Lostine River/Tulley-Hill Diversion Structural Replacement

COMPLETION REPORT

February 1, 2017 – December 31, 2018

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BPA Project # 1992-026-01
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INTRODUCTION/BACKGROUND INFORMATION

With the cooperation of the primary irrigator and landowner Woody Wolfe, landowner Perry Johnston, and coordination by Grande Ronde Model Watershed (GRMW) and Oregon Department of Fish & Wildlife (ODFW), the Tulley-Hill irrigation diversion replacement project located on the Lostine River (Figure 3) was completed during the month of August, 2017. Tetra Tech and ODFW provided survey data, Tetra Tech produced the designs and specifications, and acquired removal/fill permits while GRMW and NPT accomplished all other environmental compliance requirements. NPT was responsible for all contracting and Tetra Tech supplied bid documents, construction engineering, and inspection. The resulting project is a diversion structure and fishway that requires minimal annual instream maintenance, reduces erosion and sedimentation, and improves aquatic passage and local fish habitat conditions.

Project History

The Tulley-Hill ditch diversion on the Lostine River in Wallowa County, Oregon was a passage barrier to ESA Listed fish including Chinook salmon (Oncorhynchus tshawytscha), steelhead trout (Oncorhynchus mykiss), bull trout(Salvelinus confluentus), and other aquatic species. The structure failed to meet fish passage criteria as currently applied by ODFW and National Marine Fisheries Service - especially at low, late-season summer flows (Figure 1 and 2).

The former diversion structure was an upstream velocity barrier to all fish at high flow, juvenile upstream movement at low flows due to jump height, and adult Chinook at low flow during the spawning time of year, again due to jump height. The elevation difference between steps at low flows was greater than 12 inches, which exceeded fish passage criteria. The jump height barrier was exacerbated by dewatering in the later part of the irrigation season. There was also concern as the structure aged that extreme high water brought on by rain on snow events related to climate change could cause catastrophic failure at the diversion. Such an event had the potential to impede upstream migration to the detriment of an already imperiled stock of Chinook salmon and steelhead.

The diversion was comprised of a series of steps including rock weirs at the bottom, leading up to two log weirs – the upper most providing the water elevation for the diversion headgate. The structures were installed in 1998 by the Bureau of Reclamation to provide fish passage through the thalweg of the stream through gaps between the logs. Since its installation, considerable scour pools had formed below each step of the weir.

Figure 1. Photo taken below two log weirs downstream of the headgate, August 4, 2016.

Figure 2. Photo taken below rock weir and log weir structures, August 5, 2015.

Figure 3. Overview map depicting the location of the Tulley-Hill irrigation diversion on the Lostine River, downstream of the town of Lostine, OR.

The Tulley-Hill diversion is used during the Wallowa Valley irrigation season, which starts on May 1st and ends on September 30th. At all times of the year this ditch delivers stock water, but at a much lower rate than during irrigation season. An ODFW operated fish screen composed of three paddle wheel operated drums is located below the diversion and in the irrigation ditch.

Fish native to the Lostine River include spring Chinook, summer steelhead, rainbow trout, and bull trout as well as other resident species. Design criteria to pass spring Chinook, bull trout, and steelhead are the most stringent and were been used for design purposes. Spring Chinook migrate through the Lostine system to their spawning areas between July and mid-September. Summer steelhead migrate to their spawning areas in late winter and spring. Bull trout are very sparse in the area and mainly forage during winter and early spring. However, bull trout use this reach as a migration corridor to access spawning areas in the upper Lostine River from June through September.

In addition to previous diversion structure replacements, other activities in the Lostine Watershed have informed the development of this project. Many decades of stream flow gauging directly above the project site, which have been OWEB and BPA funded for the last 15-years, has allowed for the precise calculation of maximum, average, and minimum flows necessary for design purposes. OWEB projects 208-5076 and 210-5057, Migratory Assessment of Spring Chinook Salmon in the Lostine River Using Radio-Telemetry Techniques, have been essential in the decision to improve passage in the project area. This empirical data has shown that the Tulley-Hill diversion delays passage timing for adult Chinook salmon as river flow declines.

The Grande Ronde Subbasin Plan Supplement (2004) also identifies the importance of this project in the following sections for the Lostine River:

1. 5.2.2.1, page 37, GRSBP. Provide connectivity between functioning habitats.
2. 5.2.4.1, page 38, GRSBP. Protect high quality habitat and protect and restore connectivity of functioning habitats.
3. Table 5.4, Wallowa – Lostine River, page 40, GRSBP. Priority attribute sediment (reduction)

4. Table 5.6, page 50, GRSBP. Grande Ronde Subbasin watersheds listed in order of potential impact to steelhead and spring Chinook populations (abundance and productivity) from comprehensive habitat restoration: Wallowa – Lostine is the highest ranked watershed.

Pre-project monitoring was performed above and below the Tulley-Hill irrigation diversion fish passage barrier. BPA is supporting a programmatic approach to assess reach-scale responses to restoration actions across the Columbia Basin. Datasets derived from these Action Effectiveness Monitoring (AEM) efforts are to provide standardized, cost-effective assessments of programmatic restoration efficacy (Roni, 2013). AEM administrators have incorporated the Tulley-Hill Fish Passage Improvement project into the long-term monitoring program. The highly structured AEM program, which shares many elements with the programmatic Columbia Habitat Monitoring Program (CHaMP), utilizes a multiple before-after control impact (MBACI) study design to track changes over time at both partial passage barrier treatment and control (reference) sites (Bouwes, 2011). A Nez Perce Tribe AEM monitoring crew implemented the following surveys at treatment and control sites for two years prior to implementation (2015 and 2016) and will repeat the survey one, two, and five years after implementation:

1. Snorkel surveys to assess fish species composition, relative abundance, and habitat utilization.

2. Longitudinal profile surveys to track changes in streambed elevation, stream depth, bankfull width, wetted width, habitat composition, and substrate size.

3. Photo compilation from points established at numerous cross sections within each site.

As this data becomes available it will be supplied to partners, landowners, and funding sources in the completion and monitoring reports.

DISCUSSION OF WORK COMPLETED

This project resulted in the successful replacement of a fishway downstream of the Tulley-Hill irrigation diversion on the Lostine River, Wallowa County, Oregon. The former diversion created a fish passage barrier to migrating and spawning adult Chinook salmon during the later part of the summer when flows are at their lowest. The pre-existing log weir fishway also created

a jump height and velocity barrier for juvenile salmonids during low summer flows and spring runoff, respectively.

Implementation entailed replacement of two log weirs and rock weir with an engineered riffle and associated low-flow channel, pool habitat, and large wood structures. Specific stream restoration actions included installation of eight rock grade control structures and stream bed mix material, excavation of a sinuous low-flow channel and seven pools, and construction and anchoring of eight large wood structures for habitat enhancement and bank stability. Site rehabilitation and vegetation planting/seeding also occurred along the riparian and adjacent floodplain using a variety of native/locally sourced tree and shrub species.

Project Objectives

1. Restore fish passage at the Tulley-Hill diversion and fish ladder such that both State and Federal fish passage criteria are met as currently applied.
2. Improve hydraulic complexity throughout the project reach.
3. Enhance stream habitat characteristics throughout the project reach.

Contract Objectives

1. Coordination – NPT was the primary project sponsor with additional funding and coordination provided by GRMW, while ODFW provided technical assistance. Both NPT and GRMW coordinated funding, environmental compliance, and communication with stakeholders.

2. Design & Engineering – NPT contracted Tetra Tech to complete initial design concept and final engineering complete with construction specification. The deliverable was final design with construction specification and complete bid documents.

3. Environmental compliance – ESA Section 7 Consultation was completed with HIP 3 programmatic that covers consultation for both U.S. Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS). NPT contracted with Tetra Tech to complete removal/fill permit applications. The first deliverable was biological clearance for the project as stated in the letter of concurrence from both NMFS and USFWS complete with terms and conditions of project construction. The second deliverable was removal/fill permits from both Oregon DSL and Army Corps of Engineers complete with terms and conditions of project

construction. A cultural resources survey was conducted by BPA archeologist's spring of 2017 and consultation was completed prior to construction.

4. Contracting – NPT contracted with BPA for funds to implement the project. NPT also advertised for and awarded Partney Construction, Inc. of La Grande, OR with the construction contract.

5. Construction – The project was constructed during a modified in-stream work window for this reach of the Lostine River. The normal in-water work window on the Lostine River is from July 15 to August 15, however, due to experience gained from former projects on the Lostine paired with long-term stream gauge data, a variance was granted to reduce water management costs and hazards to migrating fish during construction. Following consultation with State and Federal regulatory agencies an extension to the in-water work window was granted which resulted in Partney Construction completing construction between July 15 and August 30, 2017. Tetra Tech was hired as the engineer tasked with project stakeout and construction oversight.

Work included mobilization, delivery of rock, clearing and grubbing the work site, erosion and water control, installation of the roughened channel, site restoration and demobilization. The project was complete with a final inspection conducted on August 30, 2017.

Construction

Construction elements included the following:

a. Grade Control Structures: Installation of eight grade control structures. These structures were built with large boulders, span the channel, and have a shallow V-shape pointing upstream (Figure 4). These were sized to remain stable during expected high flow events. The final product resulted in subsurface features that will maintain channel invert elevation, concentrate expected low flows to the meandering low flow channel, and meet jump height and flow velocity standards for fish passage.

Figure 4. Contractor installing boulders to build one of eight rock weirs to maintain grade throughout the project reach.

b. Engineered Riffle with Large Scale Roughness Boulders and Sinuous Low-flow Channel: One aspect to consider when working in rivers is sediment transport. Installing large-scale roughness features in the form of boulders will create a hydraulically diverse environment in which sediment transport is anticipated to be maintained. Built at a 2.5 percent slope, the engineered riffle complete with streambed simulation material and a sinuous low-flow channel was installed between grade control structures. This will aid in natural sediment transport and conveyance of water providing continuous fish passage through the project reach even during low water in later summer.

c. Large Woody Debris Structures: Eight log cross structures were placed throughout the channel to provide increased habitat complexity within the engineered riffle. Upon placement of each structure the bank was excavated to embed the LWD to provide increased structure stability during higher flood flows (Figure 5). Boulders were placed on LWD to provide added stability. Seven pools were constructed in association with LWD structures including one large plunge pool at the downstream end of the engineered riffle for increased habitat complexity.

Figure 5. Contractor installing one of eight large wood structures within the project footprint.

d. Water Control - Water control was accomplished by diverting the Lostine River flow around the work area in the Tulley-Hill ditch. While the bulk of flow was passed around the work area subsurface flow continued to wet the work area. Two water pumps complete with NMFS approved fish screens and 4 inch hose were used as needed along with double wall Eco blocks and plastic sheeting were installed at the upper and lower extent of the project reach for isolation/water control. Additionally, a silt fence was

installed at the bottom of the bypass work area for reduced sediment input to the main channel.

e. Site Restoration – The portion of the irrigation ditch that was used to divert water around the construction site was reconstructed and regraded to pre-construction conditions. All disturbed areas were seeded following construction with native grass seed material, the access road to the staging area was regraded, and planting of riparian shrubs and trees occurred (Figure 6).

Figure 6. Willow whips were planted in the bank and container plants of various native trees and shrubs were planted on the floodplain bench throughout the project reach.

In 2015, NPT applied for design funds through OWEB and following thorough review by a team of stakeholders, and an the granting of in-water work window variance, NPT successfully solicited for a construction bid awarding the project to Partney Construction, Inc. for construction July 2017.

Mobilization of materials to the project site began on July 14, followed by equipment delivery, clearing and grubbing of the work site, installation of the temporary irrigation pipe, and excavation of the irrigation ditch to bypass the river around construction in the main channel.

NPT lead three separate fish salvage efforts with partners, including GRMW and ODFW. The first event was conducted in the irrigation ditch on August 2, prior to dewatering and excavation of the bypass channel. The second occurred in the main channel on August 7, before dewatering (Figure 7). The last fish salvage took place in the bypass channel on August 28, following construction. Prior to shocking the main channel and bypass channel, the reach was surveyed for adult Chinook. The total number of juvenile salmonids captured was as follows:

- Chinook = 228
- Steelhead = 243
- Chinook mortalities = 8
- Steelhead mortalities = 10

Figure 7. NPT, ODFW, and GRMW staff conducting the fish salvage in the main channel prior to construction.

Erosion and water control were finalized with the installation of a silt fence and Eco blocks with associated plastic sheeting at the bottom end of the main channel and bypass prior to construction. Sediment pumps were used as needed throughout construction (Figure 8).

Figure 8. Sediment pump with 4 inch hose and fish screen, and Eco block isolation being implemented at the bottom of the bypass channel upon dewatering following construction.

Construction in the main channel began on August 8, 2017 and all construction on site ended on August 31, 2017. During this time the two log weirs, rock weir, and boulder cluster associated with the former fish barrier were removed and replaced with eight channel spanning grade control structures along with eight large wood structures and associated pools, engineered riffle, and low-flow channel (see Appendix B for before and after photos). Slope reduction through the project reach was achieved by more than doubling the project length at approximately 302-feet.

In addition to the installation of the rock weirs was the excavation of a meandering low-flow channel, placement of river gravel between each of the grade control structures, and finally the

placement of the largescale roughness boulders. These components are necessary to simulate a natural stream bottom and stabilize the grade control structures while still providing for uninhibited fish movement through the reach.

In-stream construction was concluded with the installation of large wood structures. Each structure was keyed into the bank to provide bank stability and fish habitat enhancement.

Once construction was complete, a final wash was applied to the substrate, and Eco bocks, plastic sheeting, and sand bags were removed to re-water the reach. The ditch was restored, the staging area was regraded, seeded and planted, fences were repaired, and the access road was regraded.

LESSONS LEARNED & ADAPTIVE MANAGEMENT

Lessons Learned

What Did and Did Not Work

Overall, the project was a success with only minor setbacks. Due to their extensive experience, Partney Construction, Inc. was thorough and consistent in their application of the engineered designs. NPT staff was onsite for all in-water work and Tetra Tech was onsite as needed to survey, and oversee construction and inspections throughout the entire project.

A high snow pack resulted in higher than average spring/summer run off in the Lostine River drainage. Consequently a request for an in-water work variance to extend the work window was submitted. Following review and approval by ODFW, Oregon DSL, USFWS, and NMFS, a variance was granted extending the usual July 15 - August 15 in-water work window through August 31. This enabled in-stream work to be completed in a safer manner for the fish and work crew, while improving water control, and reducing turbidity and scour.

Small adjustments to the method and route to the proposed bypass were implemented by the contractor. The first change included piping the water via a 36 inch diameter pipe around the project reach instead of pumping it from the river into the irrigation ditch. The second change involved shortening the route of the bypass excavation back to the river downstream of the project, thus avoiding removal/replacement of the flume located in the irrigation ditch. These

alterations were approved by the ODFW fish passage coordinator, project partners, engineers, and landowners. The incentive for this change was realized in cost savings to the project.

Lesson Learned

Exchange of Information

By communicating directly and honestly by phone, at technical team meetings, one-on-one, and on site during construction, information exchange served the project greatly. Project partners were able to keep landowners and ditch irrigators abreast on information pertaining to construction and water management effectively, preventing any misunderstandings or discontent. The contractor and project sponsors shared the responsibility of monitoring over weekends and holidays, communicating as needed to ensure proper management of flows throughout the site.

Adaptive Management

Applying Lessons Learned: Past Work Practices

The scope of the project and the habitat issues being addressed are similar to past projects completed – past experience and lessons learned largely contributed to the successful completion of this project. These prior lessons learned helped inform project sponsors resulting in a more successful project including, but not limited to acquiring a variance for the in-water work window to avoid high water and peak adult Chinook migration through the project site.

Applying Lessons Learned: Other Projects

RM&E Adjustments

We look forward to continuing to utilize data obtained from the RM&E that has been collected in our project area. This has been useful in putting forward projects and evaluating work completed from a biological standpoint, rooted in science. The combination of data produced by the Lostine River adult Chinook radio-telemetry and the AEM monitoring will continue to enhance our understanding of both biotic and abiotic interactions pre- and post-restoration.

Anticipated Future Critical Landmarks and Challenges

As with all the formerly implemented irrigation diversion fish passage improvements, the integrity of this structure will not be truly tested until it proves to stand a 10+ year flow event.

REFERENCES

Bouwes, N. J. (2011). *Scientific Protocol for salmonid habitat surveys within the Columbia Habitat Monitoring Program.* Wauconda, WA: Terraque, Inc.

Roni, P. S. (2013). *Action Effectiveness Monitoring of Tributary Habitat Improvement: A Programmatic Approach for the Columbia Basin Fish and Wildlife Program.* Seattle, WA: Watershed Program, Fisheries Ecology Division, Northwest Fisheries Science Center NOAA Fisheries.

Watershed Professionals Network, l. (2004). *Grande Ronde Subbasin Plan Supplement.* Prepared for the Northwest Power and Conservation Coucil.

APPENDICES

Appendix A: Final Sources

Construction:

Funding sources (Construction) include:

1. Bonneville Power Administration (NPT contract) = $218,928 (cash)
2. Oregon Watershed Enhancement Board (GRMW contract) = $168,786 (cash)
3. Nez Perce Tribe = $16,355 (In kind)
4. Grande Ronde Model Watershed = $7,805 (In kind)
    a. Total secured contribution = $411,874.

Funding Source	Cash Amount Contributed	Amount Spent
BPA	$218,928	$218,928
OWEB	$168,786	$168,786
NPT (in-kind)	$0	$16,355
GRMW (in-kind)	$0	$7,805
Total		**$411,874.00**

Technical Assistance:

OWEB TA funds were applied for, obtained, and used to procure project design, specification, permitting, ESA consultation, and was an essential step towards implementation of this project. OWEB Technical Assistance project #216-5018-12099 in the amount equal to $44,321 with $25,086 in kind cost share. Contributions by:

- ODFW Screens Shop Surveying (in-kind) = $5,100
- GRMW project management (in-kind) = $1,800
- NPT project management (in-kind) = $9,398
- OWEB (cash) = $44,321
    - Total = $69,407

Funding Source	Cash Amount Contributed	Amount Spent
BPA	$8,788	$8,788
OWEB	$44,321	$44,321
NPT (in-kind)	$0	$9,398
GRMW (in-kind)	$0	$1,800
ODFW (in-kind)	$0	$5,100
Total		**$69,407.00**

Project Grand Total Technical Assistance and Construction = **$481,281**.

Appendix B: Pre- and Post-Implementation Photos

Tulley-Hill Fish Passage Improvement Photo Points & Map – Pre & Post Implementation

Photo Point #1: Before (top photo) and after (bottom photo)

Photo Point #2: Before (top photo) and after (bottom photo)

Photo point #3: Before (top) and after (bottom)

Photo point #4: Before (top) and after (bottom)

Photo point #5: Before (top) and after (bottom)

Corresponding Photo Point Map

Appendix C: Final Design Drawings

THE NEZ PERCE TRIBE - DEPARTMENT OF FISHERIES RESOURCE MANAGEMENT
LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN
FINAL (100 PERCENT) DESIGN

LOCATION MAP
SCALE: NTS

VICINITY MAP
SCALE: 1 INCH = 1 MILE

DRAWING INDEX

DWG #	TITLE	REV #
	GENERAL	
G-001	COVER SHEET	D
G-002	GENERAL NOTES: ABBREVIATIONS AND CONSTRUCTION NOTES	D
G-003 - G-006	GENERAL NOTES: HIP III CONSERVATION NOTES	D
	CIVIL	
C-101	EXISTING CONDITIONS: ACCESS ROUTES AND CONTROL POINTS	D
C-102	EXISTING CONDITIONS: STREAM BYPASS AND TESC	D
C-201	PROPOSED CONDITIONS: ENGINEERED RIFFLE AND LOW FLOW CHANNEL	D
C-202 - C-204	PROPOSED CONDITIONS: ENGINEERED RIFFLE SECTIONS	D
C-205	PROPOSED CONDITIONS: PLUNGE POOL	D
C-206	PROPOSED CONDITIONS: CONSTRUCTION POINTS	D
C-207	PROPOSED CONDITIONS: LWD PLACEMENT	D
C-208	PROPOSED CONDITIONS: TEMPORARY BYPASS CHANNEL	D
C-209	PROPOSED CONDITIONS: BYPASS CHANNEL SECTIONS	D
C-300 - C-301	DETAILS: LWD CONSTRUCTION	D
C-302	DETAILS: EROSION AND SEDIMENT CONTROLS	D
L-101	PROPOSED CONDITIONS: REVEGETATION PLAN	D
L-102 - L-103	PROPOSED CONDITIONS: REVEGETATION DETAILS	D

ISSUED FOR CONSTRUCTION

NOTE: THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE BONNEVILLE POWER ADMINISTRATION HABITAT IMPROVEMENT PROGRAM, PROGRAMMATIC BIOLOGICAL OPINION (HIP III)

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX ST. ROY STATE OF WASHINGTON 47162 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") / REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

COVER SHEET

DWG. NO.: G-001

CREATED: 03/21/2016

SHEET: 1 OF 23

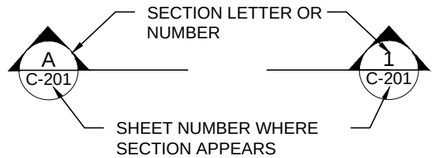
Z:\PROJECTS\194-5583.TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\COVER SHEET_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 10:56 AM

ABBREVIATIONS

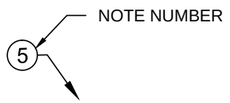
1H:1V	HORIZONTAL TO VERTICAL EXAGGERATION
%	PERCENT
BKF	BANKFULL
CP	CONSTRUCTION POINT
CY	CUBIC YARDS
DIA	DIAMETER
DWG	DRAWING
EX.	EXISTING
EL.	ELEVATION
ELEV.	ELEVATION
FT, '	FOOT
HIP	HABITAT IMPROVEMENT PROGRAM
IN, "	INCH
LT	LEFT
LWD	LARGE WOOD
MI	MILE
MJR	MAJOR
MNR	MINOR
N/A	NOT APPLICABLE
NPT	NEZ PERCE TRIBE
NTS	NOT TO SCALE
OWRD	OREGON WATER RESOURCES DEPARTMENT
PA	PROJECT AREA
PRO.	PROPOSED
RD	ROAD
RT	RIGHT
STA	STATION
TESC	TEMPORARY EROSION SEDIMENT CONTROL
TYP	TYPICAL
WSEL	WATER SURFACE ELEVATION
XS	CROSS SECTION
YR	YEAR

SYMBOLS

SECTIONS ARE REFERENCED IN THE FOLLOWING MANNER:



NOTES ARE REFERENCED IN THE FOLLOWING MANNER:



CONSTRUCTION SEQUENCING:

1. PLACE EROSION CONTROLS, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.
2. COMPLETE CLEARING AND GRUBBING.
3. REMOVE EXISTING DEBRIS.
4. REMOVE EXISTING GRADE CONTROL STRUCTURES.
5. CONSTRUCT ENGINEERED RIFFLE.
5. INSTALL PROPOSED GRADE CONTROL STRUCTURES.
6. INSTALL LWD STRUCTURES.
7. RESTORE AND RE-VEGETATE WORK AREAS.
8. REMOVE EROSION CONTROL MEASURES, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.

GENERAL NOTES:

1. HORIZONTAL PROJECTION: OREGON STATE PLANES, NORTH ZONE, INTERNATIONAL FOOT.
2. VERTICAL DATUM: NAVD88.
3. FIELD SURVEY EFFORTS COMPLETED BY ODFW. TOPOGRAPHIC DATA PROVIDED IN THIS DESIGN MAY VARY FROM FIELD CONDITIONS DURING TIME OF CONSTRUCTION DUE TO EROSIVE NATURE OF LOSTINE RIVER.
4. PROPOSED FLOOD ELEVATIONS CALCULATED USING HEC-RAS HYDRAULIC MODEL.
5. PROPOSED PROJECT DESIGN, CONSTRUCTION ACTIVITIES, AND MATERIALS SUBJECT TO APPROVAL BY OWNER.
6. CHANNEL STATIONING HEREON REFERS TO LOSTINE EXISTING THALWEG UNLESS OTHERWISE NOTED.

GENERAL CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL CONSTRUCT THE RESTORATION DESIGN ELEMENTS IN ACCORDANCE WITH THE PLANS STAMPED "APPROVED FOR CONSTRUCTION". THESE PLANS WILL BE PROVIDED TO THE CONTRACTOR BY THE CONTRACTING AGENCY PRIOR TO CONSTRUCTION. WORK SHALL NOT BE STARTED WITHOUT THE CURRENT SET OF APPROVED CONSTRUCTION PLANS.
2. THE CONTRACTOR SHALL PURSUE WORK IN A CONTINUOUS AND EFFICIENT MANNER TO ENSURE TIMELY COMPLETION OF THE PROJECT.
3. ALL WORK WITHIN THE ACTIVE CHANNEL SHALL OCCUR WITHIN THE ALLOWABLE FISH WINDOW (JULY 15 TO AUGUST 15).
4. ALL CONSTRUCTION ACTIVITIES SHALL MINIMIZE DISTURBANCE TO AND MAXIMIZE RE-USE OF EXISTING RIPARIAN VEGETATION.
5. ALL MATERIAL NOT USED ON-SITE SHALL BE DISPOSED OF ON-SITE AS DIRECTED BY THE OWNER OR OWNER'S REPRESENTATIVE OR SHALL BE HAULED OFF-SITE AND LEGALLY DISPOSED OF.
6. THE CONTRACTOR SHALL PROTECT ALL CONTROL POINTS TO THE EXTENT POSSIBLE DURING CONSTRUCTION ACTIVITIES.
7. ALL TEMPORARY ACCESS ROUTES SHALL BE LAID OUT TO MINIMIZE DISTURBANCE TO EXISTING VEGETATION AND FINAL LOCATION WILL BE VERIFIED BY OWNER.
8. CHANNEL CONDITIONS MAY DIFFER DURING CONSTRUCTION AND EROSION CONTROL MEASURES WILL NEED TO BE FIELD ADJUSTED TO CONFORM WITH HIP III GUIDELINES.
9. PRIOR TO BEGINNING ANY EXCAVATION WORK THE CONTRACTOR SHALL CALL FOR A LOCATION OF ANY UTILITIES THROUGH THE OREGON UTILITY NOTIFICATION CENTER AT 1-800-332-2344, OR 811.

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EXPIRES: 05/07/2017

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TREATY OF 1855
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NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
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LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

GENERAL NOTES
ABBREVIATIONS AND CONSTRUCTION NOTES

DWG. NO.: G-002

CREATED: 03/21/2016

SHEET: 2 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\ SHEET FILES\COVER SHEET_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX
April 12, 2017
9:06 AM

DOCUMENTATION: TO BE POSTED ONSITE BY THE CONTRACTOR IN A LOCATION VISIBLE TO THE PUBLIC:

A) NAME(S), PHONE NUMBER(S), AND ADDRESS(ES) OF PERSON(S) RESPONSIBLE FOR OVERSIGHT.
B) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES.
C) PROCEDURES TO CONTAIN AND CONTROL A SPILL OF ANY HAZARDOUS MATERIAL GENERATED, USED OR STORED ON-SITE, INCLUDING NOTIFICATION OF PROPER AUTHORITIES.
D) A STANDING ORDER TO CEASE WORK IN THE EVENT OF HIGH FLOWS EXCEPT AS NECESSARY TO MINIMIZE RESOURCE DAMAGE (ABOVE THOSE ADDRESSED IN THE DESIGN AND IMPLEMENTATION PLANS) OR EXCEEDANCE OF TAKE OR WATER QUALITY LIMITATIONS.

INSPECTIONS AND MONITORING: PROJECT SPONSOR STAFF OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE IMPLEMENTATION MONITORING TO ENSURE COMPLIANCE WITH THIS BIOLOGICAL OPINION, INCLUDING:

A) GENERAL CONSERVATION MEASURES AND PROJECT DESIGN CRITERIA ARE ADEQUATELY FOLLOWED; AND
B) EFFECTS TO ESA-LISTED SPECIES ARE NOT GREATER THAN PREDICTED AND TAKE LIMITATIONS ARE NOT EXCEEDED.

HIP III GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS:

THE ACTIVITIES COVERED UNDER THE HIP III ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES; HOWEVER, CONSTRUCTION ACTIVITIES MAY HAVE SHORT-TERM ADVERSE EFFECTS ON ESA-LISTED SPECIES AND ASSOCIATED CRITICAL HABITAT. TO AVOID AND MINIMIZE THESE SHORT-TERM ADVERSE EFFECTS, BPA HAS DEVELOPED THE FOLLOWING GENERAL CONSERVATION MEASURES IN COORDINATION WITH USFWS AND NMFS. THESE MEASURES WILL BE IMPLEMENTED ON ALL PROJECTS COVERED UNDER THE HIP III.

CLIMATE CHANGE: BEST AVAILABLE SCIENCE REGARDING THE FUTURE EFFECTS WITHIN THE PROJECT AREA OF CLIMATE CHANGE, SUCH AS CHANGES INSTREAM FLOWS AND WATER TEMPERATURES, WILL BE CONSIDERED DURING PROJECT DESIGN.

STATE AND FEDERAL PERMITS: ALL APPLICABLE REGULATORY PERMITS AND AUTHORIZATIONS WILL BE OBTAINED PRIOR TO PROJECT IMPLEMENTATION. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA), NATIONAL HISTORIC PRESERVATION ACT (NHPA), STATE AND FEDERAL SECTION 404 OF THE CLEAN WATER ACT (CWA) PERMITS, AND SECTION 401 WATER QUALITY CERTIFICATIONS.

TIMING OF IN-WATER WORK: FORMAL RECOMMENDATIONS PUBLISHED BY STATE AGENCIES SUCH AS THE OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP) OR INFORMAL RECOMMENDATIONS FROM THE APPROPRIATE STATE FISHERY BIOLOGIST IN REGARD TO THE TIMING OF IN-WATER WORK WILL BE FOLLOWED.

A) BULL TROUT - UTILIZING STATE-RECOMMENDED IN-WATER WORK WINDOWS WILL DECREASE POTENTIAL EFFECTS TO BULL TROUT, BUT THIS ALONE MAY NOT BE SUFFICIENT TO PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK WILL OCCUR IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE PRESENT NEARLY YEAR ROUND. SOME PROJECT LOCATIONS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT, OR IF THEY DO, THEY MAY DIFFER FROM THE IN-WATER WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF THE PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, THE PROJECT SPONSOR WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO ENSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
B) LAMPREY - THE PROJECT SPONSOR AND/OR THEIR CONTRACTORS WILL AVOID WORKING INSTREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY FROM MARCH 1 TO JULY 1 IN LOW- TO MID-ELEVATION REACHES (<5,000 FEET). IN HIGH-ELEVATION REACHES (>5,000 FEET), THE PROJECT SPONSOR WILL AVOID WORKING INSTREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE BEST MANAGEMENT PRACTICES (BMPS) OUTLINED IN USFWS 20101.
C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED THROUGH THE VARIANCE PROCESS (PAGE 22).

WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES ARE CONSIDERED INCIDENTAL TO CONSTRUCTION-RELATED ACTIVITIES AND SHALL OCCUR DURING STATE-RECOMMENDED IN-WATER WORK WINDOWS.

CONTAMINANTS: THE PROJECT SPONSOR WILL COMPLETE A SITE ASSESSMENT WITH THE FOLLOWING ELEMENTS TO IDENTIFY THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION FOR ANY ACTION THAT INVOLVES EXCAVATION OF MORE THAN 20 CUBIC YARDS OF MATERIAL:

A) A REVIEW OF AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
B) A SITE VISIT TO INSPECT THE AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES AND THE CONDITION OF THE PROPERTY;
C) INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, AND OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
D) A SUMMARY, STORED WITH THE PROJECT FILE THAT INCLUDES AN ASSESSMENT OF THE LIKELIHOOD THAT CONTAMINANTS ARE PRESENT AT THE SITE, BASED ON ITEMS 4(A) THROUGH 4(C).

SITE LAYOUT AND FLAGGING: PRIOR TO CONSTRUCTION, THE PROJECT AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER (OHW), SPAWNING AREAS, SPRINGS, AND WETLANDS;
B) EQUIPMENT ENTRY AND EXIT POINTS;
C) ROAD AND STREAM CROSSING ALIGNMENTS;
D) STAGING, STORAGE, AND STOCKPILE AREAS; AND
E) NO-HERBICIDE-APPLICATION AREAS AND BUFFERS.

TEMPORARY ACCESS ROADS AND PATHS:

A) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER POSSIBLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED TO LESSEN SOIL DISTURBANCE, SOIL COMPACTION, AND IMPACTS TO VEGETATION.
B) TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
C) THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
D) AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE ROAD SURFACE AND ASSOCIATED DITCHES, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
E) TEMPORARY ROADS AND PATHS IN WET AREAS OR AREAS PRONE TO FLOODING WILL BE OBLITERATED BY THE END OF THE IN-WATER WORK WINDOW.

TEMPORARY STREAM CROSSINGS:

A) EXISTING STREAM CROSSINGS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
B) TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR OVER WATER.
C) EQUIPMENT AND VEHICLES WILL CROSS STREAMS IN THE WET ONLY WHERE:
   I. THE STREAMBED IS BEDROCK; OR
   II. MATS OR OFF-SITE LOGS ARE PLACED IN THE STREAM AND USED AS A CROSSING.
D) VEHICLES AND MACHINERY WILL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHEREVER POSSIBLE.
E) THE LOCATION OF THE TEMPORARY CROSSING WILL AVOID AREAS THAT MAY INCREASE THE RISK OF CHANNEL RE-ROUTING OR AVULSION.
F) IMPACTS TO POTENTIAL SPAWNING HABITAT (I.E., POOL TAILOUTS) AND POOLS WILL BE AVOIDED TO THE MAXIMUM EXTENT POSSIBLE.
G) NO STREAM CROSSINGS WILL OCCUR AT ACTIVE SPAWNING SITES, WHEN HOLDING ADULT LISTED FISH ARE PRESENT, OR WHEN EGGS OR ALEVINS ARE IN THE GRAVEL. THE APPROPRIATE STATE FISH AND WILDLIFE AGENCY WILL BE CONTACTED FOR SPECIFIC TIMING INFORMATION.
H) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED, AND THE STREAM CHANNEL AND BANKS RESTORED.

STAGING, STORAGE, AND STOCKPILE AREAS:

A) STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA IN A LOCATION AND MANNER THAT WILL PRECLUDE EROSION INTO OR CONTAMINATION OF THE STREAM OF FLOODPLAIN.
B) NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN THE 100-YEAR FLOODPLAIN.
C) ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
D) ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE REMOVED TO A LOCATION OUTSIDE OF THE 100-YEAR FLOODPLAIN FOR DISPOSAL.

TETRA TECH
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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2008 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

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LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

GENERAL NOTES

HIP III CONSERVATION NOTES

DWG. NO.: G-003

CREATED: 03/21/2016

SHEET: 3 OF 23

HIP III GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

EQUIPMENT: MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G. MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS). ALL VEHICLES AND OTHER MECHANIZED EQUIPMENT WILL BE:

A) STORED, FUELED, AND MAINTAINED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM ANY NATURAL WATERBODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA;
B) REFUELED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM A NATURAL WATERBODY OR WETLAND, OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES TO ONLY GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);
C) BIODEGRADABLE LUBRICANTS AND FLUIDS SHOULD BE USED, IF POSSIBLE, ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER;
D) INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND
E) THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

EROSION CONTROL: EROSION CONTROL BEST MANAGEMENT PRACTICES (BMPS) WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

A) TEMPORARY EROSION CONTROL BMPS.
I. TEMPORARY EROSION CONTROL BMPS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE.
II. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION.
III. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC.
IV. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED-FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION.
V. SEDIMENT WILL BE REMOVED FROM EROSION CONTROL BMP ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE BMP.
VI. ONCE THE SITE IS STABILIZED FOLLOWING CONSTRUCTION, TEMPORARY EROSION CONTROL BMPS WILL BE REMOVED.

B) EMERGENCY EROSION CONTROL BMPS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
I. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
II. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

DUST ABATEMENT: THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES (IF NECESSARY) BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES. IN ADDITION, THE FOLLOWING CRITERIA WILL BE FOLLOWED:
A) WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
B) DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR STREAM CHANNELS AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING A 50:50 (LIGNINSULFONATE TO WATER) SOLUTION.
C) APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
D) SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
E) PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

SPILL PREVENTION, CONTROL, AND COUNTERMEASURES: THE USE OF MECHANIZED MACHINERY INCREASES THE RISK FOR ACCIDENTAL SPILLS OF FUEL, LUBRICANTS, HYDRAULIC FLUID, OR OTHER CONTAMINANTS INTO THE RIPARIAN ZONE OR DIRECTLY INTO THE WATER. ADDITIONALLY, UNCURED CONCRETE AND FORM MATERIALS ADJACENT TO THE ACTIVE STREAM CHANNEL MAY RESULT IN ACCIDENTAL DISCHARGE INTO THE WATER. THESE CONTAMINANTS CAN DEGRADE HABITAT, AND INJURE OR KILL AQUATIC FOOD ORGANISMS AND ESA-LISTED SPECIES. THE PROJECT SPONSOR WILL ADHERE TO THE FOLLOWING MEASURES:
A) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
B) WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
C) SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIAL USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
D) WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
E) ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.

INVASIVE SPECIES CONTROL: THE FOLLOWING MEASURES WILL BE FOLLOWED TO AVOID INTRODUCTION OF INVASIVE PLANTS AND NOXIOUS WEEDS INTO PROJECT AREAS:
A) PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER-WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
B) WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES.

WORK AREA ISOLATION & FISH SALVAGE:
ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS. WORK AREA ISOLATION & FISH SALVAGE ACTIVITIES ARE CONSIDERED INCIDENTAL TO CONSTRUCTION-RELATED ACTIVITIES AND SHALL OCCUR DURING THE STATE-RECOMMENDED IN-WATER WORK WINDOWS.

WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, AND, WHEN A PUMP IS USED TO DEWATER THE ISOLATION AREA AND FISH ARE PRESENT, A FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 20112, OR MOST CURRENT). WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

FOR SALVAGE OPERATIONS IN KNOWN BULL TROUT SPAWNING AND REARING HABITAT, ELECTROFISHING SHALL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTROFISHED OR OTHERWISE HANDLED WHEN TEMPERATURES EXCEED 15 DEGREES CELSIUS. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS TO FISH SPECIES PRESENT.

SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODOLOGIES, AND CONSERVATION MEASURES SPECIFIED BELOW IN STEPS 1 THROUGH 6. STEPS 1 AND 2 WILL BE IMPLEMENTED FOR ALL PROJECTS WHERE WORK AREA ISOLATION IS NECESSARY ACCORDING TO CONDITIONS ABOVE. ELECTROFISHING (STEP 3) CAN BE IMPLEMENTED TO ENSURE ALL FISH HAVE BEEN REMOVED FOLLOWING STEPS 1 AND 2, OR WHEN OTHER MEANS OF FISH CAPTURE MAY NOT BE FEASIBLE OR EFFECTIVE. DEWATERING AND REWATERING (STEPS 4 AND 5) WILL BE IMPLEMENTED UNLESS WETTED INSTREAM WORK IS DEEMED TO BE MINIMALLY HARMFUL TO FISH, AND IS BENEFICIAL TO OTHER AQUATIC SPECIES. DEWATERING WILL NOT BE CONDUCTED IN AREAS KNOWN TO BE OCCUPIED BY LAMPREY, UNLESS LAMPREYS ARE SALVAGED USING GUIDANCE SET FORTH IN USFWS 20103.

STEP 1: ISOLATE:
A) BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
B) BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH.
C) IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION. IF THE PROJECT IS WITHIN BULL TROUT SPAWNING AND REARING HABITAT, THE BLOCK NETS MUST BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT ON THE NET. LESS FREQUENT INTERVALS MUST BE APPROVED THROUGH A VARIANCE REQUEST.
D) NETS WILL BE MONITORED HOURLY ANYTIME THERE IS INSTREAM DISTURBANCE.

HIP III GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

STEP 2: SALVAGE: AS DESCRIBED BELOW, FISH TRAPPED WITHIN THE ISOLATED WORK AREA WILL BE CAPTURED TO MINIMIZE THE RISK OF INJURY, THEN RELEASED AT A SAFE SITE:

A) REMOVE AS MANY FISH AS POSSIBLE PRIOR TO DEWATERING.

B) DURING DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.

C) SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.

D) MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.

E) IF BUCKETS ARE USED TO TRANSPORT FISH:

I. THE TIME FISH ARE IN A TRANSPORT BUCKET WILL BE LIMITED, AND WILL BE RELEASED AS QUICKLY AS POSSIBLE;

II. THE NUMBER OF FISH WITHIN A BUCKET WILL BE LIMITED BASED ON SIZE, AND FISH WILL BE OF RELATIVELY COMPARABLE SIZE TO MINIMIZE PREDATION;

III. AERATORS FOR BUCKETS WILL BE USED OR THE BUCKET WATER WILL BE FREQUENTLY CHANGED WITH COLD CLEAR WATER AT 15 MINUTE OR MORE FREQUENT INTERVALS.

IV. BUCKETS WILL BE KEPT IN SHADED AREAS OR WILL BE COVERED BY A CANOPY IN EXPOSED AREAS.

V. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS BUT WILL BE LEFT ON THE STREAMBANK TO AVOID MORTALITY COUNTING ERRORS.

F) AS RAPIDLY AS POSSIBLE (ESPECIALLY FOR TEMPERATURE-SENSITIVE BULL TROUT), FISH WILL BE RELEASED IN AN AREA THAT PROVIDES ADEQUATE COVER AND FLOW REFUGE. UPSTREAM RELEASE IS GENERALLY PREFERRED, BUT FISH RELEASED DOWNSTREAM WILL BE SUFFICIENTLY OUTSIDE OF THE INFLUENCE OF CONSTRUCTION.

G) SALVAGE WILL BE SUPERVISED BY A QUALIFIED FISHERIES BIOLOGIST EXPERIENCED WITH WORK AREA ISOLATION AND COMPETENT TO ENSURE THE SAFE HANDLING OF ALL FISH.

STEP 3: ELECTROFISHING: ELECTROFISHING WILL BE USED ONLY AFTER OTHER SALVAGE METHODS HAVE BEEN EMPLOYED OR WHEN OTHER MEANS OF FISH CAPTURE ARE DETERMINED TO NOT BE FEASIBLE OR EFFECTIVE. IF ELECTROFISHING WILL BE USED TO CAPTURE FISH FOR SALVAGE, THE SALVAGE OPERATION WILL BE LED BY AN EXPERIENCED FISHERIES BIOLOGIST AND THE FOLLOWING GUIDELINES WILL BE FOLLOWED:

A) THE NMFS' ELECTROFISHING GUIDELINES WILL BE USED (NMFS 2004).

B) INITIAL SITE SURVEYS AND EQUIPMENT SETTINGS

I. IN ORDER TO AVOID CONTACT WITH SPAWNING ADULTS OR ACTIVE REDDS, RESEARCHERS MUST CONDUCT A CAREFUL VISUAL SURVEY OF THE AREA TO BE SAMPLED BEFORE BEGINNING ELECTROFISHING.

II. PRIOR TO THE START OF SAMPLING AT A NEW LOCATION, WATER TEMPERATURE AND CONDUCTIVITY MEASUREMENTS SHALL BE TAKEN TO EVALUATE ELECTROFISHER SETTINGS AND ADJUSTMENTS. NO ELECTROFISHING SHOULD OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18°C OR ARE EXPECTED TO RISE ABOVE THIS TEMPERATURE PRIOR TO CONCLUDING THE ELECTROFISHING SURVEY. IN ADDITION, STUDIES BY NMFS SCIENTISTS INDICATE THAT NO ELECTROFISHING SHOULD OCCUR IN CALIFORNIA COASTAL BASINS WHEN CONDUCTIVITY IS ABOVE 350 MS/CM.

III. WHENEVER POSSIBLE, A BLOCK NET SHOULD BE PLACED BELOW THE AREA BEING SAMPLED TO CAPTURE STUNNED FISH THAT MAY DRIFT DOWNSTREAM.

IV. EQUIPMENT MUST BE IN GOOD WORKING CONDITION AND OPERATORS SHOULD GO THROUGH THE MANUFACTURER'S PRESEASON CHECKS, ADHERE TO ALL PROVISIONS, AND RECORD MAJOR MAINTENANCE WORK IN A LOGBOOK.

V. EACH ELECTROFISHING SESSION MUST START WITH ALL SETTINGS (VOLTAGE, PULSE WIDTH, AND PULSE RATE) SET TO THE MINIMUMS NEEDED TO CAPTURE FISH. THESE SETTINGS SHOULD BE GRADUALLY INCREASED ONLY TO THE POINT WHERE FISH ARE IMMOBILIZED AND CAPTURED, AND GENERALLY NOT ALLOWED TO EXCEED CONDUCTIVITY-BASED MAXIMA (TABLE 1). ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) SHOULD BE USED.

B) ELECTROFISHING TECHNIQUE

I. SAMPLING SHOULD BEGIN USING STRAIGHT DC. THE POWER NEEDS TO REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. IF FISH CAPTURE IS UNSUCCESSFUL WITH INITIAL LOW VOLTAGE, GRADUALLY INCREASE VOLTAGE SETTINGS WITH STRAIGHT DC.

II. IF FISH CAPTURE IS NOT SUCCESSFUL WITH THE USE OF STRAIGHT DC, THEN SET THE ELECTROFISHER TO LOWER VOLTAGES WITH PDC. IF FISH CAPTURE IS UNSUCCESSFUL WITH LOW VOLTAGES, INCREASE PULSE WIDTH, VOLTAGE, AND PULSE FREQUENCY (DURATION, AMPLITUDE, AND FREQUENCY).

III. ELECTROFISHING SHOULD BE PERFORMED IN A MANNER THAT MINIMIZES HARM TO THE FISH. STREAM SEGMENTS SHOULD BE SAMPLED SYSTEMATICALLY, MOVING THE ANODE CONTINUOUSLY IN A HERRINGBONE PATTERN (WHERE FEASIBLE) THROUGH THE WATER. CARE SHOULD BE TAKEN WHEN FISHING IN AREAS WITH HIGH FISH CONCENTRATIONS, STRUCTURE (E.G., WOOD, UNDERCUT BANKS) AND IN SHALLOW WATERS WHERE MOST BACKPACK ELECTROFISHING FOR JUVENILE SALMONIDS OCCURS. VOLTAGE GRADIENTS MAY BE HIGH WHEN ELECTRODES ARE IN SHALLOW WATER WHERE BOUNDARY LAYERS (WATER SURFACE AND SUBSTRATE) TEND TO INTENSIFY THE ELECTRICAL FIELD.

IV. DO NOT ELECTROFISH IN ONE LOCATION FOR AN EXTENDED PERIOD (E.G., UNDERCUT BANKS) AND REGULARLY CHECK BLOCK NETS FOR IMMOBILIZED FISH.

V. FISH SHOULD NOT MAKE CONTACT WITH THE ANODE. THE ZONE OF POTENTIAL INJURY FOR FISH IS 0.5 M FROM THE ANODE.

VI. ELECTROFISHING CREWS SHOULD BE GENERALLY OBSERVANT OF THE CONDITION OF THE FISH AND CHANGE OR TERMINATE SAMPLING WHEN EXPERIENCING PROBLEMS WITH FISH RECOVERY TIME, BANDING, INJURY, MORTALITY, OR OTHER INDICATIONS OF FISH STRESS.

VII. NETTERS SHOULD NOT ALLOW THE FISH TO REMAIN IN THE ELECTRICAL FIELD ANY LONGER THAN NECESSARY BY REMOVING STUNNED FISH FROM THE WATER IMMEDIATELY AFTER NETTING.

C) SAMPLE PROCESSING AND RECORDKEEPING

I. FISH SHOULD BE PROCESSED AS SOON AS POSSIBLE AFTER CAPTURE TO MINIMIZE STRESS. THIS MAY REQUIRE A LARGER CREW SIZE.

II. ALL SAMPLING PROCEDURES MUST HAVE A PROTOCOL FOR PROTECTING HELD FISH. SAMPLERS MUST BE AWARE OF THE CONDITIONS IN THE CONTAINERS HOLDING FISH; AIR PUMPS, WATER TRANSFERS, ETC., SHOULD BE USED AS NECESSARY TO MAINTAIN SAFE CONDITIONS. ALSO, LARGE FISH SHOULD BE KEPT SEPARATE FROM SMALLER PREY-SIZED FISH TO AVOID PREDATION DURING CONTAINMENT.

III. USE OF AN APPROVED ANESTHETIC CAN REDUCE FISH STRESS AND IS RECOMMENDED, PARTICULARLY IF ADDITIONAL HANDLING OF FISH IS REQUIRED (E.G., LENGTH AND WEIGHT MEASUREMENTS, SCALE SAMPLES, FIN CLIPS, TAGGING).

IV. FISH SHOULD BE HANDLED PROPERLY (E.G., WETTING MEASURING BOARDS, NOT OVERCROWDING FISH IN BUCKETS, ETC.).

V. FISH SHOULD BE OBSERVED FOR GENERAL CONDITION AND INJURIES (E.G., INCREASED RECOVERY TIME, DARK BANDS, VISUALLY OBSERVABLE SPINAL INJURIES). EACH FISH SHOULD BE COMPLETELY REVIVED BEFORE RELEASING AT THE LOCATION OF CAPTURE. A PLAN FOR ACHIEVING EFFICIENT RETURN TO APPROPRIATE HABITAT SHOULD BE DEVELOPED BEFORE EACH SAMPLING SESSION. ALSO, EVERY ATTEMPT SHOULD BE MADE TO PROCESS AND RELEASE ESA-LISTED SPECIMENS FIRST.

VI. PERTINENT WATER QUALITY (E.G., CONDUCTIVITY AND TEMPERATURE) AND SAMPLING NOTES (E.G., SHOCKER SETTINGS, FISH CONDITION/INJURIES/MORTALITIES) SHOULD BE RECORDED IN A LOGBOOK TO IMPROVE TECHNIQUE AND HELP TRAIN NEW OPERATORS. IT IS IMPORTANT TO NOTE THAT RECORDS OF INJURIES OR MORTALITIES PERTAIN TO THE ENTIRE ELECTROFISHING SURVEY, INCLUDING THE FISH SAMPLE WORK-UP.

VII. THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.

VIII. ELECTROFISHING SHALL NOT BE CONDUCTED WHEN THE WATER CONDITIONS ARE TURBID AND VISIBILITY IS POOR. THIS CONDITION MAY BE EXPERIENCED WHEN THE SAMPLER CANNOT SEE THE STREAM BOTTOM IN ONE FOOT OF WATER.

IX. IF MORTALITY OR OBVIOUS INJURY (DEFINED AS DARK BANDS ON THE BODY, SPINAL DEFORMATIONS, DE-SCALING OF 25% OR MORE OF BODY, AND TORPIDITY OR INABILITY TO MAINTAIN UPRIGHT ATTITUDE AFTER SUFFICIENT RECOVERY TIME) OCCURS DURING ELECTROFISHING, OPERATIONS WILL BE IMMEDIATELY DISCONTINUED, MACHINE SETTINGS, WATER TEMPERATURE, AND CONDUCTIVITY CHECKED, AND PROCEDURES ADJUSTED OR ELECTROFISHING POSTPONED IN ORDER TO REDUCE MORTALITY.

TABLE 1. GUIDELINES FOR INITIAL AND MAXIMUM SETTINGS FOR BACKPACK ELECTROFISHING

	INITIAL SETTINGS	MAXIMUM SETTINGS		NOTES
VOLTAGE	100 V	CONDUCTIVITY (µS/cm)	MAX. VOLTAGE	IN CALIFORNIA COASTAL BASINS, SETTINGS SHOULD NEVER EXCEED 400 VOLTS. ALSO, NO ELECTROFISHING SHOULD OCCUR IN THESE BASINS IF CONDUCTIVITY IS GREATER THAN 350 µS/cm.
		100	1100 V	
		100 - 300	800 V	
		> 300	400 V	
PULSE WIDTH	500 µs	5 ms		
PULSE RATE	30 Hz	70 Hz		IN GENERAL, EXCEEDING 40 Hz WILL INJURE MORE FISH.

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 24708 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

PLAN SHEET SIZE ANSI B (11" X 17")

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

GENERAL NOTES
HIP III CONSERVATION NOTES

DWG. NO.: G-005
CREATED: 03/21/2016
SHEET: 5 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\ SHEET FILES\COVER SHEET_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 10:57 AM

HIP III GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS (CONTINUED):

STEP 4: DEWATER: DEWATERING, WHEN NECESSARY, WILL BE CONDUCTED OVER A SUFFICIENT PERIOD OF TIME TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA AND WILL BE LIMITED TO THE SHORTEST LINEAR EXTENT PRACTICLE.

A) DIVERSION AROUND THE CONSTRUCTION SITE MAY BE ACCOMPLISHED WITH A COFFER DAM AND A BY-PASS CULVERT OR PIPE, OR A LINED, NON-ERODIBLE DIVERSION DITCH. WHERE GRAVITY FEED IS NOT POSSIBLE, A PUMP MAY BE USED, BUT MUST BE OPERATED IN SUCH A WAY AS TO AVOID REPETITIVE DEWATERING AND REWATERING OF THE SITE. IMPOUNDMENT BEHIND THE COFFERDAM MUST OCCUR SLOWLY THROUGH TRANSITION, WHILE CONSTANT FLOW IS DELIVERED TO THE DOWNSTREAM REACHES.

B) ALL PUMPS WILL HAVE FISH SCREENS TO AVOID JUVENILE FISH IMPINGEMENT OR ENTRAINMENT, AND WILL BE OPERATED IN ACCORDANCE WITH CURRENT NMFS FISH SCREEN CRITERIA. IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET PER SECOND, A NMFS HYDRO FISH PASSAGE REVIEW WILL BE NECESSARY.

C) DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO RIPARIAN VEGETATION OR STREAM CHANNEL.

D) SAFE REENTRY OF FISH INTO THE STREAM CHANNEL WILL BE PROVIDED, PREFERABLY INTO POOL HABITAT WITH COVER, IF THE DIVERSION ALLOWS FOR DOWNSTREAM FISH PASSAGE.

E) SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OR INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL OR TO FILTER THROUGH VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

STEP 5: SALVAGE NOTICE: MONITORING AND RECORDING FISH PRESENCE, HANDLING, AND MORTALITY MUST OCCUR DURING THE DURATION OF THE ISOLATION, SALVAGE, ELECTROFISHING, DEWATERING, AND REWATERING OPERATIONS. ONCE OPERATIONS ARE COMPLETED, A SALVAGE REPORT WILL DOCUMENT PROCEDURES USED, ANY FISH INJURIES OR DEATHS (INCLUDING NUMBERS OF FISH AFFECTED), AND CAUSES OF ANY DEATHS.

FISH PASSAGE: FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE ACTION AREA DURING CONSTRUCTION, UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION OR THE STREAM IS NATURALLY IMPASSABLE AT THE TIME OF CONSTRUCTION. IF THE PROVISION OF TEMPORARY FISH PASSAGE DURING CONSTRUCTION WILL INCREASE NEGATIVE EFFECTS ON AQUATIC SPECIES OF INTEREST OR THEIR HABITAT, A VARIANCE CAN BE REQUESTED FROM THE NMFS BRANCH CHIEF AND USFWS FIELD OFFICE SUPERVISOR. PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVES CONSIDERED, WILL BE INCLUDED IN THE VARIANCE REQUEST.

CONSTRUCTION AND DISCHARGE WATER:

A) SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS, BUT ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.

B) DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

C) ALL CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED USING THE BEST AVAILABLE TECHNOLOGY APPLICABLE TO SITE CONDITIONS.

D) TREATMENTS TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS AND OTHER POLLUTANTS LIKELY TO BE PRESENT WILL BE PROVIDED.

MINIMIZE TIME AND EXTENT OF DISTURBANCE: EARTHWORK (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING AND COMPACTING) IN WHICH MECHANIZED EQUIPMENT IS IN STREAM CHANNELS, RIPARIAN AREAS, AND WETLANDS WILL BE COMPLETED AS QUICKLY AS POSSIBLE. MECHANIZED EQUIPMENT WILL BE USED IN STREAMS ONLY WHEN PROJECT SPECIALISTS BELIEVE THAT SUCH ACTIONS ARE THE ONLY REASONABLE ALTERNATIVE FOR IMPLEMENTATION, OR WOULD RESULT IN LESS SEDIMENT IN THE STREAM CHANNEL OR DAMAGE (SHORT- OR LONG-TERM) TO THE OVERALL AQUATIC AND RIPARIAN ECOSYSTEM RELATIVE TO OTHER

ALTERNATIVES. TO THE EXTENT FEASIBLE, MECHANIZED EQUIPMENT WILL WORK FROM THE TOP OF THE BANK, UNLESS WORK FROM ANOTHER LOCATION WOULD RESULT IN LESS HABITAT DISTURBANCE.

CESSATION OF WORK: PROJECT OPERATIONS WILL CEASE UNDER THE FOLLOWING CONDITIONS:

A) HIGH FLOW CONDITIONS THAT MAY RESULT IN INUNDATION OF THE PROJECT AREA, EXCEPT FOR EFFORTS TO AVOID OR MINIMIZE RESOURCE DAMAGE;

B) WHEN ALLOWABLE WATER QUALITY IMPACTS, AS DEFINED BY THE STATE CWA SECTION 401 WATER QUALITY CERTIFICATION, HAVE BEEN EXCEEDED; OR

C) WHEN "INCIDENTAL TAKE" LIMITATIONS HAVE BEEN REACHED OR EXCEEDED.

SITE RESTORATION: WHEN CONSTRUCTION IS COMPLETE:

A) ALL STREAMBANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED AS NECESSARY USING STOCKPILED LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL.

B) ALL PROJECT RELATED WASTE WILL BE REMOVED.

C) ALL TEMPORARY ACCESS ROADS, CROSSINGS, AND STAGING AREAS WILL BE OBLITERATED. WHEN NECESSARY FOR REVEGETATION AND INFILTRATION OF WATER, COMPACTED AREAS OF SOIL WILL BE LOOSENED.

C) ALL DISTURBED AREAS WILL BE REHABILITATED IN A MANNER THAT RESULTS IN SIMILAR OR IMPROVED CONDITIONS RELATIVE TO PRE-PROJECT CONDITIONS. THIS WILL BE ACHIEVED THROUGH REDISTRIBUTION OF STOCKPILED MATERIALS, SEEDING, AND/OR PLANTING WITH LOCAL NATIVE SEED MIXES OR PLANTS.

REVEGETATION: LONG-TERM SOIL STABILIZATION OF THE DISTURBED SITE WILL BE ACCOMPLISHED WITH RE-ESTABLISHMENT OF NATIVE VEGETATION USING THE FOLLOWING CRITERIA:

A) PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

B) AN APPROPRIATE MIX OF SPECIES THAT WILL ACHIEVE ESTABLISHMENT, SHADE, AND EROSION CONTROL OBJECTIVES, PREFERABLY FORB, GRASS, SHRUB, OR TREE SPECIES NATIVE TO THE PROJECT AREA OR REGION AND APPROPRIATE TO THE SITE WILL BE USED.

C) VEGETATION, SUCH AS WILLOW, SEDGE AND RUSH MATS, WILL BE SALVAGED FROM DISTURBED OR ABANDONED FLOODPLAINS, STREAM CHANNELS, OR WETLANDS.

D) INVASIVE SPECIES WILL NOT BE USED.

E) SHORT-TERM STABILIZATION MEASURES MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE SEEDS ARE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, JUTE MATTING, AND OTHER SIMILAR TECHNIQUES.

F) SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM CHANNEL, WATERBODY, OR WETLAND.

G) FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.

H) RE-ESTABLISHMENT OF VEGETATION IN DISTURBED AREAS WILL ACHIEVE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN 3-YEARS.

I) INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY 3-YEARS POST-CONSTRUCTION).

SITE ACCESS: THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE IN ORDER TO MONITOR THE SUCCESS OF THE PROJECT OVER ITS LIFE.

IMPLEMENTATION MONITORING: PROJECT SPONSOR STAFF OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE IMPLEMENTATION MONITORING TO ENSURE COMPLIANCE WITH THE APPLICABLE BIOLOGICAL OPINION, INCLUDING:

A) GENERAL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED; AND

B) EFFECTS TO LISTED SPECIES ARE NOT GREATER THAT PREDICTED AND INCIDENTAL TAKE LIMITAITONS ARE NOT EXCEEDED.

CWA SECTION 401 WATER QUALITY CERTIFICATION: THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS TO ENSURE THAT IN-WATER WORK IS NOT DEGRADING WATER QUALITY. DURING CONSTRUCTION, CWA SECTION 401 WATER QUALITY CERTIFICATION PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, OR IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

STAGED REWATERING PLAN: SEE STAGED REWATERING PLAN SHEETS, IF APPLICABLE.

VARIANCE REQUESTS: BECAUSE OF THE WIDE RANGE OF PROPOSED ACTIVITIES AND THE NATURAL VARIABILITY WITHIN AND BETWEEN STREAM SYSTEMS, BPA (ON BEHALF OF THE APPLICANT) MAY REQUIRE VARIATIONS FROM CRITERIA SPECIFIED HEREIN. THE SERVICES WILL CONSIDER GRANTING VARIANCES, ESPECIALLY WHEN THERE IS A CLEAR CONSERVATION BENEFIT OR THERE ARE NO ADDITIONAL ADVERSE EFFECTS (ESPECIALLY INCIDENTAL TAKE) BEYOND THAT COVERED BY THE OPINION. MINOR VARIANCES CAN BE AUTHORIZED BY THE NMFS BRANCH CHIEF AND USFWS FIELD OFFICE SUPERVISOR.

VARIANCE REQUESTS MAY BE SUBMITTED AND APPROVED BY EMAIL CORRESPONDENCE AND WILL INCLUDE:

1) NAME AND BRIEF DESCRIPTION OF PROJECT, LOCATION OF PROJECT AND 6TH FIELD HUC NUMBER.
2) DEFINE THE REQUESTED VARIANCE AND THE RELEVANT CRITERION BY PAGE NUMBER.
3) CURRENT ENVIRONMENTAL CONDITIONS (CURRENT FLOW AND WEATHER CONDITIONS).
4) BIOLOGICAL JUSTIFICATION AS TO WHY A VARIANCE IS NECESSARY AND A BRIEF RATIONALE WHY THE VARIANCE WILL EITHER PROVIDE A CONSERVATION BENEFIT OR, AT A MINIMUM, NOT CAUSE ADDITIONAL ADVERSE EFFECTS BEYOND THE SCOPE OF THE OPINION.
5) INCLUDE AS ATTACHMENTS ANY NECESSARY APPROVALS BY STATE AGENCIES.

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47402 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

GENERAL NOTES

HIP III CONSERVATION NOTES

DWG. NO.: G-006

CREATED: 03/21/2016

SHEET: 6 OF 23

Z:\PROJECTS\194-5583.TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\COVER SHEET_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 10:57 AM

0 100 200 Feet

POINT TABLE				
POINT #	EASTING	NORTHING	ELEVATION	DESCRIPTION
117	8975767.37	696562.03	3059.31	OREGON STATE HIGHWAY DIVISION G673
119	8977896.13	695606.19	3074.53	CP
122	8978234.84	695110.96	3081.67	CP

LEGEND:
- EXISTING 5-FOOT CONTOURS
- PROPERTY BOUNDARY
- BANKFULL WSEL
- STAGING AREA
- CONTROL POINTS
- FENCE
- EXISTING DITCH LINE
- TEMPORARY ACCESS ROUTE

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ALEX STROM STATE OF WASHINGTON 21632 REGISTERED PROFESSIONAL ENGINEER EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

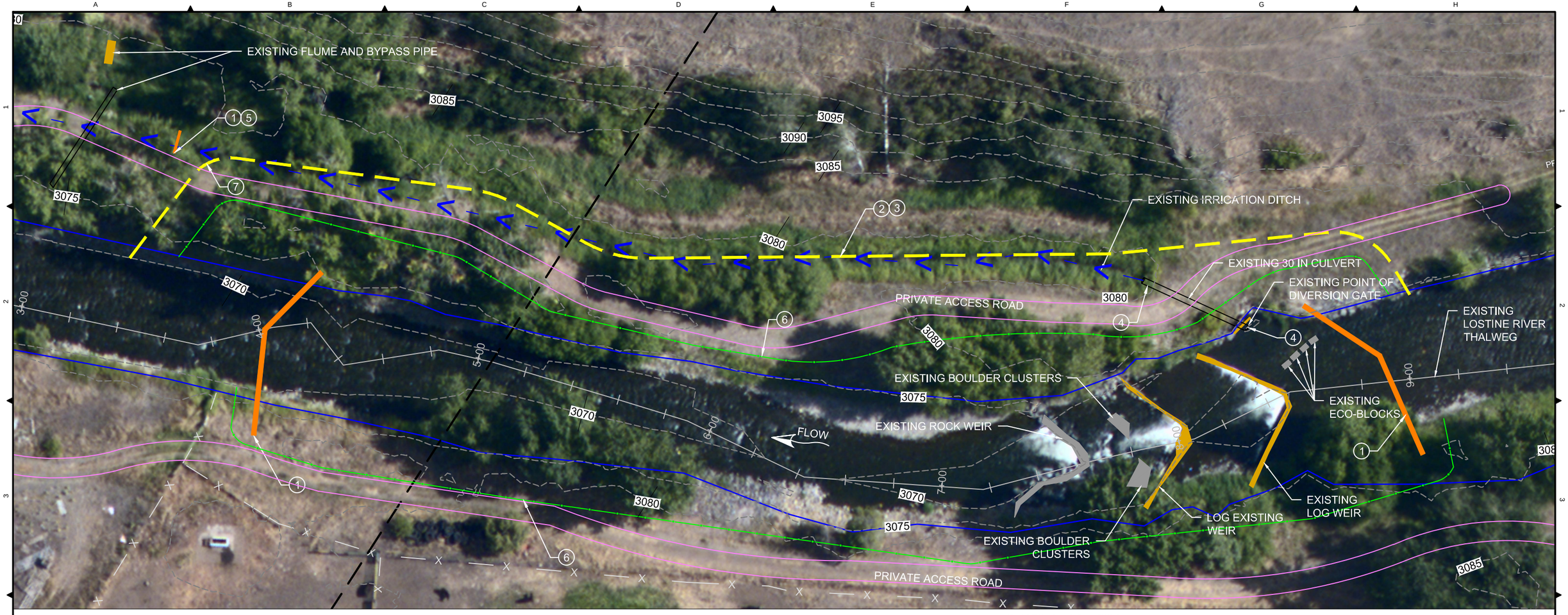
EXISTING CONDITIONS
ACCESS ROUTES AND CONTROL POINTS

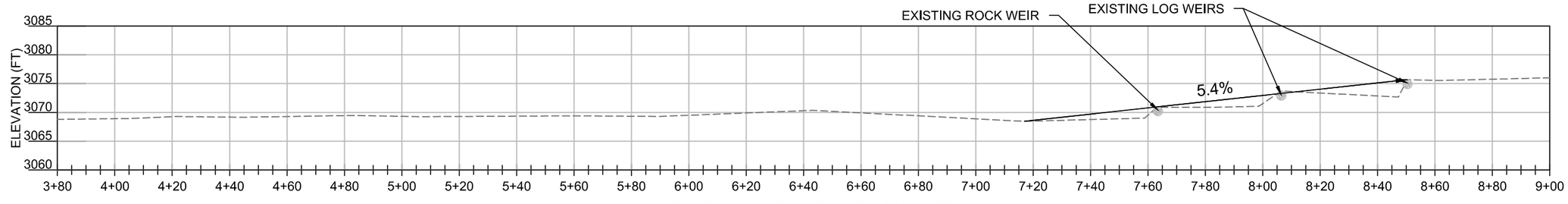
DWG. NO.: C-101

CREATED: 05/16/2016

SHEET: 7 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\EXISTING CONDITIONS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017 10:57 AM





EXISTING MAIN CHANNEL PROFILE VIEW (FT)
(SCALE 1" = 40', 2H:1V)

0 40 80 Feet

NOTES:
1. INSTALL COFFERDAMS PER EROSION AND SEDIMENT CONTROL DETAILS. SEE SHEET C-302.
2. PROPOSED STREAM TEMPORARY BYPASS. SEE SHEETS C-208 AND C-209 FOR TEMPORARY BYPASS PLAN, PROFILE, AND CROSS SECTIONS.
3. STREAM BYPASS TO ISOLATE CONSTRUCTION AREA. ALL WORK IN CHANNEL SHALL OCCUR BETWEEN JULY 15 AND AUGUST 15.
4. CONSTRUCTION ACTIVITIES SHALL NOT IMPACT EXISTING CULVERT, IRRIGATION INTAKE GATE, AND RELATED IRRIGATION SYSTEM.
5. CONTRACTOR TO PROVIDE IRRIGATION BYPASS PUMP WITH MAXIMUM CAPACITY OF 10.5 CFS, IF NEEDED.
6. INSTALL SILT FENCE PER EROSION AND SEDIMENT CONTROL DETAILS. SEE SHEET C-302.
7. TEMPORARY BRIDGE TO BE INSTALLED OVER BYPASS CHANNEL DURING CONSTRUCTION. SEE SHEET C-302 FOR DETAILS

LEGEND:
- PROPERTY BOUNDARY
- EXISTING 5 FT MAJOR CONTOUR
- BANKFULL FLOW
- ACCESS ROUTE
- SILT FENCE
- FENCE
- COFFERDAM
- STREAM BYPASS ALIGNMENT

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EXPIRES: 12/31/2016

ALEX STROM 21470 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855 © NPT 1995

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
		PLAN SHEET SIZE ANSI B (11" X 17")				
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

EXISTING CONDITONS

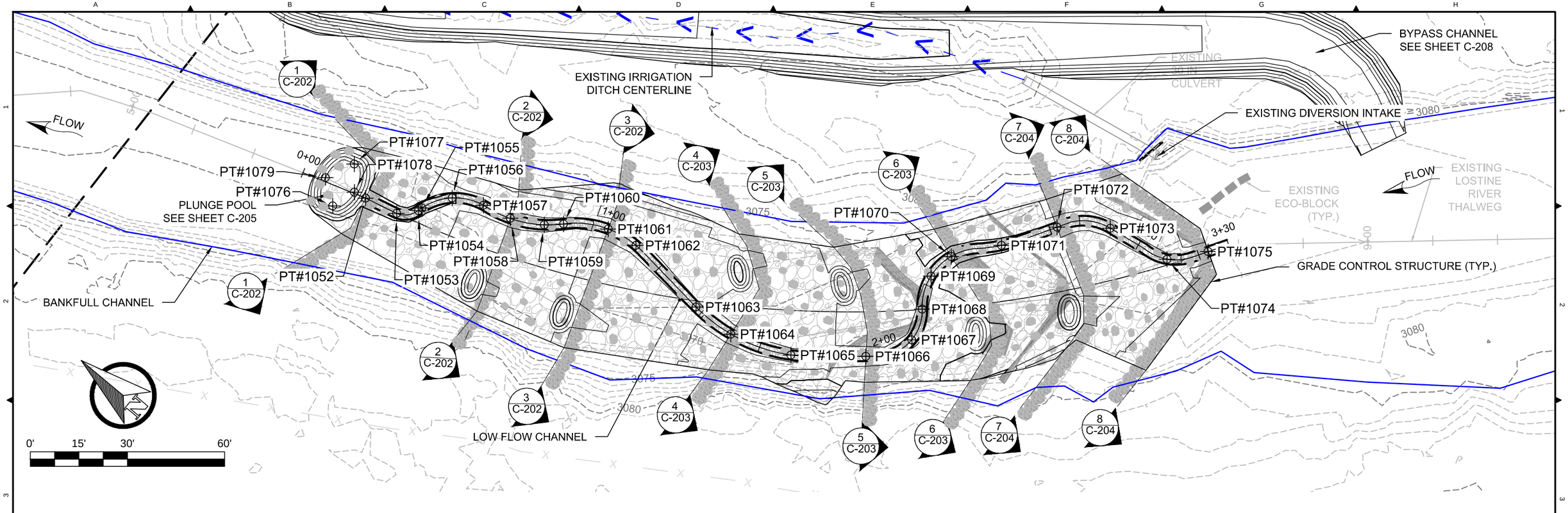
STREAM BYPASS AND TESC

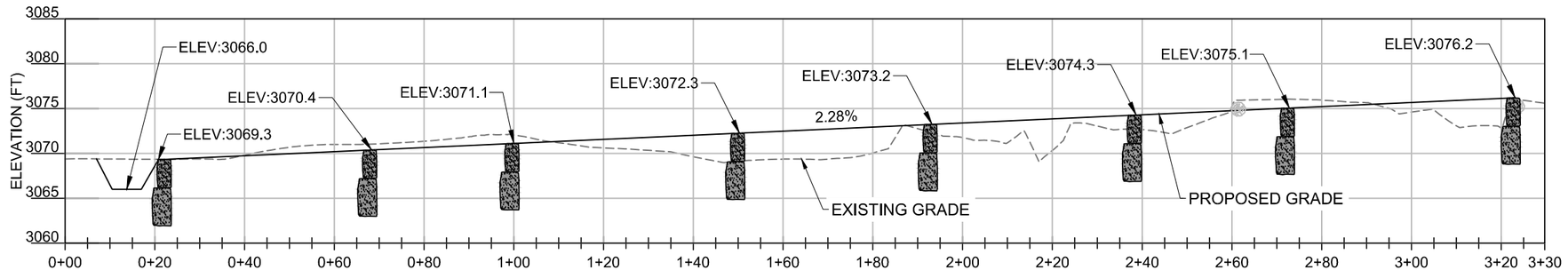
DWG. NO.: C-102

CREATED: 05/16/2016

SHEET: 8 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\EXISTING CONDITIONS.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 10:58 AM





LOW FLOW CHANNEL PROFILE VIEW (FT)
(SCALE 1" = 30', 1H:2V)

GENERAL NOTES:

1. EXISTING DEBRIS AND EXISTING GRADE CONTROL STRUCTURES LOG WEIRS (2), ROCK WEIR (1), BOULDER CLUSTERS (2) TO BE REMOVED.
2. ENGINEERED RIFFLE DEPICTED ON PLANS DESIGNED WITH A BANKFULL SLOPE OF 2.6 PERCENT, AND LOW FLOW CHANNEL DESIGNED WITH 2.3 PERCENT SLOPE TO MEET FISH PASSAGE REQUIREMENTS.
3. ENGINEERED RIFFLE WILL BE CONSTRUCTED BY PLACING PROPOSED STREAMBED MATERIAL WITHIN BANKFULL CHANNEL. SEE PROJECT SPECIFICATIONS FOR STREAMBED MIX AND PLACEMENT CRITERIA.
4. BOULDERS SHALL BE PLACED ALONG LOW FLOW CHANNEL AT 6-FOOT SPACING AS DIRECTED IN THE FIELD TO PROMOTE CONCENTRATED FLOWS WITHIN LOW FLOW CHANNEL. (45 BOULDERS)
5. BOULDERS OUTSIDE OF LOW FLOW CHANNEL SHALL BE PLACED IN GROUPS OF 20 BETWEEN WEIRS AS DIRECTED IN THE FIELD TO REPLICATE NATURAL STREAM CONDITIONS. (140 BOULDERS)
6. LWD PLACED TO PROVIDE INCREASED HABITAT COMPLEXITY WITHIN ENGINEERED RIFFLE. SEE SHEETS C-300 AND C-301 FOR LWD DETAILS.
7. LOW FLOW CHANNEL DESIGNED WITH BOTTOM WIDTH OF 3 FEET, DEPTH OF 1 FOOT MIN. TO MEET FISH PASSAGE REQUIREMENTS.
8. TOTAL FILL QUANTITY FOR STREAMBED MATERIAL IS 715 CY. (715 CY BELOW OHW)
9. TOTAL EXCAVATION QUANTITY FOR MAIN CHANNEL IS 925 CY. (925 CY BELOW OHW)

LEGEND:

- EXISTING CONTOUR MAJOR - 5FT
- EXISTING CONTOUR MINOR - 1FT
- PROPOSED CONTOUR MAJOR - 5FT
- PROPOSED CONTOUR MINOR - 1FT
- PROPOSED BANKFULL FLOW
- PROPOSED LWD
- PROPOSED BOULDER
- PROPOSED STREAMBED
- PROPOSED LOW FLOW CHANNEL
- PROPERTY BOUNDARY

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EXPIRES: 12/31/2016

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EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

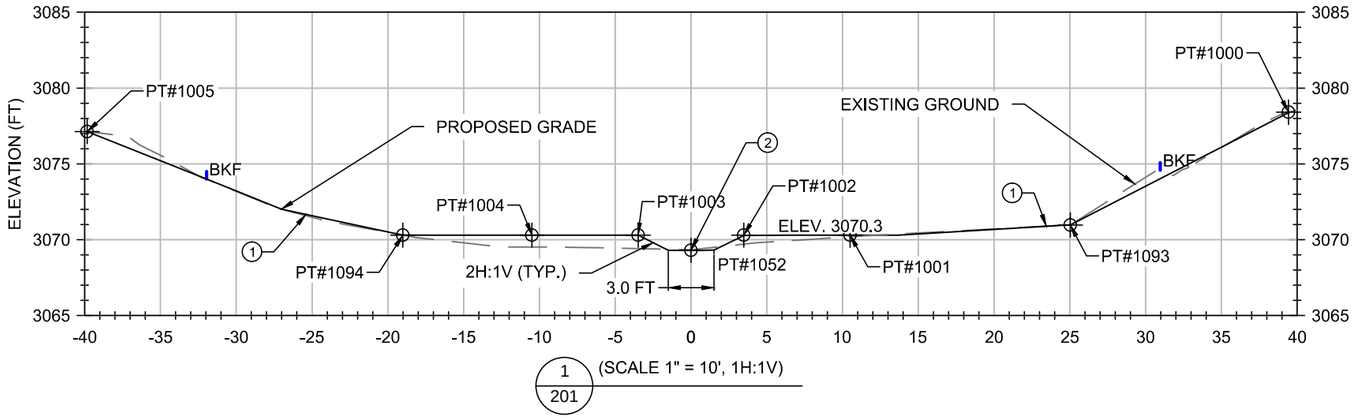
ENGINEERED RIFFLE AND LOW FLOW CHANNEL

DWG. NO.: C-201

CREATED: 06/16/2016

SHEET: 9 OF 23

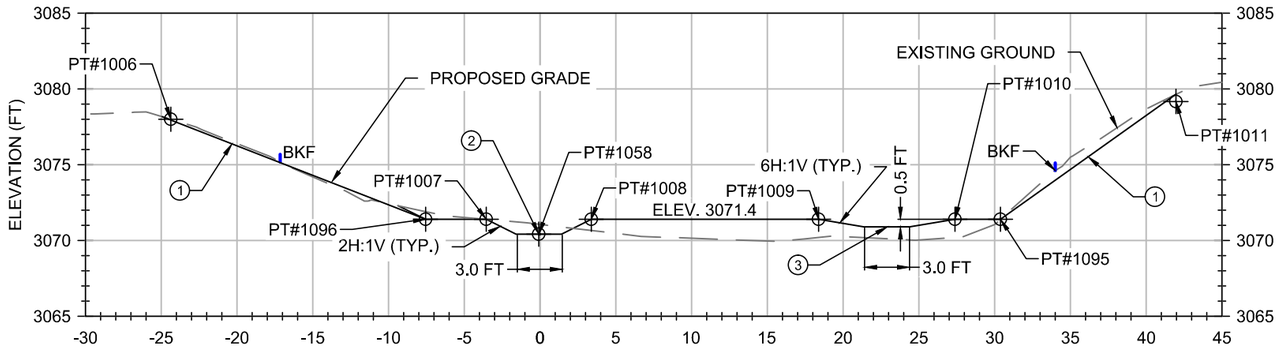
Z:\PROJECTS\194-5583.TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\PROPOSED CONDITIONS_SINUOUS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017 10:59 AM



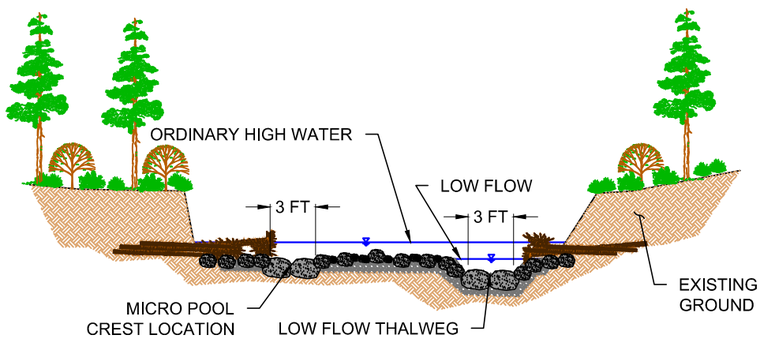
1 / 201 (SCALE 1" = 10', 1H:1V)

NOTES:

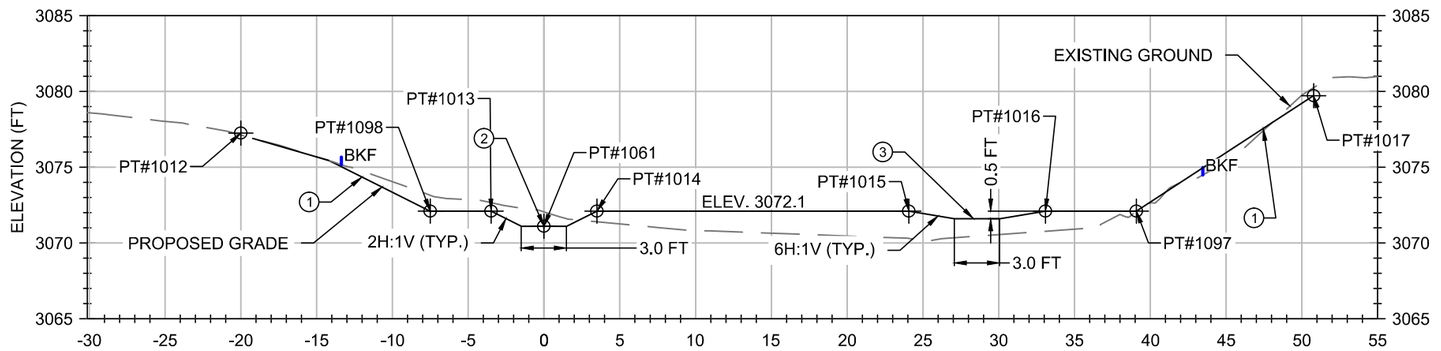
1. CONSTRUCTION OF BOULDER WEIR SHALL EXTEND TO 8FT OUTSIDE OF BANKFULL CHANNEL ALONG EXISTING GRADE TO KEY STRUCTURE INTO EXISTING STREAM BANKS.
2. DEPTH OF LOW FLOW CHANNEL IS 1FT, BOTTOM WIDTH OF LOW FLOW CHANNEL IS 3FT WITH 2:1 SIDE SLOPES.
3. DEPTH OF MICRO POOL CREST IS 0.5FT, BOTTOM WIDTH OF MICRO POOL CREST IS 3FT WITH 6:1 SIDE SLOPES.
4. CONSTRUCTION POINT DATA LOCATED ON SHEET C-206.



2 / 201 (SCALE 1" = 10', 1H:1V)



-- / -- TYPICAL SINUOUS CHANNEL GRADING



3 / 201 (SCALE 1" = 10', 1H:1V)

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47106 REGISTERED PROFESSIONAL ENGINEER EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855 © NPT 1995

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
		PLAN SHEET SIZE ANSI B (11" X 17")				
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

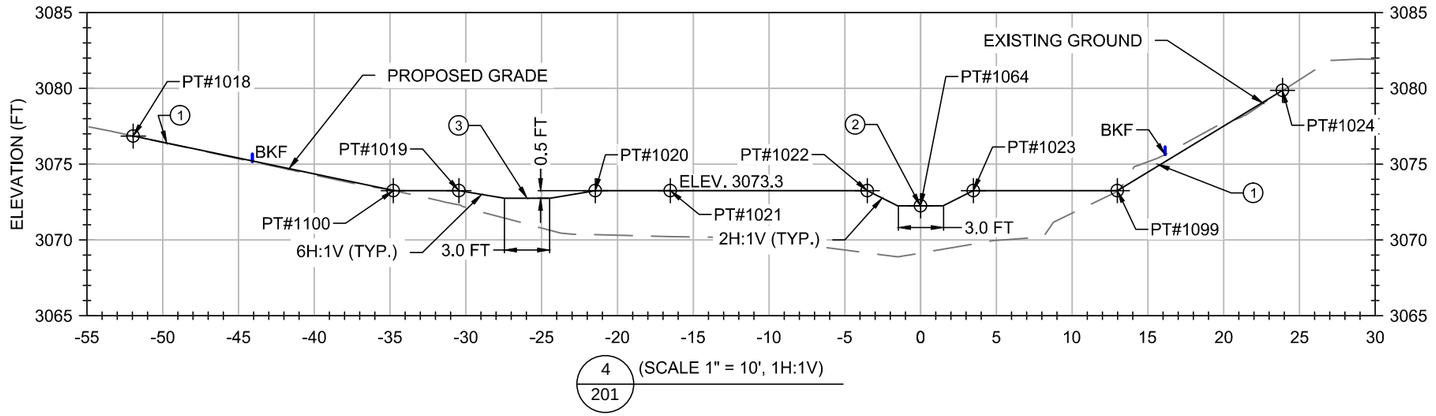
ENGINEERED RIFFLE SECTIONS

DWG. NO.: C-202

CREATED: 05/16/2016

SHEET: 10 OF 23

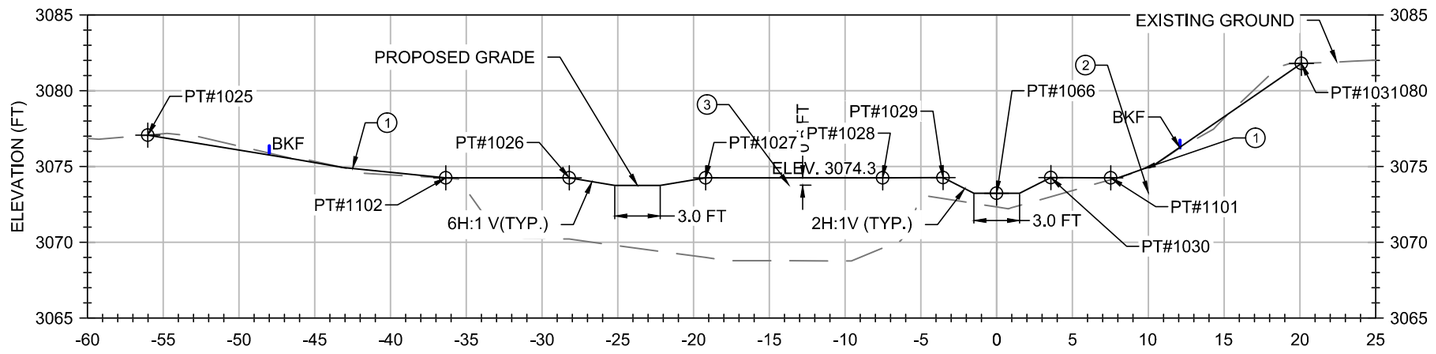
Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\PROPOSED CONDITIONS_SINUOUS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017
10:59 AM



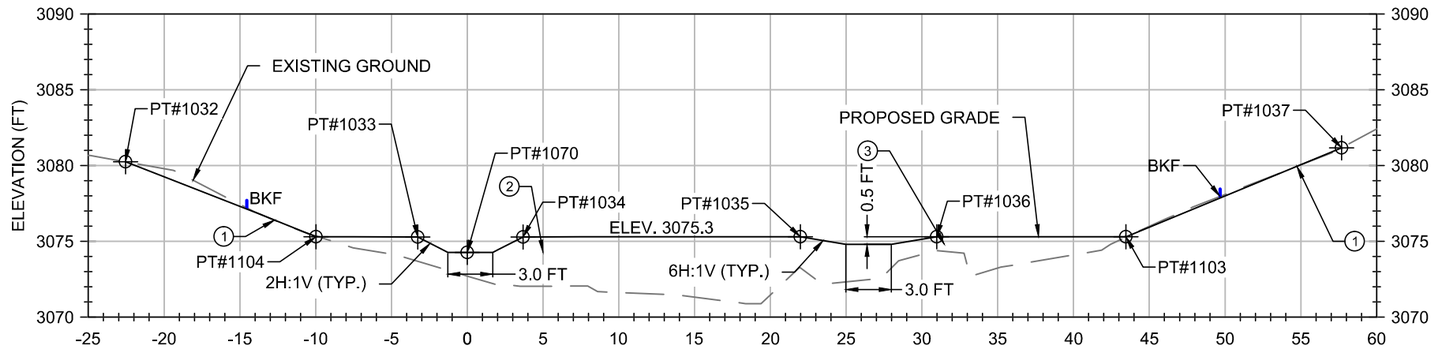
4 / 201 (SCALE 1" = 10', 1H:1V)

NOTES:

1. CONSTRUCTION OF BOULDER WEIR SHALL EXTEND TO 8FT OUTSIDE OF BANKFULL CHANNEL TO KEY STRUCTURE INTO EXISTING STREAM BANKS.
2. DEPTH OF LOW FLOW CHANNEL IS 1FT, BOTTOM WIDTH OF LOW FLOW CHANNEL IS 3FT WITH 2:1 SIDE SLOPES.
3. DEPTH OF MICRO POOL CREST IS 0.5FT, BOTTOM WIDTH OF MICRO POOL CREST IS 3FT WITH 6:1 SIDE SLOPES.
4. CONSTRUCTION POINT DATA LOCATED ON SHEET C-206.



5 / 201 (SCALE 1" = 10', 1H:1V)



6 / 201 (SCALE 1" = 10', 1H:1V)

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN — EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47108 REGISTERED PROFESSIONAL ENGINEER — EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855 © NPT 1995

NEZ PERCE FISHERIES

PLAN SHEET SIZE ANSI B (11" X 17")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

ENGINEERED RIFFLE SECTIONS

DWG. NO.: C-203

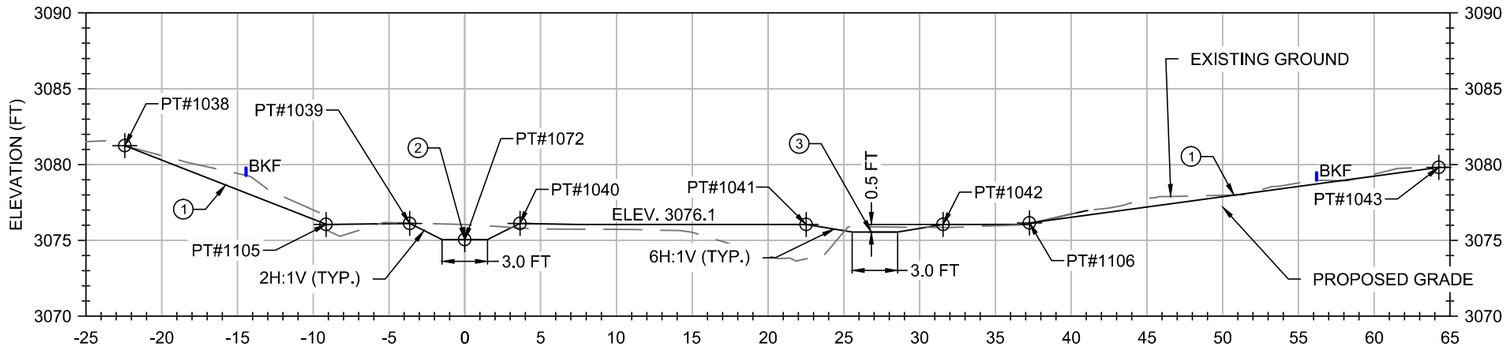
CREATED: 05/16/2016

SHEET: 11 OF 23

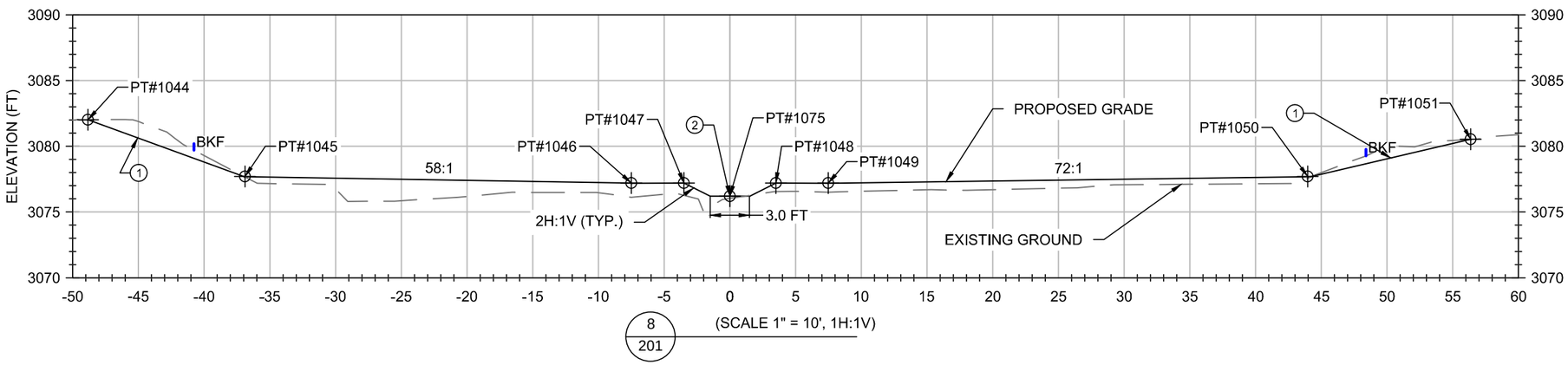
Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\.SHEET FILES\PROPOSED CONDITIONS_SINUOUS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017
10:59 AM

NOTES:

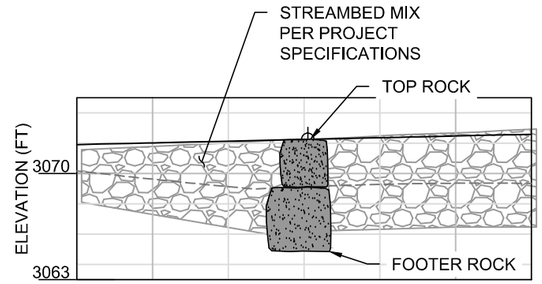
1. CONSTRUCTION OF BOULDER WEIR SHALL EXTEND TO 8FT OUTSIDE OF BANKFULL CHANNEL TO KEY STRUCTURE INTO EXISTING STREAM BANKS.
2. DEPTH OF LOW FLOW CHANNEL IS 1FT, BOTTOM WIDTH OF LOW FLOW CHANNEL IS 3FT WITH 2:1 SIDE SLOPES.
3. DEPTH OF MICRO POOL CREST IS 0.5FT, BOTTOM WIDTH OF MICRO POOL CREST IS 3FT WITH 6:1 SIDE SLOPES.
4. CONSTRUCTION POINT DATA LOCATED ON SHEET C-206.



7/201 (SCALE 1" = 10', 1H:1V)



8/201 (SCALE 1" = 10', 1H:1V)



BOULDER WEIR TYPICAL SECTION

(SCALE 1" = 10', 1H:1V)

BOULDER WEIR NOTES:

1. SIZE OF TOP ROCK USED IN WEIR CONSTRUCTION SHALL BE 3FT MIN. ALONG B-AXIS.
2. SIZE OF FOOTER ROCK USED IN WEIR CONSTRUCTION SHALL BE 3.5FT TO 4FT MIN. ALONG B-AXIS.
3. CONSTRUCTION POINT PROVIDED FOR TOP OF WEIR.
4. DO NOT OVER-EXCAVATE TO CONSTRUCT WEIR. EXCAVATION DEPTH REQUIRED FOR EACH WEIR MAY VARY DEPENDING ON ACTUAL SIZE OF BOULDER USED.
5. STREAMBED MIX SHALL BE PLACED IN 6-INCH LIFTS. EACH LIFT SHALL BE COMPACTED AS SPECIFIED IN PROJECT SPECIFICATIONS.
6. FINES SHALL BE ADDED AND WASHED IN TO EACH STREAMBED MIX LIFT TO SEAL ALL VOIDS AS SPECIFIED IN PROJECT SPECIFICATIONS.

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47134 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

ENGINEERED RIFFLE SECTIONS

DWG. NO.: C-204

CREATED: 05/16/2016

SHEET: 12 OF 23

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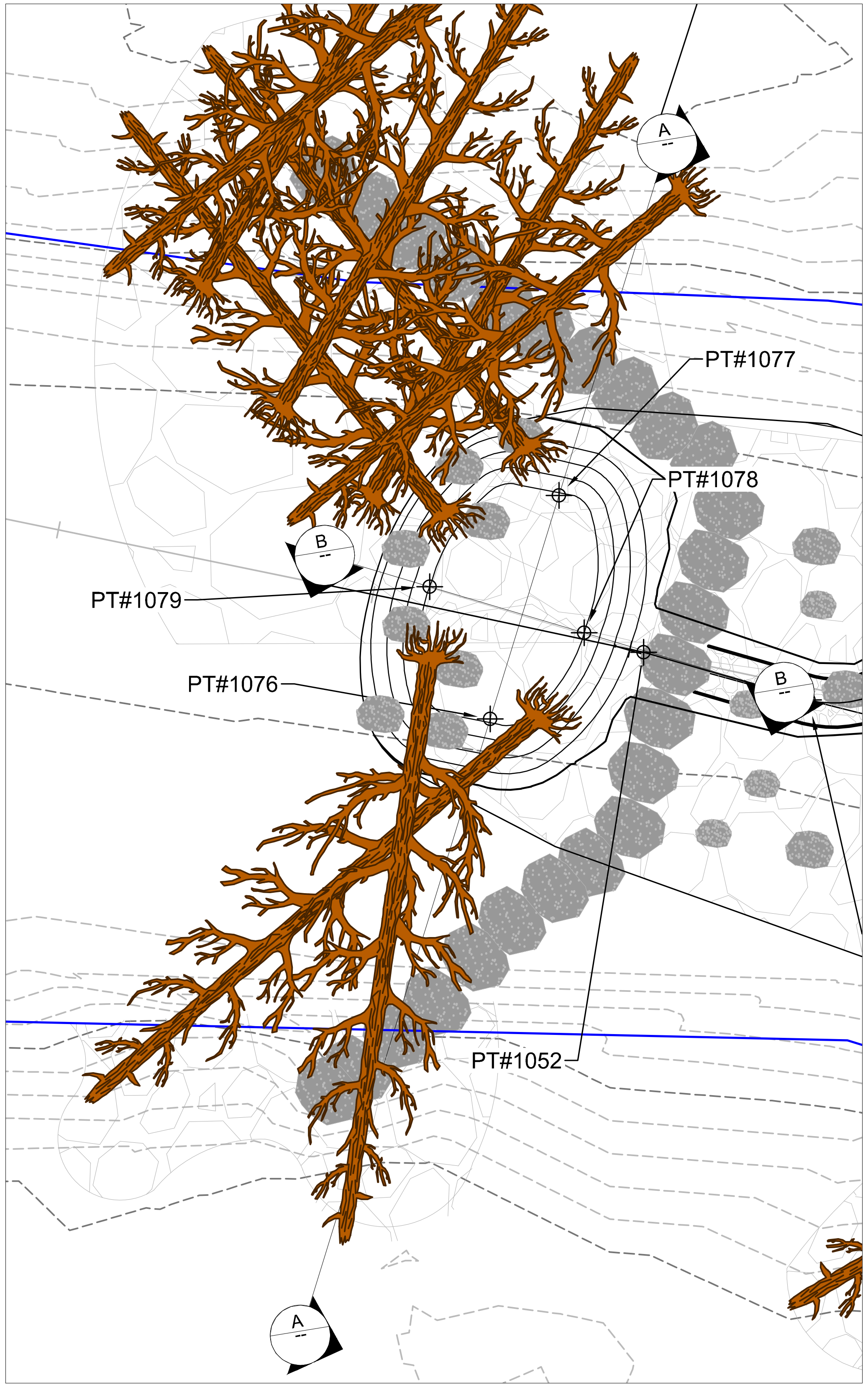
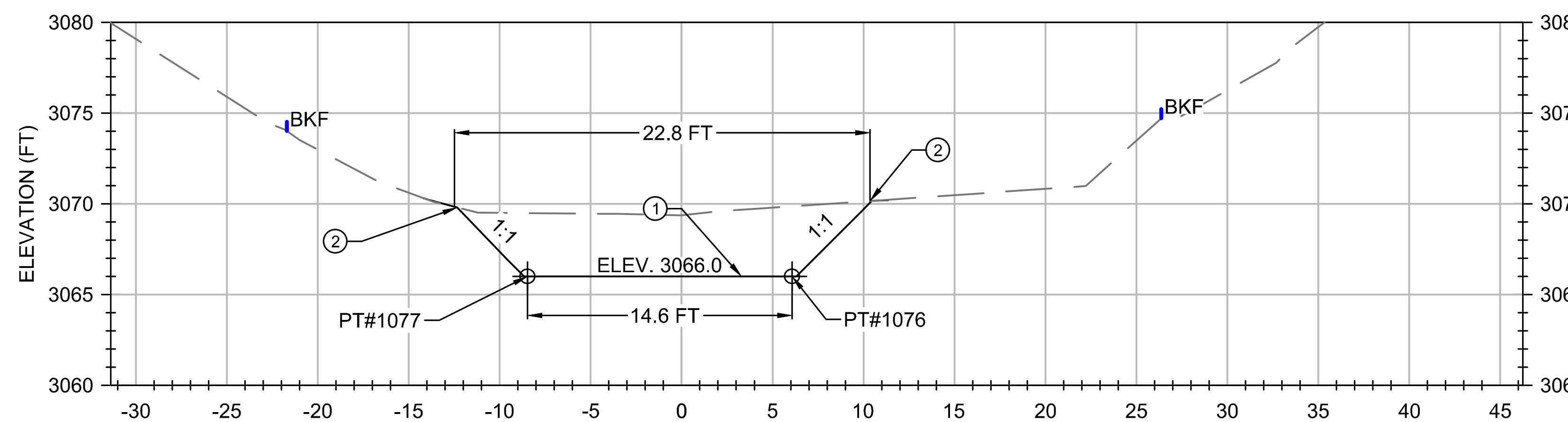
PLOT DETAILS: STROM, ALEX
April 11, 2017
10:59 AM

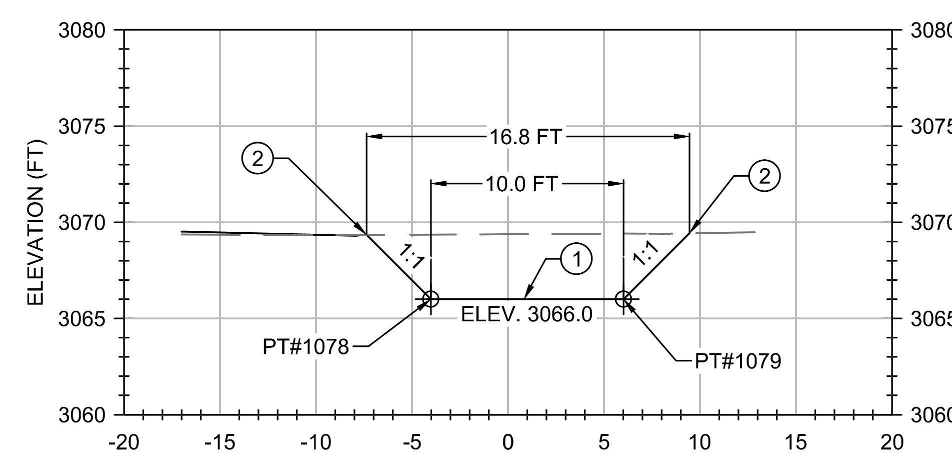


0' 5' 10' 20'

NOTES:
1. DIMENSIONS OF PLUNGE POOL EXCAVATION MAY VARY. FINAL CONSTRUCTION OF POOL SHALL BE AS DIRECTED IN THE FIELD.
2. DAYLIGHT PROPOSED POOL GRADING TO MATCH EXISTING GRADE.
3. LWD SHOWN SHALL BE PLACED AS DIRECTED ON SHEET C-300.
4. CONSTRUCTION POINT DATA LOCATED ON SHEET C-206.



A (SCALE 1" = 10', 1H:1V)



B (SCALE 1" = 10', 1H:1V)

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PLOT DETAILS: STROM, ALEX April 11, 2017 10:59 AM

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 13, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47025 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

PLAN SHEET SIZE ANSI B (11" X 17")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

PLUNGE POOL

DWG. NO.: C-205

CREATED: 05/16/2016

SHEET: 13 OF 23

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1052	695238.4FT	8978220.5FT	3069.3FT	THWG
1053	695228.0FT	8978223.0FT	3069.6FT	THWG
1054	695223.4FT	8978228.0FT	3069.7FT	THWG
1055	695223.1FT	8978229.3FT	3069.7FT	THWG
1056	695217.9FT	8978237.7FT	3070.0FT	THWG
1057	695209.1FT	8978242.2FT	3070.2FT	THWG
1058	695200.1FT	8978244.4FT	3070.4FT	THWG
1059	695190.8FT	8978249.6FT	3070.7FT	THWG
1060	695186.4FT	8978253.6FT	3070.8FT	THWG
1061	695174.8FT	8978261.3FT	3071.1FT	THWG
1062	695165.0FT	8978262.9FT	3071.3FT	THWG
1063	695138.6FT	8978260.3FT	3071.9FT	THWG
1064	695124.9FT	8978260.8FT	3072.3FT	THWG
1065	695106.6FT	8978267.7FT	3072.7FT	THWG
1066	695088.6FT	8978282.3FT	3073.2FT	THWG
1067	695081.0FT	8978295.3FT	3073.6FT	THWG
1068	695084.6FT	8978304.7FT	3073.8FT	THWG
1069	695089.1FT	8978314.3FT	3074.1FT	THWG
1070	695088.2FT	8978322.9FT	3074.3FT	THWG
1071	695078.5FT	8978335.5FT	3074.6FT	THWG
1072	695069.0FT	8978350.8FT	3075.1FT	THWG
1073	695056.2FT	8978361.1FT	3075.4FT	THWG
1074	695036.7FT	8978365.0FT	3075.9FT	THWG
1075	695028.4FT	8978375.0FT	3076.2FT	THWG

LOW FLOW THALWEG

NOTE:
1. CONSTRUCTION POINTS WILL BE STAKED PRIOR TO INITIAL CONSTRUCTION. DURING CONSTRUCTION, CONTRACTOR SHALL BE RESPONSIBLE FOR STAKING CONSTRUCTION OFFSET POINTS AS NEEDED TO COMPLETE CONSTRUCTION.

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1000	695245.4FT	8978182.9FT	3078.4FT	TOP WEIR
1001	695236.0FT	8978210.2FT	3070.3FT	TOP WEIR
1002	695237.5FT	8978217.1FT	3070.3FT	TOP WEIR
1003	695239.2FT	8978223.9FT	3070.3FT	TOP WEIR
1004	695240.7FT	8978230.7FT	3070.3FT	TOP WEIR
1005	695269.9FT	8978234.1FT	3077.1FT	TOP WEIR
1052	695238.4FT	8978220.5FT	3069.3FT	THWG
1093	695240.7FT	8978196.5FT	3071.0FT	TOP WEIR
1094	695249.2FT	8978231.8FT	3070.3FT	TOP WEIR

WEIR 1

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1018	695159.2FT	8978291.6FT	3076.9FT	TOP WEIR
1019	695138.8FT	8978284.8FT	3073.2FT	TOP WEIR
1020	695131.4FT	8978279.8FT	3073.2FT	TOP WEIR
1021	695127.2FT	8978277.1FT	3073.2FT	TOP WEIR
1022	695125.4FT	8978264.2FT	3073.2FT	TOP WEIR
1023	695124.6FT	8978257.3FT	3073.2FT	TOP WEIR
1024	695122.4FT	8978237.0FT	3079.9FT	TOP WEIR
1064	695124.9FT	8978260.8FT	3072.3FT	THWG
1099	695123.2FT	8978247.9FT	3073.2FT	TOP WEIR
1100	695143.0FT	8978286.1FT	3073.2FT	TOP WEIR

WEIR 4

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1038	695088.9FT	8978361.3FT	3081.2FT	TOP WEIR
1039	695072.2FT	8978352.6FT	3076.1FT	TOP WEIR
1040	695065.9FT	8978349.1FT	3076.1FT	TOP WEIR
1041	695049.3FT	8978340.0FT	3076.0FT	TOP WEIR
1042	695043.4FT	8978333.2FT	3076.0FT	TOP WEIR
1043	695041.8FT	8978300.5FT	3079.8FT	TOP WEIR
1072	695069.0FT	8978350.8FT	3075.1FT	THWG
1105	695077.1FT	8978355.2FT	3076.1FT	TOP WEIR
1106	695042.9FT	8978327.5FT	3076.1FT	TOP WEIR

WEIR 7

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1006	695213.2FT	8978265.3FT	3078.0FT	TOP WEIR
1007	695201.3FT	8978247.7FT	3071.4FT	TOP WEIR
1008	695198.9FT	8978241.2FT	3071.4FT	TOP WEIR
1009	695193.7FT	8978227.1FT	3071.4FT	TOP WEIR
1010	695190.6FT	8978218.6FT	3071.4FT	TOP WEIR
1011	695189.3FT	8978203.8FT	3079.2FT	TOP WEIR
1058	695200.1FT	8978244.4FT	3070.4FT	THWG
1095	695189.6FT	8978215.8FT	3071.4FT	TOP WEIR
1096	695202.7FT	8978251.4FT	3071.4FT	TOP WEIR

WEIR 2

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1025	695137.5FT	8978302.7FT	3077.1FT	TOP WEIR
1026	695109.9FT	8978300.4FT	3074.2FT	TOP WEIR
1027	695102.1FT	8978295.8FT	3074.3FT	TOP WEIR
1028	695093.1FT	8978288.4FT	3074.3FT	TOP WEIR
1029	695090.7FT	8978285.2FT	3074.3FT	TOP WEIR
1030	695086.5FT	8978279.5FT	3074.3FT	TOP WEIR
1031	695076.5FT	8978266.2FT	3081.8FT	TOP WEIR
1066	695088.6FT	8978282.3FT	3073.2FT	THWG
1101	695084.1FT	8978276.3FT	3074.2FT	TOP WEIR
1102	695117.9FT	8978301.8FT	3074.2FT	TOP WEIR

WEIR 5

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1044	695076.1FT	8978375.3FT	3082.0FT	TOP WEIR
1045	695064.2FT	8978376.3FT	3077.7FT	TOP WEIR
1046	695034.9FT	8978378.9FT	3077.2FT	TOP WEIR
1047	695031.4FT	8978376.8FT	3077.2FT	TOP WEIR
1048	695025.4FT	8978373.2FT	3077.2FT	TOP WEIR
1049	695021.9FT	8978371.3FT	3077.2FT	TOP WEIR
1050	695019.5FT	8978334.8FT	3077.7FT	TOP WEIR
1051	695019.3FT	8978322.4FT	3080.5FT	TOP WEIR
1075	695028.4FT	8978375.0FT	3076.2FT	THWG

WEIR 8

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1012	695184.4FT	8978279.2FT	3077.3FT	TOP WEIR
1013	695176.0FT	8978264.6FT	3072.1FT	TOP WEIR
1014	695173.6FT	8978258.0FT	3072.1FT	TOP WEIR
1015	695166.7FT	8978238.6FT	3072.1FT	TOP WEIR
1016	695163.7FT	8978230.1FT	3072.1FT	TOP WEIR
1017	695159.7FT	8978212.9FT	3079.7FT	TOP WEIR
1061	695174.8FT	8978261.3FT	3071.1FT	THWG
1097	695161.7FT	8978224.5FT	3072.1FT	TOP WEIR
1098	695177.3FT	8978268.4FT	3072.1FT	TOP WEIR

WEIR 3

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1032	695109.8FT	8978329.5FT	3080.3FT	TOP WEIR
1033	695091.3FT	8978323.9FT	3075.3FT	TOP WEIR
1034	695084.7FT	8978321.7FT	3075.3FT	TOP WEIR
1035	695067.3FT	8978316.1FT	3075.3FT	TOP WEIR
1036	695061.0FT	8978309.7FT	3075.3FT	TOP WEIR
1037	695057.4FT	8978283.2FT	3081.2FT	TOP WEIR
1070	695088.2FT	8978322.9FT	3074.3FT	THWG
1103	695059.1FT	8978297.4FT	3075.3FT	TOP WEIR
1104	695097.7FT	8978325.9FT	3075.3FT	TOP WEIR

WEIR 6

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1076	695244.6FT	8978212.1FT	3066.0FT	POOL BOT
1077	695247.8FT	8978226.3FT	3066.0FT	POOL BOT
1078	695242.2FT	8978219.7FT	3066.0FT	POOL BOT
1079	695251.9FT	8978217.3FT	3066.0FT	POOL BOT

PLUNGE POOL

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47108 REGISTERED PROFESSIONAL ENGINEER EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855 © NPT 1995

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

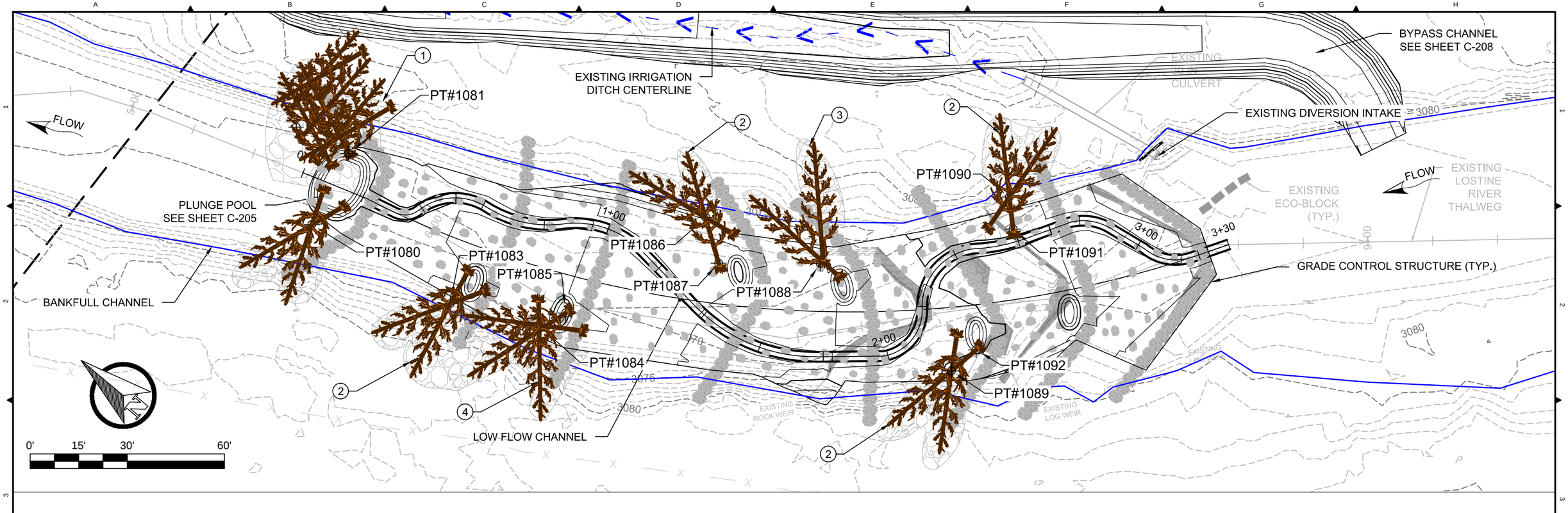
LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS
CONSTRUCTION POINTS

DWG. NO.: C-206

CREATED: 06/16/2016

SHEET: 14 OF 23



CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1080	695245.8FT	8978203.5FT	-	LWD
1081	695251.2FT	8978227.7FT	-	LWD
1082	695268.9FT	8978223.5FT	-	LWD
1083	695197.4FT	8978212.3FT	-	LWD
1084	695171.1FT	8978224.6FT	-	LWD
1085	695168.2FT	8978233.0FT	-	LWD
1086	695154.0FT	8978283.4FT	-	LWD
1087	695141.9FT	8978275.1FT	-	LWD
1088	695117.9FT	8978295.2FT	-	LWD
1089	695065.5FT	8978295.8FT	-	LWD
1090	695086.3FT	8978348.5FT	-	LWD
1091	695079.0FT	8978341.7FT	-	LWD
1092	695063.8FT	8978305.7FT	-	LWD

NOTES:

1. TREE BANK LOG STRUCTURE. SEE SHEET C-300 FOR DETAILS.
2. 2-LOG CROSS STRUCTURE - TYPE 1. SEE SHEET C-300 FOR DETAILS.
3. 2-LOG CROSS STRUCTURE - TYPE 2. SEE SHEET C-301 FOR DETAILS.
4. 3-LOG CROSS STRUCTURE - TYPE 2. SEE SHEET C-301 FOR DETAILS.
5. ALL LWD STRUCTURES SHALL BE FIELD FIT TO MINIMIZE DAMAGE TO EXISTING VEGETATION AS DIRECTED.

LEGEND:

- EXISTING CONTOUR MAJOR - 5FT
- EXISTING CONTOUR MINOR - 1FT
- PROPOSED CONTOUR MAJOR - 5FT
- PROPOSED CONTOUR MINOR - 1FT
- PROPOSED BANKFULL FLOW
- PROPOSED LWD
- PROPOSED BOULDER
- PROPOSED STREAMBED
- PROPOSED LOW FLOW CHANNEL
- PROPERTY BOUNDARY

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Phone: 425-482-7600 Fax: 425-482-7652

REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47162 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL
FISH PASSAGE DESIGN

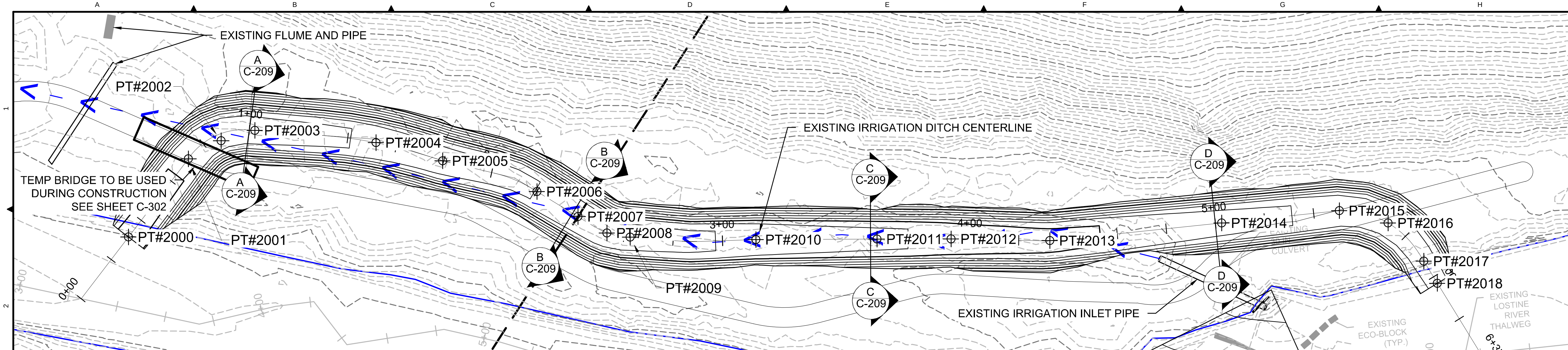
PROPOSED CONDITIONS
LWD PLACEMENT

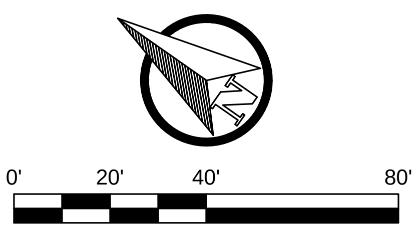
DWG. NO.: C-207

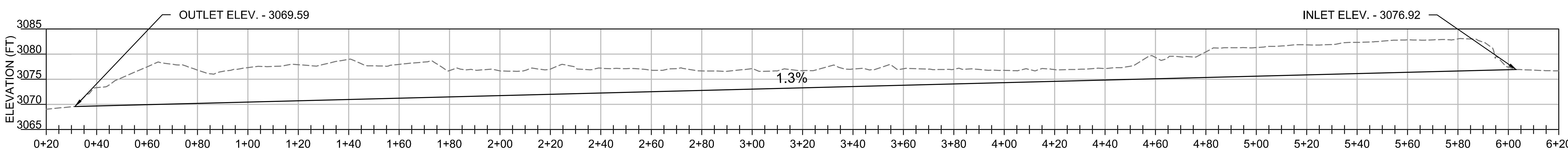
CREATED: 06/16/2016

SHEET: 15 OF 23

Z:\PROJECTS\194-5583.TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\PROPOSED CONDITIONS_SINUOUS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017 11:00 AM







BYPASS CHANNEL - PROFILE VIEW (FT)
(SCALE 1" = 40', 1H:2V)

NOTES:

1. TEMPORARY BYPASS CHANNEL SHALL BE FREE OF DEBRIS AT ALL TIMES WHILE IN OPERATION.
2. TEMPORARY BYPASS CHANNEL SHALL BE EXCAVATED ALONG EXISTING IRRIGATION DITCH TO PROVIDE FREE MOVEMENT OF WATER DURING OPERATION.
3. TEMPORARY ROCK GRADE CONTROL STRUCTURES MAY BE REQUIRED TO PREVENT EROSION AND MAINTAIN FISH PASSAGE. DETERMINATION OF NEED AND INSTALLATION AS DIRECTED IN THE FIELD.
4. EXCAVATION SHALL BE COMPLETED TO NOT DISTURB EXISTING ROAD PRISM.
5. EXCAVATED MATERIAL SHALL BE STOCKPILED AND STORED FOR RE-USE AFTER PROJECT COMPLETION.
6. ALL EXISTING TREES AND SHRUBS AFFECTED BY EXCAVATION SHALL BE PRESERVED DURING CONSTRUCTION AND RE-PLANTED AT CLOSE OF PROJECT.
7. UPON PROJECT COMPLETION, IRRIGATION DITCH DIMENSIONS, DEPTH, AND GRADE SHALL BE RESTORED TO ORIGINAL CONDITIONS. COMPACTION OF FILL PLACED IN IRRIGATION DITCH SHALL BE REQUIRED.
8. PROPOSED BYPASS CHANNEL EXCAVATION QUANTITY IS 2,110 CY.

LEGEND:
- EXISTING CONTOUR MAJOR - 5FT
- EXISTING CONTOUR MINOR - 1FT
- PROPOSED CONTOUR MAJOR - 5FT
- PROPOSED CONTOUR MINOR - 1FT
- PROPOSED BANKFULL

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\PROPOSED CONDITIONS_BYPASS.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 11:00 AM

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 13, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

PLAN SHEET SIZE ANSI B (11" X 17")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

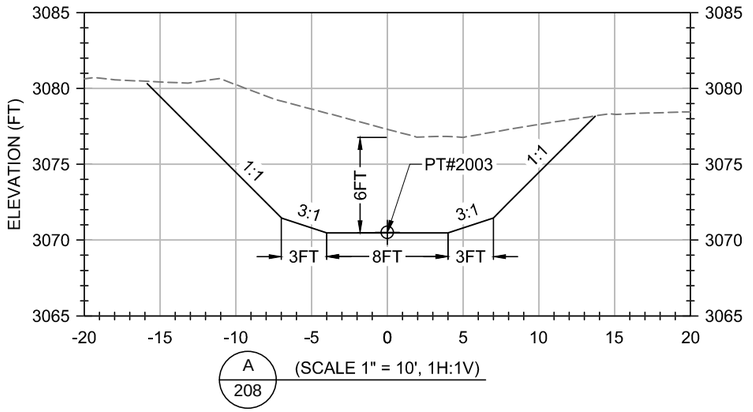
PROPOSED CONDITIONS

TEMPORARY BYPASS CHANNEL

DWG. NO.: C-208

CREATED: 06/16/2016

SHEET: 16 OF 23



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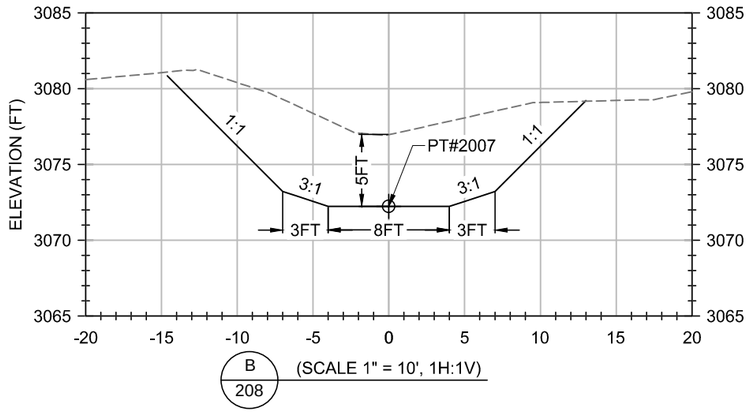

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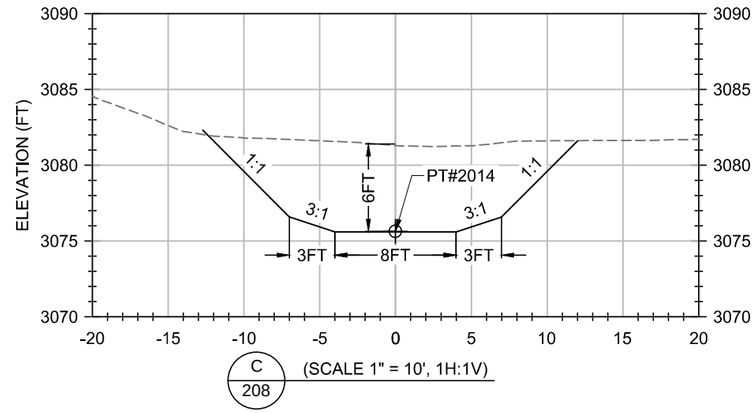

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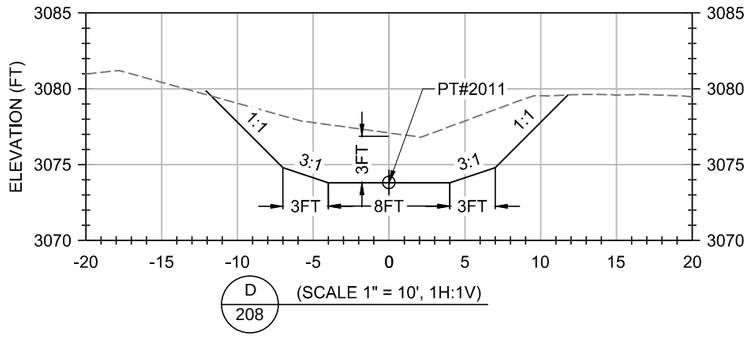

D / 208 (SCALE 1" = 10', 1H:1V)

CONSTRUCTION POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
2000	695453.2FT	8978146.9FT	3069.6FT	THWG BYPASS
2001	695451.4FT	8978186.7FT	3070.1FT	THWG BYPASS
2002	695444.8FT	8978200.3FT	3070.3FT	THWG BYPASS
2003	695436.0FT	8978211.6FT	3070.5FT	THWG BYPASS
2004	695392.9FT	8978235.7FT	3071.1FT	THWG BYPASS
2005	695366.6FT	8978245.1FT	3071.5FT	THWG BYPASS
2006	695328.2FT	8978256.8FT	3072.0FT	THWG BYPASS
2007	695308.7FT	8978258.0FT	3072.2FT	THWG BYPASS
2008	695295.3FT	8978259.4FT	3072.4FT	THWG BYPASS
2009	695286.7FT	8978263.3FT	3072.5FT	THWG BYPASS
2010	695244.4FT	8978291.7FT	3073.2FT	THWG BYPASS
2011	695204.4FT	8978320.0FT	3073.8FT	THWG BYPASS
2012	695179.8FT	8978337.3FT	3074.2FT	THWG BYPASS
2013	695146.7FT	8978359.7FT	3074.7FT	THWG BYPASS
2014	695093.7FT	8978405.5FT	3075.6FT	THWG BYPASS
2015	695057.6FT	8978436.9FT	3076.2FT	THWG BYPASS
2016	695038.6FT	8978444.1FT	3076.5FT	THWG BYPASS
2017	695017.8FT	8978439.7FT	3076.8FT	THWG BYPASS
2018	695008.2FT	8978435.5FT	3076.9FT	THWG BYPASS

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47106 REGISTERED PROFESSIONAL ENGINEER EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855 © NPT 1995

NEZ PERCE FISHERIES

REV.	DATE	PLAN SHEET SIZE ANSI B (11" X 17") REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

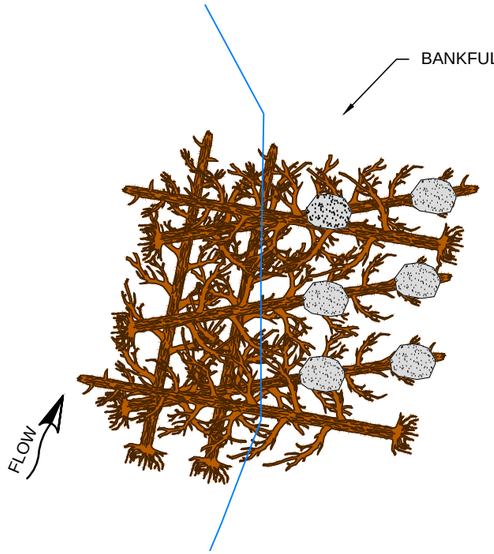
BYPASS CHANNEL SECTIONS

DWG. NO.: C-209

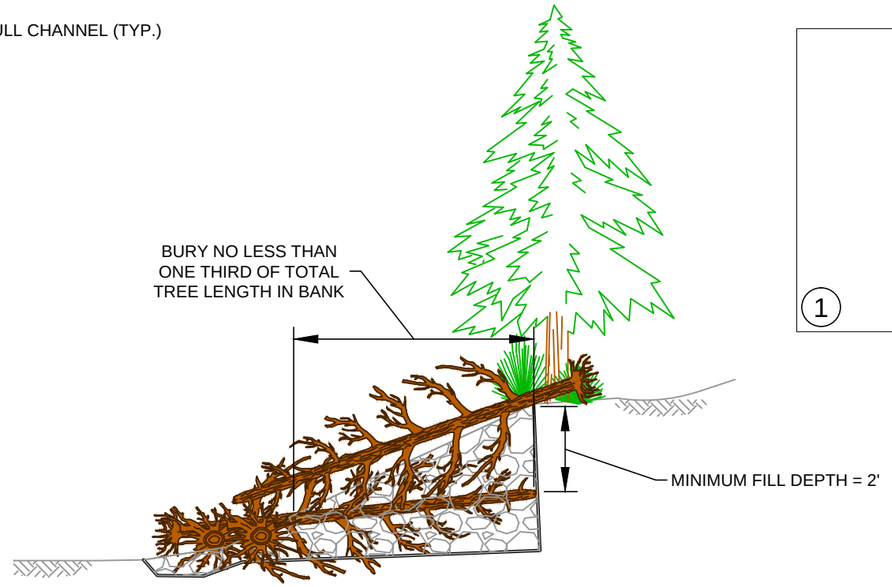
CREATED: 06/16/2016

SHEET: 17 OF 23

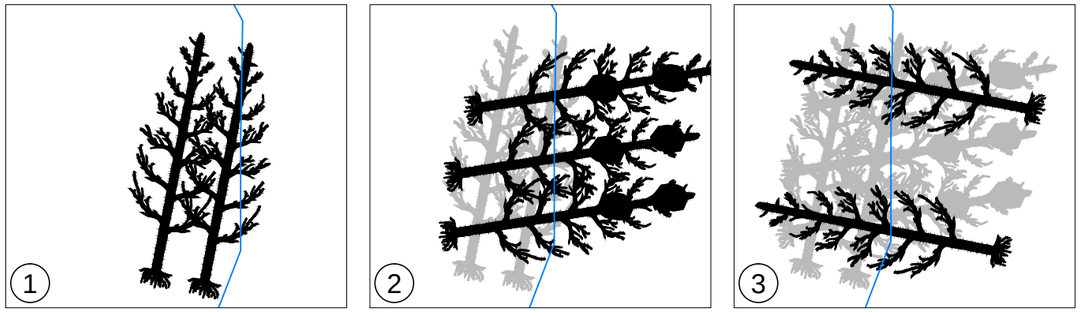
Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\PROPOSED CONDITIONS_BYPASS.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017
11:00 AM



TREE BANK LOGS - PLAN VIEW



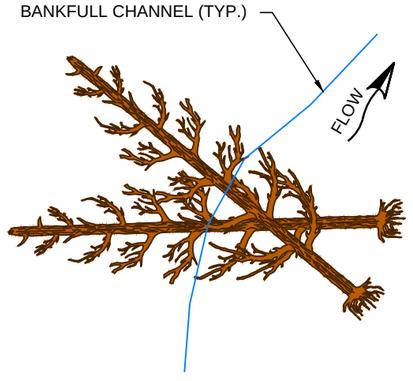
TREE BANK LOGS - SECTION VIEW



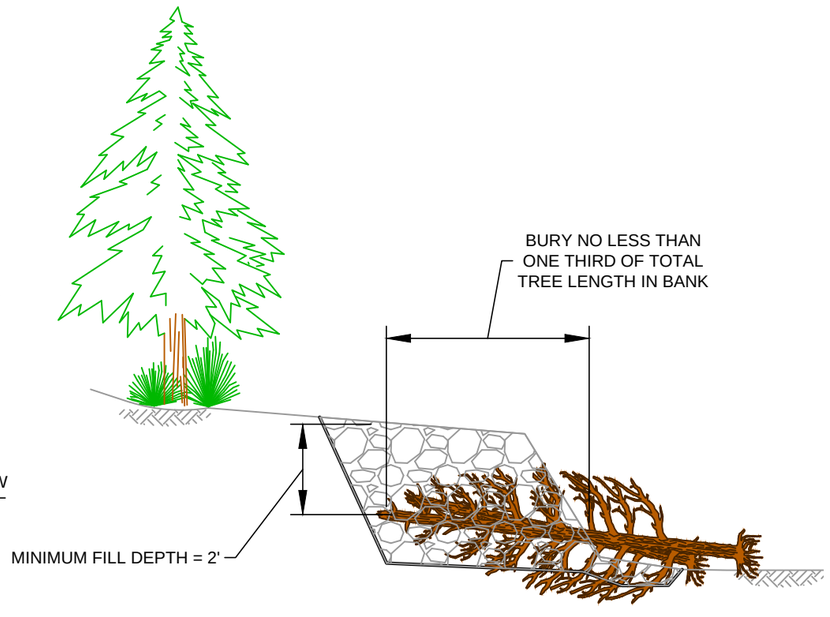
TREE BANK LOGS - LOG PLACEMENT SEQUENCING

LWD NOTES:

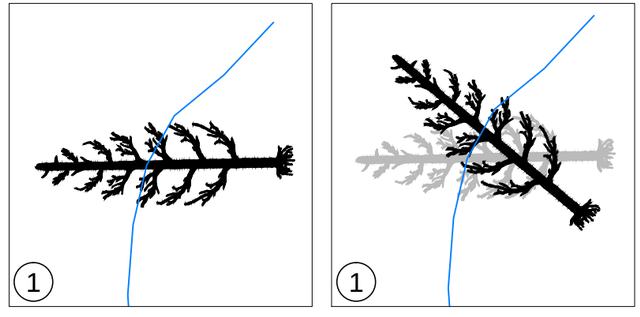
1. LWD SHALL BE 18" DBH MIN., 35 TO 50 FEET IN LENGTH WITH 5 FT MIN DIA ROOTWAD.
2. EXCAVATION WILL BE REQUIRED TO EMBED LWD STEMS TO PROVIDE INCREASED STRUCTURE STABILITY DURING HIGHER FLOOD FLOW EVENTS.
3. MINIMUM STEM EMBEDMENT IS 30% OF LWD LENGTH.
4. 6 BOULDERS USED AS BALLAST MATERIAL. USE OF BOULDERS AS BALLAST IS AS DIRECTED BY ENGINEER IN THE FIELD.
5. ROOTWAD OF LWD IN SEQUENCE #3 SHALL BE INTERTWINED IN STANDING TREES ON BANK.
6. FILL SHALL BE PLACED TO MIMIC NATURAL BANK TOPOGRAPHY.



2-LOG CROSS STRUCTURE - TYPE 1 - PLAN VIEW



2-LOGS CROSS STRUCTURE - TYPE 1 - SECTION VIEW



2-LOG CROSS STRUCTYRE - TYPE 1 - LOG PLACEMENT SEQUENCING

LWD NOTES:

1. LWD SHALL BE 18" DBH MIN., 35 TO 50 FEET IN LENGTH WITH 5 FT MIN DIA ROOTWAD.
2. EXCAVATION WILL BE REQUIRED TO EMBED LWD STEMS TO PROVIDE INCREASED STRUCTURE STABILITY DURING HIGHER FLOOD FLOW EVENTS.
3. MINIMUM STEM EMBEDMENT IS 30% OF LWD LENGTH.
4. BOULDERS (NOT SHOWN) MAY BE USED AS BALLAST MATERIAL. USE OF BOULDERS AS BALLAST IS AS DIRECTED BY ENGINEER IN THE FIELD.
5. FILL SHALL BE PLACED TO MIMIC NATURAL BANK TOPOGRAPHY.
6. FINAL CONFIGURATION OF LWD STRUCTURE SHALL BE AS DIRECTED IN FIELD.

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REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 13, 2005
SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM
STATE OF WASHINGTON
21470
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE
TREATY OF 1855

NEZ PERCE
FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
		PLAN SHEET SIZE ANSI B (11" X 17")				
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

DETAILS

LWD CONSTRUCTION

DWG. NO.: C-300

CREATED: 03/21/2016

SHEET: 18 OF 23

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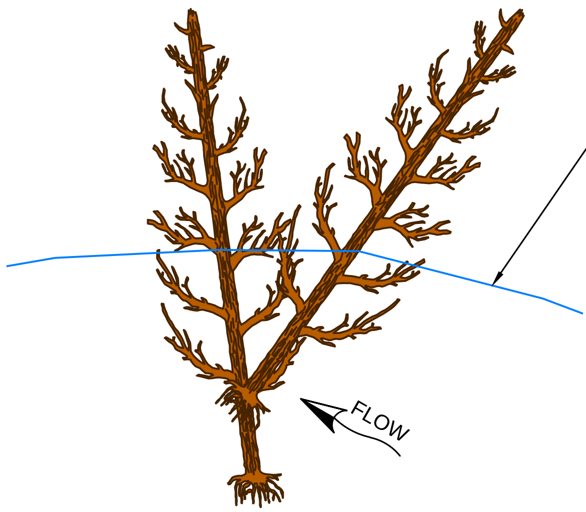
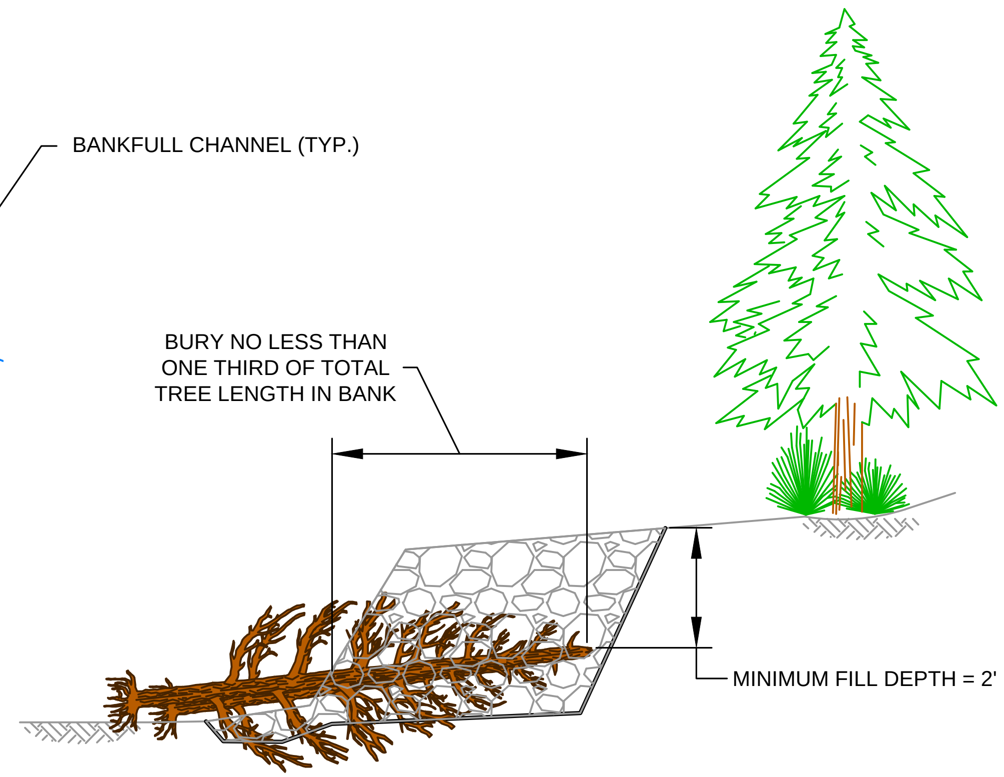
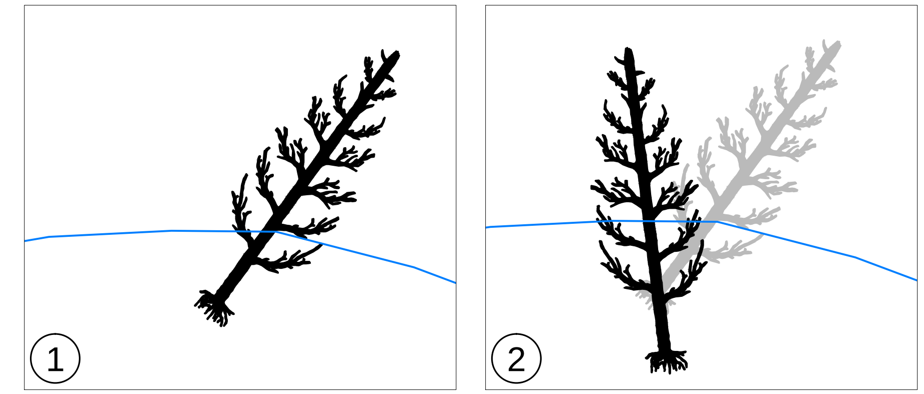
10:04 AM



2-LOG CROSS STRUCTURE - TYPE 2 - PLAN VIEW



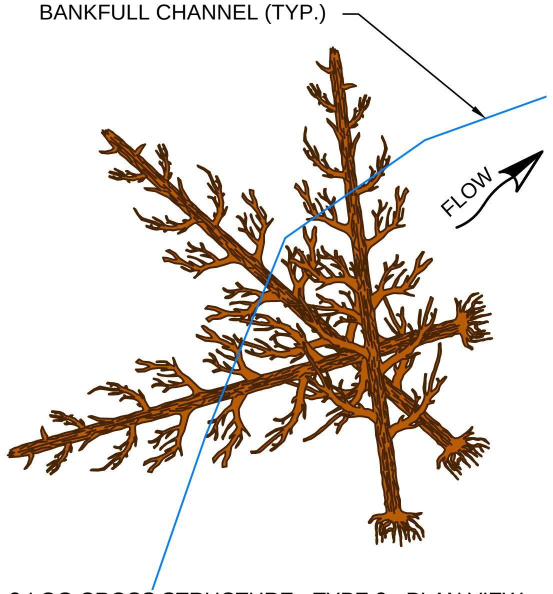
2-LOGS CROSS STRUCTURE - TYPE 2 - SECTION VIEW



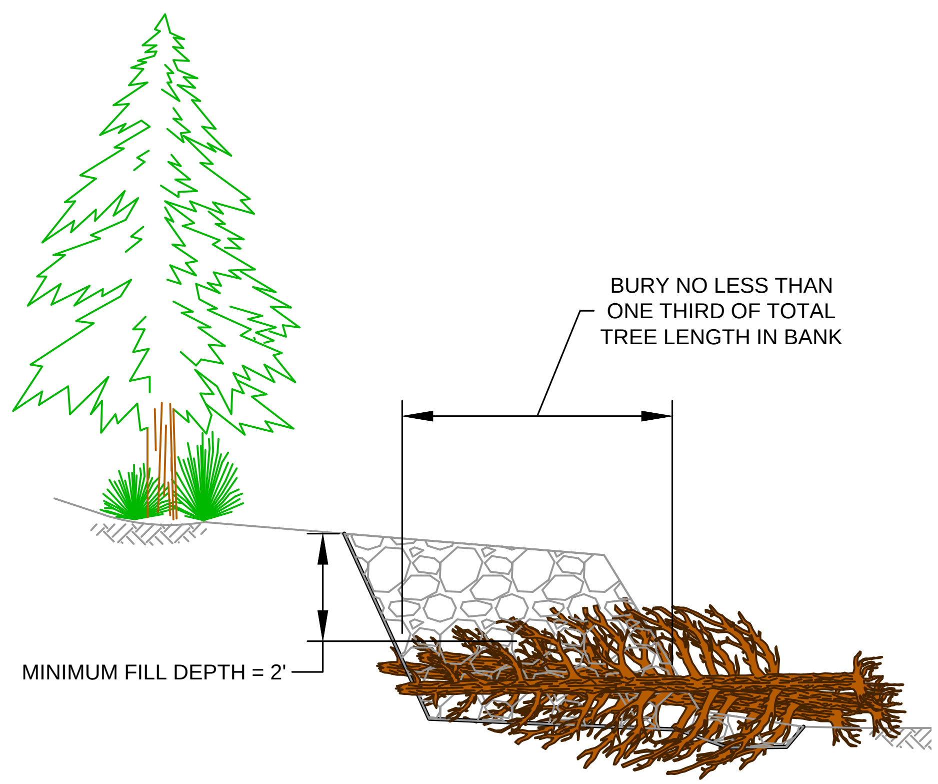
2-LOG CROSS STRCTURE - TYPE 2 - LOG PLACEMENT SEQUENCING

LWD NOTES:

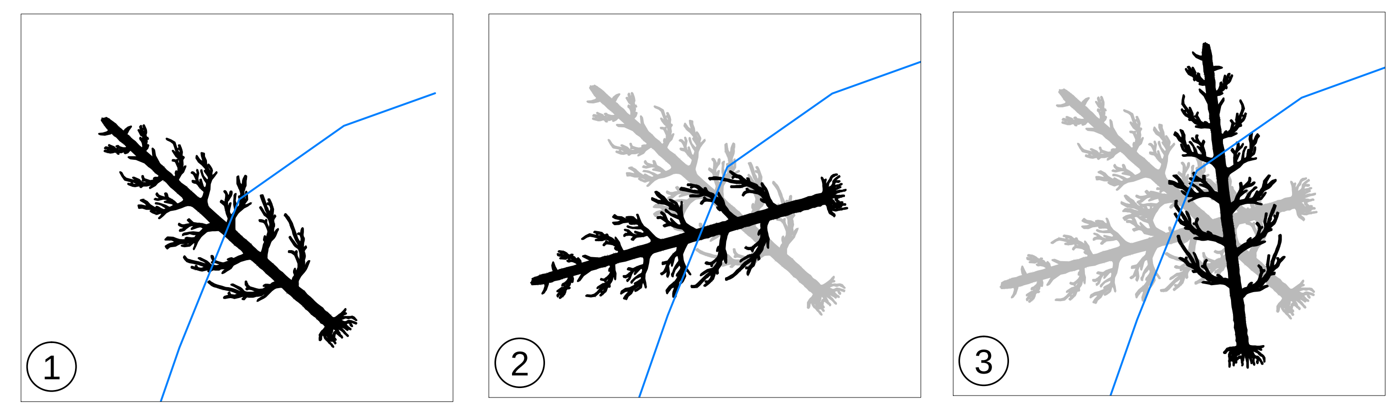
1. LWD SHALL BE 18" DBH MIN., 35 TO 50 FEET IN LENGTH WITH 5 FT MIN DIA ROOTWAD.
2. EXCAVATION WILL BE REQUIRED TO EMBED LWD STEMS TO PROVIDE INCREASED STRUCTURE STABILITY DURING HIGHER FLOOD FLOW EVENTS.
3. MINIMUM STEM EMBEDMENT IS 30% OF LWD LENGTH.
4. BOULDERS (NOT SHOWN) MAY BE USED AS BALLAST MATERIAL. USE OF BOULDERS AS BALLAST IS AS DIRECTED BY ENGINEER IN THE FIELD.
5. FILL SHALL BE PLACED TO MIMIC NATURAL BANK TOPOGRAPHY.
6. FINAL CONFIGURATION OF LWD STRUCTURE SHALL BE AS DIRECTED IN FIELD.



3-LOG CROSS STRUCTURE - TYPE 2 - PLAN VIEW



3-LOGS CROSS STRUCTURE - SECTION VIEW



3-LOG CROSS STRUCTURE - TYPE 2 - LOG PLACEMENT SEQUENCING

LWD NOTES:

1. LWD SHALL BE 18" DBH MIN., 35 TO 50 FEET IN LENGTH WITH 5 FT MIN DIA ROOTWAD.
2. EXCAVATION WILL BE REQUIRED TO EMBED LWD STEMS TO PROVIDE INCREASED STRUCTURE STABILITY DURING HIGHER FLOOD FLOW EVENTS.
3. MINIMUM STEM EMBEDMENT IS 30% OF LWD LENGTH.
4. BOULDERS (NOT SHOWN) MAY BE USED AS BALLAST MATERIAL. USE OF BOULDERS AS BALLAST IS AS DIRECTED BY ENGINEER IN THE FIELD.
5. FILL SHALL BE PLACED TO MIMIC NATURAL BANK TOPOGRAPHY.
6. FINAL CONFIGURATION OF LWD STRUCTURE SHALL BE AS DIRECTED IN FIELD.

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 13, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

PLAN SHEET SIZE ANSI B (11" X 17")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

LOSTINE RIVER / TULLEY-HILL
FISH PASSAGE DESIGN

DETAILS

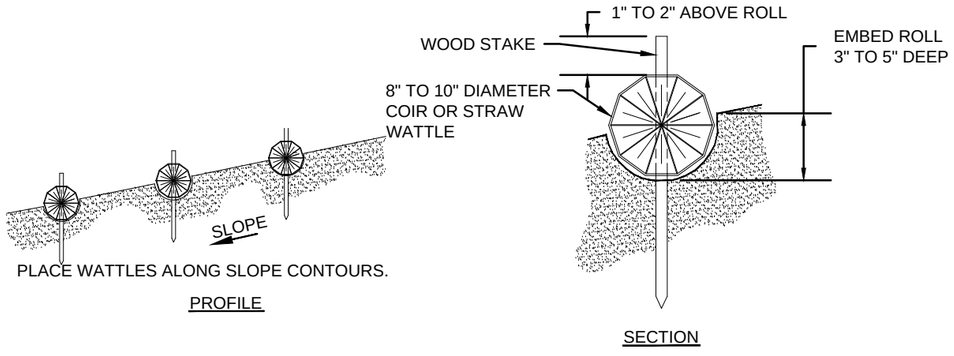
LWD CONSTRUCTION

DWG. NO.: C-301

CREATED: 03/21/2016

SHEET: 19 OF 23

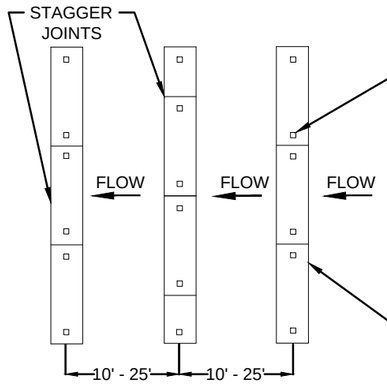
Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\SHEET FILES\LWD DETAIL SHEETS_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX April 11, 2017 11:02 AM



PLACE WATTLES ALONG SLOPE CONTOURS.

PROFILE

SECTION

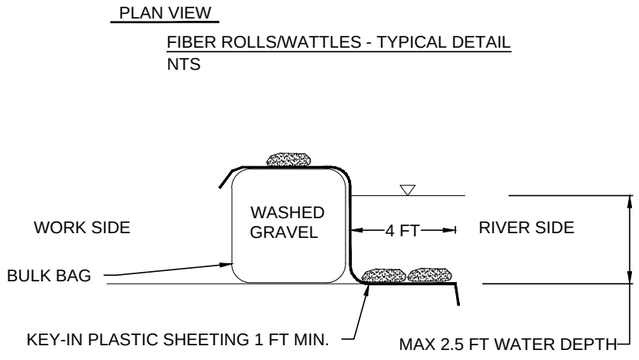


PLAN VIEW

FIBER ROLLS/WATTLES - TYPICAL DETAIL
NTS

STAKING NOTES:

1. STAKES SHALL BE 1"X2" WOODEN STAKES.
2. ADDITIONAL STAKES MAY BE INSTALLED ON DOWNHILL SIDE OF WATTLES, ON STEEP SLOPES OR HIGHLY EROSIVE SOILS
3. FIBER ROLLS OR WATTLES TO BE INSTALLED IN ROWS WITH 10' TO 25' SPACING.

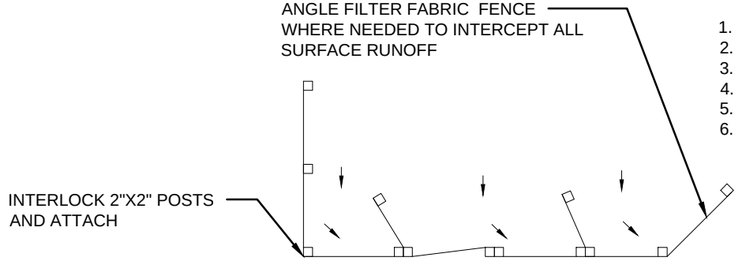


TEMPORARY COFFERDAM SECTION TYPICAL DETAIL
NTS

COFFERDAM NOTES:

1. ALL WORK IN CHANNEL SHALL ONLY OCCUR BETWEEN JULY 15 AND AUGUST 15.
2. ISOLATED AREAS REQUIRE FISH SALVAGE ACTIVITIES PRIOR TO THE INITIATION OF CONSTRUCTION.
3. FISH SALVAGE TO BE PERFORMED BY QUALIFIED FISH BIOLOGIST.
4. FILL BULK BAG WITH WASHED GRAVEL.
5. SAND BAGS, ECO-BLOCKS, OR SIMILAR MAY BE SUBSTITUTED FOR WASHED GRAVEL BULK BAG.

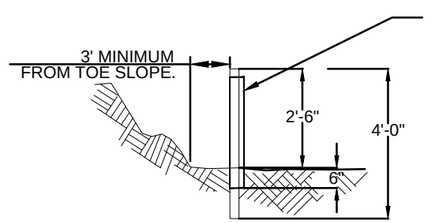
NTS



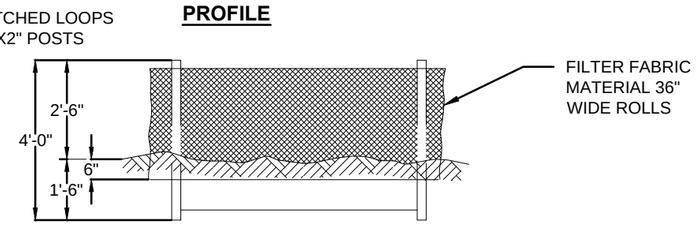
SEDIMENT FENCE NOTES:

1. SEDIMENT FENCE SHALL BE INSTALLED ON A LINE OF EQUAL ELEVATION.
2. BOTTOM EDGE OF SEDIMENT FENCE SHALL BE BURIED MIN 6".
3. POSTS MAY BE 2"X2" FIR, PINE OR STEEL.
4. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
5. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.
6. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHES 1/3 OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF TO AN AREA THAT CAN BE PERMANENTLY STABILIZED.

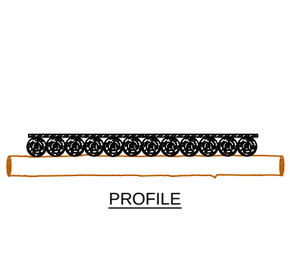
PLAN



PROFILE

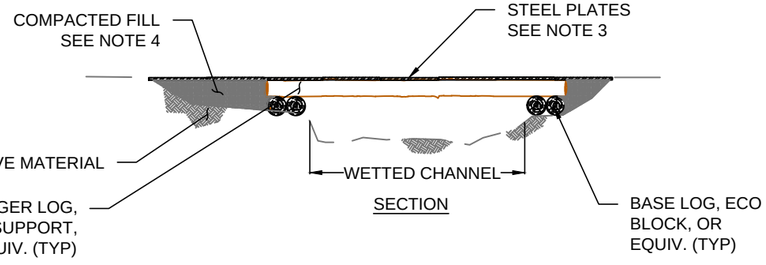


TEMPORARY SILT FENCE TYPICAL DETAIL



PROFILE

PLAN



SECTION

TEMPORARY CONSTRUCTION BRIDGE DETAIL

TEMPORARY CONSTRUCTION BRIDGE NOTES:

1. PLACE BASE LOGS, ECO BLOCKS, OR EQUIV. OUTSIDE OF WETTED CHANNEL AS DIRECTED BY ENGINEER.
2. PLACE STRINGER LOGS, STEEL SUPPORT, OR EQUIV. TO BASE TO IMPROVE TEMPORARY BRIDGE STABILITY
3. PLACE 1" X 8' X 20' STEEL ROAD PLATES ON TOP OF STRINGER LOGS, STEEL SUPPORT, OR EQUIV.
4. COMPACTED FILL MAY BE REQUIRED OUTSIDE OF TEMPORARY BRIDGE TO PROVIDE SMOOTH TRANSITION FROM BRIDGE TO EXISTING GROUND. (SHOWN IN SECTION DETAIL)
5. BASE AND SUPPORT SHOULD BE OF SIZED SUFFICIENTLY TO PROVIDE LOAD BEARING CAPACITY FOR EXPECTED VEHICLES.
6. AFTER COMPLETION OF WORK AND REMOVAL OF BRIDGE, SUBSOIL SHALL BE RIPPED TO PROVIDE SUITABLE SURFACE FOR PLANTING.

TETRA TECH
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Bothell, Washington 98011
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REGISTERED PROFESSIONAL ENGINEER
76918PE
OREGON
SEPTEMBER 9, 2005
SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM
STATE OF WASHINGTON
21708
REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE
TREATY OF 1855
© NPT 1995

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	VM	SO

PLAN SHEET SIZE ANSI B (11" X 17")

LOSTINE RIVER / TULLEY-HILL
FISH PASSAGE DESIGN

DETAILS

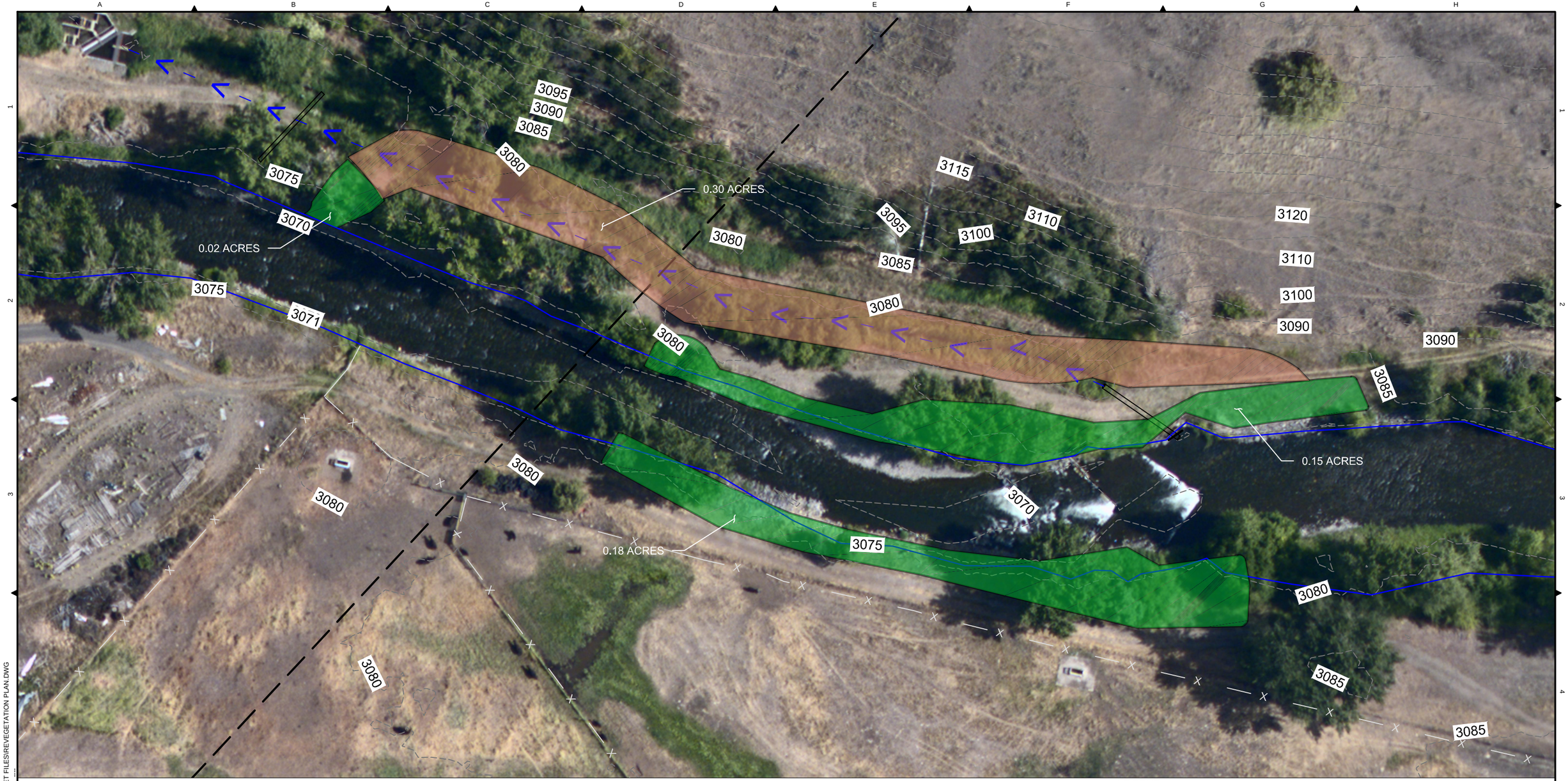
EROSION AND SEDIMENT CONTROL

DWG. NO.: C-302

CREATED: 03/21/2016

SHEET: 20 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN\.SHEET FILES\LWD DETAIL SHEETS_LOSTINE.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017
11:02 AM



NOTES:

1. SEE SHEET L-102 AND L-103 FOR RIPARIAN AND FLOODPLAIN PLANTING DETAILS.

LEGEND:

- PROPOSED CONTOUR MAJOR - 5FT
- PROPOSED CONTOUR MINOR - 1FT
- ZONE 1 - PROPOSED RIPARIAN REVEGETATION
- ZONE 2 - PROPOSED FLOODPLAIN REVEGETATION

N

0' 80' 160'

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PLAN SHEET SIZE ANSI B (11" X 17")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
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LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS REVEGETATION PLAN

DWG. NO.: L-101

CREATED: 03/31/2016

SHEET: 21 OF 23

Z:\PROJECTS\194-5583 TULLEY HILL FISH PASSAGE\100% DESIGN_SHEET FILES\REVEGETATION PLAN.DWG
PLOT DETAILS: STROM, ALEX
April 11, 2017
11:02 AM

CRITERIA FOR PLANTING PLAN

1. NATIVE TREE AND SHRUB SPECIES SUCH AS COTTONWOOD, ALDER, WILLOW, REDOSIER DOGWOOD, CURRANT, AND ROSE SHOULD BE USED FOR RIPARIAN PLANTINGS. LOCAL STOCK OF NATIVE SPECIES SHOULD BE USED TO THE EXTENT POSSIBLE BECAUSE THESE STOCKS WOULD BE BEST SUITED TO AND ADAPTED TO LOCAL CONDITIONS.
2. FINAL PLANTING PLANS WILL BE BASED ON THE FINAL CONSTRUCTION DESIGN. FACTORS SUCH AS TOPOGRAPHY DISTANCE TO STREAM CHANNEL SHALL BE TAKEN INTO ACCOUNT. THE FINAL PLANTING PLAN WILL BE INTENDED TO FACILITATE PLANT SURVIVAL AND TO FACILITATE PROJECT GOAL OF IMPROVING AQUATIC AND RIPARIAN HABITAT.
3. IF RIPARIAN PLANTINGS ARE TO BE PHASED IN OVER SEVERAL YEARS, AREAS WHERE BANK STABILITY IS OF IMMEDIATE CONCERN SHOULD BE PRIORITIZED.
4. TO AUGMENT SURVIVAL OF RIPARIAN PLANTINGS:
   a. FINAL PLACEMENT OF PLANTS SHALL BE CHOSEN BASED ON MICROSITE CONDITIONS, BECAUSE SOIL PROPERTIES AND WATER TABLE DEPTH CAN VARY OVER SHORT DISTANCES, SUCH THAT SPECIES ARE BEST MATCHED TO THEIR SITE CONDITIONS.
   b. SITE PREPARATION, SUCH AS REMOVAL OF WEEDS OR OTHER SPECIES THAT WILL COMPETE WITH SEEDLINGS AND TILLING OF THE SOIL SHALL OCCUR PRIOR TO PLANTING.
   c. IF NECESSARY, SOIL AMENDMENT, SUCH AS FERTILIZER, SHALL BE INCORPORATED PRIOR TO OR DURING PLANTING.
   d. IF NECESSARY, MEASURES, SUCH AS TUBING, OR OTHER ANIMAL CONTROL TECHNIQUES CAN BE UTILIZED TO PROTECT PLANTS FROM GRAZING/HERBIVORY.
   e. IF POSSIBLE, PLANTS SHALL BE INSTALLED IN THE LATE FALL THROUGH EARLY SPRING TO MINIMIZE THE NEED FOR SUPPLEMENTAL WATER AND TO ALLOW FOR THE OPTION OF USING BARE ROOT PLANT STOCK IF AVAILABLE.

GENERAL PLANTING NOTES:

1. PLANT MATERIALS AND SEEDS SHOULD BE FROM SOURCES EAST OF THE CASCADES AND FROM SIMILAR ELEVATION.
2. SUPPLEMENTAL FERTILIZER MAY BE ADDED TO THE BOTTOM OF EACH TREE AN SHRUB PLANTING HOLE PRIOR TO PLANTING AND BACKFILLING. IF USED, FERTILIZERS SHALL BE SLOW RELEASE PRODUCTS THAT WILL NOT RESULT IN NUTRIENT RUNOFF INTO AQUATIC SYSTEMS.
3. ADDITION OF MULCH THREE INCHES DEEP MAY BE PLACED IN AN 18 INCH DIAMETER RING AROUND EACH TREE AND SHRUB TO PREVENT COMPETITION WITH INVASIVE SPECIES.

RIPARIAN AND FLOODPLAIN PLANTING ZONES

EXAMPLE SEQUENCE:

1. SEED BARE SOIL AT APPROXIMATELY 30 LBS/ACRE IN SELECTED AREAS AS NEEDED/DESIRED FOR EROSION CONTROL.
2. INSTALL PLANTS BASED ON MICROSITE VARIATIONS WITHIN RIPARIAN AND FLOODPLAIN PLANTING ZONES, AS INDICATED ON SHEET L-101.
3. DEPENDING ON DESIRED DENSITY: TREES SHOULD BE PLANTED 10 TO 18 FEET ON CENTER, SHRUBS SHOULD BE PLANTED AT APPROXIMATELY 4 TO 8 FEET ON CENTER. HOWEVER, FINAL PLANT SPACING WILL DEPEND ON SPECIFIC SITE CONDITIONS AND DESIRED OUTCOMES AND SHOULD BE DESIGNED DURING FINAL PLAN DESIGN.

NOTES:

1. CHOICE OF SPECIES AND PLACEMENT WITHIN PLANTING ZONE WILL DEPEND ON SITE CONDITIONS AND SPECIES; SPECIES HAVE DIFFERENT MOISTURE REQUIREMENTS AND TOLERANCES.
2. ZONE 2 WILL REQUIRE SEEDING ONLY. TREES AND SHRUBS ENCOUNTERED DURING EXCAVATION WILL BE REMOVED AND REPLANTED AFTER CONSTRUCTION. NO NEW TREES OR SHRUBS WILL BE PLACED IN ZONE 2.

LIVE STAKES

DESCRIPTION:

LIVE STAKES SHOULD BE INSTALLED ALONG DISTRUBED STREAMBANKS, WHERE APPLICABLE. THE WIDTH OF THE ZONE FOR PLANTING WILL DEPEND ON SITE CONDITIONS AND DESIGN CHARACTERISTICS INCLUDING FINAL GRADE OF BANK AND MOISTURE AVAILABILITY.

EXAMPLE SEQUENCE:

1. SEED BARE SOIL AT APPROXIMATELY 30 LBS/ACRE IN SELECTED AREAS AS NEEDED/DESIRED FOR EROSION CONTROL.
2. INSTALL STAKES BASED ON MICROSITE VARIATIONS WITHIN RIPARIAN PLANTING ZONE.
3. DEPENDING ON DESIRED DENSITY, STAKES MAY BE PLANTED AT APPROXIMATELY 1 TO 10 FEET ON CENTER.

SELECTION AND INSTALLATION NOTES:

1. LIVE STAKES SHOULD BE BETWEEN 18-48 INCHES LONG AND AT LEAST ½" IN DIAMETER.
2. STAKES SHOULD BE CUT STRAIGHT AT THE TIP OF THE BRANCH AND AT AN ANGLE AT THE BASE OF CUTTING TO ENSURE THE CORRECT END IS DRIVEN INTO THE GROUND.
3. KEEP STAKES MOIST AND IN A DARK PLACE UNTIL INSTALLED; DO NOT LET STAKES DRY OUT.
4. SOAKING STAKES BEFORE INSTALLATION INCREASES SURVIVAL AND GROWTH WEIGHT.
5. DRIVE STAKES INTO THE SOIL SO AT LEAST ⅔ OF ITS LENGTH IS UNDERGROUND; LEAVE AT LEAST 12 INCHES ABOVE GROUND.
6. USE THICKER DIAMETER STAKES WHEN PLANTING IN RIPRAP; THICKER DIAMETER STAKES WILL RESIST HEAT AND DRYING BETTER THAN SMALLER CUTTINGS.
7. PLANT STAKES DURING THE DORMANT SEASON.

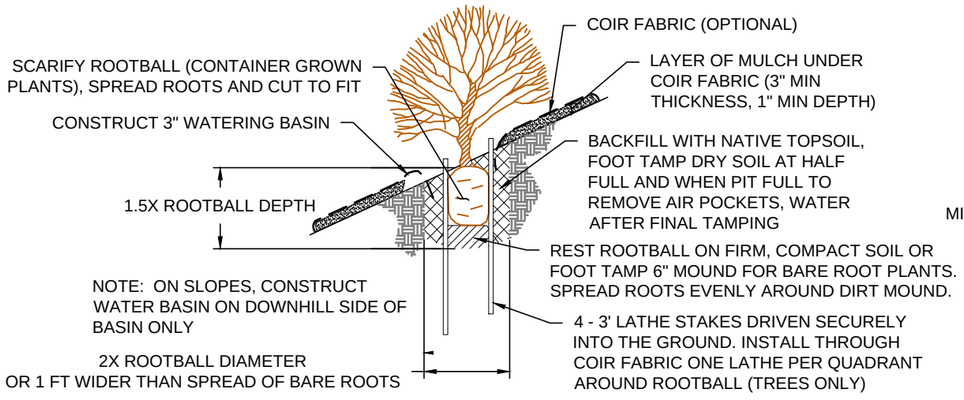
SEED MIX

DESCRIPTION:

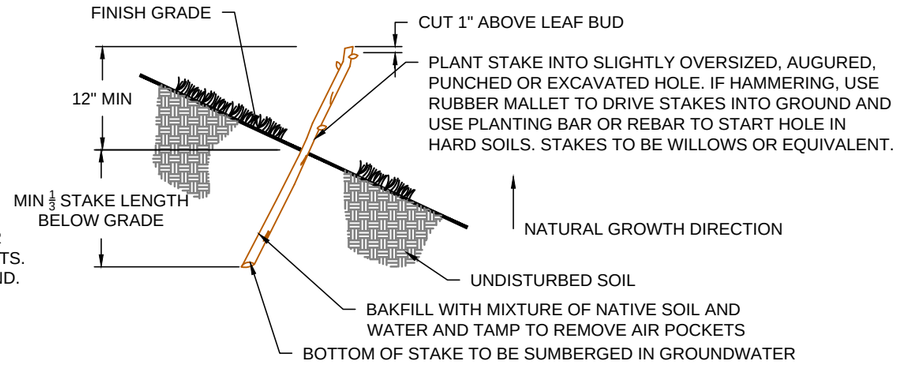
SEED MIX, COMPOSED OF NATIVE SPECIES, SHALL BE USED ON BARE SOIL IN SELECTED AREAS OF THE RIPARIAN AND FLOODPLAIN PLANTING ZONES AS NEEDED/DESIRED FOR EROSION CONTROL.

NOTES:

1. SEED AT APPROXIMATELY 30 LBS/ACRE; FINAL QUANTITY OF SEED MIX PER ACRE WILL DEPEND ON SPECIES COMPOSITION AND SITE CONDITIONS.
2. SPECIES TO BE USED FOR SEED MIX(ES) AND FINAL COMPOSITION SHOULD BE CHOSEN BASED ON SITE SPECIFIC DESIGN AND CONDITIONS (E.G. SLOPE, WIDTH OF PLANTING ZONE, MOISTURE AVAILABILITY)
3. ALL SEED MIXES SHOULD BE CERTIFIED WEED-FREE.



SHRUB AND TREE PLANTING DETAIL



LIVE STAKE PLANTING DETAIL

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 9, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47162 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
		PLAN SHEET SIZE ANSI B (11" X 17")				
					KB	
0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	KB	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

REVEGETATION DETAILS

DWG. NO.: L-102

CREATED: 03/31/2016

SHEET: 22 OF 23

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PLOT DETAILS: STROM, ALEX April 11, 2017 11:02 AM

Potential Species to be Used for Riparian and Floodplain Revegetation							
Acres: 0.64							
Growth Habit	**Scientific Name**	**Common Name**	**Potential Percent Composition[2]**	**Propagation Method**	**Spacing (feet o.c.)**	**Density per Acre[1]**	**Quantity[1]**
TREE	*Populus balsamifera* subsp. *trichocarpa*	Black cottonwood	50	CONTAINER OR LIVE STAKE	15	30	47
	Alnus incana subsp. *tenuifolia*	Mountain alder	30	CONTAINER	15	18	28
	Pinus ponderosa	Ponderosa pine	10	CONTAINER	15	6	9
	Pseudotsuga menziesii	Doulas fir	10	CONTAINER	15	6	9
SHRUB	*Salix* spp.	Willow	50	LIVE STAKE	6	158	247
	Holodiscus discolor	Oceanspray	15	CONTAINER	6	47	74
	Cornus sericea	redosier dogwood	15	LIVE STAKE	6	47	74
	Crataegus douglasii	Black hawthorn	15	CONTAINER	6	47	74
	Symphoricarpos albus	Snowberry	5	CONTAINER	6	16	25

[1] Acres, density per acre, final species list and quantities are subject to approval by NPT.

[2] Percent composition adds to 100 for each strata (i.e., tree, shrub)

Potential Species for Riparian and Floodplain Seed Mix		
Acres: 0.64		
Scientific Name	**Common Name**	**Potential Percent Composition[1]**
Elymus glaucus	Blue wildrye	40
Festuca idahoensis	Idaho fescue	30
Bromus marginatus	Mountain brome	15
Deschampsia caespitosa	Tufted hairgrass	15
	SEED MIX TOTALS	**100**

[1] Acres and seed mix required are subject to approval by NPT.

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REGISTERED PROFESSIONAL ENGINEER 76918PE OREGON SEPTEMBER 13, 2005 SENDA OZKAN
EXPIRES: 12/31/2016

ALEX STROM STATE OF WASHINGTON 47402 REGISTERED PROFESSIONAL ENGINEER
EXPIRES: 05/07/2017

NEZ PERCE TRIBE TREATY OF 1855

NEZ PERCE FISHERIES

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	CHK	APP
		PLAN SHEET SIZE ANSI B (11" X 17")				
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0	04/11/17	ISSUED FOR CONSTRUCTION	ATS	ATS	KB	SO

LOSTINE RIVER / TULLEY-HILL FISH PASSAGE DESIGN

PROPOSED CONDITIONS

REVEGETATION DETAILS

DWG. NO.: L-103

CREATED: 03/31/2016

SHEET: 23 OF 23

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PLOT DETAILS: STROM, ALEX April 11, 2017 11:03 AM