

PUBLIC UTILITY DISTRICT NO. 1 *of* CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

June 28, 2013

VIA ELECTRONIC FILING

Honorable Kimberly D. Bose, Secretary, and
Nathaniel J. Davis, Sr., Deputy Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Re: Rocky Reach Hydroelectric Project No. 2145
License Article 406 – Final Entiatqua Trail Construction Drawings
Request for Expedited Review and Approval of Entiatqua Trail Contract Plans and Specifications

Dear Ms. Bose and Mr. Davis:

The Public Utility District No. 1 of Chelan County, Washington (Chelan PUD) hereby requests expedited approval of the Entiatqua Trail Contract Plans and Specifications. Any comments you may have would be appreciated as soon as practicable to help in our efforts to maintain the overall project schedule. Construction is scheduled to begin on August 26, 2013, pending Commission approval.

On June 14, 2012, the Federal Energy Regulatory Commission (Commission) issued the "*Order Modifying and Approving Entiatqua Trail Implementation Plan"* for the Rocky Reach Hydroelectric Project (Project). Ordering Paragraph (B) requested that the Public Utility District No. 1 of Chelan County, Washington (Chelan PUD) shall file with the Commission, the final construction drawings and other final construction documentation identified in the approved plan including erosion and sedimentation control measures, trash clean-up and removal provisions, and a discussion of how the needs of the disabled were considered in the planning and design of the trail by June 30, 2013.

Chelan PUD prepared the final construction details in consultation with the City of Entiat, Washington State Department of Transportation, C & C Railway, Washington Department of Fish and Wildlife, Washington State Parks and Recreation Commission, National Park Service, U.S. Bureau of Land Management, and National Marine Fisheries Service (NMFS), and include in its filing, documentation of such consultation.

In accordance with the above Order, Chelan PUD hereby files electronically, with this letter, an electronic file for each of the items listed below. Additionally, in accordance with license article 302, hard copies will be filed with the Commission's Director of Division of Dam Safety and Inspections and the Portland Regional Office by copy of this letter.

- Quality Control Inspection Plan (QCIP)
- Exhibit S – Specifications
- Exhibit T – Contract Drawings
- Exhibit U – Additional Information (including permits)

Erosion and sediment control measures are provided in Section 02270 of Exhibit S – Specifications and Sheet 32 of Exhibit T – Contract Drawings.

Trash clean up during construction is the responsibility of the Contractor. Following construction work, provisions have been made to locate garbage receptacles at the beginning of the Trail. The City of Entiat will be responsible to pick up and collect trash on a regular basis.

The handicapped were taken into consideration with the development of the Entiatqua Trail; however, because of a combination of factors and conditions, it is impractical to make the entire trail handicap accessible. The trail does comply with the Architectural Barriers Act (ABA) Accessibility Guidelines for Outdoor Developed Areas (Federal Register 36 CFR Park 1195).

Construction of the trail requires a U.S. Army Corps of Engineers (USACE) 404 permit, a Washington State Department of Fish and Wildlife hydraulic project approval, and a shoreline permit from the City of Entiat. On April 29, 2013, U.S. Fish & Wildlife Service provided their Letter of Concurrence on the Biological Assessment for the Entiatqua Trail to the USACE. On January 10, 2013, NMFS provided the USACE an email stating that their 2007 Biological Opinion provides Endangered Species Act coverage for the Entiatqua Trail. The USACE has indicated that a permit to construct the project will be issued soon. When the USACE permit is received, we will file it with the Commission. Chelan PUD has obtained all the necessary rights for construction of the trail and will enter into a right-of-way agreement with the City of Entiat for that portion of the trail that falls within city limits. Chelan PUD will construct the trail and the City of Entiat will be responsible for operation and maintenance.

Please contact Kris Pomianek of my office at (509)661-4186 or me if you have any questions or require additional information.

Sincerely,

Michelle Smith
Licensing & Compliance Manager
(509) 661-4180
michelle.smith@chelanpud.org

Enclosure: Electronic files of the QCIP and contract plans and specifications
Consultation

cc: Commission's Director of Division of Dam Safety & Inspections (hard copy)
Commission's Portland Regional Office (two hard copies)

CONSULTATION

U.S. Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office

Central Washington Field Office
215 Melody Lane, Suite 103
Wenatchee, WA 98801-8122

IN REPLY REFER TO:
USFWS Reference: 13410-2013-I-0265
Hydrologic Unit Code: 17-02-00-10-01

April 29, 2013

Re: Informal Section 7 Consultation on the Entiatqua Trail
NWS-2012-1364 (Public Utility District No. 1 Chelan County, Chelan County)

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Ms. Walker:

This responds to your request for informal consultation regarding the proposed construction of the Entiatqua Trail at the confluence of the Entiat and Columbia Rivers, Chelan County, Washington (Project). The objective of the Project is for Public Utility District of Chelan County (Chelan PUD) to fulfill a requirement of the Federal Energy Regulatory Commission (FERC) relicensing agreement for the Rocky Reach Hydroelectric Project (FERC No. 2145). Your December 7, 2012, Biological Assessment (BA) and Memorandum for Services (MFS), were received in the U.S. Fish and Wildlife Service's (Service) Central Washington Field Office on April 5, 2013.

The U.S. Army Corps of Engineers (COE) has requested Service concurrence with the determination of "may affect, likely to adversely affect" the bull trout (*Salvelinus confluentus*) and Columbia River bull trout critical habitat. The COE has also requested Service concurrence with the determination of "no effect" for Ute ladies'-tresses (*Spiranthes diluvialis*).

The Project entails the construction of a 1776 foot long bike and pedestrian trail connecting Entiat Park to an outdoor learning center. To stabilize the trail, gabion baskets will be placed along the upland side of the trail and on the waterward side of the trail concrete modules or a rock wall will be constructed. The rock wall will be constructed below the ordinary high water mark along certain sections of the trail. The rock wall will include a partially buried rock toe and streambed cobbles/sediments fronting the toe; above the toe riparian will be planted. Numerous conservation measures will be employed to minimize effects to aquatic species. For a more detailed description of the proposed action, please refer to the Project BA and MFS.

The Service met with Chelan PUD on August 29, 203 and corresponded with Chelan PUD on numerous occasions during September 2012 in an attempt to modify the Project in a manner that reduces impacts to aquatic and terrestrial resources. In particular, we discussed the challenges associated with the placement of a trail of this nature on a steep, unstable slope. While the Service normally advocates the use of interlocking boulders to stabilize slopes such as those

described in the Project, we suggested the use of native plantings to conceal and stabilize the conspicuous nature of the rock gabions proposed in this Project. We also discussed the specific placement of a riparian corridor with native herbaceous and woody vegetation along discrete section of the proposed trail to minimize effects of the Project. More recently on April 24, 2013, Chelan PUD agreed to modify the timeframe to conduct all in-water activities from September 1- February 28 to September 1- October 31 with a contingency period of November 1 – 15 for unforeseen circumstances to avoid impacts to post-spawn adult bull trout migrating downstream through the Entiat River to the Columbia River.

The Service agrees the proximity of the action area to the mouth of the Entiat River increases the probability of adult and sub-adult bull trout being in the project area during construction activities. However, based on evidence presented in the BA, the probability of adult and sub-adult bull trout being in the project area during the in-water work window and construction period is very low. After careful review of the BA and associated MFS, we conclude the Project is "not likely to adversely affect" the bull trout and Columbia River bull trout critical habitat. Our conclusion is conditioned on the Project being implemented as described in the BA, MFS, and Chelan PUD's April 24, 2013 correspondence outlining the modification to the in-water work window, including the prescribed conservation measures. While we acknowledge your "no effect" determination for Ute ladies'-tresses, we are legally unable to concur with it.

This concludes informal consultation pursuant to the implementing regulations of the Endangered Species Act, 50 C.F.R. § 402.13. This Project should be reanalyzed if new information reveals effects of the action that may affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this Project.

Thank you for your assistance in the conservation of listed species. If you have any questions or comments regarding this letter, please contact Steve Lewis at the Central Washington Field Office in Wenatchee at (509) 665-3508, extension 2002, or via e-mail at Stephen_Lewis@fws.gov.

Sincerely,

Jeffrey M Krupka FOR

Ken S. Berg, Manager
Washington Fish and Wildlife Office

CONSULTATION

National Marine Fisheries Service

Sokolowski, Rosana

Subject: FW: Follow up from 7/10 meeting
Attachments: Entiatqua Trail NMFS Comments 7-27-2012.pdf; REVISED CONSULTATION Doc2 (2).docx; 8_8_2012_NMFS_Comments_Response.docx

-----Original Message-----
From: Justin Yeager [mailto:justin.yeager@noaa.gov]
Sent: Friday, July 27, 2012 9:42 AM
To: Hill, Courtney
Cc: Osborn, Jeff; Frantz, Waikele M.
Subject: Re: Follow up from 7/10 meeting

Court,
I have attached my comments as a PDF to this email. This is certainly a complex project between a road/railroad and the river that makes it very challenging.
If you have any questions give me a call.

Justin Yeager
National Marine Fisheries Service
Eastern Washington Habitat Branch
304 S Water Street, Suite 201
Ellensburg, WA 98926
(509) 925-2618 x224
(509) 962-8544 fax

On 7/11/2012 5:04 PM, Hill, Courtney wrote:
> Justin – Thanks for squeezing us in to your Wenatchee tour. Although
> our time was short I thought it was nonetheless helpful to meet. I
> know you had some concerns/questions and we didn't have enough time to
> address them. I thought I would take some time to address some of the
> items you brought up in this e-mail. Hopefully you can take some time
> to review the drawings and provide any further comments. We would like
> to get the drawings finalized in the next week or two so that we can
> move forward with development of actual JARPA drawings.
> You expressed some concern over the use of the Lock+Load Retaining
> Wall System in a shoreline erosion demonstration site. As you know we
> are planning to put in an interpretive sign which points out the use
> of the shoreline stabilization methods employed at this site. Our
> intent is not to highlight the retaining wall system as part of the
> stabilization method. The wall system is necessary from a geotechnical
> engineering slope stabilization perspective and is not intended as a
> shoreline stabilization method. We have only employed this system in
> areas where it is absolutely needed to safeguard the public. We have
> located this wall system landward (above) the ordinary high water
> mark. At our full reservoir operating level as allowed by FERC the
> wall will not be in contact with the water. Our intent with the
> interpretive sign is to point out the bio-engineering stabilization
> features employed between the wall and river. Once the plantings have
> established the wall will not be as noticeable. Attached is a draft
> description of the write up for the shoreline stabilization
> demonstration interpretive sign. Please feel free to review and
> comment on the write up.
> We also discussed use of coir logs and coir fabric. The links below
> will take you to directly to these items as they will be specified.
> These are an integral part of the bio-engineered design we are

> planning to employ at the site.
> Coir Log:
> _http://www.beltonindustries.com/Erosion-Control/GEOCOIR®/GEOCOIR®-Log
> s.aspx_
> <http://www.beltonindustries.com/Erosion-Control/GEOCOIR%AE/GEOCOIR%AE
> -Logs.aspx>
> Coir Fabric:
> _http://www.beltonindustries.com/Erosion-Control/GEOCOIR®/GEOCOIR®-900
> .aspx_
> <http://www.beltonindustries.com/Erosion-Control/GEOCOIR%AE/GEOCOIR%AE
> -900.aspx> You also suggested we develop a more thorough explanation
> or justification for the 8 foot trail width. The justification is
> primarily centered on the 8 foot width being the minimum width to
> which we can feasibly construct and maintain the trail. At this width
> we are already pushing the envelope for access of construction
> equipment, specifically excavators and loaders, of sufficient size and
> capacity to construct the trail and associated features. Construction
> of the complex woody structures and rock walls will initially require
> the use of an excavator with capacities equal to no less than a CAT
> 320 (see attached picture). The width of this excavator is
> approximately 10’0”. It’s likely the contractors will also employ a
> mini excavator such as a CAT 308 for more of the light duty work
> towards the end of construction once the bulk of the trail has been
> built. The CAT 308 has a width of 8’-6”. Construction work will also
> require use of a loader (for hauling of material) with capacities
> equal to no less than a CAT 924 (see attached picture). The wheel base
> on this piece of equipment is 8’-6”.
> If you consider that we also have a wood rail fence along the edge
> (needed for public safety based on 48” drop off) the trail width is
> actually closer to 7’-3”. We have made provisions in the design for
> the fence to be removable if we ever need to get a piece of equipment
> back on site for maintenance purposes. At that point we would be
> limited to a mini mini excavator such as a CAT305 which has a width of
> 8’-0” and capacities likely undersized for any heavy lifting needs.
> One thing that may not be readily apparent in the drawings is the
> amount of excavation or cut planned into the existing embankment to
> make space for the trail. A considerable amount of money and risk is
> involved in this excavation work. From a geotechnical engineering
> perspective we are pushing the boundary. Cutting into the slope any
> further would result in risk and costs that would make the project
> infeasible.
> During discussions of the project withWSDOT they requested we meet a
> Federal Highways Administration (FHWA) standard which calls for a 14
> foot wide paved trail. The 14 foot width is largely an outgrowth of
> what WSDOT and FHWA views as a safe width for a mixed use trail
> (bikers, walkers, skaters, etc.). For the Entiatqua trail, we will be
> asking bikers to walk their bikes because of the narrow width. As for
> our response to WSDOT we have requested a deviation from the FHWA
> standard for this project and so far they are agreeable (we still need
> to complete the permitting process with them).
> We think a 3 to 5 foot width for the planting corridor is sufficient
> to attain and sustain a vibrant riparian corridor. A greater width
> would require additional in-water fill. We are trying our best to
> minimize impacts but yet improve the aquatic environment. We believe
> the 3 to 5 foot width is a good balance. However if there are short
> stretches of shoreline where you think a slightly wider corridor would
> be more advantageous we are more than willing to consider them.

> We also discussed the use of willow as an additional plant. We will
> incorporate willow, specifically coyote willow, into the design. We
> tend to be a little cautious in using willow because of its tendency
> to dominate and not be respective to the propagation of other valued
> native species. For this reason we'll plant the willow in four clumps
> at each of the complex woody structures with the trees rather than the
> full length of the corridor. There's a good chance they will spread
> waterward with continued deposition from the Entiat. Those areas might
> make for the best candidates for a bump out or increase in the
> planting corridor width.
> We look forward to any other comments you might have and hope we can
> continue the collaborative effort. We believe the project demonstrates
> a good balance of enhancing recreational opportunities on/around the
> reservoir while also improving fish habitat. We hope to have your
> support in that regard.
> *Courtney Hill, PE*
> Civil Engineer
> PUD No. 1 of Chelan County
> _www.chelanpud.org_
> 509-661-4143 (direct)
> 509-668-4143 (cell)
> 509-661-8117 (fax)

Entiatqua Trail Comments
July 27, 2012

I have included some of NMFS concerns, as well as, areas where additional information is needed for the biological assessment.

Listed fish in the action area

- This area is an important habitat for both ESA listed UCR spring-run Chinook salmon and UCR steelhead. In addition, this area is also designated as Essential Fish Habitat under the MSA for all Chinook salmon and coho.
- The confluence of the Entiat River is an important rearing and migration corridor for all the above listed species. This area provides critically important rearing habitat between the Entiat River and the Columbia River for juvenile fish outmigrating during the spring and summer months. It also provides, in places, predator cover and forage habitat year-round.

Water levels

- What are the water levels at this location and fluctuation between OLW and OHW in the Columbia River and Entiat River?
- How often do water levels rise above the OHW mark at this location on the Columbia River and Entiat River sides of the project?
- Would flooding in the Columbia River or Entiat River have any effects on water levels at the project site?
- Is the depositional area in the Columbia River filling with finer material from the Entiat River or is it at some level of stasis, meaning it is neither aggrading or depositing material here? Is this an area that would ever be dredged?

Trail options

- What are the options to make the trail narrower? The project affects approximately a ¼ acre of inwater habitat, including some shallow water habitat.
- Can the gabion baskets be arranged more vertically, or another structure type used to provide a more vertical structure so the project requires less in-water fill in the Columbia River habitat/or can provide a wider planting area?
- Can the educational signs be mounted on the trail rail without increasing the width of the trail in locations where the project fills into the Columbia River? It just does not seem prudent to provide educational signage in locations where the project actually removes physical habitat for fish. Or move the education signs to locations that can better accommodate a wider trail, such as nearer the park where the upland area is already wider.
- At STA 15+46 can the lock and load wall be moved back to provide more room for vegetation, the project greatly encroaches on the establishment of future vegetation and will completely remove any opportunity of future riparian development at this area. Again this a challenging area where the project will be encroaching on the future establishment of riparian vegetation and placing a vertical wall at this location completely removes the possibility of this area ever having any type of vegetation.

Riparian Vegetation

- The project should strive for a larger riparian planting area, around 10 feet in width, this would better accommodate trees, shrubs, and a mix of riparian vegetation.
- The project should incorporate a more robust planting plan with the inclusion of trees. Red osier dogwood is considered a shrub. Example of trees and shrubs are located in the WDFW Integrated Streambank Protection Guidelines appendix H, http://wdfw.wa.gov/publications/00046/
- How will the vegetation be trimmed as it grows towards the trail? What is the plan for vegetation management?
- Are there opportunities to plant riparian vegetation from STA 0+00 to STA3+00?
- We need to determine the amount of mitigation, if any, needed for riparian vegetation removal, in-water fill, bank armoring, etc…

Large Wood

- Can the Chelan PUD incorporate a study on the use of the large wood structures by fish? To determine the amount of use by predators and juvenile salmon and steelhead.
- Are there opportunities to plant vegetation in and around the large wood structures to provide another area for vegetation to get established?

Other

- Does the railroad spray this area for noxious weeds that would kill the planted riparian vegetation?
- One typical minimization measure NMFS often recommends is placing a smaller round cobble rock mix over the streambed cobble to fill in voids.
- How will work occur waterward of OHW?
- What are the other options for a trail to connect the park to the Entiat River?

Sokolowski, Rosana

Subject: FW: NMFS update

From: Miller, Joseph
Sent: Thursday, August 09, 2012 4:13 PM
To: Hill, Courtney; Smith, Michelle; Osborn, Jeff; Frantz, Waikele M.
Cc: Truscott, Keith; Heit, Ray; Pomianek, Kris; Hall, Casey; Osborn, Jeff
Subject: NMFS update


8_8_2012_NMFS_C
mments_Respons.


Confirmation
Letter.docx

I spoke with Justin Yeager from NMFS today and I wanted to pass on some information regarding Entiatqua, Entiat, and Daroga & Lincoln Rock projects:

Entiatqua: Justin has reviewed the two attached documents (interpretation of 2007 coverage and our response to his comments) and is not requesting any other information or commitments from Chelan. He expects to have Dale review the confirmation letter and put it in the file next week. This is a good indicator that we may be closing this out without much if any more NMFS process.

I did change the tone of some of the responses in the 8_8_2012 document but did not make any substantive changes. Justin did not bring up any concerns with the response document.

Overall, our primary concession was increasing the width of the Riparian buffer from 3-10 feet instead of 3-8 feet. Minor, but addresses the comments regarding a desired 10 foot buffer and the simultaneous pushback against more fill (already coordinated with Court on this).

Entiat : Justin has received the document and is currently reviewing it. I indicated that this is one project that will be garnering lots of attention so Chelan is very interested in getting it moving. I also offered to provide any technical information if he needs additional support on fish distribution or run timing data etc. I asked him to take a close look at the proposal and provide feedback on the level of consultation complexity…specifically any indication that it will take longer than the advertised 140 days. I asked his opinion on the "likely to adversely affect" vs "not likely to adversely affect calls"… He said he would review the submittal from the Corps and try to understand, however, the scale of in-water work was generally aligned with a likely to adversely affect determination. He committed to get back to me after he reviewed the entire package next week.

Daroga and Lincoln Rock projects; I asked how he would like the information for these two projects organized if we are submitting as one BA. He confirmed that one BA would be fine, but we need to clearly separate the project descriptions and effects within the BA so they can be clearly analyzed. This should be easy to do for Gretty.

Overall the conversation was good and Justin seemed to be interested in keeping things moving.

-Joe

Joe Miller
Fisheries Manager
Public Utility District No. 1 of Chelan County
cell 509.264.4598 , office 509.661.4473

CHELAN PUD RESPONSE TO NMFS 7-27-12 COMMENTS

Water Levels

Q: What are the water levels at this location and fluctuation between OLW and OHW in the Columbia River and Entiat River?
A: Water level at the confluence of the Entiat and Columbia rivers is approximately 707 feet NGVD (National Geodetic Vertical Datus of 1929) or approximately 711 feet on the 1988 North American Vertical Datum (NAVD88). OLW is approximately 703 feet NGVD and 707 feet NAVD88.

Q: How often do water levels rise above the OHW mark at this location on the Columbia River and Entiat River sides of the project?
A: Water levels at the project site are controlled through operation of the Rocky Reach Hydro. There is limited backwater effect between Rocky Reach Hydro and the Entiatqua Trail site, meaning the forebay water levels at Rocky Reach closely mirror water levels at the project site. By FERC license the Rocky Reach Hydro is allowed to operate to forebay elevation 707 feet NGVD (710.8 feet NAVD88). Conversely the project, by FERC license, has a minimum operating forebay elevation of 703 feet NGVD (707.8 feet NAVD88). Rocky Reach forebay operating levels average 706.5 USGS29 (710.5 NAVD88). Chelan PUD may be ordered by Corps of Engineers to operate at levels above 707 feet for flood storage up to 710 feet.

Q: Would flooding in the Columbia River or Entiat River have any effects on water levels at the project site?
A: The walking trail would be located above the area of potential flood influence. Flood events have occurred on both rivers over the last 30 years but there are no significant deviations above the 707 USGS29 operating level. During flood conditions, the U.S. Army Corps of Engineers sets discharge requirements to draft upstream storage projects to minimize flood effects on all parts of the Columbia River System. With the available upstream storage, these flood control operations can typically reshape flows to be held well below the level of natural, unregulated flow for flood events.

Also, the influence of the Rocky Reach reservoir on water levels at the mouth of the Entiat River was studied during relicensing. This information provided useful information in determining the final site location to ensure consideration was given to potential water level impacts. We've provided a link to that document below.

Lower Entiat River Backwater Hydraulic Profile Evaluation, final, June 2001.
http://www.chelanpud.org/rr_relicense/study/reports/2913_2.pdf

Q: Is the depositional area in the Columbia River filling with finer material from the Entiat River or is it at some level of stasis, meaning it is neither aggrading or depositing material here? Is this an area that would ever be dredged?
A: Based on historical aerial photos the confluence of the Entiat and Columbia Rivers appears to be filling with finer material. Whether or not the area would ever be dredged is not known, however Chelan has no plans to dredge and we are not aware of other plans to do so.

Trail Options

Q: What are the options to make the trail narrower? The project affects approximately a ¼ acre of inwater habitat, including some shallow water habitat.

A: The proposed width is necessary to meet the intended function of the trail and is the minimum width to which Chelan PUD can feasibly construct and maintain the trail. The narrow width already presents a significant challenge for access of construction equipment, specifically excavators and loaders, of sufficient size and capacity to construct the trail and associated features. Construction of the complex woody structures and rock walls will initially require the use of an excavator with capacities equal to no less than a CAT 320. The width of this excavator is approximately 10 feet. It's likely the awarded contractor will also employ a mini excavator such as a CAT 308 for more of the light duty work towards the end of construction once the bulk of the trail has been built. The CAT 308 has a width of 8 feet 6 inches. Construction work will also require use of a loader (for hauling of material) with capacities equal to no less than a CAT 924. The wheel base on this piece of equipment is 8 feet 6 inches.

Picture 1: CAT 320 Excavator

Picture 2: CAT 308 Excavator

The design also calls for a wood rail fence along the edge (needed for public safety based on 48" drop off). The rail fence will further reduce the functional width of the trail to 7 feet 3 inches. Chelan PUD has made provisions in the design for the fence to be removable if there is ever a need to get heavy equipment back on site for maintenance purposes. The 8 foot width will not likely accommodate heavy equipment large enough to conduct major repairs (moving rock in excess of 1 ton).

From a geotechnical engineering slope stability perspective the project site presents a significant amount of risk. Geotechnical engineers have analyzed the site conditions and have recommended retaining wall designs which meet acceptable building


Picture 3: CAT 924 Loader

standards. Any further cutting into the slope could jeopardize the stability of the embankment slope which increases risk for human casualty and environmental damage.

During discussions of the project with WSDOT they requested Chelan PUD meet a Federal Highways Administration (FHWA) standard which calls for a 14 foot wide paved trail. The 14 foot width is largely an outgrowth of what WSDOT and FHWA views as a safe width for a mixed use trail (bikers, walkers, skaters, etc.). For the Entiatqua trail, Chelan PUD will be asking bikers to walk their bikes because of the narrow width. Chelan PUD has responded to WSDOT by requesting a deviation from the FHWA standard for this project. Thus far WSDOT is agreeable although Chelan PUD still needs to complete the permitting process with them.

Q: Can the gabion baskets be arranged more vertically, or another structure type used to provide a more vertical structure so the project requires less in-water fill in the Columbia River habitat/or can provide a wider planting area?
A: The gabion baskets form a mass gravity retaining wall system and to comply with building codes they must be installed at the orientation shown (6V:1H batter). In areas where the embankment is steep Chelan PUD has chosen to use a Lock +Load™ retaining wall system which substantially reduces the retained width of the trail and is a significant betterment over the use of gabion baskets below the trail and waterward of the OHW mark as described in the 2007 biop. The Lock+Load™ System reduces the retaining width from 3 plus feet to approximately 4 inches.

All of the retaining wall systems being used for the project are located above the OHW mark. The in-water fill proposed is strictly for development of a riparian corridor (independent of the wall). Currently the Columbia River side of the trail site is void of any riparian vegetation.

Q: Can the educational signs be mounted on the trail rail without increasing the width of the trail in locations where the project fills into the Columbia River? It just does not seem prudent to provide educational signage in locations where the project actually removes physical habitat for fish. Or move the education signs to locations that can better accommodate a wider trail, such as nearer the park where the upland area is already wider.
A: The sign can be moved.

Q: At STA 15+46 can the lock and load wall be moved back to provide more room for vegetation, the project greatly encroaches on the establishment of future vegetation and will completely remove any opportunity of future riparian development at this area. Again this a challenging area where the project will be encroaching on the future establishment of riparian vegetation and placing a vertical wall at this location completely removes the possibility of this area ever having any type of vegetation.
A: The design of the Lock+Load retaining wall system at Station 15+46 includes provisions to protect and maintain existing vegetation. The retaining wall system is sited in an existing rock fill above the OHW mark which currently does not sustain riparian vegetation. The potential for future establishment of riparian vegetation is low because of extensive development around the project and the composition and slope of the existing fill (i.e., rock scree).

Riparian Vegetation

Comment: The project should strive for a larger riparian planting area, around 10 feet in width, this

would better accommodate trees, shrubs, and a mix of riparian vegetation.
Response: The current proposal has been modified to increase the width of the riparian planting area to 3 to 10 feet (previously 3-8 feet). As discussed with NMFS, the width of the new riparian area is directly related to the quantity of fill necessary to sustain plant life: the riparian zone is being created at the toe of a significant, barren slope and will not function without some quantity of fill. We've attempted to maximize the riparian area while minimizing the fill to achieve both of NMFS' recommendations. The increased width of 3-10 feet will provide heterogeneity to an otherwise linear shore line and establish native plants where they do not currently exist. Collectively, this should be a significant improvement over the current condition.

Comment: The project should incorporate a more robust planting plan with the inclusion of trees. Red osier dogwood is considered a shrub. Example of trees and shrubs are located in the WDFW Integrated Streambank Protection Guidelines appendix H, http://wdfw.wa.gov/publications/00046/
Response: The project planting plan will include shrubs, trees and native grasses: 290 red osier and coyote willow live stake shrubs, 241 potted native shrubs and 16 trees (shore pine and water birch). More specific location and densitiy information is included in the project plans.

Q: How will the vegetation be trimmed as it grows towards the trail? What is the plan for vegetation management?
A: Vegetation will only be trimmed if it presents a safety hazard for trail users. The project includes provisions to install a temporary irrigation system to help vegetation to establish; once established, plants will be maintained as necessary to ensure survivability.

Q: Are there opportunities to plant riparian vegetation from STA 0+00 to STA3+00?
A: Chelan is not proposing to plant the area from STA 0+00 to STA 3+00 because it is not adjacent to the trail and would require significant quantities of in-water fill to establish a riparian area. Because of concerns with in-water fill we've attempted to limit the of the project.

Comment: We need to determine the amount of mitigation, if any, needed for riparian vegetation removal, in-water fill, bank armoring, etc…
Response: One of the primary intentions of the project is to enhance the habitat function in an area that is otherwise degraded. The project proposes to maintain all functional riparian vegetation and in-water fill is strictly for the development a riparian corridor.

Large Wood

Q: Can the Chelan PUD incorporate a study on the use of the large wood structures by fish? To determine the amount of use by predators and juvenile salmon and steelhead.
A: There is not a proposal to directly study the Entiatqua Project, but Chelan PUD is currently implementing a phased study to address predation and habitat associations for littoral salmon and steelhead predators within the Rocky Reach reservoir. This ongoing study will help establish the distribution and occurrence of predators in littoral habitats and adjacent to in-water structures.

Q: Are there opportunities to plant vegetation in and around the large wood structures to provide another area for vegetation to get established?
A: The project proposes to plant trees and coyote willow between the large wood structures and the trail. Coyote willow is a very aggressive plant species which will expand to fill the site.

Other

Q: Does the railroad spray this area for noxious weeds that would kill the planted riparian vegetation?
A: The railroad is known to spray along their rail corridors (on land they own). The trail is located on lands owned by Chelan PUD. It is highly unlikely that spray will be employed and extend sufficiently far to kill the proposed plantings. Nonetheless Chelan PUD will work to ensure the plantings are not impacted by the railroads operations.

Comment: One typical minimization measure NMFS often recommends is placing a smaller round cobble rock mix over the streambed cobble to fill in voids.
Response: The project proposes to use WSDOT 2012 Standard specifications 9-03.11(1) Streambed Sediment and 9-03.11(2) Streambed Cobbles. The streambed sediment is a 2.5 inch rounded sediment which will fill the voids of the larger rounded cobble.

Q: How will work occur waterward of OHW?
A: The work will occur in the wet. The Contractor will be required to deploy a silt curtain to contain turbidity. Chelan PUD will observe the work area to ensure the proper deployment/function of the curtain.

Q: What are the other options for a trail to connect the park to the Entiat River?
A: The Entiatqua trail is an obligation of Chelan PUDs license to operate the Rocky Reach Hydro Electric Project as described in the Rocky Reach Comprehensive Settlement Agreement.

August 7, 2012

Justin Yeager
National Marine Fisheries Service, Habitat Conservation Division
304 S Water Street, Suite 201
Ellensburg, WA 98926

RE: Entiatqua Trail Project

Dear Justin,

This letter requests confirmation that the National Marine Fisheries Service's (NMFS) 2007 Biological Opinion[1] provides Endangered Species Act coverage for Chelan PUD's (Chelan) Entiatqua Trail Project. Chelan recognizes that NMFS' interpretation of the applicability of the 2007 Biological Opinion is based upon (1) the project description and incidental take statement provided in the 2007 Biological Opinion, (2) a site visit to the proposed project area by NMFS and Chelan on September 26th, 2011; (3) updated project plans and descriptions submitted by Chelan to NMFS on July 10, 2012; and (4) several phone calls and emails exchanged between NMFS and Chelan.

Chelan also recognizes that NMFS interpretation of project effects relies upon Chelan's commitment to implement specific habitat measures that have been agreed to by NMFS and Chelan PUD.

Specifically, these habitat measures include:

1. Reduction of trail length from 4,340 feet to approximately 1,775 feet long
2. Construction and placement of four large woody debris structures to provide fish habitat
3. Addition of a 625 foot long, 3 to 10 foot wide riparian strip along the portion of trail adjacent to the Columbia River (i.e., from STA 3.0-STA 9.25). The riverside boundary of the riparian zone will be irregular to increase the heterogeneity of the shoreline.
4. Riparian plantings will include a minimum of 290 red osier and coyote willow live stake shrubs, 241 potted native shrubs and 16 trees (shore pine and water birch).
5. Preservation of existing riparian trees and vegetation.
6. Use of bioengineered, fish friendly products for inwater/riparian habitat features (i.e., coir logs and coir fabric and streambed cobble/sediment mix)
7. Elimination of gabion baskets below the trail and waterward of the ordinary high water mark.
8. Elimination of fill on the Entiat River side of the trail.

Chelan understands that all of the terms and conditions described in the 2007 Biological Opinion apply to the Entiatqua Trail Project and NMFS reserves the right to reinitiate consultation if *"(1) any action is modified in a way that causes an adverse effect on the species that is new or significantly different from those analyzed herein, (2) new information or Project monitoring reveals adverse effects of the action in*

[1] July 9, 2007 Biological Opinion: *Proposed License for the Rocky Reach Hydroelectric Project License* (FERC No. 2145).

a way not previously considered or that involves additional take not analyzed in connection with the original HCP (NMFS 2002b), or (3) a new species is listed or new critical habitat is designated that may be affected by the action." (2007 Biological Opinion).

If you concur with the assessment provided in this letter please provide notification to my office. If you have any other questions, please contact me directly at (509) 661-4473.

Sincerely,

Joe Miller
Fisheries Manager
Public Utility District No. 1 of Chelan County

From:	Smith, Michelle
To:	Sokolowski, Rosana
Cc:	Pomianek, Kris
Subject:	FW: NWS-2012-1364 Chelan Co. PUD No. 1 (Entiatqua Trial) (UNCLASSIFIED)
Date:	Friday, June 21, 2013 9:22:57 AM
Attachments:	Chelan PUD Entiatqua letter 8-16-12.pdf

-----Original Message-----
From: Justin Yeager - NOAA Federal [mailto:justin.yeager@noaa.gov]
Sent: Thursday, January 10, 2013 2:01 PM
To: Habel, Darren NWS
Cc: Miller, Joseph
Subject: Re: NWS-2012-1364 Chelan Co. PUD No. 1 (Entiatqua Trial) (UNCLASSIFIED)

Darren,
Here is the letter I received from the Chelan PUD regarding the Entiatqua Trail Project. NMFS agrees with the conclusion that this project is covered under the July 9, 2007 Biological Opinion for the Rocky Reach Hydroelectric License.

If you have any additional questions feel free to contact me.

Justin Yeager
National Marine Fisheries Service
Eastern Washington Habitat Branch
304 S Water Street, Suite 201
Ellensburg, WA 98926
(509) 925-2618 x224
(509) 962-8544 fax

On 1/10/2013 1:25 PM, Habel, Darren NWS wrote:
> Classification: UNCLASSIFIED
> Caveats: NONE
>
> Good afternoon Justin,
>
> I will be handling the Chelan Co. PUD's Entiatqua Trail project and noticed in the file a letter to you from the PUD requesting confirmation whether the project would be covered under the July 9, 2007 Biological Opinion for the Proposed License for the Rocky Reach Hydroelectric Project License (FERC No. 2145). Is the project covered? There was not a response letter in the file. The Corps permit will be a Standard Individual Permit.
>
> Thanks,
>
> Darren
>
> Darren Habel
> Project Manager, Regulatory Branch
> U.S. Army Corps of Engineers
> Seattle District
> 206-764-6883
>
>
>
> Classification: UNCLASSIFIED
> Caveats: NONE
>
>



PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

August 16, 2012

Justin Yeager
National Marine Fisheries Service, Habitat Conservation Division
304 S Water Street, Suite 201
Ellensburg, WA 98926

RE: Entiatqua Trail Project

Dear Justin,

This letter requests confirmation that the National Marine Fisheries Service's (NMFS) 2007 Biological Opinion[1] provides Endangered Species Act coverage for Chelan PUD's (Chelan) Entiatqua Trail Project. Chelan recognizes that NMFS' interpretation of the applicability of the 2007 Biological Opinion is based upon (1) the project description and incidental take statement provided in the 2007 Biological Opinion, (2) a site visit to the proposed project area by NMFS and Chelan on September 26th, 2011; (3) updated project plans and descriptions submitted by Chelan to NMFS on July 10, 2012; and (4) several phone calls and emails exchanged between NMFS and Chelan.
Chelan also recognizes that NMFS interpretation of project effects relies upon Chelan's commitment to implement specific habitat measures that have been agreed to by NMFS and Chelan PUD.
Specifically, these habitat measures include:

1. Reduction of trail length from 4,340 feet to approximately 1,775 feet long
2. Construction and placement of four large woody debris structures to provide fish habitat
3. Addition of a 625 foot long, 3 to 10 foot wide riparian strip along the portion of trail adjacent to the Columbia River (i.e., from STA 3.0-STA 9.25). The riverside boundary of the riparian zone will be irregular to increase the heterogeneity of the shoreline.
4. Riparian plantings will include a minimum of 290 red osier and coyote willow live stake shrubs, 241 potted native shrubs and 16 trees (shore pine and water birch).
5. Preservation of existing riparian trees and vegetation.
6. Use of bioengineered, fish friendly products for inwater/riparian habitat features (i.e., coir logs and coir fabric and streambed cobble/sediment mix)
7. Elimination of gabion baskets below the trail and waterward of the ordinary high water mark.
8. Elimination of fill on the Entiat River side of the trail.

[1] July 9, 2007 Biological Opinion: *Proposed License for the Rocky Reach Hydroelectric Project License* (FERC No. 2145).

Chelan understands that all of the terms and conditions described in the 2007 Biological Opinion apply to the Entiatqua Trail Project and NMFS reserves the right to reinitiate consultation if *"(1) any action is modified in a way that causes an adverse effect on the species that is new or significantly different from those analyzed herein, (2) new information or Project monitoring reveals adverse effects of the action in a way not previously considered or that involves additional take not analyzed in connection with the original HCP (NMFS 2002b), or (3) a new species is listed or new critical habitat is designated that may be affected by the action."* (2007 Biological Opinion).
If you concur with the assessment provided in this letter please provide notification to my office. If you have any other questions, please contact me directly at (509) 661-4473.

Sincerely,

Joe Miller
Fisheries Manager
Public Utility District No. 1 of Chelan County

Cc:
Keith Kirkendall
1201 NE Lloyd Blvd.
Suite 1100
Portland, OR 97232

CONSULTATION

Rocky Reach Forum / Department of Transportation / Rail America

Entiatqua Trail Consultation
Rocky Reach Recreation Forum
Including Department of Transportation and Rail America

The following e-mail was sent to the Rocky Reach Recreation Forum on Tuesday, February 26 requesting comment on the Entiatqua Trail. Documentation of comments received follow.

From: Pomianek, Kris
Sent: Tuesday, February 26, 2013 4:06 PM
To: Keith Vradenburg; Bob Whitehall (bwhitehall.city@entiat.org); Dan Lewis; Buck.Workman@RailAmerica.com; 'Verhey, Patrick M (DFW)'; 'Ernsberger, Tom (PARKS)'; Van De Vanter, Jamie (PARKS); Susan Rosebrough; Karen Kelleher
Cc: Heit, Ray; Hill, Courtney; Bitterman, Deborah
Subject: Consultation requested on Entiatqua Trail


ET Description for BA.docx


EntiatquaTrail_Plan Mtg 11-9-1...

Good afternoon everyone!

Construction drawings are now complete for the development of the Entiatqua Trail to be built on the south end of Entiat Park and I am asking for your review and input. This trail will provide a connection between Entiat Park and a proposed Outdoor Learning Center at the mouth of the Entiat River. Please take a moment to review the two documents that I have attached to this e-mail. They will provide you with a detailed description of the trail plans as well as a conceptual drawing of the trail location.

I am not including the complete set of construction drawings with this e-mail because of the large size of the document, however if you would like to review these drawings, just let me know or you can contact Chelan PUD's engineer on this project, Courtney Hill, 509-661-4143, courtney.hill@chelanpud.org and he will be glad to provide them for you as well.

I am hopeful to send the construction drawings to FERC for approval by March 26 and would appreciate your input before that time. As always, if you have any questions, do not hesitate to call or e-mail me.

Thank you for your help.

Enjoy the rest of your week!

Kris


CITY OF ENTIAT
ENTIAT PARK
Trail Connection to proposed Entiat Park Waterfront Trail
Entiat River Road
Trail Connection to proposed Entiatqua Outdoor Learning Center
COLUMBIA RIVER
ENTIAT RIVER
SR 97A
C&C RR
N
0 25 50 100 150
Feet
LEGEND
ENTIATQUA TRAIL

ENTIATQUA TRAIL DESCRIPTION

Introduction

The Entiatqua Trail is a 1,776 foot long non-motorized pedestrian trail which links Entiat Park (Park), located on the Columbia River, to the proposed Entiatqua Outdoor Learning Center (Center), located on the Entiat River. See Figure 1.

Purpose

The project fulfills an obligation of the Rocky Reach Hydroelectric Project Comprehensive Settlement Agreement dated February 3, 2006 (an outcome of the Federal Energy Regulatory Commission relicensing of Rocky Reach Dam). More specifically the project fulfills an obligation to provide recreational opportunities along the Rocky Reach Reservoir.

Background

Filling of Rocky Reach reservoir in 1961 resulted in the inundation of the old Entiat Town core. In order to maintain its existence the town was forced to relocate further upland. This project mitigates for the impacts associated with the inundation and relocation of Old Entiat. The modern City of Entiat is the District's primary stakeholder for the project. Through agreement with the District, the City will operate and maintain the Trail.

Construction of Rocky Reach Dam and subsequent filling of the Rocky Reach Reservoir also required relocation of State Route 97A and the railroad (originally owned by Great Northern Rail Road). At the confluence of the Columbia and Entiat Rivers two large bridges were constructed at a significantly higher elevation to accommodate the predicted higher water flows. In order to provide access on and off the north end of the bridges it was necessary to construct a large earthen ramp. This ramp was constructed using the blasted rock attained from construction of SR97A (the blasted rock coming from the outcroppings located along the western side of the Columbia River adjacent to the modern SR97A). The manmade earthen ramp forms the embankment upon which the proposed Trail will reside.

Description

The Trail will provide for a critical connection between the Park and the proposed Center. Both the Park and Center will have their own connecting trails to form a continuous waterfront trail system. The connection of the Trail to the Park will be made at the Park's south end. From that location the trail continues in a downstream direction parallel with the Columbia River for approximately 925 feet before making a sharp turn to head up the Entiat River. From there the Trail crosses below the railroad and SR97A bridges before making another sharp turn in a northerly direction following the contour of the earthen embankment. The Trail continues north before making a gradual swerve to the west to head in the general direction of the Entiat River Valley. At this point the trail will connect to the proposed Center Trail. A timeline for construction of the Center has not been determined.

The trail setting provides striking views of the Lake Entiat (aka Rocky Reach Reservoir), Number Rock, and the Entiat River. The trail contains two wide spots for trail users to take in these views. While enjoying the view trail users may also learn about shoreline erosion stabilization methods and the regions fish and wildlife resources at one of two interpretive signs to be located along the trail. The content of these signs is located in Attachment 1.

Construction of the Trail attempts to not only provide a spectacular recreational and educational opportunity but also provides for a significant improvement to shoreline habitat. The project includes the development of a 650 foot long, 3 to 15 foot wide riparian corridor along the Columbia River side of the Trail. The Corridor will be planted with nearly 350 new shrubs and trees. The shrubs and trees will provide near shore foliage (shade and nutrients). In addition the riparian corridor includes the construction of four large complex woody structure. These structures will provide in-water habitat for a variety of fish. Further supplementing the structures will be the placement of sediment and cobble mix specifically designed for enhancing the near shore aquatic habitat.

To provide for the safety of Trail users a wood rail fence is located on the side of the trail closest to the river. The rail fence provides a protective barrier from a 3 to 8 foot high drop off which will be created by retaining the trail as a means to minimize the amount of in-water fill required.

The Trail also takes into consideration the needs of the physically disabled by constructing the trail consistent with Accessibility Guidelines for Outdoor Developed Areas. This includes constructing the trail at reasonable grades and providing sufficient trail width to allow two wheel chairs to pass side by side.

Summary of Trail Elements

- Clear Trail width: 7'-3" from outside face of upper retaining structure (gabions) to inside of rail fence.
- Total Trail width (including rail fence): 8'-0" from outside face of upper retaining structure (gabion) to inside face of lower retaining structure (Lock + Load or rock wall). Expands to greater width at interpretive signs (see drawings).
- Trail retaining structures: Gabion Baskets along upland side of Trail, Lock + Load (concrete) modules or rock wall along waterward side of Trail.
- Trail Surface: Well compacted crushed rock aggregate.
- Large complex wood structures: 4 total along Columbia River, each structure has five (5) logs 18 inches to 30 inches diameter, log type is Cedar or Ponderosa Pine or Douglas Fir; Structures are held in place by ballast boulders 36 inches to 54 inches in diameter.
- A 650 foot long, 3 foot to 15 foot wide Riparian Corridor includes over 350 trees and shrubs as well as native grasses. Stabilization includes the use of coir logs and fabric. Irrigation system for watering of new plants.
- Wood Rail Fence: approximately 4 foot 6 inches tall, three rails, to be located along the waterward side of trail (protection from fall hazard).
- Chainlink fence: 6 feet in height, to be located above gabions (minimizes pedestrian conflicts with railroad and SR97A to improve safety).
- A Bench for resting on the Entiat River side of the Trail.
- Two interpretive signs one on each side of the Trail.

Property Ownership

The portion of the Trail adjacent to the Columbia River is within property owned by Chelan County PUD. For the portion under the rail road bridge Chelan PUD has obtained an easement with Rail America. For the portion under the SR97A Chelan PUD is seeking a general permit with Washington State Department of Transportation. The portion of the trail along the Entiat River is within WSDOT right-of-way and will be permitted through agreement with the City of Entiat.

Construction Sequence

The construction sequence will largely depend on the Contractor awarded the project. The project will go to public bid once all permits have been obtained. Preliminary cost estimates have assumed the Contractor will build the trail from the bottom up as well as from both ends concurrently. This results in the following construction sequence:

1. Mobilization and staging of project. Mobilization includes the placement of erosion control devices including silt fences.
2. Rough excavation of embankment starting at each end concurrently.
    a. On the Columbia River side rough excavation work will occur to provide access to construct the in-water components (during the approved work window). Specifically this will include placement of the base rock, streambed cobble and sediment, complex wood log structures, etc.. During in-water work the Contractor will deploy a turbidity curtain to contain suspended sediment in the immediate work vicinity.
    b. On the Entiat River side excavation work will occur in conjunction with construction of the Lock + Load retaining Wall. Because of the narrow working conditions the Contractor will likely have multiple iterations of excavation then wall construction.
3. Once the lower walls are constructed various fill materials will be brought in and construction including excavation and building of the other retaining structures upland. The gabions will likely be final retaining wall structure built. Once they are built the embankment just above them will be capped with quarry spall to stabilize the slope directly above the trail.
4. In conjunction with building the trail the Contractor will place sono tubes or similar for the construction of the rail and chainlink fences. Placement of the interpretive signs and bench will likely happen during this same time period.
5. The final component will be development of the riparian corridor. This consists of installation of the irrigation system, placement of top soil and coir fabric, planting of native shrubs and trees, placement of soil/gravel mix and finally hydroseeding with native grasses.

Access and Staging

Because the Trail will likely be built from each end access and staging is provided at each end. These routes and staging areas are illustrated in the attached Staging Area Map.

Refueling

The Contractor has stringent requirements regarding refueling of machinery. Included in these requirements is for the refueling area to be located 150 feet from either river. Depending on how the Contractor arranges Staging Area 1 there may be sufficient space to allow refueling there otherwise the Contractor will need to conduct refueling at a location outside the staging and project areas.

Attachment 1

Content of the interpretive sign located on the Columbia River Side of the Trail (Sta. 7+00):

Wherever water and land meet erosion is inevitable. It's simply a matter of time. Both natural and manmade events can speed up the process. Along the Rocky Reach Reservoir wave action is one of the major contributors. Waves are generated by wind and boats. Wind is of course a phenomenon of nature and boating is an essential part of our culture. Both activities are here for the long term and as a result some shorelines must be stabilized to guard against erosion or to stop erosion in progress.

There are many different methods for stabilizing shorelines. The selection of which method to use depends on site specific conditions and consideration of the aquatic environment. Balancing between a structurally stable method and one that is respectful of the aquatic environment is referred to as a bio-engineered method. Bio-engineering is a relatively new branch of science which in this case involves the use of biological or naturally occurring material in the building of an engineered structure.

This demonstration site incorporates the following features of a bio-engineered shoreline stabilization site:

- Large complex woody structures which provide in-water habitat while also dissipating wave action.
- Coir logs and fabric made from the natural fiber of coconut husk to also dissipate wave action and to hold soil in place for the establishment of plantings.
- Plantings consisting of shrubs (willow, dogwood, salmon berry, nootka rose and spirea), trees (shore pine and water birch) and grass seed (rye, hairgrass and junegrass). Once the plants are fully established their root systems form an invisible framework to lock earth materials in place. The plantings also provide shade in the hot summer and drop material in the fall to help replenish nutrients along the river's edge promoting further biological activity.

Additional information regarding other shoreline stabilization demonstration sites on the Rocky Reach Reservoir can be found at: www.chelanpud.org

Content of the interpretive sign located on the Entiat River Side of the Trail (Sta. 12+00):

Once an important part of the livelihood of the Entiat Indians, the Entiat River valley continues to be rich with fish and wildlife.

The confluence of the Entiat with the Columbia River provides a unique wetland area used by waterfowl, eagles, and great blue herons. Beaver, river otter, muskrat, raccoon and mink can often be seen, especially in the early morning, enjoying the wetland habitat.

The Entiat River also has an abundance of many species of fish. Dams put in the river in 1889 nearly eliminated the fish population, but a successful restoration effort in 2004 led by the Entiat Watershed Planning Unit enhanced fish habitat and protected the integrity of the stream.

Today, the Entiat River boasts of runs of steelhead, bull trout, spring and late-run Chinook, coho and sockeye salmon. Rainbow, a resident form of steelhead, bull, Westslope cutthroat, brook and interior redband trout use the river and its tributaries most or all of their lives. Other resident species found in the area include mountain whitefish and pacific lamprey.

This wetland habitat consists of a variety of trees, shrubs, forbs, grasses, and aquatic vegetation that wildlife call home. The cottonwood and pine trees provide nesting habitat during spring and summer

for owls, hawks, herons, and songbirds. During the winter, these same trees are used regularly by bald eagles as they hunt for waterfowl and fish. Cottonwood trees found along the banks of the Entiat River provide food and materials for beaver to build lodges. Trees damaged by beaver become snags that are important for cavity-nesting birds such as chickadees and woodpeckers.

Riparian areas are important for many animals to raise their young due to the abundant food sources and thick vegetation for hiding. Shrubs provide cover for a variety of birds, small mammals, and reptiles. Plants overhanging the water provide shade for fish that inhabit the rier during the hot summer period. Cottonwood leaves that fall in the water provide food for aquatic insects, which fish depend on to grow and thrive. Shrubs and other shoreline vegetation help to stabilize the river banks, protecting them from erosion. Forbs and grasses host a variety of insects needed to pollinate spring flowers. Insects also provide a ready food source for birds.

During winter, deer migrate down from the Cascade Mountains to forage along the foothills and riverbanks. Bitterbrush and other shrubs that dot the upland landscape are required for their survival during hard winters when deep snow buries other food sources. This viewpoint offers an excellent opportunity to watch wildlife using the habitat year-round. What can you see?

Kris Pomianek
Recreation Resources Advisor
Chelan County PUD
PO Box 1231
Wenatchee, WA 98807-1231
Office: 509-661-4186
Cell: 509-679-0813
kris.pomianek@chelanpud.org

Date comment received	Rocky Reach Forum Representative	Agency	Agency Comments	PUD Response
	Bob Huber	Alcoa	No comments	
	Pat Irle	Ecology	No comments	
April 29, 2013	Steve Lewis	US Fish and Wildlife Service	Letter of Concurrence sent April 29, 2013 from Ken Berg at US Fish and Wildlife Services to the U.S. Army Corps of Engineers regarding the Entiatqua Trail project.	Letter of Concurrence is attached.
	Diane Priebe	Bureau of Land Management (BLM)	No comments	
	Susan Rosebrough	National Park Service (NPS)	No comments	
	Keith Vradenburg	City of Entiat	No comments	
March 7, 2013	Bob Whitehall	Entiat Coalition	I'm ready to build it as shown.	
	Ken Finicle	Puget Sound Energy	No comments	
	Karen Kelleher	Bureau of Land Management (BLM)	No comments	
	Nona Snell	Recreation	No comments	

		Conservation Office (RCO)		
March 20, 2013	Patrick Verhey	Washington Department of Fish and Wildlife (WDFW)	WDFW has reviewed the engineered drawings and they generally look good. We do have a few comments that may improve the Entiatqua Trail Project.	The complete list of comments from Patrick and responses from Court Hill, Chelan PUD Engineer are below.*
	Doug Ward	Washington Department of Fish and Wildlife (WDFW)	No comments	
	Tom Ernsberger	Washington State Parks	No comments	
March 6, 2013	Jamie VanDeVanter	Washington State Parks	This looks good. Thanks for the opportunity to review and learn about the area. I was wondering about parking for the future outdoor learning center when so close to the highway. Where will this occur?	I am attaching a map - it shows where the Entiatqua Trail connects to the proposed outdoor learning center and you can see where parking would be. There will be parking at the south end of Entiat Park too.
March 1, 2013	William Gould	Washington Department of Transportation (DOT)	Phone conversation between Courtney Hill and William Gould. He asked for hard copies of the drawings for their review.	Court Hill, Chelan PUD Project Engineer took hard copies of the drawings to DOT for review. They did not find any issues with the drawings as

				presented and they will be issuing a General Permit for the project.
March 1, 2013	Buck Workman	Rail America/ Cascade and Columbia River Railroad	The attached are the information sheets that have been provided to Cascade and Columbia River Railroad. It has been brought to my attention that there is no "Typical Section in detail" for the work that is to be performed within the RR right-of-way, particularly beneath the trestle. Before any work on RR property can begin our chief engineers will have to give their approval. Please provide this documentation as soon as possible and I will forward to the appropriate party.	Court Hill, Chelan PUD Project Engineer forwarded on the documentation requested on March 4: Attached are the drawing sheets more specific to the portion of the Entiatqua Trail beneath the trestle ("ET Drawings for FERC 12.pdf" is the "typical section in detail"). Please let me know if you need any additional information or have any further questions. No additional request for information was made.

*Comments from Patrick Verhey (WDFW) and responses from Chelan PUD:

From: Pomianek, Kris
Sent: Thursday, March 21, 2013 8:39 AM
To: 'Verhey, Patrick M (DFW)'
Cc: Hill, Courtney; Osborn, Jeff
Subject: FW: Consultation requested on Entiatqua Trail
Attachments: 02810 Site Irrigation.pdf; 02073 Geosynthetics.pdf; 02200 Earthwork.pdf; 02950 Landscaping.pdf

Good morning, Patrick,

I wanted to follow-up with you on your comments on the Entiatqua Trail project. Court Hill our engineer on this project has provided the following information which I think you will find helpful and Jeff Osborn will be following up with you in case you have any further questions.

Hope this helps and again thank you for your comments.

Kris

Kris Pomianek
Recreation Resources Advisor
Chelan County PUD
PO Box 1231
Wenatchee, WA 98807-1231
Office: 509-661-4186
Cell: 509-679-0813
kris.pomianek@chelanpud.org

From: Verhey, Patrick M (DFW) [mailto:Patrick.Verhey@dfw.wa.gov]
Sent: Wednesday, March 20, 2013 9:23 AM
To: Pomianek, Kris
Subject: RE: Consultation requested on Entiatqua Trail

Kris, WDFW has reviewed the engineered drawings and they generally look good. We do have a few comments that may improve the Entiatqua Trail Project.

- The key habitat feature is the vegetation. Success of the vegetation is critical to creating functional habitat. We recommend having a staff person dedicated to ensure regular watering of the vegetation for a couple of seasons to ensure success of the vegetation.

Regular watering of the vegetation will be achieved through installation of a sprinkler irrigation system. The sprinkler irrigation system will extend the full length of the planting strip from station 2+75 to station 9+25. Following construction Entiat Park maintenance staff will oversee watering. In addition the Contractor will be required to replace any plants which die in the first year. The layout of the irrigation main is shown on sheets 20 – 22. Additional irrigation system details are included on sheets 28 and 30. The specification for the system is attached.

- On sheet 5 of the engineered drawings for the project we noticed Chelan PUD is proposing to remove existing nonnative trees (Elm). We recommend replacing them at a minimum ratio of 3:1 with native trees.

The project involves removing 2 nonnative elm trees. These trees will be replaced by planting 16 native trees (8:1 replacement ratio). See sheets 24 and 29.

- We recommend filling the voids of the streambed cobble toe material which will be placed below OHW with small gravel to stabilize it.

The cobble toe material will be filled with streambed sediment as specified in the attached Earthwork specification. The streambed sediment is consistent with the WSDOT Standard Specification 9-03.11(1) developed specifically for this type of application. Streambed sediment is a 2.5" minus material and will work well to stabilize the cobble.

- Within the engineered drawings, we did not see what material Chelan PUD is using to fill the soil bags with. We assume soil. These bags will be in the wave zone of the Columbia River. When the bags deteriorate the soil will be eroded away. We suggest a soil-gravel mix or streambed mix similar to that used in culvert replacement projects. The material should allow roots to penetrate to help hold the soil together once the bags deteriorate. If the vegetation does not establish a vigorous root mass the topsoil behind the coir logs may be eroded.

As suggested the bags will be filled with a soil/gravel mix. See attached Geosynthetics, Earthwork and Landscaping specifications. The bags will also be wrapped with a coir fabric and topped with a coir log. Vegetation will be watered with the intent to establish a vigorous root system to aid in locking the soil materials together. The toe rock will act as firm foundational support for the soil bag system.

Thanks for the opportunity to comment on the project.

Patrick Verhey
Renewable Energy Biologist
WDFW Habitat Program
Renewable Energy Section
1550 Alder St N.W.

Ephrata, WA 98823
(509) 754-4624 ex. 213
Patrick.Verhey@dfw.wa.gov
Work schedule is M-Th

From: Pomianek, Kris
Sent: Thursday, March 07, 2013 9:47 AM
To: 'Van De Vanter, Jamie (PARKS)'
Subject: RE: Consultation requested on Entiatqua Trail
Attachments: OUTDOOR LEARNING CENTER.pdf

Good morning Jamie –

I am attaching a map that will help to answer your question. It shows were the Entiatqua Trail connects to the proposed outdoor learning center and you can see by the road coming in off of the Entiat River Road where parking would be. Also there will be parking at the south end of Entiat Park for those using the Entiatqua Trail too, so I think we are pretty well covered.

I hope that this helps! And, if you have any more questions, don't hesitate to contact me –

Thanks Jamie –

Kris

Kris Pomianek
Recreation Resources Advisor
Chelan County PUD
PO Box 1231
Wenatchee, WA 98807-1231
Office: 509-661-4186
Cell: 509-679-0813
kris.pomianek@chelanpud.org

From: Van De Vanter, Jamie (PARKS) [mailto:Jamie.VanDeVanter@PARKS.WA.GOV]
Sent: Thursday, March 07, 2013 7:49 AM
To: Pomianek, Kris
Subject: FW: Consultation requested on Entiatqua Trail

Kris,
I was wondering about parking for the future outdoor learning center when so close to the hwy. Where will this occur?
Thanks,

Thanks,
Jamie

James S. Van De Vanter, RLA, ASLA
Parks Planner - Eastern Region Capital Development
Washington State Parks & Recreation Commission
270 9th Street NE, Suite 200

East Wenatchee, WA 98802
509 665-4333 office
509 679-4843 cell
509 886-0478 fax

From: Van De Vanter, Jamie (PARKS)
Sent: Wednesday, March 06, 2013 5:34 PM
To: 'Pomianek, Kris'; Keith Vradenburg; Bob Whitehall (bwhitehall.city@entiat.org); Dan Lewis; Buck.Workman@RailAmerica.com; Verhey, Patrick M (DFW); Ernsberger, Tom (PARKS); Susan Rosebrough; Karen Kelleher
Cc: Heit, Ray; Hill, Courtney; Bitterman, Deborah
Subject: RE: Consultation requested on Entiatqua Trail

Kris,
This looks good. Thanks for the opportunity to review and learn about the area.
Thanks,
Jamie

James S. Van De Vanter, RLA, ASLA
Parks Planner - Eastern Region Capital Development
Washington State Parks & Recreation Commission
270 9th Street NE, Suite 200
East Wenatchee, WA 98802
509 665-4333 office
509 679-4843 cell
509 886-0478 fax


ENTIAT PARK
CONNECTION TO
ENTIATQUA TRAIL
PARKING
OUTDOOR LEARNING CENTER
97A
97

From:	Hill, Courtney
To:	Sokolowski, Rosana
Cc:	Pomianek, Kris
Subject:	FW: Consultation requested on Entiatqua Trail
Date:	Monday, June 24, 2013 1:56:30 PM
Attachments:	ET Drawings for FERC 5.pdf ET Drawings for FERC 12.pdf ET Drawings for FERC 18.pdf ET Drawings for FERC 22.pdf ET Drawings for FERC 32.pdf

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From: Hill, Courtney
Sent: Monday, March 04, 2013 8:34 AM
To: 'Buck.Workman@RailAmerica.com'
Cc: Vaughn, Steve; Pomianek, Kris
Subject: RE: Consultation requested on Entiatqua Trail

Buck – Attached are the drawing sheets more specific to the portion of the Entiatqua Trail beneath the trestle ("ET Drawings for FERC 12.pdf" is the "typical section in detail"). Please let me know if you need any additional information or have any further questions.

Courtney Hill, PE
Civil Engineer
PUD No. 1 of Chelan County
www.chelanpud.org
509-661-4143 (direct)
509-668-4143 (cell)
509-661-8117 (fax)

From: Workman, Buck (GPRK) [mailto:Buck.Workman@RailAmerica.com]
Sent: Friday, March 01, 2013 1:55 PM
To: Pomianek, Kris; Vaughn, Steve
Subject: RE: Consultation requested on Entiatqua Trail

Kris & Steve—The attached are the information sheets that have been provided to Cascade and Columbia River Railroad. It has been brought to my attention that there is no "Typical Section in detail" for the work that is to be performed within the RR right-of-way, particularly beneath the trestle. Before any work on RR property can begin our chief engineers will have to give their approval. Please provide this documentation as soon as possible and I will forward to the appropriate party(s).

Thanks,
Buck Workman
Manager, Real Estate
Genesee & Wyoming Inc.
7411 Fullerton St. STE 300
Jacksonville, FL 32256
Phone: 904-999-5368

From: Pomianek, Kris [mailto:Kris.Pomianek@chelanpud.org]
Sent: Tuesday, February 26, 2013 7:06 PM
To: Keith Vradenburg; Bob Whitehall (bwhitehall.city@entiat.org); Dan Lewis; Workman, Buck (GPRK); 'Verhey, Patrick M (DFW)'; 'Ernsberger, Tom (PARKS)'; Van De Vanter, Jamie (PARKS); Susan Rosebrough; Karen Kelleher
Cc: Heit, Ray; Hill, Courtney; Bitterman, Deborah
Subject: Consultation requested on Entiatqua Trail

Good afternoon everyone!

Construction drawings are now complete for the development of the Entiatqua Trail to be built on the south end of Entiat Park and I am asking for your review and input. This trail will provide a connection between Entiat Park and a proposed Outdoor Learning Center at the mouth of the Entiat River. Please take a moment to review the two documents that I have attached to this e-mail. They will provide you with a detailed description of the trail plans as well as a conceptual drawing of the trail location.

I am not including the complete set of construction drawings with this e-mail because of the large size of the document, however if you would like to review these drawings, just let me know or you can contact Chelan PUD's engineer on this project, Courtney Hill, 509-661-4143, courtney.hill@chelanpud.org and he will be glad to provide them for you as well.

I am hopeful to send the construction drawings to FERC for approval by March 26 and would appreciate your input before that time. As always, if you have any questions, do not hesitate to call or e-mail me.

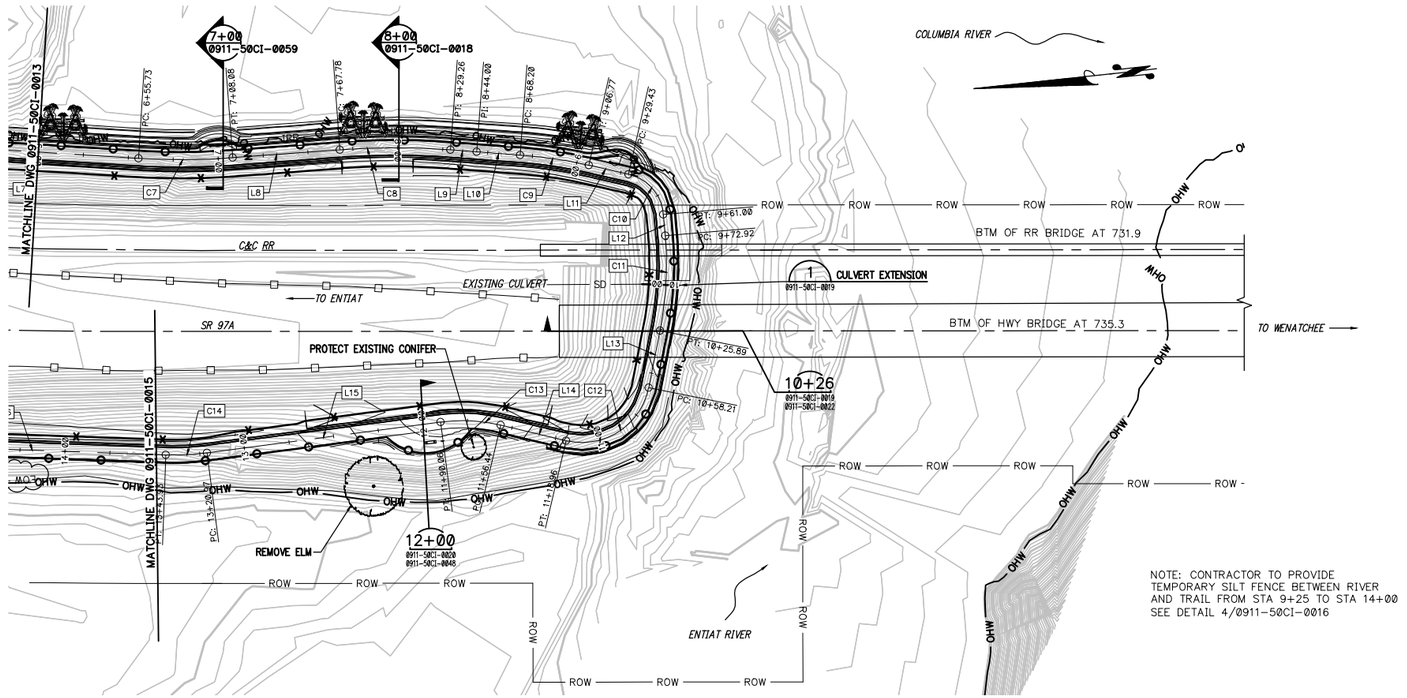
Thank you for your help.

Enjoy the rest of your week!

Kris

Kris Pomianek
Recreation Resources Advisor
Chelan County PUD
PO Box 1231
Wenatchee, WA 98807-1231
Office: 509-661-4186
Cell: 509-679-0813

kris.pomianek@chelanpud.org

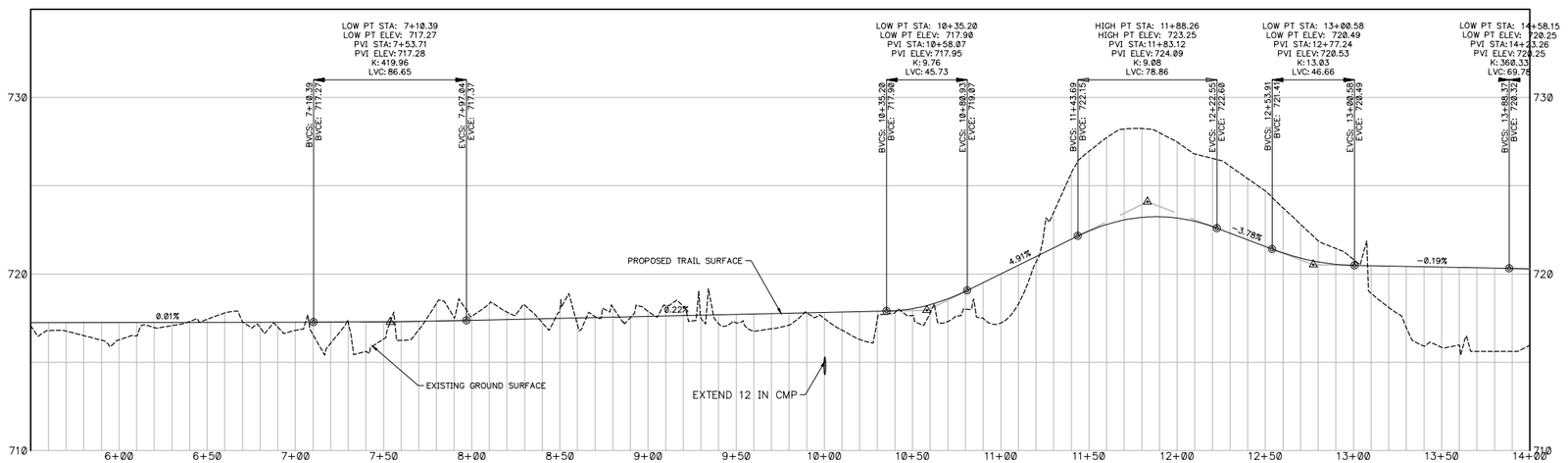


PLAN STA 6+00 – 13+50

1" = 40' HORZ

NOTE: CONTRACTOR TO PROVIDE TEMPORARY SILT FENCE BETWEEN RIVER AND TRAIL FROM STA 9+25 TO STA 14+00 SEE DETAIL 4/0911-50CI-0016

ENTIATQUA TRAIL			
NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION
C7	385.58	52.35	S5° 52' 52.53"W
L8		59.70	S1° 59' 29.23"W
C8	409.80	61.48	S6° 17' 22.26"W
L9		14.73	S10° 35' 15.30"W
L10		24.21	S10° 29' 17.88"W
C9	257.44	38.56	S14° 46' 46.57"W
L11		22.67	S19° 04' 15.27"W
C10	25.00	31.56	S55° 14' 24.44"W
L12		11.92	N88° 35' 26.39"W
C11	188.69	52.97	N80° 32' 52.02"W
L13		32.32	N72° 30' 17.64"W
C12	37.80	60.75	N26° 27' 51.88"W
L14		37.47	N19° 34' 33.88"E
C13	92.42	33.62	N9° 09' 18.13"E
L15		130.92	N1° 15' 57.62"W
C14	138.23	22.96	N3° 29' 32.22"E



℄ PROFILE STA 5+50 – 14+00

1" = 40' HORZ, 1"=4' VERT

TRAIL ℄ ALIGNMENT TABLE			
STATION	EASTING	NORTHING	ELEVATION
6+00	1790504.52	242346.21	717.26
6+25	1790500.28	242321.57	717.26
6+50	1790496.04	242296.94	717.26
6+75	1790492.27	242272.23	717.27
7+00	1790490.07	242247.33	717.27
7+25	1790489.12	242222.35	717.28
7+50	1790488.25	242197.36	717.30
7+75	1790487.32	242172.38	717.33
8+00	1790485.25	242147.47	717.38
8+25	1790481.66	242122.73	717.44
8+50	1790477.10	242098.15	717.49
8+75	1790472.46	242073.58	717.55
9+00	1790466.09	242049.42	717.60
9+25	1790458.00	242025.77	717.66
9+50	1790443.01	242006.87	717.71
9+75	1790418.31	242005.11	717.77
10+00	1790393.46	242007.65	717.82
10+25	1790369.16	242013.45	717.88
10+50	1790345.32	242020.96	718.04
10+75	1790323.10	242031.81	718.80
11+00	1790311.53	242053.46	720.01
11+25	1790315.26	242077.84	721.23
11+50	1790323.64	242101.39	722.44
11+75	1790330.22	242125.45	723.15
12+00	1790330.89	242150.41	723.17
12+25	1790330.34	242175.40	722.51
12+50	1790329.79	242200.40	721.56
12+75	1790329.24	242225.39	720.79
13+00	1790328.68	242250.38	720.49
13+25	1790328.19	242275.38	720.44
13+50	1790330.49	242300.25	720.39

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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PROJ. MGR.	REV	DATE	REVISION			REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY

WENATCHEE, WASHINGTON

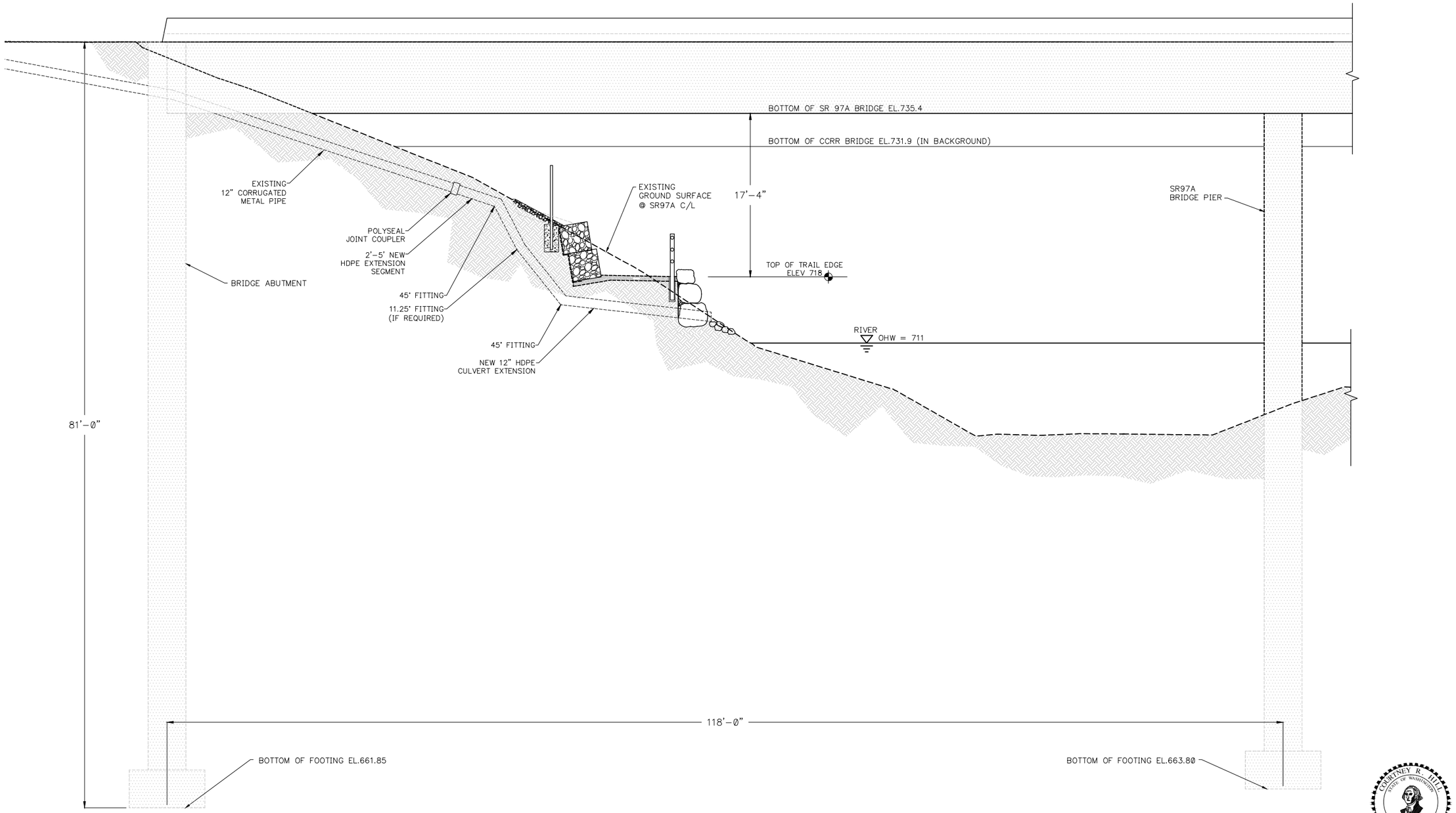
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
PLAN AND PROFILE
STA. 6+00 TO 13+50
BID 14-XX

SHEET 5 OF 38
REVISION Ø
DATE 2/19/2013
DWG. 0911-50CI-0014

ORIG. DRAWN TPD
ORIG. DATE 1/17/2012

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



EXPANDED TRAIL SECTION @ SR97A BRIDGE C/L

1"=5'-0"

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

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PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT		

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
EXPANDED SECTION
AT SR97A BRIDGE C/L STA 10+26
BID 14-XX

SHEET 7 OF 38
REVISION
DATE 2/19/2013
DWG. 0911-50CI-0022

ORIG. DRAWN
ORIG. DATE

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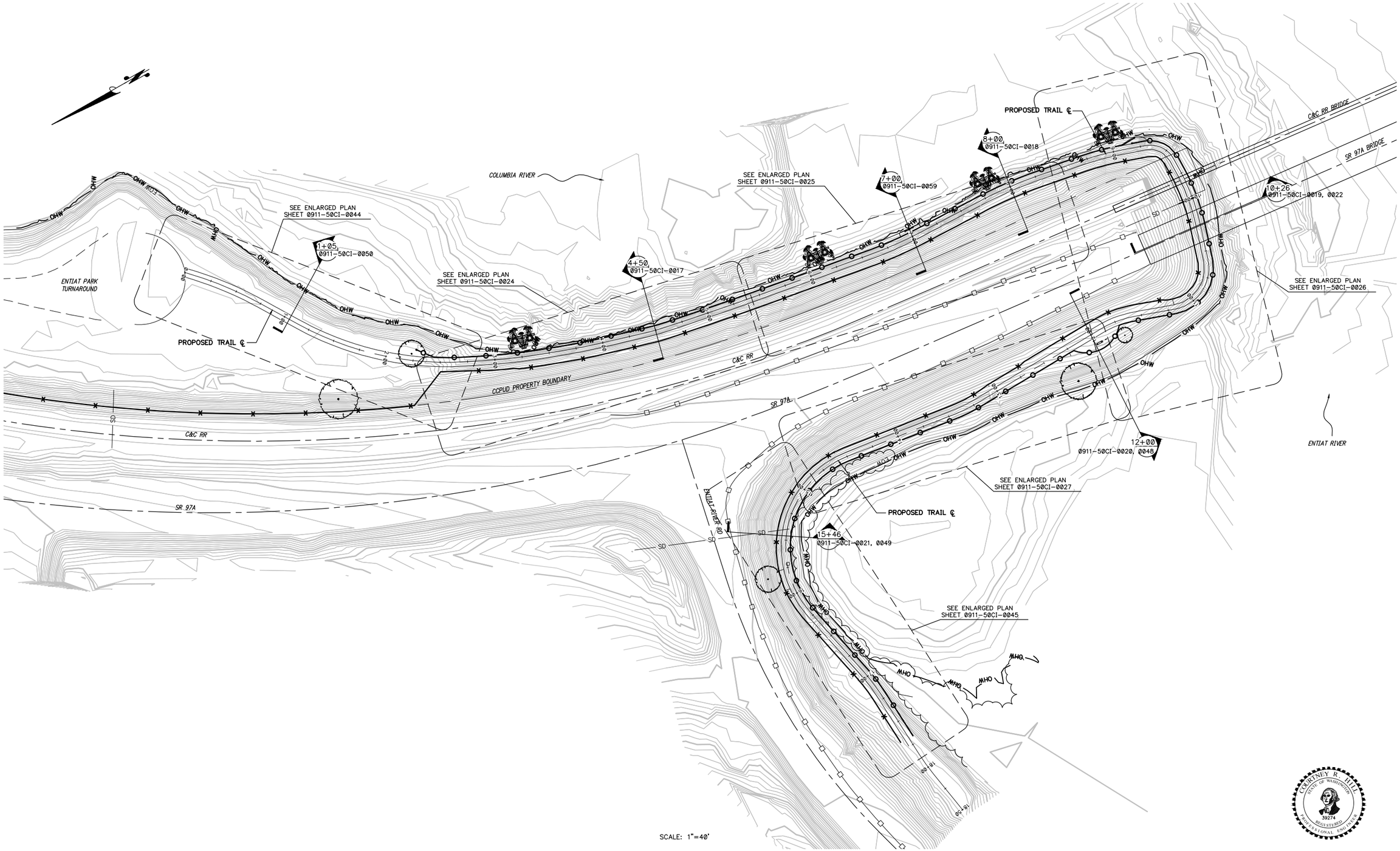

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PRIM. ENG. COURT HILL							REVISION Ø
2ND ENG.	Ø	2/19/2013	PRELIMINARY – PERMITTING/FERC	CRH			DATE 2/19/2013
PROJ. MGR. CASEY HALL	REV	DATE	REVISION	REQ. BY / DRFT			DWG. 0911-50CI-0023

COURTNEY R. HILL STATE OF WASHINGTON 39274 REGISTERED PROFESSIONAL ENGINEER

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MATCHLINE DWG 0911-50CI-0027

2 BENCH 0911-50CI-0047

1 SIGN MOUNT 0911-50CI-0047

EXISTING CONIFER TO REMAIN (PROTECT)

PROPOSED ENTIATQUA TRAIL

SLOPE ARMOR (QUARRY SPALL) 5' UPSLOPE FROM GABION

SR 97A

CSXC RR

COPUD PROPERTY LINE

SD

OHW

MHO

IRR

MATCHLINE DWG 0911-50CI-0025

COIR LOG

EXTENTS OF FISH COBBLE

STA 8+98 COMPLEX WOOD LOG STRUCTURE (TYP.)

1 0911-50CI-0040

PROPOSED ENTIATQUA TRAIL

STA 9+25 END PLANTING CORRIDOR

SEE DETAIL

DETAIL OF PLANTING PATTERN

PATTERN REPEATS TO STA 3+00

NOTE: SUBSTITUTE (SE) FOR (CS) AT WOOD STRUCTURES

PATTERN REPEATS TO STA 9+25

COLUMBIA RIVER

NOTE: TREAT SLOPE IN ACCORDANCE WITH THE SPECIFICATIONS FROM STA 10+50 TO 17+50 BETWEEN GUARDRAIL AND CHAINLINK FENCE

10+26 0911-50CI-0019,22

1 CMP DRAIN 0911-50CI-0019

ENTIAT RIVER

SR97A BRIDGE

RR BRIDGE

SCALE: 1"=10'

STA 9+09

3' GAP

STA 9+18

4' OVERLAP

9+25

FENCE DETAIL – STA 9+25

LEGEND

- TRAIL SURFACE – CSBC
- ROCK
- GABION BASKET
- CHAINLINK FENCE
- WOODRAIL FENCE
- SLOPE ARMOR
- LOCK+LOAD WALL
- IRR — IRRIGATION MAIN
- COMPLEX WOOD LOG STRUCTURE

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 4

BID 14-XX

SHEET 22 OF 38
REVISION Ø
DATE 2/19/2013
DWG. 0911-50CI-0026

ORIG. DRAWN TPD
ORIG. DATE 1/17/2012

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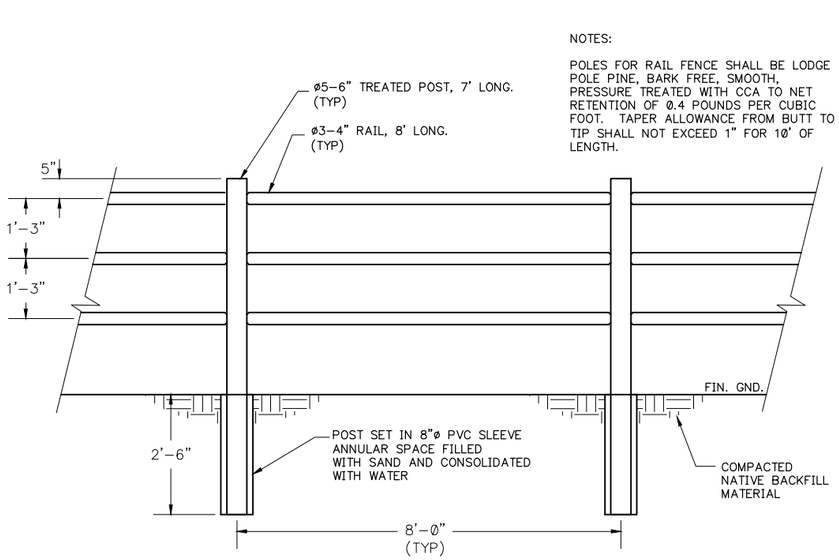
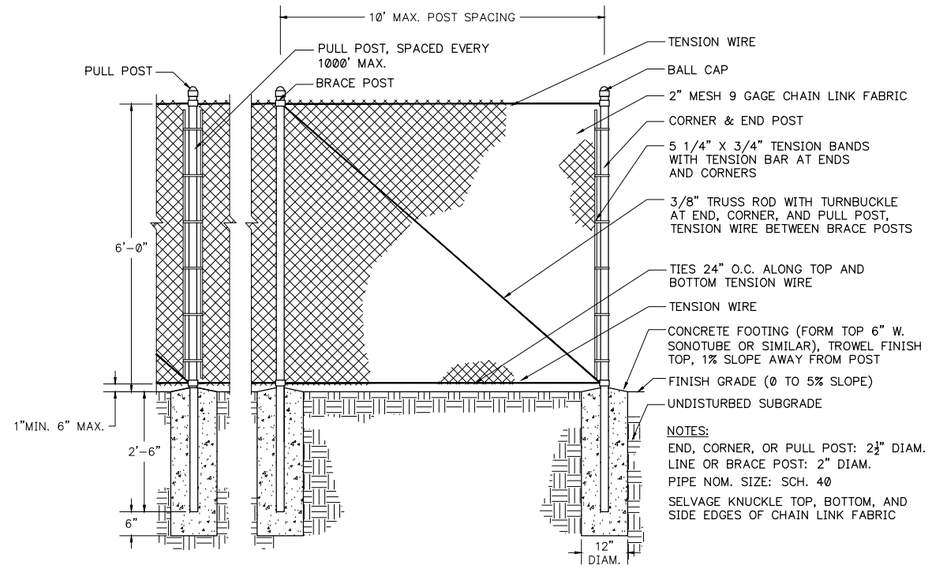
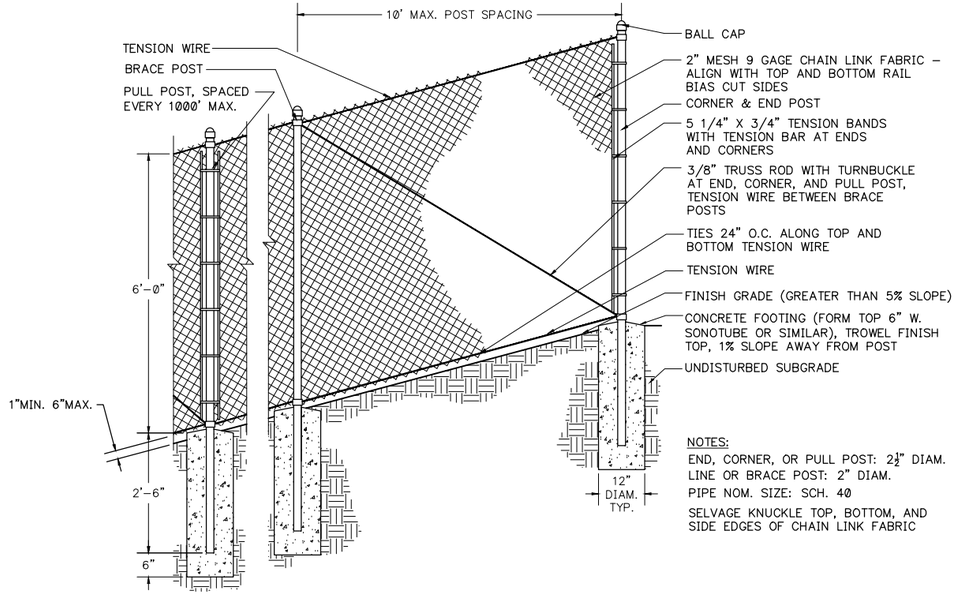


1 RAIL FENCE
NOT TO SCALE



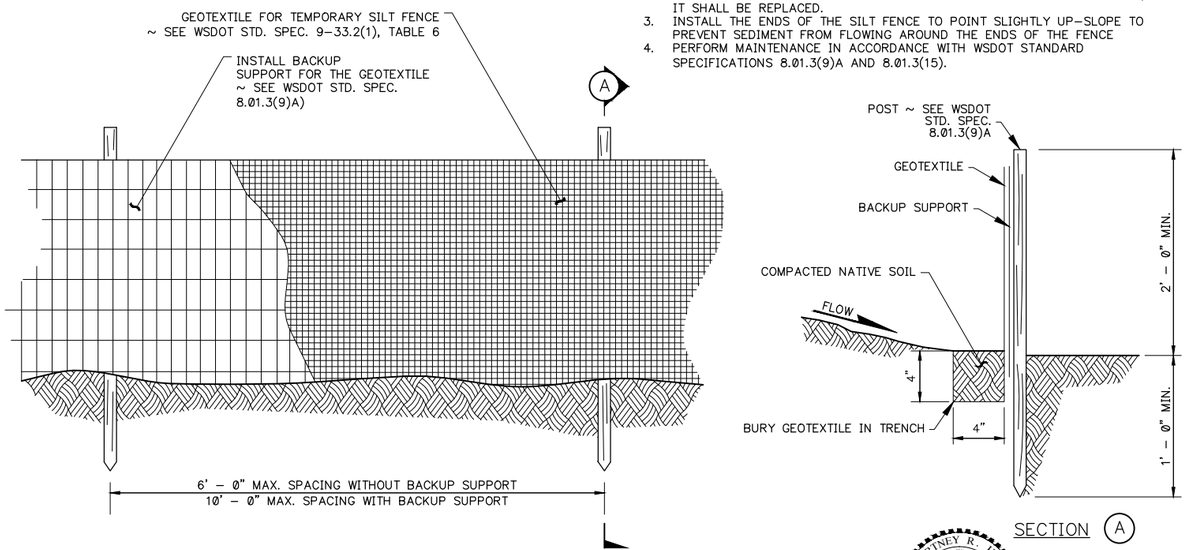
2 CHAINLINK FENCE
NOT TO SCALE



3 CHAINLINK FENCE – SLOPED
NOT TO SCALE

NOTES:

1. ANY DAMAGE WILL BE REPAIRED IMMEDIATELY.
2. IF THE GEOTEXTILE HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.
3. INSTALL THE ENDS OF THE SILT FENCE TO POINT SLIGHTLY UP–SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE
4. PERFORM MAINTENANCE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS 8.01.3(9)A AND 8.01.3(15).



SECTION (A)

4 TEMPORARY SILT FENCE DETAIL
NOT TO SCALE

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

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PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

PUD CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
FENCE DETAILS
BID 14–XX

SHEET 32 OF 38
REVISION Ø
DATE 2/19/2013
DWG. 0911–50CI–0016

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –

Quality Control and Inspection Plan

Entiatqua Trail

Rocky Reach Hydroelectric Project
FERC Project No. 2145

June 2013

Table of Contents

Page

1. Introduction 1

2. Organization and Staffing Responsibilities 2

A. Titles, duties, and responsibilities of staff 2

(1) Construction Manager 2

(2) Project Engineer/ Owner's Engineer, 1st Alternate 2

(3) Testing Service(s) 3

(4) Construction Contractor(s) 3

B. Approval and rejection of work 3

C. Authority to stop work 3

D. Resumes3

3. Inspection Plan and Field Practices 4

A. Inspection criteria 4

B. Inspection equipment and resources 4

C. Contractor operations 4

D. Coordination with Contractor's schedule 4

E. QCIP operations 4

F. Frequency of inspections 5

4. Documentation 5

A. Daily Progress Reports 6

B. Nonconformance Reports 6

C. Environmental Deficiency Reports 7

D. Material Test Reports 7

E. Maintenance of records 7

F. Photographs 7

5. Training 7

6. Material Testing 7

7. Environmental Compliance 7

A. Environmental Compliance Plan 7

B. Frequency of inspections 8

C. Documentation and corrective actions 8

8. Schedule 8

A. Start and finish dates 8

B. Anticipated construction sequence 8

9. Planned use of consultants..... 8

DISPOSITION 1 1

Appendices

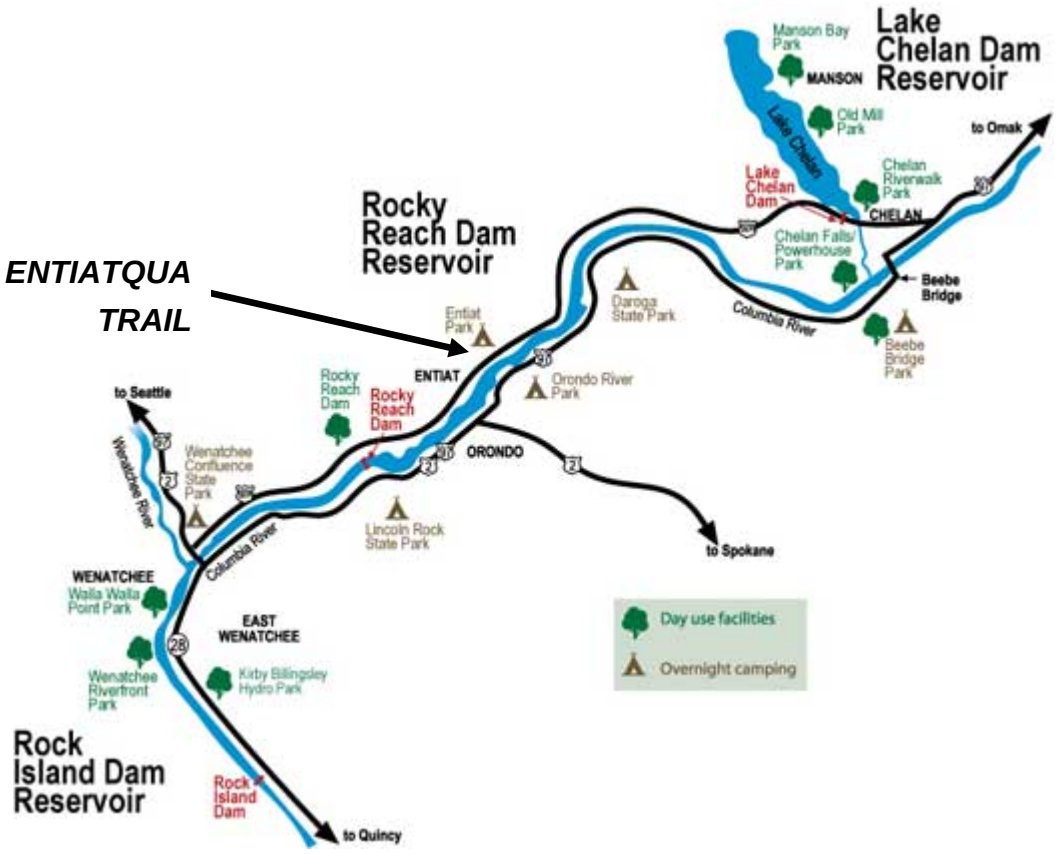
A Organizational Chart

B Quality Control and Inspection Plan
Personnel Resumes

C Construction Management Sample Forms

1. Introduction

Public Utility District No. 1 of Chelan County (District) owns and operates the Rocky Reach Hydroelectric Project. Rocky Reach Dam is located on the Columbia River approximately five miles north of Wenatchee, Washington (about Columbia river mile 473.5). The Entiatqua Trail is located on the Rocky Reach Reservoir immediately south of Entiat Park as illustrated below.



In accordance with the FERC License Order dated February 19, 2009 and further clarified in the Rocky Reach Recreation Resources Management and Implementation Plan dated February 12, 2010, the District will design and construct a trail linking the Entiat River Outdoor Learning Center (Entiatqua) at the confluence of the Entiat and Columbia Rivers to Entiat Park. The District intends to start construction of the improvements August 26, 2014 and be completed in entirety by May 27, 2016.

The project was primarily designed by Chelan PUD staff with geotechnical support from Shannon & Wilson, Inc. Chelan PUD staff will oversee construction of the project with limited technical assistance from Shannon & Wilson. All construction activities take place a considerable distance from the Rocky Reach project and therefore a Temporary Emergency

Action Plan was not developed to accompany this document.

2. Organization and Staffing Responsibilities

A. Titles, duties, and responsibilities of staff

An organizational chart for this project is presented in Appendix A. Responsibilities for maintaining quality assurance are as follows:

(1) Construction Manager

Casey Hall
Chelan County PUD
327 North Wenatchee Avenue
Wenatchee, WA 98801

Chelan County PUD
P.O. Box 1231
Wenatchee, Washington 98807
Telephone: (509) 661-4965 office
(509) 881-9302 mobile

- Review the Contractor's Quality Control documents and project reports.
- Provide Quality Assurance by personally observing or observing via an inspection team the construction on a full-time basis to ensure compliance with contract drawings and specifications.
- Maintain daily records of type, quantity, location, and quality of construction work.
- Conduct weekly construction progress meetings, prepare documentation of meeting discussions, and distribute copies of the discussions.
- Perform final inspection with Project Team and recommend acceptance of completed project.
- File daily progress reports, nonconformance reports, and environmental deficiency reports as appropriate (sample copies presented in Appendix C).

(2) Project Engineer/ Owner's Engineer, 1st Alternate

Courtney Hill, PE
Chelan County PUD
327 North Wenatchee Avenue
Wenatchee, WA 98801

Chelan County PUD
P.O. Box 1231
Wenatchee, Washington 98807
Telephone: (509) 661-4143office
(509) 668-4143 mobile
(509) 884-3439 home

- Review Contractor's submittals.
- Provide ongoing technical assistance/clarification, as needed.
- Provide on-site inspection, as requested, at critical phases of construction.
- Provide clarification of drawings and specifications.
- Provide project record drawings at completion of the project.
- Periodically review Owner's quality control documents and project reports.

(3) Testing Service(s)

Testing services include geotechnical (density tests, compressive strength, etc.).

(4) Construction Contractor(s)

- Construct project to meet project specifications.
- Perform testing and inspection as necessary to control the quality of the work.
- Submit documents, material certificates, shop drawings, product data, and testing results to Owner's Engineer as specified in the *Technical Specifications*.
- Implement and monitor jobsite safety program and be responsible for jobsite safety.
- Implement and monitor construction techniques and procedures so that project quality control standards will be met as verified by the District and site Engineers.

B. Approval and rejection of work

The approval and rejection of work will be subject to the judgment of the Construction Manager.

C. Authority to stop work

The Owner's Construction Manager will have the authority to stop work on the project.

D. Resumes

Resumes of key quality control personnel are included in Appendix B.

3. Inspection Plan and Field Practices

A. Inspection criteria

Criteria for evaluating the quality of work under the contract are contained in the specifications, drawings, and other contract documents. The following items will be completed to make effective use of the contract documents.

- Prior to the start of work at the site, the Owner's Construction Manager and Inspectors shall take the time to become familiar with the contract documents.
- The Owner's Construction Manager and Inspectors shall review relevant portions of the documents daily as the work progresses.
- The Project Manager shall ensure that the Construction Manager/Inspector receives copies of any revisions to the contract documents in a timely manner and shall discuss the revisions to ensure a common understanding of them.

B. Inspection equipment and resources

The independent testing service will supply qualified personnel and appropriate testing equipment to satisfy the requirements of the Quality Control Inspection Plan (QCIP).

C. Contractor operations

The Contractor is responsible for choosing equipment and methods adequate to perform the work specified in the contract documents and for actually achieving the required results. For this reason, the Owner's Construction Manager will avoid direction or control of the Contractor's operations. The Owner's Construction Manager is responsible for verifying that the contract documents are being followed and the required results are being/have been achieved.

D. Coordination with Contractor's schedule

The Contractor's proposed construction schedule will be submitted after the contract is awarded. The Contractor will be required to notify the Owner 24 hours in advance of starting, or restarting, on-site construction activities.

E. QCIP operations

The Owner's Construction Manager and Inspectors are chiefly responsible for observing details of the Contractor's work as it progresses to verify that it meets requirements of the contract documents. This will require the Owner's Construction Manager and Inspectors to:

- Be familiar with the contract documents, including the technical specifications and drawings.
- Be present at key times to verify and approve items as they come up.
- Be present to observe and document progress of the work as outlined below.
- Understand the intent of the drawings and specifications as a basis for exercising judgment, as appropriate, during the work.

The Owner's Construction Manager and Inspectors shall notify the Contractor immediately upon discovery of any item of work, completed or in progress, which does not meet requirements of the contract documents.

If conditions are encountered that require redesign or substantial modification of the work, the Inspector shall contact the Construction Manager and Engineer for guidance. The contact shall be made in a timely manner to avoid or minimize delay of the work.

If the Owner's Construction Manager or Inspector observes work being performed by the Contractor in such a way that it could negatively impact human safety or cause significant damage to property, he shall immediately notify the Contractor. If the problem is not addressed by the Contractor in a timely manner, the Owner's Construction Manager or Inspector shall issue an order to the Contractor to stop work until the apparent problem is resolved.

The Owner's Construction Manager or designated Inspector also is present to serve as the interface between the Contractor and the Owner's other personnel on site. For this purpose, the Owner's Construction Manager or Inspector will be present at all times when the Contractor is working on the site.

F. Frequency of inspections

During construction, the Independent Testing Service and Engineer will perform site visits as required to comply with the specifications. Full-time observation services will be provided by the Owner's Construction Manager during fieldwork. The Engineer will provide on-site inspection during critical phases of the construction, as requested by the Construction Manager.

4. Documentation

The Owner's Construction Manager is responsible to maintain certain records as the

construction progresses. The types of documentation are outlined below, and sample forms are attached, as appropriate.

A. Daily Progress Reports

A Daily Progress Report (DPR) has been developed to document work progress, site conditions, and other relevant items. A report shall be filled out for each shift worked. A sample DPR form is presented in Appendix C.

B. Nonconformance Reports

A Nonconformance Report (NCR) form has been developed to document work that does not meet the project plans and specifications. Nonconforming work is defined as a deficiency in characteristic, documentation, or procedure that renders the work unacceptable with respect to the quality requirements for the project. A sample NCR form is presented in Appendix C.

An NCR shall be issued to the Contractor when he/she presents any portion of their work as complete and a serious deficiency exists or a deficiency trend is occurring in subsequent similar work. NCRs are not to be used for documenting acknowledged incomplete "punch list" type work items or for problems relating to project design. If the Independent Testing Service determines that rework is necessary, it should be reworked and retested without an NCR being issued.

The Owner's Construction Manager is responsible for submitting NCRs. The NCRs shall be numbered sequentially. A copy of all NCRs shall be forwarded to the Contractor and the Owner. The NCRs shall be reviewed weekly by the Owner's Construction Manager to evaluate the Contractor's compliance with corrective action requirements and to identify the need for follow-up action.

In the event of the Contractor's failure to comply with the corrective action requirements of an NCR, either unsatisfactory work or failure to meet the time requirements, the following procedure will be implemented:

- The Owner's Construction Manager will prepare a formal contract serial letter with a copy of the original NCR attached advising the Contractor of his/her failure to meet the corrective action requirements.
- Distribution of all such follow-up NCR correspondence shall be the same as the original NCR and shall be filed in the appropriate NCR file.

C. Environmental Deficiency Reports

An Environmental Deficiency Report (EDR) form has been developed to document any observed violations of environmental requirements of the contract documents and their resolution. A sample EDR form is presented in Appendix C.

D. Material Test Reports

Materials sampling and test reports will describe the type and location of the material being tested, as well as the date, time, and weather conditions when obtaining the sample or performing the test. A record of the tests performed, applicable standards, and test results shall be distributed to the Owner's Engineer and Contractor.

E. Maintenance of records

All documents, correspondence, and data pertaining to the project must be clearly identified, organized, and filed with the Owner's Construction Manager. The Owner's Construction Manager will maintain one set of record drawings in the field for use in preparing final record drawings.

F. Photographs

Photographs of significant construction activities will be taken throughout the construction period by the Owner's Construction Manager. All photographs will be dated with identification, as appropriate, of the object being photographed.

5. Training

No formal training is proposed for this project.

6. Material Testing

The number and type of tests to be performed during construction are presented in the specifications and drawings. Material testing will be performed in accordance with the Contract Documents, by an Independent Testing Service where appropriate.

7. Environmental Compliance

A. Environmental Compliance Plan

Construction of the Trail will involve placement of fill in the Columbia River. In accordance with environmental permits a turbidity curtain will be deployed prior to fill placement. The District will ensure compliance with this permit provision and any others which impact the

environment.

Section 02270 of the Specifications requires the awarded Contractor to submit an updated Storm Water Pollution Plan (SWPP). A template has been provided with the Specification. The SWPP is synonymous with Temporary Erosion and Sediment Control Plan (TESCP).

B. Frequency of inspections

Inspections for compliance with the design and SWPP will take place on a daily basis.

C. Documentation and corrective actions

Documentation of any observed violations of environmental requirements of the Contract Documents will be included in an EDR along with their resolution.

8. Schedule

A. Start and finish dates

Construction of the various projects is scheduled to begin August 26, 2013 and complete by May 27, 2016.

B. Anticipated construction sequence

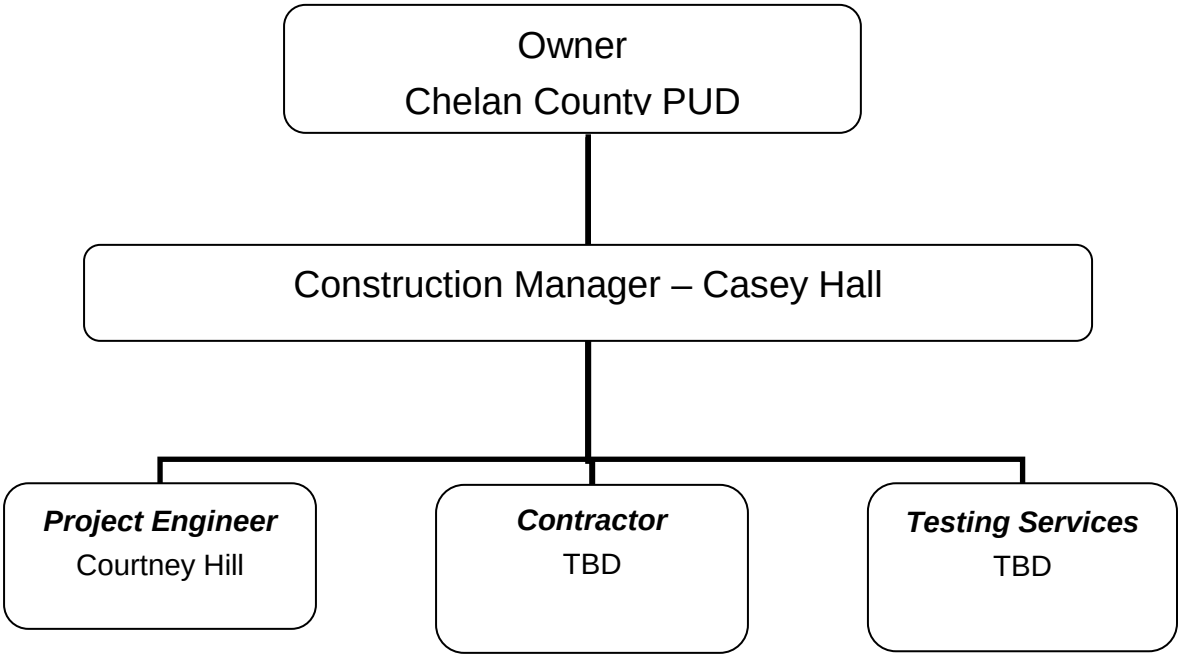
The District anticipates the Contractor completing in-water construction work during September and October 2013 and all other components during or after that time period.

9. Planned use of consultants

Consultants will be involved on a limited basis during construction for review of embankment slope stability.

Appendix A. Organizational Chart

Organizational Chart
Chelan River Project
Lake Chelan Hydroelectric Project



Appendix B. QCIP Personnel Resumes

Casey J. Hall

Construction Manager, PUD No. 1 of Chelan County

Education

B.S. Construction Management, Central Washington University, 2001

Experience – PUD No. 1 of Chelan County (June 2008 to present)

- North Wenatchee Reservoir
- Rocky Reach fishway modifications for improved Lamprey passage Ph I&II
- Dryden weir gravel removal project
- Entiat switchyard earthwork and construction
- Entiat 115kV transmission line project
- Cost estimating for a wide variety of District projects.

Experience – Goodfellow Bros. Inc., Construction Manager (June 2002 to May 2008)

Responsibilities: cost estimating, budgeting, scheduling crews/equipment, coordinating the work of subcontractors, facilitating changes in design and working with the owner to implement changes, coordinating material submittals, handling onsite problem resolution, maintaining master schedules, developed 'as built' drawings and conducting weekly safety meetings for heavy civil contractor.

Experience – Baugh – Skanska, Construction Manager/Intern (June 2000 to May 2002)

Responsibilities included subcontract management, project financial management, materials procurement, and subcontract development duties.

Internship position included developing knowledge and experience in the operation of a large construction company. Responsibilities included: estimating, scheduling and working with plans and specifications. Gained knowledge of electrical design, mechanical and HVAC systems. Introduced to surveying equipment: Total station, Theodolite and Transit.

SKILLS

- Proficiency in computer usage for personal and business applications.
    - Microsoft Programs: Word, Excel, PowerPoint, MS Project
    - Experience with AutoCAD, Oracle, Primavera, Trimble Terramodel design program for GPS equipment, Paydirt, Hard Dollar, ECMS, Maximo, Peoplesoft
- Knowledge in cost estimating procedures, construction safety and documentation, construction and project management in the public and private sectors

Courtney Hill, P.E.

Civil Engineer III, PUD No. 1 of Chelan County

Education
M.S. Civil Engineering, Brigham Young University, 1999
B.S. Civil Engineering, Brigham Young University, 1998

Professional Affiliations
Registered Professional Engineer, Washington State
Member, American Society of Civil Engineering

Continuing Education/Training
ASCE Seminars in Cost Estimating (2000), Shoreline Stabilization (2004), Pumping Systems (2005) and Water Hammer (2006)
Primavera Courses 102 & 106 (2006)

Experience – PUD No. 1 of Chelan County (October 2002 to present)

Chelan Hatchery Water Supply, 2008 to 2010, T.P.C. $1.75M
District's project engineer for development of new water well sources and transmission supply main from well field to hatchery complex; responsibilities included: developing feasibility/alternative analysis; overseeing drilling operations; leading and conducting design development; permitting including water rights, land easement, DOT and building; contract development and administration; and construction oversight

Chelan River Project, 2006 to 2009, T.P.C. $16M
District's project engineer for the Low Level Outlet, responsibilities include: leading and coordinating design development with external design consultant and District stakeholders, contract development and administration

Other PUD Projects Include:

- Chelan Ridge Water System Improvements, 2004 to 2007, T.P.C. $1M
- Rock Island Hydro Park Irrigation Well, April 2005 to June 2006, T.P.C. ~$100,000
- Dryden Wastewater Influent Metering, May 2004 to January 2005, T.P.C ~$100,000
- Dryden Canal Lining, 2004, T.P.C ~$500,000
- Tumwater Fishway – Fish Collection Improvements
- Dryden Right Bank Fishway – Fish Collection and Handling Improvements
- Confluence State Park Shoreline Stabilization
- Compliance with Ecology Water Measurement Rule
- Carlton Pond Lining

Other Employment Experience:
Franson-Noble Engineering, American Fork, UT, May 1999 to October 2002

- Otter Creek Dam Rehabilitation – design lead for fuse plug spillway
- Dairy Dam Construction – design lead for 30" twin outlets
- Combined Canals Reservoir – design lead for dam outlet
- Reinforced Concrete Domestic Water Reservoirs – design lead

Appendix C. Construction Management Sample Forms

Engineering Services
DAILY PROGRESS REPORT

Project Manager:		**Maximo No.:**	
Construction Manager:		**Date:** **Report #**	
Project Engineer:		**Weather:**	
On-Site Inspector:		**Temperature:**	

Contractor	Personnel	Hours	Overtime

Equipment	Owner	Hours	Stand-by

WORK PLANNED:

-
-
-

WORK ACCOMPLISHED:

-
-
-

SAFETY CONCERNS:

-
-
-

ISSUES & PROBLEMS:

-
-
-

WORKORDERS, CHANGE ORDERS & DELAYS IN WORK, ETC.

-
-
-

FAXES/DRAWINGS/MATERIALS/EQUIPMENT RECEIVED:

-
-
-

Submitted by: _____ **Approved by:** _____

Engineering Services
NON-CONFORMANCE REPORT

NON-CONFORMANCE REPORT			
VATH NCR No.		**NCR Number:**	
Initiator:			Date:
Contractor/Subcontractor/Vendor:			Unit No.:
Part Name:			Shop ☐ Field ☐ Other ☐
Part Location:			

REASON			
☐Deviation from Spec	Spec Violated:	Related Ref. Doc:	dated:
☐Deviation from Dwg	Dwg Violated:	☐CPUD:	☐Vendor:
☐Code Violated	Name/Sec/Para:		
☐Other, describe:	Item No.:		
Condition Details:			
Attachments:			
Condition Details Approved:			Date:
Disposition Assigned To:			Date:

DISPOSITION 1		
Action: ☐ Accept As Is ☐ Scrap ☐ Rework ☐ Revise ☐ Return to Vendor ☐ FCN Required		
Disposition Details:		
Attachments:		
Disposition by:		Date:
DISPOSITION 1 STATUS		
☐ **APP**	CPUD Engineer signature:	Date:
☐ **NOT APP**	QA/QC Manager signature:	Date:
REASON FOR ***NOT APP***:		

DISPOSITION 2 (if D1 becomes *NOT APP*)		
Action: ☐ Accept As Is ☐ Scrap ☐ Rework ☐ Revise ☐ Return to Vendor ☐ FCN Required		
Disposition Details:		
Attachments:		
Disposition by:		Date:
DISPOSITION 2 STATUS		
☐ **APP**	CPUD Engineer signature:	Date:
☐ **NOT APP**	QA/QC Manager signature:	Date:

Engineering Services
NON-CONFORMANCE REPORT

REASON FOR ***NOT APP***:			
INSPECTION/ VERIFICATION:			
☐Acceptable	☐Not Acceptable	Signature:	Date:
REINSPECTION/ RE-VERIFICATION:			
☐Acceptable	☐Not Acceptable	Signature:	Date:
New NCR No.:		*Supersedes NCR No.:*	*New IR No.:*
☐ **REVIEWED AND CLOSED**		CPUD Engineer signature:	Date:
		QA/QC Manager signature:	Date:

NON-CONFORMANCE REPORT CORRESPONDENCE

NCR NO.**:**

0 - Description / Request:

Requested Due Date:			By:	
Attachments:				
Copy:	VENDOR:			
	CPUD:		Date:	

A - **Response:** VENDOR:

Requested Due Date:			By:	
Attachments:				
Copy:	VENDOR:			
	CPUD:		Date:	

B - **Response:** CPUD:

Requested Due Date:			By:	
Attachments:				
Copy:	VENDOR:			
	CPUD:		Date:	

Engineering Services
NON-CONFORMANCE REPORT

CHELAN COUNTY POWER P.U.D.

C - **Response:** VENDOR:				
Requested Due Date:			By:	
Attachments:				
Copy:	VENDOR:			
	CPUD:		Date:	

D - **Response:** CPUD:				
Requested Due Date:			By:	
Attachments:				
Copy:	VENDOR:			
	CPUD:		Date:	

Engineering Services
ENVIRONMENTAL DEFICIENCY REPORT

ENTIATQUA TRAIL	Report No.
Date/time:	
Description:	
Reference Documents	
Spec. Section:	
Drawing:	
Please correct the above deficiency by:	
Disposition:	
Sign and return this form when the deficiency is corrected.	
signature date	

Bid No. 13-01

Entiat Park Revitalization

VOLUME 5 of 7

Schedule B – Entiatqua Trail

Exhibit S - Specifications

PUBLIC UTILITY DISTRICT NO. 1
of

CHELAN COUNTY

PROCUREMENT AND CONTRACT SERVICES
P.O. Box 1231 (98807)
327B North Wenatchee Avenue
Wenatchee, WA 98801
(509) 661-4479 or (888) 663-8121
http://www.chelanpud.org/cf/PCS_Bids

EXHIBIT S – ENTIATQUA TRAIL
SPECIFICATIONS

TABLE OF CONTENTS

DIVISION 1 - GENERAL	
SECTION 01010	SUMMARY OF WORK
SECTION 01020	SAFETY
SECTION 01200	MEASUREMENT AND PAYMENT
SECTION 01300	ADMINISTRATIVE REQUIREMENTS
SECTION 01450	CONTRACTOR QUALITY CONTROL
SECTION 01460	INSPECTIONS AND TESTS
SECTION 01500	CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS
DIVISION 2 – SITE WORK	
SECTION 02073	GEOSYNTHETICS
SECTION 02100	SITE PREPARATION, CLEARING, AND GRUBBING
SECTION 02115	ENVIRONMENTAL POLLUTION CONTROL
SECTION 02200	EARTHWORK
SECTION 02270	EROSION AND SEDIMENT CONTROL
SECTION 02350	ROCK WALL
SECTION 02360	GABIONS
SECTION 02511	STORM DRAINAGE
SECTION 02810	SITE IRRIGATION
SECTION 02820	FENCING
SECTION 02930	HYDROSEEDING
SECTION 02950	LANDSCAPING
SECTION 02990	SITE FURNISHINGS
DIVISION 3 - CONCRETE	
SECTION 03450	MECHANICALLY STABILIZED EARTH WALL

DIVISION 1 – GENERAL REQUIREMENTS

TABLE OF CONTENTS

SECTION 01010	SUMMARY OF WORK
SECTION 01020	SAFETY
SECTION 01200	MEASUREMENT AND PAYMENT
SECTION 01300	ADMINISTRATIVE REQUIREMENTS
SECTION 01450	CONTRACTOR QUALITY CONTROL
SECTION 01460	INSPECTION AND TESTS
SECTION 01500	CONSTRUCTION FACILITIES AND TEMPORARY
SECTION 02990	SITE FURNISHINGS

DIVISION 1 - GENERAL
SECTION 01010 – SUMMARY OF WORK

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 BACKGROUND 2
1.2 PROJECT SCOPE 2
1.3 PROJECT LOCATION 2

DIVISION 1 - GENERAL
SECTION 01010 – SUMMARY OF WORK

1.0 GENERAL

1.1 BACKGROUND

The Entiatqua Trail is a non-motorized pedestrian trail which links Entiat Park to the proposed Entiatqua Outdoor Learning Center. The trail runs adjacent to the Columbia and Entiat Rivers. The trail also crosses below existing bridges for the Cascade and Columbia Rail line as well as State Route 97A. The project fulfills an obligation of the Rocky Reach Comprehensive Settlement Agreement dated February 3, 2006. The City of Entiat is the District's primary stakeholder for the project. Through agreement with the District, the City will operate and maintain the trail.

1.2 PROJECT SCOPE

1. Work to be performed under these Specifications consists of furnishing all labor, materials, and equipment necessary for construction of the Entiatqua Trail. Work includes but is not limited to:

    - Earthwork including excavation, disposing, hauling, placing, grading and compacting import and native materials
    - Constructing retaining structures including gabion baskets, rockeries and Lock + Load™ retaining wall systems
    - Constructing viewpoints
    - Work in-water including construction of large complex woody structures
    - Installing wood rail and chainlink fencing
    - Landscaping including installation of irrigation system and plantings (live stakes, shrubs and trees)

2. All Work conducted under this project shall conform to the latest edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction. The technical specifications provided herein are considered supplemental or special provisions to the Standard Specifications. Conflicts between the specifications, if any, shall be immediately brought to the attention of the Engineer.

1.3 PROJECT LOCATION

1. The Project location is at the confluence of the Entiat and Columbia Rivers, south of Entiat Park, as illustrated in the Contract Drawings.
2. Entiat Park Physical Address: 2461 Lakeshore Drive, Entiat, WA 98822
3. The City of Entiat is located approximately 16 miles north of Wenatchee along State Route 97A on the west side of the Columbia River. The main entrance to Entiat

Park is the first right hand turn after crossing the Entiat River Bridge if traveling north from Wenatchee.

END OF SECTION 01010

DIVISION 1 - GENERAL
SECTION 01020 - SAFETY

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS 2
1.2 SUBMITTALS 2
1.3 ACCIDENT PREVENTION PROGRAM 3
1.4 ACCIDENT AND INJURY REPORTING 3
1.5 EMERGENCY NOTIFICATION PROCEDURE 4
1.6 CONTRACTOR SITE ORIENTATION 4
1.7 WORK AREA ENVIRONMENT 4
1.8 FIRE PREVENTION 5
1.9 HOT WORK PERMIT (HWP) 5
1.10 FALL PROTECTION WORK PLAN 6
2.0 PRODUCTS (NOT USED) 6
3.0 EXECUTION (NOT USED) 6
4.0 APPENDICES 6

DIVISION 1 - GENERAL
SECTION 01020 - SAFETY

1.0 GENERAL

1. The District's goal is zero injuries and accidents and the District expects the Contractor to have the same goal.
2. The Contractor is solely responsible for the safety of its employees and maintaining safe working conditions at the Work site.
3. Safety precautions shall be implemented to protect those individuals working at the Project site during the construction period.
4. District reserves the right to immediately stop any work or activity that is deemed to be inherently unsafe or in violation of established safe work practices. Costs relating to lost time and productivity due to Stop Work Directive for safety reasons shall not be grounds for additional consideration, compensation to the Contractor, or extension of Milestone Dates. See General Conditions.
5. Contractor shall participate in weekly safety site inspections with the District's representative to identify and correct hazards and unsafe working conditions.
6. Contractor shall provide all scaffolding, safety equipment including hard hats, safety glasses, hearing protection, respirators, first aid supplies, etc., and work platforms required to perform the Work. Contractor shall provide temporary lighting in the work areas to ensure the Work can be performed properly and safely.

1.1 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

Washington Administrative Code (WAC)	
Title 296-24	General Safety and Health Standards
Title 296-62	General Occupational Health Standards
Title 296-155	Safety Standards for Construction Work
Title 296-800-140	Accident Prevention Program
Title 296-809	Confined Space
Title 296-820	Core Rules
Title 296-841	Respiratory Hazards

1.2 SUBMITTALS

1. Contractor site specific Accident Prevention Program, including Emergency Notification Procedure, shall be submitted to the District's Engineer for review within 20 calendar days after District issuance of Notice of Award. All Safety related submittals, Company Safety Manual, Site Specific Accident Prevention Program,

and any other safety written programs As Required by WISHA shall be Approved by District prior to starting the work in the field.

1.3 ACCIDENT PREVENTION PROGRAM

1. Contractor shall have a written Accident Prevention Program that conforms to all applicable Federal, State, or local safety requirements at all times Work is being performed on site. Contractor written Accident Prevention Program shall include, as a minimum:
    a. Name of the Contractor employee and name of the District employee designated and made responsible for coordinating the Safety Program and rescue operations.
    b. Procedures to ensure that all Work is performed in compliance with District, Chelan County, WISHA, and Federal OSHA-requirements for the use of safety equipment.
    c. Procedures for identifying unsafe conditions and steps for taking corrective action.
    d. Procedure to inform workers of the actions to be followed should an accident or emergency situation occur, including evacuation routes, locations of “safe areas” to account for all Contractor employees, frequency Contractor informs workers of such actions and how to inform new employees that join the workforce throughout the duration of the Contract. Contractor personnel working in proximity of water shall be required to wear life jackets.
    e. Contractor personnel shall be required to comply with WISHA Regulations when working adjacent to water.
    f. Schedule and hold weekly safety meetings for Contractor personnel.
    g. Contractor shall discuss and review in advance the planned activities for major portions of the Work with its employees and address safety issues related to the Work and ensure safe work practices are being used during the performance of the Work.
    h. The latest District policies on “No Smoking”, “Violence in the Workplace”, and “Fitness for Duty” shall apply to all Contractor employees working on District property. The policies shall be provided to Contractor upon request to the District.
    i. Job Hazard Analysis for the specific Work that is being performed.

1.4 ACCIDENT AND INJURY REPORTING

Accidents involving equipment or employee(s) resulting in injury to employee or damage to equipment occurring on the Project site shall be reported to the District verbally and immediately after such incident followed by a detailed written incident report within twenty-four (24) hours of occurrence. Failure to report accidents or injuries to the District may result in immediate shutdown of Work.

1.5 EMERGENCY NOTIFICATION PROCEDURE

1. The Contractor shall be responsible for developing and implementing an Emergency Notification Procedure. Contractor shall submit the Emergency Notification Procedure for District approval.
2. This procedure shall be used to notify all Contractor employees in designated Work areas in the event of an emergency. The Contractor shall provide emergency notification equipment and train its employees, including affected District personnel on the use of this equipment. Contractor shall demonstrate the Emergency Notification Procedure to the District prior to commencing Work on site. Contractor supplied emergency notification equipment shall be maintained in good working order and tested monthly when Contractor employees are on the project site.
3. Washington Administrative Code Section 296-800-140 requires employers to develop an Accident Prevention Program.

1.6 CONTRACTOR SITE ORIENTATION

1. The District has developed an Accident Prevention Program Orientation Checklist (Appendix A). The checklist is not intended to be all inclusive. Contractor shall complete the checklist prior to commencement of Work and maintain documentation of completion, as well as documentation of Contractor and employee safety plans, inspections and meetings. Contractor shall be responsible for reviewing checklist information and procedures with its employees.
2. Contractor shall be responsible for observing and educating its employees with regard to any and all safety regulations, procedures and equipment requirements applicable to and consistent with the type of work being performed.

1.7 WORK AREA ENVIRONMENT

1. Contractor shall maintain a neat, clean, and safe work environment complying with all applicable regulations, laws, and codes during all site Work. Where there is a conflict in regulations, codes or laws, the most stringent shall apply.
2. Contractor shall keep the Work area free from accumulations of waste material or rubbish at all times. Upon completion of the Work, the Contractor shall remove all rubbish, tools, equipment, surplus materials, and chemicals from the site. All lay-down, storage, staging and work areas shall be completely cleaned and restored to the original condition that existed prior to beginning the Work.
3. During disassembly, scraping, blasting, grinding, welding, brazing, painting and other work that could generate airborne contaminants, smoke, fumes or other irritants, Contractor shall provide air ventilation, cleaning, dust collection, containment or other applicable systems and equipment to prevent personnel hazard or irritation. Contractor shall verify the effectiveness of all engineering controls and PPE by performing an exposure assessment when personnel are exposed to contaminants. Contractor shall verify proper operation of ventilation

equipment at the beginning of each shift. Contractor shall continue to monitor personnel exposed to contaminants As Required in WAC 296-62.

1.8 FIRE PREVENTION

1. The Contractor shall be responsible for fire prevention during the performance of the Work.
2. Proper firefighting equipment shall be present in locations as prescribed by Washington Administrative Code 296-24 Part G.
3. Contractor shall provide appropriate and Approved flammable liquid storage cabinets to be used for storage of all solvents, resins, and other flammable liquids.
4. The Contractor shall be responsible for all damage from fire due directly or indirectly to its own activities, to those of its employees, and to those of its Subcontractors and employees.

1.9 HOT WORK PERMIT (HWP)

1. A Hot Work Permit (HWP - Appendix B) is required for activities involving welding, cutting, the use of open flames, or that otherwise result in the generation of fire ignition potential (e.g. sparks).
2. The HWP shall define the scope of Work, identify the hazards, and establish the necessary controls to maintain the risk at an acceptable level. The HWP shall be obtained prior to the start of Work. The procedures and controls specified therein shall remain in effect for the duration of the activity. Contractor issued HWP's shall be issued by the Contractor's Site Superintendent or Site Safety Representative, prior to the start of Work requiring the HWP.
3. The Contractor issuing the HWP, along with the worker(s) performing the subject task shall inspect the Work area prior to the start of Work. The Hot Work Permit Checklist (Appendix C) shall be used to identify and evaluate the hazards.
4. The controls necessary to mitigate the hazards shall be identified and documented on the permit. At a minimum, these shall include the Work practices and controls specified in the Hot Work Permit Checklist.
5. The worker performing the hot work shall re-evaluate the hazards on a daily basis or whenever working conditions change. Additional controls shall be distinguished and implemented as may be required.
6. Hot Work Permits shall be task or activity specific. Blanket permits that address routine and reoccurring work or activities in multiple locations are prohibited unless specifically authorized by the District.
7. The Hot Work Permit shall be posted in the immediate work area and a copy provided to the District.
8. All workers affected by execution of the permit shall be advised of the activity and any related hazards prior to the start of Work.

9. The permit holder shall ensure that the controls specified in the hot work permit are implemented prior to the start of Work and remain in effect for the duration of the activity.
10. When Work has been completed, the expired or cancelled permit shall be returned to the District.

1.10 FALL PROTECTION WORK PLAN

For any work activities where fall hazards of 10 feet or more exist, the Contractor shall develop and implement a fall protection work plan in accordance with WAC 296-155-24505.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION (NOT USED)

4.0 APPENDICES

APPENDIX A - Contractor/Consultant Accident Prevention Program Orientation Checklist

APPENDIX B - Hot Work Permit

APPENDIX C - Hot Work Permit Checklist

Appendix A – Contractor/Consultant Accident Prevention Program Orientation Checklist

Contractor/Consultant	
Date	
Project	
Project Manager	

The Chelan County PUD ("District") has developed the following checklist to promote a general understanding of safety policies and procedures that must be followed while working on District property. As used herein, the word "Contractor" includes Contractors and consultants. Contractors must complete the checklist prior to commencement of work and maintain documentation of completion, as well as documentation of Contractor-employee safety plans, inspections, and meetings. Accident prevention programs submitted by the Contractor must meet the requirements of WAC 296-800-140.

This orientation will be a one-time event, and if necessary repeated if new information is required to be conveyed. This written policy does not address all procedural items that a District employee overseeing a Project would typically review with the Contractor. Contractors are responsible for reviewing checklist information and procedures with their employees. The checklist is not designed to cover every safety issue applicable to Contractors' work. Contractors are responsible for observing and educating their employees with regard to any and all safety regulations, procedures and equipment requirements applicable to employment in general, as well as those specifically applicable to their type of work. The Contractor is solely responsible for the safety of the Contractor's employees and the work site.

The following highlights the subject matter to be covered in the Contractor Orientation session:

A review of District Health and Safety Rules, with emphasis on the following: the need for adhering to all applicable safety requirements, the need for using personal protective equipment when necessary, the need to report any accidents or injuries to the District representative, emergency phone numbers, and the requirement for obtaining permits when necessary.	
Initials	**FACILITIES CHECKLIST** Write NA for sections that do not apply
	DISPATCHING & OPERATING SAFETY RULES (Lock-out/Tag-out) If applicable, the District's Clearance Procedure, Dispatching and Operating Safety Rules discussed if applicable. Affected workers will require certification by training and a test.
	PARKING The Contractor will be shown where to park vehicles. Coordinate special arrangements (i.e. work at spillway) with appropriate plant supervisor.
	CHECK-IN/CHECK-OUT The Contractor shall be instructed on proper check-in/check-out procedures.

A review of District Health and Safety Rules, with emphasis on the following: the need for adhering to all applicable safety requirements, the need for using personal protective equipment when necessary, the need to report any accidents or injuries to the District representative, emergency phone numbers, and the requirement for obtaining permits when necessary.	
Initials	**FACILITIES CHECKLIST** Write NA for sections that do not apply
	CONTROL ROOM The Contractor shall be made aware of the location and the function of the Control Room. Contractor shall provide the Control Room an emergency phone number list and list of onsite employees. A copy of the Contract work plan will be provided to the Control Room.
	EMERGENCY RESPONSE PLAN (ERP) Contractors will be made aware of the facility's ERP. The ERP deals with major emergencies that may arise such as fire or a major accident. Discuss assembly areas, evacuation routes and alternate evacuation routes. In the event of an emergency, Contractors will be notified by District staff or audible alarm and they should report the emergency meeting area immediately. Once all employees and Contractors are accounted for, they will be able to leave the site should the situation warrant. Contractors shall also make the District aware of any company specific emergency response plan or signals (audible or visual) that could affect District workers in the area.
	DISTRICT POLICIES Contractors will be required to adhere to all District policies. a) No smoking is permitted in District facilities. b) Fitness for duty will be discussed and will apply to all Contractors working on District property. c) Violence in the Workplace. Firearms and weapons are not permitted on District property for any reason. Violation of these rules will be grounds for immediate expulsion from the facility.
	FIRE EXTINGUISHERS The Contractor will be made aware of the location of District fire extinguishers. Contractors must provide fire extinguishers As Required by regulations and per Contract**.**
	INTRODUCTIONS The Contractor shall be introduced to the applicable facility supervisors and maintenance personnel.
	MEDICAL FACILITIES Discuss the location of the nearest 1st aid station or medical facility.
	SPILL PREVENTION Spill prevention and District procedures for spill clean-up, including notification of District personnel, will be reviewed for Contractors who would be using any petroleum-based products or Hazardous Materials on District property. The Contractor should ensure that the spill is contained before leaving the area to report the spill. Contractors are responsible for providing spill containment kits.
	HOUSEKEEPING Proper housekeeping is required. Maintain a neat work area, remove trash and rubbish daily, and remove all materials, including chemicals, paints, etc. from the site when Project is completed.
	SAFETY EQUIPMENT All safety equipment will be supplied by the Contractor. District will not loan or provide any safety and health equipment. Approved hard hats are required but not provided by the District for outside Contractor employees. Contractor must supply their employees with hard hats and enforce the wearing of these items while working on District construction Projects. Other PPE such as special footwear and protective clothing may be required depending on the task and activities being performed.

A review of District Health and Safety Rules, with emphasis on the following: the need for adhering to all applicable safety requirements, the need for using personal protective equipment when necessary, the need to report any accidents or injuries to the District representative, emergency phone numbers, and the requirement for obtaining permits when necessary.	
Initials	**FACILITIES CHECKLIST** Write NA for sections that do not apply
	SIGNAGE All traffic and site safety signage must be obeyed. Contractor must provide appropriate signage for the hazards associated with the work area As Required by WAC regulations.
	EMERGENCY NUMBERS Contractors working at Hydro plants should notify the Hydro Facility Control Room after calling the emergency number 911 or 9911. Hydro Facility Control Room phone numbers are: Rocky Reach Dam 662-8705 or extension 6000 from a plant telephone; Rock Island Dam 661-4007 or extension 5000 from a plant telephone; and Chelan Dam, 682-2612 or extension 4227 from a plant telephone.
	ACCIDENT REPORT Any accident, incident, or close call must be reported to a District representative.
	HAZARD COMMUNICATION PROGRAM WAC's Right to Know (Hazard Communication) – This program is a WAC requirement (WAC-296-800-170) requiring employers to ensure all employees, including all Contractors on-site, are aware of any hazards that they may be exposed to in the workplace. Contractors will be made aware recognized chemical hazards and the location of Material Safety Data Sheets (MSDS). Contractors must provide MSDS Sheets for all products brought to District Facilities and must make the District aware of when and where hazardous products are being used. MSDS's must be current, legible and in English. All chemical containers must be properly labeled.
	REGULATORY COMPLIANCE All federal, state, local and District safety, health and environmental regulations and rules must be observed by all employees of outside Contractors. Contractor supervisors shall ensure that all of their employees are aware of and comply with the rules and regulations. VIOLATORS WILL NOT BE PERMITTED TO WORK AT DISTRICT FACILITIES**.**

A review of District Health and Safety Rules, with emphasis on the following: the need for adhering to all applicable safety requirements, the need for using personal protective equipment when necessary, the need to report any accidents or injuries to the District representative, emergency phone numbers, and the requirement for obtaining permits when necessary.	
Initials	**FACILITIES CHECKLIST** Write NA for sections that do not apply
	PERMITS Permits/clearances must be obtained for the following operations BEFORE work begins: **a) Lockout/Tag-out Procedures** required for work on any equipment or live energy that could cause injuries if started accidentally. **b) Confined Space Entry Permit** required for any workers who enter permit required confined spaces. Confined spaces must be cleaned, purged, and ventilated before employees are allowed to enter them. Life lines, harnesses, and supplied air respirators may be required. An attendant will be required for all permit confined space entries. All work in confined spaces must meet the requirements of WAC 296-809 and employees must be properly trained in accordance with this regulation. Contractors entering confined spaces must submit a confined space program**. List all permit-required confined spaces here:** _____ _____ _____ _____ _____ **c) Hot Work Permit** required for all open flame, spark-producing, or heat producing activities on-site. This includes, but is not limited to: welding, cutting, grinding, soldering, brazing, and heat producing chemicals. **d) Other permits** may be required for special procedures or unusual work conditions. Your District contact will coordinate permit requests for the specific area where the work is being performed.
	OVERHEAD WORK When overhead work is necessary, precautions must be taken to prevent fall of persons and materials. The area underneath the work operation shall be roped off and labeled with appropriate warning signs.
	FLAMMABLES Flammable liquids shall be stored in and dispensed from Approved containers. Flammables and combustibles must be separated by a distance of no less than 20 feet. Oxygen cylinders must be separated from fuel gas cylinders by a distance of no less than 20 feet or by a 5-foot fire wall unless said cylinders are in use.
	LADDERS/FALL PROTECTION Ladders must be in good condition and must be made secure near the top. Scaffolding shall be of substantial construction with guardrails and toe boards installed. Fall protection must be provided when employees are exposed to a fall greater than 10 feet. On walking/working surfaces, fall protection must be provided at 4 feet. Where fall protection is required, a fall protection plan must be provided that meets the requirements of WAC 296-155, Part C-1.
	VEHICLES AND EQUIPMENT Vehicles must be kept in safe operation condition. Only certified equipment operators are to operate equipment.
	LIVE CONNECTIONS Do not shut off or make connections to live electric, gas, air, water, or process lines without the prior authorization of the District.

A review of District Health and Safety Rules, with emphasis on the following: the need for adhering to all applicable safety requirements, the need for using personal protective equipment when necessary, the need to report any accidents or injuries to the District representative, emergency phone numbers, and the requirement for obtaining permits when necessary.	
Initials	**FACILITIES CHECKLIST** Write NA for sections that do not apply
	SAFETY BARRICADES Safety barricades must be put in place at open man holes, floor holes, catch basins, and excavations. Appropriate lights must be installed if holes are to be left open after daylight hours.
	JOB SAFETY ANALYSIS A job safety analysis is required to insure work is planned to avoid injuries.
	TOOLS & EQUIPMENT CONDITION Tools, electrical cords, rigging equipment and machinery shall be in good condition and inspected before use.
	SUBSTATION TRAINING/ORIENTATION Anyone entering a District substation for any reason is required to have this training on an annual basis. Contact Safety & Risk Management to check out the video "Substation Orientation & Safety for Non-electrical Workers." In addition to the video, Contractors are required to attend a site specific 4 hour substation training session.

Orientation given to _____
Individual name and company name

Contractor owners and employees attending (*list additional names on back of this form*)

_____ _____
_____ _____
_____ _____

Appendix B – Hot Work Permit

(Permits shall be site and activity specific. Blanket permits are prohibited)

A Hot Work Permit is required for activities that involve the use of open flames, those producing high temperature conditions, or that otherwise create the potential for fire. Activities subject to this permit include welding, cutting, or burning using acetylene-propane-butane-etc. torches, arc welding, or work that generates airborne sparks. Only plant operators and select supervisors who have received training on issuance of this permit are authorized to sign.

<table>
<tr><th colspan="2">Hot Work Permit</th></tr>
<tr><td>Permit Issued To:

Location of Proposed Work:</td><td>Start Date:

Permit Expires Date & Time:</td></tr>
<tr><td colspan="2">Description of Activity: (Description of process, equipment, materials, etc.)</td></tr>
<tr><td colspan="2">Hazards & Precautions
Identify all hazards associated with the work activity and location such as high voltage electrical, exposure to welding arc, burn hazard, flammable liquids, etc. Describe precaution(s) to be used to safely control each hazard listed.
1)

Note: (The Hot Work Permit Checklist must be used in conjunction with this permit)</td></tr>
<tr><td>Signature of User / Permit Holder:

Date:</td><td>Signature of Authorizing Center Director or Team Leader

Date:</td></tr>
<tr><td colspan="2">Signature / Date of Permit Issuer:</td></tr>
</table>

Appendix C – Hot Work Permit Checklist

District personnel and Contractors shall comply with the most stringent regulations, standards, or guidelines available. Resources commonly used include the National Fire Protection Association (NFPA) 51B and 241; Occupational Safety and Health Administration (OSHA) 29 CFR 1926.352 & 29 CFR 1926.150; American National Standards Institute (ANSI) ANSI/UL 521 & ANSI Z49.1; and Washington Administrative Code 296-155-250 through Washington Administrative Code 296-155-280.

	Hot Work Permit - A Project walk through with the worker or Contractor is required prior to issuing a Hot Work Permit. The individual(s) performing the Work are ultimately responsible for ensuring compliance with the requirements of this permit. The attached hot work permit will be completed prior to any work that produces sparks, flames, or has the potential to cause a fire. The hot work permit is valid for the specified task noted on the Hot Work Permit. Any variance from the original scope of hot work will require a new hot work permit. The permit may not exceed a one (1) year period.
	Inspections – The worker/permit holder shall inspect the Work area a minimum of once per day to ensure compliance with permit requirements. Responsible District staff, to assure compliance with the Hot Work Permit, will perform periodic job site inspections. Inspectors have the authority to stop Work if safe Work practices are not being utilized or the scope of Work defined in the Permit is being exceeded. The Safety and Risk Management Office shall be immediately notified of any deficiencies.
	Fire Detection – Fire detection equipment shall be protected from false activation and damage. If components must be disabled or taken off line with the Fire Department, District procedures will be utilized. Work shall not proceed until confirmation of fire alarm deactivation is verified with the Plant Operators or his appointed fire alarm technician. Impairments of fire detection systems shall be minimized.
	Fire Suppression – Fire suppression systems (e.g. fire sprinklers, dry chemical, foam deluge, etc.) shall be protected by noncombustible shielding or guarding to prevent inadvertent activation. Where installed, shielding and/or guarding shall be configured to minimize any disruptive influence related to system activation or coverage outside the immediate work area. The protective shielding shall be promptly removed upon completion of Work. Fire suppression systems in the permit area shall be examined prior to the start of “hot work” to ensure that protective measures have been implemented.
	Rangeland Fires - If wind speeds are exceeding ten miles per hour, hot work will not be permitted outdoors. Vegetation and other combustibles must be removed or cut back to prevent ignition.
	Traffic Control - Barriers will be provided to assure traffic is prevented from exposure to hot work areas. Shields will be used to prevent exposure to sparks

	and flashes. A clear path of at least 44-inch must be maintained to all exits.
	Cutting and Welding Controls - The location of hot work will be determined by utilizing the following priority list: 1) An area designed for hot work use such as welding shops. 2) If Work must be conducted on site, combustibles shall not be located within 35-feet of the work area. 3) If Work must be conducted on site and combustibles cannot be removed from within thirty five feet of the Work area, fire barriers such as screens or blankets will be used to protect combustibles.
	Housekeeping - Care shall be taken to assure the barriers will not allow sparks to penetrate the seams. Openings in walls, floors, or ducts will be protected from sparks. Acetylene and oxygen tanks will be protected from flame/sparks. Cutting or welding on pipes or metal in contact with combustible walls, roofs, ceilings, partitions, or any combustible material will not be undertaken if the Work may cause ignition.
	Hazardous Materials - The Contractor shall have a written Chemical Hazard Communication Program. Information on this program and MSDS will be readily available for all Hazardous Materials including welding rods and welding materials. Adequate ventilation will be provided for all hot work processes. Hot work will not be conducted within thirty five feet of combustible/flammable liquids or gases.
	Personal Protection - Personal protective equipment will be appropriate for the task. Eye protection will comply with ANSI Z87.1- 1991. Long sleeved shirts, long pants with the pant legs outside of boots, leather gloves, and leather aprons will be used for welding and cutting operations. Additional controls are required if bulky clothing or protective suits are used that reduce the worker's ability to recognize hazards or to react to an emergency situation.
	Equipment Safety - Acetylene and oxygen tanks will be stored and changed in compliance with WISHA and NFPA requirements. Anti-flashback devices will be used on acetylene and oxygen tanks.
	Fire protection Equipment - Will be sufficient for the hazards present. At a minimum, a 2A:20B:C rated fire extinguisher is required. The fire extinguisher shall be readily available in the immediate Work area.
	Fire Watch – A fire watch shall be established to ensure the safety of workers and the protection of assets. The hot work area will be observed for thirty (30) minutes (sixty [60] minutes for roof work) after the completion of hot work. The individual assigned to this task will have fire extinguishing equipment readily/immediately available and be properly trained in the use of the equipment. Prior to leaving the site, the fire watcher will assure that no possibility of fire exists.

	Other -
	** Permit requirements must be reviewed and verified on a daily basis prior to the start of Work.

END OF SECTION 01020

DIVISION –1 - GENERAL
SECTION 01200 – MEASUREMENT AND PAYMENT

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 SCOPE 2
1.2 MEASUREMENT 2
1.3 PAYMENT 2
1.4 SUBMITTALS 2
1.5 INDIVIDUAL BID ITEMS 3
1.6 PROJECT MATERIALS ON HAND 3

DIVISION –1 - GENERAL
SECTION 01200 – MEASUREMENT AND PAYMENT

1.0 GENERAL

1.1 SCOPE

The Bid Price for each item shall constitute full compensation for furnishing all equipment, tools, labor, materials, appurtenances, and incidentals and performing all operations necessary to construct and complete the various bid items in accordance with the Contract. Payment for each item shall be considered as full compensation, notwithstanding that minor features may not be mentioned herein. Work paid for under one item will not be paid for under any other item. Certain Specification sections stipulate in the final article of the section that no separate payment will be made for the Work, services, or operations required by the Contractor and therefore all costs thereof shall be considered as incidental to the Work.

1.2 MEASUREMENT

Measurement for all items shall be as indicated in these Specifications for Unit Price and Lump Sum Bid Price items, and are outlined in detail in this section of the Specifications, and further are designated on the Bid Form.

1.3 PAYMENT

Payment for all Work will be made at the Contract Unit Price or Lump Sum Bid Price as indicated in the Bid Form, payment of which shall constitute full compensation, for a complete installation.

1.4 SUBMITTALS

Within ten (10) days following Notice of Award, the Contractor shall submit a written Schedule of Values. The Schedule of Values shall provide information used by the Bidder to develop the lump sum price. This information may be used by the District to determine the amount of progress payments, to determine the value of changes in the Work, and to evaluate potential or actual claims and shall be sufficiently detailed and complete to support those uses. At a minimum the schedule of values shall include groups of items for the following:

a. Mobilization/Demobilization
b. Erosion Control
c. Clearing and grubbing
d. General excavation
e. Retaining wall construction for rock wall, gabions and Lock+Load
f. Furnishing, installing and placing of earth materials (structural fill, CSBC, quarry spall, etc.)
g. Large complex woody structures
h. Landscaping (irrigation, plantings, etc.)

i. Fencing (rail and chain link)
j. General administration, O&M manuals, as-builts, etc.

1.5 INDIVIDUAL BID ITEMS

A. Item 1 – Entiatqua Trail

Measurement: Shall be measured by lump sum.

Payment: Costs for all of the Work described in Exhibits S, T and U excepting all other Bid Items as identified as separate Bid Items in this Specification.

B. Item 2 – Shoring Excavation Safety Systems

Measurement: Lump sum.

Payment: The Lump Sum price for Shoring Excavation Safety Systems shall be full compensation for all labor, tools, equipment and material to insure construction of safe excavations in accordance with RCW Chapter 49.17, RCW 39.04.180. This item may include shoring for wall construction and disposing of shoring material before backfilling.

C. Item 3 – One Year Landscape Maintenance

Measurement: Shall be measured by lump sum.

Payment: Costs for furnishing Entiatqua Trail landscape maintenance as described in Exhibit S, Section 02950 - Landscaping.

1.6 PROJECT MATERIALS ON HAND

The Contractor will be paid on regular monthly estimates, as detailed in General Conditions. Included in the monthly estimates will be ninety percent (90%) allowances for the invoice cost of Project materials on hand (MOH) properly stored on or near the Site. Copies of all invoices for materials from manufacturers or suppliers must be provided to and Approved by the District prior to payment. Copies of each invoice must be provided to the District and Approved for payment to be made. Payment will not be made for any invoice that is less than $200.00 or is merely a freight billing. Payment of MOH applies only to those materials that will be permanently incorporated into the Work. MOH payment will not be made for forming materials, consumables, nails, tie wire, etc.

END OF SECTION 01200

DIVISION 1 - GENERAL
SECTION 01300 – ADMINISTRATIVE REQUIREMENTS

TABLE OF CONTENTS

1.0 GENERAL 2
2.0 PROJECT CORRESPONDENCE 2
2.1 SERIALIZED LETTERS 3
2.2 SERIALIZED SPEEDY MEMOS 3
2.3 TELEPHONE AND PERSONAL CONTACT RECORDS 3
2.4 E-MAIL COMMUNICATIONS 3
2.5 SERIALIZED CONTRACTOR SUBMITTALS 4
2.6 DISTRICT SUBMITTAL RESPONSE 4
2.7 SERIALIZED CORRESPONDENCE NUMBERING (SMART NUMBERING) 5
2.8 ADDRESS INFORMATION 6
3.0 SUBMITTALS 6
3.1 GENERAL 6
3.2 DOCUMENTS AND DRAWINGS 8
3.3 SUBSTITUTIONS 8
3.4 SUBMITTAL SCHEDULE 8
3.5 DISTRICT'S REVIEW 8
3.6 OWNERSHIP 9
3.7 LANGUAGE 9
3.8 FORMAT 9
3.9 CALCULATIONS 12
3.10 DIGITAL PHOTOGRAPHS 12
4.0 PROJECT SCHEDULES 12
4.1 GENERAL 12
4.2 OVERALL PROJECT SCHEDULE 13
5.0 CONTRACT CLOSE-OUT SUBMITTALS 13
5.1 RECORD DRAWINGS 13
5.2 OPERATION & MAINTENANCE MANUALS 13
6.0 LIST OF APPENDICES 14
6.1 REQUIRED SUBMITTALS 14
6.2 CONTRACTOR SUBMITTAL AND DISTRICT REPLY FORMS 17
6.3 SPEEDY MEMO 18
6.4 RECORD OF CONVERSATION 19
6.5 HOW TO PROPERLY IDENTIFY EMBEDDED DOCUMENTS, CATALOG CUT SHEETS, ETC. 20

DIVISION 1 - GENERAL
SECTION –01300 – ADMINISTRATIVE REQUIREMENTS

1.0 GENERAL

1. This section describes the requirements and procedures for all correspondence, document and drawing submittals to the District, Engineer and all parties involved with the Contract. The District reserves the right to revise or modify these procedures as necessary to facilitate proper and consistent communication between related parties.
2. This section provides examples of forms to be used by the Contractor in the Appendices. Alternate forms may be used subject to approval by the District.

2.0 PROJECT CORRESPONDENCE

1. Correspondence between the Contractor and the District will be handled through the District's document management website, also known as cpudprojects.org website (found on the internet at www.cpudprojects.org). All correspondence (as listed in this section) will be posted to the website. The website utilizes Microsoft® Internet Explorer (which is required). The following are highly recommended for efficient correspondence processing:
    a. A high speed internet connection;
    b. Document scanning capability;
    c. Adobe® Acrobat Professional for use and creation of PDF (*.pdf) files;
    d. Autodesk® Design Review for viewing DWF (*.dwf) files
2. Acceptable file formats are as listed in paragraph 3.8.1 Format, Electronic File Format, of this Section.
3. The District will provide hands-on website training for use of the District's project management website after Contract award. A training manual will also be provided. Each Contractor employee requesting website access must be Approved by the District's Security Director. Once Approved, the user will be assigned a user name and password by the cpudprojects.org website administrator.
4. The cpudprojects.org website utilizes a specific "Smart Number" file naming convention described further in paragraph 2.7 Serialized Correspondence Numbering (Smart Numbering) (see this Section).
5. The following Project correspondence will be utilized for the duration of the Contract:
    a. Serialized Letters
    b. Serialized Speedy Memos
    c. Records of Conversation (telephone and personal contacts)
    d. Emails
    e. Serialized Contractor Submittals
    f. District Submittal Responses

2.1 SERIALIZED LETTERS

1. Serialized letters shall be used for all correspondence from any Project entity that addresses **Contract scope, budget, schedule, or other contractual issues**.
2. Serialized letters shall be posted to the cpudprojects.org website and followed immediately by the signed original via regular or express mail, by courier service, or hand carried to the District.
3. If the District determines that there is any change to the Contract scope, budget, or schedule, then the District will issue a Field Work Order/Change Order (FWO/CO).
4. All Serial Letters shall include (on the first page):
    a. Contract Number, Title, and Schedule (B)
    b. Sender's Name
    c. Sender's Company Name
    d. Date: MM/DD/YYYY
    e. Serial Letter Number
5. Additionally, each page shall indicate page number and total number of pages, formatted as "Page X of Y", and Serial Letter Number.

2.2 SERIALIZED SPEEDY MEMOS

1. Speedy Memos (Appendix 6.3) shall be used for **requesting information, clarifications, or interpretations of the Contract**. Speedy Memos may be initiated by Contractor, District, or Engineer.
2. It is Contractor's responsibility to initiate a Serialized Letter identifying any contractual changes that may result from a Speedy Memo response.
3. Speedy Memos shall be posted to the cpudprojects.org web site. No hard copy is required.

2.3 TELEPHONE AND PERSONAL CONTACT RECORDS

Telephone and personal contact discussions (except meeting minutes) and particularly those which could result in a change to scope, schedule or budget, shall be recorded by the Contractor on a Record of Conversation Form (Appendix 6.4). Completed Record of Conversation Forms shall be posted to the cpudprojects.org website within three (3) days of the conversation.

2.4 E-MAIL COMMUNICATIONS

1. Parties to the Project may use e-mail for items other than those identified in the list of Project correspondence.
2. **E-mail shall not be used for official correspondence as direction to proceed or to alter terms of the Contract.**
3. E-mail may be used as a mechanism to transmit courtesy copies of other documents. Each e-mail shall contain a single subject. In rare cases similar

subjects may be combined in a single e-mail if necessary for understanding. The Subject Line shall reference the following:

a. Contract Number
b. Project Name
c. The email contents, clearly described

2.5 SERIALIZED CONTRACTOR SUBMITTALS

1. The Contractor Submittal & District Reply Form (Appendix 6.2) shall be used as the cover sheet for all Contractor submittals. Contractor shall post the cover sheet and attachments combined as one (1) document to the cpudprojects.org web site, followed immediately by one (1) signed original with attachments via regular or express mail, by courier service, or hand carried to the District. Documents shall be **CHECKED** by Contractor before being submitted. All drawings shall be stamped by Contractor as having been checked, including the name or initials of the person checking the drawings and the date.
2. If documents are changed subsequent to the original submittal, Contractor shall post the revised document(s) in accordance with the naming convention, to the cpudprojects.org website for information or review and approval consistent with the original requirement.
3. Re-submittals shall have the same number and title as the original submittal with a numeric revision code (example: 1301-XXXX-S-0001-1) added to the submittal cover sheet and file name until submittal is Approved with no further action required.
4. **New submittals shall not be combined with re-submittals.**

2.6 DISTRICT SUBMITTAL RESPONSE

1. The Engineer will respond to submittals within two (2) calendar weeks after posting to the cpudprojects.org web site.
2. Engineer will mark **Submittal Status** with one of the following:

   ANR..... Approval Not Required
   APP ..... Approved
   AAR..... Approved as Revised
   NOT APP .... Not Approved

3. Engineer will mark **Action Required** by the Contractor with one of the following:

   NR ..... No Action Required
   REV ..... Revise and Resubmit for Approval
   RSR..... Revise and Submit for Record
   SR ..... Submit for Record (As-built, O&M Manual, QA/QC Dossier)

Submittal Status	Description
Approval Not Required	Applicable to documents submitted for information only.
Approved	Document is Approved for use.
Approved As Revised	Document is Approved for use with incorporation and resolution of comments.
Not Approved	Document is not Approved for use.

Action Required	Description
No Action Required	No action on the part of Contractor is required.
Revise and Resubmit for Approval	Contractor shall revise, take required action and incorporate comments, if any and repost the document addressing all comments within two (2) weeks of the District's posted response.
Revise and Resubmit for Record	Contractor shall revise and resubmit the document as part of the Final Record Documents.
Submit for Record (As-built, O&M Manual, QA/QC Dossier)	Contractor shall resubmit the document as part of the Final Record Documents.

4. Any work undertaken by the Contractor prior to submittal approval shall be at the Contractor's sole risk.

2.7 SERIALIZED CORRESPONDENCE NUMBERING (SMART NUMBERING)

1. Serial numbers shall begin at 0001 for each type of correspondence from each sender. Numbers shall be consecutive. Correspondence initiated by Subcontractors shall be routed and tracked through the Contractor. The Engineer shall approve all deviations to this requirement. If a deviation is agreed to in writing, then Subcontractors shall be bound by the same requirements as the Contractor, as provided herein.
2. Correspondence Smart Numbers and file names for this Project shall be formatted as follows:

Document Type	Numbering Convention And File Name
Serial Letters	1301-XXXX–L0001-0
Speedy Memos	1301-XXXX–M0001-0
Submittals	1301-XXXX–S-0001-0
Examples: **1301-HHI-L0001-0**	
1301B:	(Bid Number – Schedule Number)
HHI:	(Contractor Designation, e.g. Hyundai Heavy Industries)

Document Type	Numbering Convention And File Name
L0001:	(Correspondence Type and sequential number)
0:	(Revision number)
L0001-0	Letter Number 0001, Revision 0;
M0009-C1	Speedy Memo number 9, revision C1 (Revisions are with alpha characters (0, A, B, C…) If a Memo needs to be revised prior to a response, then use sequential numbering, following that revision alpha character.
S-0054-3	Submittal Number 54, Revision 3 (Revision with sequential numeric character (0, 1, 2, 3….)

3. The District will assign Contractor Codes for all parties involved.

2.8 ADDRESS INFORMATION

1. All Project correspondence shall be addressed as follows:

US Mail:
Chelan County PUD
Bid 13-01 Entiatqua Trail, Schedule B
Construction Manager: Casey Hall
ATTN: Judy Ursic
P.O. Box 1231
Wenatchee, WA 98807-1231

Physical Address, (Fed Ex, UPS, oversized mail):
Chelan County PUD
Bid 13-01 Entiatqua Trail, Schedule B
Construction Manager: Casey Hall
ATTN: Judy Ursic
327 N. Wenatchee Ave
Wenatchee, WA 98801

3.0 SUBMITTALS

3.1 GENERAL

1. The Contractor is required to provide information to support its engineering, design, fabrication, and installation process and provide this information in sufficient detail to demonstrate the Work is being performed in accordance with these Contract Documents.
2. The required submittals are not limited to those on the listed in Required Submittals (Appendix 6.1). The District or Engineer may, at any time throughout the duration of the Contract, require the Contractor to provide additional information pertaining to the Work. The Contractor shall comply by providing the information in the form of a Submittal.

3. Documents and Shop Drawings shall be posted to the cpudprojects.org website for information, or review and approval. Contractor shall supply complete documentation and Shop Drawings for the equipment provided in accordance with the format and procedures established by these Contract Documents.
4. Non-paper submittal items such as hardware, samples, material items, etc. that cannot be posted to the District's cpudprojects.org website shall be sent to the Project Manager along with a signed Contractor Submittal/District Reply cover sheet (see Appendix 6.2).
5. Documents shall be submitted in a timely manner to support Contractor's engineering, design, and fabrication process. All delays due to untimely submittal of documents to District shall be the responsibility of the Contractor. Contractor shall arrange the submittal schedule such that no more than twenty-five (25) documents or Shop Drawings are posted per week, except as otherwise Approved in writing (in advance), by the Engineer, or in the case of As-Built Drawings.
6. It is in the Contractor's best interest to post submittals and re-submittals far enough in advance of the District's submittal review time so that mobilization and construction start dates are not delayed while waiting for submittal approval. The District has the right to delay work if required pre-construction submittals are not Approved. Onsite work will not be allowed to proceed prior to the approval of the Contractors Work Plan, safety plan, and QA/QC plan. No increase in Contract Price or extension of the completion date will be allowed if this delay occurs.
7. The Contractor shall provide equipment documentation and Shop Drawings in sufficient detail for the District's Engineer to review with the intent of verifying the Work is being performed in accordance with these Specifications. Where both design calculations and drawings are prepared, they shall be posted together to allow complete review.
8. Contractor shall be responsible for the accuracy and correctness of dimensions and details on the documents and Shop Drawings. The approval of such documents and Shop Drawings by the Engineer shall not relieve Contractor of this responsibility.
9. Information and product data submittals shall be in a clean, consistent and orderly electronic format. Product items shall be highlighted or otherwise distinctly identified. Sloppy and difficult to interpret submittals will be returned with a Revise and Resubmit response.
10. Any document required by this Specification which is produced by a sub-supplier, or Subcontractor shall first be **REVIEWED** and noted as being **APPROVED** by Contractor and then submitted to the Engineer for review and approval.
11. Contractor shall assume all responsibility and risk for conditions due to any error on Shop Drawings regardless of drawing approval or field acceptance of material or delivery.
12. Any fabrication or other Work performed in advance of Contractor's receipt of review comments and approval shall be entirely at Contractor's risk. After review,

Contractor shall not deviate in any way from the design, details, dimensions, or other information shown on the Drawings without the written approval of Engineer.

3.2 DOCUMENTS AND DRAWINGS

1. Documents and drawings submitted by the Contractor, as a minimum, refer to information specifically required in the Submittal Schedule and elsewhere in this Specification. This information shall include all drawings, diagrams, illustrations, manufacturer's product data, catalog data, brochures, performance charts and other information required to illustrate distinct portions of work.
2. Documents and drawings shall include all the details necessary for fabrication, assembly, installation, repair, and maintenance of furnished items. The minimum drawings required are specified in individual sections of the Specifications. Contractor shall furnish detailed fabrication drawings (Shop Drawings) and procedures for installation and assembly of all items provided.
3. If standard drawings or catalog cut sheets are submitted, the applicable items and devices furnished shall be clearly marked, e.g., arrows pointing to text, text highlighted, and/or items enclosed with boxes, separating the intended item from others on the page (see Appendix 6.5).

3.3 SUBSTITUTIONS

In accordance with the Instructions to Bidders, the Contractor may propose a product substitution unless a product is otherwise specified as sole source. In the event a product other than that specified is submitted the Contractor shall clearly indicate the item is a proposed substitute. Differences between the product specified and the substitute proposed shall be clearly marked in the submittal.

3.4 SUBMITTAL SCHEDULE

1. Contractor shall prepare and submit a Submittal Schedule inclusive of all drawings, calculations, procedures, and other documentation specified in these Contract Documents. The Submittal Schedule shall be prepared and submitted in Microsoft Excel (*.xls) or other Approved file format. The Submittal Schedule shall reflect submittal number, revision, description, anticipated submittal date, actual submittal date, District reference number (if applicable) and Specification section number.
2. The Submittal Schedule shall be updated and maintained over the course of the Contract. The Submittal Schedule shall be updated and resubmitted monthly to reflect changes and for Progress Meetings, or as requested by Engineer.

3.5 DISTRICT'S REVIEW

1. The purpose for requiring Contractor submittals is to permit the District's Engineer to monitor the Contractor's progress and to determine conformance with the intent of these Specifications.

2. Contractors and Subcontractors who use unapproved documents do so at their own risk and may be required to repeat activities that were performed if the document used is subsequently rejected by Engineer.
3. Submittals reviewed by the Engineer do not become Contract Documents and are not Change Orders.
4. Engineer review, acceptance, or approval of schedules, Shop Drawings, lists of materials, and procedures submitted or requested by the Contractor shall not add to the Contract amount and additional costs shall be solely the obligation of the Contractor.
5. The District will not be precluded, by virtue of review, acceptance, or approval, from obtaining a credit for fabrication and/or construction savings resulting from allowed concessions in the Work or materials provided. Any savings shall be mutually agreed upon by the Engineer and the Contractor.
6. The Engineer's review of Contractor submittals is not intended to be a rigorous engineering analysis of the Contractor's design or proposal. Engineer reserves the right to require the Contractor to make changes to Contractor's submittals, which may be necessary, in their opinion, to make the Work conform to the provisions and intent of these Specifications. Any additional cost to correct a submittal, including work to maintain the schedule that may result from any delay to review a resubmittal, shall be solely the obligation of the Contractor.
7. The District will not be responsible for furnishing engineering or other services to protect the Contractor from additional costs accruing from submittals.

3.6 OWNERSHIP

All documents (i.e., Shop Drawings, data, manuals, calculations, schedules, digital photographs, etc., as well as plans and procedures for installation or testing) shall become the property of the District. The District shall have full rights to reproduce and submit to others any document for bids on future Projects, notwithstanding any indication otherwise on the drawing or elsewhere.

3.7 LANGUAGE

All documents (i.e. Shop Drawings, data, manuals, plans, procedures, calculations, schedules, digital photographs, etc.) submitted to the Engineer shall be in the English language. Dual language is acceptable on Drawings, provided all information is also provided in English. All elevations shall be dimensioned in feet unless otherwise indicated.

3.8 FORMAT

3.8.1 Electronic File Format

1. The following list of software and file formats shall be used for all submitted documentation or as Approved by the Engineer.

Software	File Format	Usage Examples
MathCAD®	MCD (*.mcd)	Engineering calculations
Microsoft® Word	DOC (*.doc)	Text files, forms
Microsoft® Excel	XLS (*.xls)	Spreadsheets, forms, calculations
Microsoft® Access	MDB (*.mdb)	Databases
Adobe Acrobat®	PDF (*.pdf)	Text, pictures, reports, manuals, calculations
Audio editing	WAV (*.wav)	Audio files
Digital Photograph editing	JPG (*.jpg)	Digital photographs, scanned files
Autodesk® AutoCAD®	DWG (*.dwg)	Shop Drawings
Autodesk® DWF Viewer™	DWF (*.dwf)	Shop Drawings

2. All software used shall be the latest version or as approved by the Engineer. Contractor development of AutoCAD files for submittal shall comply with District Drafting Standards as provided in SPECIFICATION REQUIREMENT.

3.8.2 Drawings

3.8.2.1 Project drawings include the following:

1. Contract Drawings (provided by District with the bid).
2. Conformed Drawings – incorporates addenda, if any (may be provided by District to Contractor at the Preconstruction Conference, if issued conformed drawing becomes the Contract Drawings).
3. Shop Drawings - all drawings provided by Contractor or Subcontractor, As Required by Contract.
4. Reference Drawings - (May be provided by District with Contract Documents or at Contractor's request. All dimensions and locations of existing equipment shall be field verified, as necessary, by Contractor). These reference drawings may be hard copy or electronic or both.
5. Contractor Project Record Drawings – hard copy Contract Drawings marked-up by the Contractor during the course of work and submitted to the District at Project Substantial Completion.

3.8.3 Electrical Shop Drawings (Not anticipated for this project)

1. Electrical Shop Drawings; schematics, wiring drawings, and panel layout drawings shall be in accordance with established District practice, as reflected in sample drawings provided as part of the Contract Drawings or reference drawings, for typical arrangement, layout, and format or as Approved by Engineer.
2. Electrical Shop Drawings shall have sufficient detail to facilitate installation and maintenance of items including terminal block identification, component values for

resistors, capacitors, etc., and industry standard designations on all semiconductor devices.

3.8.4 Contractor Project Record Drawings

1. The Contractor shall maintain at the jobsite, one (1) complete set of Contract Documents including all Drawings (Contract Drawings, Reference Drawings, and Shop Drawings), Specifications, Addenda, Change Orders, and Field Work Orders that are part of the Contract as awarded and one complete set of all Contractor prepared drawings.
2. Each of these documents shall be clearly marked “Project Record Copy,” and shall be maintained in a clean and neat condition available for District and Contractor personnel, and shall not be used for any other purpose during the performance of the Work.
3. The Contractor shall record on the Project Record Copy all deviations in the actual work from the Contract Drawings Reference Drawings or Shop Drawings. This shall include changes to the Work resulting from any Change Orders, or which may be required during assembly, installation, or inspection of the Work. Markings to the Contractor’s project record drawings shall be in accordance with part 3.8.2 of this specification.
4. Information shall be recorded concurrently with construction progress within twenty-four (24) hours after receipt of information that a change to a Contract Drawing, Reference Drawing, or Shop Drawing has occurred. Work shall not be covered or concealed until the change is recorded.
5. The Contractor’s project record shall be submitted to the District at Project Substantial Completion. Acceptance of the project record is required by the District as a condition of final acceptance. Incomplete or otherwise deficient records may constitute a deduction in the mobilization/demobilization pay item.
6. The Contractor shall maintain documents in a clean, dry, legible condition and in good order. Record documents shall not be used for in-the-field purposes.
7. Documents shall be made available at all times for observation by the District and the Engineer.

3.8.5 Making Entries on Drawings

1. Using an erasable colored pencil (not ink or indelible pencil), Contractor shall clearly describe the change by marking it on the drawing and providing a note As Required. These entries shall be dated.
2. Color Coding:
    a. **GREEN** is used when showing information deleted from drawings.
    b. **RED** is used when showing information added to drawings.

c. **BLUE** and circled in blue is used to show notes. The entry shall be highlighted by a “cloud” drawn around the area or areas affected.

3.9 CALCULATIONS

The District shall have the right to review any and all of the Contractor's calculations, including all manual and computerized design calculations. If specified and/or requested by the District, the Contractor shall provide all backup calculations, assumptions, flow charts, computer program documentation, and all other data necessary for proper review of the material by the District.

3.10 DIGITAL PHOTOGRAPHS

1. Digital photographs shall be taken to record and demonstrate progress throughout the duration of the Contract.
2. All digital photographs shall be submitted in JPG (*.jpg) file format or other District Approved file format. Photos shall have sufficient resolution values and pixel count to clearly show the documented Work in the photos when printed in 8 by 10 inch format. Acceptable digital photograph resolution values and pixel count shall remain at the discretion of the District and Approved by the Engineer.
3. Identify photographs with:
    a. Chelan County PUD
    b. Date: MM/DD/YYYY
    c. Project designation
    d. Photograph details
    e. Contract number
    f. Time
    g. Location
    h. Contractor’s name
    i. Job reference number
4. The photograph identification data shall be added to the photograph by including it in the ‘meta-data’ section of the JPG file.
5. Submit digital photographs following Project correspondence procedure on a bi-monthly basis or after significant progress. Digital photographs shall be submitted in electronic format to the Engineer, unless directed otherwise by the Engineer.

4.0 PROJECT SCHEDULES

4.1 GENERAL

1. The Contractor shall prepare and maintain Project schedules. Schedules shall be prepared and maintained in a District approved software format. Schedule logic shall be included and the critical path calculated and indicated.

2. Schedules shall be updated to reflect all changes and to show progress, and submitted at least two (2) days prior to each scheduled Progress Meeting. Updates shall indicate actual progress against a baseline schedule established at the beginning of the Project. Additionally, the Schedule shall be updated and resubmitted within five (5) working days of any change known by the Contractor that could cause actual completion dates to exceed the Milestone Completion Dates specified in the Contract Documents.

4.2 OVERALL PROJECT SCHEDULE

1. The Contractor shall prepare and maintain a time scaled Critical Path Method (CPM) Schedule showing all significant activities from Contract Notice of Award to final closeout. This Schedule shall show all major events, activities, notice of milestones, and completion dates required for Completion of the Work.
2. The Overall Schedule shall include, as a minimum, the start date, duration time in days and the completion date for the following work items:
    a. Planning and Design
    b. Submittal preparation
    c. District response to Submittals
    d. Resubmittals (preparation and review) as applicable
    e. Procurement and Fabrication
    f. Mobilization
    g. Shipment & Delivery of equipment/material to Job Site
    h. Construction (as a rollup)
    i. Construction Phases (as children to the rollup)
    j. Substantial Completion
    k. Milestone Completion Dates, if specified in Specific Requirements
    l. Demobilization
3. The Contractor shall assign such forces and perform the Work in such a manner as to assure compliance with the Approved Schedule and the Contract. The Contractor shall obtain Engineer Approval of any proposed Schedule changes.

5.0 CONTRACT CLOSE-OUT SUBMITTALS

5.1 RECORD DRAWINGS

At Project Substantial Completion, as determined by the District, submit one (1) complete, marked-up hard copy set of full-size Contract Drawings and any Shop or reference Drawings as part Project Record submittal.

5.2 OPERATION & MAINTENANCE MANUALS

Not anticipated for this project.

6.0 LIST OF APPENDICES

APPENDIX 6.1 ..... REQUIRED SUBMITTALS

APPENDIX 6.2 ..... CONTRACTOR SUBMITTAL AND DISTRICT REPLY FORMS

APPENDIX 6.3 ..... SPEEDY MEMO FORMS

APPENDIX 6.4 ..... RECORD OF CONVERSATIONS

APPENDIX 6.5 ..... HOW TO PROPERLY IDENTIFY EMBEDDED DOCUMENTS, CATALOG CUT SHEETS, ETC.

6.1 REQUIRED SUBMITTALS

Section Number	Activity /Description	Required Date:
01020	Site Specific Accident Prevention Program including Emergency Notification Procedure	Within 20 days after Notice of Award
01200	Schedule of Values	Within 10 days after Notice of Award
01300	Overall Project Schedule	Preconstruction Conference
01300	Schedule Updates	As stated in Section 01300
01300	Project Record Drawings	At Substantial Completion
01450	Contractor Quality Control (CQC) Plan	Prior to Mobilization on-site
01500	Temporary Construction Facilities	Prior to Mobilization on-site
01500	Approved Traffic Control Plan	Prior to any work within the Work Zone Clear Zone (WZCZ)
02073	Manufacturer's Product Data	Prior to Mobilization on-site
02100	Clearing and disposal Plan	Prior to Mobilization on-site
02100	Staging, access, fencing and materials storage Plan(s)	Prior to Mobilization on-site
02115	Environmental Pollution Control Plan (includes SPCC Plan)	Prior to Mobilization on-site
02115	Sediment Testing Logs	At completion of in-water work

Section Number	Activity /Description	Required Date:
02200	Test Reports and samples	Prior to Mobilization on-site
02200	Updated Excavation Plan and Equipment List	Within 20 days after Notice of Award
02200	Product Data & Material Samples	10 Days prior to use
02270	Product Data and samples	Prior to Mobilization on-site
02270	SWPP and Contractor's CESCL	Prior to Mobilization on-site
02270	Storm water General Permit Transfer of Coverage Form for District Signature	Prior to Mobilization on-site
02350	Product data	Prior to Mobilization on-site
02360	Manufacturer's Certificate of Compliance	Prior to Mobilization on-site
02360	Product Data and certifications	Prior to Mobilization on-site
02511	Product data	Prior to Mobilization on-site
02810	Product data	30 days prior to installation on-site
02810	Irrigation System Record Drawings	At completion of irrigation system installation
02820	Fencing product data, Quality control and manufacturer's	30 days prior to installation on-site
02930	Product data and seed mix certification	15 days prior to placement
02950	Material Sources	30 days after Notice of Award
02950	Soil Samples	30 days after Notice of Award
02950	Inspection Certificates	30 days after Notice of Award
02950	Product Data	30 days after Notice of Award
02950	Test Reports	30 days after Notice of Award
02950	Shipping Tickets	30 days after Notice of Award

Section Number	Activity /Description	Required Date:
02990	Bench and Interpretive sign Stand Product Data	60 days prior to installation
03450	Manufacturer's Certificate of Compliance	No less than 20 days following Notice of Award
03450	Record Drawings	No less than 20 days following Notice of Award

6.2 CONTRACTOR SUBMITTAL AND DISTRICT REPLY FORMS

CONTRACTOR SUBMITTAL & DISTRICT REPLY FORM			
Submittal No.: **1301-XXXX-S-XXXX -0**			
TO:	Chelan County PUD – Wenatchee HQ Construction Manager: Casey Hall Attn: Judy Ursic 327 N. Wenatchee Ave Wenatchee, WA 98801	Project: **Contract 13-01 Entiatqua Trail, Schedule B**	
		Date Submitted:	
FROM:		Approved Submittal Schedule Date:	
Submittal Type:	☐ Shop Drawing	☐ Administrative	☐ Sample
No. of Copies:	☐ Quality Control	☐ Contract Closeout	☐ "Or-Equal"/Substitute

CONTRACTOR SUBMITTAL:						**DISTRICT REPLY:**		
No.	CPUD REF-if app	Spec & Para No.	Description of Item (Type Size, Model No, etc.)	Drawing or Brochure No.	Contract Variation **N-or-Y**	**Status***	**Action****	**Reviewed by & Date**
1.								
2.								
3.								
4.								

Contractor Comments:

Contractor hereby certifies that (i) Contractor has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By:_____
CONTRACTOR (Authorized Signature)

District Comments:

Review is for general conformance with the design concept and Contract Documents. Markings or comments shall not be construed as relieving the Contractor from compliance with the Contract Documents. The Contractor remains responsible for details and accuracy, for confirming and correlating all quantities and dimensions for fabrication processes; for techniques of assembly; and performing the work safely.

Status*:	**Action**:**
ANR – Approval Not Required	**NR** – No Action Required
APP – Approved	**REV** – Revise and Resubmit for Approval
AAR – Approved as Revised	**RSR** – Revise and Submit for Record
NOT APP – Not Approved	**SR** – Submit for Record

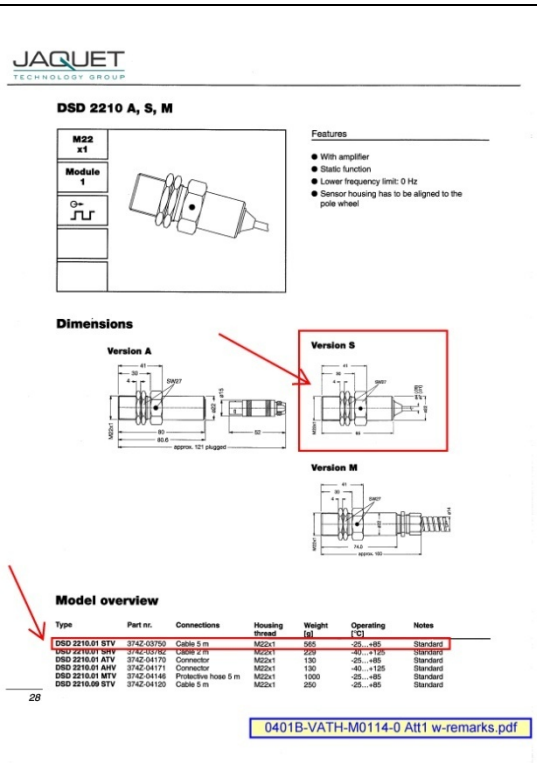
6.3 SPEEDY MEMO

SPEEDY MEMO								
Speedy Memo Number:							1301-XXXX-MXXXX-0	
Date:								
To:								
From:								
Project:	**Contract 13-01 Entiatqua Trail, Schedule B**							
Regarding:								
Description/Request:								
Requested Due Date:								
Attachments:				By:				
Copy:				Date:				
Response Assigned To (Names(s) and/or Organization(s))**:**								
Response A:								
Attachments:				By:				
Copy:				Date:				
CCPUD Action Required:								
☐	Follow Up	☐	Variance	☐	Field Order / Change Order	☐	DWG/Spec Revision	☐	Other:
Action Completed:								
By:							Date:	

6.4 RECORD OF CONVERSATION

RECORD OF CONVERSATION			
Check one:	☐ **Phone Call**	☐ **Personal Contact**	
Date:		**Time:**	ROC No. 1301-XXXX-RXXXX-0
Project:	**Contract: Contract 13-01 Entiatqua Trail, Schedule B**		
Person(s) Talked With:		Company / Phone Number:	
Conversation Summary:			
Significant Decisions:			
Required Actions/Follow-up:			
Signature:		**Date:**	
Distribution:			

6.5 HOW TO PROPERLY IDENTIFY EMBEDDED DOCUMENTS, CATALOG CUT SHEETS, ETC.



JAQUET
TECHNOLOGY GROUP

DSD 2210 A, S, M

M22 x1
Module 1

Features
- With amplifier
- Static function
- Lower frequency limit: 0 Hz
- Sensor housing has to be aligned to the pole wheel

Dimensions

Version A

Version S

Version M

Model overview

Type	Part nr.	Connections	Housing thread	Weight [g]	Operating [°C]	Notes
DSD 2210.01 STV	374Z-03750	Cable 5 m	M22x1	565	-25…+85	Standard
DSD 2210.01 SHV	374Z-03782	Cable 2 m	M22x1	225	-40…+125	Standard
DSD 2210.01 ATV	374Z-04170	Connector	M22x1	130	-25…+85	Standard
DSD 2210.01 AHV	374Z-04171	Connector	M22x1	130	-40…+125	Standard
DSD 2210.01 MTV	374Z-04146	Protective hose 5 m	M22x1	1000	-25…+85	Standard
DSD 2210.09 STV	374Z-04120	Cable 5 m	M22x1	250	-25…+85	Standard

28

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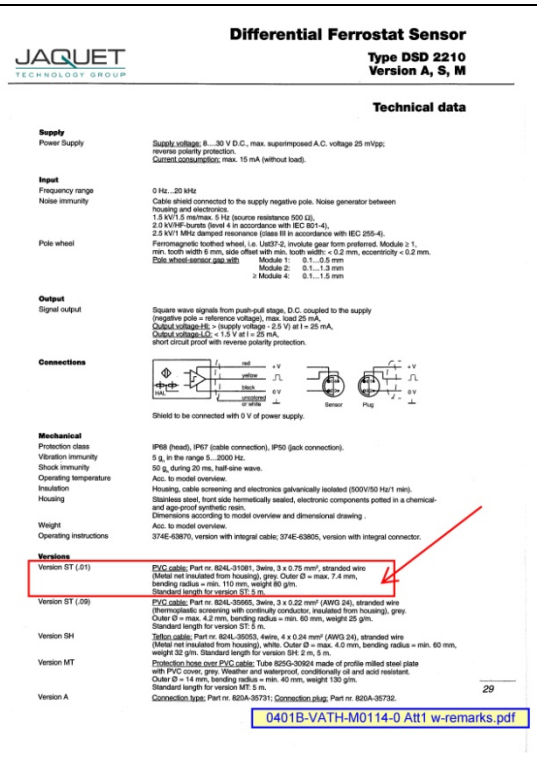

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Differential Ferrostat Sensor
Type DSD 2210
Version A, S, M

Technical data

Supply
Power Supply: Supply voltage: 8…30 V D.C., max. superimposed A.C. voltage 25 mVpp; reverse polarity protection. Current consumption: max. 15 mA (without load).

Input
Frequency range: 0 Hz…20 kHz
Noise immunity: Cable shield connected to the supply negative pole. Noise generator between housing and electronics. 1.5 kV/1.5 ms/max. 5 Hz (source resistance 500 Ω), 2.0 kV/HF-bursts (level 4 in accordance with IEC 801-4), 2.5 kV/1 MHz damped resonance (class III in accordance with IEC 255-4).
Pole wheel: Ferromagnetic toothed wheel, i.e. Ust37-2, involute gear form preferred. Module ≥ 1, min. tooth width 6 mm, side offset with min. tooth width: < 0.2 mm, eccentricity < 0.2 mm.
Pole wheel-sensor gap with: Module 1: 0.1…0.5 mm; Module 2: 0.1…1.3 mm; ≥ Module 4: 0.1…1.5 mm

Output
Signal output: Square wave signals from push-pull stage, D.C. coupled to the supply (negative pole = reference voltage), max. load 25 mA, Output voltage-HL: > (supply voltage - 2.5 V) at I = 25 mA, Output voltage-LO: < 1.5 V at I = 25 mA, short circuit proof with reverse polarity protection.

Connections
red +V; yellow; black 0 V; uncolored or white
Sensor Plug
Shield to be connected with 0 V of power supply.

Mechanical
Protection class: IP68 (head), IP67 (cable connection), IP50 (jack connection).
Vibration immunity: 5 g_n in the range 5…2000 Hz.
Shock immunity: 50 g_n during 20 ms, half-sine wave.
Operating temperature: Acc. to model overview.
Insulation: Housing, cable screening and electronics galvanically isolated (500V/50 Hz/1 min).
Housing: Stainless steel, front side hermetically sealed, electronic components potted in a chemical- and age-proof synthetic resin. Dimensions according to model overview and dimensional drawing .
Weight: Acc. to model overview.
Operating instructions: 374E-63870, version with integral cable; 374E-63805, version with integral connector.

Versions
Version ST (.01): PVC cable: Part nr. 824L-31081, 3wire, 3 x 0.75 mm², stranded wire (Metal net insulated from housing), grey. Outer Ø = max. 7.4 mm, bending radius = min. 110 mm, weight 80 g/m. Standard length for version ST: 5 m.
Version ST (.09): PVC cable: Part nr. 824L-35665, 3wire, 3 x 0.22 mm² (AWG 24), stranded wire (thermoplastic screening with continuity conductor, insulated from housing), grey. Outer Ø = max. 4.2 mm, bending radius = min. 60 mm, weight 25 g/m. Standard length for version ST: 5 m.
Version SH: Teflon cable: Part nr. 824L-35053, 4wire, 4 x 0.24 mm² (AWG 24), stranded wire (Metal net insulated from housing), white. Outer Ø = max. 4.0 mm, bending radius = min. 60 mm, weight 32 g/m. Standard length for version SH: 2 m, 5 m.
Version MT: Protection hose over PVC cable: Tube 825G-30924 made of profile milled steel plate with PVC cover, grey. Weather and waterproof, conditionally oil and acid resistant. Outer Ø = 14 mm, bending radius = min. 40 mm, weight 130 g/m. Standard length for version MT: 5 m.
Version A: Connection type: Part nr. 820A-35731; Connection plug: Part nr. 820A-35732.

29

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END OF SECTION 01300

DIVISION 1 - GENERAL
SECTION 01450 – CONTRACTOR QUALITY CONTROL

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 CONTRACTOR QUALITY CONTROL PLAN 2
1.2 COORDINATION MEETING 4
1.3 INTERPRETATIONS 4
1.4 CONTROL 4
1.5 CONTROL OF NON-CONFORMANCES 5
1.6 QUALITY RECORDS 5
1.7 DISTRICT QUALITY INTERFACE 5
1.8 WITNESS AND HOLD POINTS 6
1.9 RECORDS SYSTEM 6
2.0 PRODUCTS (NOT USED) 6
3.0 EXECUTION (NOT USED) 6
4.0 APPENDIX A - INSPECTION ELEMENTS – SUMMARY MATRIX 6

DIVISION 1 - GENERAL
SECTION 01450 – CONTRACTOR QUALITY CONTROL

1.0 GENERAL

1. The Contractor is responsible for quality control and shall establish and maintain an effective quality control system for both off-site and on-site work. The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements.
2. The Contractor Quality Control (CQC) Plan shall clearly establish the authority and responsibility of those responsible for the administration, inspections, tests and plan execution.
3. Persons performing quality functions shall be qualified (e.g., by training, education, or experience) and have sufficient and well defined authority to enforce quality requirements, to identify, initiate, recommend and provide solutions to quality problems and to verify the effectiveness of the solutions.
4. The Contractor shall monitor quality control of suppliers, manufacturers, material, equipment, services, site conditions and workmanship to produce Work of specified quality.
5. The Contractor shall comply with specified standards as a minimum quality for the Work except when more stringent tolerances or specific requirements in these Contract Documents indicate higher quality or more precise workmanship.
6. The Contractor shall comply with manufacturer's instructions and procedures, where applicable.
7. The CQC Plan shall be submitted for review by the District prior to mobilization on-site.
8. District reserves right to audit Contractor facilities for purpose of verifying compliance with District approved CQC Plan.
9. Rework caused by failure to follow approved CQC Plan shall be at Contractor's expense.
10. Additional specifications and standards for special processes are specified in other sections of this document. Specifications for special processes located in other sections of this document are "in addition to" those specified in this section. They do not relieve Contractor from compliance with this section.
11. Should conflicts arise between different or overlapping standards and the technical Specifications, District reserves the right to determine the applicable standard.

1.1 CONTRACTOR QUALITY CONTROL PLAN

1. The Contractor shall furnish for review by the District, not later than thirty (30) calendar days before start of any work, the Contractor Quality Control (CQC) Plan.

The plan shall identify personnel, procedures, control, instructions, tests, records, and forms to be used. The District will consider an interim plan for the first fifteen (15) days of operation. Work will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started. No additional days shall be added to the Contract Time or Completion Dates due to delays in obtaining permission to start work pending receipt and approval by the District of the CQC Plan or an interim plan.

1.1.1 Content of the CQC Plan

1. The CQC plan shall include, as a minimum, the following to cover all Work including work by Subcontractors, fabricators, and suppliers:

    a. A description of the quality control organization, including a chart showing lines of authority. The staff shall include a CQC system manager who shall report to the Contractor's Project Manager or someone higher in the Contractor's organization. The Contractor's Project Manager in this context shall mean the individual with responsibility for the overall management of the Project including quality and production.

    b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

    c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager including authority to stop work which is not in compliance with the Contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities and responsibilities. Copies of these letters shall also be furnished to the District.

    d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of Subcontractors, off-site fabricators, suppliers and purchasing agents.

    e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. This information shall be contained in a Inspection Elements Summary Matrix, Similar to the Districts Summary Matrix Provided document at the end of this section under Appendix A. The Summary Matrix shall list all required Inspections and Tests for each definable feature of work, references to test methods, applicable standards and procedures, acceptance criteria, and results. Laboratory facilities will be subject to approval by the District.

f. The CQC Plan shall also contain procedures for Control of Inspection Records, Traceability of Materials, Test Procedures, Packaging and Shipping Procedures, Storage and Handling Instructions, Witness and Hold Points, and Procedures for Control of Nonconforming Items.

1.1.2 Acceptance of Plan

1. Acceptance of the Contractor's plan is required prior to the start of Work. Acceptance is conditional and will be predicated on Satisfactory performance during the construction. The District reserves the right to require the Contractor to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
2. The CQC Plan shall be subject to approval and verification by District.
3. After acceptance of the CQC Plan, the Contractor shall notify the District in writing a minimum of seven calendar days prior to any proposed change. Proposed changes are subject to acceptance by the District.

1.2 COORDINATION MEETING

Before start of construction, and prior to acceptance by the District of the Quality Control Plan, the Contractor shall meet with the Project Manager or Authorized Representative and discuss the Contractor's quality control system. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both on-site and off-site work, and the interrelationship of Contractor's Management and control with the District's Quality Assurance inspection. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

1.3 INTERPRETATIONS

District reserves the right for determining the applicability and interpretation of all Specifications, standards and requirements related to this Contract. Contractor shall comply with the District’s interpretation at no additional cost provided the interpretation is within the Work scope defined herein and consistent with the intent of these Specifications.

1.4 CONTROL

1. Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of Subcontractors and suppliers, complies with the requirements of the Contract. The controls shall be adequate to cover all construction operations, including both on-site and off-site fabrication, and shall be keyed to the proposed construction sequence.

1.5 CONTROL OF NON-CONFORMANCES

1. As a part of its Quality Control and Quality Assurance Plan, the Contractor shall:
    a. Define a procedure for preventing nonconforming materials and equipment that do not meet standards, criteria or Specifications from being inadvertently used for this Project.
    b. Nonconforming materials and equipment that do not meet Contract standards, criteria or Specifications inadvertently used for this Project shall be resolved as a price deduction, repair, return to source, scrap, or rework at the discretion of the District.
    c. Any request for approval for deviations or nonconformance to the Contract Documents or Quality Control Plan shall be made to the Engineer in writing.
    d. A Nonconformance Report (NCR) shall be written and submitted to the District for each nonconforming item. As a minimum, the NCR shall 1) describe the system or part in nonconformance, 2) make reference to the controlling plan, specification, or procedure in violation, 3) include the Contractor's recommended disposition, and 4) signatures of the Contractor's Quality and Engineering personnel. An NCR Form shall be submitted to the District for approval prior to first use.

1.6 QUALITY RECORDS

1. The CQC Assurance Plan shall define the records that must be prepared and maintained. Such records shall include data, which could be required for future reference. This includes but is not limited to, as-built conditions, material certifications, installation records, and warranty.
2. The records shall be controlled by the Contractor to provide easy access for record retrieval and maintenance. All records shall be made available to the District upon request for inspection or the District's use.

1.7 DISTRICT QUALITY INTERFACE

1. The District has the right to observe any of the Contractor's Work including design, installation, field inspections and tests. The Contractor shall coordinate all quality activities with the District.
2. The District may perform, or have performed on its behalf, inspections during the work. The District shall be provided with unrestricted access to the Contractor's and Subcontractor's shops for such inspections.
3. The District's exercise of or failure to exercise its right to inspect, witness, test, or audit and any subsequent approval of Work by the District or designee, shall not relieve the Contractor of its obligation to comply with the terms and conditions of the Contract.

1.8 WITNESS AND HOLD POINTS

1. Witness points require notification from the CQC manager 24 hours prior to the scheduled time of their performance. The District or designee may witness the event; however, the Contractor may proceed without their presence. The District may require activities performed without proper notification to be repeated for the District's observation at the Contractor's expense.
2. Hold Points are those tests, inspections and operations which require witnessing by the District and beyond which operations shall not proceed without written consent of the District. The Contractor's failure to stop at a Hold Point may be cause for rejection of those items for which notification was not provided, or the Contractor may be requested to repeat the operation at its expense.
3. The Preliminary Hold Points are established within the Inspection Summary Matrix.

1.9 RECORDS SYSTEM

1. Contractor shall establish and maintain a record system that provides for the identification of materials and correlation to manufacturing, testing, and inspection records and certificates required by this Specification and the documents referenced herein.
2. Reports of tests and inspections shall be written for each test/inspection. All reports shall show the approved procedure, latest revision, the results, the date, the identification of the inspector or tester and the item examined.

2.0 PRODUCTS (NOT USED)

3.0 EXECUTION (NOT USED)

4.0 APPENDIX A - INSPECTION ELEMENTS – SUMMARY MATRIX

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END OF SECTION 01450

DIVISION 1 - GENERAL
SECTION 01460 – INSPECTIONS AND TESTS

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 GENERAL REQUIREMENTS 2
1.2 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS 2
2.0 TESTS 2
2.1 TESTING PROCEDURE 2
2.2 MEASUREMENT AND TEST EQUIPMENT 4
2.3 GENERAL 4
2.4 FIELD TEST REPORTS 5
2.5 CONSTRUCTION TESTING 5
3.0 PRODUCTS (NOT USED) 5
4.0 EXECUTION (NOT USED) 5

DIVISION 1 - GENERAL
SECTION 01460 – INSPECTIONS AND TESTS

1.0 GENERAL

1.1 GENERAL REQUIREMENTS

1. All materials, products and components manufactured, procured or fabricated by Contractor as part of the Work shall be subjected to such tests and inspections as may be necessary to verify compliance with the requirements of the Contract Documents.
2. All expenses for the tests shall be fully borne by Contractor. Contractor shall prepare and provide all labor, material and equipment necessary for performing specified or required tests. Contractor shall submit the test results to Engineer for approval.
3. Inspections shall be performed in accordance with the Approved Contractor Quality Control Plan (CQC). Inspection results shall be part of the quality documentation. Follow up inspections shall be conducted after correction of all deficiencies. Satisfactory follow up inspections shall be completed and documented prior to beginning subsequent Work that may be affected by the unsatisfactory Work. Contractor shall not build upon or conceal non-conforming Work.
4. Contractor shall perform tests as specified or required to verify that the control measures are adequate and the Work meets the requirements of the Contract and applicable standards and codes.
5. Approval of assemblies, tests and test procedures, etc., and acceptance of pertinent test certificates, inspection or waiving of inspections and tests shall in no way relieve Contractor of its contractual obligations for furnishing the Work in accordance with the provisions of these Contract Documents.

1.2 REFERENCES, SPECIFICATIONS, CODES AND STANDARDS

Code of Federal Regulations (CFR)
National Institute Of Standards and Technology (NIST)
American National Standards Institute (ANSI)
See Product Data Sheets

2.0 TESTS

2.1 TESTING PROCEDURE

1. The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Testing includes operation and/or acceptance tests when specified. A

list of tests to be performed shall be furnished as a part of the CQC plan. The list shall give the test name, frequency, Specification paragraph containing the test requirements, the personnel responsible for each type of test, and an estimate of the number of tests required. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, shall be recorded on the Quality Control report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test shall be recorded. Actual test reports may be submitted later, if approved by the Project Manager, with a reference to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility shall be provided directly to the Project Manager.

2. At the completion of all Work or any increment thereof, the CQC system manager shall conduct an inspection of the Work and develop a "punch list" of items which do not conform to the approved plans and Specifications. Such a list of deficiencies and the estimated date by which the deficiencies will be corrected shall be included in the CQC documentation. The CQC system manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected and so notify the Project Manager. These inspections and any deficiency corrections required by this paragraph shall be accomplished within the time stated for completion of the entire work or any particular increment thereof if the Project is divided into increments by separate completion dates.

3. Contractor shall perform checks and tests in accordance with the following:

a. Field Inspections and Tests as specified in these Specifications

b. Manufacturer’s and/or Contractor’s standard practices and recommendations

c. Reference and applicable testing standards

d. Mutual agreement of Contractor and Engineer based upon conditions or circumstances that may arise in the shop or in the field

4. Contractor shall evaluate test results and advise Engineer immediately of any discrepancy between test results and test limits or the failure of any item to meet the test criteria.

5. Contractor at their expense shall Furnish, set up and operate test equipment and facilities in Contractor’s shops or on site. If facilities for conducting required tests are

unavailable, Contractor may conduct tests elsewhere or have them performed by an independent agency subject to approval by Engineer.

6. Contractor shall protect all material and equipment during and after testing and checking to provide that subsequent testing of other equipment or systems does not disturb, damage, or otherwise interfere with functional capability of material and equipment.
7. In the event that test results do not fulfill the requirements specified in these Specifications or that any defects attributable to Contractor are found in test results, Contractor shall repair, adjust or correct and retest at its own expense to the satisfaction of Engineer. Repairs shall be subject to the approval of Engineer. Even in such an event, Contractor shall be responsible for maintaining the Project schedule and milestone completion dates.

2.2 MEASUREMENT AND TEST EQUIPMENT

1. Measurement and test equipment (meters, gauges, torque wrenches, sensors, etc.) supplied or used by Contractor for taking or recording of data shall:
    a. Have accuracy equal to or greater than stated acceptance criteria tolerances for test or work being performed.
    b. Have current calibration with traceability to National Institute of Standards and Technology (NIST). Calibration records shall be maintained as required by ANSI/ASQC E2 and submitted if requested by Engineer.
    c. Have traceability to national standards in the country of use, subject to approval by Engineer, where such equipment is supplied and used in facilities outside the United States.
2. Shop tests shall be performed by personnel experienced in the type of test being performed under the direct supervision of Contractor’s test engineers.

2.3 GENERAL

1. All components and assemblies installed at site shall be completely tested in accordance with the CQC Plan, Inspection Summary Matrix and these Specifications. Contractor shall provide all procedures, equipment, materials, and labor for field testing.
2. Contractor shall give full cooperation to District's inspection at the Site during installation and testing. During assembly and installation, Contractor shall request District's observation of those in-progress tests, which are impossible to be checked if the installation works are advanced or completed.
3. Field tests shall be performed by personnel experienced in the type of test being performed under the direct supervision of Contractor’s Test Engineers.

2.4 FIELD TEST REPORTS

1. Within twenty-four (24) hours of completion of each field test, Contractor shall submit one (1) copy of the test results to Engineer, unless specified otherwise. The report shall include a description (at a minimum) of the following:
    a. Item Tested
    b. Test Instrumentation
    c. List of Test Personnel
    d. Calibrations of Measuring Equipment
    e. Test Procedure
    f. Tabulations of Measurements
    g. Sample Calculations, as appropriate
    h. Test Results, including final adjustments and settings
    i. Conclusions and/or Remarks
2. To the fullest extent possible, all data gathered electronically shall be in a form easily imported to Microsoft Excel. Contractor shall furnish to the District an electronic copy of all original and manipulated test data.

2.5 CONSTRUCTION TESTING

1. During the Work, Contractor shall perform necessary and required inspections to ensure that completed installations are in accordance with the Contract Documents.
2. Construction tests shall demonstrate that all materials and equipment meet the Specifications and design documents, are properly installed, are functional, and free from damage.

3.0 PRODUCTS (NOT USED)

4.0 EXECUTION (NOT USED)

END OF SECTION 01460

DIVISION 1 - GENERAL
SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 DEFINITIONS 2
1.3 SUBMITTALS 2
2.0 PRODUCTS 3
2.1 TEMPORARY SERVICES - GENERAL 3
2.2 TEMPORARY WATER 3
2.3 TEMPORARY SANITARY FACILITIES 3
2.4 SOLID WASTE 3
2.5 SIGNAGE 3
2.6 WORK FROM SR97A 3
3.0 EXECUTION 5
3.1 GENERAL 5
3.2 REMOVAL 5

DIVISION 1 - GENERAL
SECTION 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1.0 GENERAL

1.1 DESCRIPTION

1. Work and requirements of this section include, but are not limited to the following:
    a. Furnish, install, maintain, and protect temporary signs, facilities, and utilities. Remove or relocate field offices and signs upon completion of work.
    b. Installations are required to be safe, non-hazardous, and sanitary. They are to be protective of persons and property, and be free of deleterious effects.
2. Attachment 1 to this subsection includes a Staging Area Map. Staging operations shall generally be contained within staging areas 1 and 2 as shown.

1.2 DEFINITIONS

1. Contractor's Field Office – A trailer facility provided by the Contractor to support Contractor's field work compliant with the requirements of this section.
2. District's Field Office – Provided under Entiat Park Revitalization Contract.
3. Temporary Controls - construction signage provided by the Contractor for public information and safety as well as for directing of construction traffic into and within the park.

1.3 SUBMITTALS

Prior to mobilization on-site, provide the following Temporary Construction Facilities Submittals:

1. Access Plans including identification of routes and entrances for construction traffic (Contract or may use Staging Area Map).
2. Contractors proposed locations and site layout for parking, material laydown/storage, field office, refueling and equipment staging. Locations shall be within staging areas 1 and/or 2 as shown in Attachment 1.
3. Fencing and protective barrier locations and details.
4. Temporary Utilities plan for electricity, water and sanitation.
5. Plan for site security as needed.
6. Approved traffic control plan. If Contractor's means and methods for construction of the Entiatqua Trail result in the need to impact traffic on SR97A the Contractor shall prepare, process and attain an approved traffic control plan as administered through the City of Entiat for this portion of SR97A.

2.0 PRODUCTS

2.1 TEMPORARY SERVICES - GENERAL

The Contractor shall make arrangements for the use of utilities on a temporary nature through the duration of the on-site Work.

2.2 TEMPORARY WATER

The City of Entiat will provide in-season irrigation water and potable water as required for construction and Contract-period maintenance. Use of the water and temporary connections shall be coordinated with the city.

2.3 TEMPORARY SANITARY FACILITIES

Provide sanitary facilities in compliance with laws and regulations.

1. Place Contractor's sanitation facilities in a location convenient to but not conflicting with construction operations; maintain in sanitary condition.
2. Provide such Sanitary Facilities as necessary in accordance with the provider's recommendation as to capacity based on maintenance schedule.
3. Service, clean, and maintain facilities and enclosures.
4. Pay all costs for installation, maintenance, and removal of temporary sanitary facilities.

2.4 SOLID WASTE

Contractor shall furnish adequate sanitary holding containers, and remove all solid waste from site. Local health department may inspect the site to assure adequate facilities are available for the sanitary holding of garbage and other waste organic materials, to which rodents and insects may have access.

2.5 SIGNAGE

Construction Traffic Signs – Provide, erect and maintain signs of a reasonable size and legibility to direct construction traffic to the project site.

2.6 WORK FROM SR97A

If Contractor's means and methods for construction of the Entiatqua Trail result in the need to impact traffic on SR97A the Contractor shall comply with the following:

The minimum workzone clearzone (WZCZ) distance of 22 feet from the edge of traveled way applies during working and nonworking hours. The WZCZ applies only to temporary roadside objects introduced during the Contractor's operations and does not apply to preexisting condtions to permanent Work. Those work operations that are actively in progress shall be in accordance with approved Traffic Control Plan, and other contract requirements.

During actual hours of work, only materials and construction vehicles absolutely necessary to construction shall be within the WZCZ or allowed to stop or park on the shoulder of the roadway. The Contractors's nonessential vehicles and employees private vehicles shall not be permitted to park within the WZCZ at any time.

Equipment or material will not be parked or stored inside the clear zone, 22 feet from the edge of traveled way, if not behind guardrail, during non-working hours.

Only equipment with rubber tires or street pads will be allowed on the roadway. Tracked vehicles with cleats or other devices that may damage the road surfacing will not be allowed.

Signing, flagging and traffic control shall be in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) Part 6 and the most current edition of the Public Rights-of-Way Accessibility Guidelines (PROWAG). One lane of traffic shall remain open at all times. Traffic control plans must be provided to the City of Entiat for approval at least 10 calendar days in advance of the time the signs and other traffic control devices are scheduled to be installed and utilized.

Only training with WSDOT TCS card and WSDOT training curriculum is recognized in the State of Washington. The Traffic Control Supervisor shall be certified by one of the following:

The Northwest Laborers-Employers Training Trust
27055 Ohio Ave.
Kingston, WA 98346
(360) 297-3035

Evergreen Safety Council
401 Pontius Ave. N.
Seattle, WA 98109
1-800-521-0778 or
(206) 382-4090

The American Traffic Safety Services Association
15 Riverside Parkway, Suite 100
Fredericksburg, Virginia 22406-1022
Training Dept. 1- 877-642-4637 or
(540) 368-1701

3.0 EXECUTION

3.1 GENERAL

Maintain, operate, and service temporary facilities and controls as the Work progress requires. Make accommodations to assure continuous services.

3.2 REMOVAL

1. Completely remove temporary facilities and controls when no longer required.
    a. Clean and repair damage caused by temporary installations and use of temporary facilities.
    b. Disinfect premises occupied by temporary sanitary facilities.
2. Restore existing facilities used for temporary services to specified, or to original condition.

    In areas compacted due to construction operations, till or harrow to loosen soil, rough grade, re-compact to 70% compaction and fine grade to elevations on plans, and restore existing vegetation unless otherwise indicated to be planted or seeded by Contractor or Owner.

Attachment 1 – Staging Area Map

one 11 x 17 color dwg

END OF SECTION 01500

DIVISION 2 – SITE WORK

TABLE OF CONTENTS

SECTION 02073	GEOSYNTHETICS
SECTION 02100	SITE PREP. CLEARING & GRUBBING
SECTION 02115	ENVIRONMENTAL POLLUTION CONTROL
SECTION 02200	EARTHWORK
SECTION 02270	EROSION AND SEDIMENT CONTROL
SECTION 02350	ROCK WALL
SECTION 02360	GABIONS
SECTION 02511	STORM DRAINAGE
SECTION 02810	SITE IRRIGATION
SECTION 02820	FENCING
SECTION 02930	HYDROSEEDING
SECTION 02950	LANDSCAPING
SECTION 02990	SITE FURNISHINGS

DIVISION 2 – SITE WORK
SECTION 02073 – GEOSYNTHETICS

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 SUMMARY 2
1.2 RELATED DOCUMENTS 2
1.3 SUBMITTALS 2
2.0 PRODUCTS 2
2.1 GEOGRID FOR MSEW AND ROCK WALLS 2
2.2 FILTER FABRIC 3
2.3 SOIL BAG SYSTEM 3
3.0 EXECUTION 3
3.1 GEOGRID INSTALLATION 3
3.2 FILTER FABRIC PLACEMENT 3
3.3 SOIL BAG INSTALLATION 3

DIVISION 2 – SITE WORK
SECTION 02073 – GEOSYNTHETICS

1.0 GENERAL

1.1 SUMMARY

This section describes the portion of work associated with furnishing and installing the following:

Geogrid for MSEW and Rock Walls

Filter Fabric for behind Gabion Baskets

Soil Bag System

1.2 RELATED DOCUMENTS

Section 02200 - Earthwork

Section 02270 - Erosion and Sediment Control

Section 02950 - Landscaping

1.3 SUBMITTALS

1. Submit in accordance with Section 01300 - Administrative Requirements.
2. Prior to mobilization on-site, provide manufacturer's product data (material physical properties).

2.0 PRODUCTS

2.1 GEOGRID FOR MSEW AND ROCK WALLS

1. Non-biodegradable, uniaxial, constructed of high molecular weight polyester/polyethylene structural geogrid for use in mechanically stabilized earth walls.
2. The geogrid shall conform to the following minimum average roll value properties when measured in accordance with the reference standard:

Physical Property	Required Value	Test Method
Tensile Strength @ 5% Strain (lbs/ft)	1,740	ASTM D6637
Ultimate Tensile Strength (lbs/ft)	4,700	ASTM D6637

3. Approved Products or Equal:
    a. Tencate Mirafi Miragrid® 5XT
    b. Tensar Structural Geogrid UX1400HS

2.2 FILTER FABRIC

1. Non-biodegradable, nonwoven, needle punched polypropylene fibers formed into a stable network such that the fibers retain their relative position.
2. The fabric shall conform to the following minimum average roll value properties when measured in accordance with the reference standard:

Physical Property	Required Value	Test Method
Flow Rate (gal/min/ft^2)	95	ASTM D4491
Apparent Opening Size (mm)	0.18	ASTM D4751
Grab Tensile Strength (psi)	205	ASTM D4632
Grab Elongation, (%)	50	ASTM D4632

3. Approved Products Or Equal:
    a. TenCate Mirafi 180N
    b. Propex Geotex 801

2.3 SOIL BAG SYSTEM

1. Soil Bag System shall consist of a non-woven geotextile bag, locking spike and stabilizer (Geogrid).
2. Approved Product Or Equal:

    Envirolok® by Agreacol, Suppler: Sunmark Companies, Portland, OR
    Telephone: 1-888-214-7333

3.0 EXECUTION

3.1 GEOGRID INSTALLATION

Refer to Specifications: Section 02350 - Rock Walls and Section 03450 - Mechanically Stabilized Earth Walls and Manufacturer's instructions.

3.2 FILTER FABRIC PLACEMENT

1. Filter Fabric shall be installed at the locations shown on the Drawings.
2. Where more than one (1) strip of fabric is required to cover the given area, it shall overlap the adjacent strip a minimum of 12 inches.
3. Fabric shall be held so that creasing or wrinkling is avoided as the rear face of the gabion basket wall is backfilled and compacted.
4. The Contractor shall be responsible to immediately repair all damaged areas.

3.3 SOIL BAG INSTALLATION

1. The soil bag system shall be installed at the locations shown on the Contract Drawings.

2. Fill soil bags with soil/gravel mix as specified in Specifications – Section 02200 Earthwork and 02950 Landscaping.
3. Soil bags shall be placed to fill voids in adjoining base rocks and to develop a uniform grade upon which to place the coir log.
4. The top row of soil bags shall be wrapped in a direction parallel to the Columbia River with soil stabilizer to form a functional structural system. Wrappings shall extend four (4) to eight (8) bags in length prior to starting a new wrap.
5. Following placement of the top row of soil bags locking spikes shall be placed no less than 18-inches on center or every other bag. Stabilizer shall also be placed no less than 18-inches on center or every other bag over locking spike and extend no less than three (3) feet landward. Bags shall be compacted into place with a hand tamper to lock and form a complete structural system.
6. Placement of soil bag system shall be coordinated with placement of live stakes. Live stakes may be placed between, below or just above soil bags.
7. Placement of soil bag system shall also be coordinated with placement of coir fabric and log.
8. The Contractor shall be responsible to immediately repair all damaged areas.

END OF SECTION 02073

DIVISION 2 – SITE WORK
SECTION 02100 – SITE PREPARATION, CLEARING & GRUBBING

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 RELATED SECTIONS 2
1.3 SUBMITTALS 2
1.4 EXISTING CONDITIONS 2
1.5 PROJECT CONDITIONS 3
2.0 PRODUCTS 3
2.1 TEMPORARY FENCING 3
2.2 STUMP CONTROL AGENT 3
3.0 EXECUTION 4
3.1 GENERAL 4
3.2 TREE AND PLANT PROTECTION 4
3.3 TREE REMOVAL 4
3.4 CLEARING AND GRUBBING 4
3.5 SELECT CLEARING AND GRUBBING 5
3.6 TREE AND PLANT DAMAGES 5
3.7 LIMITING DUST 6
3.8 DRAINAGE 7
3.9 DISPOSAL OF MATERIALS 7
3.10 CLEAN UP 7
3.11 TEMPORARY FACILITY REMOVAL 7

DIVISION 2 – SITE WORK
SECTION 02100 – SITE PREPARATION, CLEARING AND GRUBBING

1.0 GENERAL

1.1 DESCRIPTION

This Section includes site preparation work as indicated on the Contract Drawings. Work includes but is not limited to the following:

1. Protect from harm existing trees and vegetation not designated for removal.
2. Protect from harm existing structures, and objects not designated for removal.
3. Clear, grub and remove existing vegetation, as shown on plans.
4. Protect existing utilities.

1.2 RELATED SECTIONS

Section 02200 - Earthwork

Section 02270 - Erosion & Sediment Control

1.3 SUBMITTALS

1. Prior to mobilization on-site, provide written clearing and disposal procedures and operational sequence with stockpile areas and construction access routes for review by the District Include:
    a. Permits for transport and approved disposal of debris as required by state and local codes.
2. Project staging, access, fencing, and material storage plan(s).

1.4 EXISTING CONDITIONS

1. Protection of Existing Elements: Protect trees and vegetation noted on plans and described below.
2. If there is doubt about which vegetation shall remain, the Contractor shall consult the District prior to clearing activities.
3. Protect existing utilities to remain.
4. Survey Monuments: See General Conditions, Protection of Property
5. Contractor is responsible for the verification of all utility locations. Contractor shall meet with District and Contractor's location service to locate all known utilities.
6. Objectionable Noises: Conform to local governing requirements regarding noise control.

7. Maintain vehicular and pedestrian traffic routes:
    a. Do not close or obstruct streets, paths, easements, or passageways without permission from authorities having jurisdiction.
    b. If required by governing authorities, provide alternate routes around closed or obstructed traffic ways.

1.5 PROJECT CONDITIONS

1. Access routes for construction shall be as shown on plans, and be Approved by District prior to use.
2. Contractor shall install and maintain construction fence as needed to secure site and prevent public access.
3. Traffic: 1) Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations. 2) Do not close or obstruct streets, walks, driveways or other adjacent occupied or used facilities without permission from the District and authorities having jurisdiction.
4. For grading Work along property lines: 1) The District has spoken with adjoining property owners regarding the Work. 2) The Contractor shall coordinate with the District and adjoining property owners on scheduling of Work activities in these areas. 3) The Contractor shall employ methods to minimize disturbance to private lands. 4) Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.
5. For in-water demolition Work, comply with provisions of the Hydraulic Project Approval (HPA) and USACE 404 Permit as provided in Exhibit U.

2.0 PRODUCTS

2.1 TEMPORARY FENCING

1. Construction fencing and vegetation protection fencing: high-visibility, high density polyethylene fencing.
    a. Height: 48”
    b. Color: Orange
2. Posts: Steel “T” profile posts
3. Ties: Galvanized wire
4. Mesh openings: 3.5 x 1.5 inches

2.2 STUMP CONTROL AGENT

1. May contain potassium nitrate.
2. Submit product information, including MSDS sheets for product.

3.0 EXECUTION

3.1 GENERAL

1. Review clearing, grubbing and demolition activities with the District on site prior to commencement.
2. Obtain required permits and permission from local governing authorities and the District prior to commencing work.
3. Protect and maintain benchmarks and survey control points from disturbance during construction.
4. Verify that existing utilities, structures, and other items designated to remain are tagged or identified.
5. Locate and clearly flag trees and vegetation to remain or to be relocated. If any trees and/or tree branches are within the public right-of-way (ROW), the Contractor shall contact the property owner(s) and make provisions to protect or remove such.
6. Protect existing site conditions from damage during construction. If damage occurs, restore damaged improvements to their original condition, as acceptable to the District.

3.2 TREE AND PLANT PROTECTION

1. Protect vegetation to remain by installing construction fence and/or jersey barrier(s) between work zone and the vegetation. Fence to be located at dripline (branch perimeter) of individual plants, or plant groups. Review fence location and layout on site with the District prior to installation. Maintain fence in place until Substantial Completion and remove when Approved by Owner.
2. No material storage, vehicle access or equipment use to be within fenced area. Work including clearing and grubbing of non-native plants and debris, grading, planting, seeding, and mulching to be conducted with hand tools only.

3.3 TREE REMOVAL

Remove trees within the project area which are not identified as to be saved and protected.

Excavations resulting from tree removal shall be filled to finish grade. Fill within 12-inch depth of finish grade to be imported topsoil. Depths greater than 12-inches may be native soil.

3.4 CLEARING AND GRUBBING

Clear all shrubs, grasses, herbaceous plants rubbish and other objectionable matter within clearing limits shown on Contract Drawings. Remove all stumps and roots within the clearing limits to a depth of 12-inches or as needed for new construction.

3.5 SELECT CLEARING AND GRUBBING

1. The select clearing area is on steep slopes and requires care in vegetation clearing to prevent erosion and damage.
2. Save and protect existing vegetation not indicated for removal within Select Clearing Areas, including all root systems.
    a. Trees to be removed shall be marked by the District with flagging to identify which materials will be preserved and protected.
    b. Species include but are not limited to:
        1) Black Locust
        2) Siberian Elm
        3) Russian Olive
        4) Black Cottonwood
    c. Consult the District to identify vegetation to be removed and review prior to removal.
    d. Install construction fence surrounding trees to remain and maintain fence in place until final acceptance.
3. Clear all trees, shrubs, grasses, and herbaceous plants not identified to remain or designated to remain by the District, and remove rubbish and other objectionable matter within construction limits shown on Contract Drawings.
4. To remove invasive trees within work area such as Elm, Black Locust and Russian Olive, cut trees near the ground and apply an approved stump control agent per manufacturer's recommendations. Only allow use of stump control agent if stump isn't completely removed. In most cases the Contractor should remove stump.

3.6 TREE AND PLANT DAMAGES

The Contractor shall protect all trees and other plant types on site from damage until Project Completion. If any tree or other types of plants are destroyed, disfigured or damaged so that in the District's opinion removal is required, the Contractor shall remove the tree at no additional cost to the District and be assessed damages by Field Work Order/Change Order in accordance with the following chart. Use "tree caliper" or greatest tree trunk diameter measured 30-inches above ground from lowest elevation or lowest point at the base of the tree.

SIZE (Inches)	COST
¾	$60
1	$100
2	$200
3	$310
4	$450
5	$600
6	$880
7	$1,200
8	$1,530
9	$1,950
10	$2,430
11	$2,950
12	$3,480
13	$4,070
14	$4,730
15	$5,480
16	$6,330
17	$7,250
18	$8,300
19 and over	Use $500 per caliper inch

Note: Go to next higher classification if a fraction above an indicated caliper. Remove interfering branches and roots without damage to trunks As Directed upon approval of the District.

3.7 LIMITING DUST

Sprinkle water over excavated material and stripped areas and during grading or soil preparation operations as necessary to limit dust to lowest practicable level. Do not use water to the extent causing flooding, contaminated runoff or icing.

3.8 DRAINAGE

1. Keep roadway and site drains open for drainage at all times. Mud and sediment build-up shall be removed As Directed by the District.
2. Open pits and holes caused as a result of site preparation work shall be kept free of standing water.

3.9 DISPOSAL OF MATERIALS

1. Dispose of all debris materials, including barbed wire fencing, concrete, metals, and plant material in a legal manner off site.
2. The refuse resulting from clearing and grubbing shall be disposed of by the Contractor in a manner consistent with all government regulations. Debris hauled off site shall not be deposited in any stream or body of water, or in any street or alley, or upon any private property except by written consent of the private property owner. Maintain hauling routes clean and free of any debris resulting from work of this Section.
3. The Contractor may burn trees and vegetation, off or on-site, in accordance with all local and state regulations. If on-site, Contractor shall coordinate burning locations with the District.

3.10 CLEAN UP

Clean trucks and other equipment as required before entering access drive and roads. Clean drives and roads daily or as required to avoid dust, unsightly appearance, or water quality impacts.

3.11 TEMPORARY FACILITY REMOVAL

After Project Substantial Completion, and upon approval by Owner, Contractor shall remove temporary facilities including fences, access drives, parking areas, storage areas, offices and restrooms and restore grade, pavement, and vegetation to match adjacent areas.

END OF SECTION 02100

DIVISION 2 – SITE WORK
SECTION 02115 – ENVIRONMENTAL POLLUTION CONTROL

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 SECTION INCLUDES 2
1.2 SUBMITTALS 2
1.3 NOTIFICATIONS RELATIVE TO CONTRACTOR'S ACTIVITIES 2
1.4 PREVENTION OF ENVIRONMENTAL POLLUTION AND PRESERVATION OF PUBLIC NATURAL RESOURCES 3
1.5 SURFACE WATER CONTROL 3
1.6 DUST CONTROL 3
1.7 EROSION AND SEDIMENT CONTROL 3
1.8 NOISE CONTROL 4
1.9 PEST AND RODENT CONTROL 4
1.10 POLLUTION CONTROL 4
2.0 PRODUCTS 4
2.1 SPILL CONTAINMENT, CONTROL AND CLEAN-UP DEVICES 4
3.0 EXECUTION 4
3.1 PERSONNEL 4
3.2 HAZARDOUS SUBSTANCE DISPOSAL 4
3.3 HAZARDOUS WASTE STORAGE 5
3.4 SPILL RESPONSE AND CLEAN-UP 5
4.0 APPENDICES 5
4.1 APPENDIX A – PRELIMINARY SPCC PLAN 5

DIVISION 2 – SITE WORK
SECTION 02115 – ENVIRONMENTAL POLLUTION CONTROL

1.0 GENERAL

1.1 SECTION INCLUDES

This section covers the requirements for compliance with environmental precautions and controls.

1.2 SUBMITTALS

1. Prior to mobilization on-site, the Contractor shall submit an Environmental Pollution Control Plan. The Plan shall include provisions to address:
    a. Air quality, including dust control (See General Conditions)
    b. Noise pollution
    c. Sediment testing logs (see WDFW HPA provisions 27 – 29)
2. The Environmental Pollution Control Plan shall also include a Spill Prevention, Control and Countermeasures (SPCC) Plan including the following:
    a. Location of fueling station and associated spill prevention and control devices.
    b. Locations of other oil, fuel and chemical storage sites and associated spill prevention and control devices.
    c. Procedures and methods for emergency spill response including tools and materials that will be on hand and readily available to facilitate containment and cleanup.
    d. Notification process in the event of a spill.
    e. Any other items identified in the preliminary SPCC Plan included in Appendix A of this Specification section. An electronic copy of the preliminary SPCC Plan will be provided to the Contractor upon request. The preliminary plan represents the minimum requirements. Contractor shall assume full responsibility for compliance with and implementation of the Plan.

1.3 NOTIFICATIONS RELATIVE TO CONTRACTOR'S ACTIVITIES

The Contractor shall plan and schedule Contractor work activities to conform to and allow time for notifications, approvals, reviews, and other conditions of the Contract Documents. Notifications are required for spills or discharges for the following:

1. Sanitary Sewer Spills
2. Chemical, Oil, Hazardous Substance, or other Contaminant Spill or Discharge

1.4 PREVENTION OF ENVIRONMENTAL POLLUTION AND PRESERVATION OF PUBLIC NATURAL RESOURCES

General:

1. During the life of the Contract, the Contractor shall comply with Washington Administrative Code 173-303, 296-155 and all provisions of federal, State and local statutes, ordinances and regulations pertaining to the prevention of environmental pollution and the preservation of public natural resources. Pursuant to RCW 39.04.120 such provisions as are reasonably obtainable are set forth below. Further, if the Contractor must undertake extra work not contemplated by the Contract, due to the enactment of new, or the amendment of existing, statutes, ordinances, rules, or regulations occurring after the submission of the successful Bid, the District may issue a Field Work Order/Change Order setting forth the extra work that must be undertaken, which shall not invalidate the Contract.
2. The Contractor shall make every effort to minimize the amount of hazardous waste generated through measures such as using alternative non-hazardous materials, recycling, etc. Where the use of Hazardous Materials is necessary, the Contractor shall take steps to use the minimum amount required to complete the task.
3. Hazardous wastes generated shall be carefully segregated so as to not mix waste products that require different treatment and disposal. The Contractor is responsible for ensuring that all work is completed in order that the hazardous materials can be properly characterized, designated, packaged, labeled, manifested and removed from the site.

1.5 SURFACE WATER CONTROL

1. Provide surface water drainage controls in accordance with Section 02270 - Erosion and Sediment Control.
2. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment as required.
3. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.6 DUST CONTROL

1. Execute Work by methods to minimize raising dust from construction operations.
2. Provide positive means to prevent airborne dust from dispersing into atmosphere, as Approved by the District Construction Manager.

1.7 EROSION AND SEDIMENT CONTROL

Provide surface water drainage controls in accordance with Section 02270 - Erosion and Sediment Control.

1.8 NOISE CONTROL

Provide methods, means, and facilities to minimize noise produced by construction operations in accordance with General Conditions.

1.9 PEST AND RODENT CONTROL

Provide methods, means, and facilities to prevent pests, rodents and insects from invading the premises and damaging the Work.

1.10 POLLUTION CONTROL

1. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
2. Comply with pollution and environmental control requirements of the Washington State Baseline General Permit.
3. Comply with the Construction Stormwater General permit per Section 02270 - Erosion and Sediment Control.
4. Comply with the Washington State Department of Fish and Wildlife Hydraulic Project Approval.

2.0 PRODUCTS

2.1 SPILL CONTAINMENT, CONTROL AND CLEAN-UP DEVICES

The Contractor shall furnish, install and maintain on-site devices required to contain, control and clean-up oil spills and other hazardous substances. Devices shall be maintained in proper working condition. Devices shall be certified or otherwise deemed suitable for their intended use.

3.0 EXECUTION

3.1 PERSONNEL

1. Contractor's personnel exposed to Hazardous Substances and wastes shall be trained in proper handling, storage, and protection from Hazardous Substances.
2. Eating or drinking shall not be permitted in areas containing hazardous substances.

3.2 HAZARDOUS SUBSTANCE DISPOSAL

1. Any Hazardous Substances brought on-site by the Contractor, including any unused chemical products are the responsibility of Contractor and shall be disposed of in accordance with all applicable Federal, State, and local regulatory requirements.
2. Final disposal of hazardous waste off of District facilities generated as a result of the Contract Work shall be the responsibility of the District. All recyclable material shall be sent to an Approved recycling facility by the Contractor.

3.3 HAZARDOUS WASTE STORAGE

1. Hazardous Substances shall be stored in appropriate containers and labeled in accordance with the applicable regulations and standards. All containers, including steel drums used for Hazardous Material storage shall be purchased by the Contractor and in new condition.
2. The Contractor shall identify the Hazardous Substances storage areas that are located within the construction limits.

3.4 SPILL RESPONSE AND CLEAN-UP

1. Any release (spill) of a chemical or petroleum product to the ground, open waterway, sanitary sewer, storm drain or air, requires quick and effective action on the part of the Contractor. The District shall be contacted immediately if there is a spill or if emergency conditions develop as a result of a spill.
2. The Contractor is responsible for all spill clean-up. Promptly reporting and initiating a clean-up of the spill will mitigate further damage and prevent potential fines or penalties. The Contractor will work with the District to manage the waste generated from the clean-up of spills or release of Hazardous Substances. The Contractor shall work with the District for contacting the necessary authorities, dispatching clean-up crews and fulfilling any reporting requirements.

4.0 APPENDICES

4.1 APPENDIX A – PRELIMINARY SPCC PLAN

SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

ENTIATQUA TRAIL

NOVEMBER 2012

Public Utility District No. 1 of Chelan County

Wenatchee, Washington

TABLE OF CONTENTS

1.0 INTRODUCTION **8**
2.0 SPILL PREVENTION AND CONTAINMENT **8**
2.1 EQUIPMENT AND MATERIAL STAGING AREA **8**
2.2 FUEL STAGING AREA **8**
2.3 SPILL KITS **9**
3.0 SPILL RESPONSE **10**
3.1 CONTAMINATED SOIL **10**
3.2 SPILL RESPONSE SCENARIOS **10**

1.0 INTRODUCTION

Public Utility District No. 1 of Chelan County (District) has agreed complete the Entiatqua Trail Project as a condition of its Federal Energy Regulatory Commission (FERC) license to operate Rocky Reach Dam. As per Section 5.8(4) of the Rocky Reach 401 Water Quality Certification (401), for all new construction activities under the Rocky Reach FERC License, a water quality protection plan (WQPP) is to be prepared and implemented for each project involving work in or near water. This SPCC Plan has been prepared by the District to meet the requirements of the 401 and to develop a site-specific plan that covers the work involved in the construction of Entiatqua Trail (Trail).

The purpose of the SPCC Plan is to identify prevention measures, controls and mitigation associated with potential oil spills. The ultimate goal for the project is to avoid any oil spills.

The provisions of any state of federal permit regarding spill containment, control and countermeasures will supersede any requirements stated herein.

2.0 SPILL PREVENTION AND CONTAINMENT

2.1 EQUIPMENT AND MATERIAL STAGING AREA

Areas will be designated for equipment and material staging. Equipment and materials stored in these designated areas will be inspected at the beginning of each work shift for leaks. Any spills discovered will be immediately cleaned through the use of on-site spill kits (spill pads). The source of the leak will be immediately identified and repaired. Contaminated material(s) including soils will be disposed of in a legal manner at an offsite location.

2.2 FUEL STAGING AREA

An area will be designated for all refueling. The area will be no closer than 150 feet from the Columbia River. The perimeter of this area will have secondary containment berms and/or other devices to contain fuel in the event of a spill. A 55 gallon spill response kit will be located in the fueling area for easy access.

2.3 SPILL KITS

Two 55 gallon drum spill response kits will be kept and maintained at the project site. One kit will be located at the refueling area. The second kit will be located at the opposite end of the project site.

Each kit will include at a minimum the following items:

One 55-Gallon Collection Barrel with a minimum of the items listed below:			
10	Each	3” x 4’	Oil absorbant socks
4	Each	3” x 8”	Oil only absorbant socks
10	Each	18” x 18”	Oil only pillows
40	Each		Oil only absorbant pads
10	Pairs		Nitrile gloves
2	Pairs		Splash resistant goggles
10	30 gallon size		Heavy duty disposable bags with zip ties
10	lb.	bag	Kitty litter
1	Each		Baking soda to neutralize batter acid
1	Each		Emergency response guide book

Along with the 55 gallon kits there will be mini spill response kits located on each major piece of equipment. The mini spill response kits will include at a minimum the following items:

Mini-spill response kit will include at a minimum the following items:			
2	Each	18” x 18”	Oil only pillows
5	Each		Oil only absorbant pads
1	Pair		Nitrile gloves
2	Each	30 gallon	Heavy duty disposable bags with zip ties

3.0 SPILL RESPONSE

In the event of a spill an immediate response to protect the environment will take precedence over all other work. Any spill that has potential significant water quality impacts will be reported to the Department of Ecology, Central Regional Office at (509) 575-2490.

3.1 CONTAMINATED SOIL

If contaminated soil is encountered during excavation activities the Contractor will contain it by constructing a soil berm around the contaminated soil. The soil will be placed on a plastic liner and covered with plastic at the end of each workday. A soil berm or hay bales will be used to contain the stockpile and prevent migration of contaminated liquids. Identification and determination of source will be investigated.

3.2 SPILL RESPONSE SCENARIOS

Potential Spill Source 1:		Diesel or Unleaded Fuel (fueling operations, leak, rupture, etc.)
Spill Type:		Diesel fuel
Spill Response Equipment:		Appropriate PPE (fuel resistant gloves, eye protection), sorbent pads, kitty litter, 30-gallon plastic bags, "non-sparking" shovel, plastic sheeting, and one 55-gallon open top drum.
Spill Response Procedures:		In the case of a release or spill of diesel fuel, the following spill response procedures will be conducted:
1.	Stop operations immediately.	
2.	Notify the project superintendent who will immediately notify the District Inspector for the project.	
3.	Assess the hazard. If the spill cannot be safely and effectively controlled, direct safe evacuation of the area, and notify outside response services. Implement an emergency action plan (EAP) as appropriate.	
4.	If the spill is "incidental" and can be safely and effectively controlled by contractor personnel:	
	4.1	Secure the area
	4.2	Obtain appropriate spill response equipment and personal protective equipment
	4.3	Identify the source of the release. Determine the origin of the release. Is the release from a leaking fuel tank? A ruptured discharge hose? An overfilled fuel tank?
	4.4	Shut off source / equipment. If the release occurred as a result of fueling operations, turn off the fuel source. If the release occurred due to faulty equipment, make sure

		equipment is turned OFF.
	4.5	Contain the spill using appropriate spill response equipment provided in the on-site spill response kit
	4.6	Protect sensitive areas.
	4.7	Diesel fuel is a combustible liquid. Keep all sources of ignition away from spill.
	4.8	Cleanup spill. The area is not paved therefore any spills or releases in this area will contaminate surface oil. Once the source and the spill have been contained, remove visibly contaminated surface soil (wet, stained, and/or odorous) with a shovel (found in the spill response kit). Depending on the volume, removed soil is to be placed in either a labeled drum, or in a stockpile. If removed soil is to be placed in a stockpile, the stockpile must be placed on and covered with plastic (Visqueen). Sandbags or rocks will be used to anchor the plastic sheeting down.
	4.9	The site superintendent will immediately notify the District Inspector for appropriate local, state and federal agency notification.

Potential Spill Source 2:		Transmission, Hydraulic or Motor Oil (fueling operations, leak, rupture, etc.)
Spill Type:		Hydraulic oil
Spill Response Equipment:		Appropriate PPE (fuel resistant gloves, eye protection), sorbent pads, kitty litter, 30-gallon plastic bags, "non-sparking" shovel, plastic sheeting, and one 55-gallon open top drum.
Spill Response Procedures:		In the case of a release or spill of hydraulic oil, the following spill response procedures will be conducted
1.	Stop operations immediately.	
2.	Notify the project superintendent who will immediately notify the District Inspector for the project.	
3.	Assess the hazard. If the spill cannot be safely and effectively controlled, direct safe evacuation of the area, and notify outside response services. Implement an emergency action plan (EAP) as appropriate.	
4.	If the spill is "incidental" and can be safely and effectively controlled by contractor personnel:	
	4.1	Secure the area
	4.2	Obtain appropriate spill response equipment and personal protective equipment
	4.3	Identify the source of the release. Determine the origin of the release. Is the release from a leaking hydraulic line? A ruptured hydraulic hose?
	4.4	Shut off source/shut off equipment. If the release occurred as a result of oiling operations, turn off the source. If the release occurred due to faulty equipment, make sure equipment is turned off.
	4.5	Shut off source/shut off equipment. If the release occurred as a result of oiling operations, turn off the source. If the release occurred due to faulty equipment, make sure equipment is turned off.
	4.6	Contain the spill using appropriate spill response equipment provided in the on-site spill response kit.
	4.7	Please note that this material may burn, but will not ignite readily. Use caution to keep all ignition sources away from the spill.
	4.8	Cleanup spill. The area is not paved therefore any spills or releases in this area will contaminate surface soil. Once the source and the spill have been contained, remove visibly contaminated surface soil (wet, stained, and/or odorous) with a shovel (found in the spill response kit). Depending on the volume, removed soil is to be placed in either a labeled drum, or in a stockpile. If removed soil is to be placed in a stockpile, the stockpile must be placed on and covered with plastic (Visqueen). Sandbags or rocks will be used to anchor the plastic sheeting down.
	4.9	The site superintendent will immediately notify the District Inspector for appropriate local, state and federal agency notification.

Potential Spill Source 3:		Ethylene Glycol (fueling operations, leak, rupture, etc.)
Spill Type:		Ethylene Glycol (Radiator Fluid)
Spill Response Equipment:		Appropriate PPE (fuel resistant gloves, eye protection), sorbent pads, kitty litter, 30-gallon plastic bags, "non-sparking" shovel, plastic sheeting, and one 55-gallon open top drum.
Spill Response Procedures:		In the case of a release or spill of ethylene glycol, the following spill response procedures will be conducted:
1.	Stop operations immediately.	
2.	Notify the project superintendent who will immediately notify the District Inspector for the project.	
3.	Assess the hazard. If the spill cannot be safely and effectively controlled, direct safe evacuation of the area, and notify outside response services. Implement EAP as appropriate.	
4.	If the spill is "incidental" and can be safely and effectively controlled by contractor personnel, then:	
	4.1	Secure and ventilate the area of leak or spill.
	4.2	Remove sources of ignition and isolate the area.
	4.3	Contain and recover any liquid possible and absorb remainder with dry sand or earth (do not use combustible material such as sawdust).
	4.4	Collect the material place in a waste container.
	4.5	Obtain appropriate spill response equipment and personal protective equipment.
	4.6	Protect sensitive areas.
	4.7	The site superintendent will immediately notify the District Inspector for appropriate local, state and federal agency notification.

Potential Spill Source 4:			Battery Acid (fueling operations, leak, rupture, etc.)
Spill Type:			Battery Acid
Spill Response Equipment:			Appropriate PPE (fuel resistant gloves, eye protection), sorbent pads, kitty litter, 30-gallon plastic bags, "non-sparking" shovel, plastic sheeting, and one 55-gallon open top drum.
Spill Response Procedures:			In the case of a release or spill of battery acid, the following spill response procedures will be conducted:
1.	Stop operations immediately.		
2.	Isolate the area.		
3.	Assess the hazard. If the spill cannot be safely and effectively controlled, direct safe evacuation of the area, and notify outside response services. Implement EAP as appropriate.		
4.	If the spill is "incidental" and can be safely and effectively controlled by contractor personnel, then:		
	4.1	Secure the area.	
	4.2	Absorb the electrolyte with a non-organic absorbant such as dry sand or earth (avoid dilution with water).	
	4.3	Vacuum any lead spilled from battery (do not sweep or use compressed air).	
	4.4	Use soda ash or baking soda to neutralize the electrolyte.	
	4.5	Protect sensitive areas.	
	4.6	The site superintendent will immediately notify the District Inspector for appropriate local, state and federal agency notification.	

END OF SECTION 02115

DIVISION 2 – SITE WORK
SECTION 02200 – EARTHWORK

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 REFERENCES 2
1.3 DEFINITIONS 2
1.4 SUBMITTALS 4
1.5 JOB CONDITIONS 5
1.6 QUALITY CONTROL 5
1.7 FIELD QUALITY CONTROL 6
2.0 PRODUCTS 7
2.1 MATERIALS 7
3.0 EXECUTION 8
3.1 PROTECTION OF EXISTING FACILITIES 8
3.2 EXCAVATION 9
3.3 SHORING 10
3.4 SLOPE EXCAVATION 10
3.5 EXCAVATION PROTECTION 11
3.6 BACKFILL 11
3.7 WET WEATHER EARTHWORK 13
3.8 COMPACTION 13
3.9 PLACEMENT OF GRAVEL-SOIL MIX 14
3.10 CRUSHED ROCK SURFACING 14
3.11 MAINTENANCE 14
3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS 15
3.13 PROTECTION OF FINISHED WORK 15

DIVISION 2 – SITE WORK
SECTION 02200 – EARTHWORK

1.0 GENERAL

1.1 DESCRIPTION

Work specified in this Section includes providing all labor and materials associated with import and native earth materials including: excavating, removing, disposing, hauling, importing, reusing, preparing, conditioning, placing and compacting.

1.2 REFERENCES

1. Exhibit U – Additional Information - Entiatqua Geotechnical Report prepared by Shannon & Wilson, Inc.
2. Washington State Department of Transportation – Standard Specifications for Road, Bridge, and Municipal Construction (latest edition).
3. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.
4. ASTM D2487 - Classification of Soils for Engineering Purposes.
5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.

1.3 DEFINITIONS

1. Trench Fill: Soil or gravel material used to fill an excavation for trenched utilities, to the limits shown in the Contract Drawings.
2. Native Fill: Native soil designated for re-use conforming to 2.0 PRODUCTS for the various fill materials specified therein.
3. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
4. Rock Excavation/Removal: Rock excavation as defined herein is expected to be required in this Contract. No additional compensation shall be made for rock excavation as a changed condition. Rock excavation shall be defined as the removal of any rock that requires systematic drilling, chemically induced fracturing, hydraulic hammering or other special measures to facilitate removal.
5. Subgrade: Surface or elevation remaining after completing site clearing and grubbing, and authorized excavation.
6. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.
7. Relative Compaction:

- Ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined in accordance with ASTM D1557.
- Apply Corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by the District.

8. Optimum Moisture Content:
   - Determined in accordance with ASTM Standard specified to determine maximum dry density for relative compaction.
   - Determine field moisture content on basis of fraction passing ¾-inch sieve.
9. Relative Density: Calculated in accordance with ASTM D4254 based on maximum index density determined in accordance with ASTM D4253 and minimum index density determined in accordance with ASTM D4254.
10. Prepared Ground Surface: Ground surface after completion of required demolition, clearing and grubbing, scalping of sod, stripping of topsoil, excavation to grade, and subgrade preparation.
11. Completed Course: A course or layer that is ready for next layer or next phase of Work.
12. Lift: Loose (uncompacted) layer of material.
    - Well-Graded. A mixture of particle sized with no specific concentration or lack thereof of one or more sizes
    - Does not define numerical value that must be placed on coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.
    - Used to define material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids.
13. Influence Area: Area within planes sloped downward and outward at 2H:1V slope measured from:
    - One foot outside outermost edge at base of foundations or slabs.
14. Borrow Material: Material from required excavations or from designated borrow areas on or near Site.
15. Selected Backfill Material: Materials available onsite that Engineer determines to be suitable for specific use.
16. Imported Material: Materials obtained from sources offsite, suitable for specified use.
17. Structural Fill: Fill materials As Required to be placed behind retaining structures.
18. Embankment Material: Fill materials required to raise existing grade in areas other than under structures.

19. Intact Native Soil: Undisturbed earth material native to the project site as determined by the monitoring archaeologist or other designated District Representative.

1.4 SUBMITTALS

1.4.1 Test Reports:

Submit test results, signed and sealed by a registered Professional Engineer, to the District for review prior to mobilization on-site.

- For compacted soils and subgrades, perform Optimum Moisture Density Relationship ASTM D1557. One test for each soil type encountered.
- Field density ASTM D1557 test reports. Certified test lab report of the sieve analysis of the following:
  - Structural fill material
  - CSBC

1.4.2 Submit with five (5) days of testing.

1.4.3 Samples:

Submit each of the following in sealed plastic bags labeled with material name, size, and supplier.

- Imported structural fill and CSBC material (1 lb)
- Quarry Spalls (representative sample)
- Top Soil (representative sample)
- Soil/Gravel Mix (1 lb)

1.4.4 Excavation Plan and Equipment List (update plan submitted with bid proposal)

Within 20 days of Notice of Award, provide an excavation plan, detailing:

a. Methods and sequencing of excavation Work along entire trail with special emphasis on Work from stations 14+00 to 16+50.

b. If Work is necessitated from SR97A include discussion of traffic impacts and need for an approved traffic control plan.

c. Proposed locations of stockpiled excavated material.

d. Proposed on-site and off-site spoil disposal sites.

e. Numbers, types, and sizes of equipment proposed to perform excavations.

f. Anticipated difficulties and proposed resolutions, if any.

g. Reclamation of on-site spoil disposal areas.

h. Sources and associated locations for import materials.

1.5 JOB CONDITIONS

1.5.1 Native Soil/Rock

The existing conditions of the native soil and rock in the area of Work are either stated in Exhibit U – Geotechnical Report or are unknown. The District shall determine in the field if the native soil/rock is suitable for reuse.

1.5.2 Existing Utilities

1. Contact utility-locator service for area where Project is located before excavating.
2. Coordinate with a District Representative more than three (3) business days in advance of connecting to existing irrigation system.

1.5.3 Bench Marks/Survey Monuments

See General Conditions.

1.5.4 Excavation

Where subgrade is encountered that is not in conformance with the moisture and density requirements contained herein, it must be removed. Over excavation, below subgrade depths, shall only be completed with the approval of the District. When authorized, over excavation shall be completed in 0.50-foot vertical increments. Upon approval of the District, over excavation shall be replaced using approved backfill material. Replacement of over excavations shall be completed in accordance with Section 3.4 of this Specification.

1.5.5 Existing Utilities

Prior to beginning construction, the Contractor shall check and verify the location and elevation of all known utility lines. Any damage to existing utilities as a result of construction operation shall be promptly repaired by the Contractor at no expense to the District.

1.6 QUALITY CONTROL

1. The Contractor shall check quality of work and shall perform compaction, and density tests on request of the District to check compliance with these Specifications. The Contractor shall employ, at their expense, a testing lab acceptable to District to perform soil tests specified herein.
2. All test results must indicate conformance to this specification before proceeding with related work. Placed material that does not conform to the quality, gradation, moisture and density shall be removed and replaced at the Contractor's expense. The District shall have the authority to accept or reject any or all testing agencies, testing methods, or locations selected by the Contractor. The Contractor shall

provide three (3) days advance notice to the District when tests are required to be performed.

3. Inspection and testing will be performed under provisions of Specifications, Section 01450 Contractor Quality Control.

4. Tests and analysis of soil material will be performed in accordance with ANSI/ASTM D1557.

    - If tests indicate materials do not meet specified requirements, change material and retest at no cost to Owner.

1.7 FIELD QUALITY CONTROL

1. Field inspection will be performed under provisions of Specifications, Section 01450 - Contractor Quality Control.

2. The Contractor shall employ an operator with no less than ten (10) years experience as a heavy equipment operator for all embankment slope excavations.

3. Contractor Supplied Testing:

    a. Compaction testing will be performed by the Contractor in accordance with ANSI/ASTM D1557.

    b. Testing Agency: A qualified independent geotechnical engineering testing agency employed by the Contractor to perform field quality-control testing.

    c. All soil sampling and testing including in-place density testing will be conducted and paid for by the Contractor. Retesting and re-inspection by the same testing laboratory required because of defective Work and testing performed for the convenience of the Contractor shall also be paid for by the Contractor.

    d. The Contractor shall cooperate with laboratory personnel employed to conduct the density testing, sampling of material(s), and special inspections. The Contractor shall further provide safe access within the Work site for laboratory personnel such that density testing and visual inspection can be performed. Testing requirements shall not be cause for claims of delay by the Contractor and all expenses accruing therefrom shall be deemed incidental to the performance of the Contract.

    e. Allow testing agency to inspect and test subgrades as required for each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed Work comply with requirements.

    f. When testing agency reports that subgrade, structural fill, pipe zone bedding, trench backfill, or crushed rock surfacing have not been compacted to the degree specified, scarify and moisten or aerate, or remove and replace material to depth required. Re-compact and retest until specified compaction is obtained. Failure to achieve compaction requirements and subsequent rework shall be at no cost to the District.

g. If tests indicate Work meets compaction requirements Contractor shall employ similar compaction methods on subsequent layers. If after multiple testing efforts confirm Contractor's compaction methods result in meeting the specified conditions, the District may modify the number and frequency of compaction tests required.

h. The District may elect to conduct, for quality assurance, their own in-place density tests. Under such provisions the Contractor shall cooperate in a like manner as if they were conducting the tests. The District will pay for quality assurance test, if required. In the event quality assurance tests indicate in-place material does not meet compaction requirements the Contractor shall cooperate fully to bring the material into conformance and pay for any subsequent quality assurance testing.

2.0 PRODUCTS

2.1 MATERIALS

1. Trail Finish Course: Shall conform to WSDOT Standard Specification 9-03.9(3) Crushed Surfacing Base Course (CSBC).
2. Steambed Sediment: Shall conform to WSDOT Standard Specification 9-03.11(1).
3. 8"-12" Streambed Cobbles: Shall conform to WSDOT Standard Specification 9-03.11(2) – for 12-inch Streambed Cobbles.
4. Base Rock and Boulders for Large Woody Complex Structures: Shall conform to WSDOT Standard Specification 9-03.11(3) Streambed Boulders.
5. Drain Rock or irrigation valve boxes: Shall conform to WSDOT Standard Specification 9-03.12(4) – Gravel Backfill for Drains.
6. Pipe zone bedding materials irrigation HDPE pipe shall conform to WSDOT Standard Specification 9-03.13 – Backfill for Sand Drains.
7. Trench Backfill: Import or on-site native material conforming to WSDOT Standard Specification 9-03.14(2) - Select Borrow.
8. Structural Fill: Shall conform to WSDOT Standard Specification 9-03.14(4) Gravel Borrow for Geosynthetic Retaining Wall (Footnote 1 applies: "100 percent passing 1¼-inch sieve and 90 to 100 percent passing 1-inch sieve") or 9-03.9(3) Crushed Surfacing Base Course.
9. Quarry Spall: For use at drainage outfall, below base rock and five (5) feet above gabion wall as slope armoring. Shall be hard, sound and durable material free from defects tending to destroy its resistance to weather. Grading shall conform to the requirements stated in WSDOT Standard Specification 9-13.6 Quarry Spalls.
10. Rock Walls: Shall conform to WSDOT Standard Specification 9-13.7(1) Rock for Rock Walls and Chinking Material.

11. Rock Fill for Gabions: Shall conform to WSDOT Standard Specification 9-27.3(6) Stone.

12. Topsoil: Shall be on-site or imported sandy loam soil materials conforming to the gradation, below; free of debris, waste, frozen materials, vegetable and other deleterious matter. For use as a bulk material to fill planting corridor as illustrated in the Contract Drawings. Not acceptable as Prepared Planting Soil Backfill.

Sieve Size	Percent Passing (by weight)
1 inch	100
3/8 inch	80 - 100
No. 10	80 Max
No. 40	40 Max
No. 200	7 Min

13. Soil/Gravel Mix: Shall be a 50/50 blend of topsoil and clean, rounded, naturally occurring gravel material meeting the following gradation requirements

Screen Size	**Percent Passing (by weight)**
1 ½ inch	65-100
1 ¼ inch	45-60
No.4	22-46
No. 200	0-2

14. Prepared Planting Soil Backfill: See Section 02950 Landscaping

15. Compost: See Section 02950 - Landscaping.

3.0 EXECUTION

3.1 PROTECTION OF EXISTING FACILITIES

1. Utilities: The Contractor shall protect from damage private and public utilities. Verify the locations of underground utilities, call Dial-a-Dig: 1 (800) 424- 5555 a minimum of 48 hours prior to excavation (Lat/Long = 47°39’45” -120°13’29”).

2. Access Streets and Roadways: Provide wheel cleaning stations to clean wheels and undercarriage of trucks before leaving site, as necessary to prevent dirt from being carried onto easement drive and public streets. If streets are fouled, they must be cleaned immediately in conformance with WSDOT Standard Specifications, latest edition.

3. Repair and/or replacement of damaged facilities will be accomplished at the Contractor's expense.

4. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Section 02100 - Site Clearing.

5. Protect and maintain erosion and sedimentation controls during earthwork operations.
6. Protect existing trees designated to remain in accordance with Section 02100 - Site Clearing.

3.2 EXCAVATION

1. General: Removal of materials beyond indicated subgrade elevations or dimensions without specific direction of District is not authorized. Unauthorized excavation, as well as remedial work directed by District, shall be at the Contractor's expense.
2. All grades shown on Contract Drawings are finish grades. Over excavation to subgrade levels may be necessary to backfill with earthen, rock or soil materials shown on Contract Drawings.
3. Stability of excavations:
    a. Excavations on embankment side slopes shall be performed in a safe manner. Heavy equipment operators should be seasoned veterans who have demonstrated good judgment and a high level of proficiency. The operators shall recognize and avoid working in unstable slope conditions. If conditions are determined to be unsafe, the Contractor shall immediately cease Work and notify the District of such conditions. Contractor shall then develop a work plan to remedy such conditions to the satisfaction of the District.
    b. Sloping of excavations shall be done in conformance with Federal, State and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
    c. If shoring, bracing or other structural methods are required to maintain stability of excavation, the Contractor shall employ an engineer licensed in the State of Washington to certify stability methods are safe and meet relevant codes.
4. Dewatering: Prevent surface and subsurface water from flowing into upland excavations and from flooding project site. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations to collecting or run-off areas. If required, line ditches and sumps with coarse-grained material that acts as a filter. Do not use trench excavations as temporary drainage ditches. Methods of dewatering marsh areas must be Approved by District.
5. Material Storage: Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
6. Dispose of excess soil material and waste materials as herein specified.

7. Remove completely any existing "natural" obstructions in areas to be occupied by construction elements or other new work.
8. Remove surficial plant material on construction slope areas.
9. Layout: Layout of all work shall be surveyed and staked as required.
10. Maintain all bench marks, control monuments and stakes, whether newly established or previously existing. Protect from damage and dislocation. If necessary to disturb existing bench marks, re-establish in a safe place. Notify District a minimum of 3 days prior to excavation of work areas. District shall inspect staking and layout of work.
11. Prior to and during excavation work install and maintain erosion control devices per Specifications, Section 02270 - Erosion and Sediment Control.

3.3 SHORING

1. If shoring is used, the Contractor shall provide all materials, labor, and equipment necessary to shore excavations to protect the Work, existing property, utilities, pavement, etc., and to provide safe working conditions. The Contractor may elect to use any combination of shoring and overbreak, sliding trench shield, or other method of accomplishing the Work consistent with the applicable local, State, or federal safety codes.
    a. If workers enter excavations 4 feet or more in depth that does not meet open pit requirements, it shall be shored. The Contractor alone shall be responsible for worker safety, and the Engineer assumes no responsibility.
    b. Upon completing the Work, the Contractor shall remove all shoring unless the Contract Drawings or the Engineer direct otherwise.
    c. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Contractor.
    d. The Contractor may perform extra excavation without shoring if worker safety is ensured As Required by law.
        - If a slide occurs in an over-excavated trench, the Contractor shall remove the slide material. The Contractor shall pay all costs related to removing slide material and restoring the slide area.

3.4 SLOPE EXCAVATION

1. Excavation into existing embankment shall not be greater than 0.75 horizontal to 1 vertical (0.75H:1V) over an eight (8) foot height without the use of shoring or other methods to shore the slope.
2. Excavate trenches to indicated grades, lines, and widths per Contract Drawings.
    a. Smooth and proof compact bottom of site water lines trench. Remove all sharp rocks or rocks in excess of 1 1/2" in diameter.

b. Grade top perimeter of excavation to prevent surface water from draining into excavation.

c. Hand trim excavation. Remove loose matter.

d. Remove lumped subsoil, boulders, and rock. Larger rock may need to be removed with expansive tools or explosives.

3. All surplus or waste material shall be disposed of by the Contractor.

4. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume Work.

5. Correct areas over-excavated in accordance with Specifications herein.

6. Stockpile suitable excavated material designated for reuse in area designated on site and remove unsuitable material not being reused from site.

7. When quantities of suitable materials obtained from specified excavations are insufficient to construct specified fills, the additional materials shall meet Specification requirements.

8. All borrow (gravel) pits (if used) shall be left in a final condition with stable side slopes, removal of hazards, and other unsightly conditions.

3.5 EXCAVATION PROTECTION

1. Protect excavations by methods required to prevent cave-in or loose soil from upper slope from falling into excavation.

2. Protect bottom of excavations and soil adjacent to and beneath foundation, from freezing.

3.6 BACKFILL

1. General

a. Remove all loose materials and trash from excavation before placing backfill.

b. Materials determined by the District to be unsuitable for backfill at the time of excavation shall be removed and replaced with imported backfill.

c. Moisten material as required to aid compaction. Maintain optimum moisture content of backfill materials to attain required compaction.

d. Place material in horizontal lifts in a manner which avoids segregation.

e. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

f. Employ a placement method that does not disturb or damage other Work.

g. Remove excess and unsuitable surplus backfill materials from site.

2. Tolerances:

a. Top Surface of CSBC Trail: Plus or minus 1-inch from required elevations.

b. Top Surface of General Backfilling: Plus or minus 1-inch for required elevations.

3. Structural Fill: See Specifications, Section 03450 - Mechanically Stabilized Earth Wall.

4. Crushed Rock Surfacing:

   a. Place crushed rock surfacing on compacted structural fill free of mud, frost, snow, or ice.
   b. Compact crushed rock surfacing course at optimum moisture content to required grades, lines, cross sections, and thickness.
   c. Shape crushed rock surfacing course to required crown elevations and cross-slope grades.
   d. Compact crushed rock surfacing course at optimum moisture content to required grades, lines, cross sections, and thickness.
   e. Compaction Requirements: Backfill shall conform with 7-09.3(9-11) of Washington State DOT Standard Specifications, except where indicated otherwise in the Specifications herein.

5. Trenches:

   a. Place pipe zone bedding on compacted subgrade free of mud, frost, snow, or ice.
   b. Place and compact pipe zone bedding on trench bottoms around pipe haunches and over pipe to the dimensions identified in the Contract Drawings. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Use hand tools to compact material under haunches and around fittings and valves. Carefully compact initial backfill under pipe haunches evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit.
   c. Compact pipe zone bedding at optimum moisture content to required grades, lines, cross sections, and thickness.
   d. Place trench backfill on compacted pipe zone bedding free of mud, frost, snow, or ice.
   e. Compact trench backfill at optimum moisture content to required grades, lines, cross sections, and thickness.

6. Planting Areas:

   a. Slope grade towards river.
   b. Backfill areas to contours and elevations with unfrozen materials. Make gradual grade changes.
   c. Incorporate soil amendments and fine grade per Sections 02930-Hydroseeding and 02950 Landscaping.
   d. Work shall be built to the required elevations, slope and grade and finished surfaces shall be even and present a neat appearance. Placed material not

meeting these limits shall be removed or reworked as directed by the District. The District will approve subgrade and make minor grade changes as necessary prior to placement of paving materials.

3.7 WET WEATHER EARTHWORK

1. The ground surface in and surrounding the construction area shall be sloped to promote runoff of precipitation away from work areas, and to prevent ponding of water.
2. Cover work areas or slopes with plastic, execute sloping, ditching, sumps, dewatering, and other as necessary to permit proper completion of the Work. Stockpiles of soil shall be covered with plastic sheeting, properly weighted down.
3. Earthwork should be accomplished in small sections to minimize exposure to wet conditions. Each section should be small enough so the removal of unsuitable soils and placement and compaction of clean structural fill can be accomplished on the same day.
4. No soil should be left uncompacted and exposed to moisture. A smooth-drum vibratory roller, or equivalent, should roll the surface to seal out as much water as possible.
5. In-place soils or fill soils that are or become wet and unstable, and/or too wet to suitably compact, should be removed and replaced with clean, granular soil.
6. Grading and earthwork should not be accomplished during periods of heavy, continuous rainfall.

3.8 COMPACTION

1. General: Control soil compaction during construction providing minimum percentage of density specified for area classification.
2. The Contractor shall determine the most cost effective means and methods for attaining compaction requirements as stated herein. Equipment or hand tools selected for use shall produce consistent results.
3. Contractor as part of their quality control program shall test compaction according to the Modified Proctor ASTM D 1557 to the following percentages and minimum frequency levels:

Material	Percent Compaction	Testing Frequency
Pipe Zone Bedding	90%	Top of bedding material once per every 500 feet of utility type installed
Trench Backfill	90%	In top one foot of trench once per every 500 feet of utility type trench installed
Structural Fill	95%	Once every 50 feet per 6 inch lift or less frequent as determined by the District based on consistency of compaction

		methods employed
Crushed Rock Surfacing	95%	Once per 250 feet of trail
Planting Mix/Soil	80%	Visual

3.9 PLACEMENT OF GRAVEL-SOIL MIX

1. All materials shall be installed to specified grades and elevations at locations shown on the Contract Drawings.
2. The materials shall be constructed to form a uniform layer having a final thickness as specified on the Contract Drawings.
3. No over-placement above the specified lines and grades (and allowable tolerances) will be allowed. The Contractor will be responsible for removing any over placed materials at no additional expense to the District.

3.10 CRUSHED ROCK SURFACING

1. Excavation and embankment shall be accomplished to meet the lines and grades shown on the drawings and designated on the ground.
2. Compact subgrade using mechanical roller or compactor. Remove loose material from compacted subbase surface. Proof roll prepared subgrade to check for unstable areas and need for additional compaction. Do not begin path installation until unstable conditions have been corrected.
3. Before placing crushed rock, all organic soil, duff and litter shall, unless otherwise shown on the drawings, be removed from within pathway limits.
4. The path cross section shall be constructed in accordance with the Contract Drawings.
5. Compact crushed rock to required density.
6. Keep path clean and free of stains, discolorations, dirt and other foreign material throughout contract period and rake clean just prior to final inspection.

3.11 MAINTENANCE

1. Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded and rutted areas to specified tolerances.
2. Reconditioned Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

3.12 DISPOSAL OF EXCESS AND WASTE MATERIALS

Remove from Owner's property all waste materials, trash and debris, and dispose of it off site in a legal manner.

3.13 PROTECTION OF FINISHED WORK

1. Protect finished Work.
2. Reshape and re-compact fills subjected to vehicular/equipment traffic.

END OF SECTION 02200

DIVISION 2 – SITE WORK
SECTION 02270 – EROSION AND SEDIMENT CONTROL

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 SCOPE 2
1.2 QUALIFICATIONS 2
1.3 GENERAL REQUIREMENTS 2
1.4 SUBMITTALS 4
2.0 PRODUCTS 5
2.1 SILT FENCES 5
2.2 JERSEY BARRIER 5
2.3 STORM DRAIN INLET PROTECTION (IF REQUIRED) 5
2.4 TURBIDITY CURTAIN (FOR IN-WATER WORK) 6
2.5 CONSTRUCTION ENTRANCE 6
2.6 STRAW BALE BARRIER (IF USED) 7
2.7 STRAW MULCH (IF USED) 7
2.8 COIR FABRIC 7
2.9 COIR LOG 7
2.10 STAKES/WEDGES 7
3.0 EXECUTION 8
3.1 EROSION AND SEDIMENT CONTROL PLAN (ESCP) 8
3.2 TURBIDITY CURTAIN 10
3.3 SILT FENCES AND STRAW BALE DAMS 10
3.4 CONSTRUCTION ENTRANCE 11
3.5 COIR FABRIC AND LOGS 12
4.0 APPENDICES 12
4.1 ATTACHMENT A - STORMWATER POLLUTION PREVENTION PLAN 12

DIVISION 2 – SITE WORK
SECTION 02270 – EROSION AND SEDIMENT CONTROL

1.0 GENERAL

1.1 SCOPE

1. The Work specified in this section shall consist of stabilization of soil to prevent erosion during and after construction and land disturbing activities, as well as stormwater pollution prevention. Contractor shall furnish all labor, materials, tools, and equipment to perform the Work and services necessary as specified herein and as indicated in the Contract Documents. This includes installation, maintenance, and final removal as necessary, of all temporary and permanent control measures.
2. The areas anticipated as requiring soil erosion and sediment control measures are indicated on the Contract Drawings. Contractor shall employ these and additional measures, as necessary, to prevent soil erosion and protect water quality. The District reserves the right to modify the use, location, and quantities of soil erosion and sediment control measures based on the activities of the Contractor.
3. Work also includes installation of shoreline erosion control including coir logs, coir fabric, and soil gravel mix where indicated on Contract Drawings.

1.2 QUALIFICATIONS

All erosion control Work shall be done under the supervision of a Contractor employed, on-site, Certified Erosion and Sedimentation Control Lead (CESCL). The CESCL shall have successfully completed the Washington State Department of Ecology approved CESCL Course. Contractor's CESCL shall have and maintain active CESCL registration for the duration of Work for which a Construction Stormwater General Permit is required.

1.3 GENERAL REQUIREMENTS

1. Unless otherwise specified herein, all erosion control and stormwater management activities shall conform to the Washington State Department of Ecology Stormwater Management Manual for Eastern Washington.
2. The District previously obtained coverage for construction stormwater discharges under the State of Washington Construction Stormwater General Permit. Immediately upon District issuance of the Notice of Award for this Contract, the Contractor shall process a District Transfer of Coverage Form (www.ecy.wa.gov/programs/wq/stormwater/construction/permit) to transfer coverage from the District and assume full responsibility for stormwater management on the project site including monthly reporting, completion of Termination Form and payment of all fees (approximately $2,000/year).

3. The District has prepared and submitted an Erosion and Sediment Control Plan (ESCP) to the Federal Energy Regulatory Commission (FERC). The ESCP is synonymous to the Washington State Department of Ecology (ECY) Storm Water Pollution Plan (SWPP). A copy of the SWPP is included in Appendix A at the end of this Specification section. Upon Notice of Award, the Contractor assumes ownership of the SWPP and shall review and update the SWPP in accordance with the Construction Stormwater General Permit.

4. The SWPP combined with the Spill Prevent Control and Countermeasures (SPCC) Plan, as described in Section 02115 Environmental Pollution Control, constitutes a Water Quality Protection Plan (WQPP). As a condition of the District's FERC license to operate the Rocky Reach Hydroelectric Project a WQPP has been submitted to ECY for their review and approval.

5. The Contractor assumes full responsibility for implementation of the SWPP. The preliminary SWPP represents the minimum required for the project. The Contractor shall consider additional practices to ensure avoidance of water quality violations.

6. The Contractor shall be responsible for phasing Work in areas allocated for his exclusive use during this Project, including any proposed stockpile areas, to restrict sediment transport. This will include installation of any temporary erosion control devices, ditches, or other facilities.

7. The areas set aside for the Contractor's use during the Project may be temporarily developed to provide satisfactory working, staging, and administrative areas for his exclusive use. Preparation of these areas shall be in accordance with other requirements contained within these Specifications and shall be done in such a manner to control sediment transport away from the area.

8. All permanent stockpiles shall be seeded with soil stabilization seed and protected by construction of silt fences and permanent 2 foot minimum depth ditches, completely surrounding stockpiles and located within 10 feet of the toes of the stockpile slopes.

9. Sediment transport and erosion from working stockpiles shall be controlled and restricted from moving beyond the immediate stockpile area by construction of temporary toe-of-slope ditches and accompanying silt fences, as necessary. The Contractor shall keep these temporary facilities in operational condition by regular cleaning, regrading, and maintenance. Erosion control or covering with clear plastic or other mulching materials of stockpiles should be completed within 15 days (October 1 through June 30) or 30 days (July 1 through September 30) of the formation of the stockpile.

10. The Contractor shall maintain all elements of the Soil Erosion Stabilization and Sediment Control systems and facilities to be constructed during this Project for the duration its activities at the site. Formal inspections may be made by the District at any time to evaluate Contractor's conformance to the requirements of these Specifications.

11. All silt traps shall be cleaned of collected sediment after every storm or as required by the District following inspections. Cleaning shall be done in a manner that will not direct the sediment into any storm drain piping system or water course. Removed sediment shall be taken to an area Approved by the District where it can be cleaned of sticks and debris, then allowed to dry. Final sediment and debris disposal shall be at an Approved off-site location.
12. Contractor's CESCL shall inspect the project site on weekly basis, and daily during runoff producing rain events. Replacement or repair of failed or overloaded silt fences or other temporary erosion control devices shall be accomplished by the Contractor within 7 days per CESCL's guidance.
13. Unpaved earth drainage ditches shall be regraded as needed to maintain original grade and remove sediment buildup. If a ditch becomes difficult to maintain, the Contractor shall install additional erosion control devices such as check dams, temporary paving, or silt fences as necessary to facilitate maintenance and proper functioning of the canal.

1.4 SUBMITTALS

1. Product Data

   Submit manufacturer's product data for the following prior to mobilization on-site:

   a. Silt Fence
   b. Jersey Barrier
   c. Storm Drain Inlet Protection (if used)
   d. Turbidity Curtain
   e. Construction Entrance
   f. Straw Bale Barrier (if used)
   g. Straw Mulch (if used)
   h. Coir Fabric
   i. Coir Log
   j. BioStakes (if used)

2. Samples

   Submit the following labeled with product name and manufacturer prior to mobilization on-site:

   - Coir Fabric: 12″x12″ sample

3. Contractor's CESCL

   Submit name and registration number of Contractor's CESCL prior to mobilization on-site.

4. Prior to mobilization on-site, submit Washington State Construction Stormwater General Permit Transfer of Coverage Form for District signature.

   Contractor shall complete processing and provide District confirmation on Ecology acceptance. The Contractor shall comply with all provisions of the Stormwater General Permit including but not limited to monthly reporting.

5. Final Stormwater Protection Plan (SWPP)

   A. The Contractor shall submit an updated SWPP to the District prior to mobilization on-site. The Contractor's SWPP must be Approved by the District and comply with the requirements of the Construction Stormwater General Permit. An electronic copy of the District prepared SWPP is available for the Contractor's use in preparation of their final SWPP.

   B. The final SWPP shall address in detail the elements and best management practices required for controlling and minimizing erosion and transport of sediments during and following construction activities, and measures to prevent spills and control pollution by oil, fuels, and chemical pollutants.

   C. The Contractor shall consider additional practices beyond the minimum stated in the preliminary SWPP. Such additional practices shall be stated in the final SWPP and if practices include products those products used shall be submitted to the District for approval. The use of straw mulch, wattles and bales are examples of products not specifically called for in the Contract Drawings but may be used by the Contractor as "material on hand". Furthermore construction of sediment traps or other site construction devices may be required as additional practices to protect water quality.

2.0 PRODUCTS

2.1 SILT FENCES

1. Provide and install silt fences in accordance with all permits, WSDOT Standard Specification 8.01.3(9)A and with the details shown on the Contract Drawings.

2.2 JERSEY BARRIER

Concrete Jersey Barrier may be utilized at Contractor's option as a more rigid barrier to protect existing vegetation and to preserve water quality.

2.3 STORM DRAIN INLET PROTECTION (IF REQUIRED)

1. Catch Basin Filter Insert

   A. Inserts should be designed by the manufacturer for use at construction sites. The limited sediment storage capacity increases the amount of inspection and maintenance required, which shall be daily for heavy sediment loads.

B. The Insert shall be manufactured from a specially designed woven polypropylene geotextile and sewn by a double needle machine, using a high strength nylon thread.

C. The insert will be manufactured to fit the opening of the catch basin or drop inlet.

D. The insert shall have the following features:

1) Dump strap(s) attached at the bottom to facilitate the emptying of the insert.

2) Lifting loops as an integral part of the system to be used to loft the insert from the basin.

3) The insert shall have a restraint mechanism approximately half way up the sack to keep sides away from the catch basin walls.

2. The insert seams shall have certified average wide width strength per ASTM D4884 standards.

2.4 TURBIDITY CURTAIN (FOR IN-WATER WORK)

1. The fabric shall be a reinforced PVC material (or equivalent) with a minimum tensile strength of 300 lb/in.; a minimum fabric weight of 22 oz/sq yd; a tear strength of 200 pounds; and a tensile strength after abrasion of greater than 200 lb/in.
2. The fabric surface shall be easy cleaning and resistant to marine growth, ultraviolet light and mildew. All fabric seams shall be heat sealed. Sections of solid, closed-cell plastic foam flotation material shall be sealed into a fabric pocket and provide a buoyancy ratio (buoyant force/curtain weight) of greater than 5.
3. If current velocities exceed 0.1 knot (1 knot = 1.7 fps), aluminum extrusion (or an equivalent) load transfer connectors are required. The non-corrosive, ballast chain should have a minimum weight of 2 ft-lb/in. For current velocities between 0.1 and 1 knot, a galvanized or stainless steel wire rope shall be used as a top or center tension member. A repair kit shall be available for patching minor tears in the fabric.

2.5 CONSTRUCTION ENTRANCE

1. Construction entrances shall be stabilized wherever traffic will be leaving the construction site and traveling on paved roads or other paved areas.
2. The surface material shall be 4-inches to 8-inches quarry spalls. Smaller crushed rock such as base course may be appropriate in some situations but must be Approved by the District prior to construction.
3. A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Item	Description	Standard
1	Grab Tensile Strength (ASTM D4751)	200 psi min.

2	Grab Tensile Elongation (ASTM D4632)	30% max.
3	Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
4	AOS (ASTM D4751)	20-45 (U.S. std sieve size)

2.6 STRAW BALE BARRIER (IF USED)

1. Straw bale barriers are to be used at the option of the Contractor to maintain water quality protection. If used, provide and install straw bale barriers in accordance with the Department of Ecology, Stormwater Management Manual for Eastern Washington, latest edition.
2. All straw material shall be in an air-dried condition free of noxious weeds and other materials detrimental to plant life.

2.7 STRAW MULCH (IF USED)

1. Straw mulch is to be provided at the option of the Contractor to maintain water quality protection. If used, provide and install straw mulch according to the Department of Ecology, Stormwater Management Manual for Eastern Washington, latest edition.
2. Threshed straw of oats, wheat, barley, or rye, free from seed of noxious weeds, or clean salt hay.
3. Straw mulch, if provided, shall be suitable for spreading with mulch blower equipment.

2.8 COIR FABRIC

1. Coir fabric shall be 100% biodegradable, long-lasting, durable, heavyweight spun coir fabric. The coir fabric erosion control blanket shall have the following physical properties:

    a. Unit Weight 29 oz/SY
    b. Open Area: 38%

2. Product: RoLanka BioD-Mat 90™ Or Equal.
3. Manufacturer: RoLanka, phone: 1-800-760-3215.

2.9 COIR LOG

1. Coir logs shall be 100% biodegradable coir (coconut fiber) log bound by a coir fiber, designed for 4 year lifespan, 12″ diameter, 10 foot long and 9lbs/cubic foot density.
2. Product: RoLanka BioD-Roll™ 30H Or Equal.

2.10 STAKES/WEDGES

1. Rigid wood stakes and/or wedges made of pine, Douglas Fir or Oak.

2. Product: Pine Wedges and Oak stakes by RoLanka Or Equal.
3. Manufacturer: RoLanka, phone: 1-800-760-3215.

3.0 EXECUTION

3.1 EROSION AND SEDIMENT CONTROL PLAN (ESCP)

1. General Construction Requirements
   A. The Contractor shall provide protection to adjoining property from excavation and fill activities and from sediment due to runoff by compliance with the Approved SWPP.
   B. Approval of the SWPP does not constitute an approval of permanent road or drainage design (e.g. size and location of roads, pipes, restrictors, channels, retention facilities, utilities, etc.).
   C. The implementation of the SWPP and the construction, maintenance, replacement, and upgrading of these SWPP facilities is the responsibility of the Contractor until all construction is completed and Approved, and vegetation/landscaping is established.
   D. The boundaries of the clearing limits shown on the plan shall be clearly flagged or fenced in the field prior to construction. During the construction period, no disturbance beyond the flagged or fenced clearing limits shall be permitted. The flagging and/or fencing shall be maintained by the Contractor for the duration of the construction project.
   E. The SWPP facilities shown on this plan must be constructed prior to all other clearing and grading activities, and in such a manner as to ensure that sediment-laden water does not enter the drainage system, leave the site, or violate applicable water quality standards.
   F. The SWPP facilities shall be inspected daily by the Contractor and maintained as necessary to ensure their continued functioning and operation.
   G. The SWPP facilities on inactive sites shall be inspected and maintained a minimum of once a week and within 24 hours following a storm discharge event.
   H. At no time shall more than one foot of sediment be allowed to accumulate within a trapped catch basin. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment-laden water into the downstream system.
   I. Stabilized construction entrances and wash pads (as required) shall be installed at the beginning of construction and maintained for the duration of the project. Additional measures may be required to insure that all paved areas are kept clean for the duration of the project.
   J. The SWPP facilities shown on this plan are the minimum requirements for anticipated site condition. During the construction period, these SWPP facilities

shall be upgraded and added to (e.g. additional sumps, relocation of ditches and silt fences, etc.) as needed for unexpected storm events and to reflect changed conditions as the District requires.

K. Any area stripped of vegetation, including roadway embankments, where no further work is anticipated for a period of fifteen days during the wet season (October 1 – June 30) and 30 days during the dry season (July 1 – September 30), shall be immediately stabilized with approved SWPP methods such as seeding, mulching, netting, erosion blankets, plastic covering, etc. to prevent erosion. Grass seeding alone will be acceptable only between April 1 and October 31.

L. Any area needing SWPP measures, but not requiring immediate attention during the wet season (October 1 – April 30), shall be addressed within 15 days.

M. Erosion control measures identified are the minimum required. Contractor shall provide additional SWPP measures as necessary to control erosion and sediment from his construction operations at no additional cost to the District.

N. Where possible, natural vegetation shall be maintained for silt control and to minimize erosion.

O. All temporary stockpiles and any area which has been stripped of vegetation shall be stabilized with seed, fertilizer and mulch or other Approved measure.

P. Siltation control areas shall be returned to original ground conditions or brought to finish grade at the project's completion. Any permanent storm drainage facilities used for erosion control shall be cleaned prior to final project acceptance.

2. Revegetation

Revegetation of all disturbed areas shall be performed per the planting plan and Approved by the District.

3. Dust Abatement and Water Management Plan

A. Dust is likely to occur in disturbed areas, cuts, fills, and stockpiles.

B. Control of dust on the site shall be the sole responsibility of the Contractor.

C. Water for dust control shall be available on site at all times from the start of construction until the completion of the punch list items to the Approval of the District.

D. Contractor shall provide the District with the name and telephone number of the contact person responsible for dust abatement. This personal shall be available 24 hours per day, 7 days a week.

E. A temporary irrigation system shall be installed if necessary for dust control.

3.2 TURBIDITY CURTAIN

1. The turbidity curtain shall extend from the water surface to the river bottom at all locations of deployment.
2. Use of turbidity curtains shall be in conformance with all in-water work permits.
3. Curtains shall be in place prior to starting work and remain in place for the duration of in-water work activities.
4. The Contractor shall ensure turbidity tight connections between adjoining curtain sections.
5. The Contractor shall regularly inspect the condition of the curtain(s) and conduct any necessary repairs.

3.3 SILT FENCES AND STRAW BALE DAMS

1. Silt fences and straw bale dams shall be constructed to control erosion and migration of soils disturbed during construction. The fences and dams shall provide temporary protection and shall be removed only upon approval of the District.
2. The silt fence filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid use of joints. When joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6-inch overlap, and both ends securely fastened to the post.
3. The filter fabric fence shall be installed to follow the contours where feasible. The fence posts shall be spaced a maximum of 6 feet apart and driven securely into the ground a minimum of 12-inches.
4. A trench shall be excavated roughly 8-inches wide by 12-inches deep, upslope and adjacent to the wood post to allow the filter fabric to be buried.
5. The standard strength filter fabric shall be stapled or wired to the fence, and 12- inches of the fabric shall be extended into the trench. The fabric shall not extend more than 30-inches above the original ground surface. Filter fabric shall not be stapled to existing trees.
6. Sediment fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.
7. Sediment fences shall be inspected by contractor immediately after each rainfall event and at least daily during prolonged rainfall. Any required repairs shall be made immediately.
8. At no time shall more than one foot depth of sediment be allowed to accumulate behind a sediment fence. Sediment should be removed or regarded into slopes and the sediment fences repaired and reestablished.
9. All areas or drainage ways downstream of the construction site shall have SWPP devices installed prior to the beginning of any clearing activities. Runoff from cleared or disturbed area shall be directed through the SWPP devices.

10. Disturbed ground shall be stabilized at the end of each work day.
11. Permanent soil stabilization and erosion and sedimentation control shall be implemented upon reaching finish grade.
12. Slope protection shall be immediately implemented upon any soils showing signs of erosion. This shall be done in a manner approved by the District.
13. All SWPP devices shall be inspected, maintained and kept in a condition sufficient to provide effective erosion and sedimentation control at all times.
14. The site shall be inspected to ensure the devices are properly located, constructed and operating as designed during the first storm. Any necessary adjustments or repairs shall be made immediately and be Approved by the District. These devices shall be inspected thereafter on a weekly basis and after all large storm events.
15. All ESCP devices shall be removed no sooner than 30 consecutive calendar days after final site stabilization has been achieved as determined by the District. SWPP devices such as straw bales, silt fences and supports and plastic coverings shall be removed and properly disposed of offsite by the Contractor. Areas disturbed by removal of these devices shall be immediately stabilized in a manner Approved by the District.

3.4 CONSTRUCTION ENTRANCE

Maintenance Standards

A. Quarry spalls shall be added if the pad is no longer in accordance with specifications.

B. If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash as approved by the District.

C. Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump shall be considered. The sediment would then be washed into the sump where it can be controlled.

D. Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.

E. If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (See BMPs C103 and C104) shall be installed to control traffic.

F. Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

3.5 COIR FABRIC AND LOGS

Install coir fabric and logs per manufacturer's recommendations and secure with wood stakes/wedges and live stakes. Overlap fabric edges 6-inch minimum. Tie logs together with manufacturer provided coir twine. Secure so fabric and logs cannot be moved by human force.

4.0 APPENDICES

4.1 ATTACHMENT A - STORMWATER POLLUTION PREVENTION PLAN

END OF SECTION 02270

Stormwater Pollution Prevention Plan

For
ENTIATQUA TRAIL

Prepared For
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902-3452
509-575-2490

Owner	Developer	Operator/Contractor
PUD No. 1 of Chelan County	PUD No. 1 of Chelan County	TBD
P.O. Box 1231	P.O. Box 1231	TBD
Wenactchee, WA 98807-1231	Wenatchee, WA 98807-1231	TBD

Project Site Location
Entiat, WA

Certified Erosion and Sediment Control Lead
TBD
TBD

SWPPP Prepared By
Courtney Hill
P.O. Box 1231
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Courtney Hill, Owner's Project Manager

SWPPP Preparation Date
November 2012

Approximate Project Construction Dates
September 2014
May 2015

Table of Contents

1.0 Introduction....1

2.0 Site Description....3

2.1 Existing Conditions....3
2.2 Proposed Construction Activities....6

3.0 Construction Stormwater BMPs....8

3.1 The 12 BMP Elements....8
3.1.1 Element #1 – Mark Clearing Limits....8
3.1.2 Element #2 – Establish Construction Access....8
3.1.3 Element #3 – Control Flow Rates....9
3.1.4 Element #4 – Install Sediment Controls....9
3.1.5 Element #5 – Stabilize Soils....9
3.1.6 Element #6 – Protect Slopes....10
3.1.8 Element #8 – Stabilize Channels and Outlets....10
3.1.9 Element #9 – Control Pollutants....11
3.1.10 Element #10 – Control Dewatering....12
3.1.11 Element #11 – Maintain BMPs....13
3.1.12 Element #12 – Manage the Project....13
3.2 Site Specific BMPs....15

4.0 Construction Phasing and BMP Implementation....16

5.0 Pollution Prevention Team....17

5.1 Roles and Responsibilities....17
5.2 Team Members....17

6.0 Site Inspections and Monitoring....18

6.1 Site Inspection....18
6.1.1 Site Inspection Frequency....18
6.1.2 Site Inspection Documentation....19
6.2 Stormwater Quality Monitoring....19

7.0 Reporting and Recordkeeping....21

7.1 Recordkeeping....21
7.1.1 Site Log Book....21
7.1.2 Records Retention....21
7.1.3 Access to Plans and Records....21
7.1.4 Updating the SWPPP....21
7.2 Reporting....22
7.2.1 Discharge Monitoring Reports....22
7.2.2 Notification of Noncompliance....22
7.2.3 Permit Application and Changes....22

Appendix A – Site Plans 23
Appendix B – Construction BMPs 24
Appendix C – Alternative BMPs 25
Appendix D – General Permit 26
Appendix E – Site Inspection Forms (and Site Log) 27

1.0 Introduction

This Stormwater Pollution Prevention Plan (SWPPP) has been prepared as part of the NPDES stormwater permit requirements for the Entiatqua Trail construction project in Entiat, Washington. The site is located between the Columbia River and State Route 97A just north of the Entiat River confluence with the Columbia River and south of Entiat Park. The proposed project consists of development of a 1,776 foot long non-paved pedestrian trail.

Construction activities will include TESC installation, excavation, grading, paving, utility work, and planting. The purpose of this SWPPP is to describe the proposed construction activities and all temporary and permanent erosion and sediment control (TESC) measures, pollution prevention measures, inspection/monitoring activities, and recordkeeping that will be implemented during the proposed construction project. The objectives of the SWPPP are to:

1. Implement Best Management Practices (BMPs) to prevent erosion and sedimentation, and to identify, reduce, eliminate or prevent stormwater contamination and water pollution from construction activity.

2. Prevent violations of surface water quality, ground water quality, or sediment management standards.

3. Prevent, during the construction phase, adverse water quality impacts including impacts on beneficial uses of the receiving water by controlling peak flow rates and volumes of stormwater runoff at the Permittee's outfalls and downstream of the outfalls.

This SWPPP was prepared using the Ecology SWPPP Template downloaded from the Ecology website on March 28, 2012. This SWPPP was prepared based on the requirements set forth in the Construction Stormwater General Permit, Stormwater Management Manual for Eastern Washington (SWMMEW 2004). The report is divided into seven main sections with several appendices that include stormwater related reference materials. The topics presented in the each of the main sections are:

- Section 1 – INTRODUCTION. This section provides a summary description of the project, and the organization of the SWPPP document.

- Section 2 – SITE DESCRIPTION. This section provides a detailed description of the existing site conditions, proposed construction activities, and calculated stormwater flow rates for existing conditions and post–construction conditions.

- Section 3 – CONSTRUCTION BMPs. This section provides a detailed description of the BMPs to be implemented based on the 12 required elements of the SWPPP (SWMMEW 2004).

- Section 4 – CONSTRUCTION PHASING AND BMP IMPLEMENTATION. This section provides a description of the timing of the BMP implementation in relation to the project schedule.

- Section 5 – POLLUTION PREVENTION TEAM. This section identifies the appropriate contact names (emergency and non-emergency), monitoring personnel, and the onsite temporary erosion and sedimentation control inspector

- Section 6 – INSPECTION AND MONITORING. This section provides a description of the inspection and monitoring requirements such as the parameters of concern to be monitored, sample locations, sample frequencies, and sampling methods for all stormwater discharge locations from the site.

- Section 7 – RECORD KEEPING. This section describes the requirements for documentation of the BMP implementation, site inspections, monitoring results, and changes to the implementation of certain BMPs due to site factors experienced during construction.

Supporting documentation and standard forms are provided in the following Appendices:

Appendix A – Drawings
Appendix B – Construction BMPs
Appendix C – Alternative Construction BMP list
Appendix D – General Permit
Appendix E – Site Log and Inspection Forms

2.0 Site Description

2.1 Existing Conditions

The Trail is located in Entiat, WA between State Route 97 and the Columbia River, approximately 16 miles north of Wenatchee, Washington. The primary entry to the Trail is through the main entry of Entiat Park. Coordinates for the entry are as follows:

Main Entry Highway 97A W120° 13′ 04.3123″ N47° 40′ 08.0945″

The Entiatqua Trail is a 1,776 foot long non-motorized pedestrian trail which links Entiat Park (Park), located on the Columbia River, to the proposed Entiatqua Outdoor Learning Center (Center), located on the Entiat River. See Figure 1.

The project fulfills an obligation of the Rocky Reach Hydroelectric Project Comprehensive Settlement Agreement dated February 3, 2006 (an outcome of the Federal Energy Regulatory Commission relicensing of Rocky Reach Dam). More specifically the project fulfills an obligation to provide recreational opportunities along the Rocky Reach Reservoir.

Filling of Rocky Reach reservoir in 1961 resulted in the inundation of the old Entiat Town core. In order to maintain its existence the town was forced to relocate further upland. This project mitigates for the impacts associated with the inundation and relocation of Old Entiat. The modern City of Entiat is the District's primary stakeholder for the project. Through agreement with the District, the City will operate and maintain the Trail.

Construction of Rocky Reach Dam and subsequent filling of the Rocky Reach Reservoir also required relocation of State Route 97A and the railroad (originally owned by Great Northern Rail Road). At the confluence of the Columbia and Entiat Rivers two large bridges were constructed at a significantly higher elevation to accommodate the predicted higher water flows. In order to provide access on and off the north end of the bridges it was necessary to construct a large earthen ramp. This ramp was constructed using the blasted rock attained from construction of SR97A (the blasted rock coming from the outcroppings located along the western side of the Columbia River adjacent to the modern SR97A). The manmade earthen ramp forms the embankment upon which the proposed Trail will reside.

The Trail will provide for a critical connection between the Park and the proposed Center. Both the Park and Center will have their own connecting trails to form a continuous waterfront trail system. The connection of the Trail to the Park will be made at the Park's south end. From that location the trail continues in a downstream direction parallel with the Columbia River for approximately 925 feet before making a sharp turn to head up the Entiat River. From there the Trail crosses below the railroad and SR97A bridges before making another sharp turn in a northerly direction following the contour of the earthen embankment. The Trail continues north before making a gradual swerve to the west to head in the general direction of the Entiat River

Valley. At this point the trail will connect to the proposed Center Trail. A timeline for construction of the Center has not been determined.

The trail setting provides striking views of the Lake Entiat (aka Rocky Reach Reservoir), Number Rock, and the Entiat River. The trail contains two wide spots for trail users to take in these views. While enjoying the view trail users may also learn about shoreline erosion stabilization methods and the regions fish and wildlife resources at one of two interpretive signs to be located along the trail. The content of these signs is located in Attachment 1.

Construction of the Trail attempts to not only provide a spectacular recreational and educational opportunity but also provides for a significant improvement to shoreline habitat. The project includes the development of a 650 foot long, 3 to 15 foot wide riparian corridor along the Columbia River side of the Trail. The Corridor will be planted with nearly 350 new shrubs and trees. The shrubs and trees will provide near shore foliage (shade and nutrients). In addition the riparian corridor includes the construction of four large complex woody structure. These structures will provide in-water habitat for a variety of fish. Further supplementing the structures will be the placement of sediment and cobble mix specifically designed for enhancing the near shore aquatic habitat.

To provide for the safety of Trail users a wood rail fence is located on the side of the trail closest to the river. The rail fence provides a protective barrier from a 3 to 8 foot high drop off which will be created by retaining the trail as a means to minimize the amount of in-water fill required.

The Trail also takes into consideration the needs of the physically disabled by constructing the trail consistent with Accessibility Guidelines for Outdoor Developed Areas. This includes constructing the trail at reasonable grades and providing sufficient trail width to allow two wheel chairs to pass side by side.

Summary of Trail Elements

- Clear Trail width: 7'-3" from outside face of upper retaining structure (gabions) to inside of rail fence.
- Total Trail width (including rail fence): 8'-0" from outside face of upper retaining structure (gabion) to inside face of lower retaining structure (Lock + Load or rock wall). Expands to greater width at interpretive signs (see drawings).
- Trail retaining structures: Gabion Baskets along upland side of Trail, Lock + Load (concrete) modules or rock wall along waterward side of Trail.
- Trail Surface: Well compacted crushed rock aggregate.
- Large complex wood structures: 4 total along Columbia River, each structure has five (5) logs 18 inches to 30 inches diameter, log type is Cedar or Ponderosa Pine or Douglas Fir; Structures are held in place by ballast boulders 36 inches to 54 inches in diameter.
- A 650 foot long, 3 foot to 15 foot wide Riparian Corridor includes over 350 trees and shrubs as well as native grasses. Stabilization includes the use of coir logs and fabric. Irrigation system for watering of new plants.
- Wood Rail Fence: approximately 4 foot 6 inches tall, three rails, to be located along the

waterward side of trail (protection from fall hazard).
- Chainlink fence: 6 feet in height, to be located above gabions (minimizes pedestrian conflicts with railroad and SR97A to improve safety).
- A Bench for resting on the Entiat River side of the Trail.
- Two interpretive signs one on each side of the Trail.

The portion of the Trail adjacent to the Columbia River is within property owned by Chelan County PUD. For the portion under the rail road bridge Chelan PUD has obtained an easement with Rail America. For the portion under the SR97A Chelan PUD is seeking a general permit with Washington State Department of Transportation. The portion of the trail along the Entiat River is within WSDOT right-of-way and will be permitted through agreement with the City of Entiat.

A geotechnical engineering evaluation of the site has been conducted. The evaluation focused on the suitability of the site for construction of the Trail, specifically slope stability. Major conclusions include the following:

- The site is compatible with planned improvements.

- There are no critical areas on the site such as high erosion risk, wetlands, streams, or steep slopes (landside potential).

- The embankment upon which the Trail will be built generally comprises 1 to 3-foot diameter angular boulders (tonalite of the Chelan Complex) with a sandy, gravelly matrix. A 1 foot thick layer of rounded, 3 to 12-inch rounded cobbles covers portions of the embankment, particularly on the east side of the embankment.

- The Columbia/Entiat River sediments at the toe of the embankment were likely deposited since the Rocky Reach Dam raised the rivers to their current levels. Based on the results of the penetration testing, the sediments likely comprise very loose to loose, silty sand and sandy silt. The sediments likely extend to and over portions of the embankment fill material.

- The erosion hazard of the site material is listed as moderate. The erosion hazard for site soils should be low in areas where the site is not disturbed.

The site contains a stormwater conveyance pipeline originating from upland properties. This pipelinesdischarge directly into the confluence of the rivers between the SR97A and railroad bridges. The City of Entiat as an agent of Washington State Department of Transportation is responsible for these pipelines and their associated discharge.

2.2 Proposed Construction Activities

Due to the significant embankment slope and relatively small construction footprint storm water is not anticipated to accumulate in such volumes as to require construction of extensive storm water collection, retention and treatment facilities. Stormwater will most likely infiltrate within the work zone.

Construction Sequence

The construction sequence will largely depend on the Contractor awarded the project. The project will go to public bid once all permits have been obtained. Preliminary cost estimates have assumed the Contractor will build the trail from the bottom up as well as from both ends concurrently. This results in the following construction sequence:

1. Mobilization and staging of project. Mobilization includes the placement of erosion control devices including silt fences.
2. Rough excavation of embankment starting at each end concurrently.
    a. On the Columbia River side rough excavation work will occur to provide access to construct the in-water components (during the approved work window). Specifically this will include placement of the base rock, streambed cobble and sediment, complex wood log structures, etc.. During in-water work the Contractor will deploy a turbidity curtain to contain suspended sediment in the immediate work vicinity.
    b. On the Entiat River side excavation work will occur in conjunction with construction of the Lock + Load retaining Wall. Because of the narrow working conditions the Contractor will likely have multiple iterations of excavation then wall construction.
3. Once the lower walls are constructed various fill materials will be brought in and construction including excavation and building of the other retaining structures upland. The gabions will likely be final retaining wall structure built. Once they are built the embankment just above them will be capped with quarry spall to stabilize the slope directly above the trail.
4. In conjunction with building the trail the Contractor will place sono tubes or similar for the construction of the rail and chainlink fences. Placement of the interpretive signs and bench will likely happen during this same time period.
5. The final component will be development of the riparian corridor. This consists of installation of the irrigation system, placement of top soil and coir fabric, planting of native shrubs and trees, placement of soil/gravel mix and finally hydroseeding with native grasses.

Access and Staging

Because the Trail will likely be built from each end access and staging is provided at each end. These routes and staging areas are illustrated in the attached Staging Area Map.

Refueling

The Contractor has stringent requirements regarding refueling of machinery. Included in these requirements is for the refueling area to be located 150 feet from either river. Depending on how the Contractor arranges Staging Area 1 there may be sufficient space to allow refueling there otherwise the Contractor will need to conduct refueling at a location outside the staging and project areas.

3.0 Construction Stormwater BMPs

The following BMPs listed represent the minimum required. Additional or alternate BMPs are included in Appendix C as a quick reference tool for the onsite inspector in the event the BMP(s) listed above are deemed ineffective or inappropriate during construction to satisfy the requirements set forth in the General NPDES Permit (Appendix D). To avoid potential erosion and sediment control issues that may cause a violation(s) of the NPDES Construction Stormwater permit (as provided in Appendix D), the Certified Erosion and Sediment Control Lead will promptly initiate the implementation of one or more of the alternative BMPs listed in Appendix C after the first sign that existing BMPs are ineffective or failing.

3.1 The 12 BMP Elements

3.1.1 Element #1 – Mark Clearing Limits

Protect adjacent properties and to reduce the area of soil exposed to construction, the limits of construction are shown in the Construction Drawings and will be delineated on-site prior to Construction. Trees that are to be preserved, as well as all sensitive areas and their buffers, are delineated in the Drawings and will be flagged on-site. Existing vegetation and native topsoil will be retained in an undisturbed state for as long as practical. The BMPs relevant to protecting trees designated to remain include preserving Natural Vegetation (BMP C101)

- High Visibility Plastic or Metal Fence (BMP C103)

A detail describing the requirement of this BMP is included in the Drawings (see Appendix A). This BMP will be placed prior to the start of construction.

3.1.2 Element #2 – Establish Construction Access

Construction access or activities occurring on unpaved areas shall be minimized, yet where necessary, access points shall be stabilized to minimize the tracking of sediment onto public roads, and wheel washing, street sweeping, and street cleaning shall be employed to prevent sediment from entering state waters. All wash wastewater shall be controlled on site. The specific BMPs related to establishing construction access that will be used on this project include:

- Stabilized Construction Entrance (BMP C105)

A detail describing the requirement of this BMP is included in the Drawings (see Appendix A). This BMP will be placed prior to the start of construction.

3.1.3 Element #3 – Control Flow Rates

In order to protect the Columbia and Entiat Rivers, stormwater discharges from the site will be controlled. The specific BMPs for flow control that shall be used on this project include:

- Materials on Hand (BMP C150) include but not be limited to straw bales, straw mulch or straw wattles.

The project site is located west of the Cascade Mountain Crest. As such, the project must comply with Minimum Requirement 7 (Ecology 2005) and Core Element 6 (Ecology 2004).

In general, discharge rates of stormwater from the site will be controlled where increases in impervious area or soil compaction during construction could lead to accumulated flows which potentially impact water quality.

3.1.4 Element #4 – Install Sediment Controls

All stormwater runoff from disturbed areas shall pass through an appropriate sediment removal BMP before leaving the construction site or prior to being discharged to an infiltration facility. The specific BMPs to be used for controlling sediment on this project include:

- Silt Fence (BMP C233)

- Materials on Hand (BMP C150) may also be applicable

In some cases, sediment discharge in concentrated runoff can be controlled using permanent stormwater BMPs (e.g., infiltration swales, ponds, trenches). Sediment loads can limit the effectiveness of some permanent stormwater BMPs, such as those used for infiltration or biofiltration; however, those BMPs designed to remove solids by settling (wet ponds or detention ponds) can be used during the construction phase. When permanent stormwater BMPs will be used to control sediment discharge during construction, the structure will be protected from excessive sedimentation with adequate erosion and sediment control BMPs. Any accumulated sediment shall be removed after construction is complete and the permanent stormwater BMP will be restabilized with vegetation per applicable design requirements once the remainder of the site has been stabilized.

3.1.5 Element #5 – Stabilize Soils

Exposed and unworked soils shall be stabilized with the application of effective BMPs to prevent erosion throughout the life of the project. The specific BMPs for soil stabilization that shall be used on this project include:

- Temporary and Permanent Seeding (BMP C120)

- Mulching (BMP C121)

- Nets and Blankets (BMP C122)
- Plastic Covering (BMP C123)
- Sodding (BMP C124)
- Topsoiling (BMP C125)
- Surface Roughening (BMP C130)
- Dust Control (BMP C140)
- Materials on Hand (BMP C150) may also be applicable.

The project site is located in the Central Basin east of the Cascade Mountain Crest. As such, no soils shall remain exposed and unworked for more than 30 days during the dry season (July 1 to September 30) and 15 days during the wet season (October 1 to June 30). Regardless of the time of year, all soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on weather forecasts.

In general, cut and fill slopes will be stabilized as soon as possible and plastic sheeting shall be kept on site as necessary to cover soil stockpiles. All stockpiled soils shall be stabilized from erosion, protected with sediment trapping measures, and where possible, be located away from storm drain inlets, waterways, and drainage channels.

3.1.6 Element #6 – Protect Slopes

All cut and fill slopes will be designed, constructed, and protected in a manner than minimizes erosion. The following specific BMPs will be used to protect slopes for this project:

- Temporary and Permanent Seeding (BMP C120)
- Surface Roughening (BMP C130))
- Pipe Slope Drains (BMP C204)
- Subsurface Drains (BMP C205)
- Materials on Hand (BMP C150)

3.1.8 Element #8 – Stabilize Channels and Outlets

Where site runoff is to be conveyed in channels, or discharged to a stream or some other natural drainage point, efforts will be taken to prevent downstream erosion. The specific BMPs for channel and outlet stabilization that shall be used on this project include:

- Materials on Hand (BMP C150)

The project site is located east of the Cascade Mountain Crest. As such, all temporary on-site conveyance channels shall be designed, constructed, and stabilized to prevent erosion from the expected peak flow velocity of a 2-year, 24-hour recurrence interval storm for the developed condition. Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent streambanks, slopes, and downstream reaches shall be provided at the outlets of all conveyance systems.

3.1.9 Element #9 – Control Pollutants

All pollutants, including waste materials and demolition debris, that occur onsite shall be handled and disposed of in a manner that does not cause contamination of stormwater. Good housekeeping and preventative measures will be taken to ensure that the site will be kept clean, well organized, and free of debris. If required, BMPs to be implemented to control specific sources of pollutants are discussed below.

Vehicles, construction equipment, and/or petroleum product storage/dispensing:

- All vehicles, equipment, and petroleum product storage/dispensing areas will be inspected regularly to detect any leaks or spills, and to identify maintenance needs to prevent leaks or spills.
- On-site fueling tanks and petroleum product storage containers shall include secondary containment.
- Spill prevention measures, such as drip pans, will be used when conducting maintenance and repair of vehicles or equipment.

- In order to perform emergency repairs on site, temporary plastic will be placed beneath and, if raining, over the vehicle.

- Contaminated surfaces shall be cleaned immediately following any discharge or spill incident.

Chemical storage:

- Any chemicals stored in the construction areas will conform to the appropriate source control BMPs listed in Volume IV of the Ecology stormwater manual. In Western WA, all chemicals shall have cover, containment, and protection provided on site, per BMP C153 for Material Delivery, Storage and Containment in SWMMWW 2005

- Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers′ recommendations for application procedures and rates shall be followed.

Excavation and tunneling spoils dewatering waste:

- Dewatering BMPs and BMPs specific to the excavation and tunneling (including handling of contaminated soils) are discussed under Element 10.

Concrete and grout:

- Process water and slurry resulting from concrete work will be prevented from entering the waters of the State by implementing Concrete Handling measures (BMP C151).

Sanitary wastewater:

- Portable sanitation facilities will be firmly secured, regularly maintained, and emptied when necessary.

- Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system or to the sanitary sewer as part of Wheel Wash implementation (BMP C106).

Solid Waste:

- Solid waste will be stored in secure, clearly marked containers.

Other:

- Other BMPs will be administered as necessary to address any additional pollutant sources on site.

This facility does not require a Spill Prevention, Control, and Countermeasure (SPCC) Plan under the Federal regulations of the Clean Water Act (CWA). However, as per the Contract a Spill Prevention, Control, and Countermeasure (SPCC) Plan is required for construction activities. An SPCC Plan has been prepared to address an approach to prevent, respond to, and report spills or releases to the environment that could result from construction activities.

3.1.10 Element #10 – Control Dewatering

Dewatering is not anticipated for this construction project unless construction activities occur during a wet season or water line breaks occur. If dewatering is required from open cut excavation, foundation work, trench, or underground vaults the sediment laden water shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels will be stabilized, per Element #8. Clean, non-turbid dewatering water will not be routed through stormwater sediment ponds, and will be discharged to systems tributary to the receiving waters of the State in a manner that does not cause erosion, flooding, or a violation of State water quality standards in the receiving water. Highly turbid dewatering water from soils known or suspected to be contaminated, or from use of construction equipment, will require additional monitoring and treatment as required for the specific pollutants based on the receiving

waters into which the discharge is occurring. Such monitoring is the responsibility of the contractor.

However, the dewatering of soils known to be free of contamination will trigger BMPs to trap sediment and reduce turbidity. At a minimum, geotextile fabric socks/bags/cells will be used to filter this material. Other BMPs to be used for sediment trapping and turbidity reduction include the following:

- Concrete Handling (BMP C151)
- Temporary Sediment Pond (BMP C241)
- Construction Stormwater Chemical Treatment (BMP C250)
- Construction Stormwater Filtration (BMP C 251)
- Infiltration
- Use of a sedimentation bag, with outfall to a ditch or swale for small volumes of localized dewatering.
- Alternative BMP not included in the SWMMWW (2005) or SWMMEW (2004)

3.1.11 Element #11 – Maintain BMPs

All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. Maintenance and repair shall be conducted in accordance with each particular BMPs specifications (attached). Visual monitoring of the BMPs will be conducted at least once every calendar week and within 24 hours of any stormwater or non-stormwater discharge from the site. If the site becomes inactive, and is temporarily stabilized, the inspection frequency will be reduced to once every month.

All temporary erosion and sediment control BMPs shall be removed within 30 days after the final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil resulting from removal of BMPs or vegetation shall be permanently stabilized.

3.1.12 Element #12 – Manage the Project

Erosion and sediment control BMPs for this project have been designed based on the following principles:

- Design the project to fit the existing topography, soils, and drainage patterns.

- Emphasize erosion control rather than sediment control.
- Minimize the extent and duration of the area exposed.
- Keep runoff velocities low.
- Retain sediment on site.
- Thoroughly monitor site and maintain all ESC measures.
- Schedule major earthwork during the dry season.

In addition, project management will incorporate the key components listed below:

As this project site is located east of the Cascade Mountain Crest, the project will be managed according to the following key project components:

Construction Schedule:

- The construction schedule has sufficient flexibility to prevent, to the maximum extent practicable, earthwork during the wet season.
- Placement of TESC devices shall be done prior to any construction activities.
- A winter shutdown will be allowed as necessitated by weather conditions.

Coordination with Utilities and Other Contractors:

- Care has been taken to coordinate with utilities, other construction projects, and the local jurisdiction in preparing this SWPPP and scheduling the construction work.

Inspection and Monitoring:

- All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function.
- A Certified Erosion and Sediment Control Lead shall be on-site or on-call at all times.
- Sampling and analysis of the stormwater discharges from the construction site may be necessary to ensure compliance with standards. It is recognized that the local permitting authority may establish monitoring and reporting requirements when necessary.
- Whenever inspection and/or monitoring reveals that the BMPs identified in the this SWPPP are inadequate, due to the actual discharge of or potential to discharge a

significant amount of any pollutant, the SWPPP shall be modified, as appropriate, in a timely manner.

Maintenance of the Construction SWPPP:

- This SWPPP shall be retained on-site or within reasonable access to the site. The SWPPP shall be modified whenever there is a significant change in the design, construction, operation, or maintenance of any BMP. ---

3.2 Site Specific BMPs

Site specific BMPs are shown on the TESC Plan Sheets and Details in Appendix A. These site specific plan sheets will be updated annually.

4.0 Construction Phasing and BMP Implementation

The BMP implementation schedule will be driven by the construction schedule. The following provides a sequential list of the proposed construction schedule milestones and the corresponding BMP implementation schedule. The list contains key milestones such as wet season construction.

The BMP implementation schedule listed below is keyed to proposed phases of the construction project, and reflects differences in BMP installations and inspections that relate to wet season construction. The project site is located east of the Cascade Mountain Crest. As such, the dry season is considered to be from July 1 to September 30 and the wet season is considered to be from October 1 to June 30.

Estimate of Construction start date:.....September 2014

Estimate of Construction finish date:.....May 2015

Mobilize equipment on site:.....TBD

Mobilize and store all ESC and soil stabilization products: .....**TBD**

Install ESC measures: .....**TBD**

Install stabilized construction entrance:.....**TBD**

Begin clearing and grubbing:.....**TBD**

TBD.....TBD
TBD.....TBD
TBD.....TBD
TBD.....TBD
TBD.....TBD
TBD.....TBD

5.0 Pollution Prevention Team

5.1 Roles and Responsibilities

The pollution prevention team consists of personnel responsible for implementation of the SWPPP, including the following:

- Certified Erosion and Sediment Control Lead (CESCL) – primary contractor contact, responsible for site inspections (BMPs, visual monitoring, sampling, etc.); to be called upon in case of failure of any ESC measures.
- Resident Engineer – For projects with engineered structures only (sediment ponds/traps, sand filters, etc.): site representative for the owner that is the project's supervising engineer responsible for inspections and issuing instructions and drawings to the contractor's site supervisor or representative
- Emergency Ecology Contact – individual to be contacted at Ecology in case of emergency.
- Emergency Owner Contact – individual that is the site owner or representative of the site owner to be contacted in the case of an emergency.
- Non-Emergency Ecology Contact – individual that is the site owner or representative of the site owner than can be contacted if required.
- Monitoring Personnel – personnel responsible for conducting water quality monitoring; for most sites this person is also the Certified Erosion and Sediment Control Lead.

5.2 Team Members

Names and contact information for those identified as members of the pollution prevention team are provided in the following table.

Title	Name(s)	Phone Number
Certified Erosion and Sediment Control Lead (CESCL)	TBD	TBD
Resident Engineer	TBD	**TBD**
Emergency Ecology Contact	N/A	509-575-2490
Emergency Owner Contact	**Casey Hall**	**509-881-9302**
Non-Emergency Ecology Contact	Derek Sandison	509-662-0516
Monitoring Personnel	**TBD**	**TBD**

6.0 Site Inspections and Monitoring

Monitoring includes visual inspection, monitoring for water quality parameters of concern, and documentation of the inspection and monitoring findings in a site log book. A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

For convenience, the inspection form and water quality monitoring forms included in this SWPPP include the required information for the site log book. This SWPPP may function as the site log book if desired, or the forms may be separated and included in a separate site log book. However, if separated, the site log book but must be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.1 Site Inspection

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections will be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. The onsite inspector will have the skills to assess the potential for water quality impacts as a result of the type of construction activities occurring on site, and the knowledge of the appropriate and effective ESC measures needed to control the quality of stormwater discharges.

All BMPs will be inspected, maintained, and repaired as needed to assure continued performance of their intended function. The inspector will be a Certified Erosion and Sediment Control Lead (CESCL) per BMP C160. The name and contact information for the CESCL is provided in Section 5 of this SWPPP.

Site inspection will occur in all areas disturbed by construction activities and at all stormwater discharge points. Stormwater will be examined for the presence of suspended sediment, turbidity, discoloration, and oily sheen. The site inspector will evaluate and document the effectiveness of the installed BMPs and determine if it is necessary to repair or replace any of the BMPs to improve the quality of stormwater discharges. All maintenance and repairs will be documented in the site log book or forms provided in this document. All new BMPs or design changes will be documented in the SWPPP as soon as possible.

6.1.1 Site Inspection Frequency

Site inspections will be conducted at least once a week and within 24 hours following any discharge from the site. For sites with temporary stabilization measures, the site inspection frequency can be reduced to once every month if the site operator has successfully applied for

inactive status for the site using the Permit Fee Activity Status Change Form, which can be found at the following web site.
http://www.ecy.wa.gov/programs/wq/permits/permit_fees/ConstructionActivityStatusChangeForm.pdf

6.1.2 Site Inspection Documentation

The site inspector will record each site inspection using the site log inspection forms provided in Appendix E. The site inspection log forms may be separated from this SWPPP document, but will be maintained on-site or within reasonable access to the site and be made available upon request to Ecology or the local jurisdiction.

6.2 Stormwater Quality Monitoring

Discharges to the Columbia River are not anticipated for this project. The Columbia River is not a water body listed as impaired for turbidity under Section 303(d) of the Clean Water Act. However, if during the work stormwater discharges become necessary the following section describes the site-specific monitoring for the proposed development.

Water quality monitoring will be required for all in-water work. Those requirements and the associated BMPs are covered in a separate document.

6.2.1 Turbidity Sampling (only if work conditions necessitate)

Monitoring requirements for the proposed project will include either turbidity or water transparency sampling to monitor site discharges for water quality compliance with the 2005 Construction Stormwater General Permit (Appendix D). Sampling will be conducted at all discharge points at least once per calendar week.

Turbidity or transparency monitoring will follow the analytical methodologies described in Section S4 of the 2005 Construction Stormwater General Permit (Appendix D). The key benchmark values that require action are 25 NTU for turbidity (equivalent to 32 cm transparency) and 250 NTU for turbidity (equivalent to 6 cm transparency). If the 25 NTU benchmark for turbidity (equivalent to 32 cm transparency) is exceeded, the following steps will be conducted:

1. Ensure all BMPs specified in this SWPPP are installed and functioning as intended.

2. Assess whether additional BMPs should be implemented, and document revisions to the SWPPP as necessary.

3. Sample discharge location daily until the analysis results are less than 25 NTU (turbidity) or greater than 32 cm (transparency).

If the turbidity is greater than 25 NTU (or transparency is less than 32 cm) but less than 250 NTU (transparency greater than 6 cm) for more than 3 days, additional treatment BMPs will be implemented within 24 hours of the third consecutive sample that exceeded the benchmark value. Additional treatment BMPs to be considered will include, but are not limited to, off-site treatment, infiltration, filtration and chemical treatment.

If the 250 NTU benchmark for turbidity (or less than 6 cm transparency) is exceeded at any time, the following steps will be conducted:

1. Notify Ecology by phone within 24 hours of analysis (see Section 5.0 of this SWPPP for contact information).

2. Continue daily sampling until the turbidity is less than 25 NTU (or transparency is greater than 32 cm).

3. Initiate additional treatment BMPs such as off-site treatment, infiltration, filtration and chemical treatment within 24 hours of the first 250 NTU exceedance.

4. Implement additional treatment BMPs as soon as possible, but within 7 days of the first 250 NTU exceedance.

5. Describe inspection results and remedial actions taken in the site log book and in monthly discharge monitoring reports as described in Section 7.0 of this SWPPP.

7.0 Reporting and Recordkeeping

7.1 Recordkeeping

7.1.1 Site Log Book

A site log book will be maintained for all on-site construction activities and will include:

- A record of the implementation of the SWPPP and other permit requirements;
- Site inspections; and,
- Stormwater quality monitoring.

7.1.2 Records Retention

Records of all monitoring information (site log book, inspection reports/checklists, etc.), this Stormwater Pollution Prevention Plan, and any other documentation of compliance with permit requirements will be retained during the life of the construction project and for a minimum of three years following the termination of permit coverage in accordance with permit condition S5.C.

7.1.3 Access to Plans and Records

The SWPPP, General Permit, Notice of Authorization letter, and Site Log Book will be retained on site or within reasonable access to the site and will be made immediately available upon request to Ecology or the local jurisdiction. A copy of this SWPPP will be submitted to Ecology for review and approval prior to starting work as a condition of Chelan PUD's FERC License Order. Any other information requested by Ecology will be submitted within a reasonable time. A copy of the SWPPP or access to the SWPPP will be provided to the public when requested in writing in accordance with permit condition S5.G.

7.1.4 Updating the SWPPP

In accordance with Conditions S3, S4.B, and S9.B.3 of the General Permit, this SWPPP will be modified if the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site or there has been a change in design, construction, operation, or maintenance at the site that has a significant effect on the discharge, or potential for discharge, of pollutants to the waters of the State. The SWPPP will be modified within seven days of determination based on inspection(s) that additional or modified BMPs are necessary to correct problems identified, and an updated timeline for BMP implementation will be prepared.

7.2 Reporting

7.2.1 Discharge Monitoring Reports

Discharge Monitoring Reports (DMRs) will be submitted to Ecology monthly. If there was no discharge during a given monitoring period, the Permittee shall submit the form as required, with the words "No discharge" entered in the place of monitoring results. The DMR due date is 15 days following the end of each month.

Water quality sampling results will be submitted to Ecology monthly on Discharge Monitoring Report (DMR) forms in accordance with permit condition S5.B. If there was no discharge during a given monitoring period, the form will be submitted with the words "no discharge" entered in place of the monitoring results. If a benchmark was exceeded, a brief summary of inspection results and remedial actions taken will be included. If sampling could not be performed during a monitoring period, a DMR will be submitted with an explanation of why sampling could not be performed.

7.2.2 Notification of Noncompliance

If any of the terms and conditions of the permit are not met, and it causes a threat to human health or the environment, the following steps will be taken in accordance with permit section S5.F:

1. Ecology will be immediately notified of the failure to comply.

2. Immediate action will be taken to control the noncompliance issue and to correct the problem. If applicable, sampling and analysis of any noncompliance will be repeated immediately and the results submitted to Ecology within five (5) days of becoming aware of the violation.

3. A detailed written report describing the noncompliance will be submitted to Ecology within five (5) days, unless requested earlier by Ecology.

Any time turbidity sampling indicates turbidity is 250 nephelometric turbidity units (NTU) or greater or water transparency is 6 centimeters or less, the Ecology regional office will be notified by phone within 24 hours of analysis as required by permit condition S5.A (see Section 5.0 of this SWPPP for contact information).

In accordance with permit condition S4.F.6.b, the Ecology regional office will be notified if chemical treatment other than CO_2 sparging is planned for adjustment of high pH water (see Section 5.0 of this SWPPP for contact information).

7.2.3 Permit Application and Changes

In accordance with permit condition S2.A, a complete application form will be submitted to Ecology and the appropriate local jurisdiction (if applicable) to be covered by the General Permit.

Appendix A – Site Plans

See Construction Drawings

Appendix B – Construction BMPs

BMP Number	Description
BMP C103	High Visibility Plastic or Metal Fence
BMP C105	Stabilized Construction Entrance
BMP C233	Silt Fence
BMP C220	Storm Drain Inlet Protection
BMP C150	Materials on Hand (BMP) may also be applicable
BMP C120	Temporary and Permanent Seeding
BMP C121	Mulching
BMP C122	Nets and Blankets
BMP C123	Plastic Covering
BMP C124	Sodding
BMP C125	Topsoiling
BMP C130	Surface Roughening
BMP C140	Dust Control
BMP C204	Pipe Slope Drains
BMP C205	Subsurface Drains
BMP C101	Preserving Natural Vegetation

Appendix C – Alternative BMPs

See the Eastern Washington Stormwater Management Manual

Appendix D – General Permit

(To be added by the Contractor)

Appendix E – Site Inspection Forms (and Site Log)

Site Ispection Form

General Information					
Project Name:					
Title: CESCL #					
Inspector Name:					
Date:			Time:		
Inspection Type:					
	□	After a rain event			
	□	Weekly			
	□	Turbidity/transparency benchmark exceedance			
	□	Other:			
Weather:					
Precipitation:	Since last inspection		In last 24 hours		
Description of General Site Conditions:					

Inspection of BMPs						
Element 1: Mark Clearing Limits						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 2: Establish Construction Access						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Inspection of BMPs						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 3: Control Flow Rates						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 4: Install Sediment Controls						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Inspection of BMPs						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 5: Stabilize Soils						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 6: Protect Slopes						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Inspection of BMPs						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 7: Protect Drain Inlets						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 8: Stabilize Channels and Outlets						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Inspection of BMPs						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 9: Control Pollutants						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
Element 10: Control Dewatering						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Inspection of BMPs						
BMP:						
	Inspected		Functioning			
Location	Y	N	Y	N	NIP	Problem/Corrective Action

Stormwater Discharges From the Site			
	Observed?		
	Y	N	Problem/Corrective Action
Location			
Turbidity			
Discoloration			
Sheen			
Location			
Turbidity			
Discoloration			
Sheen			

Water Quality Monitoring				
Was any water quality monitoring conducted?	□	Yes	□	No
If water quality monitoring was conducted, record results here:				
If water quality monitoring indicated turbidity 250 NTU or greater; or transparency 6 cm or less, was Ecology notified by phone within 24 hrs?	□	Yes	□	No
If Ecology was notified, indicate the date, time, contact name and phone number below:				
Date:				
Time:				
Contact Name:				
Phone #:				
General Comments and Notes Include BMP repairs, maintenance, or installations made as a result of the inspection.				
Were Photos Taken?	□	Yes	□	No
If photos taken, describe photos below:				

DIVISION 2 – SITE WORK
SECTION 02350 - ROCK WALL

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 SUMMARY 2
1.2 REFERENCES 2
1.3 QUALITY ASSURANCE 2
1.4 SUBMITTALS 3
1.5 RECORD DRAWINGS 3
1.6 COORDINATION 3
2.0 PRODUCTS 3
2.1 ROCK CHARACTERISTICS 3
2.2 ROCK WALL BASE COURSE 4
2.3 ROCK WALL BACK FILL 4
2.4 GEOGRID 4
3.0 EXECUTION 4
3.1 ROCK WALL KEYWAY 4
3.2 BASE COURSE 4
3.3 ROCK SELECTION 5
3.4 ROCK PLACEMENT 5
3.5 GEOGRID INSTALLATION 6

DIVISION 2 – SITE WORK
SECTION 02350 - ROCK WALL

1.0 GENERAL

1.1 SUMMARY

1. Work specified in this Section includes providing all labor and materials associated with constructing Rock Walls.
2. A geotechnical analysis has been completed by Shannon & Wilson, Inc. using this MSEW system as provided in Exhibit U – Additional Information – Geotechnical Report.

1.2 REFERENCES

1. Exhibit U – Additional Information - Entiatqua Geotechnical Report prepared by Shannon & Wilson, Inc.
2. Washington State Department of Transportation – Standard Specifications for Road, Bridge, and Municipal Construction (latest edition) specifically Section 8-24.3(1) Rock Wall.

1.3 QUALITY ASSURANCE

1. Rock walls shall be constructed in compliance with the Geotechnical Report.
2. Construction of rock walls shall be performed by a company specializing in performing the Work of this section with a minimum of five (5) years documented and successful experience in construction of rock walls. Heavy equipment operator constructing rock walls shall have a minimum of three (3) years of work experience building rock walls.
3. Contractor shall review and be familiar with the geotechnical report. Conflicts between the report, the Contract Drawings, and/or this Section shall be brought to the attention of the Engineer.
4. A preconstruction conference shall be held prior to construction of rock walls. A representative of the District and all Contractor personnel involved in the construction of the rock wall shall be present. Conference shall address the following items:
    a. Safe work practices (injury avoidance)
    b. Work methods/sequencing
    c. Equipment proposed for use
    d. Compaction testing requirements
    e. Geogrid installation
    f. Coordination with other work

g. Any other items as necessary to improve efficiency and quality of work.

1.4 SUBMITTALS

Submit product data and testing certificates for the following prior to mobilization on-site under provisions of Section 01300 - Administrative Requirements:

a. Source of rock wall products and certification of compliance with material specification.

b. Source of import and/or structural fill material and certified soils lab sieve analyses.

1.5 RECORD DRAWINGS

1. Submit under provisions of Section 01300 - Administrative Requirements.
2. Accurately record wall components including height of wall, wall steps below grade, geogrid location and lengths.

1.6 COORDINATION

1. Coordinate installation of PVC pipe for rail fencing post with the work of this Section.
2. Coordinate the work of this Section with the Excavation Plan as specified in Exhibit S Specifications, Section 02200 – Earthwork, Part 1.4.4.

2.0 PRODUCTS

2.1 ROCK CHARACTERISTICS

1. Rock Walls: Shall conform to WSDOT Standard Specification 9-13.7(1) Rock for Rock Walls and Chinking Material. Rock shall be hard, sound, and durable material free from seams, cracks, and other defects tending to decrease its resistance to weather.
2. On-site rock meeting the requirements of this specification may be used. The District has not evaluated the use of on-site rock and therefore does not make any claim as to whether the on-site rock meets specification or any assertion regarding the quantity of rock available.
3. Rock which fractures during the course of construction shall not be considered compliant with this specification and shall consequently be removed and replaced at the expense of the Contractor.
4. Rock not compliant with the specification or otherwise unused shall be considered property of the Contractor.
5. Rock shall be of a geometric size suited to provide a tight and structurally stable position upon construction. The longest dimension of any individual rock shall not exceed three times its shortest dimension.

2.2 ROCK WALL BASE COURSE

1. Rock wall base shall consist of unyielding native soil or import fill material compacted to at least 95 percent of the maximum dry density as determined by Modified Proctor (ASTMA D1557). Import fill material shall be used as a leveling course.
2. Import fill shall conform to WSDOT Standard Specification 9-03.9(3) Crushed Surfacing Base Course or 9-03.14(4) Gravel Borrow for Geosynthetic Retaining Wall (Footnote 1 applies: “100 percent passing 1¼-inch sieve and 90 to 100 percent passing 1-inch sieve”).

2.3 ROCK WALL BACK FILL

1. Rock Wall Backfill shall consist of rock chinking and structural fill.
2. Chinking Rock: Shall conform to WSDOT Standard Specification 9-13.7(1) Rock for Rock Walls and Chinking Material. Chinking rock shall generally consist of rock sized from three (3) to six (6) inches.
3. Structural Fill: Shall conform to WSDOT Standard Specification 9-03.14(4) Gravel Borrow for Geosynthetic Retaining Wall (footnote 1 applies: “100 percent passing 1¼-inch sieve and 90 to 100 percent passing 1-inch sieve”) or 9-03.9(3) Crushed Surfacing Base Course.

2.4 GEOGRID

See Specifications, Section 02073 - Geosynthetics.

3.0 EXECUTION

3.1 ROCK WALL KEYWAY

1. After general excavation of site, Contractor shall construct a keyway in which to set the basal row of rock forming the rock wall.
2. The keyway shall comprise a shallow trench of not less than 8- inches in depth, extending the full length of the rock wall. Keyway depth shall be measured after placement and compaction of leveling course.
3. The keyway width shall be equal to the width of the base rock as indicated in the Contract Drawings.
4. The keyway subgrade shall be slightly inclined with downslope to the back of the wall to help in the formation of a 6V:1H batter.

3.2 BASE COURSE

1. Contractor shall excavate keyway to depth shown in Contract Drawings.
2. Contractor shall over excavate and place import material if native is yielding. Import base course shall be placed in lifts not exceeding 6-inches as needed to

achieve at least 95 percent of the maximum dry density, as determined by modified proctor, before any additional fill is placed.

3. Following base preparation, Contractor shall loosely place import material to depths necessary to provide a stable leveling course. Rock shall be placed in a manner to shape and provide compaction to the leveling course.

4. Contractor shall be responsible for maintaining quality control during compaction including but not limited to using the services of a certified independent testing agency to verify compaction, as specified, has been achieved in conformance with Specifications – Section 02200 Earthwork. Contractor shall submit compaction testing results to District.

3.3 ROCK SELECTION

1. Contractor shall stockpile rock in an open and visible manner to accommodate both the inspection and selection of rock.

2. During the course of construction, Contractor shall strategically select rock most geometrically suited for placement resulting in a tight and structurally stable condition.

3. Rocks exhibiting significant cracks, seams, foliation joints or other probable weaknesses shall not be used. The Contractor shall assume ownership of unused rock and provide for their removal from the site.

3.4 ROCK PLACEMENT

1. Rock sizes shall be placed at locations as shown in the Contract Drawings.

2. The first course of rock shall be placed on leveling course. Rock shall make full contact with foundation material, which may require shaping of the ground surface or slamming or dropping the rocks into place so that the leveling course better conforms to the rock face bearing on it.

3. As the rock wall is constructed, the rocks shall be placed so that there are no continuous joint planes in either the vertical or lateral direction. Wherever possible, each rock shall bear on at least two (2) rocks below it. Rocks shall be placed so that there is some bearing between flat rock faces rather than in or on spaces between the underlying rocks. The upper plane of each rock between courses (the top surface of rock) shall slope back towards the protected soil face and away from the face of the rock wall.

4. Contractor shall not place rock into any wall with a top surface sloping downwards out of the wall face.

5. The use of smaller rocks (1 or 2 man size) shall be limited to only those places requiring stabilization. In no case shall smaller rocks be used or placed in a position of instability.

6. All voids shall be “chinked” from the rear face of the wall. Chinking shall be done in a manner which increases contact points and therefore the structural stability of the rock wall. Chinking shall also be performed to minimize the migration of the structural backfill through the voids. Chinking rock shall be of the same material as the rock wall but of an appropriate size to fill voids.
7. The face of the rockery wall shall be inclined at a gradient of 1H:6V or flatter back towards the face being protected.
8. Backfill for the rock wall shall be placed behind each course and tamped to provide a stable condition prior to placing rocks for the next successive course. Backfill shall involve placement of chinking rock on the rear face of the wall to fill voids and stabilize wall followed by placement and compaction of structural fill in 6- inch lifts.

3.5 GEOGRID INSTALLATION

1. Geogrid shall be placed between the first and second course of rock. Geogrid shall extend 6 feet beyond the back face of the rock wall.
2. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.
3. The geogrid soil reinforcement shall be placed so that a minimum of 2-inches remains vertical and in contact with the back of rock after backfill is placed and compacted.
4. The geogrid shall be pulled taut and free of wrinkles prior to backfill placement on the geogrid.
5. Geogrid reinforcements shall be continuous throughout their embedment lengths.
6. Spliced connections between shorter pieces of geogrid are not permitted.
7. Rubber tired equipment may pass over the geogrid reinforcement at slow speeds less than 5 mph. Sudden braking and sharp turning shall be avoided.
8. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6-inches is required prior to operation of tracked vehicles over the geogrid. To prevent displacing the fill and geogrid, tracked vehicles should not turn while on the geogrid.

END OF SECTION 02350

DIVISION 2 – SITE WORK
SECTION 02360 – GABIONS

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 REFERENCES 2
1.3 DEFINITIONS 2
1.4 QUALITY ASSURANCE 2
1.5 SUBMITTALS 3
1.6 RECORD DRAWINGS 3
1.7 COORDINATION 3
2.0 MATERIAL 3
2.1 GABIONS AND ASSOCIATED MATERIALS 3
2.2 FILL MATERIALS 4
3.0 EXECUTION 4
3.1 GENERAL 4
3.2 EXAMINATION 4
3.3 ASSEMBLY 4
3.4 ERECTION 5
3.5 GABION FILLING 5
3.6 BACKFILL PLACEMENT 6
3.7 COMPACTING EQUIPMENT 6
3.8 DRAINAGE REQUIREMENTS 6
3.9 FIELD QUALITY CONTROL 6

DIVISION 2 – SITE WORK
SECTION 02360 – GABIONS

1.0 GENERAL

1.1 DESCRIPTION

1. Work specified in this Section includes providing all labor and materials associated with the gabion retaining wall system.
2. The gabion retaining wall system shall be Hilfiker ArtWeld Gabions (welded wire mesh) Or Equal.
3. A geotechnical analysis has been completed by Shannon & Wilson, Inc. using this gabion system as provided in Exhibit U – Additional Information – Geotechnical Report.

1.2 REFERENCES

1. Exhibit U – Additional Information - Entiatqua Geotechnical Report prepared by Shannon & Wilson, Inc.
2. Washington State Department of Transportation – Standard Specifications for Road, Bridge, and Municipal Construction (latest edition) specifically Sections 8-24.3(3) Gabion Cribbing and 9-27 Cribbing.

1.3 DEFINITIONS

Working Drawings – Manufacturer supplied drawings supplemental to the Contract Drawings for use by the Contractor to construct the gabion wall to the manufacturer's recommendations.

1.4 QUALITY ASSURANCE

1. The gabion wall shall be constructed in compliance with the Geotechnical Report.
2. Construction of the gabion wall shall be performed by a company specializing in performing the Work of this section with a minimum of five (5) years documented and successful experience in construction of gabion walls or equivalent.
3. A representative of the gabion manufacturer shall be present at the beginning of construction of the wall. The representative shall continue on-site supervision until it has been demonstrated that the Contractor is knowledgeable, experienced, and capable of constructing the wall system in accordance with manufacturer's standards.
4. Gabion manufacturer representative shall participate and provide guidance as necessary in the development of an Excavation Plan as specified in Exhibit S Specifications, Section 02200 – Earthwork, Part 1.4.4.
5. Gabion manufacturer representative shall review and be familiar with the geotechnical report. Conflicts between the report, the Contract Drawings, this

Section and/or the Manufacturer's recommendations shall be brought to the attention of the Engineer.

6. A preconstruction conference shall be held with the manufacturer's representative, the Contractor and the Engineer present.

1.5 SUBMITTALS

Prior to mobilization on-site, the Contractor shall submit a Manufacturer's Certificate of Compliance including:

a. Certification indicating the geotechnical analysis complies with the manufacturer's recommendations. If conditions warrant the manufacturer shall perform an independent analysis and submit additional design calculations and Working Drawings.

b. Product data and written warranty.

c. Sufficient technical data and manufacturer's specifications to demonstrate that all such items meet or exceed the specified requirements.

d. Manufacturer's recommended installation instructions or field construction manual. The manufacturer's recommended installation procedures will become the basis for inspecting and accepting or rejecting actual installation procedures on this Work.

1.6 RECORD DRAWINGS

1. Submit under provisions of Section 01300 - Administrative Requirements.
2. Accurately record wall components including height of wall, wall steps below grade, geotextile location and lengths.

1.7 COORDINATION

Coordinate installation of sonotube for chainlink fencing posts with the work of this Section.

2.0 MATERIAL

2.1 GABIONS AND ASSOCIATED MATERIALS

1. Gabion wall system shall consist of Hilfiker ArtWeld Gabions (welded wire mesh) Or Equal.
2. Gabions shall be of a single unit construction. The base, ends, sides, and lid shall be either welded into a single unit or shall be connected in such a manner that strength and flexibility at the connection are at least equal to that of the wire mesh. The gabions shall be fabricated in such a manner that they can be assembled at the construction site with spiral binders and pre-formed stiffeners into rectangular baskets of the specified size.
3. The height, length, and width of the gabions shall not vary more than five (5) percent from the standard gabion dimension sizes as provided by the manufacturer. The gabion size used shall be three (3) feet wide. The predominant height shall be three

(3) feet, however at start or end points a half height or 1 foot 6-inch gabion height shall be used to taper and step gabions as site conditions dictate. Gabion lengths shall vary from three (3) to nine (9) feet to meet site conditions. Specifically gabions shall be of shorter length where the trail bends as shown in the Contract Drawings. In general, gabion dimensions shall be selected to contour with the embankment slopes and bending of the trail.

4. Gabions shall be divided into cells of equal length, not more than three (3) feet long, by diaphragms made of the same wire mesh as used for the gabion body. Each gabion shall be fabricated with the necessary diaphragm or diaphragms secured in proper position on the base in such a manner that no additional tying at the base will be necessary.
5. Welded wire fabric including stiffeners and spiral binders shall be nine (9) gauge galvanized (0.90 oz/SF) steel wire in accordance with ASTM A185, A370, A641, and A90.
6. Tie wire shall be 13.5-gauge galvanized (0.70 oz/SF) steel in accordance with ASTM A641 and A90.

2.2 FILL MATERIALS

1. Rock Fill for Gabions: Shall conform to WSDOT Standard Specification 9-27.3(6) Stone.
2. Structural Fill: See Specifications, Section 02200 - Earthwork.

3.0 EXECUTION

3.1 GENERAL

Construction of the gabion wall shall be performed under guidance from the manufacturer's field representative and with observance to the manufacturer's written construction guide.

3.2 EXAMINATION

1. Verify site conditions prior to commencement of Work.
2. The Contractor shall confirm the locations of all man-made elements that may be affected or damaged by the Work. Elements which may be affected or damaged by the Work must be reported to the District in advance of the work beginning. The District may modify the design or approve of changes to installation techniques proposed by the Contractor to preclude damage or conflict with existing elements.
3. The Contractor shall verify all dimensions and report discrepancies to the District.

3.3 ASSEMBLY

1. Gabions shall first be assembled individually as empty units. Each gabion shall be manufactured with the necessary panels, properly spaced and secured, so they can be rotated into position at the construction site with no additional tying of the rotation joint. The panels and diaphragms shall be rotated into position and joined along vertical edges.

2. Vertical edges of each gabion panel shall be constructed first with 13.5 gauge tie wire to form individual empty gabions. Simple spiraling (looping without locking) of 13.5 gauge tie wire is not permitted.
3. Joints shall be constructed using alternating single and double half hitches (locked loops) in every mesh opening along the joint.
4. The 9-gauge spiral binder shall be screwed into position such that is passes through each mesh opening along the joint. Both ends of all 9-gauge spiral binders shall be crimped to secure the spiral in place.
5. Temporary fasteners may be used to hold panels wherever gabions-to-gabion joints will be constructed. Temporary fasteners may remain in place.

3.4 ERECTION

1. The first course of empty gabions shall be placed on the compacted foundation and the alignment and horizontal level checked by the Contractor. The compacted foundation shall be tilted from front to back to form the 6:1 front face batter.
2. The Contractor shall coordinate erection of gabions and subsequent backfill with the placement of the non-woven geotextile along the back face.
3. Individually constructed empty gabions shall be joined successively to the next empty gabion with 13.5-gauge tie wire or 9-gauge spirals, before filling with rock begins. The 13.5-gauge tie wire or 9-gauge spiral binders shall secure, in one pass, all selvage or end wires of panels of all the adjacent gabions along the joint.
4. Multi-layered gabion configurations shall be stacked as shown on the plans or As Directed by the Engineer. When constructing multi-layered gabion configurations, each layer of gabions shall be joined to the underlying layer along the front, back, and ends, or as shown on the Contract Drawings.

3.5 GABION FILLING

1. Rock shall be placed in gabions to insure proper alignment, avoid bulges, and provide a minimum of voids. All exposed rock surfaces shall have smooth and neat appearance. No sharp edges shall project through the wire mesh.
2. Pre-formed stiffeners shall be used to produce a flat, smooth external surface. Stiffeners shall be installed on the exposed face of the gabion prior to rock placement, two (2) rows at 1/3 points on three (3) foot gabions, one row at 1/2 point in 1.5 foot high gabions (if used).
3. When filling 3 foot high gabions, rock shall be placed in 3 nominal 12-inch layers; when filling 1.5 foot high gabions, rock shall be placed in two 9-inch layers.
4. The last layer of rock shall slightly overfill the gabions such that the lid will rest on rock when it is closed. Lids shall be tied along the front, ends, and diaphragms of individual gabions and to successive gabions with 9 gauge spiral binders in the same manner as specified elsewhere in this specification.

3.6 BACKFILL PLACEMENT

1. Structural backfill shall be placed and compacted 6-inch lifts to not less than 95 percent of the maximum density as determined by ASTM D 1557 (Modified Proctor) or equivalent. See Exhibit S – Specifications, Section 02200 Earthwork.
2. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be within two (2) percent of the optimum moisture content.
3. Care shall be taken to maintain the geotextile tight against gabions backside and avoiding wrinkles.
4. Coordinate backfill placement and compaction with chainlink fence construction.

3.7 COMPACTING EQUIPMENT

Hand-operated mechanical compactors should be used within three (3) feet of wall faces. Heavy equipment compactors should not be used near walls.

3.8 DRAINAGE REQUIREMENTS

1. At the end of each day of operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from the wall face.
2. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.

3.9 FIELD QUALITY CONTROL

1. Field inspection and testing will be performed under provisions of Specifications, Section 01450 - Contractor Quality Control. The Contractor shall provide safe access to Work and cooperate with required inspections.
2. At the discretion of the District, the Engineer may perform the following inspections:
    a. Evaluate slope stability during excavation.
    b. Inspect the excavation and approve the foundation prior to the placement of the leveling pad for retaining modules.
    c. Verify the specified soil compaction.
    d. Evaluate soil parameters during construction.

END OF SECTION 02360

DIVISION 2 – SITE WORK
SECTION 02511 – STORM DRAINAGE

TABLE OF CONTENTS

1.0 GENERAL 2
1.1. SCOPE 2
1.2. SUBMITTALS 2
2.0 PRODUCTS 2
2.1. GENERAL 2
2.2. 12-INCH CULVERT EXTENSION 2
3.0 EXECUTION 3
3.1. GENERAL 3
3.2. PIPING INSTALLATION 3
3.3. EXCAVATION 3

DIVISION 2 – SITE WORK
SECTION 02511 – STORM DRAINAGE

1.0 GENERAL

1.1. SCOPE

The Work specified in this section includes extension of an existing storm drain pipe below the SR97A Bridge to pass beneath the Entiatqua Trail.

1.2. SUBMITTALS

Submittals shall be in accordance with Section 01300 Administrative Requirements. Submit the following items prior to mobilization on-site:

a. Culvert Pipe, fittings, and accessories – Supplier's product information.

b. Shop Drawing – Indicating layout of drain pipe if different than shown in Drawings.

2.0 PRODUCTS

2.1. GENERAL

1. All materials delivered to the job site shall be new, free from defects, and marked to identify the material, class, and other appropriate data such as thickness for piping.
2. Acceptance of materials shall be subject to strength and quality testing in addition to inspection of the complete product.

2.2. 12-INCH CULVERT EXTENSION

1. The 12-inch culvert extension shall be corrugated high density polyethylene pipe and shall conform to the requirements of AASHTO M294, Type S. The pipe shall have a smooth interior and annular exterior corrugations. Pipe and fitting material shall be high density polyethylene meeting ASTM D3350 minimum cell classification 435400C for 12-inch to 60-inch diameters. Pipe shall be ADS N-12 WT IB as manufactured by Advanced Drainage Systems, Inc., Or Equal.
2. Fittings shall conform to AASHTO M252 and AASHTO M294. Bell and spigot connections shall utilize a spun-on welded bell and valley or saddle gasket meeting the watertight joint performance requirement of AASHTO M294. All gaskets shall be factory installed on the pipe in accordance with the manufacturer's recommendations.
3. Transition coupler from corrugated metal pipe shall be Mar Mac polyseal joint coupler Or Equal.

3.0 EXECUTION

3.1. GENERAL

1. All pipe and fittings shall be handled in a manner that will prevent damage to the pipe, pipe lining, or coating. Pipe shall be stacked in such a manner as to prevent damage to the pipe, to prevent dirt and debris from entering the pipe, and to prevent any movement of the pipe. The bottom tiers of the stack shall be kept off the ground on timbers, rails, or other similar supports.
2. Fittings shall be stored on pallets or similar materials to keep them off the ground and prevent dirt and debris from entering them.

3.2. PIPING INSTALLATION

1. All pipe connections shall be made up in strict compliance with the manufacturer's recommendation.
2. Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations, and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned, and relayed. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means Approved by the District to ensure cleanliness inside the pipe.
3. Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, re-lubricated if required, and replaced before the rejoining is attempted.
4. Care shall be taken to properly align the pipe before joint connections are made. During pipe connections, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned.

3.3. EXCAVATION

1. All earthwork, excavation, backfill, and compaction shall be as specified in Section 02200 - Earthwork.
2. Excavation work shall be closely coordinated with other portions of the Work. Special care should be made to not place pipe under chain link fence post footings.

END OF SECTION 02511

DIVISION 2 – SITE WORK
SECTION 02810 - SITE IRRIGATION

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 RELATED SECTIONS 2
1.3 REFERENCES 2
1.4 QUALITY ASSURANCE 2
1.5 SUBMITTALS 3
1.6 JOB CONDITIONS 3
1.7 PROTECTION 3
1.8 INSPECTIONS AND TESTS 4
1.9 WARRANTY 4
2.0 PRODUCTS 5
2.1 GENERAL 5
2.2 IRRIGATION HEADS 5
2.3 PIPES AND FITTINGS 5
2.4 TRACE WIRE 5
2.5 PIPE RISER 6
2.6 PIPE RISER “T” POST 6
2.7 PVC SOLVENT CEMENTS AND PRIMERS 6
2.8 VALVES AND VALVE KEYS 6
2.9 VALVE BOXES 6
2.10 ELECTRICAL CONNECTORS 6
2.11 OTHER MATERIALS 6
2.12 DETECTABLE TAPE 6
3.0 EXECUTION 7
3.1 EXAMINATION 7
3.2 INSTALLATION 7
3.3 FLUSHING 9
3.4 INSPECTIONS AND TESTING 9
3.5 CLEANUP 10

DIVISION 2 – SITE WORK
SECTION 02810 - SITE IRRIGATION

1.0 GENERAL

1.1 DESCRIPTION

1. Furnish and install irrigation systems in conformance with the Contract Drawings and Specifications, complete and ready for use. The work consists of furnishing all materials necessary for a complete installation, including: Shop Drawings, wire sleeves, pipe, valves, fittings, sprinklers, controller, valves, and all appurtenances related thereto. Included shall be all labor of installation, including trenching, plumbing, backfilling, electrical work, adjustments, and all other items of labor necessary for a satisfactory operating system.
2. Underground automatic (remote) controlled irrigation system.
3. The layout of the irrigation system is schematic; follow as closely as is practicable.
4. Alterations in the locations of pipelines, valves, and related equipment shall only be made with the District's approval.
5. Before proceeding with the installation of any section or unit of the irrigation system, check and verify the correlation between ground measurements and the Contract Drawings. Advise the District of any discrepancies.

1.2 RELATED SECTIONS

Section 02100 - Site Preparation, Demolition and Tree Protection
Section 02200 – Earthwork
Section 02950 – Landscaping

1.3 REFERENCES

Reference	Title
ASTM D1784	Rigid Poly Vinyl Chloride (PVC) Compounds and Chlorinated Poly Vinyl Chloride Compounds
ASTM D1785	Rigid Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40 and 80
ASTM D2241	Rigid Poly Vinyl Chloride (PVC) Pressure Rated Pipe (SDR-PR)
ASTM D2466	Rigid Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	Solvent Cements for Poly Vinyl Chloride (PVC) Pipe and Fittings
ASTM D2672	Bell-End Poly Vinyl Chloride (PVC) Pipe

1.4 QUALITY ASSURANCE

1. All work specified herein shall conform to or exceed the requirements of the International Building Code.
2. All work hereunder shall be in full accordance with the latest rules and regulations of the governing authorities, Washington State OSHA, the Uniform Plumbing Code

published by the Western Plumbing Officials Association and other applicable local codes and regulations.

3. Qualifications: System installer shall be a Washington State licensed landscape contractor. The irrigation system must be installed under the direct supervision of a journey irrigation mechanic or journey plumber.

4. Manufacturer's Instructions: Adhere to manufacturer's instructions for product handling, installation and operations.

1.5 SUBMITTALS

1. Submit irrigation system product data no later than thirty (30) days prior to installation. Submit prior to final acceptance, product data for all irrigation equipment installed in the irrigation system, and written operating and maintenance instructions on all equipment including winterization procedures.

2. Record drawings: shall be provided at completion of irrigation system installation by installer of system.

1.6 JOB CONDITIONS

1. Solvent weld PVC pipe only during non-freezing weather. Solvent weld PVC pipe only under cover in rainy weather.

2. Site inspection and layout: Before proceeding with any work, the Contractor shall inspect the site, carefully check all grades and verify all dimensions and conditions affecting the work to satisfy Contractor so that Contractor may safely proceed. Changes or alterations to the system to meet actual conditions shall be made at the Contractor's expense. Irrigation plan is diagrammatic and is not intended to show exact locations of existing or proposed piping, valves or controllers. Pipe lines shown parallel on Contractor Drawing may be placed in a common trench but separated by at least 6 inches. Irrigation heads are shown accurately and shall be installed as indicated by center of symbol.

3. Store PVC pipe and fittings out of direct sunlight and protect from physical damage.

1.7 PROTECTION

1. Protect work and adjacent property, and be responsible for any damage or injury arising from this Contract, due to actions or neglect:

    a. Provide protection at all times ample to keep rock, dirt, gravel, debris and all other foreign materials from entering piping, valves and other irrigation equipment.

    b. Provide protective cover and barriers as necessary to prevent damage and staining.

2. Confine work to areas designated:

    a. Do not disturb existing vegetation outside of construction limits.

    b. Protect all trees within construction limits not designated to be removed.

c. Coordinate root pruning as required for the installation of irrigation system around existing trees to remain. Adjust pipe locations in field as required to ensure protection of existing trees and root system. Verify location of pipe alignment with District before trenching and installation around tree roots.

d. Repair or replace vegetation damaged as a result of Contractor's operation to satisfaction of the District.

3. Protection of utility lines and other existing facilities:

   a. Verify locations of all utility lines and underground obstructions.

   b. Be familiar with all utility, irrigation, mechanical, and electrical plans so that digging and drilling operations do not damage lines.

   c. Repair or replace any damage to buildings, equipment, underground utilities, irrigation equipment, paving, surfacing, stairs, and/or forms in a manner satisfactory to the District.

   d. Call the Underground Utilities Locator Service (1-800-424-5555) prior to commencing work.

1.8 INSPECTIONS AND TESTS

Cover or enclose work only after it has been inspected, tested, and Approved by District.

1.9 WARRANTY

1. In addition to other Contract warranties, the sprinkler system installer shall provide in writing to District a statement that sprinkler system installer will come back to job site at beginning of first winter season to perform (during one year landscape maintenance period).

   a. General inspection of system.

   b. Test all lines, valves, sprinkler heads, double-check valves.

   c. Repair all leaks and any faulty work.

   d. Check operation of system and adjust spray patterns if necessary for full coverage.

   e. Do other necessary work for adequately functioning system.

   f. Drain system completely and show grounds person and irrigation specialist location of all drain valves and/or "blow out" points. Winterize irrigation system using compressed air to evacuate all lines.

2. Contractor shall repair grades that have settled at all trenches, and for adjustment of sprinkler heads to finish grade. Contractor shall provide topsoil and other materials to bring planting corridor to finished grade. Contractor shall return in spring, after

first winter, for system check-up and, if necessary, restore system for spring and summer operation.

3. Contractor shall ensure designated park grounds person fully understands the system and operational methods. Irrigation specialist shall be present at spring start up. During first irrigation season, Contractor shall be available within one week to make required repairs to the system.

2.0 PRODUCTS

2.1 GENERAL

1. Comply with Specifications and Manufacturer's data. Where these may be in conflict, the more stringent requirements govern.
2. Materials and equipment shall be new and of brands, types and Manufacturers as shown on the Contract Drawings, specified in this Section, Or Approved substitutions.
3. Whenever references are made to a product of a particular manufacturer, such reference is for the purpose of facilitating the description and representative quality of the product intended for use.
4. Each type of material or model of equipment shall be of one manufacturer throughout.

2.2 IRRIGATION HEADS

1. Irrigation heads shall consist of riser and nozzle only.
2. Nozzle shall be Hunter Specialty Nozzles – Strip Pattern Nozzles models: LCS-515, RCS-515 and SS-530 (See: www.hunterindustries.com/product/nozzles/specialty-nozzles) Or Equal.

2.3 PIPES AND FITTINGS

1. Markings: All PVC and HDPE pipe and fittings shall bear the manufacturer's name or trademark, material designation, nominal size, applicable IPS schedule or class rating, NSF seal of approval; and on pipe ASTM Standard Number.
2. PVC Pipe: Solvent Weld Schedule 40 PVC suitable for irrigation use.
3. Polyethylene Pipe: PE 3408 DR9 (200 psi) suitable for irrigation use.

2.4 TRACE WIRE

Magnetic detectable conductor, brightly colored plastic covering, imprinted with "IRRIGATION" in large letters.

2.5 PIPE RISER

Grey schedule 80 PVC with UV inhibitor and 1/2 inch MPT ends for connection to PVC tee fitting and spray nozzle.

2.6 PIPE RISER "T" POST

Steel T shape post with a minimum weight of 0.95 lbs/ft.

2.7 PVC SOLVENT CEMENTS AND PRIMERS

1. Solvent Cement: NSF approved, meet requirements of ASTM 02564
2. Primer: NSF approved;

2.8 VALVES AND VALVE KEYS

1. Valves
    a. Automatic Control Valve: Hunter ICV-151G Or Equal.
    b. Quick Coupler Valve: Rainbird Model 44RC, Or Equal.
    c. Ball Valve: Apollo two piece bronze ball valve Or Equal.
2. Valve keys: provide Quick Coupler Key and other tools necessary for operating valves.

2.9 VALVE BOXES

1. Automatic control valves, singular: Carson 1419B with bolt down locking lid and extensions as required, green color, Or Equal.
2. Ball Valve Protective Sleeve: 4-inch PVC, length as required, with tight fitting cap, Rainbird #6100, Or Equal.
3. Keys for valve boxes: provide five (5) sets of all keys required for valve boxes and covers.

2.10 ELECTRICAL CONNECTORS

1. Scotch-lock connector sealing pack No. 3577 with Type R.
2. Rain Bird Pen-Tite Wire Connectors No. PT 101 through 104.

2.11 OTHER MATERIALS

As indicated on the Contract Drawings specified or required.

2.12 DETECTABLE TAPE

Blue detectable tape: 2-inch minimum width, with metallic backing made of plastic capable of stretching during burial, with the words "Irrigation Water" printed on it.

3.0 EXECUTION

3.1 EXAMINATION

1. Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.
2. Discrepancies in Contract Drawings: Report to District any deviations between Contract Drawings and site. Failure to do so prior to the installation of equipment may result in the replacing, and/or relocating of equipment.
3. Available pressure verification: Prior to the start of work, verify static pressure at point of connection. Notify District of pressure available for approval to proceed.
4. Coordinate planting with irrigation system installation.

3.2 INSTALLATION

1. General:
    a. Locate size and type of all equipment as specified and indicated on Contract Drawings.
    b. Make no adjustment without written approval of the District.
    c. Water service connection: Coordinate with District to connect to the existing irrigation system. Park irrigation system including controllers and control wire to be installed under the Entiat Park Revitalization Project.
    d. Install all equipment per manufacturer's recommendations unless otherwise specified.
2. Layout of irrigation system:
    a. Stake the system following the diagrammatic design shown on the Contract Drawings before irrigation system installation begins. Notify District for approval to proceed with installation.
    b. Alterations and changes in the layout may be expected in order to conform to the conditions.
    c. It is understood that corrective measures in the system may become necessary but make no changes or alterations in the system as planned without the prior authorization and approval of the District.
3. Trenching:
    a. Trench bottoms with uniform slopes 1/2% standard minimum grade. Compact trench bottom prior to placing bedding material. Bottom of trenches shall be smooth and free of sharp rock and other objects that may damage pipe.

b. Remove materials unsuitable for bedding of pipe to a depth of 4-inches below trench bottom and backfill with sand or suitable bedding material. Where backfill contains excessive rock and other material that may damage pipe, or in the opinion of District excavated material is not suitable for backfill, use sand acceptable to District. Keep construction gravel separate from topsoil.

c. Allow for minimum cover depths as follows:

d. All supply secondary main lines from water source to control valves or quick-coupling valves: 24-inches except as otherwise indicated.

e. All lateral lines from control valves to head: 12-inches except as otherwise specified.

f. Provide trench of sufficient width to allow for proper tamping around pipe.

g. Place backfill material in maximum 4-inch lifts (loose measurements) and compact to the dry density of adjacent undisturbed soil.

4. Piping:

a. Place 4 inches of sand around and above piping, removing rock or other material that may damage pipe. Excavated material may be used for remainder of backfill. Compact thoroughly.

b. Pipe in trenches “snaked” slightly allowing for expansion and contraction of PVC pipe. Slope pipe toward drains.

c. Fill piping with water at approximately 25 psi during backfilling operation.

d. Backfill over fittings only after system has been tested and test accepted.

e. Lay pipe in accordance with manufacturer’s recommendations and industry standards.

f. Only factory threaded Schedule 80 PVC pipe may be fitted to a threaded fitting without an adapter.

g. No male PVC adapters permitted, use only female PVC adapters (3-inch minimum).

h. Street ells permitted only where indicated: “Marlex“ Schedule 40 high density polyethylene (no substitutions).

i. Galvanized steel piping: Clean out threads of standard lengths, not more than two threads showing at joints. Make joints up with pipe compound applied to male threads only.

5. Jointing:

a. Threaded joints to be sealed with Teflon tape or Rectorseal “Heavy Duty” #100 Virgin Teflon Thread sealing paste only, no substitutions. Take care not to over tighten threaded joints.

b. Keep the interior of all pipes clean and free from dirt, debris, excess solvent, or other material.

c. Solvent welded PVC pipe joints, except as otherwise indicated. Cut pipe square with cutting tool, chamfer deburr, wipe from the surface all chips, dust, dirt, moisture and foreign matter which may contaminate the cemented joint. Apply primer and solvent cement per manufacturer's recommendations.

d. Allow the joints to cure at least 24 hours before pressure is applied to the system.

6. Control Valves:

a. Install automatic control valve and quick coupling valves as detailed on drawings or as otherwise directed by the District.

b. Provide PVC sch. 80 union at each automatic control valve.

c. Provide valve box with extensions as required for each automatic control valve or grouping of two valves. Set top flush with finish grade.

d. Install quick coupling valves as detailed.

7. Irrigation Nozzles:

Install sprinkler nozzles of types, sizes and coverage called for in the Contract Drawings or as otherwise directed by the District.

3.3 FLUSHING

1. One fully open flushing prior to placement of heads or drain valves. Flush for one (1) minute minimum.
2. Protect against re-entry of contaminated water into risers or piping.
3. After flushing, immediately install sprinkler heads or cap risers until sprinkler heads are installed.

3.4 INSPECTIONS AND TESTING

1. General:

a. Irrigation water is only available from approximately April 15 to October 15. If pressure testing occurs outside of this time period, the Contractor will need to supply water at no additional expense to District.

b. Coordinate with District for water availability. Notify the District at least 24 hours prior to inspections and tests.

c. Conduct test in presence of the District.

d. All gauges used in the testing of water pressures to be certified by an independent testing laboratory immediately prior to use on the Contract.

2. Preliminary Inspection:

a. Install all mains and laterals with all valves and other equipment in place, except irrigation heads.

b. Cap all risers except the first riser from valve on each lateral line.

c. Purge all air from main lines.

3. Pressure testing

a. Purge all air from laterals and cap all risers.

b. Open valves and pressurize system.

c. Visually inspect lateral lines.

d. Repair and retest lines which evidence visible leakage.

4. Final inspection and coverage check:

a. Prior to request for final inspection by the District, accomplish the following:

1) Complete all work including balancing and adjusting the system to provide optimum coverage without fogging or over throw onto paved surfaces and building.

2) Complete all wiring, adjustments to the controller and set time sequences for each valve.

3) Backfill all trenches.

b. Coverage check: Operate as needed to ensure proper coverage. Final approval of acceptable coverage to be performed by District.

3.5 CLEANUP

1. Keep premises reasonably free from accumulation of debris.
2. On completion of each division of work, remove all debris, equipment and surplus materials and leave the project site in a neat and orderly fashion.

END OF SECTION 02810

DIVISION 2 – SITE WORK
SECTION 02820 – FENCING

TABLE OF CONTENTS

1.0. GENERAL 2
1.1 SCOPE 2
1.2 REFERENCE 2
1.3 SUBMITTALS 2
1.4 QUALITY ASSURANCE 2
1.5 PROJECT CONDITIONS 2
2.0 PRODUCTS 3
2.1 CHAIN LINK FENCING 3
2.2 WOODRAIL FENCING 3
3.0 EXECUTION 3
3.1 GENERAL 3
3.2 SURFACE PREPARATION 3
3.3 CHAIN LINK FENCE INSTALLATION 4

DIVISION 2 – SITE WORK
SECTION 02820 – FENCING

1.0. GENERAL

1.1 SCOPE

The Work of this Section includes construction of chain link and wood rail fencing, conforming to the lines, grades, and details and at the locations as shown in the Contract Drawings.

1.2 REFERENCE

Washington State Department of Transportation – Standard Specifications for Road, Bridge, and Municipal Construction (latest edition) specifically Sections 3-12 Chain Link Fence and Wire Fence and 9-16.1 Chain Link Fence and Gates.

1.3 SUBMITTALS

Comply with the requirements of Section 01300 - Administrative Requirements. Thirty (30) days prior to installation submit the following:

a. Product Data: Manufacturer's catalog cuts, complete fence and gate assemblies, gate hardware and accessories.

b. Quality Control Submittals: Test reports for fence posts and braces.

c. Manufacturer's Certificates: Certifying that all materials comply with applicable requirements.

1.4 QUALITY ASSURANCE

The Contractor's Quality Control Plan shall include provisions for ensuring material and installations meet the requirements of this specification.

1.5 PROJECT CONDITIONS

1. The Contractor shall take field measurements prior to preparations of Shop Drawings and fabrication.
2. The Contractor shall coordinate construction of the chain link fence with the gabion basket Work to ensure that all fence posts are positioned and aligned to the required lines and grades.

2.0 PRODUCTS

2.1 CHAIN LINK FENCING

Chain link fencing products shall comply with the requirements of the WSDOT Standard Specification 9-16.1 and as illustrated in the Contract Drawings. The fencing shall conform to a Type 3 except the fabric shall be 9 gage galvanized steel wire in two (2) inch mesh.

2.2 WOODRAIL FENCING

1. General: Woodrail fencing products shall comply with requirements as shown in Contract Drawings and described in this specification.
2. Poles for rail fence shall be lodge pole pine, bark free, smooth, pressure treated with CCA to net retention of 0.4 pounds per cubic foot. Taper allowance from butt to tip shall not exceed 1 inch for 10 feet of length.
3. Fence width between posts may be decreased, as needed to avoid conflicts with Lock+Load counterforts. Coordinate with trail earthwork contractor for placement of poles in conjunction with location of counterforts.

3.0 EXECUTION

3.1 GENERAL

1. Coordinate as required with the District and railroads prior to starting construction activities.
2. Clearly stake and establish fencing alignment for District site review. District will provide a one-time survey and staking of property line for Contractor's use per General Conditions, Surveys.
3. Fence alignment crosses through rough terrain comprised of rock. Contractor shall anticipate encountering rock during grading of the alignment and during posthole digging.
4. Fencing installation shall not begin before final grading has been completed and finished elevations have been established, unless otherwise Approved.

3.2 SURFACE PREPARATION

1. All trees, brush, stumps, logs, and other debris which would interfere with proper construction of fence in required location shall be removed a minimum width of two (2) feet on each side of fence centerline before starting fencing operations.
2. Excavate and grade fence line as required for a complete installation. Final contours shall be 1 inch to 6 inches below chainlink fence tension wire
3. Coordinate with earthwork contractor for placing and accurate positioning of post forms (sono-tubes) as required for a complete installation.

3.3 CHAIN LINK FENCE INSTALLATION

1. Construction of chain link fencing shall comply with the requirements of the WSDOT Standard Specification 8-12 and as illustrated in the Contract Drawings.
2. Fence shall generally follow contour of the ground as indicated in the Contract Drawings.
3. Grading shall be performed where necessary and shown on the Contract Drawings to provide a neat appearance. Installation shall generally be in accordance with WSDOT Standard Plan L-20.10-01 Type 3 (Heights vary).
4. All posts shall be set in concrete at required dimension and depth and at spacing indicated.
5. Posts should be spaced not more than ten (10) feet apart and should be set a minimum of three (3) feet deep. Post holes shall be in proper alignment so that there is a minimum of 3-inches of concrete on all sides of posts, unless otherwise shown on the Contract Drawings.
6. Concrete shall be thoroughly consolidated around posts by tamping or vibrating and shall have smooth finish slightly higher than ground and sloped to drain away from posts.
7. All posts shall be set plumb and to required grade and alignment. No materials shall be installed on posts, nor shall posts be disturbed in any manner within seven (7) days after individual post footing is complete unless authorized by the Project Manager.
8. Should rock be encountered at a depth less than the planned footing depth, a hole 2-inches larger than the greatest dimension of the posts shall be drilled to a depth of 12-inches.
9. After posts are set, the remainder of drilled holes shall be filled with grout, composed of one (1) part Portland cement and two (2) parts mortar sand.
10. Any remaining space above rock shall be filled with concrete in the manner described above.
11. In lieu of drilling, rock may be excavated to the required footing depth.
12. Install horizontal brace rails with diagonal truss rods and turnbuckles at all terminal posts.
13. Wire fabric shall be firmly attached to posts and braced.
14. All wire shall be stretched taut and shall be installed to required elevations. Normal installation will be fabric barbs up with top and bottom tension wires.
15. Posts shall be straight and plumb within vertical tolerance of one-quarter 1/4 inch after fabric has been stretched.
16. Bottom of fence fabric shall be no less than 1-inch nor more than 4-inches from the ground surface.

17. Fencing and gates shall be true to line with no more than 1/2 inch deviation from established centerline between line posts.
18. At locations of small natural swales or drainage ditches and where it is not practical to have fence conform to general contour of the ground surface, longer posts may be used to span opening below fence.
19. Defects shall be repaired as directed by the Engineer.

END OF SECTION 02820

DIVISION 2 – SITE WORK
SECTION 02930 – HYDROSEEDING

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION OF WORK 2
1.2 QUALITY ASSURANCE 2
1.3 QUALITY CONTROL 2
1.4 SUBMITTALS 2
1.5 DELIVERY, STORAGE AND HANDLING 2
1.6 SCHEDULING 3
1.7 MAINTENANCE WARRANTY 3
1.8 PROJECT CONDITIONS 3
2.0 PRODUCTS 3
2.1 PLANTING CORRIDOR HYDROSEED MIX 3
3.0 EXECUTION 4
3.1 EXAMINATION 4
3.2 PREPARATION 4
3.3 GENERAL 4
3.4 HYDROSEED APPLICATION 5
3.5 CLEANUP AND PROTECTION 5

DIVISION 2 – SITE WORK
SECTION 02930 – HYRDROSEEDING

1.0 GENERAL

1.1 DESCRIPTION OF WORK

Work described in this section includes preparation of the ground surface and placement of seed for long term stabilization using a hydraulic applicator.

1.2 QUALITY ASSURANCE

1. Installer Qualifications: An experienced landscape installer who's Work has resulted in successful hydroseed application.
2. Pre-installation Conference: Conduct conference on-site prior to application.
3. All seeds shall conform to the requirements of Washington State Seed Law, and when applicable, the Federal Seed Act and shall be "Certified" grade or better.

1.3 QUALITY CONTROL

Provide a uniform stand of grass. Re-seed areas which fail to provide a uniform stand of grass with specified materials until all affected areas are accepted by the Engineer.

1.4 SUBMITTALS

Provide the following submittal in one complete package no later than 15 days prior to placement:

a. Product Data for the following:
    1) Fertilizer
    2) Organic Amendment
    3) Hydroseed components including wood fiber mulch, tackifier and moisture retention agent.

b. Certification of seed mix: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

1.5 DELIVERY, STORAGE AND HANDLING

1. Hydroseed subcontractor shall store seed and BFM until time of application. Delivered seed shall be in original sealed, labeled, and undamaged containers.
2. Hydroseed Components: Deliver materials and products in UV and weather-resistant factory labeled packages. Store and handle in strict compliance with manufacturer's instruction and recommendations. Protect from damage, weather, excessive temperatures and construction operations.

1.6 SCHEDULING

1. Apply hydroseed between October 1 and November 15.
2. Weather Limitations: Proceed with hydroseeding only when existing and forecasted weather conditions are favorable. Seeding shall not be done during windy weather or when the ground is overly wet or frozen. Contractor shall give the District forty-eight (48) hours notice of seeding operations.

1.7 MAINTENANCE WARRANTY

Warranty hydroseed application for a one-year period from date of installation. Maintain as necessary during the one year warranty period by supplementing existing watering if required, fertilizing, weeding, reseeding, and other operations. Roll, re-grade, and replant bare or eroded areas and re-mulch to produce a uniformly smooth native plant growth.

1.8 PROJECT CONDITIONS

Restrict pedestrian traffic from seeded areas until established. Erect signs and barriers as required.

2.0 PRODUCTS

2.1 PLANTING CORRIDOR HYDROSEED MIX

1. The following seed mixture shall be provided in all areas designated to receive planting corridor hydroseed mix as shown in the Contract Drawings. All seed shall be Pure Live Seed (PLS).

Seed Type (Common Name)	Pounds PLS Per Acre
Great Basin Wild Rye	16.0
Blue Wild Rye	8.0
Tufted Hairgrass	3.0
Prarie Junegrass	3.0
Total Pounds live seed per acre	**30.0**

2. Approved Suppliers:
    a. Clearwater Seed: (www.clearwaterseed.com), Spokane, WA, Telephone: 509-343-3108.
    b. BFI Native Seeds: (www.bfinativeseeds.com), Moses Lake, WA, Telephone: 509-765-6348.
    c. Front-Tier Seed Sales: (http://rpu.palouse.net/frontier.html), Moscow, ID, Telephone: 208-746-1819 or 208-798-4683.

3. Hydroseed components:
    a. Hydraulic Growth Medium: Biotic Earth Black by Verdyol or Equal
    b. Fertilizer shall be Richlawn Organic 100 8-2-1 Or Equal.
    c. Wood Fiber Mulch shall be Conwed Hydro Mulch 1000 Or Equal.
    d. Tackifier shall be Earthbound 2000 Soil Stabilizer and Tackifier Or Equal.
    e. Supplier: ACF West (www.acfwest.com), Contact: Aaron Schmidt, Telephone: 425-415-6115.

3.0 EXECUTION

3.1 EXAMINATION

Examine areas to receive hydroseeding for compliance with requirements and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

1. Uniformly fine grade areas to receive hydroseed. Roll, rake, remove ridges, and fill depressions as required to drain.
2. Complete plantings and placement of coir fabric.
3. Spread loosely a 3-inch thick layer of soil/gravel mix.
4. Protect trees, shrubs, and plantings from damage caused by hydroseed operations.
5. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent river.

3.3 GENERAL

1. Conditions: Perform seeding operations when the soil is dry and when winds do not exceed 5 miles per hour velocity.
2. Method: Apply seed using a commercial hydraulic hydroseeder. Broadcasting is not approved.
3. Finish: Roll with light lawn roller.
4. Strictly comply with hydraulic equipment manufacturer's installation instructions and recommendations. Use Approved hydro-spraying machines with fan-type nozzle (50 degree tip). To achieve optimum soil surface coverage, apply from opposing directions to soil surface.
5. Maintenance of hydroseeding installed as part of this Contract is fully the responsibility of the Contractor during the warranty period.
6. Equipment shall use water as the carrying agent utilizing a continuous built-in agitation system. Equipment with a gear pump is not acceptable.

7. Pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of material over designated areas.

3.4 HYDROSEED APPLICATION

1. Stage 1: Apply Fertilizer, hydraulic growth medium and seed in one operation with Approved hydraulic equipment at the following rates:
    a. Fertilizer: 10 lbs/1,000 square feet
    b. Biotic Earth: 60 lbs/1,000 square feet
    c. Seed: 8 lbs/1,000 square feet
2. Stage 2: Apply hydromulch and tackifier at the following rates:
    a. Hydromulch: 60 lbs/1,000 square feet
    b. Tackifier: 1 lb. per 1,000 square feet

3.5 CLEANUP AND PROTECTION

Erect barricades and warning signs As Required to protect newly planted areas from pedestrian traffic. Maintain barricades throughout maintenance period and remove after seed is established.

END OF SECTION 02930

DIVISION 2 – SITE WORK
SECTION 02950 – LANDSCAPING

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 WORK DESCRIPTION 2
1.2 RELATED WORK 2
1.3 REFERENCES 2
1.4 REVIEW OF PLANT MATERIALS 2
1.5 SUBMITTALS 2
1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING 3
1.7 PROJECT CONDITIONS 4
1.8 GUARANTEE 4
2.0 PRODUCTS 5
2.1 PLANT MATERIALS 5
2.2 TOPSOIL 6
2.3 PREPARED PLANTING SOIL BACKFILL 6
2.4 FERTILIZER AND ADDITIVES FOR PLANT MATERIAL 7
2.5 SLOW RELEASE PELLET FERTILIZER FOR PLANT MATERIAL 7
2.6 SOIL/GRAVEL MIX 7
2.7 BEAVER PROTECTION FENCING 7
2.8 BEAVER DETERRENT PAINT MIXTURE 7
2.9 LOGS FOR LARGE COMPLEX WOODY STRUCTURES 7
3.0 EXECUTION 8
3.1 INSPECTION 8
3.2 PREPARATION 8
3.3 SOIL PREPARATION 8
3.4 ORDER OF WORK 8
3.5 PLANT INSTALLATION 9
3.6 FERTILIZER AND ADDITIVES 10
3.7 BEAVER PROTECTION FENCE AND INSTALLATION 10
3.8 BEAVER DETERRENT PAINT MIXTURE 10
3.9 ACCEPTANCE 11
3.10 CLEANING 11
3.11 LANDSCAPE MAINTENANCE 11

DIVISION 2 – SITE WORK
SECTION 02950 – LANDSCAPING

1.0 GENERAL

1.1 WORK DESCRIPTION

Work of this Section includes providing all labor and materials for landscaping of the planting corridor, specifically:

a. Plant procurement and planting

b. Beaver protection

c. Topsoil placement

d. Prepared planting soil backfill

1.2 RELATED WORK

Section 02200 – Earthwork

Section 02930 - Hydroseeding

1.3 REFERENCES

ANSI Z60.1 American Standard for Nursery Stock

1.4 REVIEW OF PLANT MATERIALS

1. All plant material will be reviewed by the District before being planted and all plant material not meeting specification requirements will be rejected and separated from acceptable plant materials.
2. Contractor shall at his own expense replace rejected trees and shrubs with suitable plant material of same species and/or variety that meet specification requirements.

1.5 SUBMITTALS

1. Material sources: Submit within 30 days after Notice of Award:
    a. A list of all plant material indicating source of supply, order invoice, size and quantity for each species or variety procured. The District or its representative, at its discretion, may elect to review plant material at its source.
    b. Seed source and seed mixture for the following indicating weight and percentage by species, collection date, and planting fertilizer as a percentage of total weight:
        - Planting Corridor Seed Mix
2. Samples: Submit one-pound material sample of each of the following in clear plastic bags, labeled to indicate source:

a. Topsoil

b. Prepared planting soil backfill including organic soil amendments

3. Inspection certificates:

   a. All plant material shall meet requirements of State and Federal laws with respect to inspection for plant diseases and infestation.

   b. Inspection certificates required by law shall accompany each shipment of plant material and submitted to the District.

4. Product data including contact information for manufacturer/supplier:

   a. Fertilizer and soil additives

   b. Mycorrhiza inoculants

5. Test reports:

   Submit soil analysis for import topsoil, performed on a 2 pound sample, from a soils testing laboratory. Test report to indicate material composition, particle size and gradation, percent organic matter, ph, suitability as growth media, and recommendations for amendments.

6. Shipping Tickets:

   Provide delivery receipt for the following indicating material, quantity, source, and date of delivery to the project site:

   a. Plant Material

   b. Planting Corridor Seed Mix

   c. Soils

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

1. Protection and storage of material:

   a. Dig, pack, transport and handle plants with care to ensure protection against injury. Protect plant materials during storage and when planting from extreme weather conditions, wind drying of roots and root ball injury. If plants cannot be planted immediately upon delivery, properly heel-in root ball or bare roots with soil, or compost. Water heeled-in plants daily. Provide shade cloth or other cover to protect from excess sunlight.

   b. Failure to comply with plant care as noted above may result in the rejection of materials. Plant material showing damage from shipping or while in storage or during planting may be rejected by the District and shall be replaced by the Contractor at his own expense.

   c. Cover plants transported on open vehicle with a protective covering to prevent windburn. Anti-desiccant shall be applied only with the approval of the District. No plant shall be bound with rope or wire in a manner that could damage or break branches. Provide dry, loose soils for planting.

Frozen or muddy soil is not acceptable. Stock shall be handled by root ball only, not by the trunks, stem, or tops.

2. Deliver fertilizer materials in original unopened containers showing weight, analysis, and name of manufacture. Store materials in dry place and protect from deterioration and intrusion of moisture.

1.7 PROJECT CONDITIONS

1. Work notification: Notify the District at least seven (7) working days prior to installation of plant material.
2. Protect existing utilities, paving, and other facilities from damage caused by planting operations. Confine work to designated areas.
3. Plant trees and shrubs only during periods which are normal for such work as determined by the season, weather conditions, and accepted practice. Do not install plant materials when ambient temperatures may drop below 35 degrees F or above 80 degrees F. Do not install plants when wind velocity exceeds 30 MPH.
4. Coordinate planting work with installation of irrigation system and soil preparation.

1.8 GUARANTEE

1. Plant material guarantee:
    a. Guarantee all plant material to remain alive and be in healthy, vigorous condition for a one (1) year Landscape Maintenance Period, which will begin upon Project Substantial Completion. Inspection of plants will be made by the District at Project Substantial Completion and at the end of the one year Lanscape Maintenance Period.
    b. Guarantee shall not include damage of loss of trees and shrubs caused by fire, floods, freezing rains, lightning storms, winds over 75 MPH, or acts of vandalism or negligence.
    c. Note that the District will provide a record of maintenance activities which will be made available to the Contractor.
2. Plant material replacement:
    a. Replace, in accordance with the Contract Drawings and Specifications, all plants that are dead or, as determined by the District, are in an unhealthy or unsightly condition, and have lost their natural shape due to dead branches, or other causes due to the Contractor's negligence. The cost of such replacements is at the Contractor's expense. All replacement plants shall be guaranteed for one (1) year after Project Substantial Completion, unless otherwise specified.
    b. Remove and immediately replace all plants, as determined by the District, to be unsatisfactory during the initial planting installation.

2.0 PRODUCTS

2.1 PLANT MATERIALS

1. Genera, species, and variety; quantity, size and conditions shall be as indicated on the Contract Drawings and Plant Material Listing.
2. Plant material shall be healthy nursery stock, well-branched, full foliage when in leaf, free from disease, injury, insects, all weeds, and weed roots. Tree groups shall be matched in appearance and form.
3. Meet requirements of American Standard for Nursery Stock, ANSI Z60.1-2004 published by the American Nursery and Landscape Association except as otherwise supplemented or modified under this Section.
4. Bare root stock shall have a root system sufficient to ensure survival and healthy growth.
5. Potted and container stock well rooted, vigorous enough to ensure survival and healthy growth.
6. Container plants shall have grown therein a minimum of six (6) months and a maximum of two (2) years, with roots filling the containers but not showing evidence of being or having been root bound.
7. All grafts or budding on trees shall be at ground level except higher grafts of budding with compatible trunk and branch growth characteristics may be approved by the District.
8. All collected native plant material shall be nursery grown for a minimum of one (1) year unless otherwise approved by the District in writing.
9. Trees: Provide untapped, straight, single leader trees except for multiple stem (clump) trees. Deciduous trees with heavier than normal tops and balanced branching.
10. Plant materials shall be free from disfiguring knots, swollen grafts, sunscald injuries, bark abrasions, evidence of improper pruning and other objectionable disfigurements.
11. Trees and shrubs shall have well developed branch systems; shrubs full foliage, not leggy.
12. Thin, weak, and leggy plants will be rejected by the District.
13. One plant of each group or massing of plants shall be properly tagged giving the common and botanical plant name. Plant names to be legibly printed on bright orange or yellow survey tape with a permanent marker.
14. Live Stakes: Are cuttings of one (1) to two (2) year-old wood of species as indicated on Contract Drawings. These cuttings shall be 1/2 inch to 1-inch in diameter and of a size as indicated on Contract Drawings. Stem cuttings shall be taken at least 24-inches from the branch tip. The top of each cutting shall be just above a leaf bud, the bottom cut just below one. At least two (2) lateral buds shall

be above ground after planting. The basal ends of the shoots must be marked clearly in some manner so workers can easily determine which end to plant. The rooting end of all live stakes shall be cut at a 45 degree angle. Cuttings must be kept covered and moist during transport and storage before planting.

2.2 TOPSOIL

See Specifications – Section 02200 - Earthwork.

2.3 PREPARED PLANTING SOIL BACKFILL

1. Prepared Planting Soil Backfill or Planting mix shall be two-way topsoil consisting of 2/3 sandy loam and 1/3 composted organic material (compost).
2. Sandy loam soil shall be sandy loam or loamy sand consisting largely of sand, but with enough silt and clay present to give it a small amount of stability. Individual sand grains can be seen and felt readily. On squeezing in the hand when dry, it shall fall apart when the pressure is released; on squeezing when moist, it shall form a cast that will hold its shape when the pressure is released, and withstand handling without breaking.
3. Composted Organic Material (Compost): Shall consist of composted yard debris or organic waste material composted for a minimum of 12 months. Compost shall consist of 100% recycled content. In addition, the organic material shall have the following physical characteristics:
    a. Shall be screened using a sieve no finer than 5/16 inch and no greater than 7/16 inch.
    b. Shall pass a standard cress test for seed germination (90% ination compared to standard.)
    c. Shall have a pH from 5.5 to 7.5.
    d. Shall have a maximum electrical conductivity of 3.0 ohms/cm.
    e. Shall have a maximum carbon to nitrogen ratio of 40:1.
    f. Shall be certified by the Process to Further Reduce Pathogens FR guidelines for hot composting as established by the United States Environmental Protection Agency.
4. The mixed soil shall meet the following:

Screen Size	Percent Retained	Percent Passing
1/4 inch	5	95
#10	15	85
#30	50	50
#60	60	40
#100	80	20
#200	90	10

5. Shall have a pH range of 5.0-6.5 with dolomitic limestone added as necessary to attain this range (pH determined by soil test).

2.4 FERTILIZER AND ADDITIVES FOR PLANT MATERIAL

1. Fertilizer: Triple 14 (14-14-14)
2. Moisture Rentention Agent: Terra-Sorb Or Approved Equal.
3. Mycorrhiza inoculants
4. MycorrhizalROOTS by Roots Inc. Or Approved Equal.
5. Root Dip Gel by Roots Inc. Or Approved Equal.
6. Supplier: Roots Inc., Phone: (805) 659-1412, Contact: Jim Huges, Cell: (805) 340-4435

2.5 SLOW RELEASE PELLET FERTILIZER FOR PLANT MATERIAL

1. 21-5-12 formula
2. APEX “Tree & Shrub” Or Approved Equal

2.6 SOIL/GRAVEL MIX

See Specifications, Section 02200 - Earthwork

2.7 BEAVER PROTECTION FENCING

1. Welded Wire Mesh for Beaver Protection Fencing shall be minimum 16 gauge welded wire mesh with 1” x 1” openings. Wire shall be vinyl coating greet.
2. Wood stakes shall have minimum dimensions: 1” x 1” x 4’ high and be pointed on one end.
3. Ties – beaver protection fence ties shall be 4-inch black nylon or black coated metal ties.

2.8 BEAVER DETERRENT PAINT MIXTURE

1. Sand and paint mix (2/3 cup masonry grade sand per quart of latex paint).
2. Paint shall be clear color.

2.9 LOGS FOR LARGE COMPLEX WOODY STRUCTURES

1. Dimensions as shown in the Contract Drawings.
2. Logs shall be Ponderosa Pine, Cedar, Spruce or Douglas Fir with bark remaining.

3.0 EXECUTION

3.1 INSPECTION

1. Finish grading shall be inspected and Approved by the District prior to planting. Verify that planting bed grades and layout are in accordance with those indicated on the Project Grading and Drainage, and layout drawings before proceeding with Work.
2. Plant material shall be inspected and approved by the District at the nursery or project site prior to installation. Remove unsatisfactory material from the site immediately.
3. Soil conditions:
    a. Examine planting areas for conditions that will adversely affect execution, permanence, and quality of work and survival of plant material.
    b. Planting work shall not begin until soil and planting conditions are satisfactory, and have been Approved by the District.

3.2 PREPARATION

Contractor shall locate plants by staking with stakes and flags as indicated on the Contract Drawings or as Approved by layout of plants in the field. If obstructions are encountered that are not shown on the Contract Drawings, do not proceed until alternate locations have been selected by the District.

3.3 SOIL PREPARATION

Verify the planting corridor grade is in accordance with those indicated on the Contract Drawings before proceeding with Work. Verify that soil conditions are Satisfactory for construction.

a. Examine planting areas for conditions that will adversely affect execution, permanence, and quality of work and survival of plant material.
b. Planting work shall not begin until soil and planting conditions are Satisfactory.

3.4 ORDER OF WORK

The order of planting corridor work shall be generally as follows:

a. Following installation of base rock, place and compact topsoil in lifts and to requirements identified in Specifications, Section 02200 - Earthwork.
b. Establish corridor grade 2-inches to 3-inches below bordering walls to allow installation of coir fabric and soil/gravel mix.
c. Coordinate installation of topsoil with installation of coir logs, live stakes and coir fabric.

d. Cut coir fabric and excavate for shrub pit planting at spacing shown in the Contractor Drawings.

e. Install shrubs/trees with prepared planting soil backfill and fertilizer.

f. Place soil/gravel mix

g. Hydroseed with planting corridor seed mix.

3.5 PLANT INSTALLATION

1. Excavate circular plant pits with scarified vertical sides, except for plants specifically indicated to be planted in beds. Provide planting pits at least twice the diameter of the root system or container. Depth of pit shall accommodate the entire root system. Scarify the bottom and sides of the pit to a depth of 4-inches.
2. Place specified planting soil (pit planting topsoil) for use around the balls and roots of the plants.
3. Provide fertilizer per manufacturer's specifications for all trees and shrubs at time of planting.
4. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set crown of plant material at the finish grade. No filling will be permitted around trunks or stems or above grafts on grafted trees. Backfill the pit with specified soil in 12-inches compacted lifts. Do not use frozen or muddy mixtures for backfilling. Form a ring of soil around the edge of each planting pit to retain water.
    a. After plants are set, water in soil mixture around bases of balls and fill all voids.
5. Live Staking: Each live stake shall have a minimum of two (2) buds exposed above finished grade. Buds shall point upward, reflecting the natural orientation for growth. At least 80% of the cuttings length should be planted in the ground. Soil shall be firmly pressed around cutting to reduce moisture loss.
6. Pruning: Prune all trees only to remove broken or damaged branches, or for aesthetic purposes As Directed by the District. Branches will be pruned at the branch collar. Neither stubs nor flush cuts will be acceptable.
7. Water plants within the first 24 hours of initial planting. Water twice per week, including rain, during the dry season, which is approximately June through September, and water once per week, including rain, during the wet season, until final acceptance.
8. Planting Dates:
    a. All trees and shrubs to be installed after March 15, 2014 but, before October 31, 2014.
    b. All seeding be completed after October 1, 2014 but, before November 15, 2014.

c. Live staking planting to be completed between October 15, 2014 and November 30, 2014.

3.6 FERTILIZER AND ADDITIVES

1. Container Plant Materials:

   All new container plant materials shall be supplemented, at time of planting, with Roots Inc.

   - The mycorrhiza inoculant, mycorrhiza roots, shall be mixed per the manufacturer's recommendation, and applied prior to removing plants from the container. Each container shall be flooded with the mycorrhiza solution to achieve a saturated root and soil mass.

2. All new container plants shall be fertilized with a slow release pellet form fertilizer.

   - Fertilizer application rate shall be consistent with the manufactures recommendation, and shall be applied to the ground surface after mulch is placed. The fertilizer shall supply, at a minimum, additional micronutrients iron manganese, and zinc. Fertilizer release period shall be a minimum of six to seven (6 to 7) months, and shall be heat triggered.

3. All new container plants shall receive a moisture retention agent. Apply per Manufacturer's recommendation.

3.7 BEAVER PROTECTION FENCE AND INSTALLATION

1. Fencing shall be installed around trees as specified in Contract Drawings; fencing shall not touch branches or trunk. No pruning of plant material to accommodate fencing shall be permitted. Each tree's protection fence shall be a minimum of 3-feet in diameter.
2. The fence shall be staked with a minimum of two (2) stakes at opposite ends of the fence from each other, and driven a minimum of 12-inches into the ground. Each stake shall be tied at a minimum of three (3) locations. The bottom stake shall be tied within 2-inches of the ground surface. The fence ends shall overlap a minimum of 2-inches and be tied together tightly with a minimum of three (3) ties, same as for stakes.
3. The bottom of the fence shall be embedded a minimum of 1-inch below finish ground surface (not including mulch). Mulch circles shall be restored as necessary to meet mulch rings and beds as shown on the Contract Drawings.

3.8 BEAVER DETERRENT PAINT MIXTURE

Apply one (1) coat thoroughly between plant bole and (three) 3 feet height above finished grade. Apply to any branches within the zone. Avoid paint on leaves, needles and cones.

3.9 ACCEPTANCE

1. Review to determine acceptance of planted areas will be made by the District, upon Contractor's request. Provide notification at least ten (10) working days before requested inspection date.
2. Planted areas will be accepted provided all requirements, including the maintenance period have been complied with and plant materials are alive and in a healthy, vigorous condition.

3.10 CLEANING

Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment. Repair damage resulting from planting operations.

3.11 LANDSCAPE MAINTENANCE

1. General: Contractor shall be responsible for maintaining all existing and new landscaping from Notice to Proceed through Project Substantial Completion. Additionally, following Project Substantial Completion, the Contractor shall perform maintenance in cooperation with the City of Entiat for a one (1) year period. At the end of the one (1) year Landscape Maintenance Period, District anticipates requesting Board approval of Project final acceptance.
2. A cooperative working relationship with the City of Entiat is required during the one-year maintenance period. The Contractor shall communicate any gaps in responsibilities between them and the City of Entiat to the District immediately upon discovery. Where gaps have resulted in damage to landscape the Contractor shall develop, submit and execute a corrective action plan.
3. Contractor responsibilities during the one (1) year Landscape Maintenance Period include:
    a. Providing all equipment, tools, supplies and labor required to perform landscape maintenance work as described herein.
    b. Maintaining and publishing a routine schedule for site landscape maintenance. A minimum of two (2) site visits per week are required from April 15 through October 15. A minimum of one (1) site visit every 10 days shall be made from October 15 through April 15. More frequent visits may be required if situations arise requiring Contractors immediate attention as determined by the City of Entiat or the District.
        i. Site visits shall include:
            1) Thorough inspections of maintenance needs as stated herein.
            2) Work to address maintenance needs.
            3) Coordination with the City of Entiat, the District or other designated parties regarding maintenance needs.

c. Maintaining a log of maintenance activities identifying time and date of maintenance visits, tasks performed, and any maintenance problems or concerns. Contractor shall submit monthly log to the District in accordance with the Contract. Submittal shall identify anticipated number of maintenance visits for up-coming month.

d. Keeping premises free of weeds. Grub out weeds including roots and crown and remove from the site. Spot spray new growth with District Approved herbicide.

e. Protecting, maintaining, and replacing in kind as necessary all seeded areas and plants.

f. Protecting, maintaining, and replacing in kind as necessary all riparian seeded areas and plantings.

g. Resetting settled plants to proper grade and position. Restoring planting saucer and adjacent material and remove dead material.

h. Applying appropriate fertilizers, insecticides and fungicides necessary to maintain plants, planting beds, and seeded areas in a healthy growing condition, free of insects and disease.

   1) Apply pre-emergent spray twice on all seeded areas between April 15 and May 15, 2014 and 2015.

   2) Apply no less than three broadleaf herbicide sprays on all seeded areas during the one (1) year period. At least two of the applications shall be between April 15 and May 15, 2014 and 2015. Additional applications may be needed based on conditions.

i. Maintaining sprinkler irrigation system:

   1) Coordinate with City of Entiat on sprinkler run times and adjust as necessary to maintain planting in a healthy condition.

   2) Observe and adjust sprinkler system operation, as required, to ensure output coverage provides for a healthy landscape (i.e., not too much or too little water for planted environment).

   3) Replace defective equipment.

   4) Repair damage caused by sprinkler irrigation system either as a result of defects or negligent management. If damage results in loss of property or goods replace or make whole for such damages.

j. Updating Operation and Maintenance manuals as necessary.

4. City of Entiat responsibilities during the one-year maintenance period include:

   a. Collection and disposal of garbage/waste associated with trail use (not including waste resulting from landscape maintenance).

   b. Leaf collection and disposal.

c. Coordinate with the Contractor on sprinkler run time programming.

d. General maintenance duties associated with park operations.

e. Inform District and Contractor of gaps in maintenance or other deficiencies which may result in damage.

END OF SECTION 02950

DIVISION 2 – SITE WORK
SECTION 02990 – SITE FURNISHINGS

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 QUALITY ASSURANCE 2
1.3 SUBMITTALS 2
2.0 PRODUCTS 2
2.1 GENERAL 2
2.2 VIEWPOINT BENCH 2
3.0 EXECUTION 2
3.1 EXAMINATION 2
3.2 INSTALLATION 3

DIVISION 2 – SITE WORK
SECTION 02990 – SITE FURNISHINGS

1.0 GENERAL

1.1 DESCRIPTION

Work specified in this Section includes providing all labor, materials, and equipment to furnish and install viewpoint bench.

1.2 QUALITY ASSURANCE

Manufacturer's Instructions - Adhere to manufacturer's instructions for product handling, installation and operations.

1.3 SUBMITTALS

Submit manufacturer’s product data and shop drawings 60 days prior to installation on-site.

2.0 PRODUCTS

2.1 GENERAL

Comply with Specifications and manufacturer's data. Where these may be in conflict, the more stringent requirements govern.

2.2 VIEWPOINT BENCH

1. Bench shall be TimberForm® Greenway™ series model 2151 Or Equal.
    a. Dimensions: 5 feet 10 inches long by 1 foot 3 1/8 inches wide by 1 foot 4 1/8 inches tall.
    b. Bench slats shall be cedar color, recycled plastic.
    c. Frame shall be black coated with CASPAX-7, a tough, opaque, UV resistant exterior grad polyester powder coating applied to a minimum thickness of 6 mils.
    d. Manufacturer: Timberform, Telephone (800) 547-1940,
    Website, www.timberform.com

3.0 EXECUTION

3.1 EXAMINATION

Verify installation conditions as satisfactory to receive work of this Section. Do not install until unsatisfactory conditions are corrected. Beginning work constitutes acceptance of conditions as satisfactory.

3.2 INSTALLATION

1. Protect site furnishings from scratches, dents or other damage during handling and installation.
2. Install all equipment in accordance with Specifications, Contract Drawings and Manufacturer's directions.
3. Install benches so legs are plumb, seat and back are level.
4. Anchor timber bench by embedding legs in ready-mix concrete as shown in the Contract Drawings.

END OF SECTION 02990

DIVISION 3 – CONCRETE

TABLE OF CONTENTS

SECTION 03450 MECHANICALLY STABILIZED EARTH WALL

DIVISION 3 - CONCRETE
SECTION 03450 – MECHANICALLY STABILIZED EARTH WALL

TABLE OF CONTENTS

1.0 GENERAL 2
1.1 DESCRIPTION 2
1.2 REFERENCES 2
1.3 DEFINITIONS 2
1.4 QUALITY ASSURANCE 2
1.5 SUBMITTALS 3
1.6 RECORD DRAWINGS 3
1.7 COORDINATION 4
2.0 MATERIAL 4
2.1 CONCRETE PANELS AND COUNTERFORT MATERIALS 4
2.2 GEOGRID 4
2.3 STRUCTURAL FILL 4
3.0 EXECUTION 4
3.1 EXAMINATION 4
3.2 ERECTION 4
3.3 BACKFILL PLACEMENT 5
3.4 COMPACTING EQUIPMENT 6
3.5 DRAINAGE REQUIREMENTS 6
3.6 FIELD QUALITY CONTROL 6

DIVISION 3 - CONCRETE
SECTION 03450 – MECHANICALLY STABILIZED EARTH WALL

1.0 GENERAL

1.1 DESCRIPTION

1. Work specified in this Section includes providing all labor and materials associated with the Mechanically Stabilized Earth Wall (MSEW) system.
2. The proprietary structural earth wall system shall be LOCK+LOAD™. Manufacturer: Pacific Lock+Load, Telephone: 1-866-682-2868.
3. A geotechnical analysis has been completed by Shannon & Wilson, Inc. using this MSEW system as provided in Exhibit U, Additional Information, Geotechnical Report.

1.2 REFERENCES

1. Exhibit U – Additional Information - Entiatqua Geotechnical Report prepared by Shannon & Wilson, Inc.
2. Washington State Department of Transportation – Standard Specifications for Road, Bridge, and Municipal Construction (latest edition) specifically Section 6-13 Structural Earth Walls.
3. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.
4. ASTM D2487 - Classification of Soils for Engineering Purposes.
5. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3017 - Test Methods for Moisture Content of Soil and Soil-Aggregate Mixtures.
7. USDOT – United States Department of Transportation Federal Highway Administration's publication No. FWHA-NHI-00-043 "Mechanically Stabilized Earth Walls and Reinforced Soil Slopes Design and Construction Guidelines."

1.3 DEFINITIONS

Working Drawings – Manufacturer-supplied drawings supplemental to the Contract Drawings for use by the Contractor to construct the MSEW to the manufacturer's recommendations.

1.4 QUALITY ASSURANCE

1. The Mechanically Stabilized Earth Wall (MSEW) shall be constructed in compliance with the Geotechnical Report.

2. Construction of MSEW shall be performed by a company specializing in performing the Work of this section with a minimum of five (5) years documented and successful experience in construction of MSEWs.
3. A representative of the MSEW system manufacturer shall be present at the beginning of construction of the wall. The representative shall continue on-site supervision until it has been demonstrated that the Contractor is knowledgeable, experienced, and capable of constructing the wall system in accordance with manufacturer's standards.
4. MSEW manufacturer representative shall participate and provide guidance as necessary in the development of an Excavation Plan as specified in Specifications, Section 02200 – Earthwork, Part 1.4.4.
5. MSEW manufacturer representative shall review and be familiar with the geotechnical report. Conflicts between the report, the Drawings, this Section and/or the Manufacturer's recommendations shall be brought to the attention of the Engineer.
6. A preconstruction conference shall be held as described in 6.13.3(1) of the WSDOT Standard Specifications.
7. All MSEW products shall be carefully examined upon arrival to site. Damaged or otherwise defective products shall not be used. Contractor shall immediately notify supplier and District of such conditions.

1.5 SUBMITTALS

In compliance with Section 6-13.3(2) of the WSDOT Standard Specifications the Contractor shall submit the Manufacturer's Certificate of Compliance no later than 20 days following the Notice of Award including:

a. Certification indicating the Geotechnical analysis complies with the manufacturer's recommendations. If conditions warrant the manufacturer shall perform an independent analysis and submit additional design calculations and Working Drawings.

b. Product data and written warranty for proprietary materials including concrete wall panels, concrete capstones, concrete counterforts, geogrid, modular fill and other items as requested by the District.

c. Sufficient technical data and manufacturer's Specifications to demonstrate that all such items meet or exceed the specified requirements.

d. Manufacturer's recommended installation instructions or field construction manual. The manufacturer's recommended installation procedures will become the basis for inspecting and accepting or rejecting actual installation procedures on this Work.

1.6 RECORD DRAWINGS

1. Submit under provisions of Specifications, Section 01300 - Administrative Requirements.

2. Accurately record wall components including height of wall, wall steps below grade, geogrid location and lengths.

1.7 COORDINATION

Coordinate work of this specification with installation of rail fencing post.

2.0 MATERIAL

2.1 CONCRETE PANELS AND COUNTERFORT MATERIALS

1. MSEW system consisting of concrete panels and counterforts that lock together to form a retaining module shall be LOCK+LOAD™. Modules are to be purchased from a licensed manufacturer, and will be identified with the manufacturer's trademark on each pallet.

   Contact ordering information: Mark Crawford, 503-682-2868, e-mail: mcrawford@hardscapesinc.com, website: www.pacificlocknload.com

2. The height, length, and width of the MSEW panel modules shall not vary more than two (2) percent from the standard panel dimension sizes as provided by the manufacturer. The panel size used shall be predominantly the standard size (16-inches high by 32-inches wide), however, half height or 8-inch panel height shall be used to taper and step panels as site conditions dictate.

2.2 GEOGRID

See Specifications, Section 02073 - Geosynthetics.

2.3 STRUCTURAL FILL

See Specifications, Section 02200 - Earthwork.

3.0 EXECUTION

3.1 EXAMINATION

1. Verify site conditions prior to commencement of Work.
2. The Contractor shall confirm the locations of all man-made elements that may be affected or damaged by the Work. Elements which may be affected or damaged by the Work must be reported to the District in advance of the work beginning. The District may modify the design or approve of changes to installation techniques proposed by the Contractor to preclude damage or conflict with existing elements.
3. The Contractor shall verify all dimensions and report discrepancies to the District.

3.2 ERECTION

1. Comply with the requirements of WSDOT Standard Specification 6-13.3(5) Precast Concrete Facing Panel and Concrete Block Erection and the following provisions.
2. The first course of concrete modules shall be placed on a level compacted foundation and the alignment and level checked by the Contractor.

3. The Contractor shall ensure that modules shall be placed with the top of the panel level and parallel to the wall face.
4. The Contractor shall ensure that the counterfort base is installed horizontal and perpendicular to the face of the retaining wall.
5. Geogrid shall be oriented with the highest strength axis perpendicular to the wall alignment.
6. Geogrid reinforcement shall be placed at the elevations and to the extent shown on the Contract Drawings beginning at the back of the wall panels and at the top of the counterfort.
7. The geogrid soil reinforcement shall be placed so that a minimum of 2-inches remains vertical and in contact with the panel back after backfill is placed and compacted.
8. The geogrid shall be laid horizontally in the direction perpendicular to the face of the retaining wall and parallel to the alignment of the modules.
9. The geogrid shall be pulled taut, free of wrinkles and anchored prior to backfill placement on the geogrid.
10. Geogrid reinforcements shall be continuous throughout their embedment lengths.
11. Spliced connections between shorter pieces of geogrid are not permitted.
12. If site conditions required the Contractor shall provide bracing to ensure stability of formwork and shore or strengthen formwork that may be subject to over stressing by construction loads.

3.3 BACKFILL PLACEMENT

1. Comply with the requirements of WSDOT Standard Specification 6-13.3(7) Backfill and 6-14.3(4) Erection and Backfill and the following provisions.
2. Reinforced and Retained backfill shall be placed, spread and compacted in a manner which minimizes the development of slack in the geogrid.
3. Connection, Reinforced and Retained backfill shall be placed and compacted in lifts averaging 6-inches resulting in a minimum of three lifts for each row of modules.
4. When compacting the connection fill; compact over tail of the counterfort then toward the panel back and finally away from the retaining wall structure toward the end of the geogrid.
5. All compaction zones shall be compacted to the same specification. All backfill shall be compacted to not less than 95 percent of the maximum density as determined by ASTM D 1557 (Modified Proctor) or equivalent.
6. The moisture content of the backfill material prior to and during compaction shall be uniformly distributed throughout each layer and shall be within two (2) percent of the optimum moisture content.

3.4 COMPACTING EQUIPMENT

1. Hand-operated mechanical compactors should be used within three (3) feet of wall faces. Heavy equipment compactors should not be used near walls.
2. Rubber tired equipment may pass over the geogrid reinforcement at slow speeds less than five (5) mph. Sudden braking and sharp turning shall be avoided.
3. Tracked construction equipment shall not be operated directly upon the geogrid reinforcement. A minimum fill thickness of 6-inches is required prior to operation of tracked vehicles over the geogrid. Tracked vehicles should not turn while on the geogrid, to prevent displacing the fill and geogrid.

3.5 DRAINAGE REQUIREMENTS

1. At the end of each day of operation, the Contractor shall slope the last lift of reinforced backfill away from the wall units to direct runoff away from the wall face.
2. The Contractor shall not allow surface runoff from adjacent areas to enter the wall construction site.
3. Upon wall completion, the Contractor shall cap the Structural Fill with a 6-inch layer of CSBC and slope at two (2) percent towards wall face.

3.6 FIELD QUALITY CONTROL

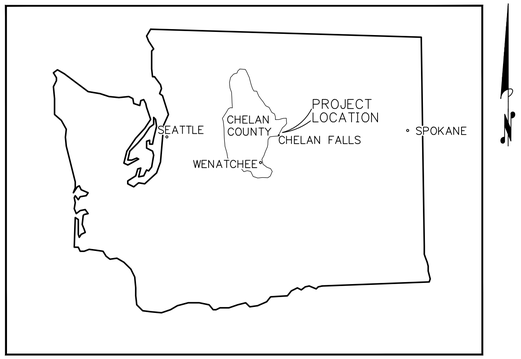
1. Field inspection and testing will be performed under provisions of Specifications, Section 01450 - Contractor Quality Control. The Contractor shall provide safe access to Work and cooperate with required inspections.
2. At the discretion of the District, the Engineer may perform the following inspections:
    a. Evaluate slope stability during excavation.
    b. Inspect the excavation and approve the foundation prior to the placement of the leveling pad or retaining modules.
    c. Verify the specified soil compaction in the reinforcing zone.
    d. Review and verify that the geogrids were installed per plan.
    e. Evaluate soil parameters during construction.

END OF SECTION 03450

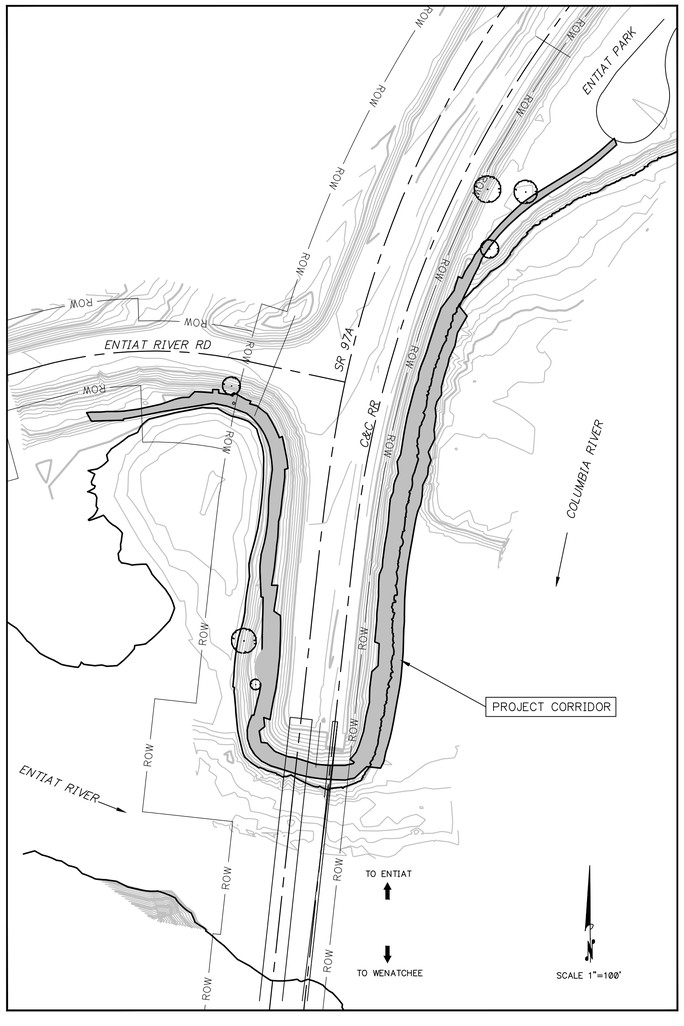
ENTIATQUA TRAIL PROJECT

BID NO. 13–01
EXHIBIT T – CONTRACT DRAWINGS
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

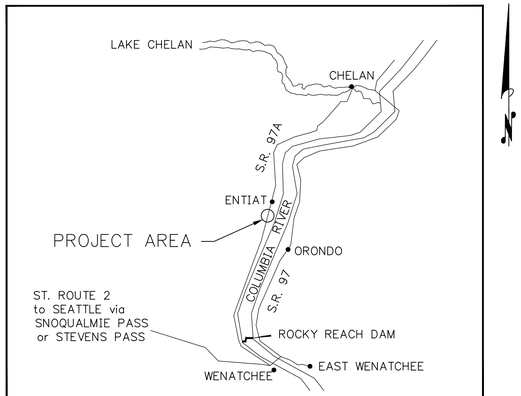
LOCATION MAP



PROJECT MAP



VICINITY MAP OF CHELAN



CONTACT PERSONNEL

CASEY HALL	CHELAN COUNTY PUD NO. 1 – CONSTRUCTION MANAGER	509–661–4965
COURT HILL	CHELAN COUNTY PUD NO. 1 – ENGINEER	509–661–4143

CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL						
2ND ENG.		0	4/26/2013		CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
COVER SHEET & MAPS

BID 13–01

SHEET	1 OF 38
REVISION	0
DATE	4/26/2013
DWG.	0911–50GA–0001

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

EXISTING FEATURES LEGEND

- SURVEY – REBAR, REBAR AND CAP
- SURVEY – ALUMINUM CAP
- EXIST. WATER METER VAULT
- EXIST. TELEPHONE PEDESTAL
- EXIST. CABLE TV PEDESTAL
- EXIST. PAD MOUNT TRANSFORMER
- EXIST. WATER VALVE (AS NOTED)
- EXIST. POWER POLE
- EXIST. ELECTRICAL VAULT
- EXIST. LIGHT POLE
- EXIST. IRRIGATION VALVE
- EXIST. SIGN
- 1300 EXIST. 5' CONTOUR LINE
- EXIST. 1' CONTOUR LINE
- SS SS EXIST. SANITARY SEWER
- IRR EXISTING IRRIGATION
- ROW EXISTING DOT ROW
- OHW OHW–ORDINARY HIGH WATER
- EXIST. BURIED POWER
- OHP EXIST. OVERHEAD POWER
- W EXIST. WATER LINE
- x x EXIST. FENCE
- EXIST. TRAIL
- EXIST. PROPERTY LINE
- EXIST. EDGE OF PAVEMENT
- EXIST. GUARDRAIL
- EXIST. SHRUB
- EXIST. TREE

NEW CONSTRUCTION LEGEND

- EDGE OF TRAIL
- TRAIL CENTERLINE
- 1380 2' CONTOUR LINE
- 1' CONTOUR LINE
- x x CHAINLINK FENCE
- RAIL FENCE
- LOCK+LOAD WALL (PLAN)
- GABION BASKETS
- CRUSHED SURFACING TOP COURSE (CSTC)
- ROCK RETAINING WALL
- LOCK+LOAD WALL (ELEVATION)

SURVEY CONTROL DEFINITION

ID	DESCRIPTION	NORTHING	EASTING	ELEVATION
#1	REBAR	242500.467	1790361.952	746.60
#2	REBAR AND CAP, ERLANDSEN CTRL.	242826.545	1790793.232	722.73

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH
   VERTICAL DATUM: NAVD 88

2. CONTRACTOR SHALL PERFORM CONSTRUCTION SURVEYING.

BID DRAWING INDEX

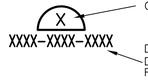
SHEET NO.	DRAWING NO.	DESCRIPTION
1	0911–50GA–0001	COVER SHEET & MAPS
2	0911–50GA–0002	GENERAL NOTES & SHEET INDEX
3	0911–50CI–0043	PLAN & PROFILE PROJECT OVERVIEW
4	0911–50CI–0013	TRAIL PLAN AND PROFILE STA: 0+00 TO 6+00
5	0911–50CI–0014	TRAIL PLAN AND PROFILE STA: 6+00 TO 13+50
6	0911–50CI–0015	TRAIL PLAN AND PROFILE STA: 13+50 TO 17+76
7	0911–50CI–0050	TRAIL SECTION – STA 1+05
8	0911–50CI–0017	TRAIL SECTION – STA 4+50
9	0911–50CI–0059	TRAIL SECTION – STA 7+00
10	0911–50CI–0018	TRAIL SECTION – STA 8+00
11	0911–50CI–0019	TRAIL SECTION – STA 10+26 AT SR97A BRIDGE C/L
12	0911–50CI–0022	EXPANDED SECTION AT SR97A BRIDGE C/L STA 10+26
13	0911–50CI–0048	EXPANDED SECTION – AT STA 12+00
14	0911–50CI–0020	TRAIL SECTION – STA 12+00
15	0911–50CI–0049	EXPANDED SECTION – AT STA 15+46
16	0911–50CI–0021	TRAIL SECTION – STA 15+46
17	0911–50CI–0042	TRAIL ELEVATION VIEW STA 12+50 – 18+50
18	0911–50CI–0023	PROJECT OVERVIEW
19	0911–50CI–0044	DETAIL AREA PLAN 1
20	0911–50CI–0024	DETAIL AREA PLAN 2
21	0911–50CI–0025	DETAIL AREA PLAN 3
22	0911–50CI–0026	DETAIL AREA PLAN 4
23	0911–50CI–0027	DETAIL AREA PLAN 5
24	0911–50CI–0045	DETAIL AREA PLAN 6
25	0911–50CI–0040	WOODY STRUCTURE PLAN
26	0911–50CI–0060	LOG STRUCTURE DETAILS
27	0911–50CI–0041	ROCK STRUCTURES SECTIONS AND DETAILS
28	0911–50CI–0046	SHORELINE STABILIZATION & PLANTING DETAILS
29	0911–50CI–0051	PLANTING DETAILS & SCHEDULE
30	0911–50CI–0061	IRRIGATION DETAILS
31	0911–50CI–0047	SITE FURNITURE
32	0911–50CI–0016	FENCE DETAILS
33	0911–50CI–0052	FENCE PLAN SHEET 1
34	0911–50CI–0053	FENCE PLAN SHEET 2
35	0911–50CI–0054	FENCE PLAN SHEET 3
36	0911–50CI–0055	FENCE PLAN SHEET 4
37	0911–50CI–0056	FENCE PLAN SHEET 5
38	0911–50CI–0057	FENCE PLAN SHEET 6

VIEW / SECTION REFERENCES

CALLOUT / DETAIL NO.

DWG. NO. WHERE FOUND IF ON DIFFERENT SHEET OR DASH IF FOUND ON SAME SHEET

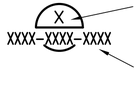
DETAIL REFERENCES



CALLOUT / DETAIL NO.

DWG. NO. WHERE FOUND IF ON DIFFERENT SHEET OR DASH IF FOUND ON SAME SHEET

SECTION / DETAIL TITLE LABELS



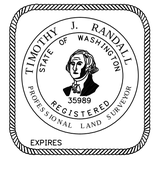
CALLOUT / DETAIL NO.

DWG. NO.(s) WHERE FOUND

NOTE:

1. EXISTING GROUND SURFACE LINE REPRESENTS AN AVERAGE OF THE ACTUAL GROUND SURFACE CONDITION IN THE GENERAL AREA OF THE CROSS SECTION OR PROFILE. THIS LINE IS DIAGRAMMATIC ONLY FOR THE GENERAL PURPOSES OF ANALYZING THE STRUCTURAL STABILITY AND NOT NECESSARILY INTENDED FOR BID DEVELOPMENT. THE ACTUAL GROUND SURFACE IS HIGHLY VARIABLE DUE TO THE PRESENCE OF LARGE ROCK IN THE AREA. IN ACCORDANCE WITH THE BID DOCUMENTS THE CONTRACTOR SHALL BE FAMILIAR WITH ACTUAL SITE CONDITIONS.

2. FOR TEMPORARY CUT SLOPE CONTRACTOR MAY ALTERNATIVELY EXCAVATE A BENCHED CUT SLOPE. IN EITHER CASE, BENCHED OR SLOPED, GEO–GRID LENGTH AS–SHOWN SHALL BE MAINTAINED AND STRUCTURAL FILL USED.



CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. COURT HILL							
2ND ENG.		0	4/26/2013			CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
GENERAL NOTES AND SHEET INDEX

BID 13–01

SHEET 2 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911–50GA–0002

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –

SEE PLAN+PROFILE
SHEET 0911-50CI-0013

SEE PLAN+PROFILE
SHEET 0911-50CI-0014

COLUMBIA RIVER

TRAIL START
STA 0+00

● SURVEY CONTROL #2

ENTIAT PARK
TURNAROUND

1+05
0911-50CI-0050

4+50
0911-50CI-0017

7+00
0911-50CI-0059

8+00
0911-50CI-0018

10+26
0911-50CI-0019, 22

12+00
0911-50CI-0020, 48

15:46
0911-50CI-0021, 49

PROPOSED TRAIL ℄

2 CHAINLINK FENCE
0911-50CI-0016

CCPUD PROPOERTY LINE

C&C RR ℄

SR 97A ℄

C&C RR BRIDGE

SR 97A BRIDGE

SURVEY CONTROL #1 ●

ENTIAT RIVER RD

ENTIAT RIVER

SEE PLAN+PROFILE
SHEET 0911-50CI-0015

TRAIL END
STA 17+76

SCALE: 1"=40'

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE Ø 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG. COURT HILL						
2ND ENG.		Ø	4/26/2013		CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT

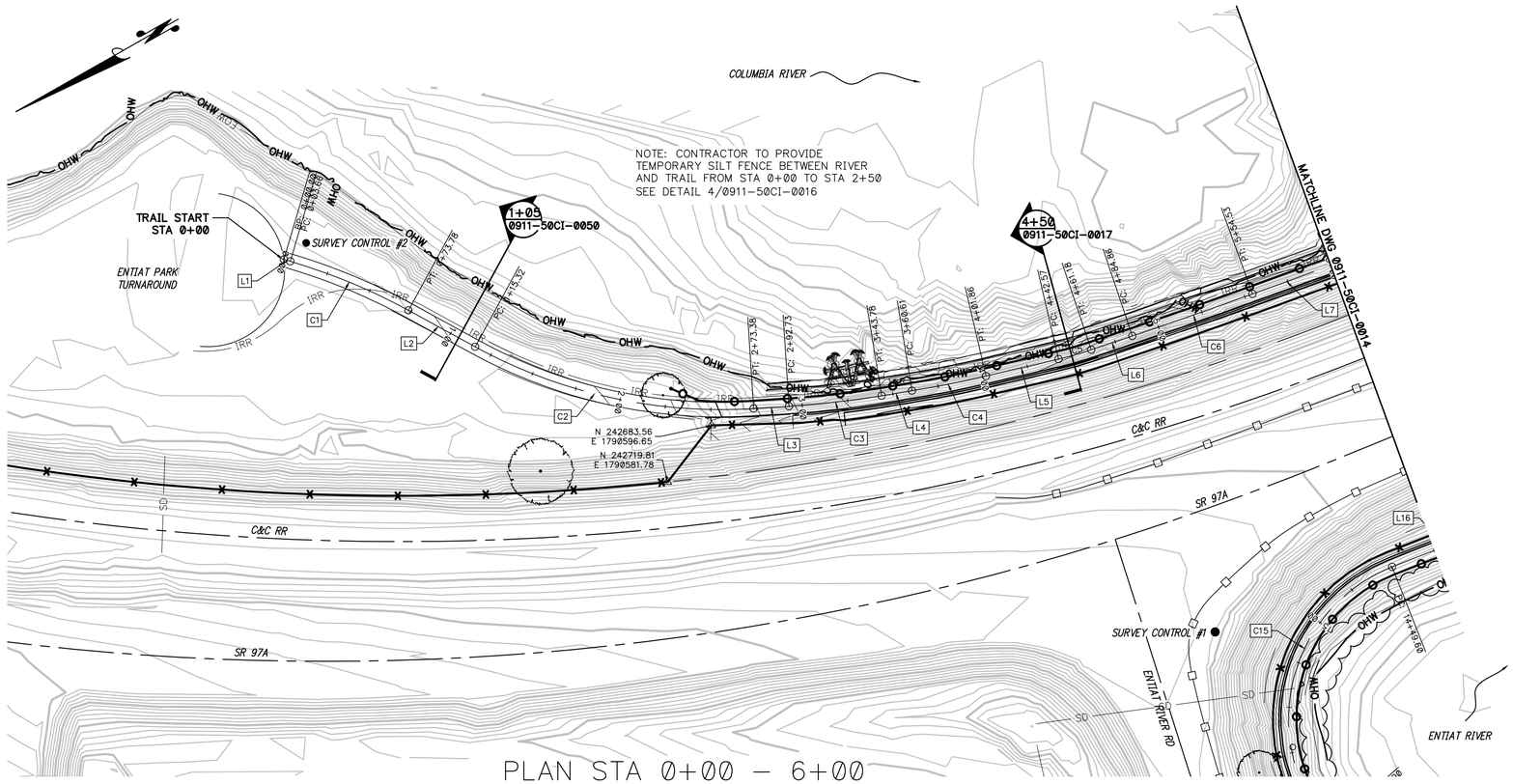
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

ENTIAT PARK
ENTIATQUA TRAIL
PLAN & PROFILE PROJECT OVERVIEW

BID 13-01

SHEET	3 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	0911-50CI-0043

DOCUMENT CLASS: ID: ORIGINAL DWG #:



PLAN STA 0+00 – 6+00

1" = 40' HORZ

℄ PROFILE STA 0+00 – 6+50

1" = 40' HORZ, 1"=4' VERT

ENTIATQUA TRAIL			
NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION
L1		3.66	S46° 08' 48.65"W
C1	327.65	70.12	S52° 16' 40.86"W
L2		41.54	S58° 24' 33.08"W
C2	280.00	158.06	S42° 14' 16.37"W
L3		19.35	S26° 03' 59.67"W
C3	520.21	51.05	S23° 15' 18.72"W
L4		16.82	S20° 26' 37.78"W
C4	612.33	41.25	S18° 30' 49.86"W
L5		40.71	S16° 35' 01.94"W
C5	196.99	18.62	S13° 52' 35.94"W
L6		23.68	S11° 10' 09.94"W
C6	2854.64	69.67	S10° 28' 12.89"W
L7		101.20	S9° 46' 15.84"W

TRAIL ℄ ALIGNMENT TABLE			
STATION	EASTING	NORTHING	ELEVATION
0+00	1790791.42	242841.57	723.30
0+25	1790772.92	242824.76	723.33
0+50	1790753.21	242809.40	723.32
0+75	1790732.38	242795.58	723.19
1+00	1790711.09	242782.48	722.95
1+25	1790689.88	242769.24	722.70
1+50	1790669.70	242754.51	722.44
1+75	1790650.91	242738.03	722.19
2+00	1790633.66	242719.94	721.82
2+25	1790618.09	242700.39	721.16
2+50	1790604.33	242679.53	720.20
2+75	1790592.48	242657.53	719.01
3+00	1790581.54	242635.05	717.82
3+25	1790571.42	242612.19	716.95
3+50	1790562.37	242588.89	716.64
3+75	1790553.80	242565.40	716.72
4+00	1790546.10	242541.62	716.81
4+25	1790538.97	242517.66	716.90
4+50	1790531.96	242493.66	716.99
4+75	1790526.81	242469.20	717.09
5+00	1790522.01	242444.67	717.18
5+25	1790517.40	242420.10	717.23
5+50	1790513.01	242395.49	717.25
5+75	1790508.77	242370.85	717.25
6+00	1790504.52	242346.21	717.26

COURTNEY R. AHTL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

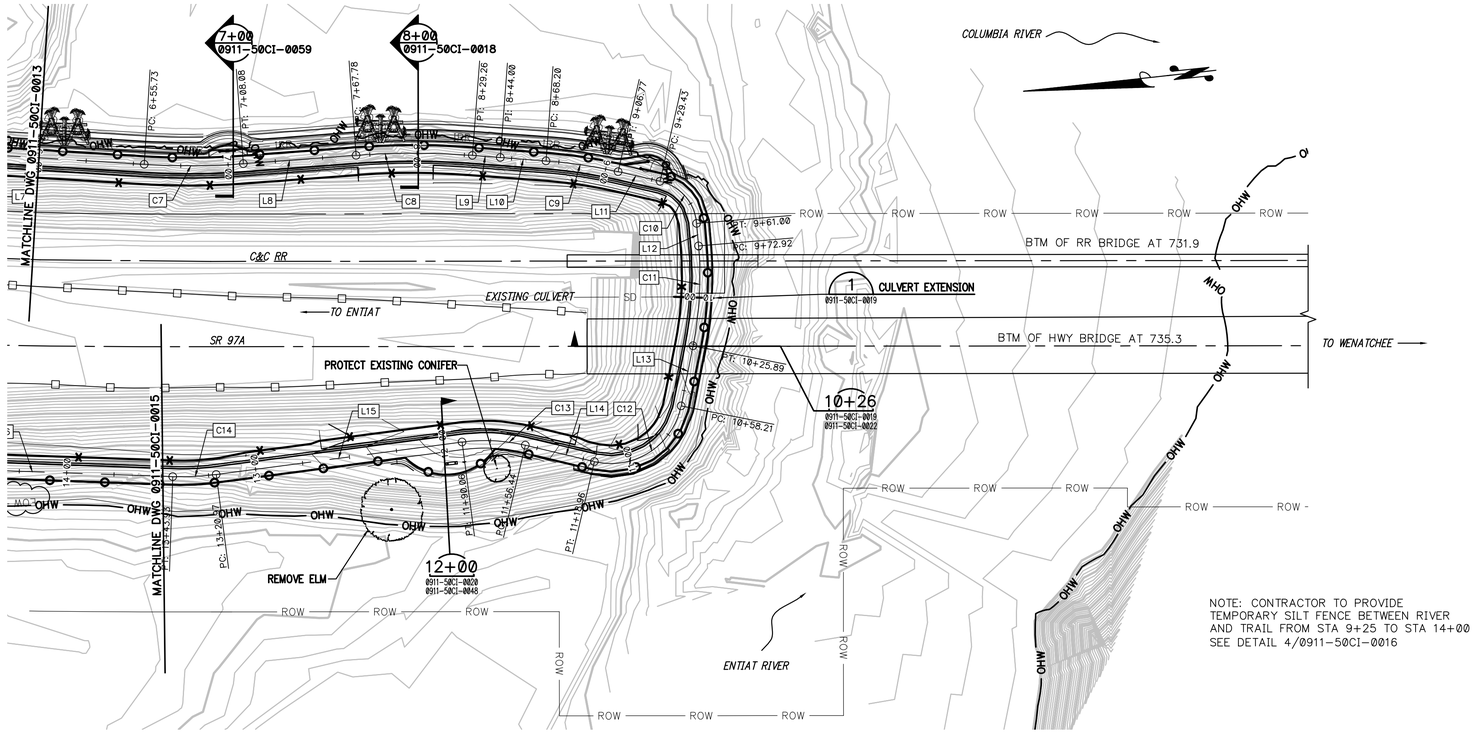
CHELAN PUD NO.1						
PRIM. ENG.	SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING.	VERIFY SCALE 0 — 1"	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
2ND ENG.	0	4/26/2013			CRH	TPD
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
PLAN AND PROFILE
STA. 0+00 TO 6+00
BID 13-01

SHEET 4 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0013

DOCUMENT CLASS: ID: ORIGINAL DWG #:

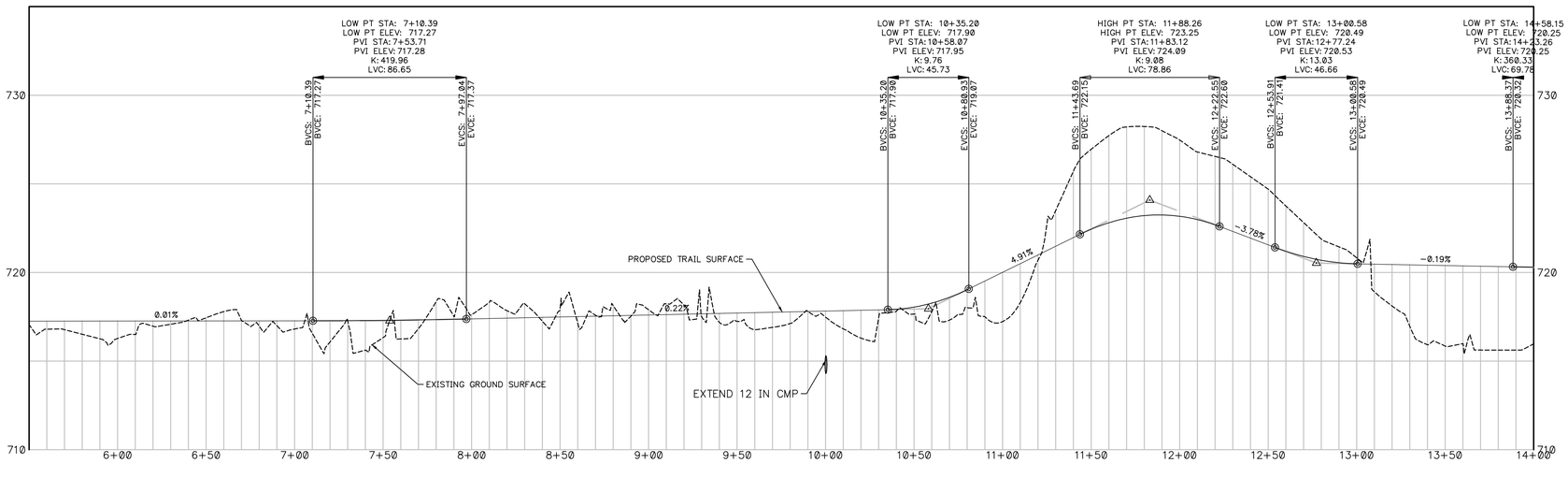


NOTE: CONTRACTOR TO PROVIDE TEMPORARY SILT FENCE BETWEEN RIVER AND TRAIL FROM STA 9+25 TO STA 14+00 SEE DETAIL 4/0911-50CI-0016

PLAN STA 6+00 – 13+50

1" = 40' HORZ

ENTIATQUA TRAIL			
NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION
C7	385.58	52.35	S5° 52' 52.53"W
L8		59.70	S1° 59' 29.23"W
C8	409.80	61.48	S6° 17' 22.26"W
L9		14.73	S10° 35' 15.30"W
L10		24.21	S10° 29' 17.88"W
C9	257.44	38.56	S14° 46' 46.57"W
L11		22.67	S19° 04' 15.27"W
C10	25.00	31.56	S55° 14' 24.44"W
L12		11.92	N88° 35' 26.39"W
C11	188.69	52.97	N80° 32' 52.02"W
L13		32.32	N72° 30' 17.64"W
C12	37.80	60.75	N26° 27' 51.88"W
L14		37.47	N19° 34' 33.88"E
C13	92.42	33.62	N9° 09' 18.13"E
L15		130.92	N1° 15' 57.62"W
C14	138.23	22.96	N3° 29' 32.22"E



℄ PROFILE STA 5+50 – 14+00

1" = 40' HORZ, 1"=4' VERT

TRAIL ℄ ALIGNMENT TABLE			
STATION	EASTING	NORTHING	ELEVATION
6+00	1790504.52	242346.21	717.26
6+25	1790500.28	242321.57	717.26
6+50	1790496.04	242296.94	717.26
6+75	1790492.27	242272.23	717.27
7+00	1790490.07	242247.33	717.27
7+25	1790489.12	242222.35	717.28
7+50	1790488.25	242197.36	717.30
7+75	1790487.32	242172.38	717.33
8+00	1790485.25	242147.47	717.38
8+25	1790481.66	242122.73	717.44
8+50	1790477.10	242098.15	717.49
8+75	1790472.46	242073.58	717.55
9+00	1790466.09	242049.42	717.60
9+25	1790458.00	242025.77	717.66
9+50	1790443.01	242006.87	717.71
9+75	1790418.31	242005.11	717.77
10+00	1790393.46	242007.65	717.82
10+25	1790369.16	242013.45	717.88
10+50	1790345.32	242020.96	718.04
10+75	1790323.10	242031.81	718.80
11+00	1790311.53	242053.46	720.01
11+25	1790315.26	242077.84	721.23
11+50	1790323.64	242101.39	722.44
11+75	1790330.22	242125.45	723.15
12+00	1790330.89	242150.41	723.17
12+25	1790330.34	242175.40	722.51
12+50	1790329.79	242200.40	721.56
12+75	1790329.24	242225.39	720.79
13+00	1790328.68	242250.38	720.49
13+25	1790328.19	242275.38	720.44
13+50	1790330.49	242300.25	720.39

CHELAN PUD NO.1	SCALE SEE SHEET		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG.					
2ND ENG.	0	4/26/2013		CRH	TPD
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT

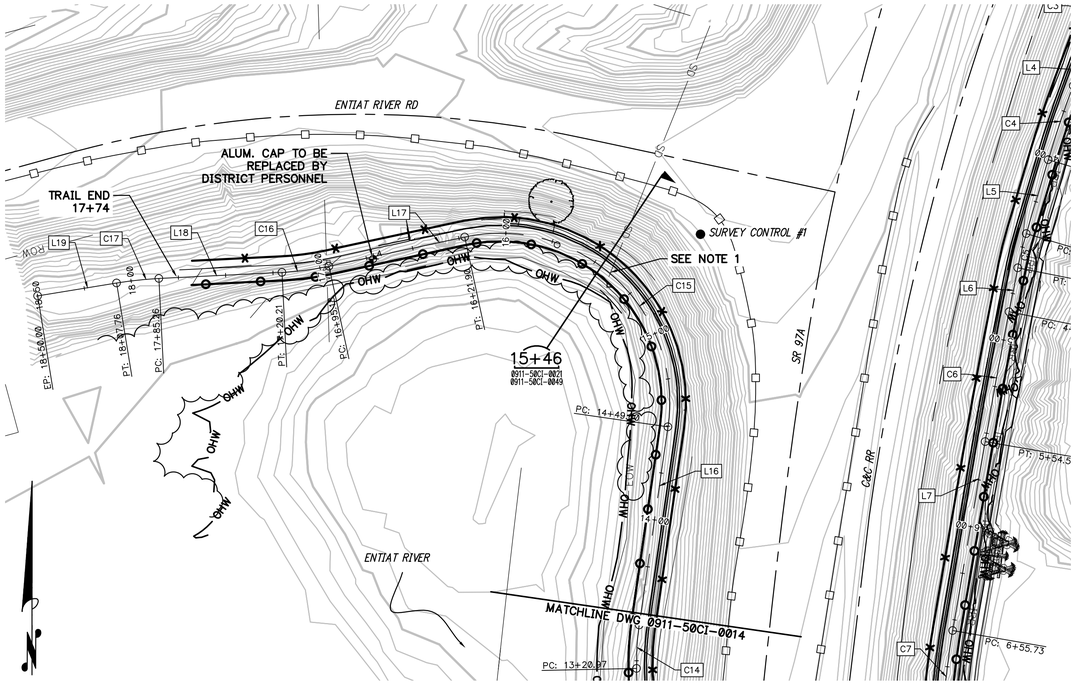
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
PLAN AND PROFILE
STA. 6+00 TO 13+50
BID 13-01

SHEET 5 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0014

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



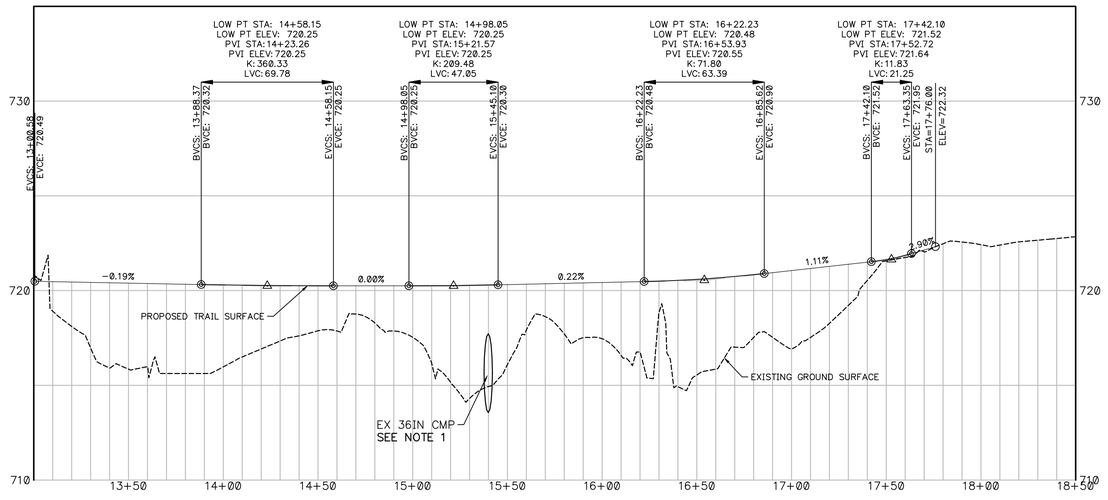
PLAN STA 13+50 – 17+74

1" = 40' HORZ

ENTIATQUA TRAIL			
NUMBER	RADIUS	LENGTH	LINE/CHORD DIRECTION
L16		105.67	N8° 15' 02.06"E
C15	89.41	172.30	N46° 57' 17.26"W
L17		73.28	S77° 50' 23.41"W
C16	153.85	25.03	S82° 30' 02.24"W
L18		65.05	S87° 09' 41.07"W
C17	200.00	22.49	S83° 56' 21.25"W
L19		42.24	S80° 43' 01.44"W

TRAIL ℄ ALIGNMENT TABLE			
STATION	EASTING	NORTHING	ELEVATION
13+50	1790330.49	242300.25	720.39
13+75	1790334.08	242324.99	720.34
14+00	1790337.66	242349.73	720.30
14+25	1790341.25	242374.47	720.27
14+50	1790344.84	242399.21	720.25
14+75	1790344.83	242424.13	720.25
15+00	1790337.95	242448.08	720.25
15+25	1790324.72	242469.20	720.27
15+50	1790306.18	242485.85	720.31
15+75	1790283.76	242496.73	720.37
16+00	1790259.22	242501.01	720.43
16+25	1790234.43	242498.40	720.48
16+50	1790209.99	242493.13	720.59
16+75	1790185.55	242487.87	720.79
17+00	1790161.10	242482.67	721.06
17+25	1790136.25	242480.11	721.33
17+50	1790111.28	242478.88	721.64
17+74.18	1790087.13	242477.68	722.26

NOTE:
1. CUT AND CAP 36-INCH DIA. CMP
2. CONTRACTOR TO PROVIDE JERSEY BARRIER TO PROTECT EXISTING PLANTS FROM STA 14+00 TO STA 17+00. SILT FENCE IN ALL OTHER AREAS. SEE DETAIL 4/0911-50CI-0016



℄ PROFILE STA 13+00 – 18+50

1" = 40' HORZ, 1"=4' VERT

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

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PRIM. ENG. C.HILL							
2ND ENG.	0	4/26/2013			CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

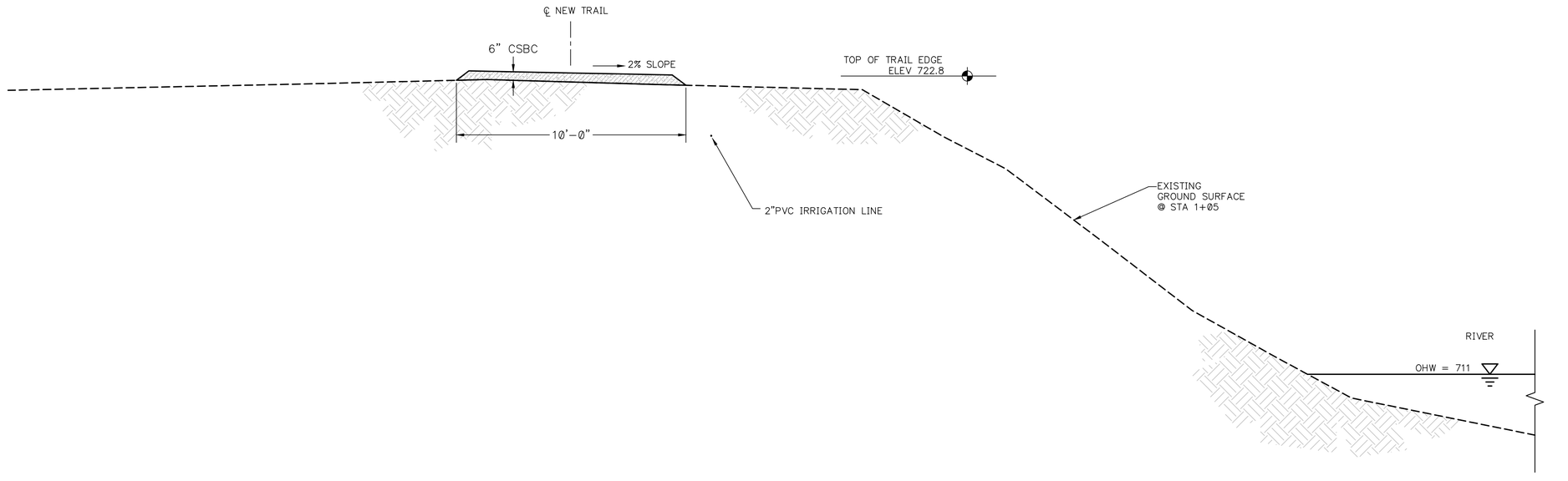
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
PLAN AND PROFILE
STA. 13+50 TO 17+76
BID 13-01

SHEET 6 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0015

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

NOTE: CONTRACTOR TO PROVIDE TEMPORARY SILT FENCE FROM BETWEEN RIVER AND TRAIL FROM STA 0+00 TO STA 2+50. SEE DETAIL 4/0911-50CI-0016



TRAIL SECTION @ STA 1+05

3/4"=1'-0"

TYP. SECTION FROM STA. 0+00 TO STA. 2+45

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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PRIM. ENG. C.HILL							
2ND ENG.		0	4/26/2013			CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – AT STA 1+05

BID 13-01

SHEET 7 OF 38	
REVISION 0	
DATE 4/26/2013	
DWG. 0911-50CI-0050	

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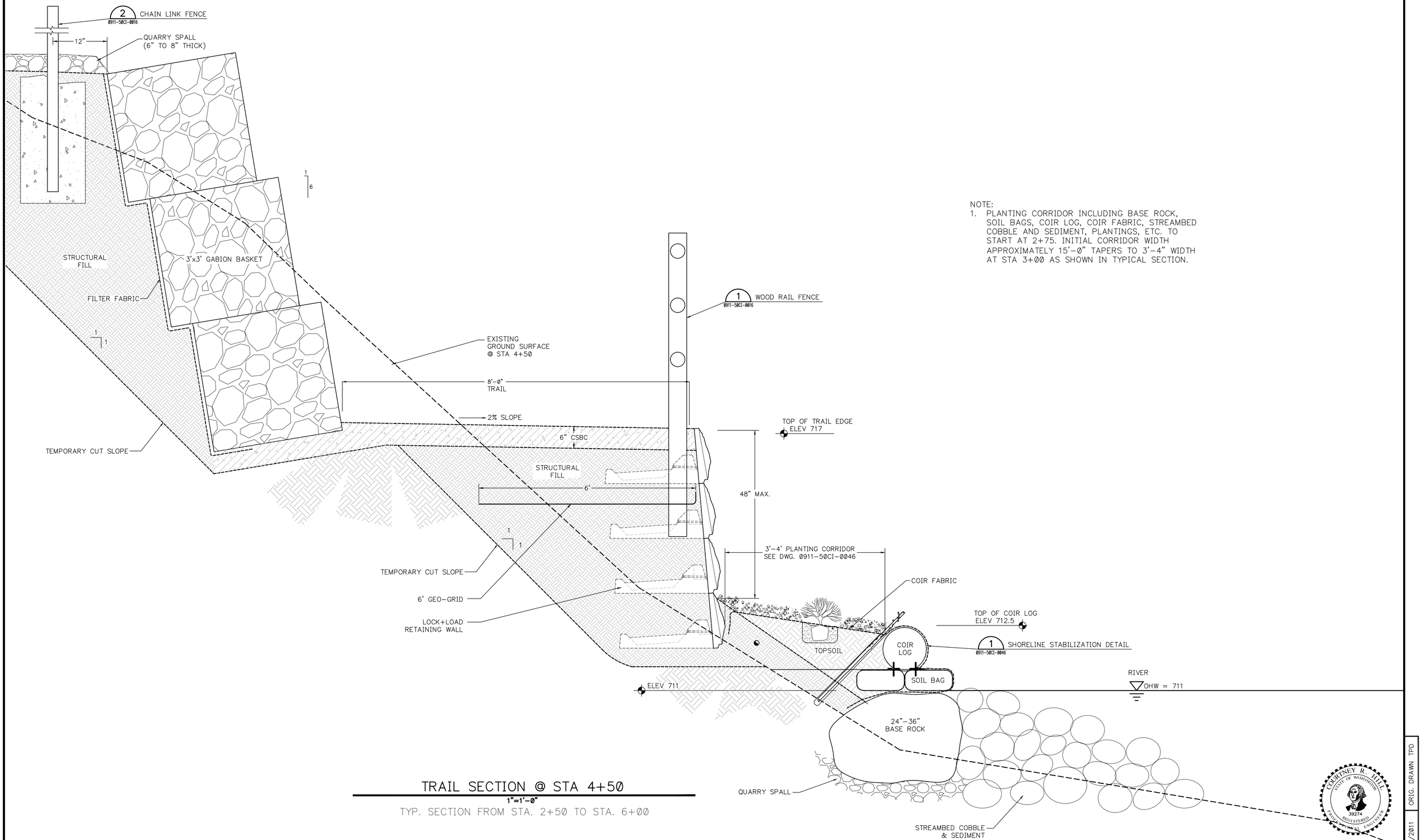

TRAIL SECTION @ STA 4+50

1"=1'-0"

TYP. SECTION FROM STA. 2+50 TO STA. 6+00

NOTE:
1. PLANTING CORRIDOR INCLUDING BASE ROCK, SOIL BAGS, COIR LOG, COIR FABRIC, STREAMBED COBBLE AND SEDIMENT, PLANTINGS, ETC. TO START AT 2+75. INITIAL CORRIDOR WIDTH APPROXIMATELY 15'-0" TAPERS TO 3'-4" WIDTH AT STA 3+00 AS SHOWN IN TYPICAL SECTION.

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

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PRIM. ENG. COURT HILL						
2ND ENG.	0	4/26/2013			CRH	TPD
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

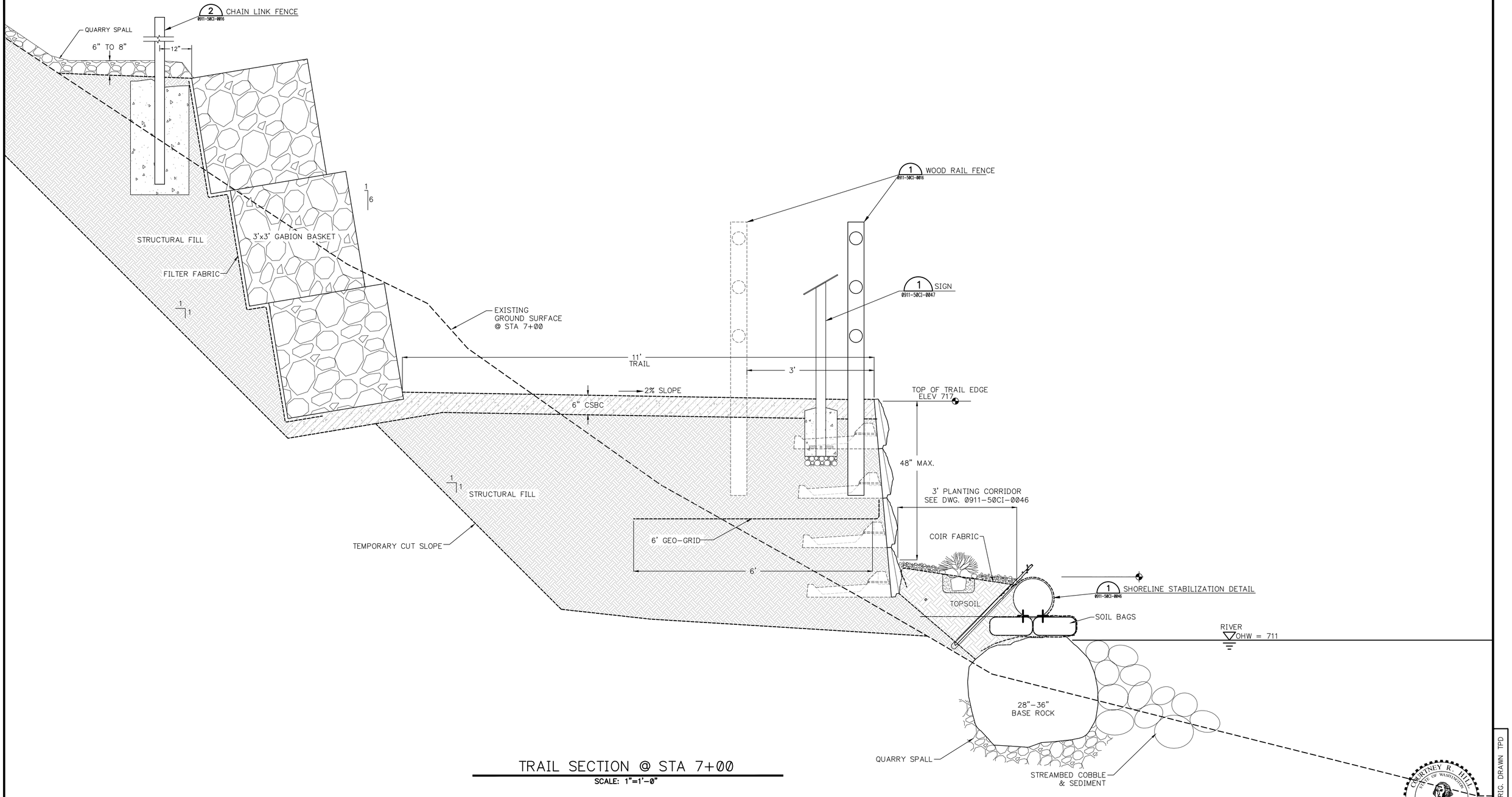
Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – STA 4+50

BID 13-01

SHEET	8 OF 38
REVISION	0
DATE	4/26/2013
DWG.	0911-50CI-0017

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



TRAIL SECTION @ STA 7+00

SCALE: 1"=1'-0"

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

ORIG. DRAWN TPD

ORIG. DATE 5/3/2012

CHELAN PUD NO.1	SCALE SEE DWG		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			**PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY** WENATCHEE, WASHINGTON	*Entiat Park* ENTIATQUA TRAIL TRAIL SECTION – STA 7+00 BID 13-01
PRIM. ENG. COURT HILL							SHEET 9 OF 38
2ND ENG.	0	4/26/2013		CRH	TPD		REVISION 0
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT		DATE 4/26/2013
							DWG. 0911-50CI-0059

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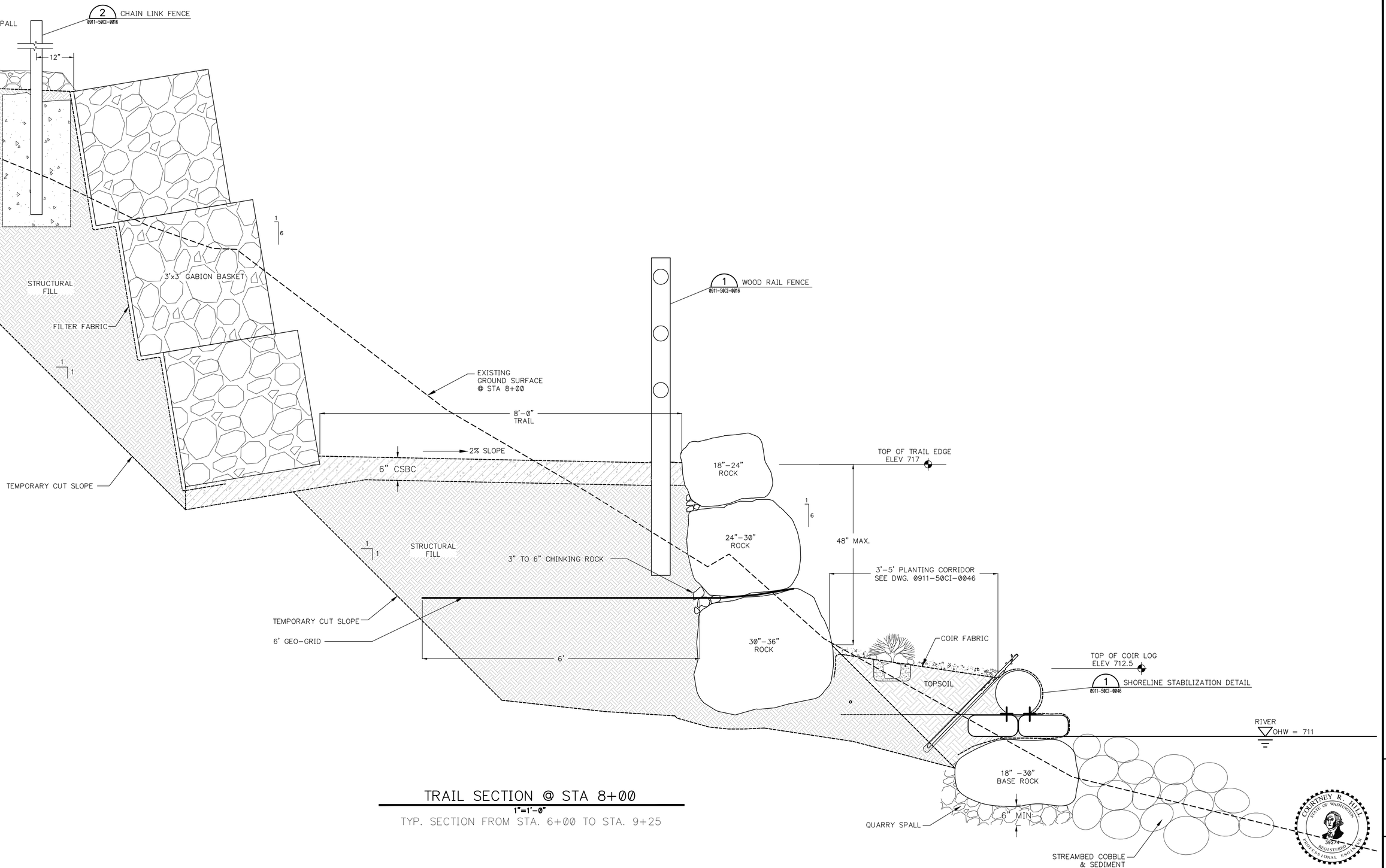

TRAIL SECTION @ STA 8+00

1"=1'-0"

TYP. SECTION FROM STA. 6+00 TO STA. 9+25

CHELAN PUD NO.1	SCALE SEE DWG		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. COURT HILL							
2ND ENG.	0	4/26/2013			CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – STA 8+00

BID 13-01

SHEET	10 OF 38
REVISION	0
DATE	4/26/2013
DWG.	0911-50CI-0018

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

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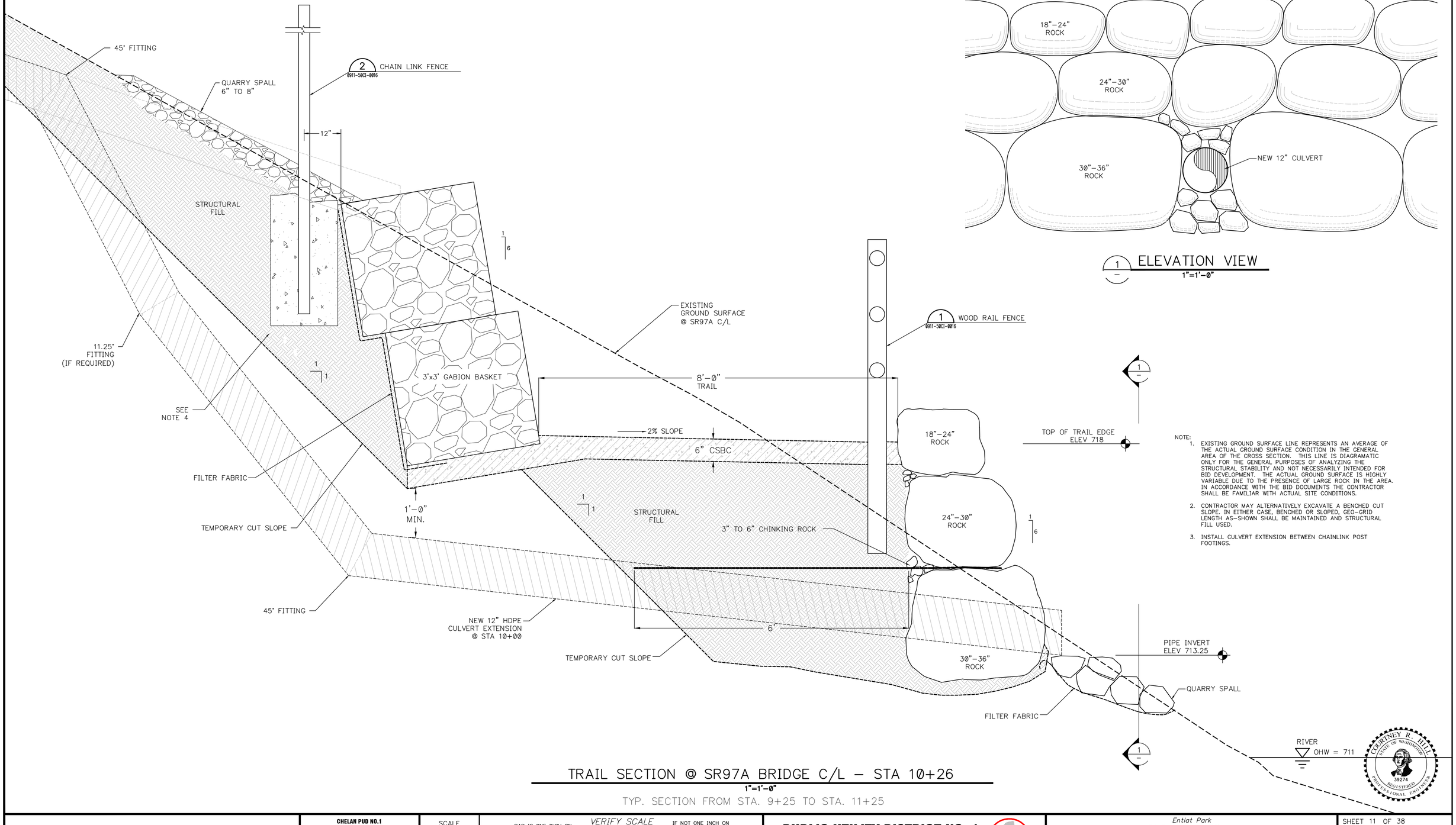


1 – ELEVATION VIEW
1"=1'-0"

NOTE:
1. EXISTING GROUND SURFACE LINE REPRESENTS AN AVERAGE OF THE ACTUAL GROUND SURFACE CONDITION IN THE GENERAL AREA OF THE CROSS SECTION. THIS LINE IS DIAGRAMATIC ONLY FOR THE GENERAL PURPOSES OF ANALYZING THE STRUCTURAL STABILITY AND NOT NECESSARILY INTENDED FOR BID DEVELOPMENT. THE ACTUAL GROUND SURFACE IS HIGHLY VARIABLE DUE TO THE PRESENCE OF LARGE ROCK IN THE AREA. IN ACCORDANCE WITH THE BID DOCUMENTS THE CONTRACTOR SHALL BE FAMILIAR WITH ACTUAL SITE CONDITIONS.
2. CONTRACTOR MAY ALTERNATIVELY EXCAVATE A BENCHED CUT SLOPE. IN EITHER CASE, BENCHED OR SLOPED, GEO-GRID LENGTH AS-SHOWN SHALL BE MAINTAINED AND STRUCTURAL FILL USED.
3. INSTALL CULVERT EXTENSION BETWEEN CHAINLINK POST FOOTINGS.

TRAIL SECTION @ SR97A BRIDGE C/L – STA 10+26
1"=1'-0"

TYP. SECTION FROM STA. 9+25 TO STA. 11+25

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

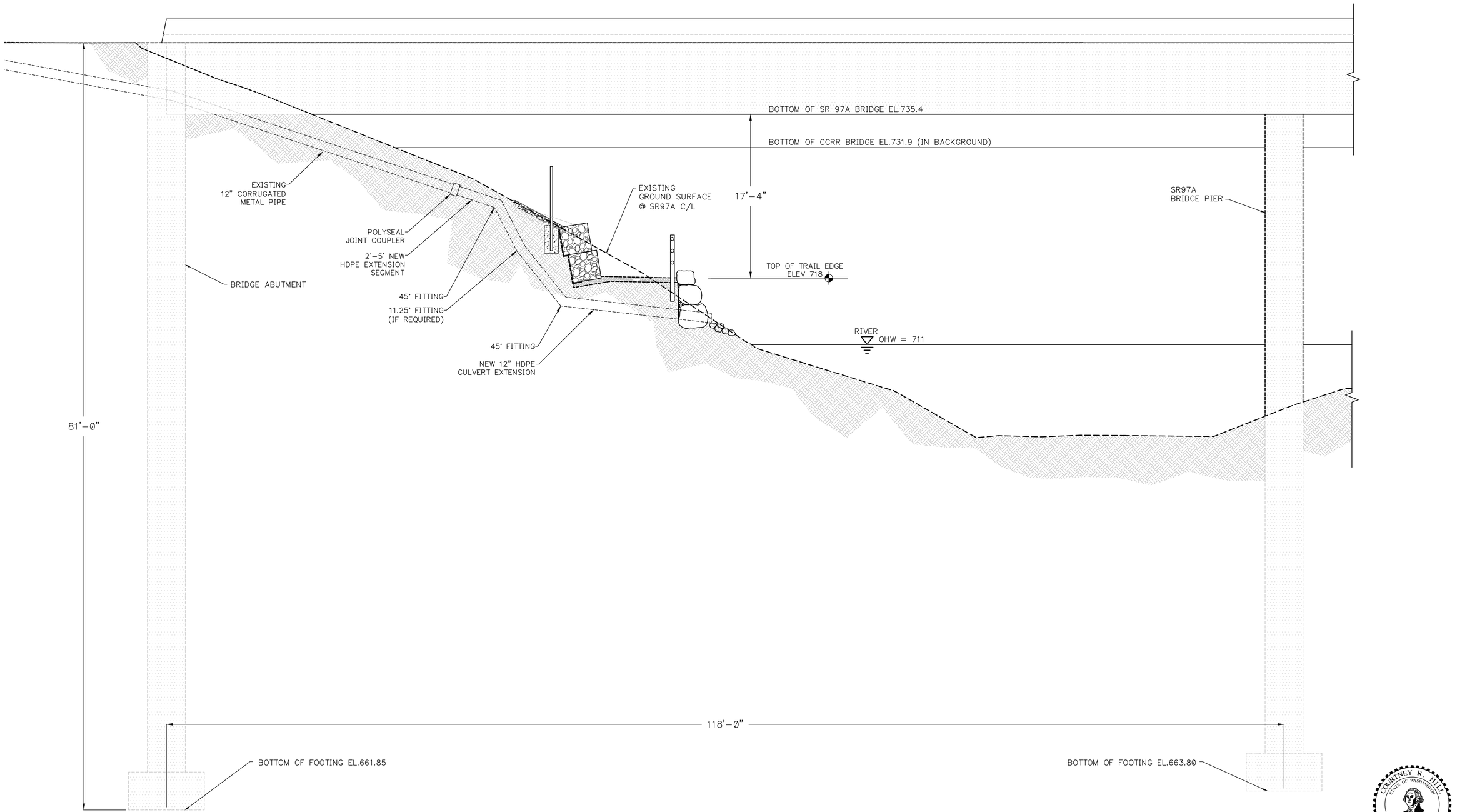
CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL						
2ND ENG.	Ø	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – STA 10+26
AT SR97A BRIDGE C/L
BID 13-01

SHEET	11 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	0911-50CI-0019

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



EXPANDED TRAIL SECTION @ SR97A BRIDGE C/L

1"=5'-0"

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

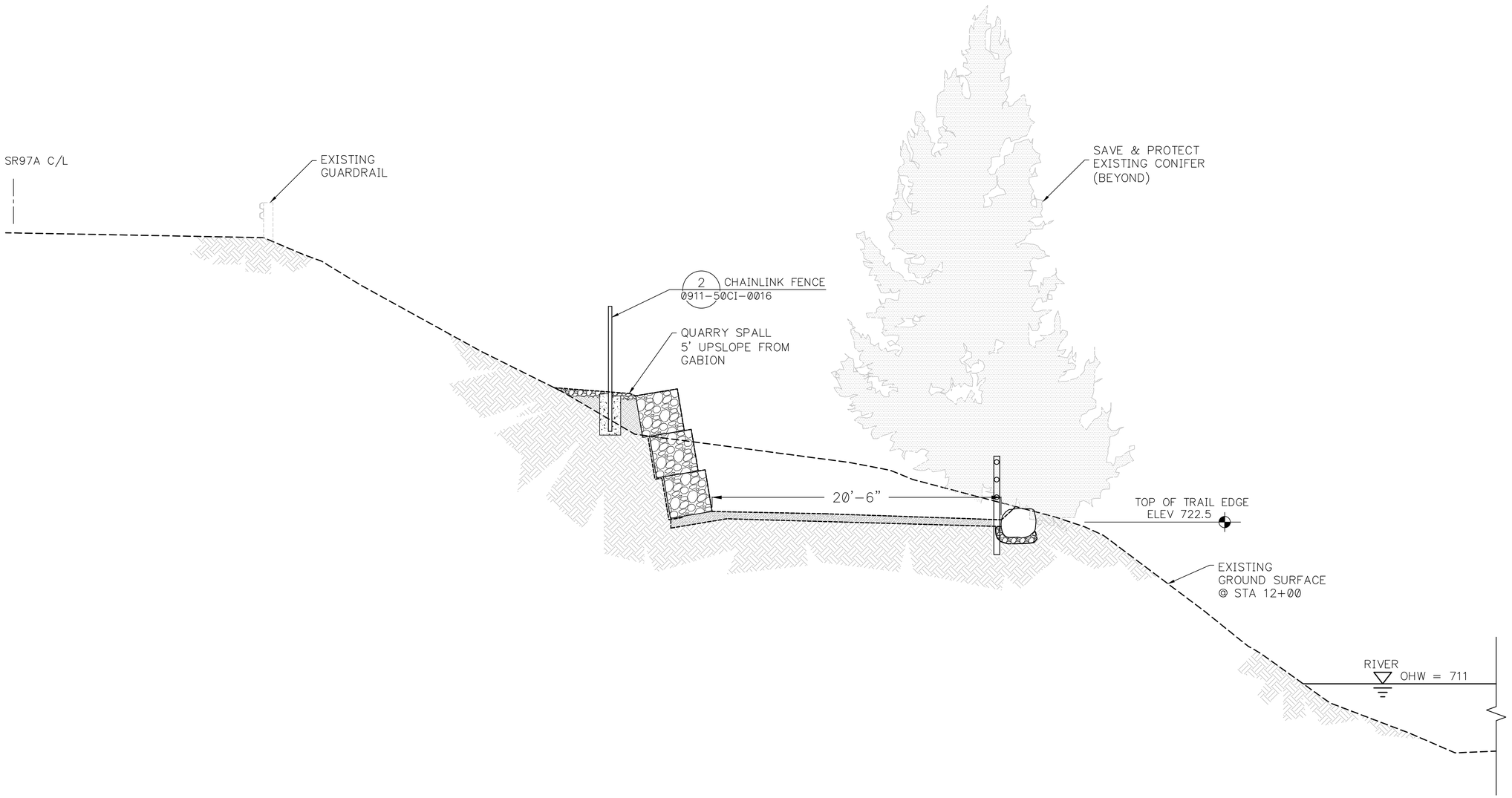
CHELAN PUD NO.1	SCALE		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL						
2ND ENG.	0	4/26/2013		CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
EXPANDED SECTION
AT SR97A BRIDGE C/L STA 10+26
BID 13-01

SHEET 12 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0022

DOCUMENT CLASS: ID: ORIGINAL DWG #:



EXPANDED TRAIL SECTION @ STA 12+00

1/4"=1'-0"

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE	BAR IS ONE INCH ON ORIGINAL DRAWING. *VERIFY SCALE* 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. C.HILL		SEE DWG					
2ND ENG.	1	4/26/2013			CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
EXPANDED SECTION – AT STA 12+00

BID 13-01

SHEET 13 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911-50CI-0048

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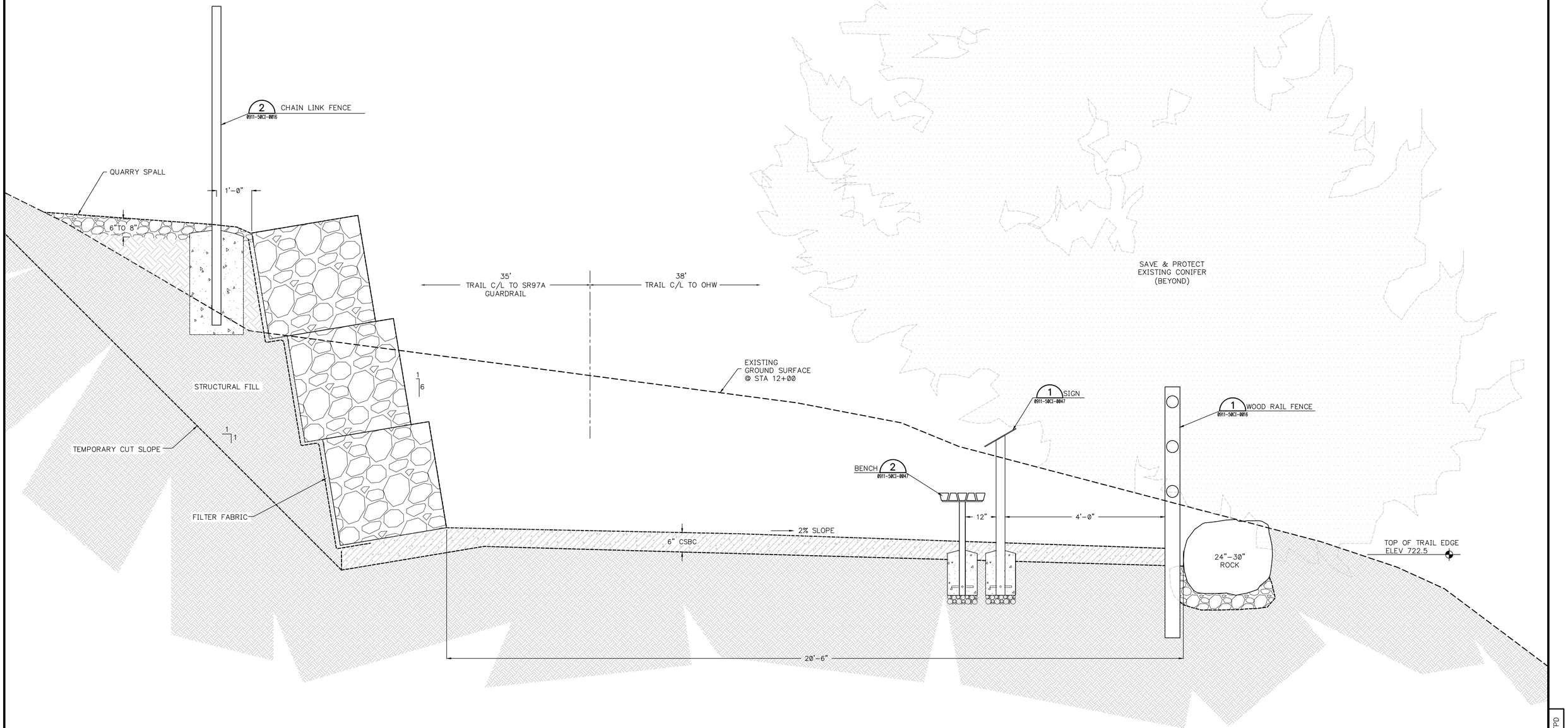


NOTE: SEE DWG 0911-50CI-0026
DETAIL AREA PLAN

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

TRAIL SECTION @ STA 12+00

3/4"=1'-0"

TYP. SECTION FROM STA. 11+25 TO STA. 13+00

CHELAN PUD NO.1		SCALE SEE DWG		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL							
2ND ENG.		1	4/26/2013			CRH	TPD
PROJ. MGR.		REV	DATE	REVISION		REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

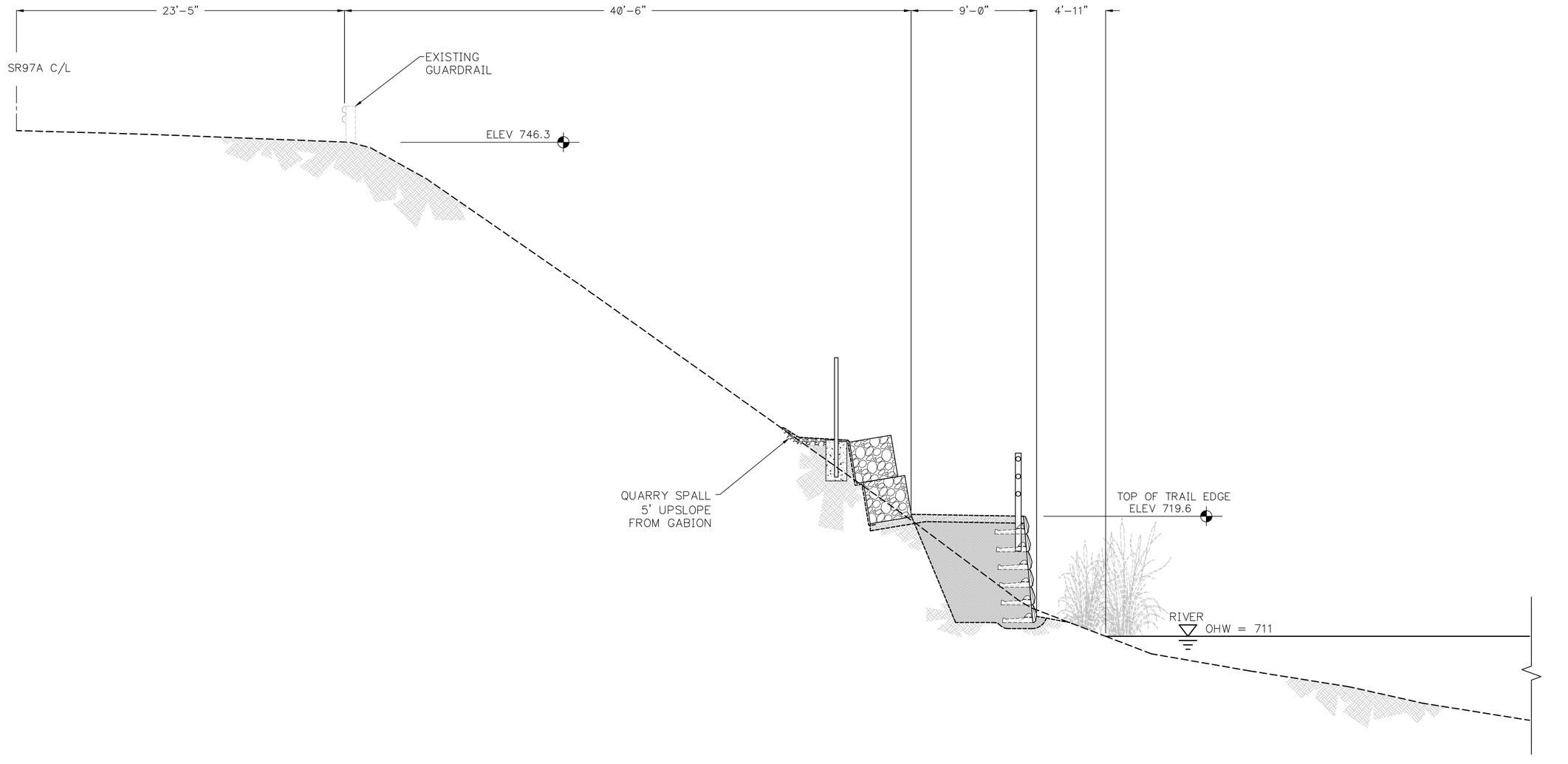
Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – STA 12+00

BID 13-01

SHEET 14 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911-50CI-0020

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



EXPANDED TRAIL SECTION @ STA 15+46

1/4"=1'–0"

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

	CHELAN PUD NO.1	SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
	PRIM. ENG. C.HILL					
	2ND ENG.	1	4/26/2013		CRH	TPD
	PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
EXPANDED SECTION – AT STA 15+46

BID 13–01

SHEET	15 OF 38
REVISION	1
DATE	4/26/2013
DWG.	0911–50CI–0049

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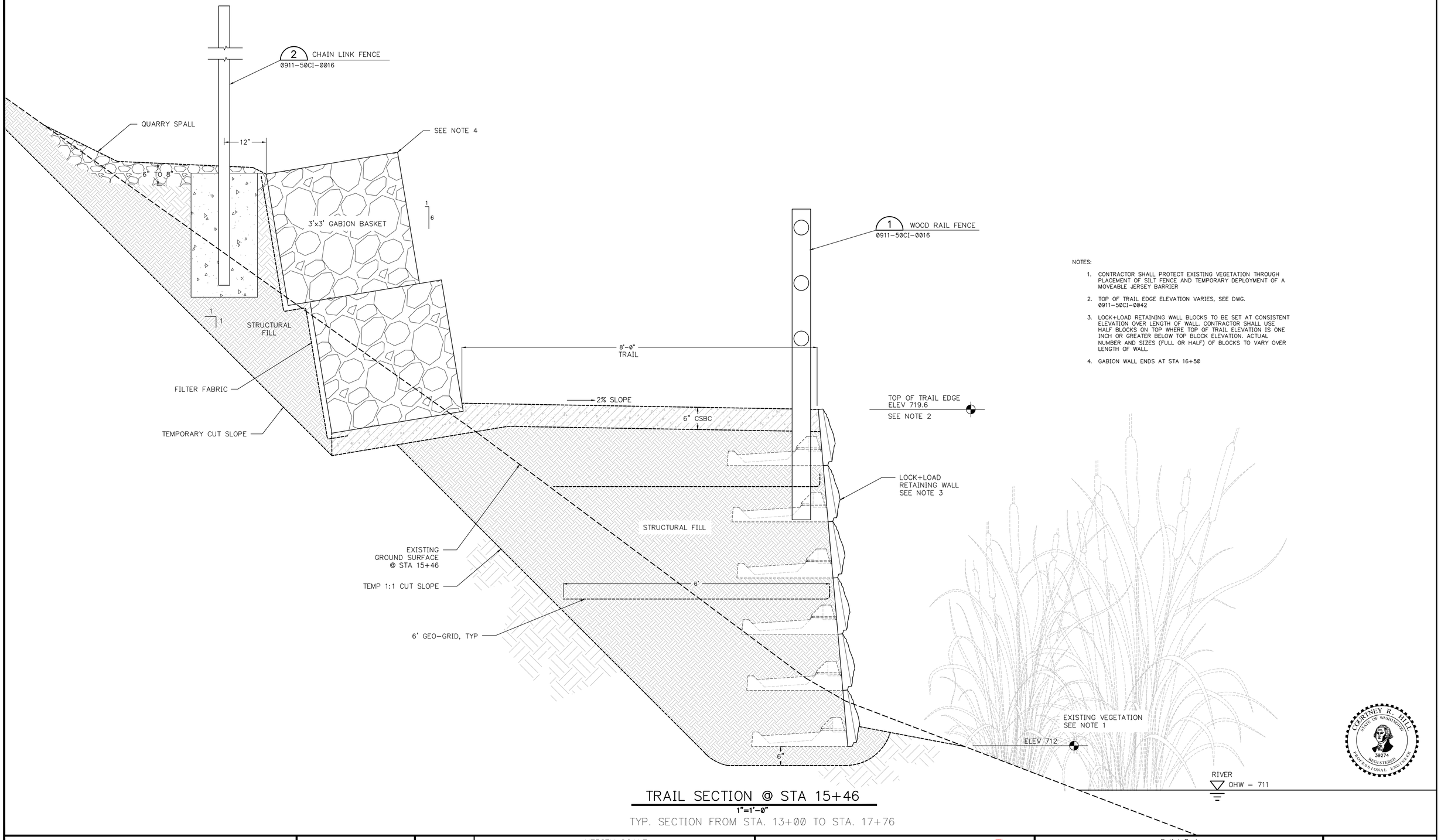


NOTES:

1. CONTRACTOR SHALL PROTECT EXISTING VEGETATION THROUGH PLACEMENT OF SILT FENCE AND TEMPORARY DEPLOYMENT OF A MOVEABLE JERSEY BARRIER
2. TOP OF TRAIL EDGE ELEVATION VARIES, SEE DWG. 0911-50CI-0042
3. LOCK+LOAD RETAINING WALL BLOCKS TO BE SET AT CONSISTENT ELEVATION OVER LENGTH OF WALL. CONTRACTOR SHALL USE HALF BLOCKS ON TOP WHERE TOP OF TRAIL ELEVATION IS ONE INCH OR GREATER BELOW TOP BLOCK ELEVATION. ACTUAL NUMBER AND SIZES (FULL OR HALF) OF BLOCKS TO VARY OVER LENGTH OF WALL.
4. GABION WALL ENDS AT STA 16+50

TRAIL SECTION @ STA 15+46

1"=1'-0"

TYP. SECTION FROM STA. 13+00 TO STA. 17+76

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

CHELAN PUD NO.1	SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. COURT HILL						
2ND ENG.	1	4/26/2013		CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT	

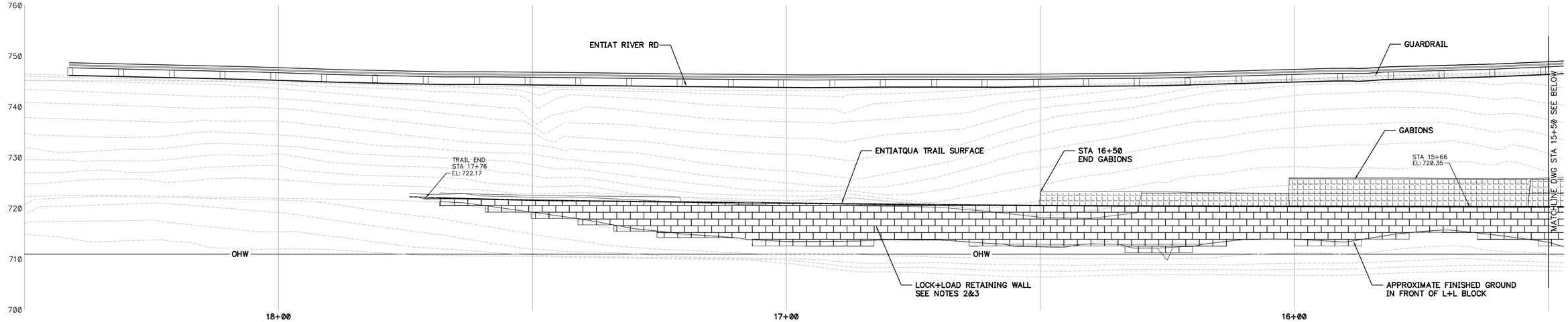
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
TRAIL SECTION – STA 15+46

BID 13-01

SHEET	16 OF 38
REVISION	1
DATE	4/26/2013
DWG.	0911-50CI-0021

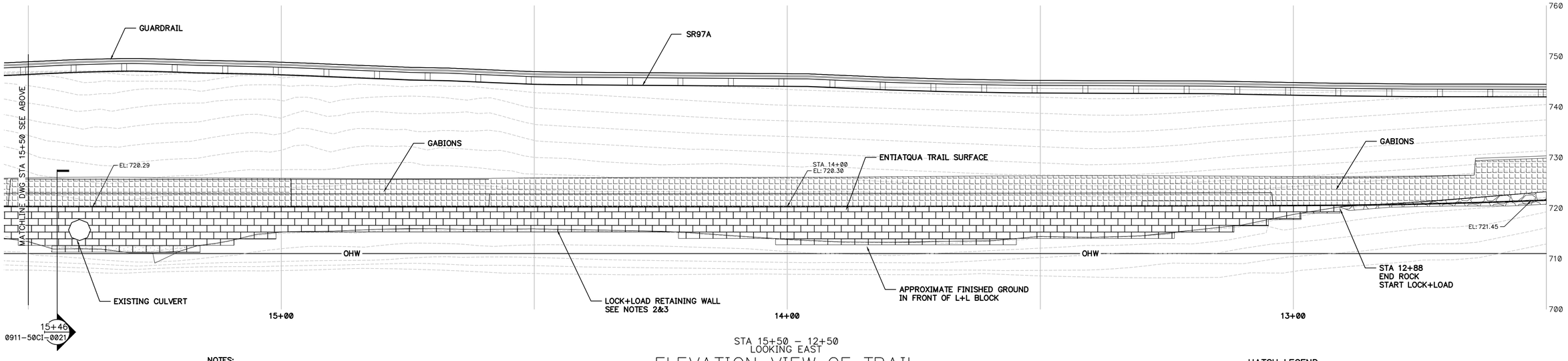
DOCUMENT CLASS: ID: ORIGINAL DWG. #:



STA 18+50 – 15+50
LOOKING NORTH

ELEVATION VIEW OF TRAIL

1"=10'



STA 15+50 – 12+50
LOOKING EAST

ELEVATION VIEW OF TRAIL

1"=10'

NOTES:

1. CONTRACTOR SHALL PROTECT EXISTING VEGETATION THROUGH PLACEMENT OF SILT FENCE AND TEMPORARY DEPLOYMENT OF A MOVEABLE JERSEY BARRIER
2. TOP OF TRAIL EDGE ELEVATION VARIES, SEE DWG. 0911-50CI-0042
3. LOCK+LOAD RETAINING WALL MODULES TO BE SET AT CONSISTENT ELEVATION OVER LENGTH OF WALL. CONTRACTOR SHALL USE HALF BLOCKS ON TOP WHERE TOP OF TRAIL ELEVATION IS ONE INCH OR GREATER BELOW TOP BLOCK ELEVATION. ACTUAL NUMBER AND SIZES (FULL OR HALF) OF BLOCKS TO VARY OVER LENGTH OF WALL.
4. LOCK+LOAD MODULES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY, ACTUAL QUANTITIES SHOULD BE DERIVED BY CALCULATION AND/OR FIELD MEASUREMENTS.

HATCH LEGEND

- LOCK+LOAD RETAINING WALL
- GABION BASKET
- ROCK RETAINING WALL

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL							
2ND ENG.		0	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

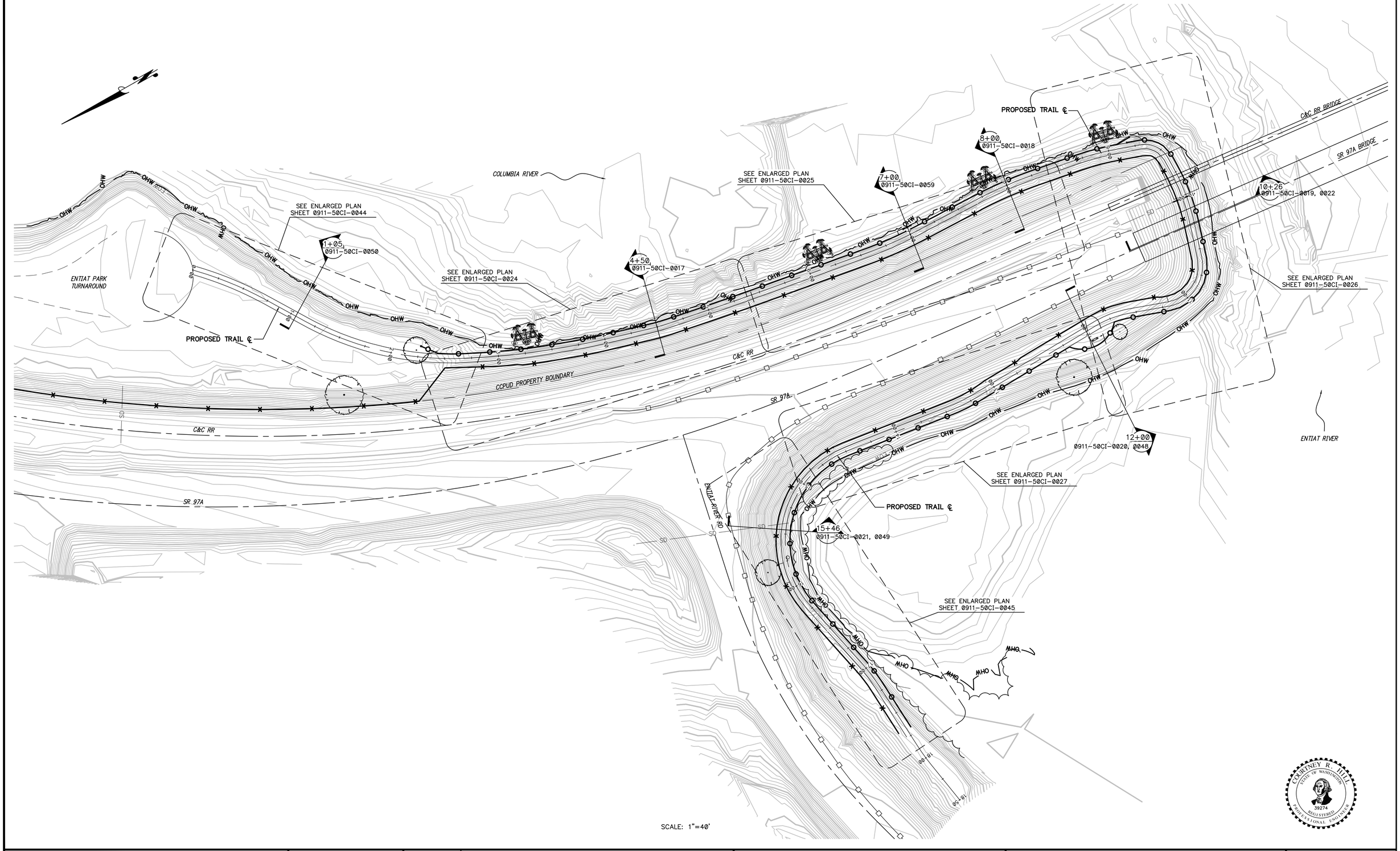
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
TRAIL ELEVATION VIEW STA 12+50 – 18+50

BID 13-01

SHEET 17 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0042

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



SCALE: 1"=40'

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1	SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. COURT HILL						
2ND ENG.	Ø	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
PROJECT OVERVIEW

BID 13-01

SHEET 18 OF 38	
REVISION Ø	
DATE 4/26/2013	
DWG. 0911-50CI-0023	

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

OHW

COLUMBIA RIVER

1+05
0911-50CI-0050

PROPOSED ENTIATQUA TRAIL

REMOVE TREE

STA 2+25
START
WOOD RAIL
FENCE

STA 2+50
START
LOCK+LOAD
WALL

IRR

3" HDPE MAIN
(SEE DWG. 0911-50CI-0061)

APPROXIMATE LOCATION OF
EXISTING STUB CONNECTION TO
PARK IRRIGATION SYSTEM

1
AUTOMATIC CONTROL VALVE
0911-50CI-0061

MATCHLINE DWG 0911-50CI-0024

STA 2+50
START GABION WALL
AND FENCE ANGLE
POINT

CCPUD PROPERTY LINE

C&C RR ℄

SCALE: 1"=10'

LEGEND

- TRAIL SURFACE - CSBC
- ROCK
- GABION BASKET
- CHAINLINK FENCE
- WOODRAIL FENCE
- SLOPE ARMOR
- LOCK+LOAD WALL
- IRR — IRRIGATION MAIN

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG.	COURT HILL					
2ND ENG.		Ø	4/26/2013		CRH	TPD
PROJ. MGR.	CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 1

BID 13-01

SHEET 19 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0044

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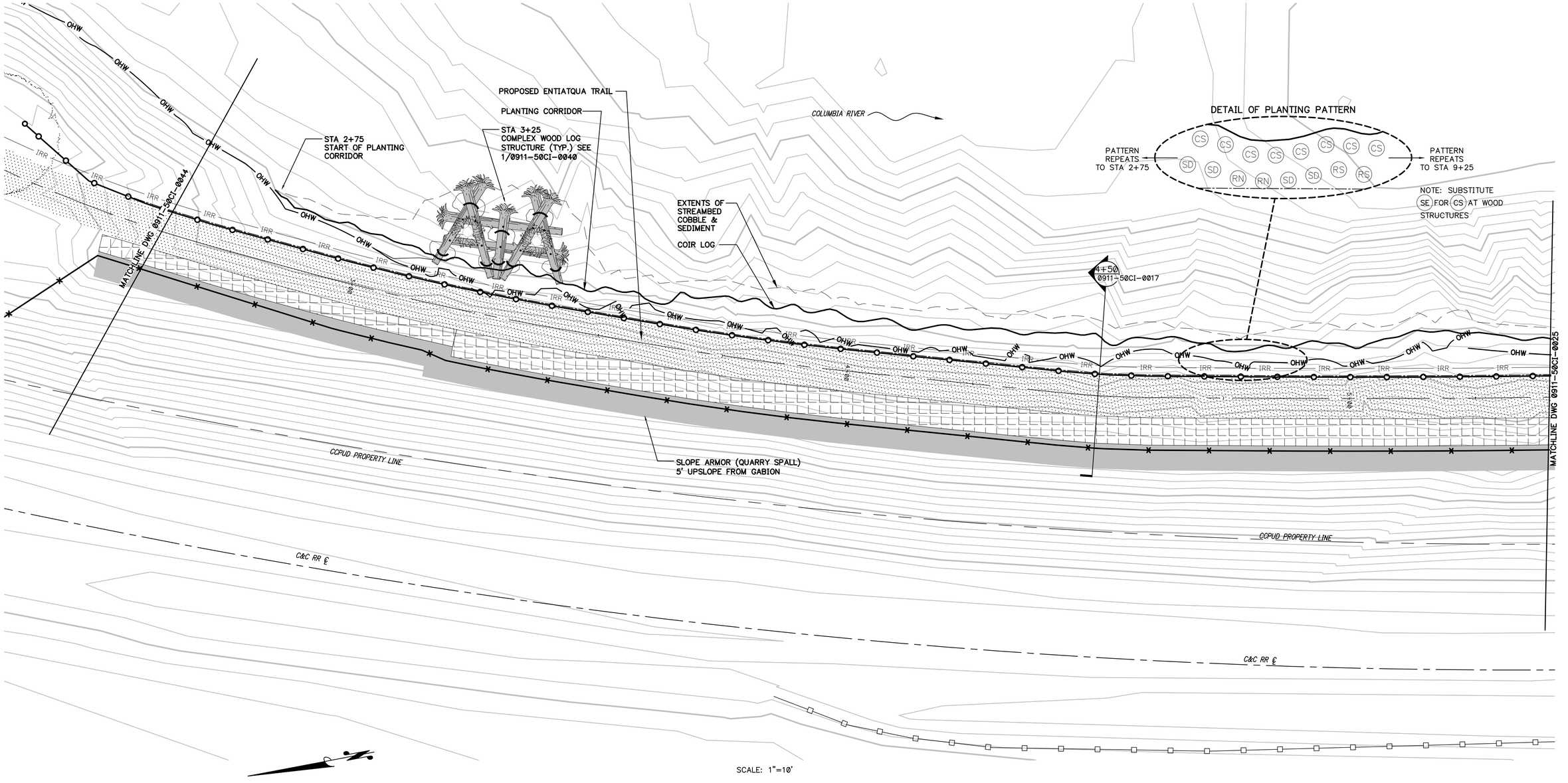

CHELAN PUD NO.1		SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE Ø 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL						
2ND ENG.	Ø	4/26/2013		CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 2

BID 13-01

SHEET 20 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0024

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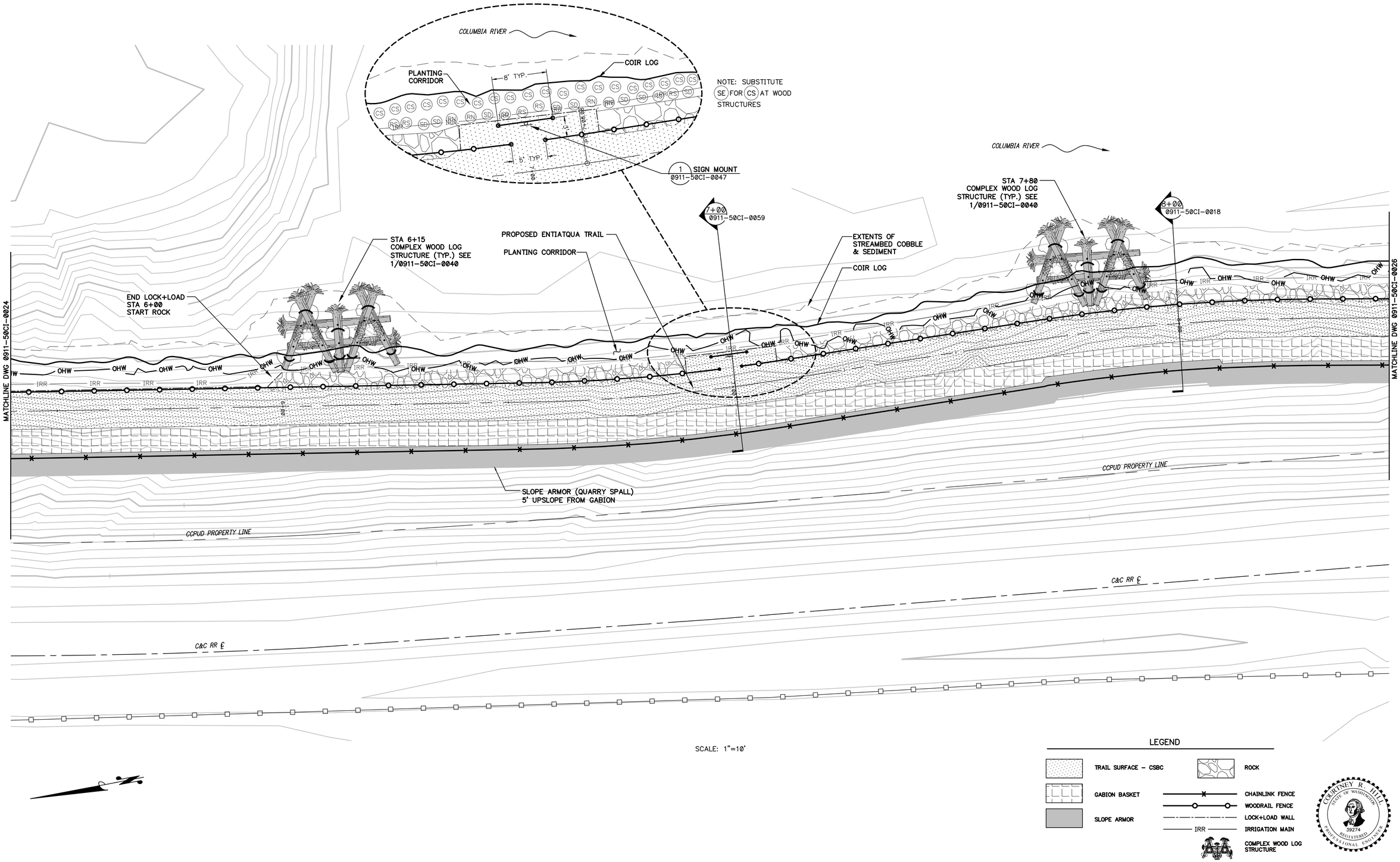


SCALE: 1"=10'

LEGEND

- TRAIL SURFACE – CSBC
- ROCK
- GABION BASKET
- CHAINLINK FENCE
- WOODRAIL FENCE
- SLOPE ARMOR
- LOCK+LOAD WALL
- IRRIGATION MAIN
- COMPLEX WOOD LOG STRUCTURE

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE Ø — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL						
2ND ENG.		Ø	4/26/2013		CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 3

BID 13-01

SHEET 21 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0025

DOCUMENT CLASS: ID: ORIGINAL DWG. #

MATCHLINE DWG 0911-50CI-0027

MATCHLINE DWG 0911-50CI-0025

2 BENCH 0911-50CI-0047

1 SIGN MOUNT 0911-50CI-0047

EXISTING CONIFER TO REMAIN (PROTECT)

PROPOSED ENTIATQUA TRAIL

SLOPE ARMOR (QUARRY SPALL) 5' UPSLOPE FROM GABION

SR 97A ℄

C&C RR ℄

COPUD PROPERTY LINE

COIR LOG

EXTENTS OF FISH COBBLE

STA 8+98 COMPLEX WOOD LOG STRUCTURE (TYP.)
1 0911-50CI-0040

PROPOSED ENTIATQUA TRAIL

STA 9+25 END PLANTING CORRIDOR

SEE DETAIL

DETAIL OF PLANTING PATTERN

PATTERN REPEATS TO STA 3+00

NOTE: SUBSTITUTE (SE) FOR (CS) AT WOOD STRUCTURES

PATTERN REPEATS TO STA 9+25

NOTE: TREAT SLOPE IN ACCORDANCE WITH THE SPECIFICATIONS FROM STA 10+50 TO 17+50 BETWEEN GUARDRAIL AND CHAINLINK FENCE

10+26
0911-50CI-0019,22

1 CMP DRAIN 0911-50CI-0019

ENTIAT RIVER

SR97A BRIDGE

RR BRIDGE

COLUMBIA RIVER

STA 9+09

STA 9+18

3' GAP

4' OVERLAP

9+25

FENCE DETAIL – STA 9+25

SCALE: 1"=10'

LEGEND

- TRAIL SURFACE – CSBC
- ROCK
- GABION BASKET
- CHAINLINK FENCE
- WOODRAIL FENCE
- SLOPE ARMOR
- LOCK+LOAD WALL
- IRR — IRRIGATION MAIN
- COMPLEX WOOD LOG STRUCTURE

COURTNEY R. ALTA — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG. COURT HILL					
2ND ENG.	Ø	4/26/2013		CRH	TPD
PROJ. MGR. CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 4

BID 13-01

SHEET 22 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0026

DOCUMENT CLASS: ID: ORIGINAL DWG #:

SR 97A

GUARDRAIL

12+00
0911-50CI-0020

MATCHLINE DWG 0911-50CI-0026

PROPOSED ENTIATQUA TRAIL

SLOPE ARMOR (QUARRY SPALL)
5' UPSLOPE FROM GABION

STA 12+88
END ROCK
START LOCK+LOAD

REMOVE
NON-NATIVE
ELM TREE

SAVE AND PROTECT EXISTING SHRUBS

MATCHLINE DWG 0911-50CI-0025

OHW

ENTIAT RIVER

SCALE: 1"=10'

LEGEND

- TRAIL SURFACE – CSBC
- ROCK
- GABION BASKET
- CHAINLINK FENCE
- WOODRAIL FENCE
- SLOPE ARMOR
- LOCK+LOAD WALL

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL							
2ND ENG.		Ø	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 5

BID 13-01

SHEET 23 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0027

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

ENTIAT RIVER ROAD

GUARDRAIL

STA 16+50
END OF GABION BASKET AND CHAINLINK FENCE
START OF TRAIL WIDTH EXPANSION TO 10'

REMOVE
NON-NATIVE
ELM TREE

PROPOSED ENTIATQUA TRAIL

SLOPE ARMOR (QUARRY SPALL)
4' UPSLOPE FROM GABION

STA 17+76
TRAIL END

LOCK+LOAD WALL

SURVEY MARKER
ALUM. CAP

10'

8'

SLOPE ARMOR (QUARRY SPALL)
5' UPSLOPE FROM GABION

SAVE AND PROTECT EXISTING SHRUBS

MATCHLINE DWG 0911-50CI-0027

ENTIAT RIVER

OHW

SCALE: 1"=10'

N

LEGEND

TRAIL SURFACE - CSBC	ROCK
GABION BASKET	CHAINLINK FENCE
SLOPE ARMOR	WOODRAIL FENCE
	LOCK+LOAD WALL

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE Ø 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG.	COURT HILL					
2ND ENG.		Ø	4/26/2013		CRH	TPD
PROJ. MGR.	CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

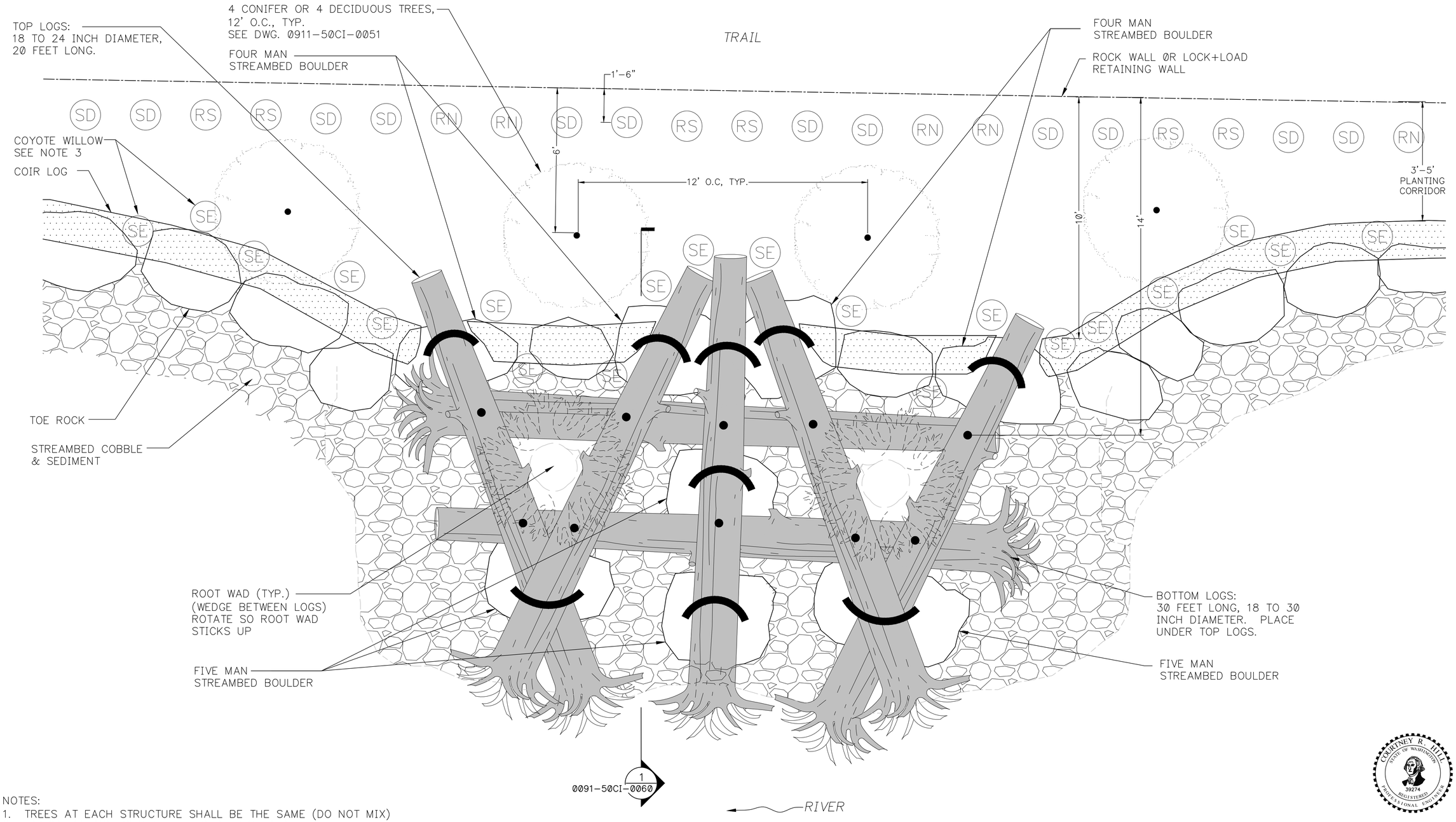
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
DETAIL AREA PLAN 6

BID 13-01

SHEET	24 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	0911-50CI-0045

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



NOTES:
1. TREES AT EACH STRUCTURE SHALL BE THE SAME (DO NOT MIX)
2. IRRIGATION NOT SHOWN BUT TO BE INCLUDED.
3. PLANT 20 COYOTE WILLOW LIVE STAKES ABOVE AND BELOW COIR LOG AND SOIL BAGS AS DIRECTED BY THE ENGINEER AT EACH STRUCTURE.
4. SEE DWG. 0911-50CI-0041 FOR CONSTRUCTION DETAILS.

TYPICAL COMPLEX WOOD STRUCTURE PLAN
1/2"=1'-0"

1
0911-50CI-0024, 25, 26

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE 1/2"=1'-0"		BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.			
PRIM. ENG. COURT HILL							
2ND ENG.		1	4/26/2013			CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION		REQ. BY	DRFT

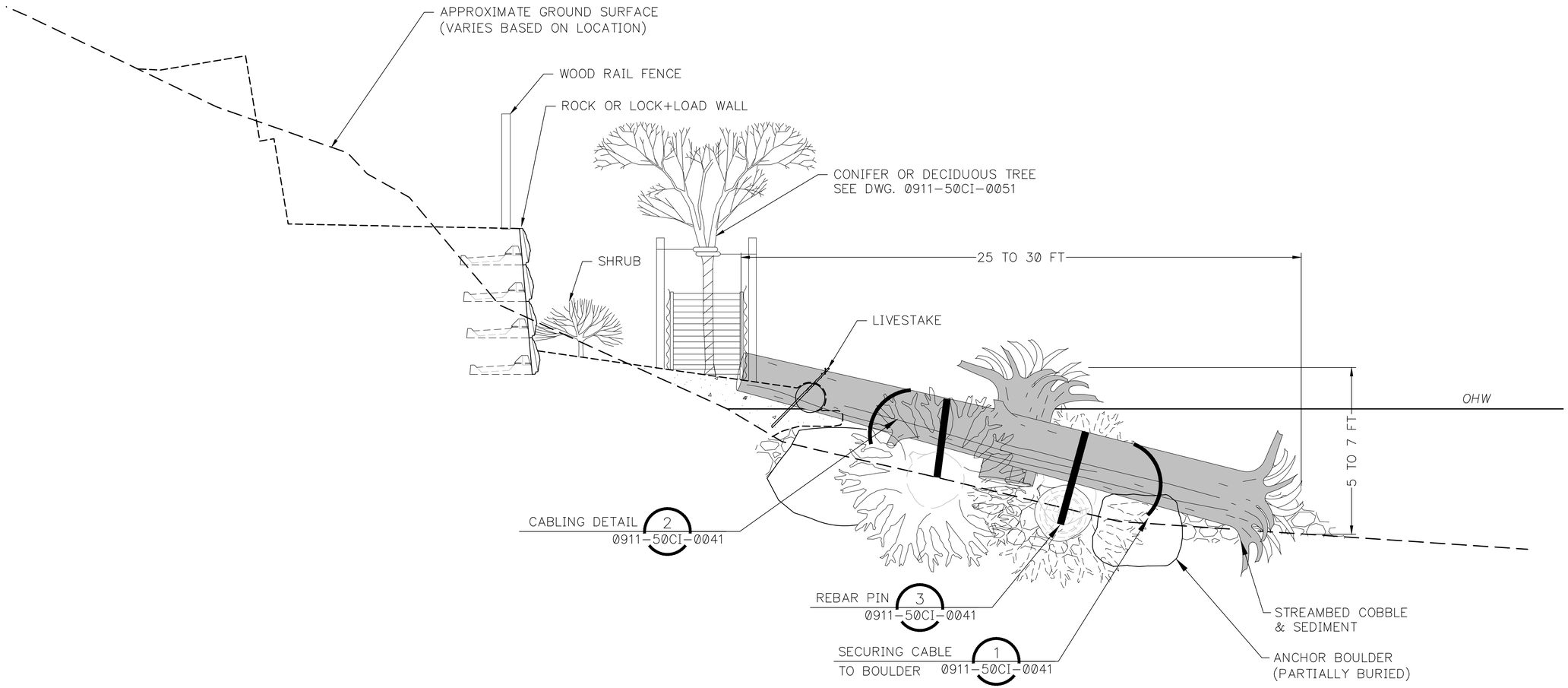
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
WOODY STRUCTURE PLAN

BID 13-01

SHEET 25 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911-50CI-0040

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



TYPICAL COMPLEX WOOD STRUCTURE SECTION

1/2"=1'-0"

1
0911-50CI-0060

COURTNEY R. HILL
STATE OF WASHINGTON
39274
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PRIM. ENG. COURT HILL	SEE DWG					
2ND ENG.	1	4/26/2013			CRH	TPD
PROJ. MGR. CASEY HALL	REV	DATE	REVISION		REQ. BY	DRFT

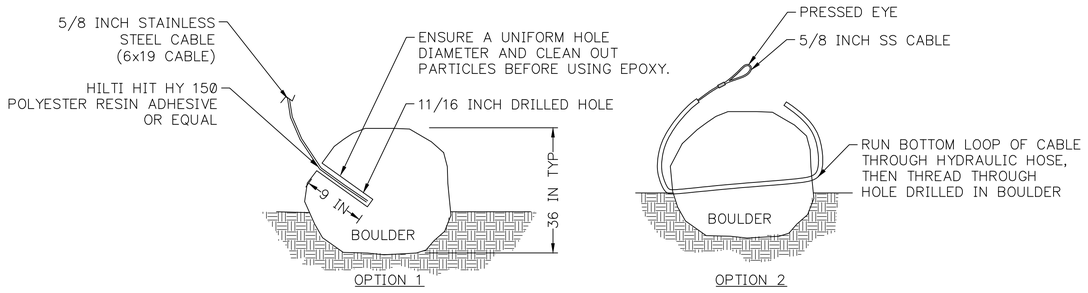
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
LOG STRUCTURE DETAILS

BID 13-01

SHEET	26 OF 38
REVISION	1
DATE	4/26/2013
DWG.	0911-50CI-0060

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –

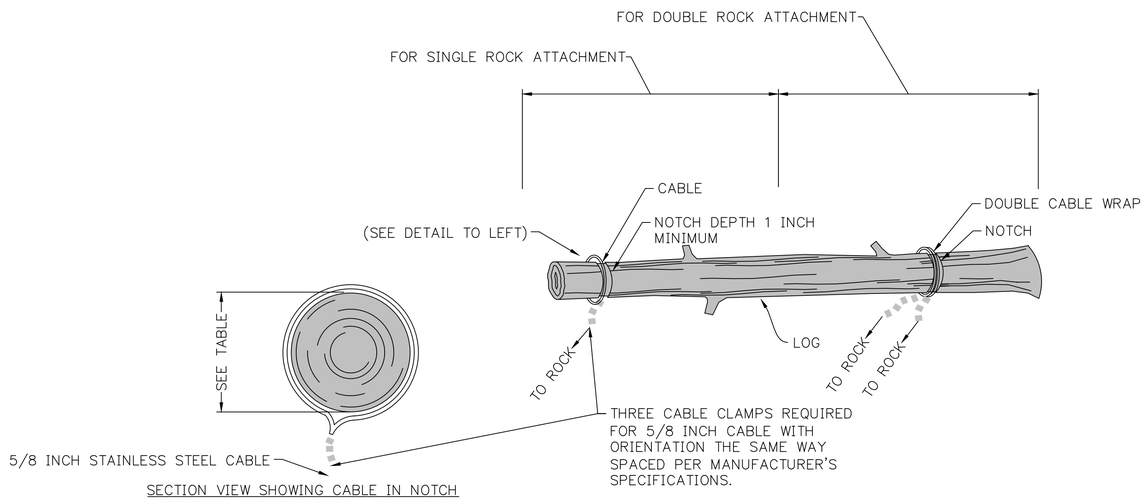


DRILL 11/16–IN HOLE 9–IN DEEP. FILL HOLE WITH HILTI HIT HY150 OR SIMILAR. INSERT CABLE PER MANUFACTURER'S SPECIFICATIONS.

1 SECURING CABLE TO BOULDER

0911–50CI–0040

NOT TO SCALE

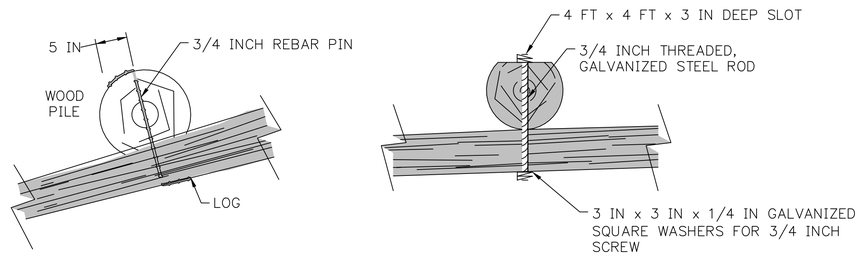


SECTION VIEW SHOWING CABLE IN NOTCH

2 CABLING DETAIL TO SINGLE OR DOUBLE ROCKS

0911–50CI–0040

NOT TO SCALE



DRILL 3/4"–DIAMETER HOLES THROUGH WOOD PILE AND LOG. DRIVE 3/4" REBAR (MINIMUM 2 FEET OR LOG DIAMETER) INTO EACH. BEND REBAR OVER SO NOT EXPOSED.

OPTIONAL BOLTED CONNECTION.
DRILL 3/4 INCH HOLES THROUGH BOTH LOGS. CUT 4 FT x 4 FT X 3 IN DEEP INTO TOP LOG. INSERT 3/4 INCH GALVANIZED THREADED ROD AND ATTACH AT BOTH ENDS WITH WASHERS AND NUTS. MAINTAIN A MINIMUM 15 INCHES FROM END OF WOOD PILE TO PIN LOCATION.

3 REBAR PIN DETAILS

0911–50CI–0040

NOT TO SCALE

COURTNEY R HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

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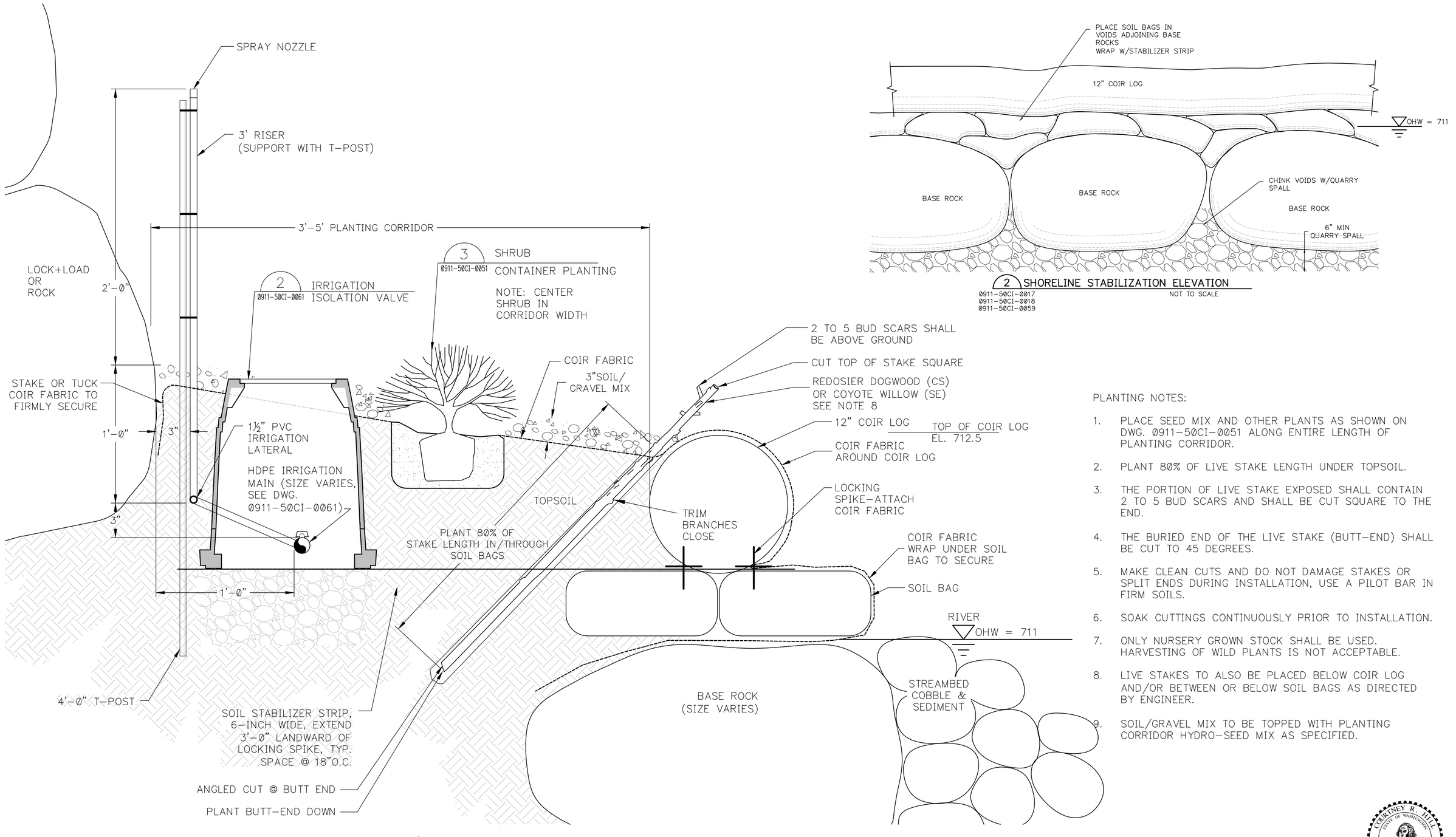
PRIM. ENG. COURT HILL						
2ND ENG.	Ø	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL	REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

Entiat Park
ENTIATQUA TRAIL
ROCK STRUCTURES
SECTIONS AND DETAILS
BID 13–01

SHEET	27 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	0911–50CI–0041

DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



1 TYP. PLANTING & IRRIGATION DETAILS
0911-50CI-0017, 18 — 1"=4"

2 SHORELINE STABILIZATION ELEVATION
0911-50CI-0017
0911-50CI-0018
0911-50CI-0059
NOT TO SCALE

PLANTING NOTES:

1. PLACE SEED MIX AND OTHER PLANTS AS SHOWN ON DWG. 0911-50CI-0051 ALONG ENTIRE LENGTH OF PLANTING CORRIDOR.
2. PLANT 80% OF LIVE STAKE LENGTH UNDER TOPSOIL.
3. THE PORTION OF LIVE STAKE EXPOSED SHALL CONTAIN 2 TO 5 BUD SCARS AND SHALL BE CUT SQUARE TO THE END.
4. THE BURIED END OF THE LIVE STAKE (BUTT-END) SHALL BE CUT TO 45 DEGREES.
5. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION, USE A PILOT BAR IN FIRM SOILS.
6. SOAK CUTTINGS CONTINUOUSLY PRIOR TO INSTALLATION.
7. ONLY NURSERY GROWN STOCK SHALL BE USED. HARVESTING OF WILD PLANTS IS NOT ACCEPTABLE.
8. LIVE STAKES TO ALSO BE PLACED BELOW COIR LOG AND/OR BETWEEN OR BELOW SOIL BAGS AS DIRECTED BY ENGINEER.
9. SOIL/GRAVEL MIX TO BE TOPPED WITH PLANTING CORRIDOR HYDRO-SEED MIX AS SPECIFIED.

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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PRIM. ENG. COURT HILL						
2ND ENG.		0	4/26/2013		CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON
P.U.D. CHELAN COUNTY

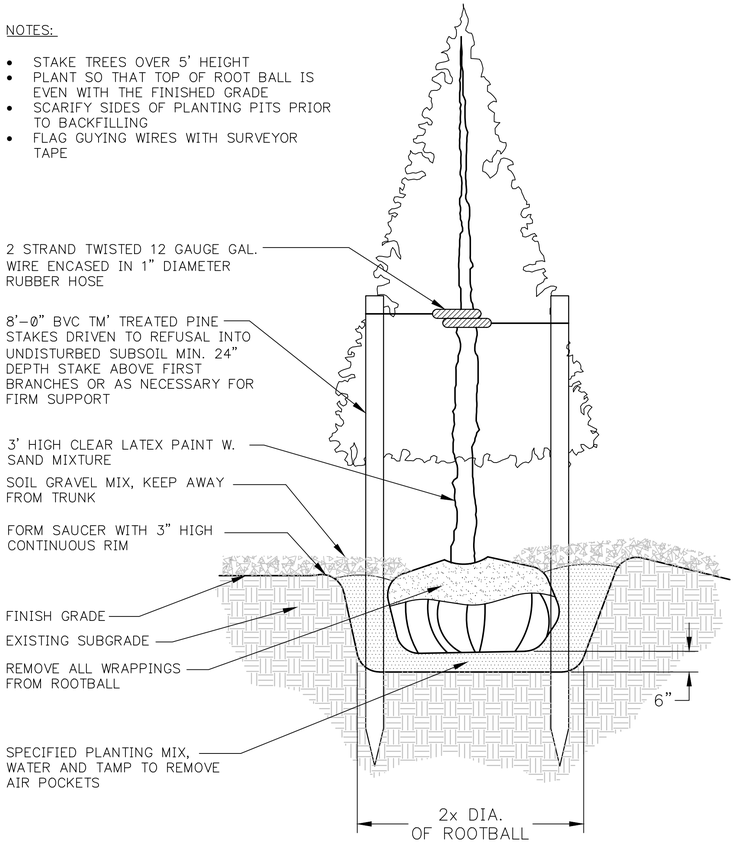
Entiat Park
ENTIATQUA TRAIL
SHORELINE STABILIZATION & PLANTING DETAILS
BID 13-01

SHEET 28 OF 38
REVISION 0
DATE 4/26/2013
DWG. 0911-50CI-0046

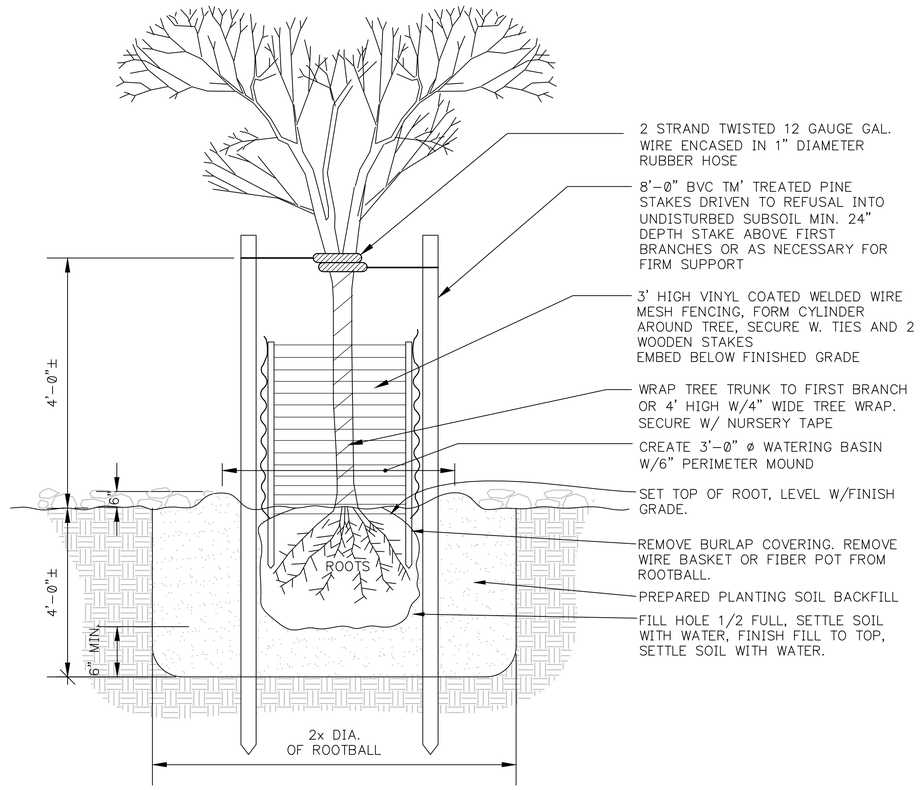
DOCUMENT CLASS: ID: ORIGINAL DWG. #:

NOTES:

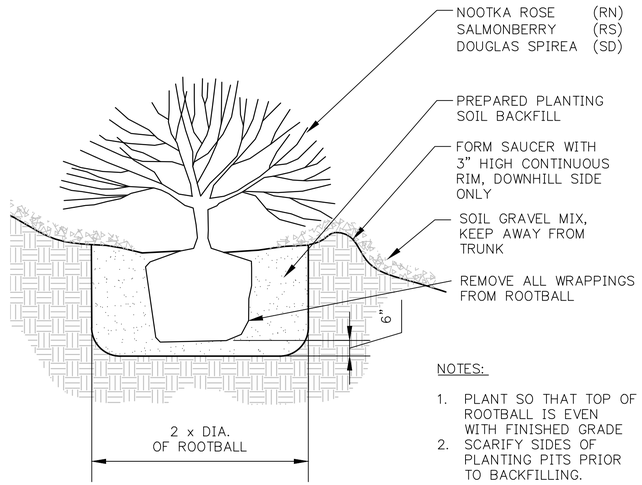
- STAKE TREES OVER 5' HEIGHT
- PLANT SO THAT TOP OF ROOT BALL IS EVEN WITH THE FINISHED GRADE
- SCARIFY SIDES OF PLANTING PITS PRIOR TO BACKFILLING
- FLAG GUYING WIRES WITH SURVEYOR TAPE



1 — CONIFEROUS TREE PLANTING
NOT TO SCALE



2 — DECIDUOUS TREE PLANTING
NOT TO SCALE



NOTES:

1. PLANT SO THAT TOP OF ROOTBALL IS EVEN WITH FINISHED GRADE
2. SCARIFY SIDES OF PLANTING PITS PRIOR TO BACKFILLING.

3 — SHRUB CONTAINER PLANTING
NOT TO SCALE

PLANT SCHEDULE

SYMBOL	PLANT SPECIES (COMMON NAME)	SCIENTIFIC NAME	MATURE HEIGHT	QUANTITY	APPROX. SIZE	CONTAINER TYPE	SPACING
SE	COYOTE WILLOW	SALIX EXIGUA	15 FEET	80	1" DIA. x 3'-0" MIN.	LIVESTAKE	20 PER WOODY COMPLEX STRUCTURE SPACED AS DIRECTED
CS	REDOSIER DOGWOOD	CORNUS SERICEA	8 FEET	200	1" DIA. X 3'-0" MIN.	LIVESTAKE	2'-6" O.C.
RN	NOOTKA ROSE	ROSA NUTKANA	4 FEET	70	1'-0" HEIGHT	2 GALLON	10'-0" O.C.
RS	SALMONBERRY	RUBUS SPECTABILIS	6-8 FEET	70	1'-0" HEIGHT	2 GALLON	10'-0" O.C.
SD	DOUGLAS SPIREA	SPIREA DOUGLASII	3-5 FEET	130	1'-0" HEIGHT	1 GALLON	5'-0" O.C.
PCC	SHORE PINE	PINUS CONTORTA CONTORTA	50 FEET	8	3"-4" CAL. X 5'-6' HEIGHT	5 GALLON	SEE DWG. 0911-50CI-0040
BO	WATER BIRCH	BETULA OCCIDENTALIS	30 FEET	8	1" CAL	5 GALLON	SEE DWG. 0911-50CI-0040

NOTE: SEE DETAIL AREA PLANS FOR LOCATIONS

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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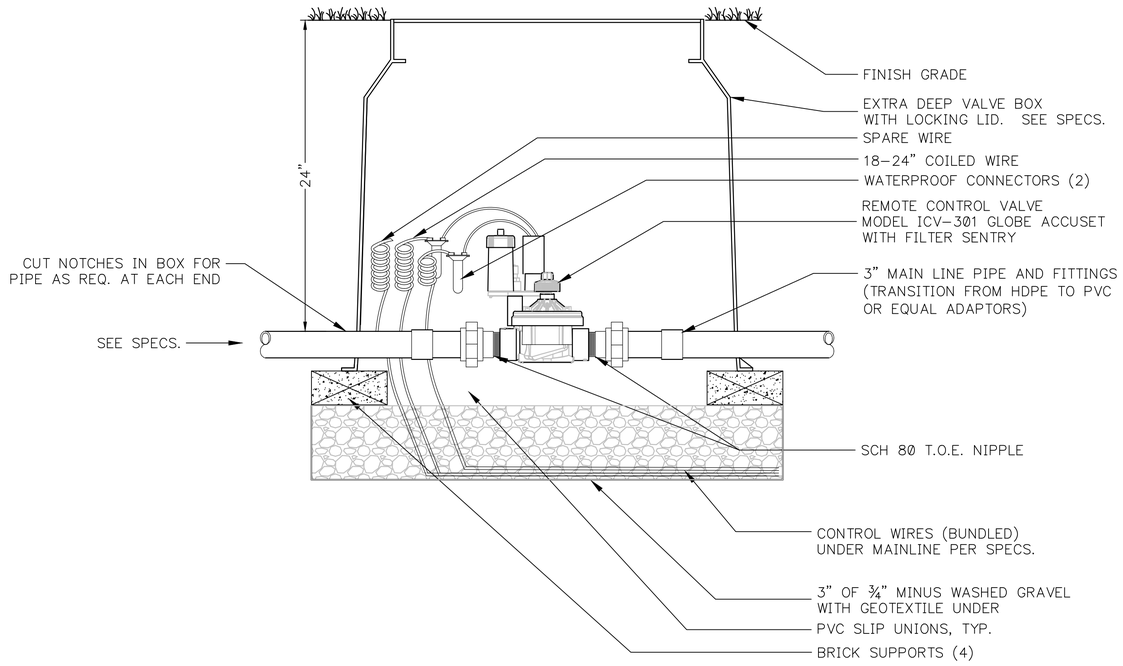
PRIM. ENG. COURT HILL							
2ND ENG.		1	4/26/2013		CRH	TPD	
PROJ. MGR. CASEY HALL		REV	DATE	REVISION	REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

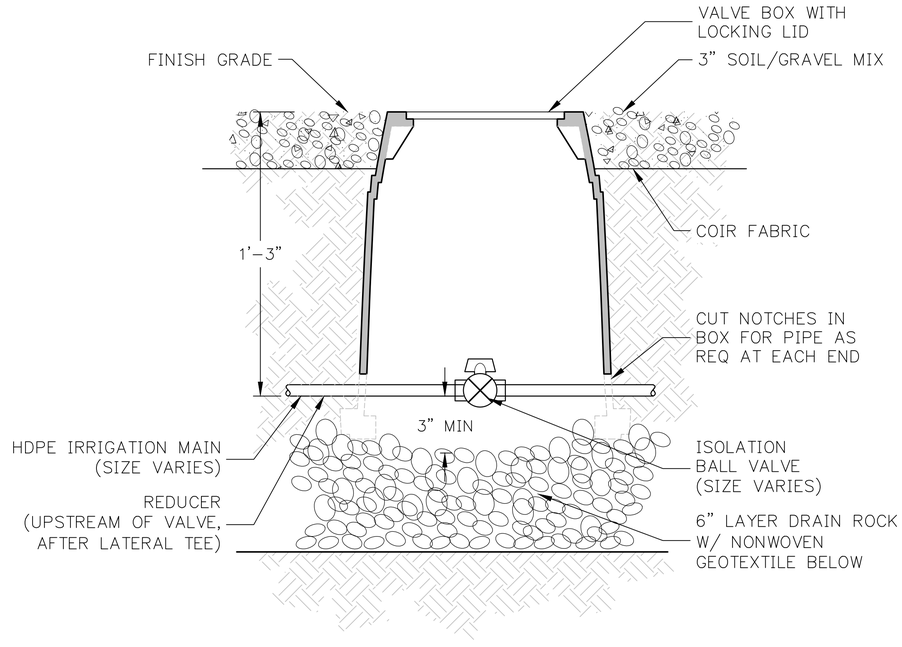
Entiat Park
ENTIATQUA TRAIL
PLANTING DETAILS & SCHEDULE
BID 13-01

SHEET 29 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911-50CI-0051

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



1 AUTOMATIC CONTROL VALVE
0911–50CI–0044 NTS



2 IRRIGATION ISOLATION VALVE DETAIL @ STA 4+00 & 6+00
0911–50CI–0017 1"=4"

IRRIGATION NOTES:

1. IRRIGATION SYSTEM TO EXTEND FULL LENGTH OF PLANTING CORRIDOR (STA. 2+75 TO STA. 9+25). MAIN TO REDUCE FROM 3" HDPE TO 2" HDPE AT STA. 4+00 AND FROM 2" HDPE TO 1.5" PVC AT STA. 6+00. ISOLATION BALL VALVES (2 TOTAL) SHALL BE INSTALLED ON THE MAIN JUST DOWNSTREAM OF REDUCER AT APPROXIMATELY STA. 4+00 AND STA. 6+00. IRRIGATION SYSTEM SHALL CONSIST OF THREE DIFFERENT SEGMENTS: SEGMENT 1 FROM STA. 2+75 TO STA. 5+25, SEGMENT 2 FROM STA. 5+25 TO STA. 7+25 AND SEGMENT 3 FROM STA. 7+25 TO STA. 9+25. SEGMENTS 1 AND 2 SHALL CONNECT TO HDPE MAIN VIA A TEE CONNECTION AT STA. 4+00 AND STA. 6+00. SEGMENTS 1 AND 2 SHALL BE SEPARATE FROM THE MAIN AND SHALL CONSIST OF 1.5" PVC PIPE WITH RISERS/HEADS SPACED AT 15' O.C.. SEGMENT 3 SHALL BE THE SAME AS THE MAIN AND CONSIST OF 1.5" PVC WITH RISERS/HEADS SPACED @ 15' O.C.
2. HDPE IRRIGATION MAIN COVER DEPTH TYP. 24", REDUCE TO 15" THROUGH PLANTING CORRIDOR MINIMUM. SEGMENTS 1 AND 2, PVC LATERALS, COVER DEPTH 12" MINIMUM.
3. SUPPORT RISERS W/4'–0" STEEL T–POST. ATTACHED RISERS TO POSTS 2/ HEAVY DUTY PLASTIC ZIP TIES. RISERS/HEADS TO BE SPACED @ 15' O.C..
4. SEE SPECIFICATIONS FOR FURTHER INFORMATION.

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

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PRIM. ENG. COURT HILL						SHEET 30 OF 38
2ND ENG.	1 4/26/2013		CRH	TPD		REVISION 1
PROJ. MGR. CASEY HALL	REV DATE	REVISION	REQ. BY	DRFT		DATE 4/26/2013
						DWG. 0911–50CI–0061

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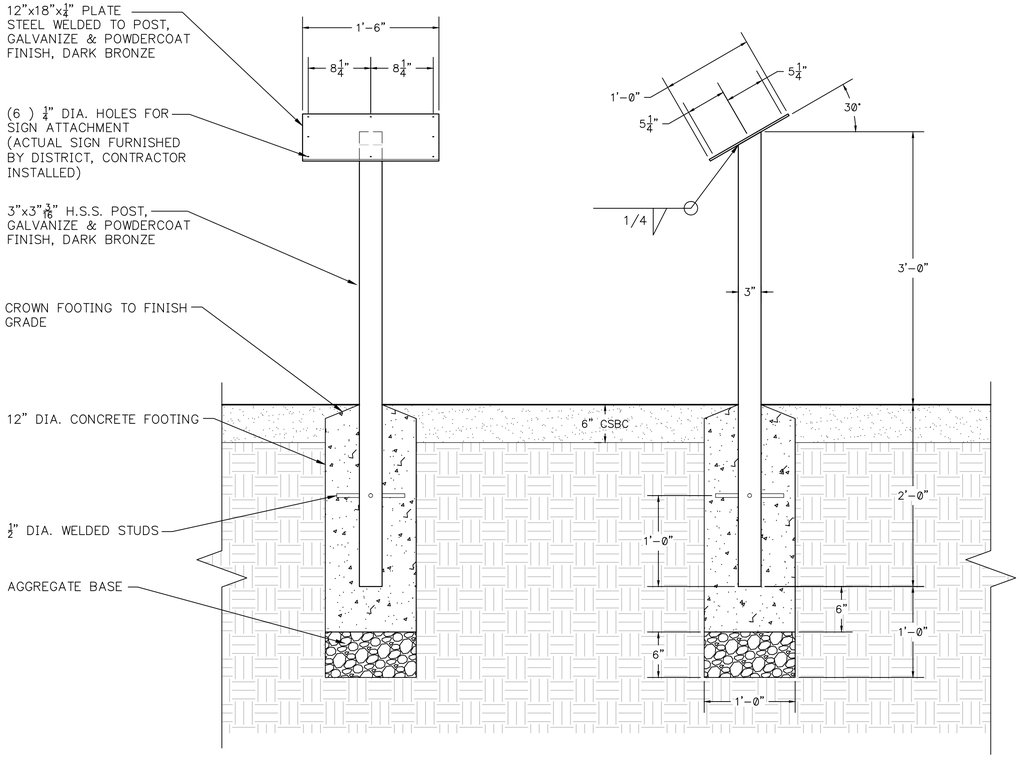
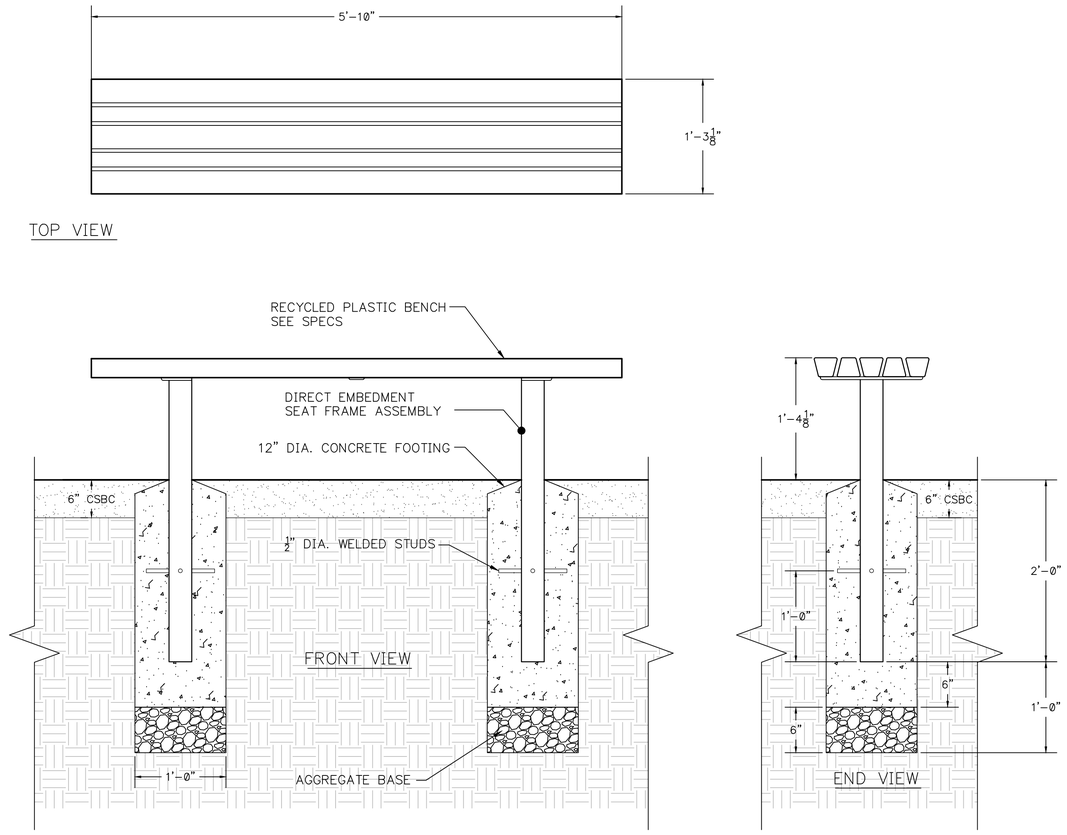


1 SIGN MOUNT
0911-50CI-0020, 25, 26, 59 NOT TO SCALE



2 BENCH
0911-50CI-0026 NOT TO SCALE

COURTNEY R. HILL STATE OF WASHINGTON 39274 REGISTERED PROFESSIONAL ENGINEER

ORIG. DRAWN TPD
ORIG. DATE 9/27/2011

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PRIM. ENG. COURT HILL							
2ND ENG.		1	4/26/2013			CRH	TPD
PROJ. MGR. CASEY HALL		REV	DATE	REVISION		REQ. BY	DRFT

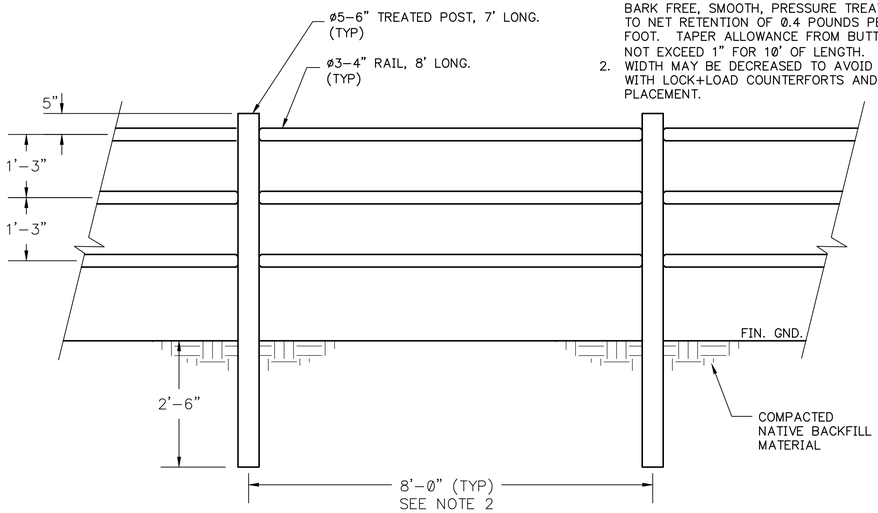
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
SITE FURNITURE

BID 13-01

SHEET 31 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911-50CI-0047

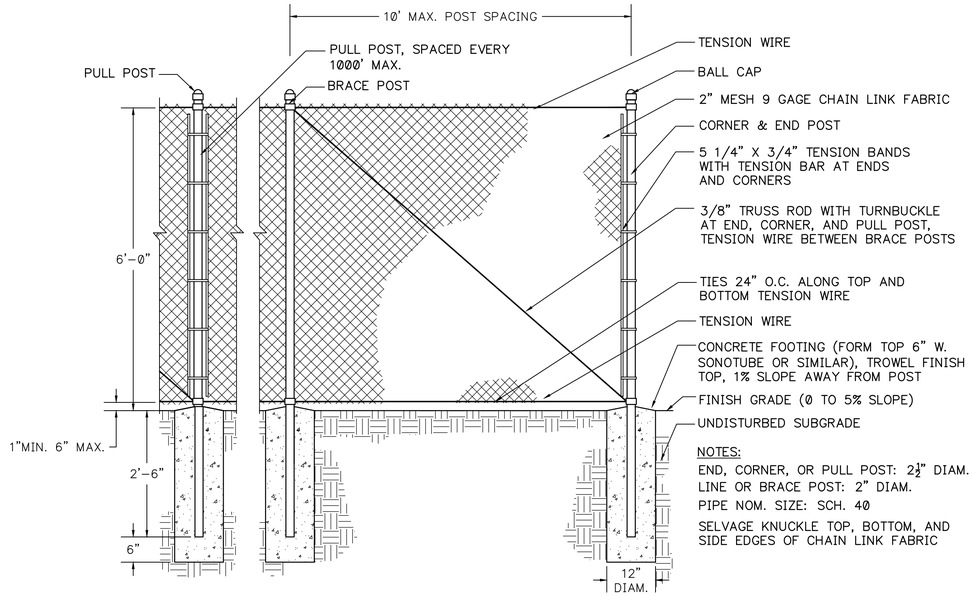
DOCUMENT CLASS: ID: ORIGINAL DWG. #: –



NOTES:

1. POLES FOR RAIL FENCE SHALL BE LODGE POLE PINE, BARK FREE, SMOOTH, PRESSURE TREATED WITH CCA TO NET RETENTION OF 0.4 POUNDS PER CUBIC FOOT. TAPER ALLOWANCE FROM BUTT TO TIP SHALL NOT EXCEED 1" FOR 10' OF LENGTH.
2. WIDTH MAY BE DECREASED TO AVOID CONFLICTS WITH LOCK+LOAD COUNTERFORTS AND POST PLACEMENT.

1 RAIL FENCE
NOT TO SCALE

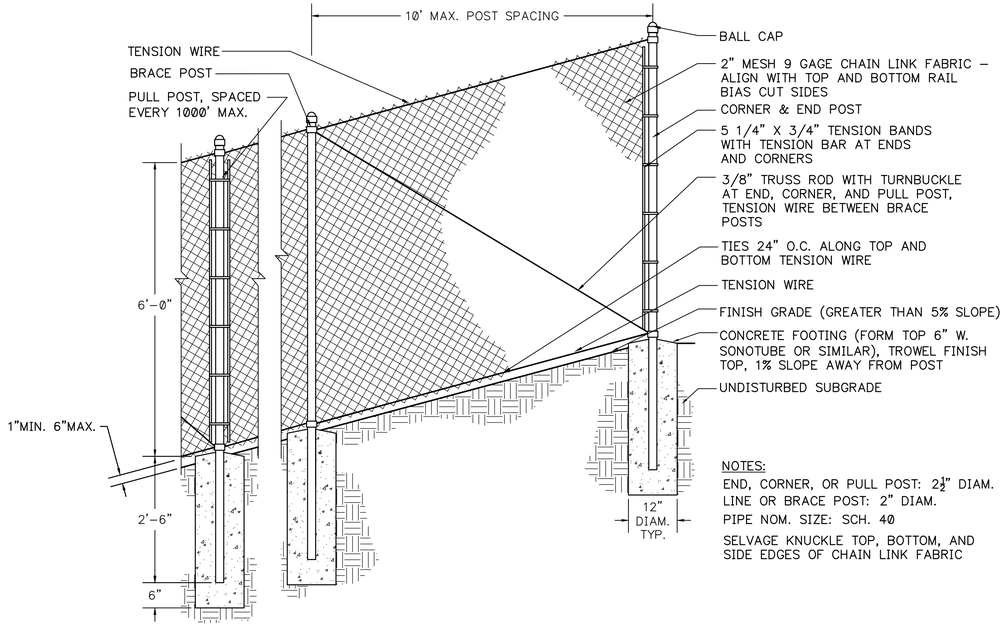


NOTES:

END, CORNER, OR PULL POST: 2½" DIAM.
LINE OR BRACE POST: 2" DIAM.
PIPE NOM. SIZE: SCH. 40
SELVAGE KNUCKLE TOP, BOTTOM, AND SIDE EDGES OF CHAIN LINK FABRIC

2 CHAINLINK FENCE
NOT TO SCALE

GENERAL NOTE: FENCE ALIGNMENT CROSSES THROUGH ROUGH TERRAIN COMPRISED OF ROCK. CONTRACTOR SHALL EXCAVATE AND GRADE FENCE LINE AS REQUIRED FOR A COMPLETE INSTALLATION. CONTRACTOR SHALL ANTICIPATE ENCOUNTERING ROCK DURING GRADING OF THE ALIGNMENT AND DURING POSTHOLE DIGGING.



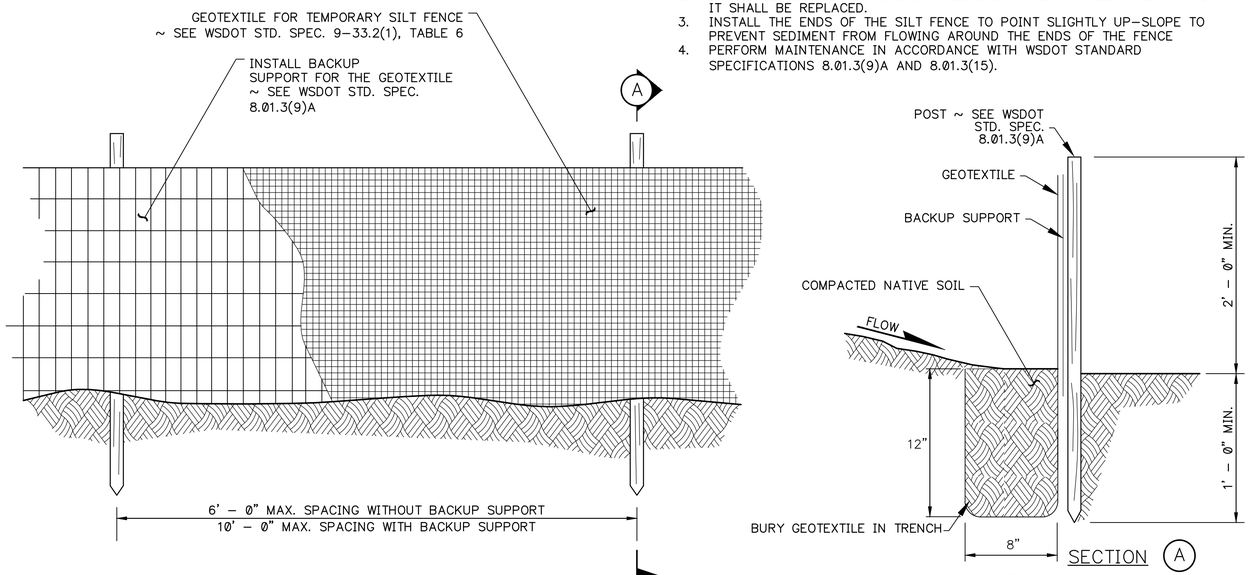
NOTES:

END, CORNER, OR PULL POST: 2½" DIAM.
LINE OR BRACE POST: 2" DIAM.
PIPE NOM. SIZE: SCH. 40
SELVAGE KNUCKLE TOP, BOTTOM, AND SIDE EDGES OF CHAIN LINK FABRIC

3 CHAINLINK FENCE – SLOPED
NOT TO SCALE

NOTES:

1. ANY DAMAGE WILL BE REPAIRED IMMEDIATELY.
2. IF THE GEOTEXTILE HAS DETERIORATED DUE TO ULTRAVIOLET BREAKDOWN, IT SHALL BE REPLACED.
3. INSTALL THE ENDS OF THE SILT FENCE TO POINT SLIGHTLY UP–SLOPE TO PREVENT SEDIMENT FROM FLOWING AROUND THE ENDS OF THE FENCE
4. PERFORM MAINTENANCE IN ACCORDANCE WITH WSDOT STANDARD SPECIFICATIONS 8.01.3(9)A AND 8.01.3(15).



4 TEMPORARY SILT FENCE DETAIL
NOT TO SCALE

COURTNEY R. HALL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. COURT HILL							
2ND ENG.	1	4/26/2013				CRH	TPD
PROJ. MGR. CASEY HALL	REV	DATE	REVISION			REQ. BY	DRFT

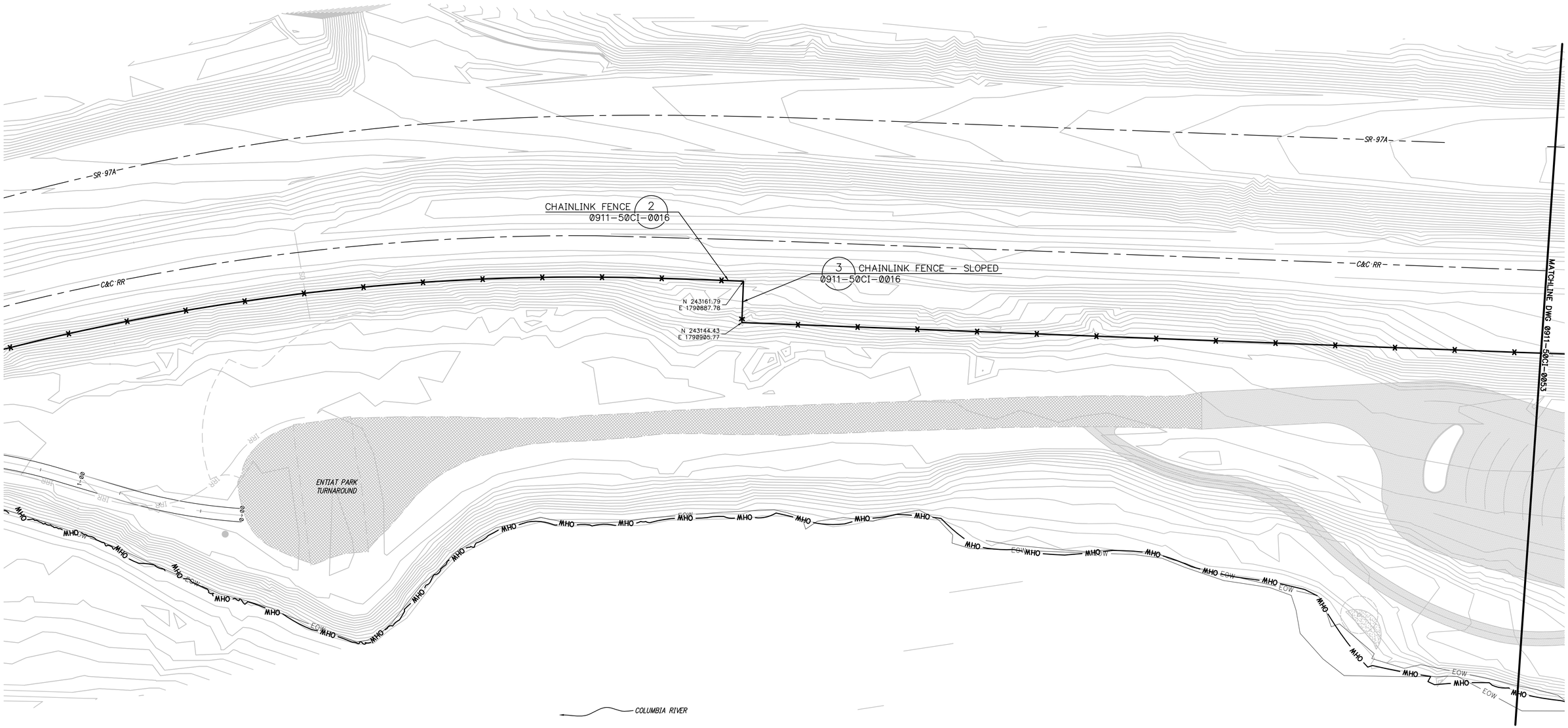
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
FENCE DETAILS

BID 13–01

SHEET 32 OF 38
REVISION 1
DATE 4/26/2013
DWG. 0911–50CI–0016

DOCUMENT CLASS: ID: ORIGINAL DWG #: –



FENCE PLAN 1

1" = 30'

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

CHELAN PUD NO.1	SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 — 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY WENATCHEE, WASHINGTON	ENTIAT PARK ENTIATQUA TRAIL FENCE PLAN - SHEET 1 BID 13-01	SHEET 33 OF 38
PRIM. ENG.								REVISION Ø
2ND ENG.	Ø	4/26/2013		CRH	TPD			DATE 4/26/2013
PROJ. MGR.	REV	DATE	REVISION	REQ. BY	DRFT			DWG. 0911-50CI-0052

DOCUMENT CLASS: ID: ORIGINAL DWG #:

SR-97A

SR-97A

C&C RR

C&C RR

CHAINLINK FENCE 2
0911-50CI-0016

MATCHLINE DWG 0911-50CI-0052

MATCHLINE DWG 0911-50CI-0054

COLUMBIA RIVER

FENCE PLAN 2

1" = 30'

CHELAN PUD NO.1		SCALE SEE SHEET	BAR IS ONE INCH ON ORIGINAL DRAWING.	VERIFY SCALE Ø 1"	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG.							
2ND ENG.	Ø	4/26/2013			CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

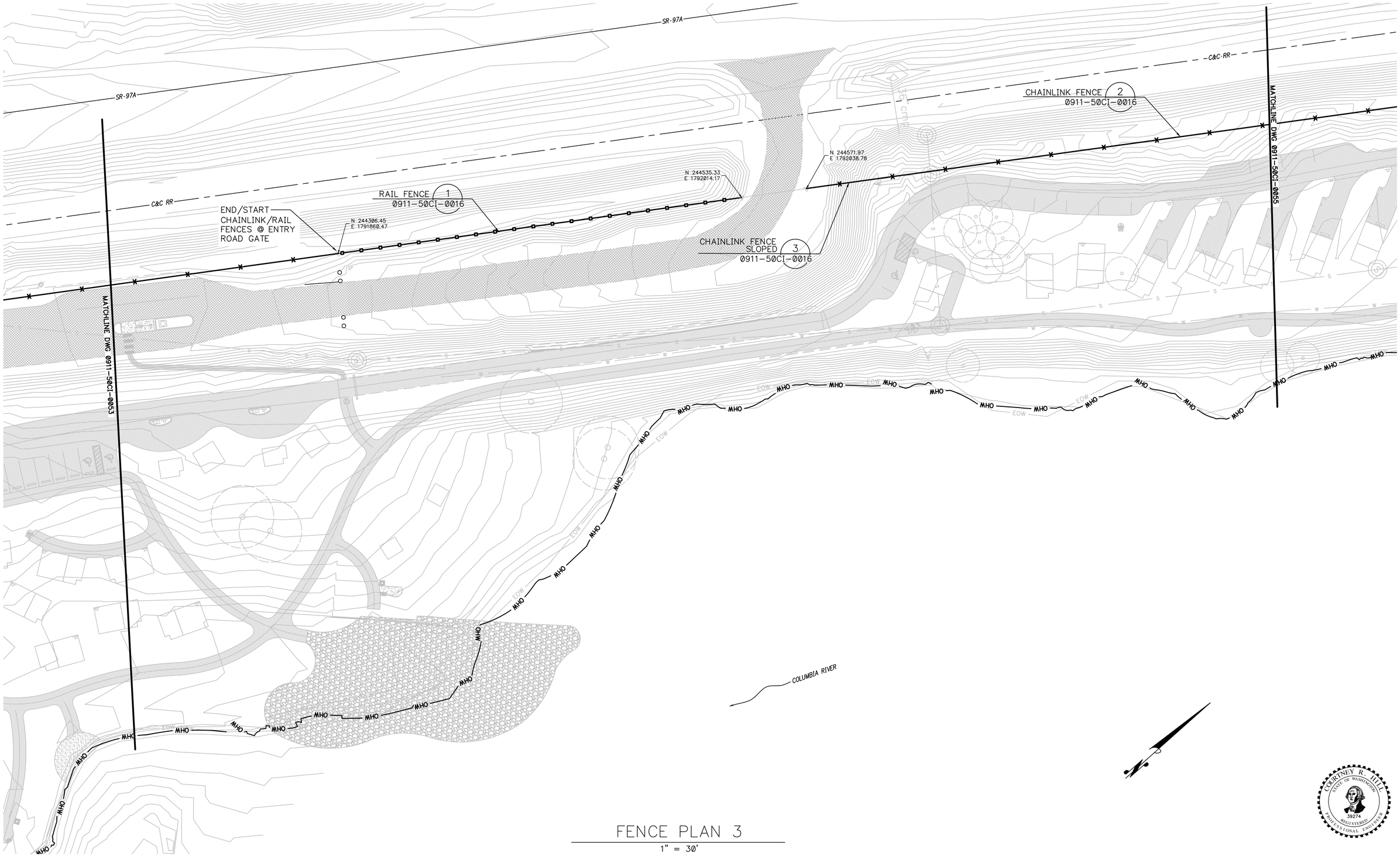
P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
FENCE PLAN – SHEET 2

BID 13-01

SHEET 34 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0053

DOCUMENT CLASS: ID: ORIGINAL DWG. #:



FENCE PLAN 3

1" = 30'

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PRIM. ENG.								REVISION Ø
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CHAINLINK FENCE 2
0911-50CI-0016

MATCHLINE DWG 0911-50CI-0054

MATCHLINE DWG 0911-50CI-0056

MHO

UGP

COLUMBIA RIVER

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

FENCE PLAN 4

1" = 30'

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PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
FENCE PLAN – SHEET 4

BID 13-01

SHEET 36 OF 38
REVISION Ø
DATE 4/26/2013
DWG. 0911-50CI-0055

DOCUMENT CLASS: ID: ORIGINAL DWG. #

SR 97A

C&C RR

CHAINLINK FENCE 2
0911-50CI-0016

MATCHLINE DWG 0911-50CI-0055

MATCHLINE DWG 0911-50CI-0057

MHO

COLUMBIA RIVER

MATCHLINE DWG 0911-50CI-0058

FENCE PLAN 5

1" = 30'

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PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
FENCE PLAN – SHEET 5

BID 13-01

SHEET	37 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	0911-50CI-0056

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

C&C RR

C&C RR

2 CHAINLINK FENCE
0911-50CI-0016

N 246323.70
E 1793835.21

N 246259.54
E 1793835.26

MATCHLINE DWG 0911-50CI-0056

N 246006.18
E 1793835.45

CHAINLINK FENCE 2
0911-50CI-0016

N 246005.86
E 1793925.28

COLUMBIA RIVER

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

FENCE PLAN 6

1" = 30'

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PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

P.U.D. CHELAN COUNTY

ENTIAT PARK
ENTIATQUA TRAIL
FENCE PLAN – SHEET 6

BID 13-01

SHEET	38 OF 38
REVISION	Ø
DATE	4/26/2013
DWG.	Ø911-50CI-0057

DOCUMENT CLASS: ID: ORIGINAL DWG. #:

EXHIBIT U
ADDITIONAL INFORMATION

TABLE OF CONTENTS

ITEM 1 – GEOTECH REPORTS

- Shannon & Wilson, Inc. Geotechnical Report dates June 13, 2011
- Shannon & Wilson, Inc. Geotechnical Report dates December 6, 2011

ITEM 2 – SHORELINE MANAGEMENT PERMIT ACTION SHEET

- Shoreline Substantial Development Permit – Application #: SSD-13-01

ITEM 3 – ENTIATQUA TRAIL HPA PERMIT

- WDFW Hydraulic Project Approval / Entiat Boat Launch Restoration, Control #: 129213-1

ITEM 4 – UNITED STATES ARMY CORPS OF ENGINEERS PERMIT

- Pending, to be issued prior to Notice to Proceed

ITEM 5 – WASHINGTON STATE DEPARTMENT OF TRANSPORTATION GENERAL PERMIT

- Permit No 49413

Geotechnical Report
Entiatqua Trail
Entiat, Washington

June 13, 2011

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value.

Since 1954.

Submitted To:
Mr. Courtney Hill, P.E.
Public Utility District No. 1 of Chelan County
327 N. Wenatchee Avenue
Wenatchee, Washington 98801

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-21501-002

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 SITE AND PROJECT DESCRIPTION 1

3.0 SUBSURFACE EXPLORATIONS 2

4.0 GEOTECHNICAL LABORATORY TESTING 2

5.0 SUBSURFACE CONDITIONS 3

6.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS 3
- 6.1 Trail Construction Options 4
  - 6.1.1 Permanent Cut Slopes 4
  - 6.1.2 Unreinforced Fill Slopes 4
  - 6.1.3 Reinforced Soil Slopes and Mechanically Stabilized Earth Walls (MSEW) 5
- 6.2 Planning Level Opinion of Probable Construction Cost 5
  - 6.2.1 Permanent Cut Slopes 6
  - 6.2.2 Unreinforced Fill Slopes 6
  - 6.2.3 Reinforced Soil Slopes 7
  - 6.2.4 Mechanically Stabilized Earth Walls (MSEW) 7
- 6.3 Viewpoint Foundations 8
- 6.4 Seismic Design Considerations 8
- 6.5 Mechanically Stabilized Earth Walls (MSEW) Design Recommendations 9
  - 6.5.1 Lateral Earth Pressures 9
  - 6.5.2 Lateral Resistance 10
- 6.6 Settlement 10
- 6.7 Global Stability 10

7.0 CONSTRUCTION CONSIDERATIONS 11
- 7.1 Site Preparation and Grading 11
- 7.2 Fill Placement and Compaction 12
- 7.3 Use of On-Site Soil 12
- 7.4 Excavations 13
- 7.5 Wet Weather Earthwork 13

8.0 ADDITIONAL SERVICES 14

9.0 LIMITATIONS 14

10.0 REFERENCES 17

TABLE OF CONTENTS (cont.)

FIGURES

1 Vicinity Map
2 Site and Exploration Plan
3 Recommended Surcharge Loading for Temporary and Permanent Walls

APPENDICES

A Subsurface Explorations
B Geotechnical Laboratory Testing Procedures and Results
C Important Information About Your Geotechnical/Environmental Report

GEOTECHNICAL REPORT
ENTIATQUA TRAIL
ENTIAT, WASHINGTON

1.0 INTRODUCTION

This report presents the results of subsurface explorations, laboratory tests, and geotechnical engineering studies performed for the proposed Entiatqua Trail in Entiat, Washington. Our geotechnical studies include evaluating the subsurface conditions and formulating geotechnical engineering recommendations for use in the design and construction of the proposed project.

Our scope of geotechnical services included the following:

- Excavating two test pits along the proposed trail alignment;
- Performing two penetration tests at the toe of the existing highway embankment;
- Performing geotechnical laboratory testing on selected soil samples;
- Conducting engineering analyses; and
- Preparing this report.

We provided our services in general accordance with our proposal dated May 2, 2011.

We previously prepared a letter, dated May 6, 2011, which presented conceptual geotechnical engineering recommendations for the proposed trail. As part of our scope of services for that letter, we performed a field reconnaissance of the proposed trail site and reviewed information about the construction of the existing embankment.

2.0 SITE AND PROJECT DESCRIPTION

The proposed trail will connect Entiat Park with the proposed Entiatqua Outdoor Learning Center (Figure 1). Entiat Park is between U.S. Highway 97 and the C&C Railroad, and the west shore of the Columbia River. The proposed Entiatqua Outdoor Learning Center will be on the shores of the Entiat River, south of Entiat River Road and west of U.S. Highway 97.

Most of the proposed trail will be along the U.S. Highway 97 and C&C Railroad embankment. As described in our May 6, 2011, letter, we understand that the embankment was built from rock quarried from the cliffs on the south side of the Entiat River. The construction of the embankment and associated bridges was completed before Rocky Reach Dam began operation and raised the level of the Columbia River to its current elevation.

The ordinary high water mark (OHWM) for the Columbia River near the project site is elevation 711 feet (North American Vertical Datum of 1988 [NAVD88]). Public Utility District (PUD) No. 1 of Chelan County is studying the feasibility of raising the OHWM to 714 feet (NAVD88).

The embankment is sparsely vegetated with grass, brush, and small trees. The embankment side slopes are generally between 30 and 40 degrees, with locally steeper areas, particularly on the east side and northwest corner of the embankment.

The proposed trail will be 6 feet wide and will be surfaced with compacted aggregate. Where practical, the trail will be 8 feet wide to include two 1-foot-wide shoulders. Other project elements could include viewpoints, a pedestrian barrier to separate the trail from U.S. Highway 97 and the C&C railroad, benches and signs, and restorative planting.

3.0 SUBSURFACE EXPLORATIONS

To evaluate the subsurface conditions at the project site, we excavated and sampled two test pits and performed two penetration tests. We also performed a site reconnaissance, as described in our May 6, 2011, letter.

Because of difficult access to the embankment side slopes, our test pits were excavated at the edges of the embankment. Test pits TP-1 and TP-2 were each excavated to a depth of about 10 feet.

Penetration tests P-1 and P-2 were advanced to depths of 11 and 10 feet, respectively. The tests were performed in the Columbia and Entiat Rivers, about 3 to 5 feet from shore.

Appendix A, Subsurface Explorations, describes the methodology and procedures used for performing and sampling the explorations. Figures A-2 through A-4 in Appendix A show the test pit and penetration test logs.

Figure 2 shows the approximate exploration locations. We estimated the exploration locations by measuring from existing site features. The exploration locations should be considered approximate.

4.0 GEOTECHNICAL LABORATORY TESTING

We performed geotechnical laboratory tests on selected samples retrieved from the explorations and used the test results to characterize soil index properties. We used the index properties to

estimate the soil engineering properties. The soil tests included visual classification, natural water content, and mechanical sieve analyses.

The Shannon & Wilson soil laboratory performed the tests. Appendix B, Geotechnical Laboratory Testing Procedures and Results, describes the test methods and summarizes the test results. The test pit logs in Appendix A show the natural water content.

5.0 SUBSURFACE CONDITIONS

We based our subsurface interpretation on

- The subsurface conditions exposed in the test pits,
- The results of the hand penetration tests,
- Our literature review, and
- Our site reconnaissance.

The test pits encountered about 10 feet of gravelly sand. The test pits did not encounter groundwater.

Based on our site reconnaissance and literature review (described in our May 6, 2011, letter), we believe the embankment generally comprises 1- to 3-foot-diameter angular boulders (tonalite of the Chelan Complex) with a sandy, gravelly matrix. A 1-foot-thick layer of rounded, 3- to 12-inch rounded cobbles covers portions of the embankment, particularly on the east side of the embankment.

The Columbia/Entiat River sediments at the toe of the embankment were likely deposited since the Rocky Reach Dam raised the rivers to their current levels. Based on the results of the penetration tests, the sediments likely comprise very loose to loose, silty sand and sandy silt. The sediments likely extend to and over portions of the embankment fill material.

6.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

The following sections present the results of our engineering analysis, including trail construction options, viewpoint foundations, seismic design considerations, settlement analyses, global stability analyses. We also present opinions of probable construction cost for each trail construction option.

6.1 Trail Construction Options

After reviewing the results of the subsurface explorations and our previous site reconnaissance, we recommend considering three options for constructing the trail:

- Permanent cut slopes;
- Unreinforced fill slopes; and
- Reinforced soil slopes/walls.

Based on the existing site topography, we recommend using the following construction methods along the trail alignment:

- Reinforced soil slopes/walls from about Station 2+00 to 9+00;
- Combination of permanent cut slopes and unreinforced fill slopes from about Station 9+00 to 10+50;
- Unreinforced fill slopes from about Station 10+50 to 12+50; and
- Reinforced soil slopes/walls from about Station 12+50 to 15+50.

The following sections describe the three alternatives for constructing the proposed trail.

6.1.1 Permanent Cut Slopes

Permanent cut slopes could be used to bench the proposed trail into the existing slope in areas where the cuts would not impact adjacent structures or rights-of-way. Based on the subsurface conditions encountered in the test pits and our site reconnaissance observations, permanent cut slopes should not exceed 1.5 horizontal to 1 vertical (1.5H:1V).

Permanent cut slopes could include a 4-foot-high near-vertical cut at the base of the slope. The near-vertical cut should be supported with stacked ecology blocks (or similar), and be inclined at an angle of at least 1H:8V.

6.1.2 Unreinforced Fill Slopes

Unreinforced fill slopes could be used to support the proposed trail in areas where the fill would not impact the adjacent river, or where the fill impact is properly mitigated. Unreinforced fill slopes should be constructed from structural fill, placed, and compacted in accordance with our recommendations in Section 7.2. The fill slopes should not be steeper than 1.5H:1V.

Section 7.1 presents recommendations for placing fill in the rivers if unreinforced fill slopes extend into the rivers. Fill slopes near the water line should be armored to prevent erosion from wave action.

6.1.3 Reinforced Soil Slopes and Mechanically Stabilized Earth Walls (MSEW)

Reinforced soil slopes (RSS) or MSEW could support the proposed trail in areas to avoid or reduce impacts to the shoreline that would occur with unreinforced slope fills. RSS and MSEW incorporate reinforcing elements (such as geosynthetics or steel strips) to reinforce soil and increase slope stability. RSS typically have face slope angles less than 70 degrees. Depending on the reinforcing material and fascia, the MSEW/RSS face could be vegetated.

Some MSEW and RSS systems are proprietary; individual manufacturers design and provide the RSS/MSEW system. Some common types of proprietary RSS/MSEW are provided by:

- Hilfiker Retaining Walls (e.g., Eureka Reinforced Soil and Steepen Slope Wall systems);
- VSL Corporation (e.g., VSoL);
- Reinforced Earth Company (e.g., Reinforced Earth and Retained Earth systems); and
- Tensar (e.g., Mesa, ARES, and Sierra systems).

We recommend contacting individual manufacturers for additional information about their products.

To construct an RSS or MSEW on the existing slope, a bench would be excavated at the base of the slope/wall. The bench would be about 50 to 70 percent of the height of the slope/wall, and a temporary cut slope would be located behind the bench.

Section 6.5 presents design recommendations for MSEW. RSS systems should be designed based on global stability analyses that incorporate the proposed reinforcement length, reinforcement strength, and slope geometry. If the PUD selects an RSS system, Shannon & Wilson could provide the design services.

6.2 Planning Level Opinion of Probable Construction Cost

The following sections present our planning-level opinions of probable construction cost (OPCCs) for each of the three trail construction options described above. The purpose of the

OPCCs is that the PUD use them in selecting trail construction alternatives and for planning purposes. We used the following information to develop our OPCCs:

- Discussions with local contractors;
- Construction cost data (RSMeans, 2011); and
- Our experience with similar projects.

For comparison purposes, we present each OPCC as a cost per foot of trail. The OPCCs assume that each trail construction option is independent; e.g., a permanent cut slope and unreinforced fill slope would not be used at the same trail cross section.

Our OPCCs do not account for:

- Delays due to weather or soil conditions;
- Costs for installing temporary erosion and sedimentation control;
- Trail surfacing; or
- Mitigation required for encroaching on the adjacent rivers.

The OPCCs are preliminary and are based on the project as we understand it.

6.2.1 Permanent Cut Slopes

In our opinion, permanent cut slopes could be constructed for about $25 to $75 per foot of trail. We assumed the following for our OPCC:

- One excavator, excavator operator, and laborer;
- One cubic yard (cy) of excavated soil per foot of trail;
- Excavated soil would be re-used on site;
- The cut slope would be vegetated over an area of 20 square feet per foot (sf/ft) of trail; and
- A wall of two stacked ecology blocks (or similar) would be placed at the toe of the cut slope, adjacent to the trail.

6.2.2 Unreinforced Fill Slopes

In our opinion, unreinforced fill slopes could be constructed for about $75 to $125 per foot of trail. We assumed the following for our OPCC:

- One excavator, excavator operator, and laborer for excavating benches in the slope and placing fill;

- One vibrating roller compactor and operator for compacting fill;
- Excavated soil would be processed and re-used on site;
- Imported fill soil would be required;
- Four cy of fill would be placed per foot of trail;
- Erosion protection would be used to protect fill near river level; and
- The fill slope would be vegetated over an area of 20 sf/ft of trail.

6.2.3 Reinforced Soil Slopes

In our opinion, RSS could be constructed for about $200 to $300 per foot of trail. We assumed the following for our OPCC:

- The slope would be 10 feet high at 0.5H to 1V;
- One excavator, excavator operator, and laborer for excavating and placing fill;
- One vibrating roller compactor and operator for compacting fill away from the RSS face;
- One walk-behind plate compactor and operator for compacting fill near the RSS face;
- Excavated soil would be re-used on site;
- Imported fill soil would be required;
- Three cy of fill would be placed per foot of trail; and
- The RSS would be vegetated over an area of 20 sf/ft of trail.

6.2.4 Mechanically Stabilized Earth Walls (MSEW)

In our opinion, MSEW could be constructed for about $300 to $500 per foot of trail. We assumed the following for our OPCC:

- The wall would be 10 feet high;
- One excavator, excavator operator, and laborer for excavating and placing fill;
- One vibrating roller compactor and operator for compacting fill away from the MSEW face;
- One walk-behind plate compactor and operator for compacting fill near the MSEW face;
- Excavated soil would be re-used on site;
- Imported fill soil would be required;

- Three cy of fill would be placed per foot of trail; and
- The MSEW face would be vegetated.

6.3 Viewpoint Foundations

We understand that several viewpoints may be constructed adjacent to the trail. The viewpoints could extend into the Columbia/Entiat Rivers, and could be supported on MSEW/RSS systems, or on deep foundations. Deep foundations could be used to reduce the impact of viewpoints extending into or over the adjacent rivers.

If deep foundations are selected to support the viewpoints, we recommend using pin piles. Pin piles are small-diameter (typically 6 inches or less) driven pipe piles that are typically installed using a pneumatic jackhammer or other impact hammer. The impact hammer can be mounted on a small excavator (e.g., Bobcat). Pipe sections can be added until the desired pile depth and capacity are achieved.

We recommend an allowable vertical capacity of 20 kips for 4-inch-diameter pin piles and 30 kips for 6-inch-diameter pin piles driven to refusal.

6.4 Seismic Design Considerations

The project is located in a moderately active seismic region. We evaluated the seismic hazard at the project site in general accordance with the American Association of State Highway and Transportation Officials (AASHTO) Load and Resistance Factor Design (LRFD) Bridge Design Specifications (AASHTO, 2010). For design, AASHTO (2010) considers an earthquake with a 7 percent probability of exceedance in 75 years, or about a 1,000-year return period (with a deterministic maximum cap in some regions).

For our analyses, we considered the peak ground acceleration (PGA) of the design earthquake. The U.S. Geological Survey and Frankel and others (2002) have conducted regional probabilistic ground motion studies and estimate that the bedrock PGA in the project area is 0.14 gravity (g).

AASHTO (2010) also considers the effect of local soil conditions on the design PGA value. To account for site amplification/damping effects, we scale the bedrock PGA value by site soil response factors. The site classification determines the site soil response factors. Based on the subsurface conditions encountered in our explorations, we recommend using a Site Class D to characterize the site subsurface conditions. Based on a Site Class D and the bedrock PGA, the design soil PGA for this project is 0.22g.

6.5 Mechanically Stabilized Earth Walls (MSEW) Design Recommendations

6.5.1 Lateral Earth Pressures

The lateral pressures acting on MSEW depend on many factors, including:

- Method of backfill placement;
- Degree of compaction;
- Backfill slope;
- Surcharge loads;
- Type of backfill soil and/or adjacent native soil;
- Drainage; and
- Whether the wall can yield laterally during or after backfill placement.

MSEW are flexible and generally move/rotate a small amount during construction. Therefore, the walls should be designed for active earth pressures. We provide the following recommendations for lateral earth pressures:

- Use an active lateral earth pressure equivalent to a fluid unit weight of 50 pounds per cubic foot;
- Analyze seismic loading conditions using a uniformly distributed pressure increase of 15 pounds per square foot per foot of wall height (added to static loading); and
- Include lateral earth pressures caused by surcharges behind the wall, as shown in Figure 4.

The lateral earth pressures act at the back of the MSEW reinforcement zone and account for the embankment slope behind the wall.

We used the Mononobe-Okabe equation (AASHTO, 2010) to estimate the seismic lateral load increment. We used a horizontal seismic coefficient of 0.1g, which is about one-half of the soil PGA value. The magnitude of this coefficient accounts for the fact that the PGA occurs only a few times within the record of earthquake shaking and that the actual earthquake ground motion is cyclic in nature, as opposed to a static force.

Our lateral earth pressure recommendations assume:

- The MSEW has a vertical face and a backslope of 1.5H:1V.
- MSEW backfill is placed and compacted in accordance with our recommendations in Section 7.2.

- Backfill materials are free draining and do not allow hydrostatic pressure buildup behind the wall.

6.5.2 Lateral Resistance

Lateral resistance for MSEW would be provided by passive pressure against the embedded portion of the walls by friction along the base of the walls. We recommend a minimum wall embedment of 2 feet. Because the wall embedment will be relatively small, the passive resistance would be negligible.

To estimate friction resistance at the base of the walls, we recommend using:

- A coefficient of friction of 0.6 if discontinuous reinforcement (e.g., strips) are used; or
- A coefficient of friction of 0.4 if continuous reinforcement (e.g., grids, fabrics, or sheets) are used.

6.6 Settlement

We estimated settlement beneath the RSS/MSEW systems and unreinforced fill slopes using elastic theory. We assumed a slope/wall height of 10 feet. We estimated soil settlement parameters based on the relative density of the subsurface soil and our experience in similar geology.

Based on our settlement calculations, we estimate that the slopes/walls could settle about ½ inch. The settlement would occur as the slopes/walls are constructed. Our estimate assumes that the slope/wall subgrades are prepared in accordance with our recommendations in Section 7.1.

6.7 Global Stability

We evaluated the global stability of the different trail construction options under static and seismic loads using the computer program SLOPE/W (Geo-Slope, 2007). We used SLOPE/W to analyze many potential failure surfaces at four representative trail cross sections. For each potential failure surface, we used the general limit equilibrium method (Fredlund and Krahn, 1977), which satisfies both force and moment equilibrium, to calculate a factor of safety (FS) against slope failure.

The FS is the ratio of the forces available to resist movement to the forces of the driving soil mass. An FS of 1.0 means that the driving and resisting forces are equal. An FS of less than 1.0 means that the driving forces are greater than the resisting forces, indicating an unstable

slope. The potential failure surface with the lowest FS is called the critical failure surface. We considered target minimum critical failure surface FSs of 1.5 for static stability and 1.1 for seismic stability.

We selected soil strength parameters for the stability analyses using the results of field explorations, laboratory testing results, and our experience. We assumed that potential failure surfaces would pass beneath the reinforced soil zone. Similar to the Mononobe-Okabe analysis (Section 6.4), we applied a horizontal seismic coefficient of 0.1g for the seismic case.

Our analysis results show that the critical failure surface FS values meet target minimum values for static and seismic loading.

We did not evaluate the internal stability of the MSEW/RSS systems, nor did we consider global failure surfaces that may pass through the reinforced soil zone. The MSEW/RSS designer must consider these failure modes during the design process.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Site Preparation and Grading

We recommend the following steps for preparing the trail subgrade:

- Clear trees and brush;
- Remove roots, stumps, concrete, asphalt, and other debris;
- Strip organic and loose material;
- Excavate to the desired grades; and
- Proof-roll and compact the exposed subgrade surface as needed to a dense and unyielding condition.

Areas that are wet, soft, loose, or yielding when proof rolled or during compaction should be further compacted, removed and reconditioned, or replaced with compacted structural fill so that a dense and unyielding condition is achieved.

We recommend that a qualified geotechnical engineer's representative be on site to evaluate the exposed subgrade during site preparation and grading.

If fill is placed in the rivers, we recommend excavating at least 2 feet of the existing river sediment to form a bench for the fill. Foundation stabilization material, such as free-draining

quarry spalls or a mixture of boulders, cobbles, and gravel (e.g., the existing embankment fill material), should be placed below the water line to create a firm working platform for construction of the fill slope.

7.2 Fill Placement and Compaction

All fill soil should be structural fill, which should:

- Consist of a well-graded mixture of sand and gravel;
- Be free of organics and debris;
- Have a moisture content within ±2 percent of its optimum;
- Have a gravel content between 25 and 50 percent retained on a No. 4 sieve; and
- Have a maximum particle size of 3 inches.

Structural fill placed behind/within MSEW and RSS should have less than 5 percent fines (material passing the No. 200 mesh sieve, based on the minus ¾ inch fraction). Other imported structural fill should contain less than 15 percent fines. All fines should be nonplastic. Examples of suitable fill soil gradations from the Washington State Department of Transportation (WSDOT) and American Public Works Association (APWA) Standard Specifications (WSDOT/APWA, 2010) include Gravel Backfill for Walls, Section 9.03-12(2), for walls; and Gravel Borrow, Section 9-03.14(1), for other areas.

Before placing structural fill in areas above river level, we recommend draining ponded water from the area. We recommend placing structural fill in uniform lifts and compacting the fill to a dense and unyielding condition, at least 95 percent of the Modified Proctor maximum dry density (ASTM International D 1557).

Hand-operated mechanical compactors should be used within 3 feet of wall faces; heavy equipment compactors should not be used near walls. Lift thickness should not exceed 8 inches for heavy equipment compactors or 4 inches for hand-operated mechanical compactors.

If placed adjacent to an existing slope, structural fill should be benched into the slope. Benches should have a maximum height of 3 feet.

7.3 Use of On-Site Soil

In our opinion, the existing native sand could be reused as general structural fill (i.e., behind MSEW/RSS reinforcement zones or in unreinforced fill slopes). The existing embankment material could be reused as general structural fill in unreinforced fill slopes, provided that

material greater than 3 inches in diameter is removed. Material lager tan 3 inches could be used to fill in the river or as erosion protection.

7.4 Excavations

Temporary cut slopes could be used to bench the proposed trail into the existing slope and facilitate construction of fill slopes, RSS, and MSEW. The practical steepness of temporary slopes will depend on factors such as:

- The presence and abundance of groundwater;
- The type and density of the soil;
- The depth of excavation;
- Surcharge loading adjacent to the excavation, such as that from excavated material or construction equipment; and
- The duration of construction.

For planning purposes, we recommend assuming that temporary slopes could be excavated at 1H:1V in the native sandy soil and 0.5H:1V in the existing embankment material. The slopes may be subject to erosion. We recommend protecting the slope against erosion during construction.

Consistent with conventional construction practice, the Contractor should be responsible for temporary excavation slopes. The Contractor is continually at the site, is able to observe the nature and conditions of the subsurface materials encountered, including groundwater, and is responsible for the methods, sequence, and schedule of construction. Flatter cut slopes or temporary shoring could be required where loose soil or seepage is encountered or if instability is observed. Regardless of the construction method used, all excavation work should be accomplished in compliance with applicable local, state, and federal safety codes.

7.5 Wet Weather Earthwork

We recommend performing earthwork during dry weather. During wet weather, placing and compacting fill material can be difficult. In-place soil or fill soil that is too wet to suitably compact should be removed and replaced with structural fill. Most of the existing site soil is subject to erosion during periods of heavy rainfall. Excavations should be protected against erosion.

8.0 ADDITIONAL SERVICES

We recommend that Shannon & Wilson be retained to review those portions of the plans and specifications pertaining to geotechnical aspects of construction to evaluate if they are consistent with our recommendations. We also recommend that we observe the geotechnical aspects of construction, which will allow us to verify the subsurface conditions as they are exposed during construction and to evaluate if the work is accomplished in accordance with our recommendations.

If the PUD selects RSS to support portions of the proposed trail, we recommend that Shannon & Wilson provide design services for the slopes.

9.0 LIMITATIONS

This report was prepared for the exclusive use of the PUD for the Entiatqua Trail project. It should be made available to prospective contractors for information on factual data only, and not as a warranty of subsurface conditions such as those interpreted from the exploration logs and presented in the discussions of subsurface conditions included in this report.

Within the limitations of the scope, schedule, and budget, the analyses, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no other warranty, either expressed or implied.

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they presently exist and further assume that the explorations are representative of the subsurface conditions throughout the project site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the explorations. Our conclusions and recommendations are based on our understanding of the project as described in this report and the site conditions as interpreted from the explorations.

If, during final design and construction, subsurface conditions different from those encountered in the field explorations are observed or appear to be present, we should be advised at once so that we could review these conditions and reconsider our recommendations where necessary. If there is substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed because of natural forces or construction operations at or adjacent to the site, we recommend that this report be reviewed to determine the applicability of the conclusions and recommendations concerning the changed conditions or the time lapse.

Unanticipated soil conditions are commonly encountered and cannot fully be determined merely by taking soil samples from a limited number of test pits or performing a limited number of penetration tests. Such unexpected conditions frequently require that additional expenditures be made to attain properly constructed projects. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

The opinion of probable costs to construct the work described in this report is based solely upon our experience with construction on similar projects, contractor and supplier information, and other information presented in this report. Our opinion of probable construction costs include a number of assumptions as to actual subsurface conditions that will be encountered. These assumptions include decisions of other design professionals and government agency personnel, the means and methods of construction the Contractor will employ, the Contractor's techniques in determining price and market conditions at the time, and other factors over which we have no control. Given the assumptions that must be made, Shannon & Wilson, Inc. cannot guarantee the accuracy of the opinion of probable construction costs.

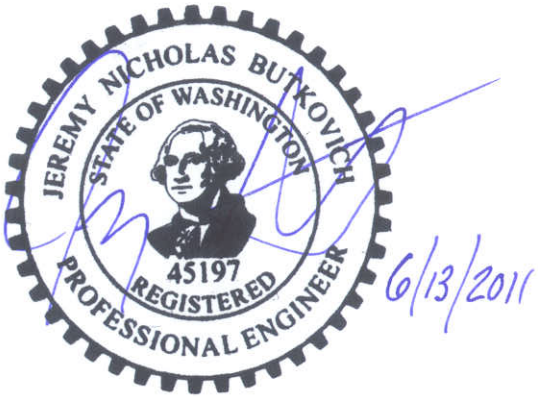
Shannon & Wilson, Inc. is not a construction cost estimator or construction contractor, nor should our rendering of an opinion of probable construction costs be considered equivalent to the nature and extent of services a construction cost estimator or contractor would provide.

The scope of our geotechnical services did not include environmental assessment or evaluation regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air on or below the site, or any evaluation for disposal of contaminated soils or groundwater.

We did not evaluate the project site for potential impacts to natural resources, including wetlands, endangered species, or environmentally critical areas. Shannon & Wilson has staff experienced in these issues should they arise.

Shannon & Wilson has prepared Appendix C, "Important Information About Your Geotechnical/Environmental Report," to assist you and others in understanding the use and limitations of our reports.

SHANNON & WILSON, INC.



Jeremy N. Butkovich, P.E.
Principal Engineer

JNB:CAR/jnb

10.0 REFERENCES

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0 1000 2000

Approximate Scale in Feet

NOTE

Map adapted from aerial imagery provided by Google Earth Pro, image by U.S. Geological Survey reproduced by permission granted by Google Earth ™ Mapping Service.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

VICINITY MAP

June 2011 21-1-21501-002

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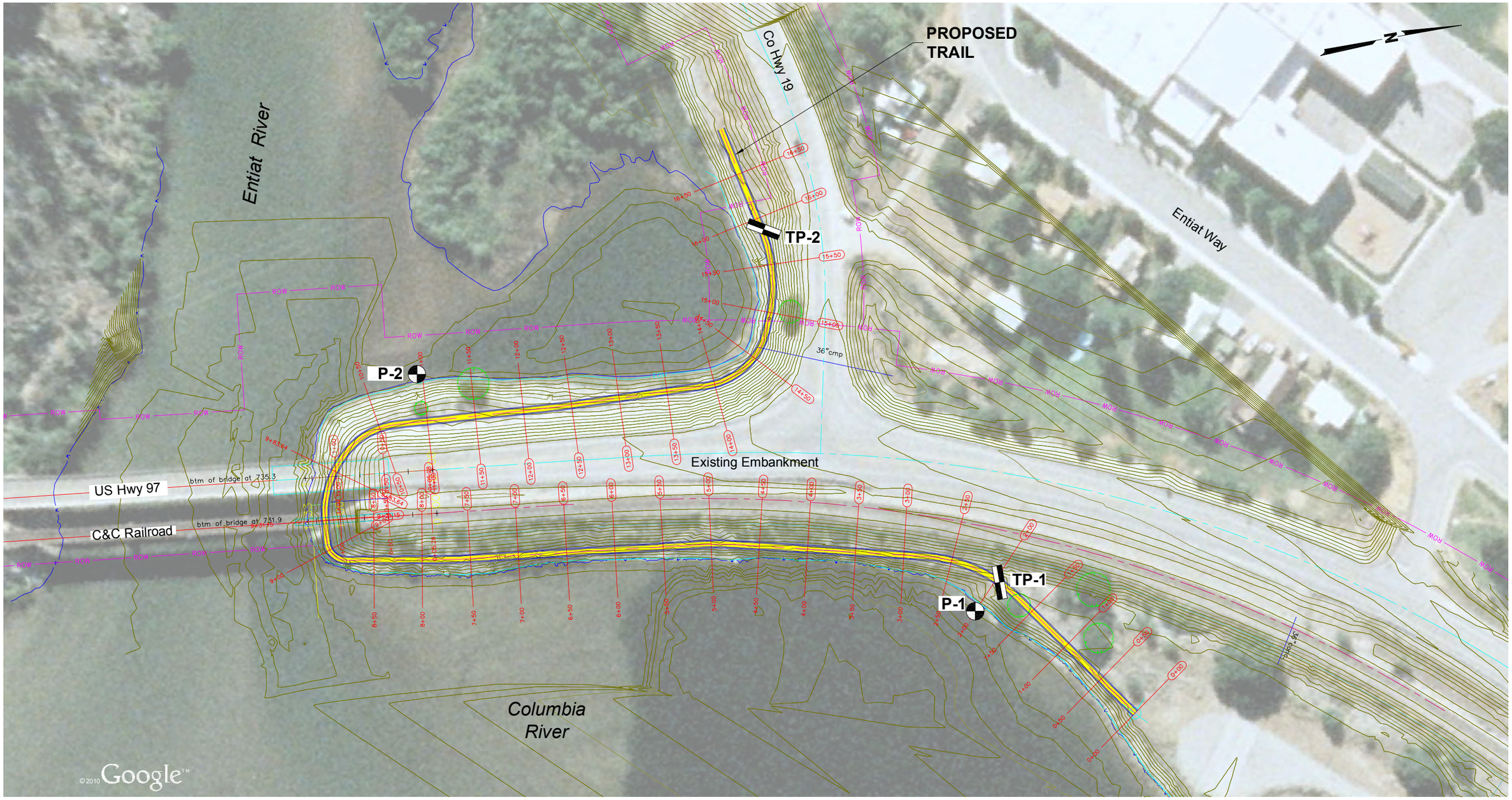
FIG. 1

Filename: J:\211\21501-002\21-1-21501-002 Fig 1.dwg Date: 06-09-2011 Login: sac



0 100 200

Scale in Feet

NOTE

Figure adapted from *"Entiatqua Trail Full Set 3-10-2011.DWG"*, dated 4-28-11.
Aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

LEGEND

P-1 Penetration Test Designation and Approximate Location

TP-1 Test Pit Designation and Approximate Location

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

SITE AND EXPLORATION PLAN

June 2011 21-1-21501-002

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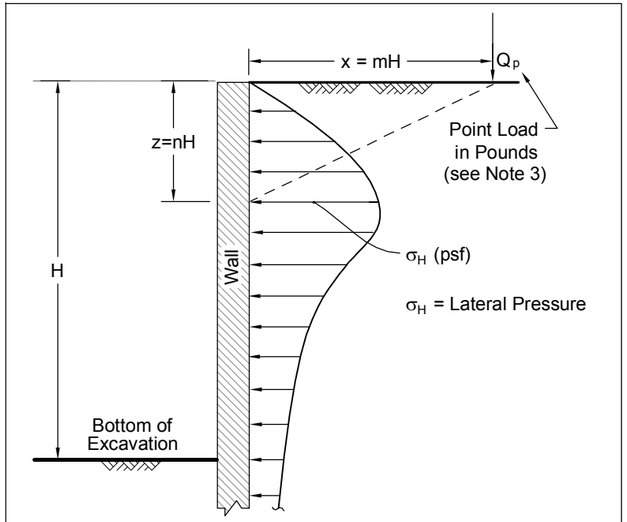
FIG. 2

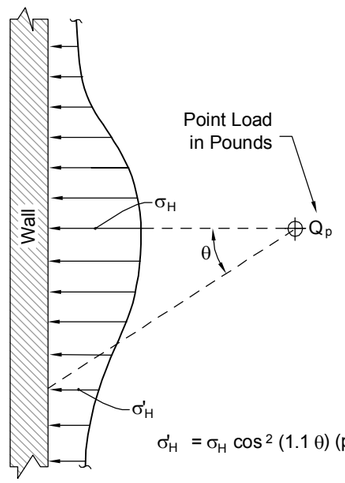
Filename: J:\21\21501-002\21-1-21501-002 Fig 2.dwg Date: 06-09-2011 Login: sac



ELEVATION VIEW

For $m \le 0.4$: $\sigma_H = 0.28 \frac{Q_p}{H^2} \frac{n^2}{(0.16 + n^2)^3}$ (psf) (see Note 3)

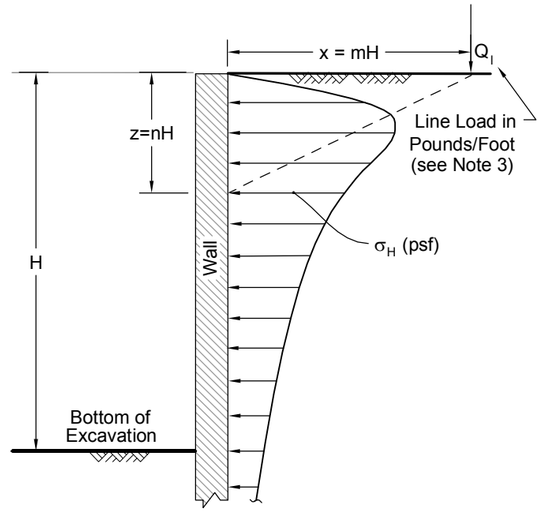
For $m > 0.4$: $\sigma_H = 1.77 \frac{Q_p}{H^2} \frac{m^2 n^2}{(m^2 + n^2)^3}$ (psf)



PLAN VIEW

A) LATERAL PRESSURE DUE TO POINT LOAD i.e. SMALL ISOLATED FOOTING OR WHEEL LOAD

(NAVFAC DM 7.2, 1986)



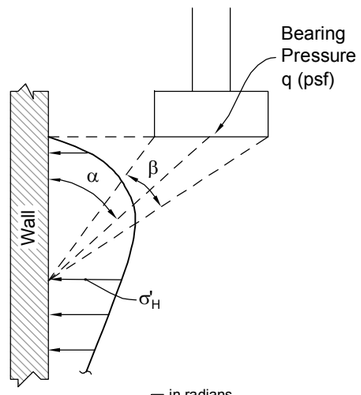
ELEVATION VIEW

For $m \le 0.4$: $\sigma_H = 0.20 \frac{Q_l}{H} \frac{n}{(0.16 + n^2)^2}$ (psf) (see Note 3)

For $m > 0.4$: $\sigma_H = 1.28 \frac{Q_l}{H} \frac{m^2 n}{(m^2 + n^2)^2}$ (psf)

B) LATERAL PRESSURE DUE TO LINE LOAD i.e. NARROW CONTINUOUS FOOTING PARALLEL TO WALL

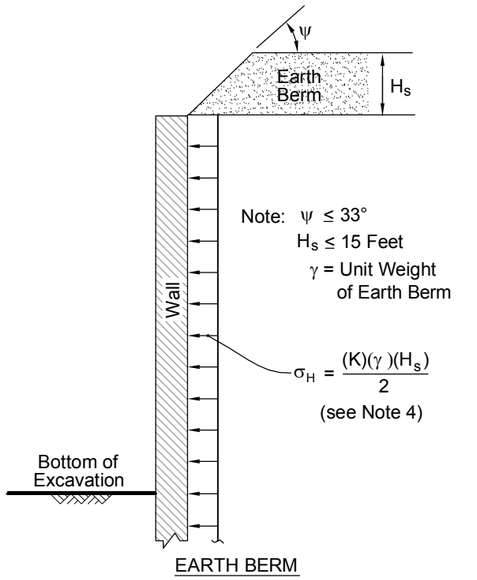
(NAVFAC DM 7.2, 1986)



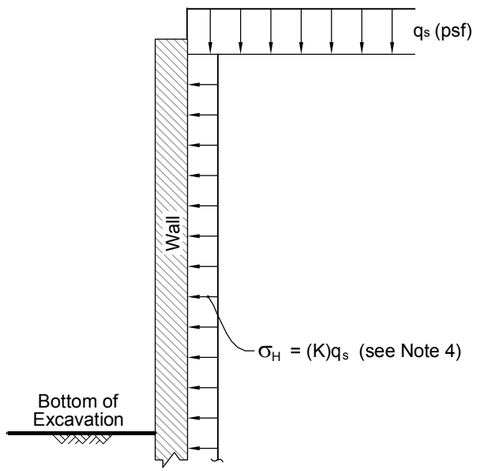
$\sigma_H = \frac{2q}{\pi} (\beta - \sin\beta \cos 2\alpha)$ (psf)

C) LATERAL PRESSURE DUE TO STRIP LOAD

(derived from Fang, *Foundation Engineering Handbook* , 1991)



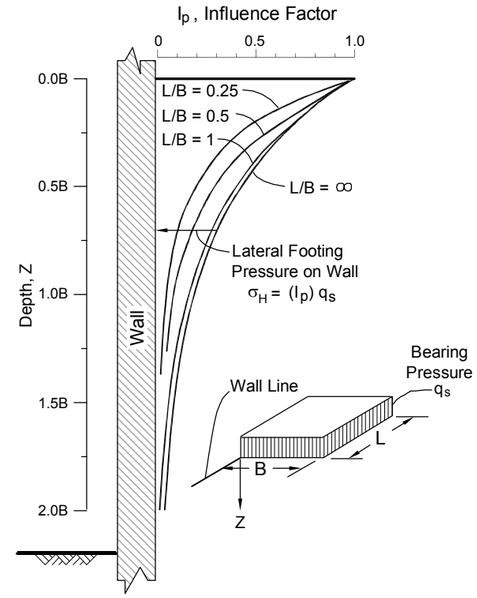
EARTH BERM



UNIFORM SURCHARGE

D) LATERAL PRESSURE DUE TO EARTH BERM OR UNIFORM SURCHARGE

(derived from Poulos and Davis, *Elastic Solutions for Soil and Rock Mechanics* , 1974; and Terzaghi and Peck, *Soil Mechanics in Engineering Practice* , 1967)



E) LATERAL PRESSURE DUE TO ADJACENT FOOTING

(derived from NAVFAC DM 7.2, 1986; and Sandhu, *Earth Pressure on Walls Due to Surcharge* , 1974)

NOTES

1. Figures are not drawn to scale.
2. Applicable surcharge pressures should be added to appropriate permanent wall lateral earth and water pressure.
3. If point or line loads are close to the back of the wall such that $m \le 0.4$, it may be more appropriate to model the actual load distribution (i.e., Detail E) or use more rigorous analysis methods.
4. Use a K value of K=0.4.
5. For areas where fill will be placed immediately behind and above the top elevation of the wall, Diagram D can be used to determine loads on the wall. For narrow fills adjacent to the wall, Diagram C can be used.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

RECOMMENDED SURCHARGE LOADING FOR TEMPORARY AND PERMANENT WALLS

June 2011 21-1-21501-002

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FIG. 3

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APPENDIX A

SUBSURFACE EXPLORATIONS

APPENDIX A

SUBSURFACE EXPLORATIONS

TABLE OF CONTENTS

Page

A.1 GENERAL A-1

A.2 TEST PITS A-1

A.3 PENETRATION TESTS A-1

FIGURES

A-1 Soil Classification and Log Key (2 sheets)
A-2 Log of Test Pit TP-1
A-3 Log of Test Pit TP-2
A-4 Log of Penetration Tests P-1 and P-2

APPENDIX A

SUBSURFACE EXPLORATIONS

A.1 GENERAL

The field exploration program for this project consisted of excavating two test pits and performing two penetration tests. Figures A-2 and A-3 present the test pit logs and Figure A-3 presents the penetration test logs. Figure 2 in the main text shows the approximate exploration locations. Figure A-1 presents a soil classification and log key as a reference for symbols and information presented on the test pit logs.

A.2 TEST PITS

We excavated two test pits, designated TP-1 and TP-2, on May 19, 2011. Each excavation was about 10 feet deep. The City of Entiat excavated the test pits using a John Deere 310G Excavator/Loader.

A Shannon & Wilson representative observed, logged, and collected soil samples from the test pits. Samples were classified in the field, placed in airtight jars or bags, and returned to our laboratory for testing.

A.3 PENETRATION TESTS

Two Shannon & Wilson representatives performed the penetration tests in the Columbia and Entiat Rivers, about 5 to 10 feet from shore. Because of difficult site access and loose soil, we used nonstandard equipment. The purpose of the penetration tests was to evaluate the relative density of the existing river sediment.

The penetration tests comprised driving 5-foot-long segments of 2-inch diameter polyvinyl chloride (PVC) pipe (P-1) or 5-foot-long segments of 1-inch outside diameter steel pipe (P-2). We drove the pipes into the soil using a 10-pound sledgehammer with a 31-inch arm. We recorded the number of blows to drive the pipe every 12 inches. Each hammer blow was dropped from a height of approximately 20 inches. Figure A-3 plots the number of hammer blows per foot versus depth.

P-1 reached refusal between 11 and 12 feet below the mudline when the PVC pipe broke after 100 blows. The mudline was about 16 inches below the water level at P-1.

P-2 reached refusal between 10 and 11 feet below the mudline when the threading connecting segments of the steel pipe broke after 15 blows. The mudline was about 15 inches below the water level at P-2.

Shannon & Wilson, Inc. (S&W), uses a soil classification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this page. Soil descriptions are based on visual-manual procedures (ASTM D 2488) unless otherwise noted.

S&W CLASSIFICATION OF SOIL CONSTITUENTS

- MAJOR constituents compose more than 40 percent, by weight, of the soil. Major consituents are capitalized (i.e., SAND).
- Minor constituents compose 12 to 50 percent of the soil and precede the major constituents (i.e., silty SAND). Minor constituents preceded by "slightly" compose 5 to 12 percent of the soil (i.e., slightly silty SAND).
- Trace constituents compose 0 to 5 percent of the soil (i.e., slightly silty SAND, trace of gravel).

GRAIN SIZE DEFINITION

DESCRIPTION	SIEVE NUMBER AND/OR SIZE
FINES	< #200 (0.8 mm)
SAND*	
- Fine	#200 to #40 (0.8 to 0.4 mm)
- Medium	#40 to #10 (0.4 to 2 mm)
- Coarse	#10 to #4 (2 to 5 mm)
GRAVEL*	
- Fine	#4 to 3/4 inch (5 to 19 mm)
- Coarse	3/4 to 3 inches (19 to 76 mm)
COBBLES	3 to 12 inches (76 to 305 mm)
BOULDERS	> 12 inches (305 mm)

** Unless otherwise noted, grain size varies from fine to coarse.*

MOISTURE CONTENT DEFINITIONS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS) (From USACE Tech Memo 3-357)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL DESCRIPTION
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Clean Gravels *(less than 5% fines)*	GW		Well-graded gravels, gravels, gravel/sand mixtures, little or no fines
			GP		Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravels with Fines *(more than 12% fines)*	GC		Silty gravels, gravel-sand-silt mixtures
			GW		Clayey gravels, gravel-sand-clay mixtures
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Clean Sands *(less than 5% fines)*	SW		Well-graded sands, gravelly sands, little or no fines
			SP		Poorly graded sand, gravelly sands, little or no fines
		Sands with Fines *(more than 12% fines)*	SM		Silty sands, sand-silt mixtures
			SC		Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Inorganic silts of low to medium plasticity, rock flour, sandy silts, gravelly silts, or clayey silts with slight plasticity
			CL		Inorganic clayss of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		Organic	OL		Organic silts and organic silty clays of low plasticity
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Inorganic clays or medium to high plasticity, sandy fat clay, or gravelly fat clay
			CH		Inorganic silts, micaceous or diatomaceous fine sands or silty soils, elastic silt
		Organic	OH		Organic clays of medium to high plasticity, organic silts
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat, humus, swamp soils with high organic content (see ASTM D 4427)

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, slightly silty fine SAND)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart.

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, silty CLAY/clayey SILT; GW/SW, sandy GRAVEL/ gravelly SAND)* indicate that the soil may fall into one of two possible basic groups.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

SOIL CLASSIFICATION AND LOG KEY

June 2011 21-1-21501-002

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FIG. A-1

Filename: J:\211\21501-002\21-1-21501-002 TPs.dwg Date: 06-09-2011 Login: sac

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LOG OF TEST PIT TP-1

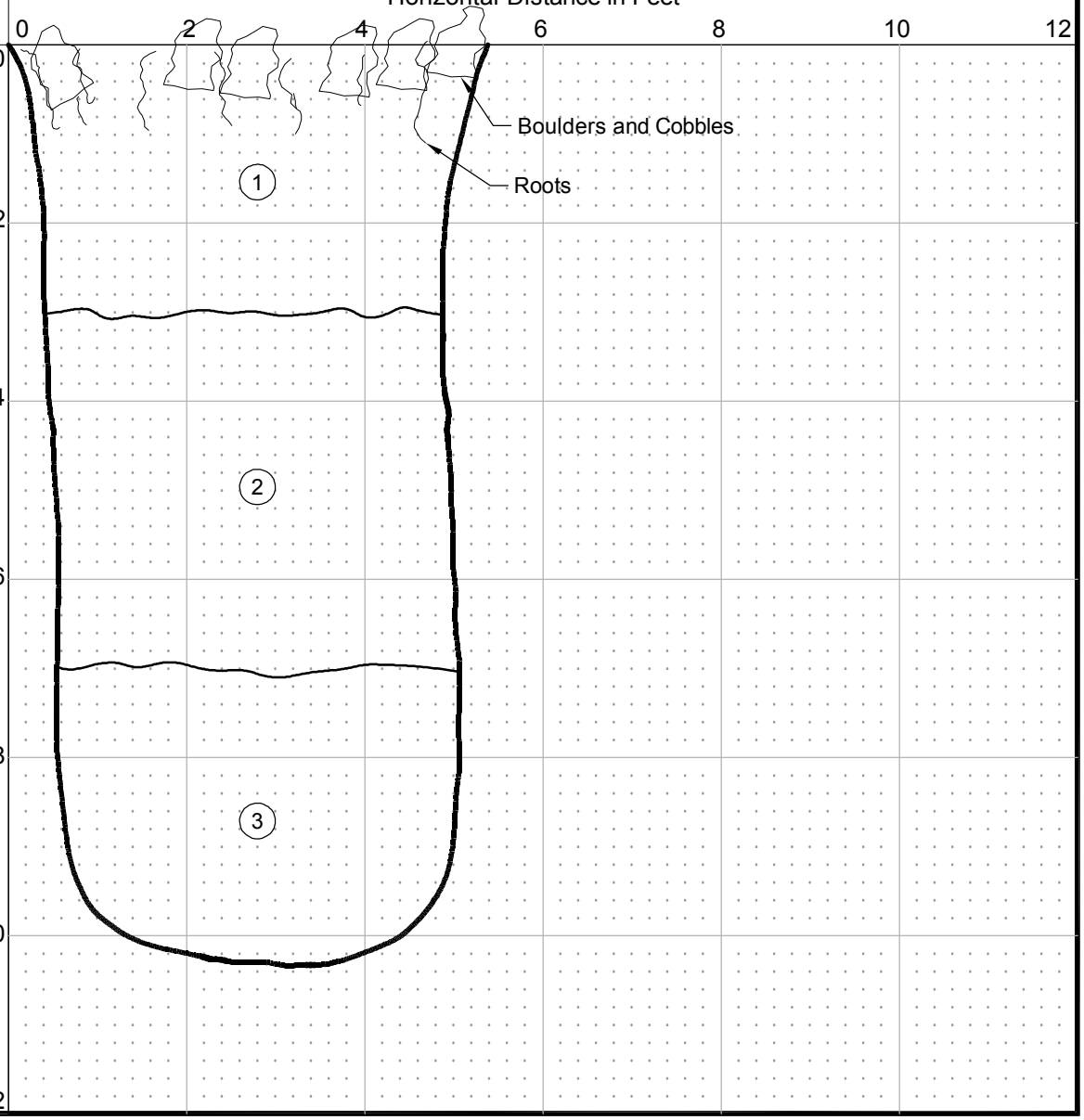
JOB NO: 21-1-21501-002 DATE: 5-19-2011 LOCATION: See Site and Exploration Plan

PROJECT: Entiatqua Trail

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
(1) Medium dense, brown, sandy GRAVEL with numerous 3- to 12-inch diameter cobbles, scattered angular boulders up to 18 inches in diameter; moist; fine roots to 1 foot depth; GP.	None Observed		S-1	0
		3.3	Bag 1	2
(2) Medium dense, gray-brown, sandy GRAVEL with numerous 3- to 12-inch diameter cobbles and scattered boulders up to (24 inches); GP.		3.4	S-2	4
(3) Medium dense to dense, brown, slightly silty, gravelly fine to medium SAND, occasional angular 1-foot diameter boulders; moist; sewer pipe debris at approximately 10 feet; SP-SM.				6
		8.6	Bag 2 & S-3	8
				10
				12

Sketch of West Pit Side

Surface Elevation: About 720 feet



NOTES

1. The test pit was excavated perpendicular to the slope of the embankment.
2. The pit was left open for about 1.5 hours. Little to no caving was observed during this time, but cracks were visible in the walls.

FIG. A-2

Filename: J:\211\21501-002\21-1-21501-002 TPs.dwg Date: 06-09-2011 Login: sac

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LOG OF TEST PIT TP-2

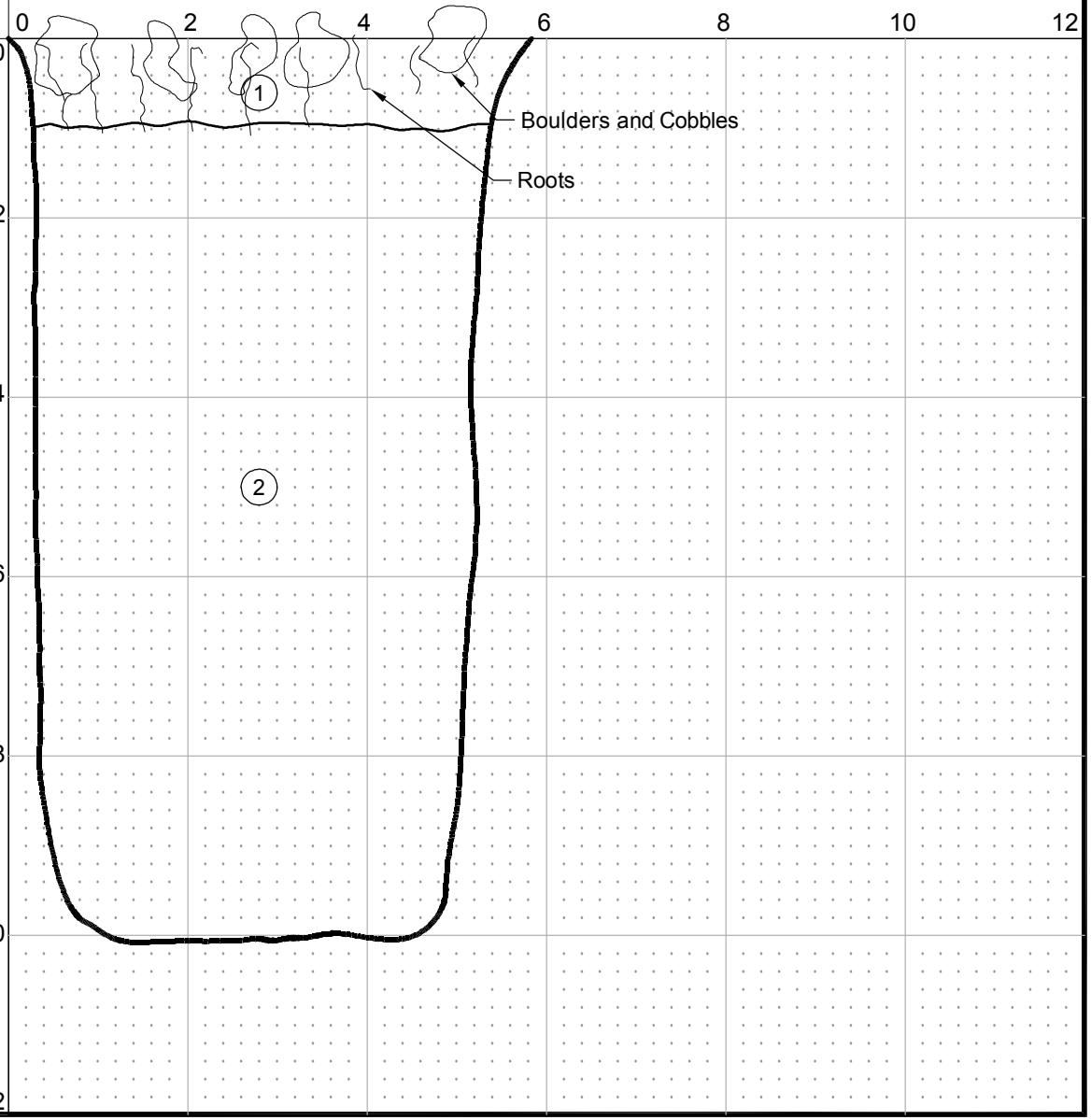
JOB NO: 21-1-21501-002 DATE: 5-19-2011 LOCATION: See Site and Exploration Plan

PROJECT: Entiatqua Trail

SOIL DESCRIPTION	Ground Water	% Water Content	Samples	Depth, Ft.
(1) Angular gravel, cobbles, and boulders (up to 2 feet in diameter), fine roots to approximately 1 foot deep.	None Observed			0
(2) Medium dense, brown, slightly silty, gravelly fine to medium SAND, occasional 3- to 4-inch diameter cobbles; moist; denser with depth; SP-SM.		5.2	S-1	2
		5.3	Bag 1 & S-2	8
				12

Sketch of Northeast Pit Side

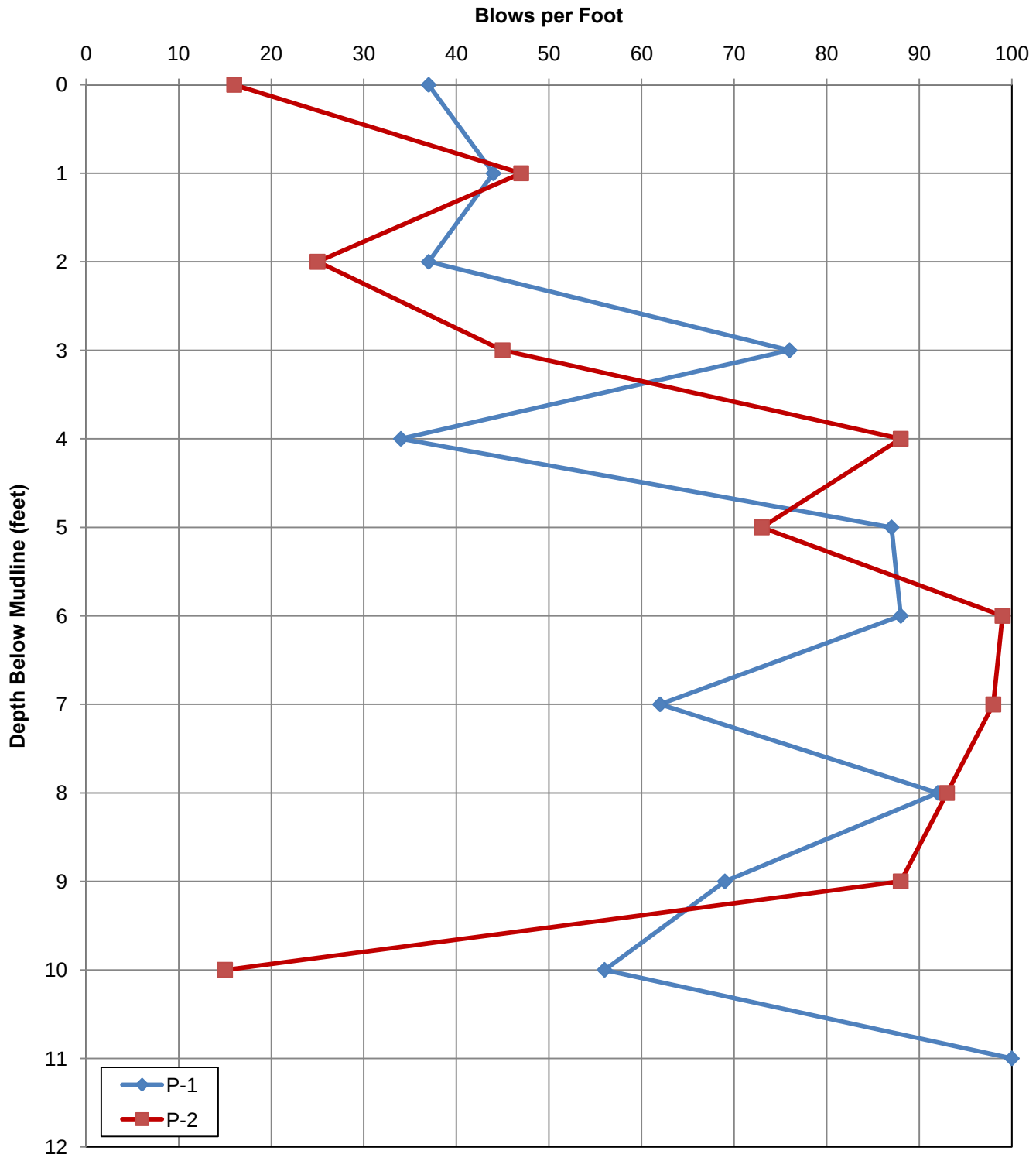
Surface Elevation: About 720 feet



NOTES

1. The test pit was excavated perpendicular to the slope of the embankment.
2. The pit was left open for about 1.5 hours. Little to no caving was observed during this time, but cracks were visible in the walls.

FIG. A-3



NOTES

1. For P-1, a 1.5-inch-diameter PVC pipe was driven by hand using a 10-pound sledge hammer with a 31 inch handle.
2. For P-2, a 1-inch-diameter steel pipe was driven by hand using a 10-pound sledge hammer with a 31 inch handle.
3. Blow counts at 3 feet deep for P-1 may be artificially high due to low energy transfer during the first 25 blows.
4. The PVC piping broke after 100 blows for 11 inches at 11 feet deep for P-1. The steel piping broke after 15 blows at 10 feet deep for P-2.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

PENETRATION TEST DRIVING RESISTANCE
P-1 AND P-2

June 2011 21-1-21501-002

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FIG. A-4

APPENDIX B

GEOTECHNICAL LABORATORY TESTING PROCEDURES AND RESULTS

APPENDIX B

GEOTECHNICAL LABORATORY TESTING PROCEDURES AND RESULTS

TABLE OF CONTENTS

Page

B.1 INTRODUCTION B-1

B.2 VISUAL CLASSIFICATION B-1

B.3 WATER CONTENT DETERMINATION.....B-1

B.4 GRAIN SIZE ANALYSIS.....B-1

FIGURE

B-1 Grain-Size Distribution

APPENDIX B

GEOTECHNICAL LABORATORY TESTING PROCEDURES AND RESULTS

B.1 INTRODUCTION

This appendix contains the results of the laboratory testing program conducted for the Entiatqua Trail project. Shannon & Wilson's Seattle laboratory tested selected soil samples from the project site in order to evaluate index properties and engineering characteristics of the soils. The following paragraphs present descriptions of the tests. Laboratory tests were conducted in accordance with appropriate ASTM International (ASTM) standards.

B.2 VISUAL CLASSIFICATION

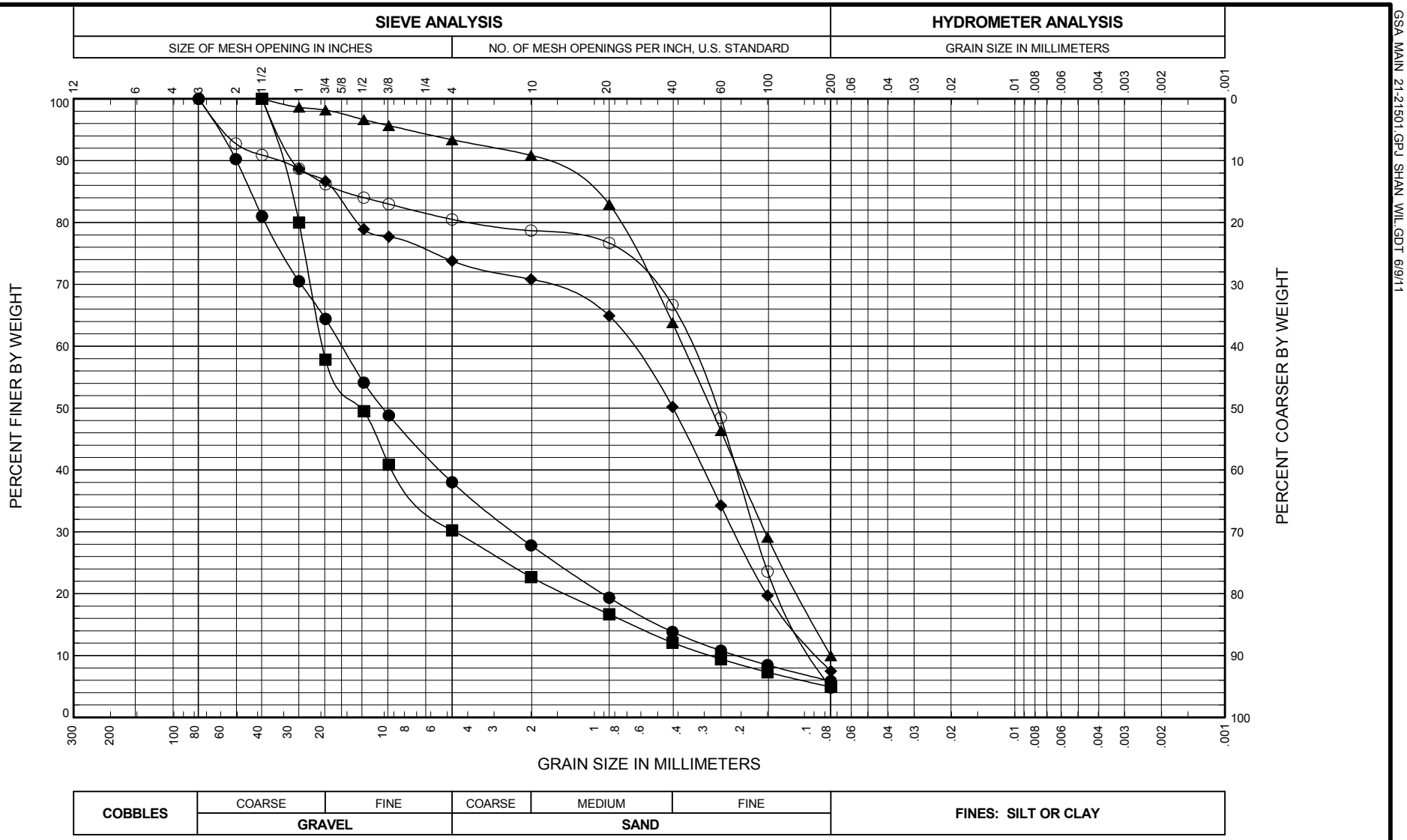
Soil samples were classified using the Unified Soil Classification System (USCS) with the modifications shown in Figure A-1 (Appendix A). Classification of the samples tested in the laboratory was based on ASTM D 2487, Standard Test Method for Classification of Soil for Engineering Purposes. Samples not tested in the laboratory were classified based on ASTM D 2488, Standard Recommended Practice for Description of Soils (Visual-Manual Procedure).

B.3 WATER CONTENT DETERMINATION

Water content was determined on most samples collected in general accordance with ASTM D 2216, Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock. The water content is shown on the test pit logs in Appendix A.

B.4 GRAIN SIZE ANALYSIS

The grain size distribution of selected samples was tested in general accordance with ASTM D 422, Standard Test Method for Particle-Size Analysis of Soils. Results of these analyses are presented in Figure B-1. Each gradation sheet provides the USCS group symbol, the sample description, and water content.



BORING AND SAMPLE NO.	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	FINES %	NAT. W.C. %	LL %	PL %	PI %
● TP-1, Bag 1	2.0	GW-GM	Gray, slightly silty, sandy GRAVEL	5.9	3.3			
■ TP-1, S-2	3.0	GP	Gray-brown, sandy GRAVEL, trace of silt	4.9	3.4			
▲ TP-1, Bag 2	8.0	SP-SM	Brown, slightly gravelly, slightly silty SAND	10.0	8.6			
◆ TP-2, S-1	2.0	SP-SM	Brown, slightly silty, gravelly SAND	7.5	5.2			
○ TP-2, Bag 1	8.0	SP	Brown, gravelly SAND, trace of silt	4.8	5.3			

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

GRAIN SIZE DISTRIBUTION

June 2011 21-1-21501-002

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FIG. B-1

FIG. B-1

GSA MAIN 21-21501.GPJ SHAN_WIL.GDT 6/9/11

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 21-1-21501-002

Date: June 13, 2011
To: Mr. Courtney Hill, P.E.
Public Utility District No. 1 of Chelan County

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

Geotechnical Report
Entiatqua Trail
Entiat, Washington

December 6, 2011

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value.

Since 1954.

Submitted To:
Mr. Courtney Hill, P.E.
Public Utility District No. 1 of Chelan County
327 N. Wenatchee Avenue
Wenatchee, Washington 98801

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-21501-003

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 SITE AND PROJECT DESCRIPTION 1

3.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS 2
- 3.1 External and Internal Stability 2
- 3.2 Global and Compound Stability 3

4.0 CONSTRUCTION CONSIDERATIONS 4
- 4.1 Site Preparation and Grading 4
- 4.2 Fill Material 5
- 4.3 Excavations 6
- 4.4 Wet Weather Earthwork 7

5.0 ADDITIONAL SERVICES 7

6.0 LIMITATIONS 7

7.0 REFERENCES 10

FIGURES

1 Vicinity Map
2 Site and Exploration Plan
3 Stability Analysis Results, Station 4+50
4 Stability Analysis Results, Section at SR 97A Bridge
5 Stability Analysis Results, Station 15+46

APPENDICES

A Engineering Calculations
B Important Information About Your Geotechnical/Environmental Report

GEOTECHNICAL REPORT
ENTIATQUA TRAIL
ENTIAT, WASHINGTON

1.0 INTRODUCTION

This report presents the results of geotechnical engineering studies performed for the proposed Entiatqua Trail in Entiat, Washington. Our geotechnical studies included formulating geotechnical engineering recommendations for use in the design and construction of the proposed project.

Our scope of geotechnical services included the following:

- Reviewing project plans provided by PUD No. 1 of Chelan County (dated December 1, 2011);
- Evaluating construction considerations;
- Conducting engineering analyses; and
- Preparing this report.

We provided our services in general accordance with our proposal dated October 26, 2011.

We previously prepared a report, dated June 2011, which presented geotechnical engineering recommendations for the proposed trail. As part of our scope of services for that report, we conducted a subsurface exploration program at the proposed trail site, and provided engineering design recommendations for the proposed trail.

2.0 SITE AND PROJECT DESCRIPTION

The proposed trail will connect Entiat Park with the proposed Entiatqua Outdoor Learning Center (Figure 1). Entiat Park is between U.S. Highway 97 and the C&C Railroad, and the west shore of the Columbia River. The proposed Entiatqua Outdoor Learning Center will be on the shores of the Entiat River, south of Entiat River Road and west of U.S. Highway 97.

Most of the proposed trail will be along the U.S. Highway 97 and C&C Railroad embankment. The embankment was built from rock quarried from the cliffs on the south side of the Entiat River. The construction of the embankment and associated bridges was completed before Rocky Reach Dam began operation and raised the level of the Columbia River to its current elevation.

The ordinary high water mark (OHWM) for the Columbia River near the project site is elevation 711 feet (North American Vertical Datum of 1988 [NAVD88]). Public Utility District (PUD) No. 1 of Chelan County is studying the feasibility of raising the OHWM to 714 feet (NAVD88).

The embankment is sparsely vegetated with grass, brush, and small trees. The embankment side slopes are generally between 30 and 40 degrees, with locally steeper areas, particularly on the east side and northwest corner of the embankment.

The proposed trail will be 8 feet wide and will be surfaced with compacted aggregate. The trail will be benched into the existing highway/railroad embankment. Figure 2 shows the proposed trail alignment. Retaining walls will support the trail and the cut slope. The project plans show three types of retaining systems: gabion walls, rockeries, and Lock+Load^{TM} walls.

As described in our June 2011 report, we believe the embankment generally comprises 1- to 3-foot-diameter angular boulders (tonalite of the Chelan Complex) with a sandy, gravelly matrix. A 1-foot-thick layer of rounded, 3- to 12-inch rounded cobbles covers portions of the embankment, particularly on the east side of the embankment.

3.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

Retaining wall stability has four components: external, internal, global, and compound. External stability involves translation or rotation of the retaining wall mass. Internal stability involves failure of reinforcing elements in the wall (e.g., geosynthetic reinforcement in mechanically-stabilized earth walls). Global stability involves failure surfaces that do not directly involve the retaining wall (e.g., slope failures that pass under the wall mass). Compound stability involves global failure surfaces that pass through a portion of the retaining wall.

We analyzed the stability of three proposed wall cross-sections: Station 4+50, the US 97A crossing, and Station 15+46. The PUD provided the wall designs at each cross-section.

3.1 External and Internal Stability

We used the computer program MSEW, Version 3.0 (ADAMA Engineering, 2007), to evaluate external and internal stability of each wall cross-section. We included an assumed surcharge live load of 150 pounds per square foot on the trail, and applied earth pressures consistent with the recommendations in our June 2011 report. For seismic cases, we used a horizontal seismic coefficient of 0.1g, which is about one-half of the soil peak ground acceleration (PGA) value (see our June 2011 report). The magnitude of this coefficient accounts for the fact that the PGA

occurs only a few times within the record of earthquake shaking and that the actual earthquake ground motion is cyclic in nature, as opposed to a static force.

Appendix A presents the engineering calculations for our analyses. Based on the results of our analyses, we recommend the following:

- Lock+Load™ walls taller than 4 feet should be reinforced with two layers of geogrid reinforcement;
- Lock+Load™ reinforcement should be at least 6 feet long and should be located at depths of 2 and 4 feet below the top of the wall;
- If the rockery exposed height is greater than 2 feet, geogrid reinforcement should be placed between each rockery rock layer;
- Rockery reinforcement should be at least 6 feet long; and
- Rockeries should be embedded at least 2 feet into compacted structural fill or dense native soil.

Geogrid reinforcement should:

- Meet the requirements of the Washington State Department of Transportation and American Public Works Association (WSDOT/APWA) (2010) Section 6-14.2, Materials for Geosynthetic Retaining Walls; and
- Have a minimum ultimate tensile strength of 4,000 pounds per foot.

The PUD incorporated our design recommendations into their trail design presented in the December 1, 2011, plan set. We analyzed three cross sections from the plan set for global and compound stability.

3.2 Global and Compound Stability

We evaluated the global and compound stability of the cross sections under static and seismic loads using the computer program SLOPE/W (Geo-Slope, 2007). We used SLOPE/W to analyze many potential failure surfaces at each cross section. For each potential failure surface, we used the general limit equilibrium method (Fredlund and Krahn, 1977), which satisfies both force and moment equilibrium, to calculate a factor of safety (FS) against slope failure.

The FS is the ratio of the forces available to resist movement to the forces of the driving soil mass. An FS of 1.0 means that the driving and resisting forces are equal. An FS of less than 1.0 means that the driving forces are greater than the resisting forces, indicating an unstable slope. The potential failure surface with the lowest FS is called the critical failure surface. We considered target minimum critical failure surface FSs of 1.5 for static stability and 1.1 for seismic stability in accordance with American Association of State Highway and Transportation Officials (2010) guidelines.

We selected soil strength parameters for the stability analyses using the results of field explorations, laboratory testing results, and our experience. We assumed that potential failure surfaces would pass beneath the reinforced soil zone. As in our internal and external stability analyses, we applied a horizontal seismic coefficient of 0.1g for the seismic case.

Figures 3 through 5 present the results of our analyses. The results show that the critical failure surface FS values meet target minimum values for static and seismic loading.

4.0 CONSTRUCTION CONSIDERATIONS

4.1 Site Preparation and Grading

We recommend the following steps for preparing the trail subgrade:

- Clear trees and brush;
- Remove roots, stumps, concrete, asphalt, and other debris;
- Strip organic and loose material;
- Excavate to the desired grades; and
- Proof-roll and compact the exposed subgrade surface as needed to a dense and unyielding condition.

Areas that are wet, soft, loose, or yielding when proof-rolled or during compaction should be further compacted, removed and reconditioned, or replaced with compacted structural fill so that a dense and unyielding condition is achieved.

We recommend that a qualified geotechnical engineer's representative be on site to evaluate the exposed subgrade during site preparation and grading.

If fill is placed in the rivers, we recommend excavating at least 2 feet of the existing river sediment to form a bench for the fill. Foundation stabilization material, such as free-draining quarry spalls or a mixture of boulders, cobbles, and gravel (e.g., the existing embankment fill material), should be placed below the water line to create a firm working platform for construction of the fill.

4.2 Fill Material

Fill soil placed beneath, behind, or within structures (e.g., behind/within retaining walls) should be structural fill. Structural fill is a fill soil that meets a specified gradation and has been placed and compacted in a specified manner. The following sections present our recommendations for structural fill.

4.2.1 Gradation

Imported structural fill soil should:

- Consist of a well-graded mixture of sand and gravel;
- Be free of organics and debris;
- Have a moisture content within ±2 percent of its optimum; and
- Have a maximum particle size of smaller than 4 inches.

Structural fill should have less than 7 percent fines (material passing the No. 200 mesh sieve, based on the minus ¾ inch fraction), and should be free draining. All fines should be nonplastic.

Examples of suitable fill soil gradations from WSDOT/APWA (2010) include:

- Gravel Borrow for Geosynthetic Retaining Wall, Section 9.03-14(4) for structural fill in geogrid-reinforced zones; and
- Gravel Borrow, Section 9-03.14(1) for structural fill in other areas.

4.2.2 Placement and Compaction

Before placing structural fill, we recommend draining ponded water from the area. We recommend placing structural fill in uniform lifts, and compacting the fill to a dense and unyielding condition and to at least 95 percent of its Modified Proctor maximum dry density (ASTM International [ASTM, 2010] D 1557).

Hand-operated mechanical compactors should be used within 3 feet of wall faces; heavy equipment compactors should not be used near walls. Lift thickness should not exceed 8 inches for heavy equipment compactors or 4 inches for hand-operated mechanical compactors.

If placed adjacent to an existing slope, structural fill should be benched into the slope. Benches should have a maximum height of 3 feet and penetrate the slope at least 3 feet.

Backfill for geogrid-reinforced walls should be placed and compacted according to WSDOT/APWA (2010) 6-14.3(4).

4.2.3 Use of On-site Soil

In our opinion, the existing native soil could be reused as structural fill, provided that material greater than 4 inches in diameter is removed and the fines content is less than 7 percent. The Contractor should be prepared to screen the on-site soil to remove material greater than 4 inches in diameter. Material larger than 4 inches could be used to fill in the river or as erosion protection. Based on laboratory testing performed for our June 2011 report, the fines content of the native soil ranges from about 5 to 10 percent. The Contractor should be prepared to perform grain size analyses to confirm that the fines content of the soil is less than 7 percent.

4.3 Excavations

Temporary cut slopes could be used to bench the proposed trail into the existing slope and facilitate wall construction. The practical steepness of temporary slopes will depend on factors such as:

- The presence and abundance of groundwater;
- The type and density of the soil;
- The depth of excavation;
- Surcharge loading adjacent to the excavation, such as that from excavated material or construction equipment; and
- The duration of construction.

For planning purposes, we recommend assuming that temporary slopes less than 8 feet high could be excavated at 0.75 Horizontal to 1 Vertical (0.75H:1V) in the existing embankment material. The slopes may be subject to erosion. We recommend protecting the slope against erosion during construction.

Consistent with conventional construction practice, the Contractor should be responsible for temporary excavation slopes. The Contractor is continually at the site, is able to observe the nature and conditions of the subsurface materials encountered, including groundwater, and is responsible for the methods, sequence, and schedule of construction. Flatter cut slopes or temporary shoring could be required where loose soil or seepage is encountered or if instability is observed. Regardless of the construction method used, all excavation work should be accomplished in compliance with applicable local, state, and federal safety codes.

4.4 Wet Weather Earthwork

We recommend performing earthwork during dry weather. During wet weather, placing and compacting fill material can be difficult. In-place soil or fill soil that is too wet to suitably compact should be removed and replaced with structural fill. Most of the existing site soil is subject to erosion during periods of heavy rainfall. Excavations should be protected against erosion.

5.0 ADDITIONAL SERVICES

We recommend that Shannon & Wilson be retained to review those portions of the plans and specifications pertaining to geotechnical aspects of construction to evaluate if they are consistent with our recommendations. We also recommend that we observe the geotechnical aspects of construction, which will allow us to verify the subsurface conditions as they are exposed during construction and to evaluate if the work is accomplished in accordance with our recommendations.

6.0 LIMITATIONS

This report was prepared for the exclusive use of the PUD for the Entiatqua Trail project. It should be made available to prospective contractors for information on factual data only, and not as a warranty of subsurface conditions such as those interpreted from the exploration logs and presented in the discussions of subsurface conditions included in this report.

Within the limitations of the scope, schedule, and budget, the analyses, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical engineering principles and practice in this area at the time this report was prepared. We make no other warranty, either expressed or implied.

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they presently exist and further assume that the explorations are representative of the subsurface conditions throughout the project site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the explorations. Our conclusions and recommendations are based on our understanding of the project as described in this report and the site conditions as interpreted from the explorations.

If, during final design and construction, subsurface conditions different from those encountered in the field explorations are observed or appear to be present, we should be advised at once so that we could review these conditions and reconsider our recommendations where necessary. If there is substantial lapse of time between the submission of this report and the start of work at the site, or if conditions have changed because of natural forces or construction operations at or adjacent to the site, we recommend that this report be reviewed to determine the applicability of the conclusions and recommendations concerning the changed conditions or the time lapse.

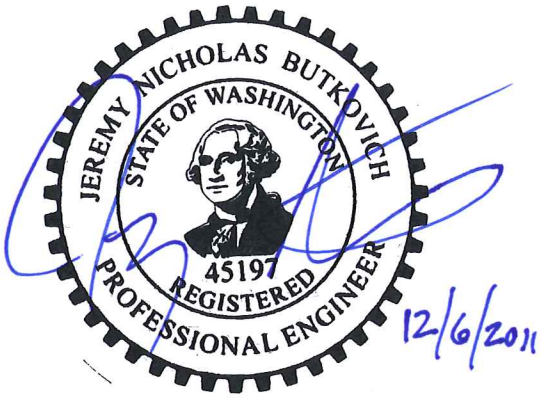
Unanticipated soil conditions are commonly encountered and cannot fully be determined merely by taking soil samples from a limited number of test pits or performing a limited number of penetration tests. Such unexpected conditions frequently require that additional expenditures be made to attain properly constructed projects. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

The scope of our geotechnical services did not include environmental assessment or evaluation regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air on or below the site, or any evaluation for disposal of contaminated soils or groundwater.

We did not evaluate the project site for potential impacts to natural resources, including wetlands, endangered species, or environmentally critical areas. Shannon & Wilson has staff experienced in these issues should they arise.

Shannon & Wilson has prepared Appendix B, "Important Information About Your Geotechnical/Environmental Report," to assist you and others in understanding the use and limitations of our reports.

SHANNON & WILSON, INC.



Jeremy N. Butkovich, P.E.
Principal Engineer

JNB:CAR/jnb

7.0 REFERENCES

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0 1000 2000

Approximate Scale in Feet

NOTE

Map adapted from aerial imagery provided by Google Earth Pro, image by U.S. Geological Survey reproduced by permission granted by Google Earth ™ Mapping Service.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

VICINITY MAP

November 2011 21-1-21501-003

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Geotechnical and Environmental Consultants

FIG. 1

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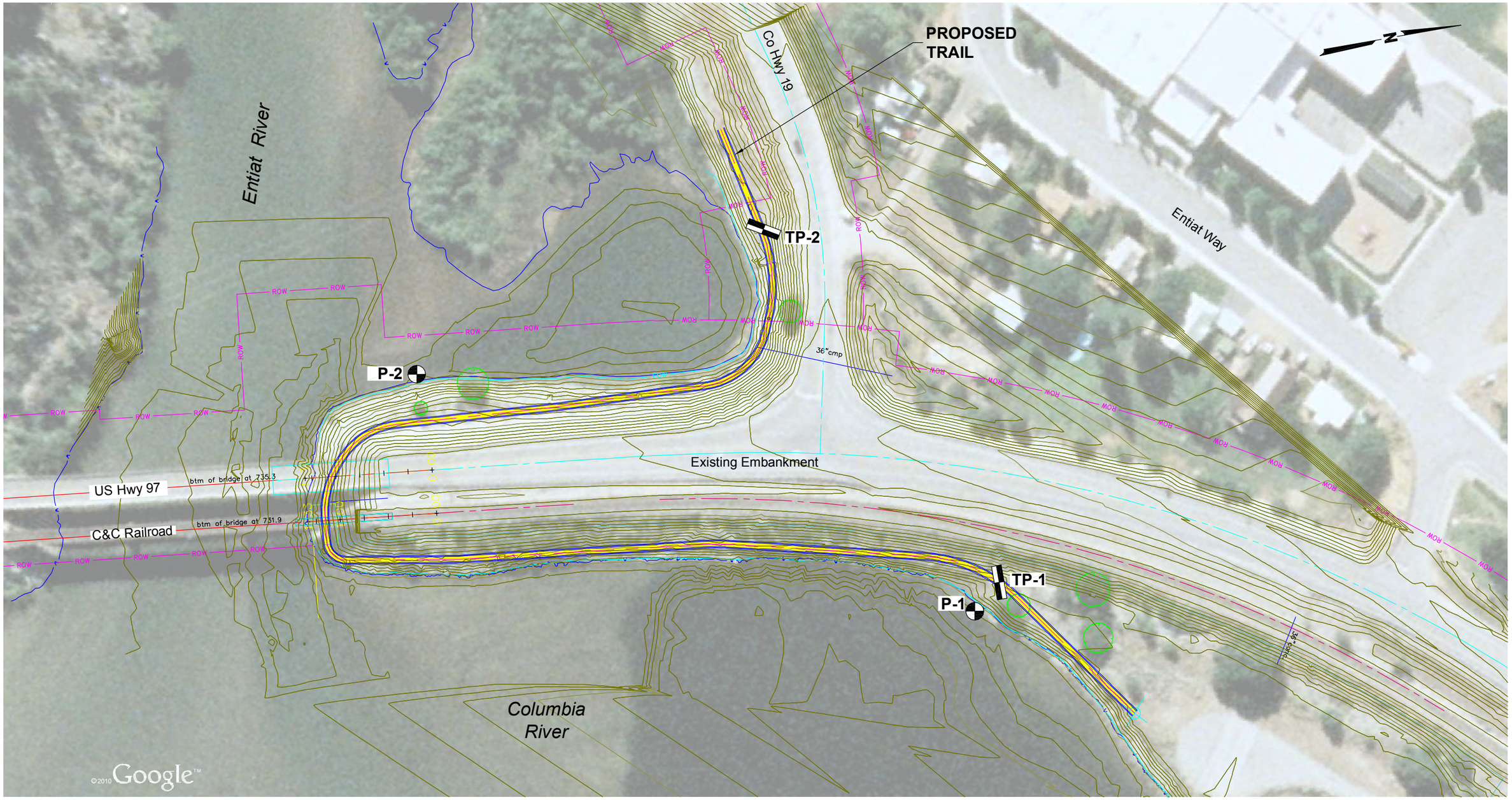

0 100 200

Scale in Feet

LEGEND

P-1 Penetration Test Designation and Approximate Location (See June 13,2011 report)

TP-1 Test Pit Designation and Approximate Location (See June 13,2011 report)

NOTE

Figure adapted from *"Entiatqua Trail Full Set 3-10-2011.DWG"*, dated 4-28-11.
Aerial imagery provided by Google Earth Pro, reproduced by permission granted by Google Earth ™ Mapping Service.

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

SITE AND EXPLORATION PLAN

November 2011 21-1-21501-003

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FIG. 2

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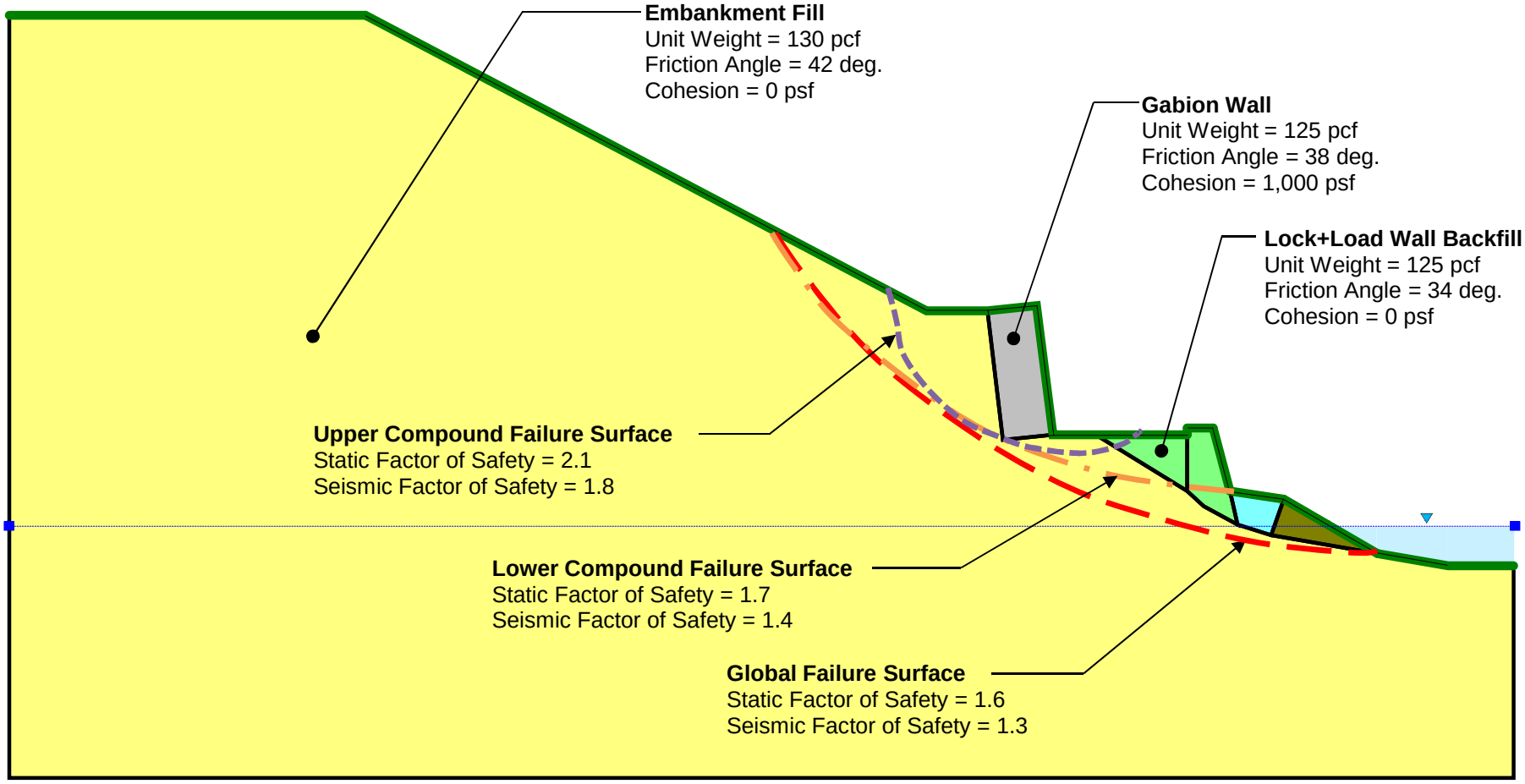

NOTES

1. We analyzed the slope stability using the computer program SLOPE/W (GeoStudio, 2008).
2. For the seismic cases, we applied a horizontal acceleration coefficient of 0.11 gravity.
3. We modeled the wall geometry provided by Chelan County PUD No. 1.
4. pcf = pounds per cubic foot
   deg. = degrees
   psf = pounds per square foot
   lb/ft = pounds per foot

FIG. 3

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

STABILITY ANALYSIS RESULTS
STATION 4+50

November 2011 21-1-21501-003

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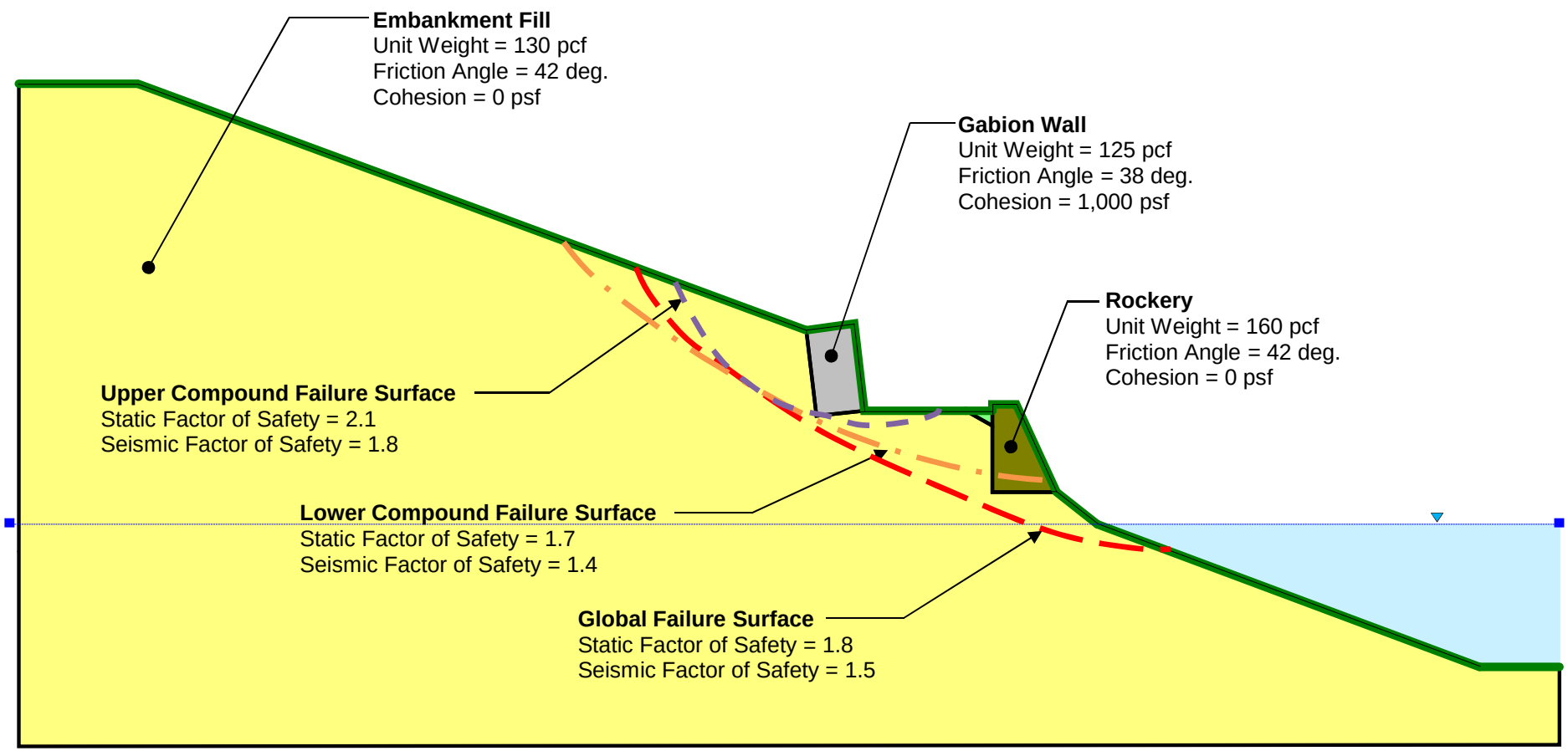
FIG. 3



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   psf = pounds per square foot
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FIG. 4

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

STABILITY ANALYSIS RESULTS
SECTION AT SR 97A BRIDGE

November 2011 21-1-21501-003

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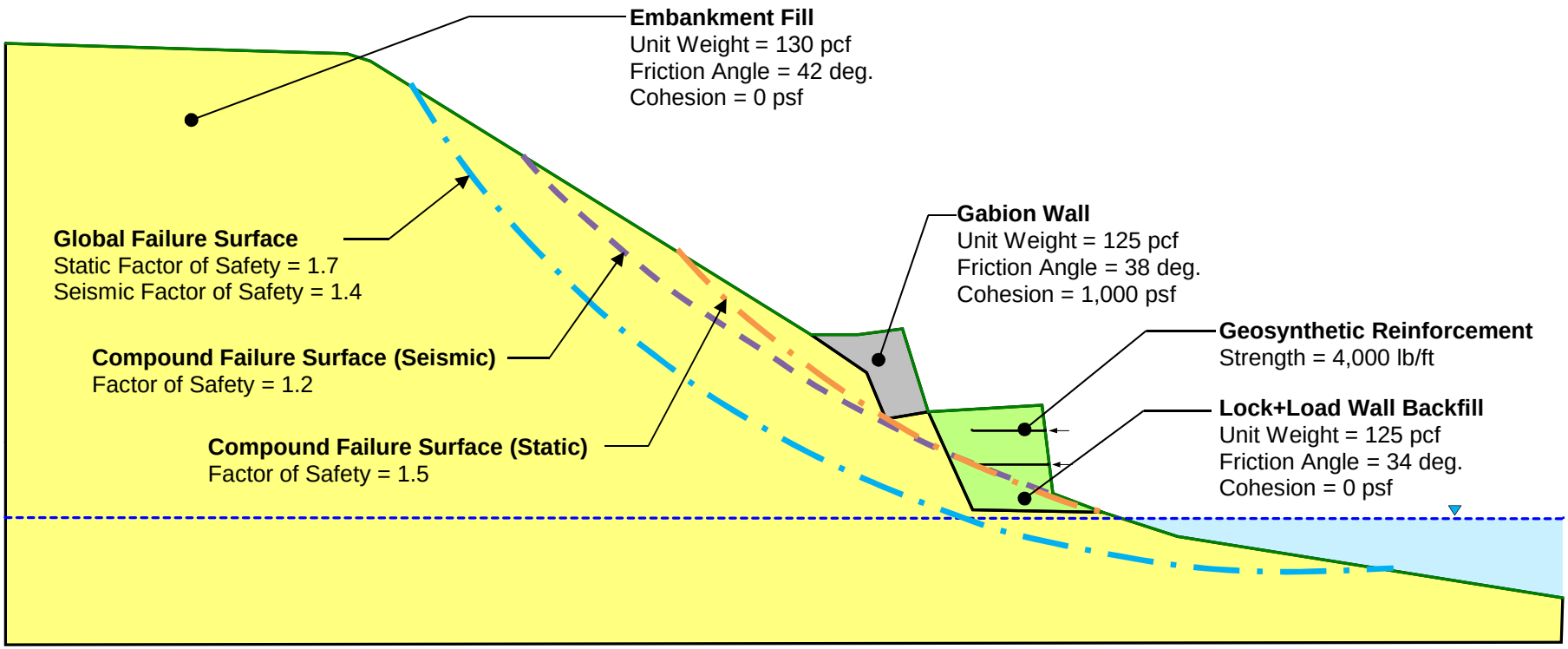
FIG. 4



NOTES

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2. For the seismic cases, we applied a horizontal acceleration coefficient of 0.11 gravity.
3. We modeled the wall geometry provided by Chelan County PUD No. 1.
4. pcf = pounds per cubic foot
   deg. = degrees
   psf = pounds per square foot
   lb/ft = pounds per foot

FIG. 5

Entiatqua Trail
Chelan County PUD No. 1
Entiat, Washington

STABILITY ANALYSIS RESULTS
STATION 15+46

November 2011 21-1-21501-003

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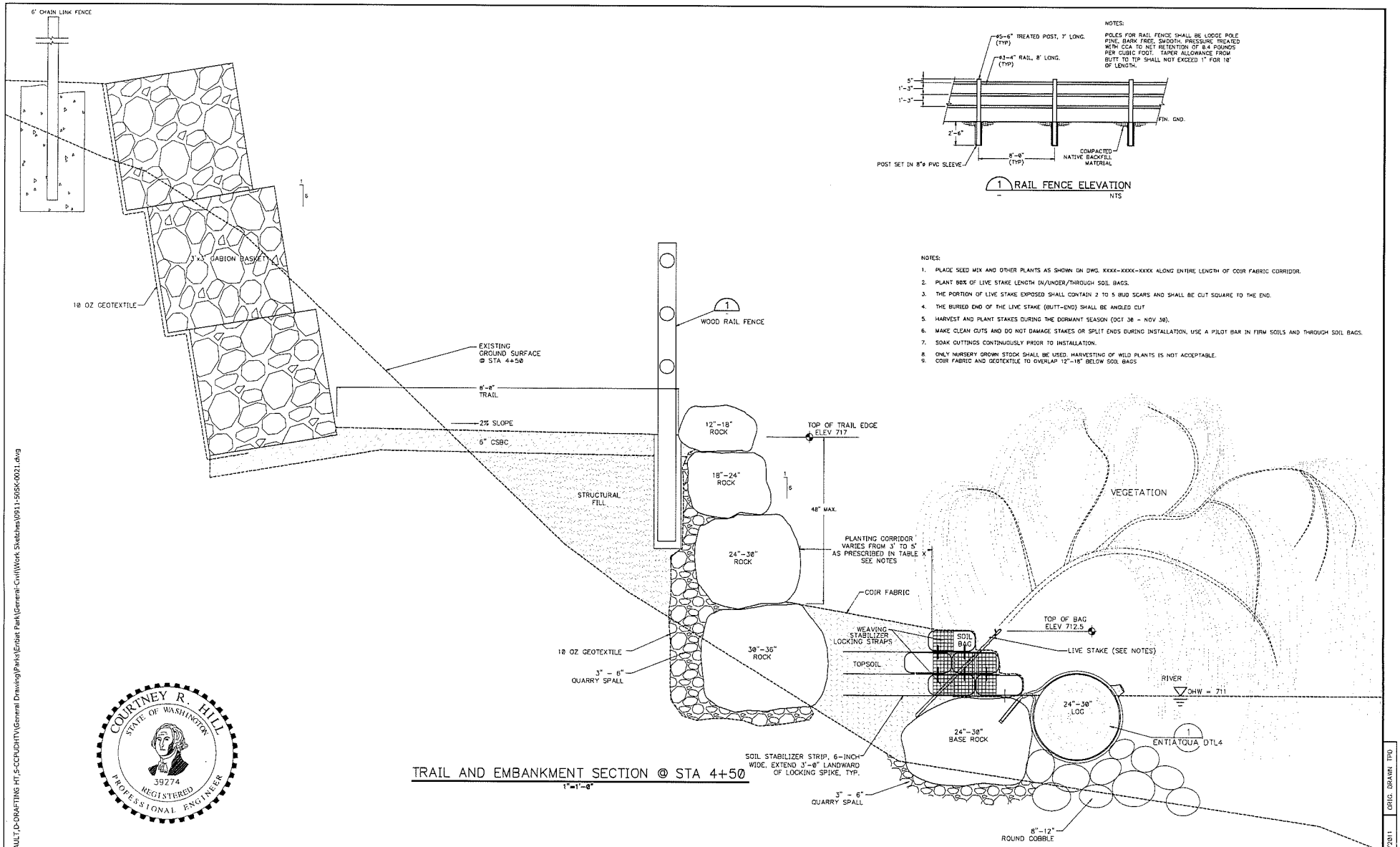
FIG. 5

APPENDIX A

ENGINEERING CALCULATIONS

STATION 4+50



TRAIL AND EMBANKMENT SECTION @ STA 4+50
1"=1'-0"

1 RAIL FENCE ELEVATION
NTS

COURTNEY R. HILL
STATE OF WASHINGTON
39274
REGISTERED
PROFESSIONAL ENGINEER

\\COBALT\ami\AULT_D-DRAFTING HT\5-CCPUDHTV\General Drawing\Parks\Entiat Park\General-Civil\Work Sketches\0911-50SK-0021.dwg

CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE @ 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. C.HILL							
2ND ENG.	0	10/10/2011	FEASIBILITY		CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

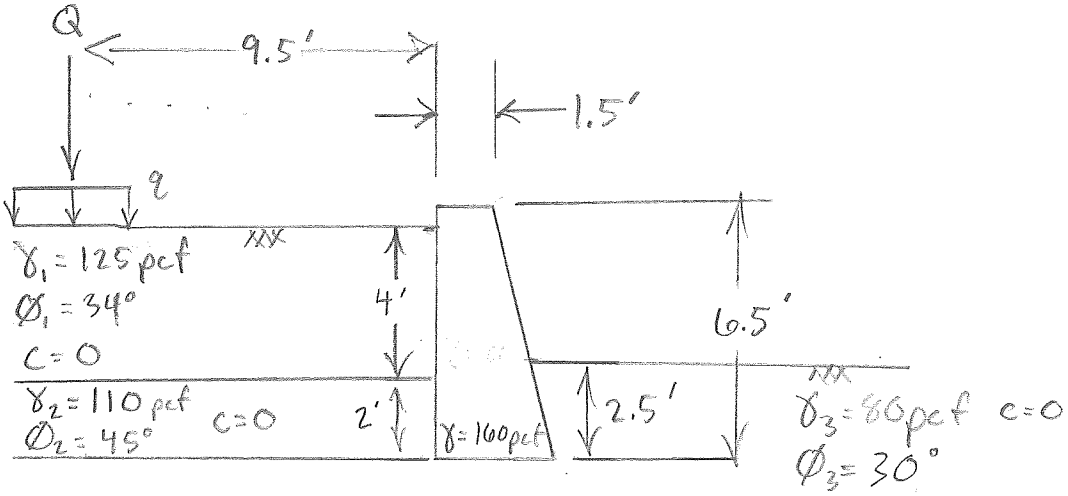
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
TYPICAL SECTION - DEEP WATER
FIGURE 3

SHEET 2 OF 2
REVISION 0
DATE 10/10/2011
DWG. 0911-50SK-0021

ORIG. DRAWN TPD
ORIG. DATE 9/1/2011

EXTERNAL STABILITY CALCS. Sta 4+50



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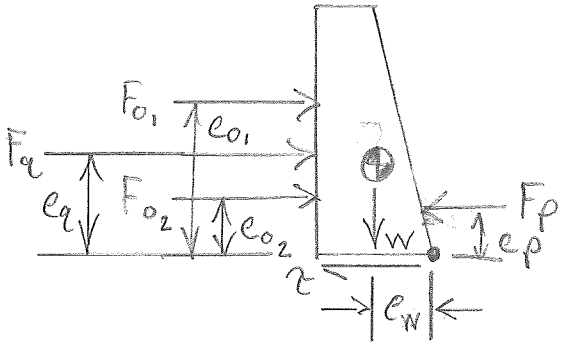


STATIC LOAD CALCS:

$K_{a_1} = \tan^2(45 - \phi_1/2) = \tan^2(45 - 34/2) = 0.28$

$K_{a_2} = \tan^2(45 - \phi_2/2) = \tan^2(45 - 45/2) = 0.17$

$F_{o_1} = \frac{1}{2}\gamma_1 (4')^2 K_{a_1} = \frac{1}{2}(125\text{ pcf})\,16\text{ ft}^2\,(0.28) = 280\text{ lb/ft}$

$F_{o_2} = \frac{1}{2}\left[\gamma_1(4')K_{a_1} + \left[\gamma_1(4')K_{a_1} + \gamma_2(2')K_{a_2}\right]\right]2'$

$= \frac{1}{2}\left[125(4)\,0.28 + \left[125(4)\,0.28 + 110(2)\,0.17\right]\right]2 = 317\text{ lb/ft}$

$e_{o_1} = 3.33'$

$e_{o_2} = \dfrac{34(0.67) + 280(1)}{34 + 280} = 0.96'$

$F_q = 937\text{ lb/ft}$

$e_q = 1.79'$

$K_p \approx \tan^2\left(45 + \frac{\phi_3}{2}\right) = \tan^2(45 + 30/2) = 3$

$F_p = \frac{1}{2}\gamma_3 (2.5')^2 K_p = \frac{1}{2}(80\,pcf)(2.5')^2 = 750$ lb/ft

$e_p = 0.83'$

$W = A\gamma = 13.5\,ft^2(160\,pcf) = 2160$ lb/ft

$e_w = 1.83'$

SEISMIC LOAD CALCS:

$A = 0.1 \Rightarrow k_h = (1.45 - A)A = 0.135$

MONONOBE-OKABE EQN $\Rightarrow \theta = \tan^{-1}(k_h) = \tan^{-1}(0.135) = 7.69$

$$K_{ae_1} = \frac{\cos^2(\phi - \theta)}{\cos\theta\cos(\phi_w + \theta)\left[1 + \sqrt{\frac{\sin(\phi + \phi_w)\sin(\phi - \theta)}{\cos(\phi_w + \theta)}}\right]^2}$$

$$K_{ae_1} = \frac{\cos^2(34 - 7.69)}{\cos(7.69)\cos(42 + 7.69)\left[1 + \sqrt{\frac{\sin(34+42)\sin(34-7.69)}{\cos(42+7.69)}}\right]^2}$$

$= 0.38$

$$K_{ae_2} = \frac{\cos^2(45 - 7.69)}{\cos(7.69)\cos(48 + 7.69)\left[1 + \sqrt{\frac{\sin(45+48)\sin(45-7.69)}{\cos(48+7.69)}}\right]^2}$$

$= 0.27$

$F_{oe_1} = \frac{1}{2}(125)4^2(0.38) = 380$ lb/ft

$F_{oe_2} = \frac{1}{2}\left[125(4)0.38 + \left[125(4)0.38 + 110(2)0.27\right]\right]2 = 439$ lb/ft

OVERTURNING:

$d_w = 2.5'$

$B = 3'$

$W = 2160\ lb/ft$

$$\Sigma M_{RES.} = W e_w + F_p e_p = 2160(1.83) + 750(0.83) = 4575\ \frac{lb\text{-}ft}{ft}$$

$$\Sigma M_{PRIV.} = F_{oc_1} e_{o_1} + F_{oe_2} e_{o_2} + F_q e_q = 380(3.33) + 439(0.96) + 937(1.79)$$

$$= 3364\ \frac{lb\text{-}ft}{ft}$$

$$FS_{O.T.} = \frac{\Sigma M_{RES}}{\Sigma M_{PRIV}} = \frac{4575}{3364} = 1.36 \not\geq 0.75(2) = 1.5$$

(JUST FAILS)

Reduce wall height or include geogrid reinforcement

New design includes Lock+Load wall; see Section 15+46 calculations.

SLIDING:

$$\Sigma F_{RES.} = 2160 \tan(45) + 750 \text{ lb/ft} = 2910 \text{ lb/ft}$$

$$\Sigma F_{DRIV} = 280 + 317 + 937 = 1534 \text{ lb/ft}$$

$$FS_{SLIDING} = \frac{2910}{1534} = 1.90 > 0.75(1.5) = 1.13 \quad \boxed{\text{SAFE}}$$

BEARING CAPACITY:

$$e = \frac{\Sigma M_{DRIV}}{W} = \frac{3364}{2160} = 1.56 > \frac{B}{6} = 0.5 \quad \therefore \text{TENSION AT BASE}$$

CALC. B_{MIN} REQUIRED FOR COMP. ACROSS ENTIRE BASE:

$$0.5 > \frac{3364}{480 B_{MIN} + 720}$$

$$240 B_{MIN} + 360 > 3364$$

$$B_{MIN} > 12.5'$$

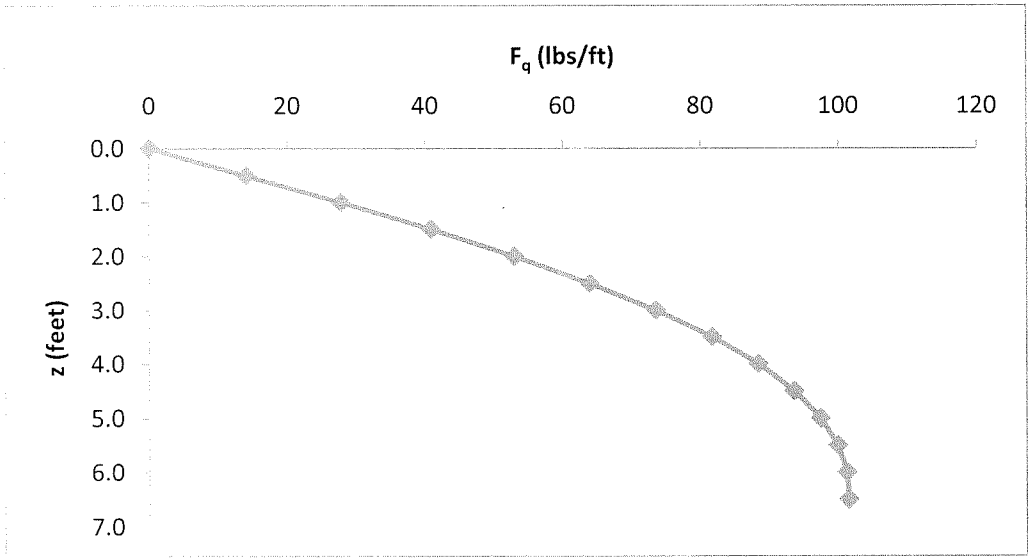
SINCE $e > B/6 \Rightarrow$

$$\sigma_{V_{max}} = \frac{4W}{3(B-2e)} = \frac{4(2160)}{3(4-2(1.56))} = 3273 \text{ psf}$$

$$q_{ULT} = \frac{1}{2}(110)3(60) = 9405 \text{ psf}$$

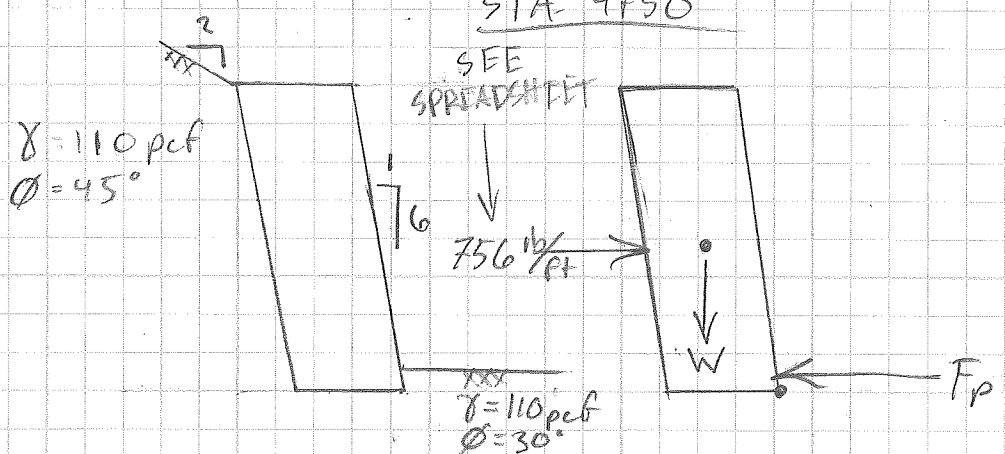
$$FS_{B.C.} = \frac{9405}{3273} = 2.87 > 0.75(1.5) \quad \boxed{\text{SAFE}}$$

z	n	$\sigma_h = F_q$ (lbs/ft)	A_i	c_iA_i	e_q (feet)
0.0	0.00	0.00	0.00	0.00	1.79
0.5	0.07	14.07	7.03	3.52	
1.0	0.14	27.80	13.90	13.90	
1.5	0.21	40.86	20.43	30.65	
2.0	0.29	52.98	26.49	52.98	
2.5	0.36	63.93	31.97	79.92	
3.0	0.43	73.54	36.77	110.31	
3.5	0.50	81.70	40.85	142.98	
4.0	0.57	88.38	44.19	176.76	
4.5	0.64	93.59	46.79	210.57	
5.0	0.71	97.39	48.69	243.47	
5.5	0.79	99.88	49.94	274.68	
6.0	0.86	101.19	50.60	303.57	
6.5	0.93	101.46	50.73	329.73	
	Σ =	936.77	468.39	1973.03	



EXTERNAL STABILITY CALCS. GABION WALLS

STA 4+50



$W = 3'(3')\,3\,(100\ pcf) = 2800\ lb/ft$

$K_p = \tan^2(45 + 30/2) = 3$

$F_p = \frac{1}{2}(110\ pcf)(0.5')^2\,3 = 41.3\ lb/ft$

OVERTURNING:

$\Sigma M_{RES} = W(2.4') + F_p(0.25')$

$= 2800(2.9') + 41.3(0.25') = 8130\ \frac{lb\text{-}ft}{ft}$

$\Sigma M_{DRIV} = 756(4) = 3024\ \frac{lb\text{-}ft}{ft}$

$\rightarrow FS_{O.T} = \frac{8130}{3024} = 2.69 > 0.75(2) = 1.5$ **SAFE**

SLIDING:

$\Sigma F_{RES} = 2800 \tan(30) + 41.3 = 1658\ lb/ft$

$\Sigma F_{DRIVE} = 756$

$FS_{SLIDING} = \frac{1658}{756} = 2.19 > 0.75(1.5) = 1.125$ **SAFE**

BEARING CAPACITY:

$$e = \frac{\Sigma M_{DRIV}}{W} = \frac{3024}{2800} = 1.08 > \frac{B}{6} = 0.5$$ TENSION @ BASE

$$\therefore \sigma_{V_{max}} = \frac{4W}{3(B-2e)} = \frac{4(2600)}{3(3-2(1.08))} = 4444 \text{ psf}$$

$$q_{ULT} = \frac{1}{2}(110)\,3\,(60) = 9405 \text{ psf}$$

(N_γ)

$$FS = \frac{9405}{4444} = 2.12 > 0.75(2) = 1.5$$ SAFE

Calculation of Dynamic Earth Pressures
(Ø soil with no liquefaction)

Job No.: 21-1-21501-003
Date: 11/11/2011
by: BRC
Wall/Footing: Sta 4+50
Conditions:

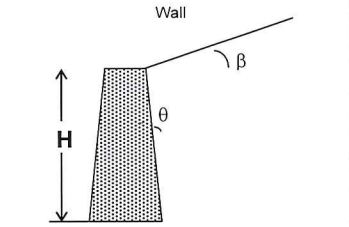
	INPUT	
Height of Retained Soil, H (ft)	8	
Soil Unit Weight, gamma (pcf)	110	
Soil Angle of Friction, ϕ (deg.)	45	0.7854 Angles (rad.)
Horizontal Acceleration Coefficient, kh (g's)	0.1	Assume kh=1/2*PGA
Vertical Acceleration Coefficient, kv (g's)	0	
Angle of Friction between soil & wall, δ (deg.)	40	0.6981 Angles (rad.)
Slope of Soil Face, θ (deg.)	-10	-0.1745 Angles (rad.)
Slope Behind Wall, β (deg.)	26	0.4538 Angles (rad.)
Theta	5.7106	0.0997

RESULTS

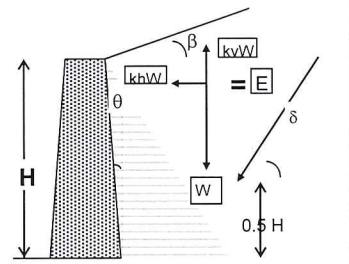
		Dynamic	Static	
			Rankine	Coulomb
ACTIVE	Active Earth Pressure Coefficient with Earthquake Effect, Kae	0.215	0.146	0.139
	Active Pressure at Base of Wall (psf)	189	128	122
	Active Pressure Equivalent Fluid Weight (pcf)	24	16	15
	Active Earth Force on Wall, Ea (lb)	756	513	488
	Δkae		0.069	0.076
	Dynamic Active Earth Force Increment		242.6	267.2
	Uniformly Distributed Active Pressure Increase		30.3	33.4
	Percent Increase in Active pressure		47%	55%
	Uniformly Distributed Active Pressure Increase divided by the wall height (psf/ft)		3.8	4.2
PASSIVE	Passive Earth Pressure Coefficient with Earthquake Effect, Kpe	8.360	99.705	8.999
	Passive Pressure at Base of Wall (psf)	7.357E+03	8.774E+04	7.919E+03
	Passive Pressure Equivalent Fluid Weight (pcf)	9.196E+02	1.097E+04	9.899E+02
	Passive Earth Force on Wall, Ep (lb)	2.943E+04	3.510E+05	3.168E+04

		Dynamic	Static
			Rankine
AT REST	At Rest Earth Pressure Coefficient with Earthquake Effect, Koe	0.353	0.293
	At Rest Pressure at Base of Wall (psf)	311	258
	At Rest Pressure Equivalent Fluid Weight (pcf)	39	32
	At Rest Earth Force on Wall, Eo (lb)	1244	1031
	Δkae		0.061
	Dynamic At Rest Earth Force Increment		213
	Uniformly Distributed At Rest Pressure Increase		27
	Percent Increase in Active pressure		21%
	Uniformly Distributed At Rest Pressure Increase divided by the wall height (psf/ft)		3.3

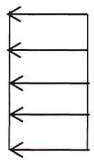
DIAGRAMS



Pressure Distribution



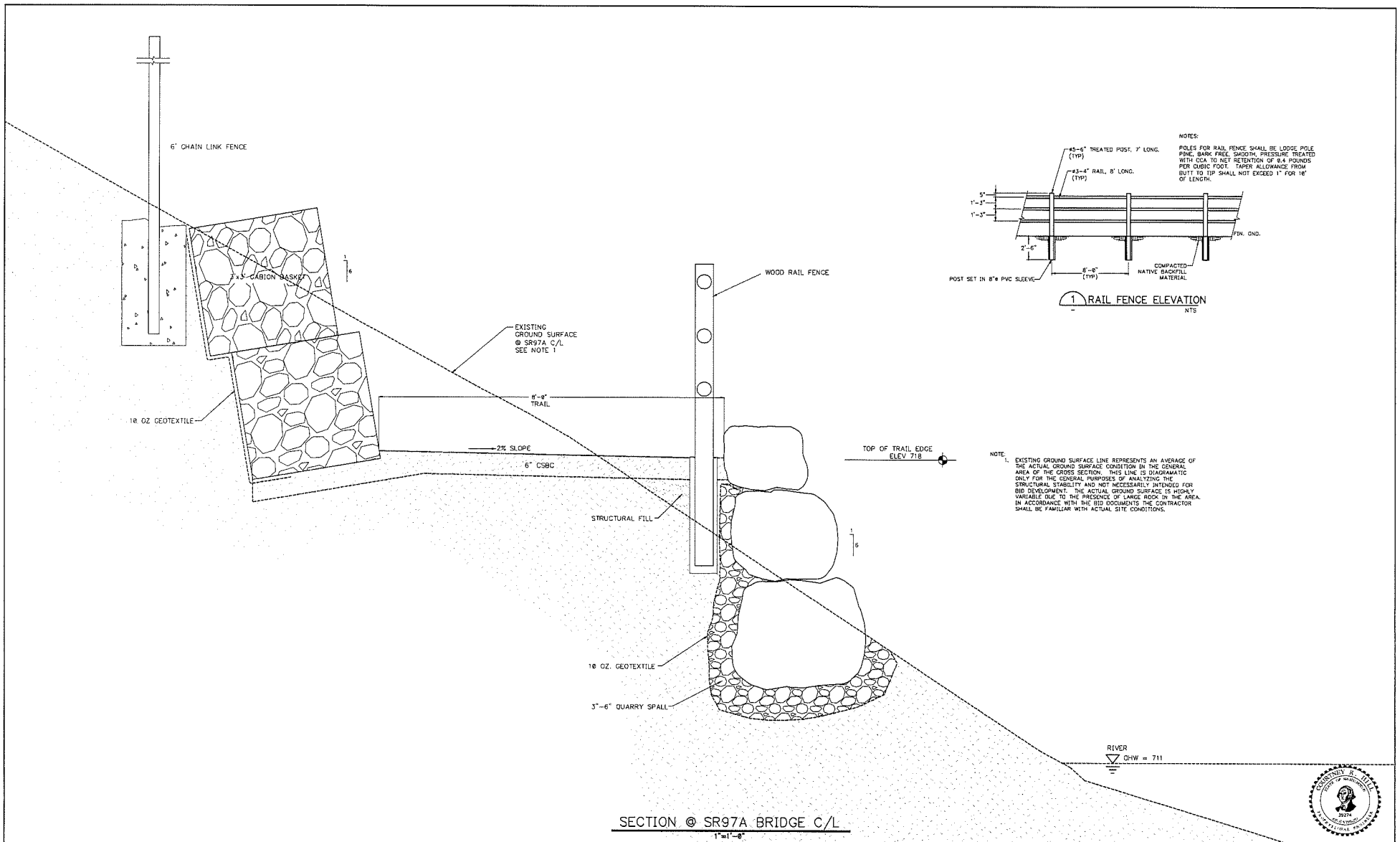
Seismic Increment



$0.5\gamma H[Kae(1-k_v)-Ka]$

Notes:
1. When calculating equivalent fluid weight, this spreadsheet assumes that the pressures and associated force E (active or passive) acts horizontally.
2. Active and Passive dynamic earth pressure coefficients are calculated using Mononobe-Okabe Method. At Rest dynamic earth pressure coefficient is calculated using Zhang et al. (1998) with R = 0.

STATION AT SR97A BRIDGE



SECTION @ SR97A BRIDGE C/L
1"=1'-0"

CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING. VERIFY SCALE 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.				
PRIM. ENG. C.HILL							
2ND ENG.	0	10/27/2011	FEASIBILITY		CRH	TPD	
PROJ. MGR.	REV	DATE	REVISION		REQ. BY	DRFT	

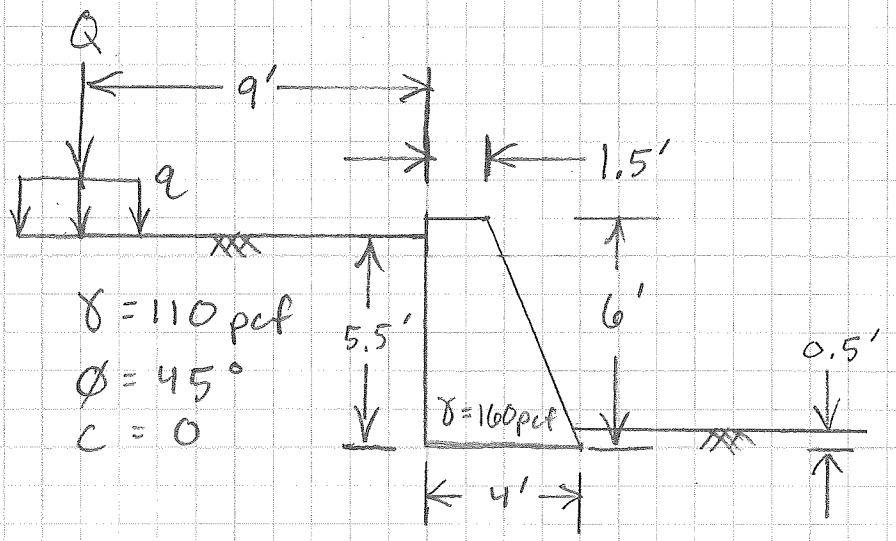
PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
TYPICAL SECTION – AT SR97A BRIDGE C/L

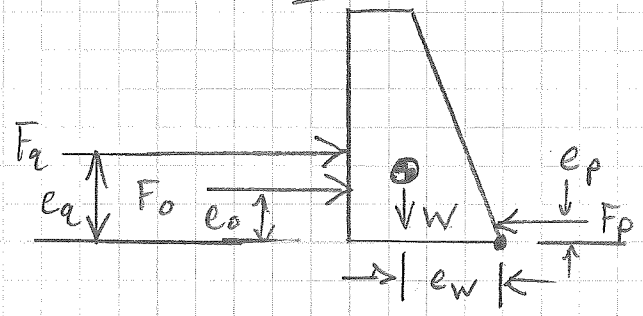
FIGURE 6

SHEET	1 OF 1
REVISION	0
DATE	10/27/2011
DWG.	0911-50SK-0024

EXTERNAL STABILITY



FBD



SEISMIC LOAD CALCS:

$A = 0.1 \Rightarrow k_h = (1.45 - A)A = 0.135$

USING MONONOBE & OKABE $\Rightarrow \theta = \tan^{-1}(k_h) = 7.69$

$$K_{ae} = \frac{\cos^2(\phi - \theta)}{\cos\theta \cos(\phi_w + \theta)\left[1 + \sqrt{\frac{\sin(\phi+\phi_w)\sin(\phi-\theta)}{\cos(\phi_w+\theta)}}\right]^2}$$

ASSUME $\phi_w \approx 42°$

$$K_{ae} = \frac{\cos^2(45 - 7.69)}{\cos(7.69)\cos(42+7.69)\left[1 + \sqrt{\frac{\sin(45+42)\sin(45-7.69)}{\cos(42+7.69)}}\right]^2}$$

$= 0.25$

$K_p = \tan^2(45 + \phi/2) = \tan^2(45 + 45/2) = 5.83$

$F_o = \frac{1}{2} \gamma H^2 K_{a_e} = \frac{1}{2}(110)\,5.5^2\,(0.25) = 416$ lb/ft

$e_o = 1.83'$

$F_q = 597$ lb/ft
$e_q = 1.27'$
} SEE SPREADSHEET
LATERAL LOADS MODELED BY STRIPLOAD

$W = A\,\gamma_{wall} = 15.4\ ft^2\,(160\ pcf) = 2464$ lb/ft

$e_w = \dfrac{8.25(3.25) + 6.88(1.67)}{15.4} = 2.49'$

$F_p = \frac{1}{2} \gamma d_w^2 K_p = \frac{1}{2}(110)(0.5)^2\,5.83 = 80$ lb/ft

$e_p = 0.17'$

OVERTURNING:

$$\Sigma M_{RES.} = W e_w + F_p e_p = 2464\,(2.49) + 80\,(0.17)$$
$$= 6148 \text{ lb-ft/ft}$$

$$\Sigma M_{DRIV.} = F_o e_o + F_q e_q = 416\,(1.83) + 597\,(1.27)$$
$$= 1519 \text{ lb-ft/ft}$$

$$FS_{O.T} = \frac{6149}{1519} = 4.05 > 0.75\,(2) = 1.5 \quad \boxed{\text{SAFE}}$$

SLIDING:

USE MIN ϕ

$$\Sigma F_{RES} = W \tan(\phi) + F_p$$
$$= 2464 \tan(45) + 80 = 2544 \text{ lb/ft}$$

$$\Sigma F_{DRIV} = F_o + F_q = 416 + 597 = 1013 \text{ lb/ft}$$

$$FS_{SLIDING} = \frac{2544}{1013} = 2.51 > 0.7\,(1.5) = 1.05 \quad \boxed{\text{SAFE}}$$

BEARING CAPACITY:

$$e = \frac{\Sigma M_{DRIV}}{W} = \frac{1519}{2464} = 0.62 < \frac{B}{6} = 0.67 \;\checkmark$$

$$\therefore \sigma_{V_{max}} = \frac{W}{4}\left[1 + \frac{6(0.62)}{4}\right] = 1189 \text{ psf}$$

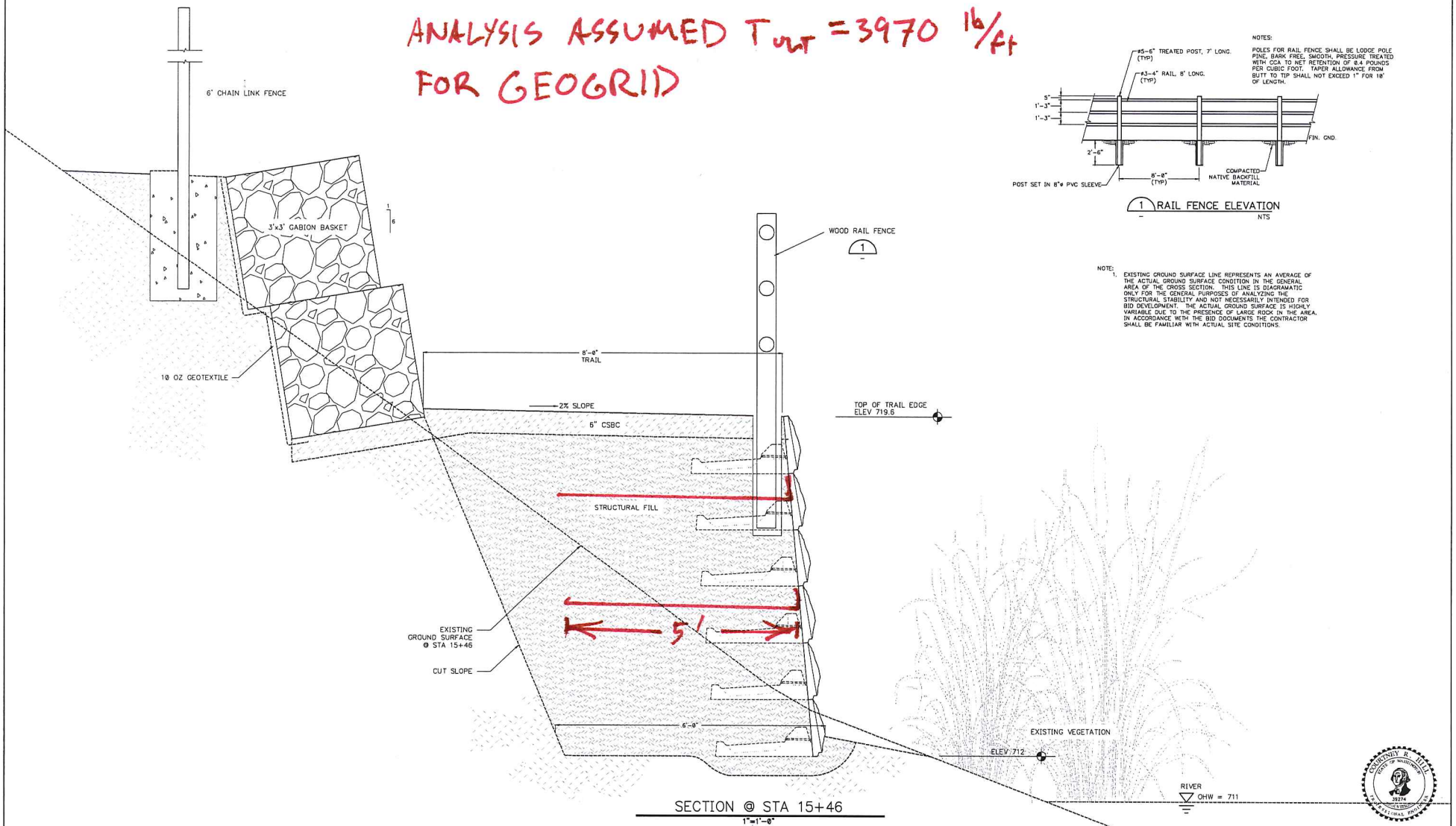
$$q_{ULT} = \frac{1}{2}(110)\,4\,(60) = 13200 \text{ psf}$$

(N_γ)

$$FS_{BEARING} = \frac{13200}{1189} = 11.1 >> 0.75\,(2) = 1.5 \quad \boxed{\text{SAFE}}$$

STATION 15+46

ANALYSIS ASSUMED T_{ult} = 3970 lb/ft FOR GEOGRID



SECTION @ STA 15+46
1"=1'-0"

NOTES:
POLES FOR RAIL FENCE SHALL BE LODGE POLE PINE, BARK FREE, SMOOTH, PRESSURE TREATED WITH CCA TO NET RETENTION OF 0.4 POUNDS PER CUBIC FOOT. TAPER ALLOWANCE FROM BUTT TO TIP SHALL NOT EXCEED 1" FOR 10' OF LENGTH.

1 RAIL FENCE ELEVATION
NTS

NOTE:
1. EXISTING GROUND SURFACE LINE REPRESENTS AN AVERAGE OF THE ACTUAL GROUND SURFACE CONDITION IN THE GENERAL AREA OF THE CROSS SECTION. THIS LINE IS DIAGRAMATIC ONLY FOR THE GENERAL PURPOSES OF ANALYZING THE STRUCTURAL STABILITY AND NOT NECESSARILY INTENDED FOR BID DEVELOPMENT. THE ACTUAL GROUND SURFACE IS HIGHLY VARIABLE DUE TO THE PRESENCE OF LARGE ROCK IN THE AREA. IN ACCORDANCE WITH THE BID DOCUMENTS THE CONTRACTOR SHALL BE FAMILIAR WITH ACTUAL SITE CONDITIONS.

COURTNEY R. HILL — STATE OF WASHINGTON — 39274 — REGISTERED PROFESSIONAL ENGINEER

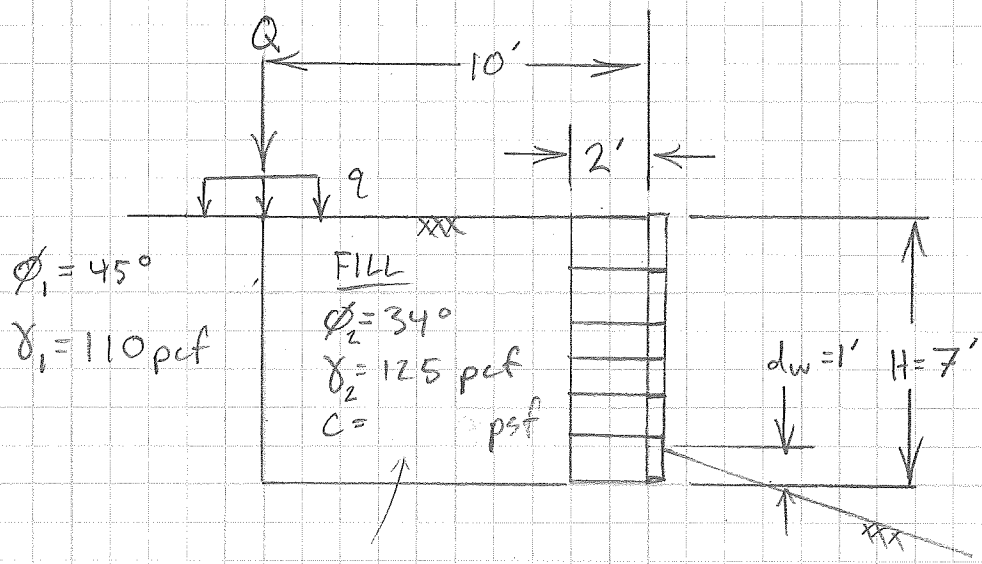
CHELAN PUD NO.1		SCALE SEE DWG	BAR IS ONE INCH ON ORIGINAL DRAWING.	VERIFY SCALE 0 — 1"	IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.		
PRIM. ENG. C.HILL							
2ND ENG.	0	10/27/2011	FEASIBILITY			CRH	TPD
PROJ. MGR.	REV	DATE	REVISION			REQ. BY	DRFT

PUBLIC UTILITY DISTRICT NO. 1 OF CHELAN COUNTY
WENATCHEE, WASHINGTON

Entiat Park
ENTIATQUA TRAIL
TYPICAL SECTION – STEEP BEND
FIGURE 9

SHEET	1 OF 1
REVISION	0
DATE	10/27/2011
DWG.	0911-50SK-0022

STA 15+46 EXTERNAL STABILITY CALCS.



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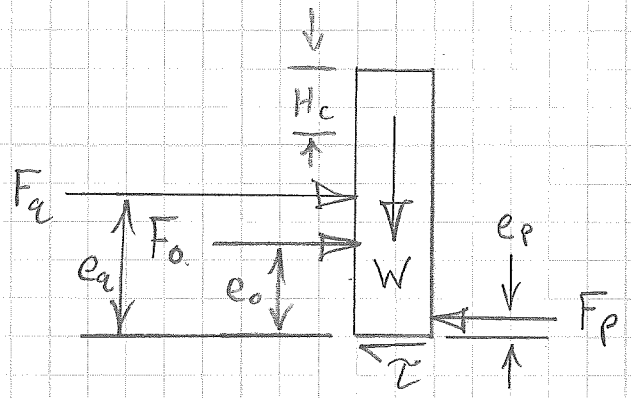

LOAD CALCS:

$K_a = \tan^2(45 - \phi_2/2) = \tan^2(45 - 34/2) = 0.28$ "FILL"

$K_p = \tan^2(45 + \phi_1/2) = \tan^2(45 + 45/2) = 5.83$ "NATIVE"

$H_c = \dfrac{2c}{\gamma_2 \sqrt{K_a}} = \dfrac{2(\quad \text{psf})}{125\sqrt{0.28}} =$

ASSUME $C = 0 \Rightarrow H_c = 0.0'$

$F_o = \dfrac{\gamma_2 H^2 K_a}{2} - 2cH\sqrt{K_a} + \dfrac{2c^2}{\gamma_2} = \frac{1}{2}(125\text{ pcf})7^2(0.28)$

$= 858$ lb/ft

$e_o = 2.3'$

$F_q = 792$ lb/ft
$e_q = 2.58'$
} SEE SPREADSHEET
ASSUMED $\gamma_{GABIONS} = 100$ pcf $\Rightarrow Q = 1800$ lbs

OVERTURNING:

$d_w = 1'$

$B = 2'$

$W = 60 \frac{lbs}{ft}(6) + 125\ pcf\,(7')2' = 2110$ lb/ft

$\Sigma M_{RES.} = W(B/2) + \frac{1}{2}\gamma_1 d_w^2 K_p e'_p =$

2110 lb/ft $\left(\frac{2'}{2}\right) + \frac{1}{2}(110\ pcf)(1')^2 5.83(0.33') = 2216$ lb-ft/ft

$\Sigma M_{O.T.} = F_o e_o + F_q e_q = 858(2.3) + 792(2.58) = 4017$ lb-ft/ft

$\Rightarrow FS_{O.T.} = \frac{\Sigma M_{RES.}}{\Sigma M_{O.T.}} = \frac{2216}{4017} = 0.55 < 2$ FAILS

CALC. B_{MIN}:

$\Sigma M_{RES.} = [\overbrace{360}^{W} + 875 B_{MIN}]\left(\frac{B_{MIN}}{2}\right) + 105.81$

$= 180 B_{MIN} + 437.5 B_{MIN}^2 + 105.81$

$FS_{O.T.} = \frac{437.5 B_{MIN}^2 + 180 B_{MIN} + 105.81}{4017} \geq 2$

$= 437.5 B_{MIN}^2 + 180 B_{MIN} - 7928.19 \geq 0$

$\Rightarrow B_{MIN} \geq 4'$

SLIDING:

USE MIN ϕ

$$\Sigma F_{RES.} = W \tan \phi_2 + F_p = 2110 \text{ lb/ft} \tan(34) + 105.81 = 1529 \text{ lb/ft}$$

$$\Sigma F_{DRIV.} = F_a + F_q = 858 + 792 = 1650 \text{ lb/ft}$$

$$FS_{SLIDING} = \frac{1529}{1650} = 0.93 < 1.5 \quad \text{FAILS}$$

CALC. B_{MIN}:

$$\Sigma F_{RES.} = [360 + 875 B_{MIN}] \tan(34) + 105.81 =$$
$$= 242.82 + 590.19 B_{MIN} + 105.81$$
$$= 348.63 + 590.19 B_{MIN}$$

$$FS_{SLIDING} = \frac{348.63 + 590.19 B_{MIN}}{1650} \geq 1.5$$

$$B_{MIN} \geq 3.6'$$

BEARING CAPACITY:

$$\sigma_v = \frac{W}{B - 2e} \qquad e = \frac{\Sigma M_{O.T.}}{W}$$

$$\Sigma M_{O.T.} = 4017 \text{ lb-ft/ft}$$

$$W = 2110 \text{ lb/ft}$$

$$e = \frac{4017}{2110} = 1.90 > \frac{B}{6} = 0.33 \therefore \text{TENSION @ BASE}$$

CALC. B SUCH THAT $e < B/6$:

$$e = \frac{4017}{360 + 875B} < \frac{1}{6} B$$

$$0 < 60B + 145.83B^2 - 4017$$

$$B = 5.1'$$

$e = 0.85$

$\sigma_v = \frac{W}{B-2e} = \frac{360 + 875(5.1)}{5.1 - 2(0.85)} = 1419 \text{ psf}$

$\phi_{SUBGRADE} = \phi_1 = 45^\circ \Rightarrow N_\gamma \approx 57$

$q_{ULT} = \frac{1}{2}(110 pcf)\,5.1(57) = 15989 \text{ psf}$

$FS_{BEARING} = \frac{q_{ULT}}{\sigma_v} = \frac{15989}{1419} = 11$ SAFE

FINAL NOTES:

LOAD DISTRIBUTION ALONG BASE CONTROLS B_{MIN} REQUIRED FOR SOUND DESIGN.

$B_{MIN} \geq 5'$

THIS IS CONSISTENT W/ FHWA RECOMMENDED REINF. LENGTHS OF $L = 0.7H$

$5' > 0.7(7) > 4.9'$

$FS_{O.T.}$, $FS_{SLIDING}$, $FS_{BEARING}$ USED IN ANALYSIS WERE MANUFACTURER RECS. (LOCK+LOAD).

TITLE PAGE
==========

PROJECT IDENTIFICATION: LOCK+LOAD with 2.5ft CF - No Geogrid -
Project Number:

Client:
Designer: Chelan County PUD No 1
Station Number: 15+46
Description: 3 Stones High (4 Ft.) 1:10 Std. Batter. No Backslope

Company's information:
Shannon & Wilson, Inc.
400 North 34th St.

Seattle, WA 98103
Telephone #:
Fax #:
E-Mail:

File path and name: C:\Documents and Settings\brc\Desktop\MSEW\Sta 15+46.BEN

Original date and time of creating this file: Tue Oct 28 09:42:49 2008
PROGRAM MODE: ANALYSIS
of a SIMPLE STRUCTURE
using GEOGRID as reinforcing material.

SOIL DATA
REINFORCED SOIL
Unit weight, gamma = 125.0 lb/ft ^{3}
Design value of internal angle of friction, phi = 34.0 °
RETAINED SOIL
Unit weight, gamma = 110.0 lb/ft ^{3}
Design value of internal angle of friction, phi = 45.0 °
FOUNDATION SOIL (Considered as an equivalent uniform soil)
Equivalent unit weight, gamma_equiv. = 110.0 lb/ft ^{3}
Equivalent internal angle of friction, phi_equiv. = 45.0 °
Equivalent cohesion, c_equiv. = 0.0 lb/ft ^{2}
Water table is at wall base elevation

LATERAL EARTH PRESSURE COEFFICIENTS
Ka (internal stability) = 0.2827 (if batter is less than 10°, Ka is calculated from eq. 15. Otherwise, eq. 38 is utilized)
Inclination of internal slip plane, ksii = 62.00° (see Fig. 28 in DEMO 82).
Ka (external stability) = 0.1716 (if batter is less than 10°, Ka is calculated from eq. 16. Otherwise, eq. 17 is utilized)

BEARING CAPACITY
Bearing capacity coefficients (calculated by MSEW): Nc = 0.00
N_gamma = 56.50

SEISMICITY
Maximum ground acceleration coefficient, Alpha_o = 0.10
Kae (Alpha_o > 0) = 0.1988
Kae (Alpha_o = 0) = 0.1386
d Kae = 0.0602 (see eq. 37 in DEMO 82)
Seismic soil-geogrid friction coefficient, F* is 80.0% of its specified static value.

INPUT DATA: Geogrids (Analysis)

D A T A	Geogrid type #1	Geogrid type #2	Geogrid type #3	Geogrid type #4	Geogrid type #5
Tult [lb/ft]	3970.0	4800.0	7810.0	9870.0	N/A
Durability reduction factor, RFd	1.0	1.0	1.0	1.0	N/A
Install.-damage reduc. fact., RFid	1.05	1.05	1.05	1.05	N/A
Creep reduction factor, RFc	2.60	2.60	2.60	2.60	N/A
Fs-overall for strength	N/A	N/A	N/A	N/A	N/A
Coverage ratio, Rc	1.000	1.000	1.000	1.000	N/A
Friction angle along geogrid-soil interface, ro	24.22	24.22	24.22	24.22	N/A
Pullout resistance factor, F*	0.7·tan(ph)	0.7·tan(ph)	0.7·tan(ph)	0.7·tan(ph)	N/A
Scale-effect correc. factor, alpha	0.8	0.8	0.8	0.8	N/A

Variation of Lateral Earth Pressure Coefficient With Depth

Z	K / Ka
0 ft	1.00
3.3 ft	1.00
6.6 ft	1.00
9.8 ft	1.00
13.1 ft	1.00
16.4 ft	1.00
19.7 ft	1.00

INPUT DATA: Facia and Connection (Analysis)

FACIA type: Segmental precast concrete panels.
Depth of panel is 2.50 ft. Horizontal distance to Center of Gravity of panel is 1.25 ft.
Average unit weight of panel is gamma_f = 135.00 lb/ft ^{3}

Z / Hd	To-static / Tmax or To-seismic / Tmd
0.00	1.00
0.25	1.00
0.50	1.00
0.75	1.00
1.00	1.00

D A T A (for connection only)	Type #1	Type #2	Type #3	Type #4	Type #5
Durability reduction factor, RFd	1.00	1.00	1.00	1.00	N/A
Creep reduction factor, RFc	1.00	1.00	1.00	1.00	N/A
Overall safety factor: connec. break, Fs	N/A	N/A	N/A	N/A	N/A
Overall safety factor: connec.pullout,Fs	N/A	N/A	N/A	N/A	N/A
CRu = Tult-connection/Tult-geogrid	0.00	0.00	0.00	0.00	N/A

INPUT DATA: Geometry and Surcharge loads (of a SIMPLE STRUCTURE)

Design height, Hd 7.00 [ft] {Embedded depth is E = 1.00 ft, and height above top of finished bottom grade is H = 6.00 ft }
Batter, omega 5.8 [deg]
Backslope, beta 2.0 [deg]
Backslope rise 0.3 [ft] Broken back equiv. angle, I = 1.15° (see Fig. 25 in DEMO 82)

U N I F O R M S U R C H A R G E
Uniformly distributed dead load is 0.0 [lb/ft ²]

OTHER EXTERNAL LOAD(S)
[S1] Strip Load, Pv-d = 1800.0 and Pv-l = 0.0 [lb/ft].
Footing width, b=3.0 [ft]. Distance of center of footing from wall face, d = 10.0 [ft]

ANALYSIS: CALCULATED FACTORS (Static conditions)

Bearing capacity, Fs = 7.56, Foundation Interface: Direct sliding, Fs = 5.754, Eccentricity, e/L = 0.0186.

GEOGRID			CONNECTION					
#	Elevation [ft]	Length [ft]	Type #	Fs-overall [pullout resistance]	Fs-overall [connect. break]	Fs-overall [geogrid strength]	Geogrid strength Fs	Pullout resistance Fs	Direct sliding Fs	Eccent. e/L
1	2.45	5.00	1	N/A	0.00	2.11	2.106	2.385	5.939	-0.0024

2	5.05	5.00	1	N/A	0.00	7.40	7.402	2.675	13.243 -0.0122

ANALYSIS: CALCULATED FACTORS (Seismic conditions)

Bearing capacity, Fs = 5.26, Foundation Interface: Direct sliding, Fs = 2.936, Eccentricity, e/L = 0.0984.

GEOGRID #	Elevation [ft]	Length [ft]	Type #	CONNECTION Fs-overall [pullout resistance]	Fs-overall [connect. break]	Fs-overall [geogrid strength]	Geogrid strength Fs	Pullout resistance Fs	Direct sliding Fs	Eccent. e/L
1	2.45	5.00	1	N/A	0.00	1.99	1.989	1.655	3.069	0.0303
2	5.05	5.00	1	N/A	0.00	6.45	6.449	1.546	7.161	-0.0064

BEARING CAPACITY for GIVEN LAYOUT

	STATIC	SEISMIC	UNITS
Ultimate bearing capacity, q-ult	6466	5393	[lb/ft ²]
Meyerhof stress, sigma_v	855.0	1025.7	[lb/ft ²]
Eccentricity, e	0.09	0.49	[ft]
Eccentricity, e/L	0.019	0.099	
Fs calculated	7.56	5.26	
Base length	5.00	5.00	[ft]

DIRECT SLIDING for GIVEN LAYOUT

Along reinforced and foundation soils interface: Fs-static = 5.754 and Fs-seismic = 2.936

#	Geogrid Elevation [ft]	Geogrid Length [ft]	Fs Static	Fs Seismic	Geogrid type #
1	2.45	5.00	5.939	3.069	1
2	5.05	5.00	13.243	7.161	1

ECCENTRICITY for GIVEN LAYOUT

Along reinforced and foundation soils interface: e/L static = 0.0186 and e/L

seismic = 0.0984

#	Geogrid Elevation [ft]	Geogrid Length [ft]	e/L Static	e/L Seismic	Geogrid type #
1	2.45	5.00	-0.0024	0.0303	1
2	5.05	5.00	-0.0122	-0.0064	1

RESULTS for STRENGTH

#	Geogrid Elevation [ft]	Tavilable [lb/ft]	Tmax [lb/ft]	Tmd [lb/ft]	Specified minimum Fs-overall static	Actual calculated Fs-overall static	Specified minimum Fs-overall seismic	Actual calculated Fs-overall seismic
1	2.45	1454	690.52	105.39	N/A	2.106	N/A	1.989
2	5.05	1454	196.46	75.46	N/A	7.402	N/A	6.449

RESULTS for CONNECTION (static conditions)

#	Geogrid Elevat. [ft]	Connect. force, To connec break, [lb/ft]	Reduc. factor for connec pull. CRu	Reduc. factor connec strength, Tc-break criterion CRs	Available connect. strength, Tc-pull. criterion [lb/ft]	Available connect. strength, Tavail. [lb/ft]	Available Geogrid break Spec.Actu. [lb/ft]	Fs-overall connection break Spec.Actu.	Fs-overall connection pullout Spec.Actu.	Fs-overall Geogrid strength
1	2.45	691	0.00	N/A	0	N/A	1454	N/A	0.00	N/A	N/A	N/A	2.11
2	5.05	196	0.00	N/A	0	N/A	1454	N/A	0.00	N/A	N/A	N/A	7.40

RESULTS for CONNECTION (seismic conditions)

# Geogrid	Connect. Elevat.	Reduc. force, To	Reduc. factor for	Available connect. strength,	Available connect. strength,	Available Geogrid strength,	Fs-overall connection break		Fs-overall connection pullout	Fs-overall Geogrid strength
		connec break,	pull. connec	Tc-break criterion	Tc-pull. criterion	Tavail.	Spec.Actu.			
	[ft]	[lb/ft]	CRu	CRs	[lb/ft]	[lb/ft]	[lb/ft]			
1	2.45	796	0.00	N/A	0	N/A	1454	N/A	0.00 N/A	N/A N/A 1.99
2	5.05	272	0.00	N/A	0	N/A	1454	N/A	0.00 N/A	N/A N/A 6.45

RESULTS for PULLOUT

# Geogrid	Elevation [ft]	Coverage Ratio	Tmax [lb/ft]	Tmd [lb/ft]	Le [ft]	La [ft]	Avail. Static Pullout Pr [lb/ft]	Specif. Static Fs	Actual Static Fs	Avail. Seismic Pullout Pr [lb/ft]	Specif. Seismic Fs	Actual Seismic Fs
1	2.45	1.000	691	105	3.94	1.06	1646.6	N/A	2.385	1317.2	N/A	1.655
2	5.05	1.000	196	75	2.82	2.18	525.6	N/A	2.675	420.5	N/A	1.546

APPENDIX B

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 21-1-21501-003

Date: December 6, 2011
To: Mr. Courtney Hill, P.E.
Public Utility District No. 1 of Chelan County

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

SHORELINE MANAGEMENT PERMIT
ACTION SHEET

Application #:	SSD 13-01
Administering Agency	City of Entiat
Type of Permit:	■ Shoreline Substantial Development
Action:	■ Approved ☐ Denied
Date of Action:	February 20, 2013

Date Mailed to DOE/AG

Pursuant to Chapter 90.58 RCW and the Shoreline Master Program of the City of Entiat, a permit is hereby granted to:

PUD Entiatqua Trail

To undertake the following development: The applicant requests a shoreline substantial development permit for the construction of a public trail passing under the US 97A highway bridge at the mouth of the Entiat River;

Upon the following property: The project site is located in the NE and SE 1/4 of Section 17, Township 25, Range 21, in the City of Entiat, WA. From Wenatchee, follow Highway 97A for approximately 15 miles to Lake Shore Drive in Entiat, approximately ½ mile beyond the Entiat River Bridge. Take a right, cross the tracks, and follow the drive past the boat launch and to the northern end of the proposed trail;

Within 200 feet of *Columbia River/Entiat River* and/or its associated wetlands.

The project will be within a shoreline of state-wide significance (RCW 90.58.030). The project will be located within an Urban designation. The following Shoreline Master Program provisions are applicable to this development:

Development pursuant to this permit shall be undertaken in conformance with the following terms and conditions:

1. All conditions imposed herein shall be binding on the "Applicant," which terms shall include the owner or owners of the property, heirs, assigns and successors.

2. The proposed project shall proceed in accordance with the submitted plans, or revisions to those plans as required by the City of Entiat building inspector, the SEPA environmental review, and all other application materials.

3. The applicant shall comply with all restrictions and conditions submitted by the Washington State Department of Ecology and the Chelan County Public Utility District.

4. All applicable provisions of the Entiat Comprehensive Plan, the Entiat Shoreline Master Program, and the City's development regulations shall be complied with in the implementation and operation of the proposed project.

5. All applicable federal, state, and local permits shall be obtained and complied with in the implementation and operation of the proposed project. Copies of said permits shall be forwarded to the City.

6. Work in or near waters of the state shall be performed in accordance with current state and federal regulations. All construction debris shall be properly disposed of on land so that it cannot enter a waterway or cause water quality degradation to state waters.

FINDINGS OF FACT

1. The applicant requests a shoreline substantial development permit for the construction of a public trail passing under the US 97A highway bridge at the mouth of the Entiat River.

2. The project site is located in the NE and SE 1/4 of Section 17, Township 25, Range 21, in the City of Entiat, WA.

3. From Wenatchee, follow Highway 97A for approximately 15 miles to Lake Shore Drive in Entiat, approximately ½ mile beyond the Entiat River Bridge. Take a right, cross the tracks, and follow the drive past the boat launch and to the northern end of the proposed trail.

4. The proposed Entiatqua Trail (Trail) will provide for a critical connection between the Entiat Park (Park) and the proposed Entiatqua Outdoor Learning Center (Center) (separate project). Both the Park and Center will have their own connecting trails to form a continuous waterfront trail system. The connection of the Trail to the Park will be made at the Park's south end. From that location the trail will continues in a downstream direction parallel with the Columbia River for approximately 925 feet before making a sharp turn to head up the Entiat River. From there the Trail will cross below the railroad and SR97A bridges before making another sharp turn in a northerly direction following the contour of the earthen embankment. The Trail will then continue north before making a gradual swerve to the west to head in the general direction of the Entiat River Valley. At this point the trail will connect to the proposed Center Trail. A timeline for construction of the Center has not been determined.

5. The trail setting provides striking views of the Lake Entiat (aka Rocky Reach Reservoir), Number Rock, and the Entiat River. The trail will include two wide spots for trail users to take in these views. While enjoying the view trail users may also learn about shoreline erosion stabilization methods and the regions fish and wildlife resources at one of two interpretive signs to be located along the trail.

6. Construction of the Trail attempts to not only provide a spectacular recreational and educational opportunity but also provides for a significant improvement to shoreline habitat. The project includes the development of a 650 foot long, 3 to 15 foot wide riparian corridor along the Columbia River side of the Trail. The corridor will be planted with nearly 350 new native shrubs and trees. The shrubs and trees will provide near shore foliage (shade and nutrients). In addition, the riparian corridor will include the construction of four large complex woody structures. These structures will provide in-water habitat for a variety of fish. Further supplementing the structures will be the placement of sediment and cobble mix specifically designed for enhancing the near shore aquatic habitat.

7. To provide for the safety of Trail users a wood rail fence will be located on the side of the trail closest to the river. The rail fence provides a protective barrier from a 3 to 8 foot high drop off which will be created by retaining the trail as a means to minimize the amount of in-water fill required.

8. The Trail design also takes into consideration the needs of the physically disabled by designing the trail consistent with Accessibility Guidelines for Outdoor Developed Areas. This includes constructing the trail at reasonable grades and providing sufficient trail width to allow two wheel chairs to pass side by side.

9. The majority of work to construct the trail is above the OHWM. Work to be done includes excavation into the existing embankment and temporary stabilization for the construction of retaining structures. Structures include: gabion basket walls and mechanically stabilized earth walls (Lock+Load) pre-cast concrete modular system). The retaining structures will be backfilled with an imported crushed rock specifically designed for structural stability of the trail and retaining system. The trail itself will be 8'-0" wide and have a crushed rock surfacing. The trail includes a 4'-6" high wood rail fence along the edge closest to the river and a 6' high chain link fence on the upland side. Below the trail just above the OHWM along the Columbia River side of the trail will be the 3 foot to 10 foot wide by 625 foot long riparian corridor. The riparian corridor will consist of imported top soil as well as soil bags, coir logs, coir fabric, gravel cobble mulch, grass seed and plantings as illustrated in the drawings.

10. Trail features include:

    10.1 Clear Trail width: 7'-3" from outside face of upper retaining structure (gabions) to inside of rail fence.

    10.2 Total Trail width (including rail fence): 8'-0" from outside face of upper retaining structure (gabion) to inside face of lower retaining structure (Lock + Load or rock wall). Expands to greater width at interpretive signs (see drawings).

    10.3 Trail Length: 1,776 feet

    10.4 Trail retaining structures: Gabion Baskets along upland side of Trail, Lock + Load (concrete) modules or rock wall along waterward side of Trail.

    10.5 Trail Surface: Well compacted crushed rock aggregate.

    10.6 Mitigation: Large complex wood structures: 4 total along Columbia River. Each structure will have seven (7) logs 18 inches to 30 inches diameter. Log type will be Cedar, Ponderosa Pine, or Douglas Fir. Structures will be held in place by ballast boulders 36 inches to 54 inches in diameter.

    10.7 Mitigation: A 650 foot long, 3 foot to 15 foot wide riparian corridor includes over 350 trees and shrubs as well as native grasses. Stabilization includes the use of coir logs and fabric. Irrigation system for watering of new plants.

    10.8 Wood Rail Fence: Approximately 4'-6" inches tall with three rails. 1,833 ft in length (1,559 feet along the trail and 276 feet along the Entiat Park Entry Road), to be located along the waterward side of trail (protection from fall hazard).

10.9 Chainlink fence: 6 feet in height, totaling 6,502 ft in length (1,503 feet along the trail located above gabions; and 4,997 along Entiat Park), to minimize pedestrian conflicts with railroad and SR97A and improve safety.

10.10 Viewpoint 1 – A viewpoint with an interpretive sign will be located along the trail along the Rocky Reach Reservoir. This interpretive site will highlight shoreline erosion techniques employed in the project.

10.11 Viewpoint 2 – A viewpoint with an interpretive sign and bench will be located along the trail on the Entiat River side. This interpretive site will highlight area fish and wildlife.

11. An important component of the Entiatqua Trail Project is inclusion of a bio-engineering erosion control demonstration site that is a requirement of the Rocky Reach Comprehensive Settlement Agreement, Comprehensive Plan, Chapter 1: Rocky Reach Shoreline Erosion Management Plan, which was incorporated into the Rocky Reach operating license. This demonstration site incorporates the following features of a bio-engineered shoreline stabilization site:

11.1 Large complex woody structures that provide in-water fish habitat while also dissipating wave action.

11.2 Coir logs and fabric made from the natural fiber of coconut husk to also dissipate wave action and to hold soil in place to establish riparian plantings.

11.3 Plantings consisting of shrubs (willow, dogwood, salmon berry, Nootka rose and spirea), trees (shore pine and water birch) and grass seed (rye, hairgrass and junegrass). Once the plants are established fully their root systems form a framework to help hold earth materials in place. The plantings are intended to provide shade and drop material to help replenish nutrients along the river's edge, further promoting biological activity.

12. The expectation is that the Entiatqua Trail will receive considerable public use and the erosion control demonstration site will receive significant attention, thus assisting to educate the public as to potential bio-engineering control measures that can be employed on Rocky Reach Reservoir or other water bodies where erosion is an issue.

13. As an obligation of Chelan County PUD's 43-year license to operation the Rocky Reach Dam, FERC required the PUD to invest approximately $1.2 million in this trail connecting the existing park site on the Columbia River with a site currently used for student education (site of the future Entiatqua Learning Center) on the Entiat River.

14. The site is on a steep slope above the mouth of the Entiat River and below the US 97A highway bridge. The steep slope and proximity to the waterways and adjacent habitat puts the project in a critical areas zone. However, the ecology of the site is heavily impacted by highway and bridge abutments.

15. To the north and east lies the Entiat Park; to the north and above the trail, the US97A highway bridge and Entiat River Road; to the south, the Entiat River; and to the west, a natural area used for student science education, fishing, swimming, and other recreation.

16. The City of Entiat's Comprehensive Plan and zoning designation for the site is Waterfront Business District, which is designed for recreation and commercial waterfront facilities. This project is in

shoreline jurisdiction and will be regulated by the Entiat Shoreline Master Program and Use Regulations.

17. The subject property and surrounding area indicated as urban designations in the Entiat Shoreline Master Program (SMP). The SMP contains nine goals that pertain to all shoreline areas, with an additional six goals pertaining specifically to shorelines of statewide significance, such as the Columbia River.

18. The general goals of the Entiat Shoreline Master Program that apply to this project proposal include the following:

    18.1 B. Goal for Public Access Element
    Assure safe, convenient and diversified access to public shorelines; assure that the intrusions created by public access will not endanger life or have adverse effects on property or fragile natural features; assure that the provisions for public access will minimize conflicts between the public and private property.

    18.2 D. Goal for Recreational Element
    Assure diverse, convenient and adequate recreational opportunities along the public shorelines for the local residents and a reasonable number of transient users.

    18.3 F. Goal for Historical/Cultural Element
    Protect and restore areas having significant historic, cultural, educational or scientific values.

    18.4 I. Goal for Rehabilitation Element
    Encourage the restoration of shoreline areas which have been modified, blighted, or otherwise disrupted by natural or human activities.

19. In addition to goals, there are also specific shoreline use regulations contained within the Entiat SMP. Section 28.1 specifically governs recreational developments within an urban environment. The following items from section 28.1 apply to the proposed project:

    19.1 28.1.2 Parking lots with spaces for 10 or more vehicles shall not be located within 50 feet of the ordinary high water mark.

    19.2 28.1.3 A recreational facility or structure which markedly changes or detracts from the character of the local environment shall be prohibited.

    19.3 28.1.4 Access roads to recreational facilities shall be subject to the regulations for roads in Section 26.

    19.4 28.1.5 Access roads and parking lots shall be paved.

    19.5 28.1.6 The design, construction and operation of recreational facilities shall be such that undue adverse impacts on adjacent properties are minimized.

    19.6 26(a) Where permitted in shorelines areas, road alignments shall be set back from the ordinary high water line in a sufficient distance to leave a usable shoreline area in its natural condition unless it is technically or economically infeasible.

20. The Chelan County PUD, as lead agency, conducted an environmental review of this project pursuant to the State Environmental Policy Act (SEPA). A DNS, along with project information and request for comments was sent out on March 14, 2012.

21. The project proponents have adequately addressed all applicable provisions of the City of Entiat's Shoreline Master Program.

22. The City contends that the applicant has provided more than adequate mitigation for the impacts to critical areas, effectively improving the ecology of the site. The project will be an erosion control demonstration project, using natural elements to address the concerns over steep slopes and simultaneously creating habitat.

23. Fencing on both sides of the trail will deter trail users from entering into the existing and proposed habitat areas.

24. Irrigation will be provided to ensure the survival of the new riparian plantings.

25. This project meets the goals of the City of Entiat's Parks, Recreation, and Open Space Plan, as well as the Entiat Comprehensive Plan.

26. It should also be reiterated that this project is a requirement of the PUD's FERC license.

27. The City of Entiat found that this project meets the goals of both SMA and the City's planning documents. The PUD has proven to be a good steward of the waterways and associated shoreline. Entiat is convinced that this project is beneficial to the community, and that the proponents will manage the shoreline environment efficiently and responsibly. The City recommended approval of this application.

28. The City of Entiat Department of Planning recommended approval of the requested permit, subject to the recommended conditions of approval.

29. An open record public hearing after legal notice was held on February 12, 2013.

30. Appearing and testifying on behalf of the applicant was Waikele Frantz. She testified that she was an authorized agent and had no objection with any of the proposed conditions of approval. Ms. Frantz also testified that the applicant would comply with all of the requirements set forth in the Department of Ecology letter dated February 7, 2013.

31. No member of the public testified at the hearing.

32. At the open record public hearing, the entire planning staff file was admitted into the record.

33. Public agencies with potential jurisdiction over this project were given an opportunity to review the proposal. Agencies that responded with comments were admitted into the record and considered by the Hearing Examiner in rendering this Decision.

34. Any Conclusion of Law that is more correctly a Finding of Fact is hereby incorporated as such by this reference.

CONCLUSIONS

1. The Hearing Examiner has been granted authority to render this Decision.

2. This proposal, as conditioned, is consistent with the Shoreline Management Act, the Shoreline Master Program and the Entiat Municipal Code.

3. Any Finding of Fact that is more correctly a Conclusion of Law is hereby incorporated as such by this reference.

This permit is granted pursuant to the Shoreline Master Program of the City of Entiat, as amended, and nothing in this permit shall excuse the applicant from compliance with any other federal, state, or local statutes, ordinances, or regulations applicable to this project, but not inconsistent with the Shoreline Management Act of 1971 (Chapter 90.58 RCW).

This permit may be rescinded pursuant to RCW 90.58.140(7) in the event the permittee fails to comply with the terms and conditions hereof.

CONSTRUCTION PURSUANT TO THIS PERMIT SHALL NOT BEGIN NOR IS AUTHORIZED UNTIL TWENTY-ONE (21) DAYS FROM THE DATE OF FILING AS DEFINED IN RCW 90.58.140(6) AND WAC 173-14-090, OR UNTIL ALL REVIEW PROCEEDINGS INITIATED WITHIN TWENTY-ONE (21) DAYS FROM THE DATE OF SUCH FILING HAVE TERMINATED; EXCEPT AS PROVIDED IN RCW 90.58.140(5)(a)(b)(c).

Substantial progress toward construction of the project for which this permit has been granted must be accomplished within two (2) years of the filing date of this permit. Authorization to conduct development activities granted by this permit shall terminate five (5) years from the filing date of this permit.

Approved this 20th day of February, 2013.

CITY OF ENTIAT HEARING EXAMINER

_____

Andrew L. Kottkamp

Anyone aggrieved by this decision has twenty-one (21) days from the "date of receipt" as defined in RCW 43.21B.001 to file a petition for review with the Shorelines Hearings Board as provided for in Washington law.

THIS SECTION FOR DEPARTMENT OF ECOLOGY USE ONLY IN REGARD TO A CONDITIONAL USE OR VARIANCE PERMIT

Date received by the Department_____

Approved_____ Denied_____

This conditional use/variance permit is approved/denied by the Department pursuant to Chapter 90.58 RCW.

Development shall be undertaken pursuant to the following additional terms and conditions:

_____
_____
_____
_____

_____ _____

Date Signature of Authorized Department Official

Washington Department of FISH and WILDLIFE

HYDRAULIC PROJECT APPROVAL

RCW 77.55.021 - See appeal process at end of HPA

North Central
1550 Alder Street NW
Ephrata, WA 98823-9699
(509) 754-4624

Issue Date: April 16, 2013
Project Expiration Date: April 15, 2018

Control Number: 129213-1
FPA/Public Notice #: N/A

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Public Utility District No. 1 of Chelan County PO Box 1231 Wenatchee, WA 98807 509-663-8121	Public Utility District No. 1 of Chelan County ATTENTION: Waikele Frantz PO Box 1231 Wenatchee, WA 98807 509-661-4627 Fax: 509-661-8203

Project Name: Entiatqua Trail

Project Description: Construction of an approximately 1776 foot long bike and pedestrian path at the confluence of the Entiat and Columbia Rivers, a 650 foot long riparian corridor, and four large complex woody structures.

PROVISIONS

1. This Hydraulic Project Approval allows the construction of an approximately 1776 foot long bike and pedestrian path at the confluence of the Entiat and Columbia Rivers, a 650 foot long riparian corridor, and four large complex woody structures.

2. TIMING LIMITATIONS: The project may begin 16 April 2013 and shall be completed by 15 April 2018, PROVIDED:
a) Work below the ordinary high water line shall occur only between 16 July and February 28 of any years of this permit.
b) Vegetation shall be planted within in 1 year of completion of construction.
c) Vegetation success of 80% after three seasons shall be assured prior to the end date of this permit.

3. NOTIFICATION REQUIREMENT: Prior to the start of construction activities Enforcement Officer Grant shall be notified at 509-662-0452 or email at Graham.Grant@dfw.wa.govby the permittee, agent, or contractor. The notification shall include the permittee's name, project location, starting date for work and the control number of this HPA.

4. NOTIFICATION REQUIREMENT: The Area Habitat Biologist (AHB) listed below shall be notified by the permittee, agent or contractor prior to the start of construction activities. The notification shall include the permittee's name, project location, starting date for work, and the control number of this HPA.

5. Work shall be accomplished per plans and specifications approved by the Washington Department of Fish and Wildlife entitled JARPA dated 11 December 2012, plans entitled Entiatqua Trail Project dated 1 December 2012, and the Geosynthetics, Earthwork, site irrigation and Landscaping specifications found in Contract Document 14-XX submitted to WDFW on 21 March 2013, except as modified by this Hydraulic Project Approval. A copy of these plans shall be available on site during construction.

6. If project activities result in fish in distress, a fish kill, or water quality problems (including equipment leaks or spills), immediate notification shall be made to the Washington Military Department Emergency Management Division at 800-258-5990 and to the Area Habitat Biologist listed below.

SITE PREPERATION

7. The clearing limits for each project element shall be clearly marked and staked prior to any clearing or ground-disturbing activities.Sensitive areas, habitat features and vegetation to be protected from disturbance shall be delineated in the field and marked so as to be clearly visible to equipment operators. Salvage areas and material to be salvaged for use in site restoration shall be clearly marked on site.

8. Equipment travel routes and material stockpile sites within 200 feet of the Ordinary High Water Mark (OHWM) shall be clearly marked and staked in the field prior to use.

9. Any non-merchantable large wood, native vegetation, weed-free topsoil or native material displaced during construction may be stockpiled for use in site restoration.

10. All temporary erosion controls shall be in place and appropriately installed down slope of applicable project activities until site restoration is complete.

11. In areas where the bank will be disturbed, prior to starting work, erosion and sediment control measures such as temporary filter fabric fence or straw wattles shall be installed to prevent sediment from entering the stream.

Fence

12. The type of filter fabric used shall be based on soil conditions at the site: for soils that will pass US standard sieve 200 the equivalent opening size (EOS) shall be selected to retain 85% of the soil; for all other soil types the EOS shall be no larger than US standard sieve 100.

13. A trench following the contour should be excavated approximately 8 inches wide and 12 inches deep along the line of the posts and upslope from the barrier.

14. For standard strength filter fabric, a wire mesh support fence shall be fastened securely to the upslope side of the posts and the fabric stapled or wired to the mesh. For extra strength fabric the wire mesh fence may be eliminated.

15. The trench shall be backfilled with native soils and/or three-quarter-inch minimum diameter washed gravel and adequately compacted.

16. Accumulated sediments shall be removed during the project and prior to removing the filter fence after completion of work.

Wattles

17. Wattles shall be installed in narrow trenches dug across the slope on contour to a depth of 3 to

5 inches on clay soils and soils with gradual slopes and to depth of depth of 5 to 7 inches, or Â½ to 2/3 of the thickness of the wattle on loose soils and steep slopes.

18. Trenches shall be installed from the base of the slope up at contour intervals of 3 to 30 feet, depending on the steepness of the slope, soil type and rainfall.

19. Excavated material should be spread evenly along the uphill slope and compacted using hand tamping or other methods.

20. Wattles shall be installed snugly into trenches with then ends tightly abutting, and staked at each end at 4-foot centers along the entire length.

21. Wooden stakes should be a minimum of Â¾ X Â¾ X 24 inches, willow cutting or 3/8-inch rebar may also be used for staking.

22. Wattles shall be inspected and maintained regularly to ensure they are in contact with soil and thoroughly entrenched.

In-water Sediment Control
23. Prior to working below the ordinary high water mark, a turbidity curtain shall be properly installed and shall remain in place until all work is complete and any suspended sediment has reduced to below that of background levels.

EQUIPMENT AND WATER QUALITY
24. All materials and equipment used for construction, monitoring and fish salvage shall be free of aquatic invasive species.Materials and equipment shall be decontaminated so that no viable invasive species are transported from the job site.

25. The contractor shall maintain on site at all times during construction adequate, site specific Spill Prevention and Pollution Control materials including those necessary for 1) spill containment; 2) confining, removing, and disposing of excess construction materials and hazardous and non-hazardous wastes; and 3) the operation and maintenance of equipment washout facilities.

26. Materials for containment and cleanup shall be available onsite during pre-construction, construction and restoration phases of the project.

27. The sediment plume created by instream work shall not exceed 5 NTUs above background at 300 feet downstream of the project location. If these criteria are exceeded during project implementation, work shall be suspended until the criteria are met.

28. Sediment testing shall be conducted daily, before and during work below the OHWL.

29. Sediment testing logs shall be available onsite at all times work is being conducted below the OHWL.

30. Vehicle staging, cleaning, maintenance, refueling, and fuel storage shall be located a minimum of 150 feet from any flowing stream or water body.

31. When heavy equipment is used, the equipment selected shall have the least adverse effects on the environment, e.g., minimally sized, low ground pressure.

32. Equipment used for this project operating with hydraulic fluid, in or over the flowing stream, shall use only those fluids certified as non-toxic to aquatic organisms.

33. Equipment used for this project shall be free of external petroleum-based products.Accumulation of soils or debris shall be removed from the drive mechanisms (wheels, tires, tracks, etc.) and undercarriage of equipment prior to its use within 150 feet of any waterbody. Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities.

34. All lumber to be used for the project shall meet or exceed the standards established in the most recent version of 'Best Management Practices For the Use of Treated Wood in Aquatic and Wetland Environments' developed by the Western Wood Preservers Institute, Wood Preservation Canada, Southern Pressure Treaters' Association, and Southern Forest Products Association. As of January, 2012, the latest version is dated November 1, 2011.

35. If ACZA treated wood is used all ACZA wood treatment methods shall be verified by providing a signed and dated certification from a third party.

36. All treated wood shall be professionally treated and completely cured prior to installation below the ordinary high water line to minimize leaching into the water or substrate. The use of wood treated with creosote or pentachlorophenol is not authorized.

37. Extreme care shall be taken to ensure that no petroleum products, hydraulic fluid, fresh cement, sediments, sediment-laden water, chemicals, or any other toxic or deleterious materials are allowed to enter or leach into the stream.

38. No concrete or fresh cement shall be poured directly into, allowed to fall or leach into or, be wasted within the area below the OHWM or wetted perimeter of the river.

39. Concrete work shall be done completely in the dry and totally landward of the current wetted perimeter at the time of construction. Concrete and concrete by-products shall be totally contained through the use of sealed forms and or other watertight leak-proof containment. No concrete or concrete by-products shall be allowed to contaminate the shoreline areas.
40. All fresh concrete shall be protected from the weather and cured a minimum of seven (7) days prior to contact with the elements and/or state waters.

41. All waste material such as construction debris, silt, excess dirt or overburden resulting from this project shall be deposited above the limits of floodwater in an approved upland disposal site.

LARGE WOODY STRUCTURES

42. Material used in the large woody structures shall be of a sufficient size and appropriate species to remain intact and stable for multiple years.

43. Material excavated for the placement of structures shall be used as backfill.Excess material shall be disposed of at an approved upland site.

SITE RESTORATION

43. All disturbed staging and access areas shall be seeded with a native seed mix with at least one quick-establishing species and protected from erosion with erosion control measures suitable to the site.

44. The native erosion control grass seed mix, such as one consisting of: 30% Hard fescue (Festuca trachyphylla), 20% Sheep fescue (Festuca ovina, 20% Crested wheatgrass (Agropyron desertorum), 20% Rush intermediate wheatgrass (Thinopyrum intermedium), 10% Sherman big bluegrass (Poa secunda 'Sherman') shall be applied at a rate of 10-12 lbs/acre and lightly compacted with a compactor, excavator bucket or the equivalent.

45. The permittee shall profusely plant the areas designated in the plans with the assemblage of native species.Non-native, noxious or invasive plants shall not be used.

46. All woody plants shall consist of large bare root nursery or container stock or, local transplanted native cuttings, spaced a minimum of 3 to 5 feet on center (except black cottonwood which can be spaced on 10 foot centers), shall be protected & properly maintained until established, and replaced as necessary for a period of at least three (3) years to assure and achieve a minimum of 80% survival by the end of the third growing season.

47. Upon completion of this project, all temporary structures, devices materials or equipment shall be completely removed from the site and all excess spoils and/or waste materials properly disposed of at an approved upland disposal site.

48. The final site condition shall ensure that there is no net loss of aquatic productivity, fish or shellfish life or their habitats resulting from this project and shall not produce any negative or long-term impacts to local fish life and their habitat.

Issue Date: April 16, 2013
Project Expiration Date: April 15, 2018

Control Number: 129213-1
FPA/Public Notice #: N/A

PROJECT LOCATIONS

Location #1

WORK START: April 16, 2013					WORK END: April 15, 2018	
WRIA:	Waterbody:				Tributary to:	
46.0042	Entiat River (rb)				Columbia River	
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
E 1/2	17	25 N	21 E	N 47.6625	W 120.22472	Chelan

Location #1 Driving Directions

From Wenatchee, follow Highway 97A for approximately 15 miles to Lake Shore Drive in Entiat, approximately 1/2 mile beyond the Entiat River bridge. Take a right, cross the tracks, and follow the drive beyond the boat launch and to the start of the proposed trail.

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW (formerly RCW 77.20). Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day and/or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

MINOR MODIFICATIONS TO THIS HPA: You may request approval of minor modifications to the required work timing or to the plans and specifications approved in this HPA. A minor modification to the required work timing means up to a one-week deviation from the timing window in the HPA when there are no spawning or incubating fish present within the vicinity of the project. You may request subsequent minor modifications to the required work timing. A minor modification of the plans and specifications means any changes in the materials, characteristics or construction of your project that does not alter the project's impact to fish life or habitat and does not require a change in the provisions of the HPA to mitigate the impacts of the modification. Minor modifications do not require you to pay additional application

fees or be issued a new HPA. To request a minor modification to your HPA, submit a written request that clearly indicates you are requesting a minor modification to an existing HPA. Include the HPA number and a description of the requested change and send by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234, or by email to HPAapplications@dfw.wa.gov. Do not include payment with your request. You should allow up to 45 days for the department to process your request.

MAJOR MODIFICATIONS TO THIS HPA: You may request approval of major modifications to any aspect of your HPA. Any approved change other than a minor modification to your HPA will require issuance of a new HPA. If you paid an application fee for your original HPA you must include payment of $150 with your written request or request billing to an account previously established with the department. If you did not pay an application fee for the original HPA, no fee is required for a change to it. To request a major modification to your HPA, submit a written request that clearly indicates you are requesting a major modification to an existing HPA. Include the HPA number, check number or billing account number, and a description of the requested change. Send your written request and payment, if applicable, by mail to: Washington Department of Fish and Wildlife, PO Box 43234, Olympia, Washington 98504-3234. If you are charging the fee to a billing account number or you are not subject to the fee, you may email your request to HPAapplications@dfw.wa.gov. You should allow up to 45 days for the department to process your request.

APPEALS INFORMATION

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

A. INFORMAL APPEALS: WAC 220-110-340 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee will conduct an informal hearing and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-110-350 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a

formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

ENFORCEMENT: Sergeant Erhardt (23) P1

Habitat Biologist Connie Iten	509-826-3123		for Director WDFW

CC: Chelan County - emailed
J. Jordan, ACOE - emailed
G. Graff, Ecology - emailed
WADNR - emailed
NOAA Fisheries, Ellensburg - emailed
USFWS, Wenatchee - emailed

ENTIATQUA TRAIL
UNITED STATES ARMY CORPS OF ENGINEERS PERMIT

TO BE ISSUED PRIOR TO NOTICE TO PROCEED

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Washington Fish and Wildlife Office

Central Washington Field Office
215 Melody Lane, Suite 103
Wenatchee, WA 98801-8122

IN REPLY REFER TO:
USFWS Reference: 13410-2013-I-0265
Hydrologic Unit Code: 17-02-00-10-01

April 29, 2013

Re: Informal Section 7 Consultation on the Entiatqua Trail
NWS-2012-1364 (Public Utility District No. 1 Chelan County, Chelan County)

Michelle Walker
Chief, Regulatory Branch
U.S. Army Corps of Engineers, Seattle District
P.O. Box 3755
Seattle, Washington 98124-3755

Dear Ms. Walker:

This responds to your request for informal consultation regarding the proposed construction of the Entiatqua Trail at the confluence of the Entiat and Columbia Rivers, Chelan County, Washington (Project). The objective of the Project is for Public Utility District of Chelan County (Chelan PUD) to fulfill a requirement of the Federal Energy Regulatory Commission (FERC) relicensing agreement for the Rocky Reach Hydroelectric Project (FERC No. 2145). Your December 7, 2012, Biological Assessment (BA) and Memorandum for Services (MFS), were received in the U.S. Fish and Wildlife Service's (Service) Central Washington Field Office on April 5, 2013.

The U.S. Army Corps of Engineers (COE) has requested Service concurrence with the determination of "may affect, likely to adversely affect" the bull trout (*Salvelinus confluentus*) and Columbia River bull trout critical habitat. The COE has also requested Service concurrence with the determination of "no effect" for Ute ladies'-tresses (*Spiranthes diluvialis*).

The Project entails the construction of a 1776 foot long bike and pedestrian trail connecting Entiat Park to an outdoor learning center. To stabilize the trail, gabion baskets will be placed along the upland side of the trail and on the waterward side of the trail concrete modules or a rock wall will be constructed. The rock wall will be constructed below the ordinary high water mark along certain sections of the trail. The rock wall will include a partially buried rock toe and streambed cobbles/sediments fronting the toe; above the toe riparian will be planted. Numerous conservation measures will be employed to minimize effects to aquatic species. For a more detailed description of the proposed action, please refer to the Project BA and MFS.

The Service met with Chelan PUD on August 29, 203 and corresponded with Chelan PUD on numerous occasions during September 2012 in an attempt to modify the Project in a manner that reduces impacts to aquatic and terrestrial resources. In particular, we discussed the challenges associated with the placement of a trail of this nature on a steep, unstable slope. While the Service normally advocates the use of interlocking boulders to stabilize slopes such as those

described in the Project, we suggested the use of native plantings to conceal and stabilize the conspicuous nature of the rock gabions proposed in this Project. We also discussed the specific placement of a riparian corridor with native herbaceous and woody vegetation along discrete section of the proposed trail to minimize effects of the Project. More recently on April 24, 2013, Chelan PUD agreed to modify the timeframe to conduct all in-water activities from September 1- February 28 to September 1- October 31 with a contingency period of November 1 – 15 for unforeseen circumstances to avoid impacts to post-spawn adult bull trout migrating downstream through the Entiat River to the Columbia River.

The Service agrees the proximity of the action area to the mouth of the Entiat River increases the probability of adult and sub-adult bull trout being in the project area during construction activities. However, based on evidence presented in the BA, the probability of adult and sub-adult bull trout being in the project area during the in-water work window and construction period is very low. After careful review of the BA and associated MFS, we conclude the Project is "not likely to adversely affect" the bull trout and Columbia River bull trout critical habitat. Our conclusion is conditioned on the Project being implemented as described in the BA, MFS, and Chelan PUD's April 24, 2013 correspondence outlining the modification to the in-water work window, including the prescribed conservation measures. While we acknowledge your "no effect" determination for Ute ladies'-tresses, we are legally unable to concur with it.

This concludes informal consultation pursuant to the implementing regulations of the Endangered Species Act, 50 C.F.R. § 402.13. This Project should be reanalyzed if new information reveals effects of the action that may affect listed or proposed species or designated or proposed critical habitat in a manner or to an extent not considered in this consultation; if the action is subsequently modified in a manner that causes an effect to a listed or proposed species or designated or proposed critical habitat that was not considered in this consultation; and/or, if a new species is listed or critical habitat is designated that may be affected by this Project.

Thank you for your assistance in the conservation of listed species. If you have any questions or comments regarding this letter, please contact Steve Lewis at the Central Washington Field Office in Wenatchee at (509) 665-3508, extension 2002, or via e-mail at Stephen_Lewis@fws.gov.

Sincerely,

Jeffrey M Krupka FOR

Ken S. Berg, Manager
Washington Fish and Wildlife Office

Application for General Permit

Permit No. 49413

Applicant - Please print or type all information

Application is Herby Made For: ☒ General Permit (no fee)
☐ General Permit $2.50 (Subject to RCW 47.12.140(2))

Intended Use of State Right of Way is to Construct, Operate, and Maintain a:
the Entiatqua Trail under the US 97A Entiat River highway bridge #097/355ALT

on a portion of State Route **97** from Mile Post **214.210** to Mile Post _____ in **Chelan** County,

NW 1/4 of **SE** 1/4 of Section **17** Township **25** Range **21** West/East W.M. **E**

Fees in the amount of **Ø** are paid to defray the basic administrative expense incident to the processing of this application according to RCW 47.12.140(2) and amendments. The applicant further promises to pay additional costs incurred by the Department on the behalf of the applicant.

***Checks or Money Orders* are to be made payable to "Washington State Department of Transportation".**

P.U.D. No. 1 of Chelan County
Applicant (Referred to as Permit Holder)

327 N. Wenatchee Ave. P.O. Box 1231
Address

Wenatchee **WA** **98807-1231**
City State Zip Code

(509) 663-8121
Telephone

_____
Applicant Authorized Signature

_____
Print or Type Name

_____
Title

Dated this _____ day of _____ , _____

Authorization to Occupy Only If Approved Below

The Washington State Department of Transportation referred to as the "Department", hereby grants this Permit subject to the terms and conditions stated in the General Provisions, Special Provisions, and Exhibits attached hereto and by this reference made a part hereof: Construction facilities proposed under this application shall begin within one year and must be completed within three years from date of approval.

For Department Use Only

Exhibits Attached
Exhibit A, Special Provisions
Exhibit B, Right of Way Detail
Exhibit C, Photo
Exhibit S, Chelan PUD #1/Entiat Park Revitalization, Schedule B - Entiatqua Trail - Specials
Exhibit T, Chelan PUD #1/ Entiat Park Revitalization, Schedule B - Entiatqua Trail - Contract Drawings
Exhibit U, Chelan PUD #1/ Entiat Park Revitalization, Schedule B - Entiatqua Trail - Additional Information

Department Approval

By: **Bill Gould**

Title: _____

Date: _____

General Provisions

1. The Permit Holder, its successors and assigns, agrees to protect the State of Washington, its officers and employees and save them harmless from all claims, actions or damages of every kind and description which may accrue to or be suffered by any person, persons, or property by reason of the acts or omissions of the Permit Holder, its assigns, agents, contractors, licensees, employees or any person whomsoever, in connection with Permit Holder's, its assigns', agents', contractors', licensees' or employees' construction, installation, maintenance, operation, use or occupancy of the right of way or in the exercise of this permit. In case any suit or action is brought against the State of Washington, its officers and employees, arising out of or by reason of any of the above causes, the Permit Holder, its successors or assigns will, upon notice of such action, defend the same at its sole cost and expense and satisfy any judgement against the State of Washington, its officers, or employees: PROVIDED, that if the claims or damages are caused by or result from the concurrent negligence of (a) the State of Washington's agents or employees and (b) the Permit Holder or Permit Holder's agents or employees, this indemnity provision shall be valid and enforceable only to the extent of the negligence of the Permit Holder or the Permit Holder's agents or employees.

   The Permit Holder, and on behalf of its assigns, agents, licensees, contractors and employees agrees to waive any claims for losses, expenses, damages or lost revenues incurred by it or its agents, contractors, licensees, employees or customers in connection with Permit Holder's, its assigns', agents', contractors', licensees' or employees' construction, installation, maintenance, operation, use or occupancy of the right of way or in the exercise of this permit against the State of Washington, its agents or employees except the reasonable costs of repair to property resulting from the negligent injury or damage to Permit Holder's property by the State of Washington, its agents, contractors or employees.

2. During the progress of the work, such barriers shall be erected and maintained as may be necessary or as may be directed for the protection of the traveling public; the barriers shall be properly lighted at night.

3. Except as herein authorized, no excavation shall be made or obstacle placed within the limits of the State highway in such a manner as to interfere with the travel over said road.

4. If the work done under this permit interferes in any way with the drainage of the State highway, the Permit Holder shall wholly and at its own expense make such provision as the Department may direct to take care of said drainage.

5. On completion of said work herein contemplated, all rubbish and debris shall be immediately removed and the roadway and roadside shall be left neat and presentable and satisfactory to the Department.

6. All of the work herein contemplated shall be done to the satisfaction of the Department, and all costs incurred by the Department shall be reimbursed by the Permit Holder.

7. The Department hereby reserves the right to order the change of location or the removal of any structure or structures authorized by this permit at any time, said change or removal to be made at the sole expense of the party or parties to whom this permit is issured, or their successors and assigns.

8. All such changes, reconstruction, or relocation by the Permit Holder shall be done in such manner as will cause the least interference with any of the Department's work, and the Department shall in no wise be held liable for any damage to the Permit Holder by reason of any such work by the Department, its agents or representatives, or by the exercise of any rights by the Department upon roads, streets, public places, or structures in question.

9. This permit or privilege shall not be deemed or held to be an exclusive one and shall not prohibit the Department from granting other permits or franchise rights of like or other nature to other public or private companies or individuals, nor shall it prevent the Department from using any of its roads, streets, or public places, or affect its right to full supervision and control over all or any part of them, none of which is hereby surrendered.

10. The Department may revoke, amend, or cancel this permit or any of the provisions thereof at any time by giving written notice to the Permit Holder. The Permit Holder shall immediately remove all facilities from the right of way. Any facilities remaining upon the right of way 30 days after written notice of cancellation shall be removed by the department at the Permit Holder's expense.

11. The party or parties to whom this permit is issued shall maintain at its or their sole expense the structure or object for which this permit is granted in a condition satisfactory to the Department.

12. Upon approval of this permit the Permit Holder shall diligently proceed with the work and comply with all provisions herein.

13. This permit is subject to all applicable provisions of RCW47.32, RCW 47.40 and/or RCW 47.12.140(2) and amendments thereto. Chapter 47.44 RCW, and amendments thereto.

14. The Permit Holder hereby certifies that the facilities described in this permit are in compliance with the Control Zone Guidelines.

Special Provisions for Highway Encroachments

Permit No. **49413**

Applicable provisions are denoted by ☒

☒ 1. No work provided for herein shall be performed until the Permit Holder is authorized by the following Department representative:

Wick McCurdy/Bill Gould
WSDOT
(509) 667-3067/2909
1551 N. Wenatchee Ave.
Wenatchee, WA 98801

☒ 2. Prior to the beginning of construction, a preconstruction conference shall be held at which the Department and the Permit Holder and Permit Holder's engineer, contractor, and inspector shall be present.

☒ 3. Should the Permit Holder choose to perform the work outlined herein with other than its own forces, a representative of the Permit Holder shall be present at all times unless otherwise agreed to by the Department representative. All contact between the Department and the Permit Holder's contractor shall be through the representative of the Permit Holder. Where the Permit Holder chooses to perform the work with its own forces, it may elect to appoint one of its own employees engaged in the construction as its representative. Failure to comply with this provision shall be grounds for restricting any further work by the Permit Holder within the State right of way until said requirement is met. The Permit Holder, at its own expense, shall adequately police and supervise all work on the above described project by itself, its contractor, subcontractor, agent, and others, so as not to endanger or injure any person or property.

☒ 4. A copy of the permit must be on the job site and protected from the elements at all times during any of the construction authorized by said permit.

☒ 5. This permit does not give the Permit Holder or any agent or contractor of the Permit Holder any rights to cut, spray, retard, remove, destroy, damage, disfigure or in any way modify the physical condition of any vegetative material located on the highway right of way, except by written permission from the Department or for purposes as described by No. 6 if denoted below. All restoration shall be done to the satisfaction of the Department at the sole expense of the Permit Holder.

☒ 6. If necessary to increase sight distance, brush shall be removed from both sides of the access connection and stumps shall be removed. The indiscriminate cutting of merchantable timber or disfiguring of any feature of scenic value shall not be permitted.

☐ 7. The access connection(s) shall be constructed in accordance with the attached
Sufficient length of diameter culvert pipe shall be placed in ditch and laid to a true line and grade.
The access connection(s) shall be surfaced to the limits as shown on the plan with a 150 millimeter (6 inch) minimum compacted depth of gravel base material and a 80 millimeter (3 inch) compacted depth of crushed surfacing top course. Asphalt paving will not be required. Finished grade of the access connection shall be in accordance with the profile control as shown on the attached plan. Directing of surface water from private property to Department right of way will not be permitted, unless otherwise approved by the Department.

☐ 8. The access connection(s) shall be constructed in accordance with the attached
Sufficient length of diameter culvert pipe shall be placed in ditch and laid to a true line and grade.
The access connection(s) shall be surfaced to the limits as shown on the plan with a 150 millimeter (6 inch) minimum compacted depth of gravel base material, a 80 millimeter (3 inch) minimum compacted depth of crushed surfacing top course, and paved with a 80 millimeter (3 inch) minimum compacted depth of Asphaltic Concrete Class B unless otherwise specified by the Department. Any existing oil mat on shoulder or roadway shall be removed and new pavement laid to a butt joint with existing pavement. Finished grade of new pavement shall be in accordance with the profile control as shown on attached plan. Directing of surface water from private property onto Department right of way will not be permitted, unless otherwise approved by the Department.

☐ 9. All buildings and appurtenances shall be so located at a distance from the right of way line of any State Highway that none of the right of way therefore is required for use of the patrons or customers of any such establishment. Permit Holder shall comply with local building codes. Set-back requirements for the location of buildingts in relation to the right of way line are a function of local authorities, and they should be consulted regarding requirements that must be adhered to.

☒ 10. The Permit Holder agrees to schedule the work herein referred to and perform said work in such a manner as not to delay the Department's contractor in the performance of his contract.

☒ 11. Work within the right of way shall be restricted to **daylight hours**, and no work shall be allowed on the right of way Saturday, Sunday, or holidays, unless authorized by the Department. Any lane closures must be submitted for approval in advance of use. The hours of permitted closure may differ from the above noted hours.

☒ 12. The shoulders, where disturbed, shall be surfaced with crushed surfacing top course **6 inches** minimum compacted depth, or as directed by the Department. The surface of the finished shoulder shall slope down from the edge of pavement at the rate of 5% unless otherwise directed. The restored shoulder must not have any strips or sections less than 0.6 meters (2 feet) wide. The restored shoulder shall be surfaced with **in kind materials.**

☒ 13. The Permit Holder shall be responsible for constructing and maintaining the access connection(s) and appurtenances between the shoulder line of the highway and the right of way line inclusive of surfacing and drainage. The Department has the right to inspect all installations at the time of construction and at any time afterward and to require that necessary changes and repairs be made. Unsatisfactory work will be corrected by the Department, at the Permit Holder's expense, or access may be removed at the Permit Holder's expense. Directing of surface water from private property onto Department right of way will not be permitted.

☒ 14. ~~The~~ Any temporary access connection shall be sufficiently surfaced back an adequate distance from the edge of the pavement to prevent any tracking of material onto the highway. Any tracking of material onto the highway shall be subject to enforcement of Chapter 46.61.655 RCW and shall be immediately cleaned up by the Permit Holder or the Permit Holder's agent.

☒ 15. Standard highway warning signs designated as "Truck Crossing" sign, plate W8-6, shall be placed and maintained at Permit Holder's expense on each side of the access connection. Signs shall be in evidence only when access is actually being used. If necessary, flagmen shall be provided. Sufficient parking space shall be provided by the Permit Holder outside Department right of way so no vehicles will be parked on said right of way.

☒ 16. All manholes, valve covers, and like appurtenances shall be constructed at such an elevation to conform to the shoulder slope from the edge of pavement or as directed by the Department.

☒ 17. All slopes, slope treatment, top soil, ditches, pipes, etc., disturbed by this operation shall be restored to their original cross section and condition. All hazards shall be marked by warning signs, barricades, and lights. If necessary, flagmenshall be employed for the purpose of protecting the traveling public. Roadside operations shall be specified by the Department's representative.

☒ 18. During the construction and/or maintenance of this facility, the Permit Holder shall comply with the Manual on Uniform Traffic Control Devices for Streets and Highways, (Federal Highway Administration) and Washington modifications thereto. If determined necessary by the Department, the Permit Holder shall submit a signing and traffic control plan to the Department's representative for approval prior to construction or maintenance operations. No lane closures shall be allowed except as approved by the Department representative. Approvals may cause revision of special provisions, including hours of operation.

☐ 19. Bond coverage required to ensure proper compliance with all terms and conditions of said permit will be furnished by a Blanket Surety Bond held by the Department at the Olympia Service Center.

☐ 20. A surety bond in the amount of written by a surety company authorized to do business in the State of Washington shall be furnished to ensure compliance with any and all of the terms and conditions of this permit and shall remain in force until all work under this permit has been completed and approved by the Department.

☐ 21. Relative to advertising adjacent to all State highways, we wish to call your attention to the Sceni Vistas Act of 1971, Chapter 47.42 RCW and State Transportation Commission ruling Chapter 468-66 WAC. Violation of this section of the statutes will be sufficient cause for cancellation of this permit. On-premise signs are allowed.

☒ 22. The Permit Holder shall notify the Department's representative upon completion of the work under this permit so that a final inspection can be made.

☐ 23. The responsibility of the Permit Holder for proper performance, safe conduct, and adequate policing and supervision of the project shall not be lessened or otherwise affected by Department approval of plans, specifications, or work, or by the presence at the work site of Department representatives, or by compliance by the Grantee with any requests or recommendations made by such representatives.

☒ 24. All material and workmanship shall conform to the Washington State Department of Transportation Standard Specifications for Road, Bridge and Municipal Construction, current edition, and amendments thereto, and shall be subject to inspection by the Department.

The following requirements must be met after construction is completed:

1) Contact STATE for final inspection.

2) Provide a letter certifying compliance to the terms of the General Permit stamped by a licensed professional engineer.

STATE CONTACT

The STATE Contact for this General Permit is Bill Gould, 509-667-2909. The STATE contact may assign other WSDOT personnel to perform field inspection and coordination.

SPILL PREVENTION, CONTROL AND COUNTERMEASURES PLAN

Section 1-07.15(1) is supplemented with the following:

The PERMITTEE's Contractor shall prepare a project specific spill prevention, control and countermeasures (SPCC) plan to be used for the duration of the project as outlined in Section 1-07.15(1). The plan shall be submitted to the STATE Representative prior to the commencement of any on site construction activities. No staging, storage, normal maintenance or normal fueling of equipment shall take place within highway right of way.

TIME FOR COMPLETION

Section 1-08.5 is supplemented with the following:

The APPLICANT is required to continue work in a diligent manner. The APPLICANT shall not perform work in a manner to prolong the impacts to the traveling public. The APPLICANT must obtain written concurrence from the State Contact if work is going to be delayed.

The APPLICANT'S Contractor's operations shall be conducted to allow two-lane two-way traffic flow during non-working hours, Fridays, weekends, holidays, and the day before major holiday weekends, unless otherwise shown in the Permit or approved by the Department Engineer.

SECTION 1-10, TEMPORARY TRAFFIC CONTROL

General

Section 1-10.2(2) is supplemented with the following:

No traffic control plans are provided in the Contract. If the Contractor's chosen method of performing the Work in the Contract requires some form of temporary traffic control for vehicles, bicyclists, or pedestrians, the Contractor

shall submit a Contractor's plan that shows the necessary construction signs, flaggers, spotters and other traffic control devices required to support the Work. Signing, flagging and traffic control shall be in accordance with the Manual of Uniform Traffic Control Devices (MUTCD) Part 6 and the most current edition of the Public Rights-of-Way Accessibility Guidelines (PROWAG). One lane of traffic shall remain open at all times. Traffic control plans must be provided to the State Contact for approval at least 10 calendar days in advance of the time the signs and other traffic control devices are scheduled to be installed and utilized.

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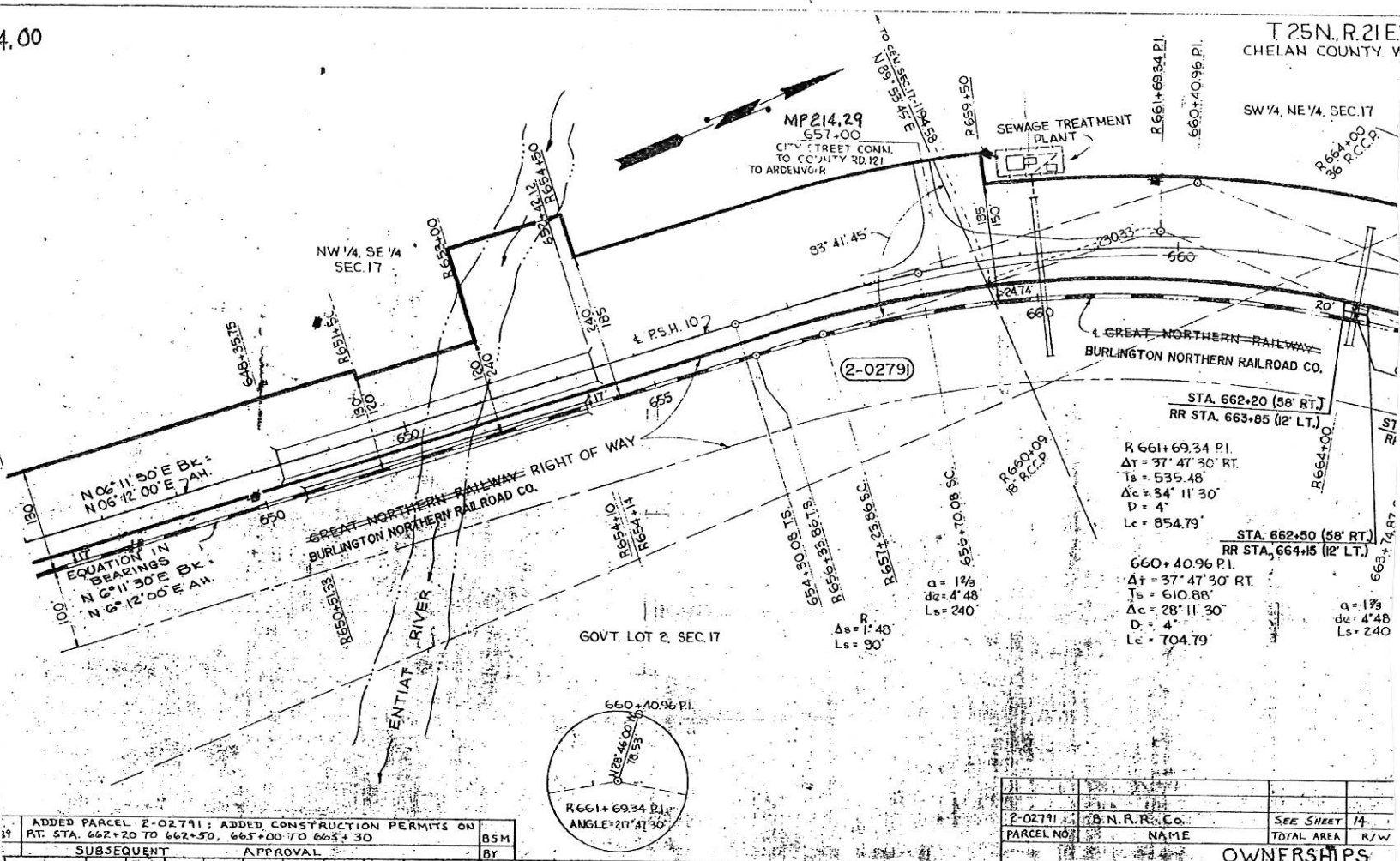
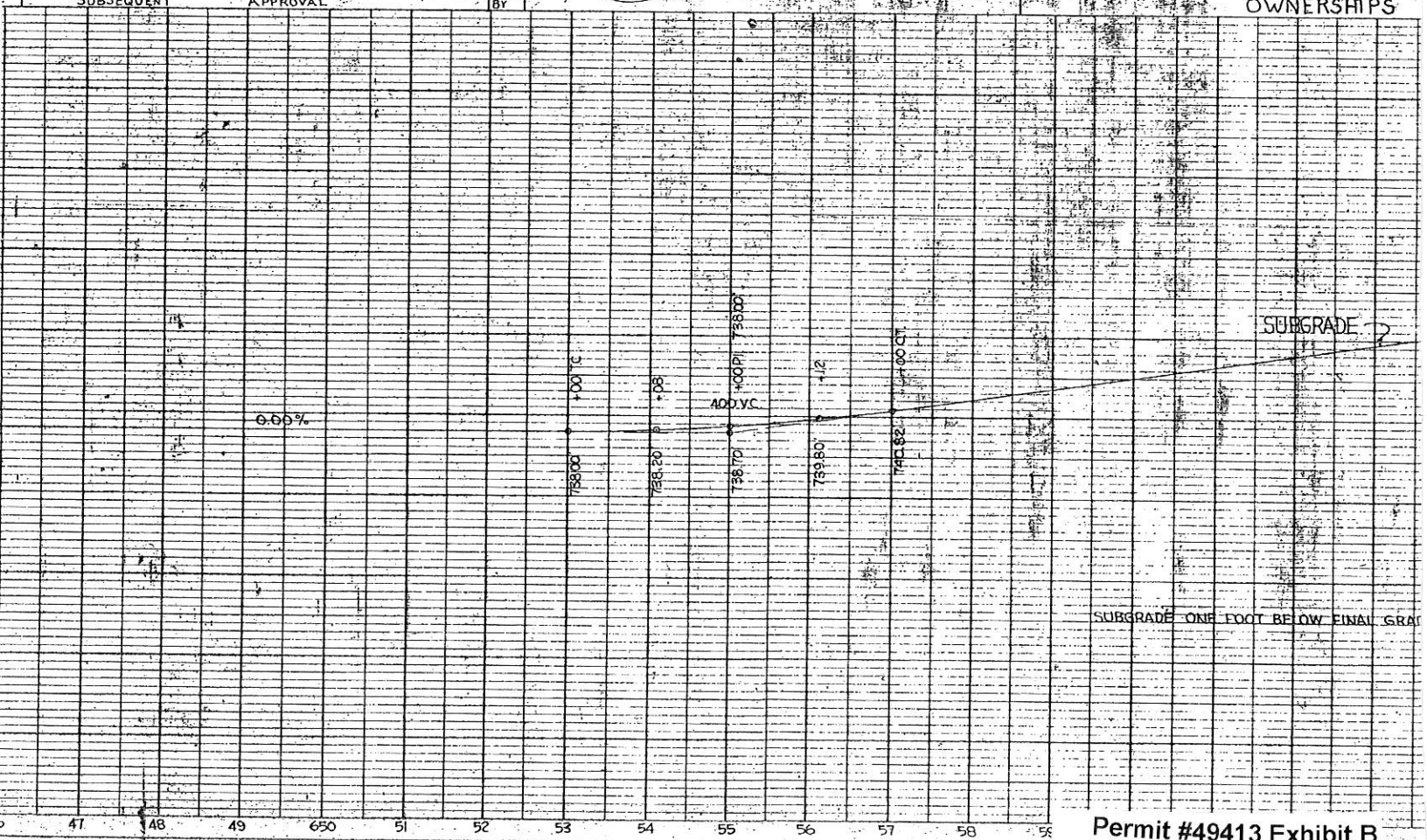
CHELAN COUNTY W



2-02791	B.N.R.R. Co.	SEE SHEET	14
PARCEL NO.	NAME	TOTAL AREA	R/W

OWNERSHIPS

	ADDED PARCEL 2-02791; ADDED CONSTRUCTION PERMITS ON RT. STA. 662+20 TO 662+50, 665+00 TO 665+30	BSM
SUBSEQUENT	APPROVAL	BY



Permit #49413 Exhibit B

PLATE 1.-PLAN-PROFILE O. P. R. & R. E. STANDARD
THE FREDERICK POST CO. CHICAGO

097 AR Inc 2012: SRMP 214.21 / ARM 14.38

Permit #49413 Exhibit C

Bid No. 13-01

Entiat Park Revitalization

VOLUME 5 of 7

Schedule B – Entiatqua Trail

Exhibit S - Specifications

PUBLIC UTILITY DISTRICT NO. 1
of

CHELAN COUNTY

PROCUREMENT AND CONTRACT SERVICES
P.O. Box 1231 (98807)
327B North Wenatchee Avenue
Wenatchee, WA 98801
(509) 661-4479 or (888) 663-8121
http://www.chelanpud.org/cf/PCS_Bids

Bid No. 13-01

Entiat Park Revitalization

VOLUME 6 of 7

Schedule B – Entiatqua Trail

Exhibit T – Contract Drawings

PUBLIC UTILITY DISTRICT NO. 1
of

CHELAN COUNTY

PROCUREMENT AND CONTRACT SERVICES
P.O. Box 1231 (98807)
327B North Wenatchee Avenue
Wenatchee, WA 98801
(509) 661-4479 or (888) 663-8121
http://www.chelanpud.org/cf/PCS_Bids

Bid No. 13-01

Entiat Park Revitalization

VOLUME 7 of 7

Schedule B – Entiatqua Trail

Exhibit U – Additional Information

PUBLIC UTILITY DISTRICT NO. 1
of

CHELAN COUNTY

PROCUREMENT AND CONTRACT SERVICES
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Wenatchee, WA 98801
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