately a 90 degree angle. The bridge needs to provide a minimum clear span length of 1.5 times the active creek channel width which needs to be confirmed. The bridge width is 18 feet wide. This includes the 12-foot trail width and 2-foot clear to the bridge ornamental concrete rail balusters on each side.

The bridge superstructure includes four side by side 18" or 21" deep voided precast concrete slab units with a cast-in-place concrete deck. Bridge abutments and wingwalls are cast-in-place concrete founded on spread footings located below maximum anticipated scour depth with riprap protection. Riprap protection must be located outside the scour prism.

### 3.6.2 Retaining Walls

Five MSE retaining wall structures and a reinforced vegetated slope are proposed along this portion of the trail. The following summarizes the wall locations, overall length, maximum height (includes a 2-foot minimum embedment), exposed facing type for each wall, and other wall features.

Retaining wall 1 is located along the right side of the trail and begins at HCRH Station 152+00.88 with a length of 75 feet, a maximum height of 9 feet and non-galvanized wire facing. The wall extends across an existing box culvert structure which is assumed to have sufficient structural capacity to support the weight of the trail and traffic. A cast-in-place concrete moment slab with cast-in-place concrete parapet and steel pedestrian railing is provided along the top of the wall with an 8 foot distance provided between trail centerline and face of parapet. A hot mix asphalt concrete wearing surface is provided on the top of the concrete moment slab to maintain the visual integrity of the trail.

Retaining walls 2A and 2B are located along the left side of the trail at each end of the Warren Creek Bridge. Retaining wall 2A begins at HCRH Station 178+20.69 with a length of 10 feet and a maximum height of 8 feet. Retaining wall 2B begins at HCRH Station 177+68.68 with a length of 27 feet and a maximum height of 7 feet. Both walls have non-galvanized wire facing with a cast-in-place concrete moment slab and ornamental concrete rail balusters same as for the Warren Creek Bridge with an 8 foot distance provided between trail centerline and face of concrete rail. Retaining walls 2A and 2B are located on the opposite side of the trail from retaining walls 3A and 3B. Further investigation of the interfaces between retaining walls 2A, 2B, 3A and 3B and the Warren Creek Bridge abutments and wingwalls during the next design phase will likely result in modifications of the retaining wall and/or wingwall lengths.

Retaining walls 3A and 3B are located along the right side of the trail at each end of the Warren Creek Bridge. Retaining wall 3A begins at HCRH Station 177+40.59 with a length of 30 feet and a maximum height of 7 feet. Retaining wall 3B begins at HCRH Station 178+10.68 with a length of 10 feet and a maximum height of 8 feet. Both walls have non-galvanized wire facing with a cast-in-place concrete moment slab and ornamental concrete rail balusters same as for the Warren Creek Bridge with an 8 foot distance provided between trail centerline and face of concrete rail.

Retaining wall 4 is located along the left side of the trail and begins at HCRH Station 193+30.10 with a length of 215 feet, a maximum height of 14 feet and a concrete facing with architectural as a result of visibility from the I-84 highway. The wall extends across an existing culvert pipe which is assumed to have sufficient structural capacity to support the weight of the trail and traffic. A wood pedestrian railing is provided along the top of the wall with an 8 foot distance provided between trail centerline and face of wood rails. As a result of the wood posts that extend into the wall backfill and soil reinforcement, the wall face is located 11 feet from the trail centerline. Retaining wall 4 is located on the opposite side of the trail from retaining walls 5A and 5B.

Retaining wall 5A is located along the right side of the trail and begins at HCRH Station 190+80.61 with a length of 65 feet, a maximum height of 14 feet and non-galvanized wire facing. A wood pedestrian railing is provided along the top of the wall with an 8 foot distance provided between trail centerline and face of wood rails. As a result of the wood posts that extend into the wall backfill and soil reinforcement, the wall face is located 11 feet from the trail centerline.

Retaining wall 5B begins at the end of retaining wall 5A at HCRH Station 191+40.76 and is a vegetated reinforced 1 to 1 slope with a length of 175 feet, a maximum height of 14 feet and non-galvanized wire form facing units. The wire form facing units will provide 1.5 feet wide by 1.5 feet tall exposed steps for vegetation. A wood pedestrian railing is provided along the top of the wall/reinforced slope with an 8

foot distance provided between trail centerline and face of wood rails. As a result of the wood posts that extend into the reinforced slope backfill and soil reinforcement, the top of the reinforced slope is located 11 feet from the trail centerline.

### 3.7 Pavement Design and Pavement Typical Sections

The pavement section developed for this project is based on the *2011 State Trail Design Guidelines* and match what has been used on previously construction segments of the HCRH State Trail. The pavement section is designed for a pavement loading of 60,000 lbs which is the recommended loading to account for maintenance and emergency vehicle usage. BPA has a pavement loading requirement of 50,000 lbs so the same pavement section is recommended at the BPA Access Road.

There are two locations where new barrier will be constructed along the I-84 shoulder. The pavement edge varies and it is anticipated that additional pavement with varying width of less than 5 feet will need to be constructed for the barrier placement. The pavement section is per previously constructed projects in which barrier has been added to the existing shoulder.

Recommendations for the two typical pavement sections proposed for use within the project are summarized in Table 3-1.

TABLE 3-1  
Preliminary Pavement Sections

Section No.	Location	Pavement Thickness (inches)	Crushed Aggregate Base Thickness (inches)	Total Pavement Thickness (inches)
1	HCRH State Trail, BPA Access Road	4 ACP	6	10
2	I-84 shoulder	8 ACP	12	20

**Notes:**

ACP = Asphalt Concrete Pavement

### 3.8 Right-of-Way

The majority of the proposed trail falls within ODOT or OPRD right-of-way. Approximately 1,200 feet of the trail through the Warren Creek area is within USFS land. Coordination with the Forest Service has been ongoing and a Special Use Permit application process is underway.

The trail also crosses a BPA easement. Coordination with BPA is also ongoing and access will be perpetuated across the trail for BPA access.

## 3.9 Traffic

### 3.9.1 Construction Staging and Temporary Protection

The proposed trail alignment for this project includes the additional of several new sections of barrier along the I-84 shoulder. The placement of the shoulder barrier and construction of sections of the trail adjacent to I-84 will necessitate a single lane closure of I-84 in two locations.

#### Stage 1

The main goal of this stage is to construct the new barrier along the I-84 shoulder from the Lindsey Creek area to approximately 2,000 feet east, ending just prior to the BPA Access Road. The wall at Lindsey Creek and trail adjacent to the shoulder will also be constructed. A 19-foot wide section (median barrier to temporary barrier) will be maintained. Sawcut and edge paving may be required along the outside shoulders of I-84 in order to place the barrier.

#### Stage 2

The main goal of this stage is to construct the section of the new trail adjacent to the shoulder from east of Warren Creek area to the Starvation Exit Ramp. There is a short section of new barrier along the I-84 shoulder that will also be constructed in this area. A 19-foot wide section (median barrier to temporary barrier) will be maintained. Sawcut and edge paving may be required along the outside shoulders of I-84 in order to place the barrier.

## 3.10 Stormwater and Erosion Control

### 3.10.1 Stormwater

Water quantity and quality impacts from stormwater runoff are expected to be nominal. There are a number of creeks flowing to the Columbia River that must be accommodated. The trail will cross Lindsey Creek via the existing concrete box culvert that carries the creek under I-84. Therefore, direct impacts to this ESA-fish stream will be avoided, and riparian impact for trail construction will be minimized by generally following previously disturbed ground along the I-84 shoulder. Warren Creek is another ESA-fish stream that will be crossed with a new bridge sized to span the channel and maintain fluvial function of the creek. A few relatively minor and unnamed jurisdictional waters cross the trail alignment at various places, and will need to be accommodated by the drainage design. Flow is generally northerly. I-84 generally sheds to the north; however, a few sections are crowned, directing some runoff to the south.

The entire project area is located outside and south of the Federal Emergency Management Agency (FEMA) 100-year floodplain for the Columbia River. According to DEQ, the project area is not located in a groundwater management area or in an EPA-designated sole source aquifer area.

The impervious areas in Segment D are 1.64 acres of new impervious and 0.26 acre of existing impervious (1.90 acres total). Drainage design will be based on ODOT standards. Conveyance and spread design will be based on the 10-year event. The project is within ODOT Zone 5 for IDF curves. Minimum culvert size will be 18-inch diameter. Maximum storm sewer length will be 400 lineal feet.

The typical trail section will be cross-sloped toward the south and away from I-84 where the trail is adjacent to I-84. Sections of the trail that are adjacent to I-84 will be separated from the shoulder of I-84 with an impervious barrier. Flows will be carried in a vegetated ditch along the south side of the trail where cross culverts will carry the flow under the trail for eventual discharge. Existing and Proposed trail Segment D cross-culverts are in Table 3-2.

TABLE 3-2  
 Existing and Proposed Drainage Crossings

Existing/ Proposed	Approximate Station	Culvert Diameter (in)	ESA Fish	Native Fish	Fish Passage
E	160+39	18"	No	No	No
P	173+05	18"	No	No	No
P	176+05	18"	No	No	No
P	178+00	Bridge	Yes	Yes	Yes
E	185+00	18"	No	No	No
E	192+70	18"	No	No	No
E	201+25	18"	No	No	No
E	202+95	24"	No	No	No

The ultimate discharge is to the Columbia River where flow control is not required due the size of the receiving water.

The Main Stem Columbia Basin has TMDLs needed for Temperature and Arsenic and approved for DDT. From RM 35.2 to 98.0, the Columbia River is listed on DEQ’s CQA Section 303(d) list of impaired water for Polychlorinated Biphenyls (PCB). No TMDLs were found for the streams that the trail will be crossing.

Stormwater runoff from pedestrian and bike trails carries few of the pollutants that run off roads and highways, which carry a variety of pollutants that include suspended sediment, nutrients, oils and grease, and heavy metals. Water quality treatment will be provided through overland, infiltration, and ditch flow.

Engineered stormwater treatment will be limited to the contributing impervious area, if any, from vehicular roads including I-84 and the Starvation Creek parking lot. Stormwater design will follow the ODOT 2011 Hydraulics Manual and the *Endangered Species Act Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Federal-Aid Highway Program in the State of Oregon* (NMFS No: 2011/02095).

ODOT will be responsible for maintaining all the facilities that convey stormwater from the trail to the natural drainage areas. ODOT will also be required to develop a detailed maintenance plan identifying specific maintenance actions and a schedule for each of those along with a contingency and repair plan. Maintenance will be aligned with ODOT’s NPDES MS4 permit requirements.

### 3.10.2 Temporary Erosion and Sediment Control Practices

The major water quality concerns during construction are erosion prevention and sediment control. For construction activities, DEQ is responsible for issuance and enforcement of their NPDES 1200-C permits. Section 401 of the federal Clean Water Act requires DEQ Water Quality Certification that the project will not violate water quality standards. It is anticipated that stormwater discharges during trail construction will be covered under the Oregon Department of Transportation’s Region 1 NPDES 1200-CA Permit.

The project will need an Oregon DEQ-compliant erosion and sediment control plan prior to the start of any construction. EPSC measures will include:

1. Preserve existing vegetation. Implement highly visible fencing and flagging of disturbance limits to preserve existing vegetation to the extent practicable. Preserved vegetation will act as a vegetative buffer to minimize stormwater velocity and control sediment transport.

2. Temporarily stabilize disturbed and placed soils. Minimize active erosion with mulch stabilization on disturbed soils prior to final stabilization. Apply mulch in conjunction with proper surface roughening techniques, which will minimize stormwater velocity and prevent erosion.
3. Install silt fence on contour downgradient of land disturbing activities to capture sediment in stormwater runoff.
4. Install straw wattles on disturbed slopes to minimize stormwater velocity and prevent erosion.
5. Insert inlet protection at stormwater collection features to minimize sediment discharge into stormwater conveyance systems.
6. Protect engineered water quality facilities during construction
7. Construct gravel construction entrances or wheel washes.
8. Establish vegetative cover of disturbed areas as permanent stabilization.
9. Require the contractor to maintain a spill control kit to be used in case of a material spill.

### 3.11 Utility Conflict Analysis

Existing utility locations that are shown in the plans of Appendix A were obtained from several sources including field surveys and communications with utility owners. Direct contact with the utility owners has provided additional verification of their location, and reinforced a tentative concept for relocation where necessary.

The preliminarily identified conflicts will require a closer evaluation to determine a more exacting vertical and horizontal location. This will be completed during the next phase of design and will aid in the development of the final conflict list and the ODOT certification of the proposed relocation designs.

Table 3-3 includes current contact information for utilities in the project area. The contact information provided for the Electric Power Supply is a temporary contact. Russ Gilbert is with the Cascade Locks Weigh Station and has provided the location information shown in the plans. Additional coordination is underway to establish the contact information that will be utilized during final design.

**TABLE 3-3**  
Utility Company Contact Information

Utility	Company Name	Contact Person	Phone
Electric Power Supply	ODOT Power	Russ Gilbert	541-374-8980
Communication Service	CenturyLink	Dyrk Pritchett	541-387-9255

A preliminary status of each utility is summarized in the following paragraphs.

#### ODOT Power

An ODOT underground high voltage line runs from east of Starvation Creek Trailhead approximately 2,000 feet to the west along the south side of I-84.

Coordination with Cascade Locks Weigh Station field staff revealed that there are issues with the power line that necessitate underground repairs approximately once every four years. It is recommended the section of powerline that falls directly under the trail footprint be placed in a conduit....

A field review will be scheduled with Russ Gilbert to help identify the location of the powerline and relocation recommendations will be further evaluated once the location is resolved.

## CenturyLink

CenturyLink has a working copper cable going east from the existing telephone pedestal located on the south side of Starvation Creek Trailhead. The preliminary design has accounted for these items and notes will be included in the plans to protect the pedestal and cable in place. There is also an abandoned copper cable going west from the existing telephone pedestal and a 2" conduit containing an abandoned copper service drop leaving the existing telephone pedestal that was previously used to feed the Starvation Creek Rest Area payphone booth. The payphone booth was removed years ago and the service drop is no longer used.

## 3.12 Environmental Impacts and Mitigation Measures

### 3.12.1 Environmental Design Considerations

The project NEPA environmental classification under 23 CFR 771.117(c)(3) is Class 2 Action (Categorical Exclusion), applicable to constructing bicycle and pedestrian lanes, paths and facilities. Categorical Exclusion is federal action that does not individually or cumulatively have a significant environmental effect and is excluded from the requirement to prepare an EA or EIS.

**Right-of-Way.** No right of way, temporary easements, or permanent easements will be required for this project. All impacts will be confined to ODOT right-of-way; Oregon Parks and Recreation Department properties including Lindsey Creek Scenic Corridor and Starvation Creek State Park; and federal land managed by USDA Forest Service Columbia River Gorge National Scenic Area Unit. Also, the trail will intersect access easements held by Bonneville Power Administration.

**Land Use.** The project is located within the Columbia River Gorge National Scenic Area and subject to the Hood River County Zoning Ordinance (Article 75, National Scenic Area Ordinance). The project area is zoned as Scenic-Open Space, Scenic-Forest, and Scenic-Public Recreation. The trail design will be consistent with the CRGNSA Management Plan and Hood River County land use ordinance. Project design will avoid or minimize impacts to significant natural resources, as possible. Preliminarily, the Segment D project will permanently or temporarily impact about 0.2 acre of Hood River County significant natural resources and about 2 acres of significant natural resource buffers. An application for a National Scenic Area permit was submitted on December 15, 2013 for geotechnical investigation, and an application for trail construction will be submitted in May, 2014. No state Goal Exception is required.

**Socioeconomics.** The project will not cause adverse socioeconomic impacts. The project will connect intact and usable highway segments with recreation trails to create a continuous bicycle/pedestrian route through the Columbia River Gorge that will benefit the public by linking state and federal recreation and historic sites. During construction, single lane closures and/or rolling slow downs on I-84 will be required during installation of barrier, railing, retaining wall, rockfall protection, signage, and drainage along the shoulder. Short duration closures or rolling slow downs on I-84 may be required during blasting. Construction delays will be minimized by working during non-peak hours. Existing recreational trails will be closed or detoured during construction.

**Environmental Justice.** The project is located entirely within public right of way or publically owned land. It consists of adding transportation and recreation appurtenances that will not impact any adjacent property owners, businesses, or residents. The project will improve safety and mobility for all user groups by separating the travel way from I-84. There are no disproportionately high or adverse impacts on environmental justice populations.

**CWA Section 404/Wetlands/Waters.** Jurisdictional U.S. and/or state non-wetland water will be permanently disturbed at Wonder Creek (Stn. 175+50) with a new drainage crossing feature (about 55 LF or 200 SF). Temporary water disturbance is expected at Warren Creek (Stn. 177+80) to install rewrap armoring around abutments. The project will avoid permanent and/or temporary impacts to jurisdictional waters at Lindsey Creek (Stn. 152+00), former Warren Creek (Stn. 185+00), Cabin Creek (Stn. 202+00), and unnamed drainage (Stn. 217+00). The project will not permanently or temporarily impact jurisdictional wetlands. A Joint Permit Application will be submitted to DSL and/or the Corps. Nationwide Permit 14 (Linear Transportation Projects) is anticipated. Mitigation might be required to compensate for the impacts to Wonder and Warren Creeks. Mitigation, if required, will be fulfilled through stream habitat improvement at Warren Creek.

**Water Quality.** Section 401 of the federal Clean Water Act requires DEQ certification that the project will not violate water quality standards. It is anticipated that construction stormwater discharges will be covered under the Oregon Department of Transportation's Region 1 NPDES 1200-CA Permit.

Stormwater runoff from pedestrian and bike trails carries few of the pollutants that run off roads and highways. Therefore, engineered stormwater treatment will be limited to the contributing impervious area, if any, from vehicular roads including I-84 and the Starvation Creek parking lot. Stormwater design will follow the ODOT 2011 Hydraulics Manual and the *Endangered Species Act Programmatic Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Federal-Aid Highway Program in the State of Oregon* (NMFS No: 2011/02095).

**ESA/T&E Species.** ESA-listed aquatic species under NMFS jurisdiction are present in Warren Creek, Lindsey Creek, and the Columbia River. Use of the ODOT Federal-Aid Highway Program ESA-MSA Programmatic BO was initiated September 18, 2013, and Tom Loynes/ODOT-NMFS verified during a September 26, 2013 site visit that use of the FAHP Programmatic BO is appropriate for this project. A FAHP Notification Form for Segment D will be submitted in May, 2014. Based on the DAP, the project meets the following FAHP Programmatic BO Conservation/General Construction Measures outright: (1) Conservation Measures: 10-11, 15-17, 20-22, (2) General Construction Measures: 27-28, 32-37. The primary design considerations will be to avoid aquatic habitats, minimize disturbances to riparian habitats, and treat stormwater run-on and runoff from vehicular roads.

Through early coordination with Kevin Maurice/USFWS on November 15, 2013, the Service requested that a biological assessment be prepared to address potential take of northern spotted owl from construction impacts through blasting and tree removal to potential dispersal habitat. An ESA determination of Not Likely to Adversely Affect for owl is expected. Biological Resources. No other state or federal threatened, endangered, or candidate species are known to occur in the API.

To address the Migratory Bird Treaty Act, USFWS recommended that tree removal should occur outside the migratory bird nesting season. For this reason, tree clearing in advance of geotechnical investigation was performed during March 2014. Additional tree clearing for trail construction will be performed between September 1, 2014 and February 28, 2015. If activities need to be conducted during the nesting season, a qualified wildlife biologist will be required to survey the area for the presence of active nests. If active nests were present, all efforts will be required to modify the project activities to avoid disturbing the nests. If potential impacts to nesting birds are anticipated, the Animal and Plant Health Inspection Service (APHIS) at the U.S. Department of Agriculture (USDA) would be notified well in advance of project activities.

Trail Segment D is within the Special Management Area (SMA) for natural resources of the Columbia River Gorge National Scenic Area (CRGNSA). Projects in the SMA of the CRGNSA must evaluate impacts

to all Oregon-side listed sensitive species, Columbia River Gorge endemic species, and state and federally listed species, per the CRGNSA Management Plan (CRGC 2011) and the Hood River County Zoning Ordinance, Article 75 (Hood River County 2009). A biological survey will be conducted for U.S. Forest Service sensitive species project-wide. Focal species include northern spotted owl, Larch Mt. salamander, red tree vole, pika, Jackson lake springsnail, and long-bearded hawkweed. Consequently, the U.S. Forest Service requires a biological evaluation as outlined in the USDA Forest Service Manual (2672.42, 2672.43).

A portion of the Segment D Area of Potential Impact (API) consists of trail construction on land managed by the Mt. Hood National Forest Columbia River Gorge National Scenic Area Unit (i.e., tax assessor parcel 02N09E04 00400). According to Carol Hughes/USFS Regional Survey and Manage Coordinator, the proposed trail construction is exempt from Survey and Manage requirements because the project footprint is less than 5 acres on U.S. Forest Service land (Carré 2012). The portion of the trail to be constructed on U.S. Forest Service land is only 0.2 acre (about 600' long X 16' wide).

**NHPA Section 106 (Cultural Resources).** A single historic archaeological site (a CCC/CPS camp, site 35HR86) and the National Register-listed Historic Columbia River Highway were previously recorded along Segment D of the HCRHST corridor. Current field survey identified additional historic sites and historic artifact isolates. The Segment D historic properties determined to be eligible for inclusion to the National Register of Historic Places include: the Dalles-Sandy Wagon Road (35HR128); grade features of the Oregon Railway & Navigation Company (Site 35HR131); and a crew camp with domed stone bread ovens (Site 35HR132). The historic properties were analyzed to ensure that the provisions of Section 106 of the National Historic Preservation Act (NHPA) are properly addressed. A plan to address these resources, including all mitigation outlined in Section 106 MOAs to resolve adverse effects, will be developed in coordination with the Oregon State Historic Preservation Office (SHPO). The Section 106 finding (FOE) is No Adverse Effect for built resources. Robert Hadlow/ODOT cleared this project for the built environment in April, 2014, and Mike Schurke/WFLHD will submit the FOE to the SHPO.

The NHPA and other related federal and state regulations require that project planning address any existing prehistoric and Native American cultural resources, including the presence of any Traditional Cultural Properties or other sites significant to applicable tribal groups. Tribal consultation and coordination with the Oregon SHPO will be conducted by WFLHD to ensure that all potential issues are identified and addressed. No prehistoric archaeological resources have been identified along the corridor.

**Visual Resources.** The project is in a National Scenic Area Special Management Area (SMA). Visual resources will be managed consistent with the Hood River County Zoning Ordinance (Article 75) and design guideline sources identified in the ordinance, such as the *I-84 Corridor Strategy: A Vision and Design Guidelines for Interstate 84 in the Columbia River Gorge National Scenic Area* (ODOT 2005) and the *Historic Columbia River Highway State Trail Guidelines 2011* (ODOT 2011). A Visual Impact Assessment (VIA) report was developed to determine how the proposed project will be consistent with Article 75.

The Hood River County scenic standard for proposed projects in the SMA, located in the Coniferous Woodland landscape setting, and designated Open Space is “not visually evident,” which means that a proposed project cannot be “visually noticeable to the casual visitor” when viewed from five key viewing areas (KVAs): I-84, the Columbia River, State Route 14, Dog Mountain Trail, and Cook-Underwood Road. The design will strive to retain the overall appearance of a Coniferous Woodland landscape. Considering the visual screening, and use of the I-84 Corridor Strategy and HCRH State Trail Guidelines, the design will not be visually noticeable by casual visitors.

**Section 4(f).** Section 4(f) historic, park, and recreational properties occur within the project limits. Section 4(f) of the Department of Transportation Act of 1966 affords protection to publicly-owned parks, recreation areas, and wildlife and waterfowl refuges, as well as publicly or privately-owned historic sites. Section 4(f) prohibits the Secretary of Transportation from approving the use of a 4(f) resource unless there is no feasible and prudent alternative to the use of the resource, and the action includes all possible planning to minimize harm to the property resulting from the use.

Regarding Section 4(f) cultural resources, ODOT determined No Adverse Effect for built resources, which results in a *de minimis* impact to Section 4(f) resources. Therefore, a Section 4(f) Evaluation is not required.

Starvation Creek State Park and Lindsey Creek State Park are potential Section 4(f) properties. Oregon Parks and Recreation Department determines whether or not these parks are “significant” public resources. Assuming the parks are significant, the project would constitute a *de minimis* use of the 4(f) properties because the proposed trail project would enhance recreation use of the parks. Notification of the public is required for *de minimis* use of recreation properties, and a statement about Section 4(f) will be added to the ODOT project blog. Therefore, a Section 4(f) Evaluation is not required.

**Section 6(f)(3).** Starvation Creek State Park and Lindsey Creek State Park were purchased with Land and Water Conservation Funds. This project will connect Starvation Creek State Park to Lindsey Creek State Park with a multi-use path. Construction of a recreational trail connecting these two parks is not a 6(f)(3) conversion according to Michelle Schalise/OPRD on April 24, 2014.

**Air Quality.** (1) Regional Conformity: The project is not located within an air quality non-attainment area or maintenance area, and the project is not subject to conformity; (2) Project-Level Conformity: Hot spot analysis is not required; (3) MSAT Considerations: For MSAT considerations, this project falls in the category of ‘Exempt or a Project with No Meaningful Potential MSAT Effects’ because it qualifies as a categorical exclusion under 23 CFR 771.117(c)(3) [Construction of bicycle and pedestrian lanes, paths, and facilities].

**Noise.** The project does not involve the addition of through-traffic lanes or changes to the horizontal or vertical alignment. Therefore, no trigger event exists and no noise analysis is required. A noise variance from Hood River County would be obtained for any night work. Public outreach and night time noise mitigation measures would be stipulated in the County noise variance. If the contractor chooses to work at night in unincorporated Hood River County, they would need to obtain an appropriate noise variance.

**Hazardous Materials.** A Level I Modified Hazardous Materials Corridor Study (HMCS) was completed in March, 2014. This HMCS identified environmental conditions that have the potential to have a material, adverse effect on the proposed construction within the Project Corridor. These include historical gasoline stations located at Lindsey Creek and Warren Creek. Additionally, ODOT Region 1 HazMat Coordinator has recommended additional sampling along the I-84 shoulder to be in compliance with ODOT’s new draft directive on management of soils removed adjacent to highways. If the final design requires soil excavation and removal, the collection of environmental soil samples is recommended in areas of soil excavation to facilitate appropriate waste stream designation. If the scope of the Project changes to include additional excavation, the HMCS report should be reviewed and updated by a qualified environmental professional.

**Tribal Coordination.** FHWA initiated consultation with seven Tribal entities on this project, and will request concurrence with ODOT’s Section 106 findings. Coordination with affected tribes has been conducted by Mike Schurke/WFLHD Archaeologist.

**Public Outreach.** A Public Outreach and Communications plan was prepared by Kristen Stallman/ODOT. The plan calls for dissemination of project information through the use of a project blog, website, fact sheets, on line surveys, email broadcasts, community meetings, advertising, media releases, and a project overview video.

## Environmental Commitments

The following project-specific environmental mitigation measures and environmental commitments will be requirements for this project:

### Land Use

- Comply with the conditions of the National Scenic Area permits.
- Have a biologist on site immediately prior to ground disturbance to relocate any animals seen during initial construction activities.
- Prepare a Natural Resource Mitigation Plan and implement native forest restoration with the following objectives:
  - Control invasive plant species (e.g., English ivy, Himalayan blackberry) by severing stems that climb native trees; brush cutting ivy to ground level and cultivating soil to break up roots; applying appropriate herbicide; and establishing desirable replacement ground cover.
  - Minimize clearing of mid- to large-size trees (e.g., maples) and hazard trees.
  - Plant native species (e.g., Oregon ash) in canopy gaps.
  - Plant understory species (e.g., sword fern, creeping Oregon grape, salal).
  - Favor habitat elements suitable for low elevation pika, such as placing boulder groupings or porous rock embankment.

### Socioeconomics

- Provide the public with adequate notification of temporary closures or detours.
- Provide sufficient signage to guide travelers safely through construction zones.

### CWA Section 404/Wetlands/Waters

- Avoid in-water work, except where authorized by permit.
- Comply with conditions of wetland removal-fill permit(s).
- Perform compensatory water resource replacement, as required.

### Water Quality

- Comply with the conditions of the DEQ Section 401 Water Quality Certification.
- Prepare a Temporary Erosion and Sediment Control Plan and implement the plan per the provisions of the Oregon Department of Transportation's Region 1 NPDES 1200-CA Permit.
- Control stormwater runoff from the construction site.
- Provide engineered stormwater treatment (per ODOT 2011 Hydraulics Manual) for the contributing impervious area of vehicular roads.

### Biological Resources

- Align the trail on historic highway segments and previously disturbed ground, as possible.
- Minimize removal of large trees, and root damage.
- Minimize canopy fragmentation.
- Leave large wood from clearing on the forest floor.

- Narrow trail width to 10 feet at sensitive areas, and use retaining walls or steepened slopes, to reduce clearing of large trees.
- Conduct tree cutting, grubbing, or clearing activities between September 1 and February 28 to avoid disturbance to nesting birds and their young. If such activities must be conducted during the nesting season (March 1 through August 31), a qualified wildlife biologist should survey the area for the presence of active nests. If active nests are present, all efforts will be made to modify the project activities to avoid disturbing the nests. If potential impacts to nesting birds are anticipated, the Animal and Plant Health Inspection Service (APHIS) at the United State Department of Agriculture (USDA) should be notified in advance of project activities (Diane Winterboer, APHIS, P.O. Box 533 Lebanon, OR 97355, (541) 258-2189).
- Designate staging and disposal sites that may be used by the contractor. Delineate site limits with fencing for the duration of the project, and remove when the project is complete.
- Restore all disturbed ground with native landscaping. Implement roadside development consistent with specifications of ODOT, OPRD, and USFS.
- Ensure fish passage at the new Warren Creek crossing.
- Perform in-water work during the ODFW preferred window for Columbia River tributaries: July 15 to September 30.
- Comply with the terms and conditions of the USFWS Biological Opinion.
- Prevent blasting during periods when northern spotted owls are sensitive to loud noise (March 1 to July 15).
- Comply with the applicable Conservation/General Construction Measures of the FAHP Programmatic BO.
- For the new single span bridge structure at Warren Creek, the necessary opening will be at least 1.5 times the active channel width. No riprap allowed in the scour prism.
- Install relief conduits, as necessary, within the trail fill at potential flood flow pathways based on analysis of flow patterns or floodplain topography.
- If a temporary stream crossing is necessary, avoid fish use areas, ensure that the crossing is perpendicular to the riparian area and main channel, and take steps to ensure that streamflow will not be diverted out of the channel if the crossing fails.
- When a temporary stream crossing is no longer needed, block the area, obliterate the route, and restore the soils and vegetation.
- Comply with the requirements and provisions of the USFS biological evaluation.

### Cultural Resources

- Perform all mitigation outlined in Section 106 MOAs to resolve adverse effects.
- Delineate historic properties near the HCRHST as No Work Zones.
- Notify the ODOT archaeologist and immediately halt work in the vicinity in the event that archaeological material is encountered during construction, until any finds can be inspected and assessed.
- Consult Oregon Revised Statutes (ORS 358.905 to 955) for inadvertent discovery requirements.

### Section 4(f)

- Notify the public about *de minimis* use of recreation properties.

## Visual Resources

- Implement the specifications of the Visual Impact Assessment (VIA) report per Hood River County Zoning Ordinance (Article 75).

## Noise

- If the contractor chooses to work at night in unincorporated Hood River County, they would need to obtain an appropriate noise variance.

## Hazardous Materials

- Conduct a lead and asbestos survey of the existing facilities before demolition. This work should include an analysis of existing paint layers for total and toxicity characteristic leaching procedures for heavy metals, such as cadmium, chromium, zinc, and lead.
- Investigate and address areas of known contaminated soil before or during construction to limit exacerbation. These measures could include direct removal of contaminated media, capping or covering contaminated soils, and pumping contaminated groundwater from impacted aquifers.
- Implement construction-phase monitoring to identify and manage unknown or unanticipated media.
- Characterize waste generated during construction (such as excavated soil, wastewater, and construction debris) and assign each waste stream to appropriate waste-disposal facilities.
- Avoid cross-contamination or carryover of contaminated material to clean areas.
- Limit access to contaminated areas.

## Permits and Approvals

Environmental permits and approvals will be sought during the final design process. Anticipated permits are shown in Table 3-3.

TABLE 3-4  
 Anticipated Permits

Regulatory Agency	Permit/Action Required	Comments
<b>Federal</b>		
US Army Corps of Engineers	CWA Section 404	For disturbance to Wonder and Warren Creeks
National Marine Fisheries Service	FAHP Programmatic B.O.; NMFS No: 2011/02095	Requires FAHP Notification Form
USDI USFWS	Biological Opinion for northern spotted owl	Based on mini-BA
USDI USFWS/USDA APHIS	Migratory Bird Take permit	Required only if nesting birds are impacted
USDA Forest Service	Special Use Permit; Biological evaluation	Addresses impacts to all Oregon-side listed sensitive species, Columbia River Gorge endemic species, and state and federally listed species
<b>State</b>		
Oregon Department of Environmental Quality	National Pollutant Discharge Elimination System 1200-C	For construction discharges under Temporary Erosion and Sediment Control Plan
Oregon State Historic Preservation Office	Historic/Archaeology concurrence	Addresses National Historic Preservation Act Section 106

<b>Regulatory Agency</b>	<b>Permit/Action Required</b>	<b>Comments</b>
Department of State Lands	Removal-Fill Permit	Not anticipated if Wonder Creek is not a water of the state
<b>County</b>		
Hood River County	National Scenic Area permit (geotechnical)	Addresses Hood River County Zoning Ordinance (Article 75, National Scenic Area Ordinance)
	National Scenic Area permit (trail construction)	Addresses Hood River County Zoning Ordinance (Article 75, National Scenic Area Ordinance)
	Noise variance	For construction work outside of permissible hours and noise level

### 3.13 Construction Cost Estimate Summary

Preliminary construction costs have been estimated for both the roadway and bridge improvements. Appendix B contains the detailed cost estimates. The estimated costs are presented in 2014 dollars. The estimated construction cost for the project is \$2,640,542.

The cost estimate includes a contingency calculated on construction costs, accounting for the preliminary design level of this project. Final project costs will vary from those presented in this document and will depend on actual labor and material costs, competitive market conditions, and final project scope, among other variables.

### 3.14 Project Schedule

#### Project Schedule Summary

The proposed project design schedule is outlined below.

Preliminary design is underway with the Final DAP scheduled for completion in June 2014. The project will immediately progress into Final Design with bid ready documents scheduled for completion in February 2015.

The critical path for the preliminary schedule is the permitting process. SHPO and Tribal Coordination has been ongoing with Concurrence expected Spring 2014. NSA Permitting has been initiated as well. The NSA Permit for Construction is scheduled for submission in June 2014 with NSA Authorization anticipated in November 2014. The NEPA documentation is underway with an anticipated completion date of October 2014. The Section 4(f) Evaluation is expected to occur from September until November 2014.



## SECTION 4

# Items for Consideration

---

This section presents items that are currently under discussion and will be incorporated into the final design. Design considerations include limited tree removals, limited construction footprint, railing types, landscaping and amenities.

## 4.1 Tree Clearing

As previously noted, the trail has been realigned in areas to reduce the impacts to the surrounding area. After the footprint is established, the proposed clearing limits will be staked and a field review coordinated with OPRD and USDA Forest Service. After the tree removals are agreed upon, FHWA will then conduct the clearing. No additional tree clearing with construction is anticipated; however, hazard trees may be felled for public safety.

## 4.2 Construction Footprint

The preliminary construction footprint shown in the Preliminary Plans in Appendix A provides for the trail facility, and 5 feet beyond the toes of slope and walls. Areas for side-paths and temporary staging areas are also included. The footprint will be further evaluated and reduced in areas where possible.

## 4.3 Railing Types

Concepts for railing types have been developed with the Landscape and Amenities Plans shown in Appendix E. The aesthetic aspects have been designed per the 2011 STG and each type of railing treatment chosen dependent upon where it is required along the trail alignment. The construction details for each type of rail, including footings, is shown in the Preliminary Design Plans shown in Appendix A. The details will be fully developed during final design.

### Two Rail White Wooden Rail

This rail is similar to the iconic rail seen along segments of the historic highway. The design has been modified to introduce variations, such as the black footing, in accordance with the STG. This rail is currently proposed in areas that will require either a 42- or 48-inch rail. The details currently only provide for a 42-inch height. An additional detail may be need to be developed for the 48-inch height.

### Barrier Mounted Rail

The barrier mounted rail is proposed where the trail is directly behind the I-84 concrete barrier. The rail itself is a 22-inch rail mounted on a 32-inch barrier to provide at total height of 54 inches. The 54-inch height is recommend in this instance due to the trail being directly adjacent to I-84 traffic.

### V-Fence

The V-Fence is proposed where the trail is behind a proposed I-84 shoulder barrier but slightly separated by a fill slope. The V-Fence will provide a physical separation between the trail and highway.

---

## Steel Rail

The Steel Rail is proposed as a 42-inch Rail at the location where the trail is approaching an historic highway segment and is sitting on a bench faced with an historic masonry wall. A railing is necessary due to the drop off adjacent to I-84 however the masonry wall is to be protected in place. The proposed steel rail in this location will have a shallow-depth reinforced concrete footing as shown in the Preliminary Plans in Appendix A. The proposed footing does not extend below the pavement section. The concrete footing will have a 2-inch asphalt overlay to blend with the trail surface.

## 4.4 Trail Medallion Markers

Trail Medallion Markers are called for in the project plans and are proposed to designate segments where the trail is on historic highway alignment. Details for the placement of the markers will be provided during final design.

## 4.5 Landscaping and Amenities Concepts

Conceptual Landscape Plans are located in Appendix E. The Plans contain planting and amenities concepts for Segments A through D. The plans include a Warren Creek Bridge perspective as well as conceptual layouts for the side trails and pull-outs previously mentioned in the report. The plans will be further developed during final design with improvements adjusted as necessary to fit within the project footprint.

---

SECTION 5

# References

---

Central Oregon Intergovernmental Council (COIC). 2010. *Central Oregon Stormwater Manual*. Updated August.

Carré, Brett. 2012. Personal communication with Wendy Wente, MB&G biologist; CRGNSA Wildlife and Fisheries Biologist, U.S. Forest Service. April 26, 2012.

Columbia River Gorge Commission (CRGC). 2011. Columbia River Gorge National Scenic Area Management Plan. Columbia River Gorge Commission, White Salmon, WA. URL: <http://www.gorgecommission.org/managementplan.cfm>.

Hood River County. 2009. Hood River County Zoning Ordinance, Article 75 National Scenic Area Ordinance, Section 600 Special Management Area Natural Resource Review Criteria. July 16, 2009.

ODOT (Oregon Department of Transportation). 2005. I-84 Corridor Strategy: A Vision and Design Guidelines for Interstate 84 in the Columbia River Gorge National Scenic Area. ODOT, Portland, OR. November.

ODOT (Oregon Department of Transportation). 2011. Historic Columbia River Highway State Trail Guidelines 2011. USDA Forest Service, Oregon Department of Parks and Recreation, and ODOT, Salem, OR.



# Design Plans

---



# Cost Estimate Detail Spreadsheet

---



# Geotechnical Exploration Plan

---



# Stormwater Management Plan

---



# Landscape Plans

---