80 Road at Piscoe Creek Culvert Replacement

90% Basis of Design Report

SUBMITTED TO
Confederated Tribes of the Yakama Nation

March 2020

80 Road at Piscoe Creek Culvert Replacement

90% Basis of Design Report

SUBMITTED TO

Confederated Tribes and
Bands of the Yakama Nation
P.O. Box 151, Fort Road
Toppenish, WA 98948

PREPARED BY
Inter-Fluve
501 Portway Ave.
Hood River, OR 97031

March 2020

Table of Contents

List of Appendices:

1. Preface

Piscoe Creek is a 4th order tributary of the Klickitat River which runs under Forest Road 80 approximately 0.34 miles upstream of its confluence with the Klickitat River (Figure 1). The project area is located on the Yakama Nation Reservation. The crossing has been a chronic road maintenance problem over the years because of frequent road washouts due to failed or blocked undersized culverts during high flows. The original road design and maintenance performed to re-open the crossing after each successive failure has often left conditions for upstream fish passage impaired for most age classes of *O. mykiss* (Rainbow Trout/Steelhead). The upper Klickitat and Piscoe Creek provide spawning and rearing habitat for mid-Columbia ESA-threatened steelhead and resident rainbow trout. The goal of the project is to provide a road crossing design that solves chronic maintenance problems, allows upstream migration of all fish species for all age classes, and facilitates the longitudinal movement of wood and sediment across a wide range of flow conditions. This report summarizes the field work and analysis completed for the crossing design provided in Appendix A of this report.

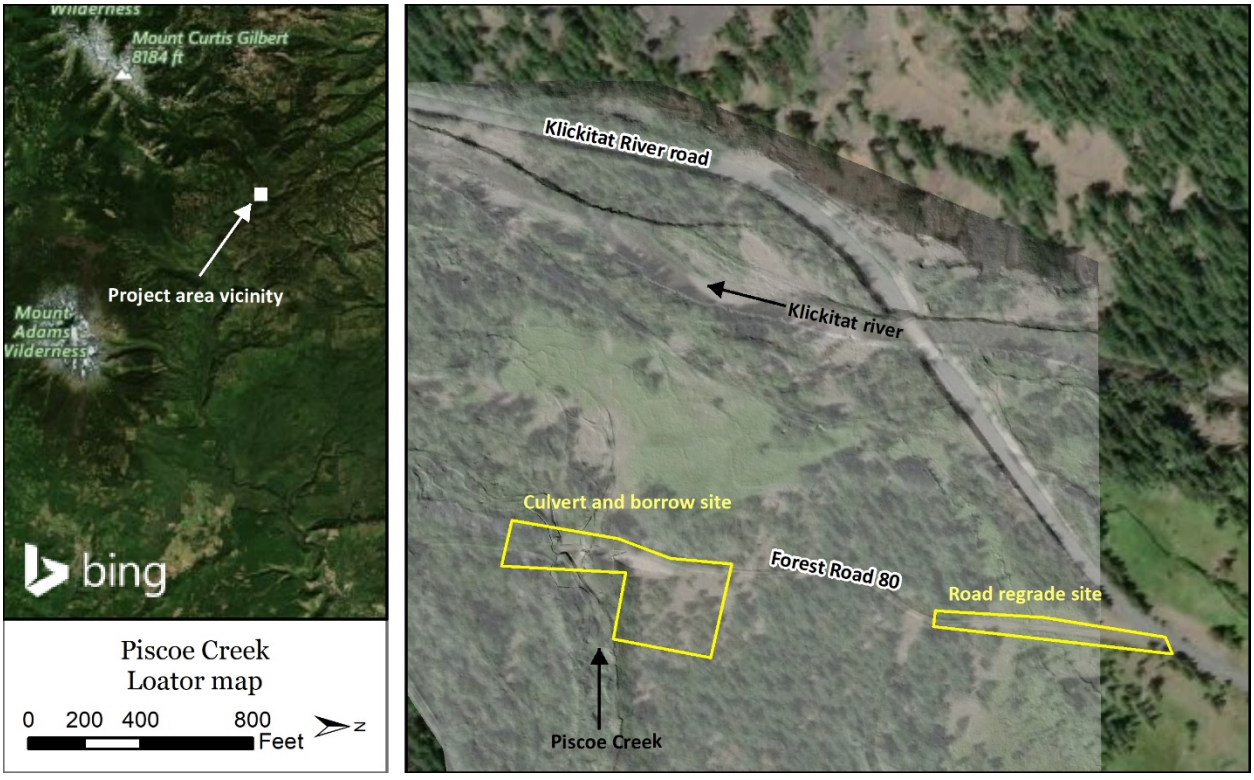


Figure 1. Piscoe Creek project area location.

The existing crossing is composed of two four- foot diameter corrugated metal culverts. There are no upstream wing walls at the inlets and both culverts outfall into a 3- foot deep pool. Push up berms have been utilized upstream to funnel flows toward the structures. The north culvert has a 1.5-foot drop into the downstream pool. The south culvert has a 0.5-foot drop.

At the time of survey, the road was not passable because the northern road approach was washed out. A previous high-water event paired with inadequate culvert capacity caused the road to be over topped north of the crossing. At the time of the survey, during the low flow period, all of the Piscoe Creek discharge was running through the two culverts.

Figure 2. Existing conditions of Forest Road 80 Piscoe Creek crossing outfall.

1.1 NAME AND TITLES OF SPONSOR, FIRMS AND INDIVIDUALS RESPONSIBLE FOR DESIGN

The project is sponsored by the Yakama Nation. David Lindley, Habitat Biologist is the project manager for the Yakama Nation. Inter-Fluve is the engineering design firm. The project team includes Mike Brunfelt (PG) and Mike McAllister (PE).

1.2 LIST OF PROJECT ELEMENTS THAT HAVE BEEN DESIGNED BY A LICENSED PROFESSIONAL ENGINEER

Mike McAllister (PE) is the licensed engineer of record for this project. Project elements include the following, with BPA HIP III activity and risk category included:

Table 1. Activity categories and risk included in the Upper Kahler project.

Description of Proposed Enhancement	Work Element	HIP III Category	HIP III Risk Level
Replace culvert under FR 80	Bridge and culvert removal or replacement	1f	Medium
Regrade FR 80	Road maintenance	5a	Low

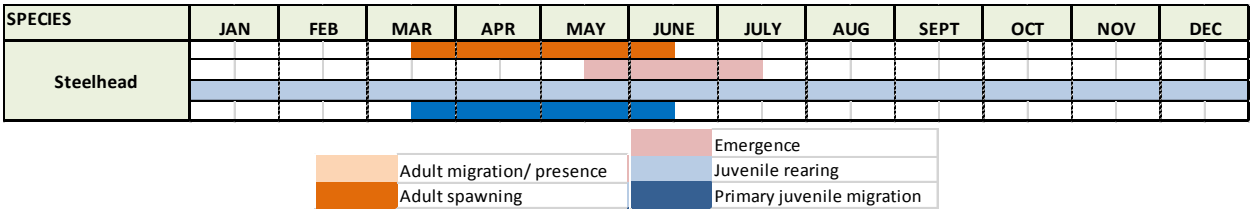
1.3 IDENTIFICATION AND DESCRIPTION OF RISK TO INFRASTRUCTURE OR EXISTING RESOURCES

The only infrastructure within the project area is Forest Road 80. The project is intended to reduce washout risk to this road by installing a new appropriately sized bridge.

1.4 EXPLANATION AND BACKGROUND ON FISHERIES USE (BY LIFE STAGE – PERIOD) AND LIMITING FACTORS ADDRESSED BY THE PROJECT

Steelhead are known to utilize the project area for migrating to spawning habitats upstream. Juveniles utilize the area for outmigration and rearing. Life history timing is presented in Figure 3. By improving fish passage through the crossing, access will be restored to 7 miles of upstream spawning and rearing habitats that is currently blocked. O. mykiss are present throughout the Piscoe Creek drainage, including in the headwater Piscoe Meadows located at RM 7.

Figure 3. Life history timing of steelhead in the Klickitat River (NMFS 2009).



1.5 LIST OF PRIMARY PROJECT FEATURES INCLUDING CONSTRUCTED OR NATURAL ELEMENTS

Primary project features consist of the following:

- **Bridge installation**: Remove existing undersized culverts under Forest Road 80 and replace with a bridge with a natural bottom. Minor upgrades to the streambed and banks will be made to align the channel appropriately. The road bed over the culvert will be lifted to provide approaches to the bridge. The road lift will be level (no sag) with vertical curves at end points to taper into the existing road.
- **Forest Road 80 regrade area**: Re-grade the portion of Forest Road 80 to provide a drier and firmer road base to improve access and prevent future washout and overtopping during high water events.

1.6 DESCRIPTION OF DISTURBANCE INCLUDING TIMING AND ARIAL EXTENT AND POTENTIAL IMPACTS ASSOCIATED WITH IMPLEMENTATION OF EACH ELEMENT

It is anticipated that the proposed work will take less than 20 days to construct, and will occur during baseflow conditions in late summer. Work will be scheduled such that road closure is minimized. Flows during this time are anticipated to be below 4 cfs. See section 3.3 for a detailed discussion on low flow conditions and flow duration curves. It is expected that the entire Piscoe Creek flow could be diverted around the work area using two 6" trash pumps. This would allow work to occur in the dry.

2. Resource inventory and evaluation

2.1 DESCRIPTION OF PAST AND PRESENT IMPACTS ON CHANNEL, RIPARIAN AND FLOODPLAIN CONDITIONS

Forest road construction and historical logging throughout the watershed, and intensive grazing in the headwater meadow complex have influenced channel, riparian, and floodplain conditions. More recent and chronic impacts are related to frequent sediment deposition upstream of the existing culverts, resulting in decreased flow capacity, flanking, and overtopping of the road. Road crews regularly rebuild pushup berms to prevent flanking, and perform road repairs. Despite multiple failures of this crossing, the size of the structures and the alignment has remained relatively unchanged. The road crossing is located at the head of an alluvial fan. Upstream of the crossing, the the left bank of Piscoe Creek is up against the Piscoe Creek valley wall, further constraining the creek.

2.2 INSTREAM FLOW MANAGEMENT AND CONSTRAINTS IN THE PROJECT REACH

Not applicable to this project.

2.3 DESCRIPTION OF EXISTING GEOMORPHIC CONDITIONS AND CONSTRAINTS ON PHYSICAL PROCESSES

Much of the problem with the existing crossing condition can be attributed to poor culvert capacity, culvert blockage, or both. The crossing is also sited along an alluvial fan surface created by Piscoe Creek where it meets the flatter Klickitat River valley. As Piscoe Creek meets the Klickitat valley channel slope lowers, bedload transport is lost and the channel bed aggrades. In this way, alluvial fan channels develop a fan surface and migrate across it until or unless sediment supply is reduced enough in volume and/or size to maintain a single thread. The Forest Road 80 crossing is on the Piscoe alluvial fan surface and is within a zone of natural deposition. When combined with undersized or blocked culverts sediment transport is easily lost and rapid aggradation, road overtopping and road prism erosion occurs.

Figure 4. Piscoe Creek upstream of road crossing and culvert inlet within aggrading alluvial fan surface.

Figure 5. Road prism washout north of Piscoe Creek. Alluvial fan surface is in the foreground.

Previous efforts to prevent washouts have included earthen berms constructed along the forest road 80 (Figure 4). These efforts were washed out in 2008 and 2011 during high flow events. The proposed project is expected to greatly reduce the frequency of road washouts and provide a more permanent fix to this recurring problem.

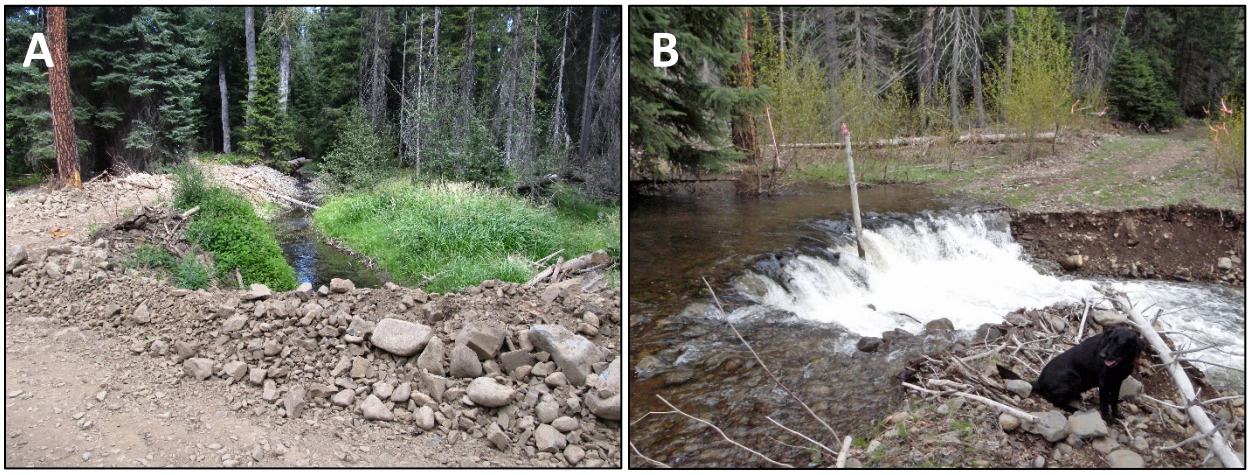


Figure 6. Typical fixes to recurring road-washouts include earthen berms to protect the road (A). These fixes have failed repeatedly, notable in 2008 and 2011 during high flow events (B).

2.4 DESCRIPTION OF EXISTING RIPARIAN CONDITION AND HISTORICAL RIPARIAN IMPACTS

Forest road construction within the watershed and historical logging are the largest impacts to channel, riparian, and floodplain conditions. Aside from the localized impacts associated with roads and road maintenance, the riparian condition is healthy and intact. Roads in the drainage are primarily located mid-slope and are constructed with native materials. The BIA 32 Road parallels the stream in the upper watershed but is located upslope, the road is two-lane width and surfaced with crushed gravel.

2.5 DESCRIPTION OF LATERAL CONNECTIVITY TO FLOODPLAIN AND HISTORICAL FLOODPLAIN IMPACTS

Piscoe Creek appears to be well connected to its floodplain. Forest road construction and historical logging have impacted forest cover in the upstream area. The supply of large wood to the system is likely less than historic levels.

2.6 TIDAL INFLUENCE IN PROJECT REACH AND INFLUENCE OF STRUCTURAL CONTROLS (DIKES OR GATES)

Not applicable to this project.

3. Technical data

3.1 INCORPORATION OF HIPIII SPECIFIC ACTIVITY CONSERVATION MEASURES FOR ALL INCLUDED PROJECT ELEMENTS

HIPIII conservation measures will be met through the project design and variances will be submitted for any conservation measures that cannot be met.

3.2 SUMMARY OF SITE INFORMATION AND MEASUREMENTS (SURVEY, BED MATERIAL, ETC) USED TO SUPPORT ASSESSMENT AND DESIGN

3.2.1 Elevation data

The road crossing area was surveyed October 13, 2017. The stream reach through the crossing was examined to identify past failure process, general channel and sediment characteristics, changes in transport characteristics, and existing fish passage conditions. Survey was completed using RTK GPS and Total Station survey equipment. Temporary control points were established throughout the project site and permanent control south of the crossing in an upland area.

Ground survey data was supplemented with pre-existing LiDAR data to produce a three-dimensional surface of the project area. Ground survey and LiDAR data compared well and were used for both grading design and hydraulic modelling. Field photos were used to document existing conditions.

3.2.2 Hydrology data

Hydrologic peak flows were estimated so a hydraulic model of the site could be developed in order to design a new crossing. No stream gage data exists on Piscoe Creek in which to establish peak flow statistics directly. Therefore, regional regression equations were used to estimate peak flow hydrology at the project site.

3.2.3 Bankfull Width

The project site occurs at a transition from ravine to an alluvial fan occurring on a terrace transitioning to the Klickitat River valley bottom. This is further complicated by a road that forces a single channel alignment through undersized culverts that have caused interference in natural sediment transport and fan processes. The combination of the transition zone and anthropogenic disturbances make identification of bankfull channel characteristics unreliable. However, the observations of possible bankfull widths are as follows: 16 feet in the ravine upstream of the deposits; 18 feet at an abandoned channel to the north, now cut off by the road; 19 feet just downstream of the culvert. For bridge design, bankfull width is assumed to be 19 feet.

3.3 SUMMARY OF HYDROLOGIC ANALYSES CONDUCTED, INCLUDING DATA SOURCES AND PERIOD OF RECORD INCLUDING A LIST OF DESIGN DISCHARGE (Q) AND RETURN INTERVAL (RI) FOR EACH DESIGN ELEMENT

Hydrologic equations were obtained from the report titled "USGS Scientific Investigations Report 2016-5118 Magnitude, frequency, and trends of floods at gaged and ungagged sites in Washington, based on data through water year 2014" (Mastin et al. 2016). Within the report, Washington State was divided into four regions. Each watershed that has a stream gage was statistically compared to watersheds in the same region without gages and regression equations were developed for ungagged sites. An annual precipitation average of 51 inches within the region four regression equation was used to provide an estimate of peak flood hydrology for the crossing design. Discharges measured at Piscoe Creek in 2017 were used along with gage data at nearby streams to provide another line of evidence to validate results from regression equations. Generally, this comparison supported the validity of regression equations, particularly the revised 2016 Mastin regression equations rather than the older 2001 Knowles and Sumioka version. Peak flow estimates are provided below.

Table 1. Recurrence interval flows calculated for the Piscoe Creek Forest Road 80 crossing site.

Recurrence Interval	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Flow (cfs)	200	286	375	470	550	630

The Yakama Nation operates a discharge gage at the mouth of Piscoe Creek, and data are available from May 2016 through September 2017. The maximum measured discharge from water year 2017 was 200 cfs (Figure 7). Annual 7-day minimum discharge was 3.2 cfs in mid-September, and daily discharge was less than 4.0 cfs from August 2, 2016 to October 27, 2017. Analysis of historical manual discharge data from 1993 to present shows that flows less than 4.0 cfs occur from early August through mid-October nearly every year, and the lowest flow measurement recorded was 1.7 cfs on October 5, 1994.

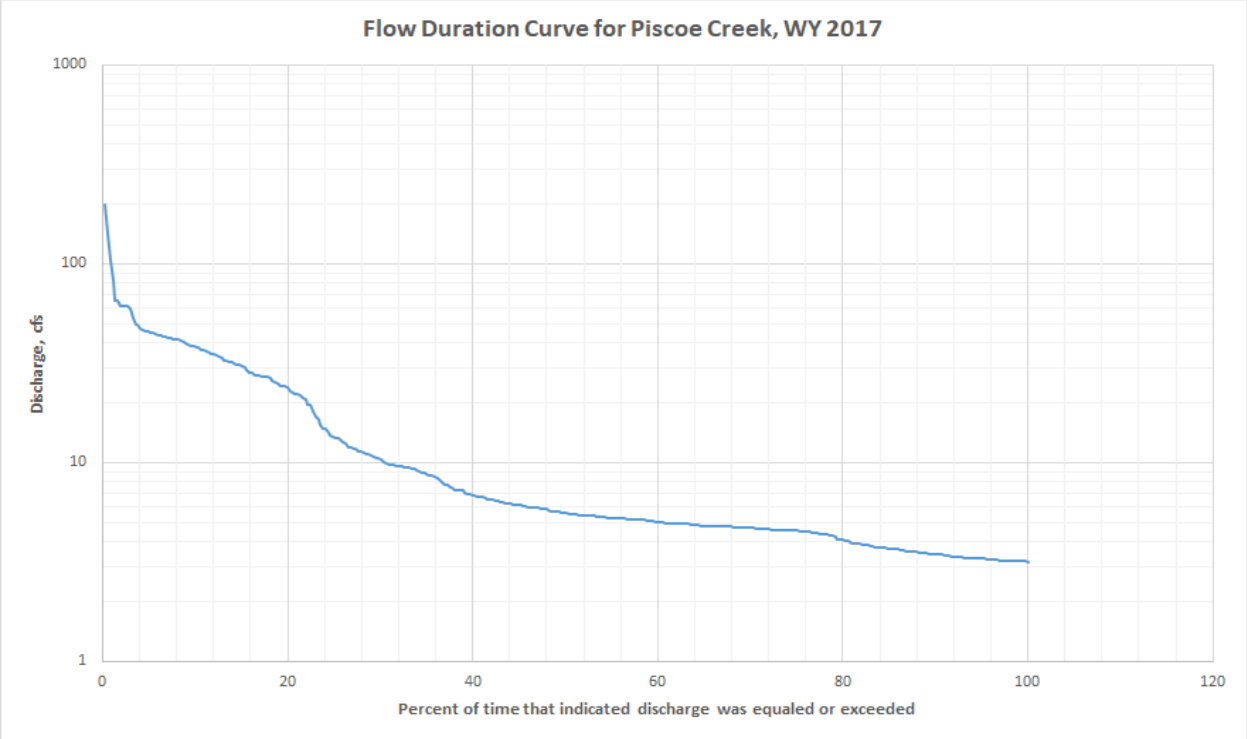


Figure 7. Flow duration curve for Piscoe Creek for water year 2017. Data from gaged flows at the mouth. Y axis on log scale.

3.4 SUMMARY OF SEDIMENT SUPPLY AND TRANSPORT ANALYSES CONDUCTED, INCLUDING DATA SOURCES INCLUDING SEDIMENT SIZE GRADATION USED IN STREAMBED DESIGN

Detailed sediment characterization, supply, transport analysis, and streambed design were not performed. The site is at the upper end of an alluvial fan so there is a wide variation in sediment volume and sizes delivered to the area over time. The streambed armor layer is currently composed of 2-8″ cobbles (Figure 8). Deposits on the floodplain show evidence of 10-18″ boulder delivery (Figure 5).

This is a streambed simulation design. The channel bed through the bridge will be constructed from salvaged stream gravels. The stream profile will be built approximately 6″ above the average long profile, so that a when fines winnow out and the stream self-armors, it will settle to approximately average grade.

For bridge scour analysis, a conservative size of 60 mm was entered for D50.

Figure 9. Piscoe Creek gravel bar

3.5 SUMMARY OF HYDRAULIC MODELING OR ANALYSES CONDUCTED AND OUTCOMES – IMPLICATIONS RELATIVE TO PROPOSED DESIGN

The hydraulic analysis used the U.S. Army Corps of Engineers' Hydraulic Engineering Center River Analysis System (HEC-RAS 5.0.3; USACE 2016). HEC-RAS is a computer program that models the hydraulics of water flow through natural rivers and other channels. Models were run as one-dimensional steady-state condition to perform hydraulic computations to predict the hydraulic effects of the floods listed in Table 1. Models were built for the existing and proposed crossings. For each model, HEC-RAS cross-sections were spatially drawn to sample the surveyed cross-sections on the ground and span the 100-year flood inundation extents at hydraulic controls. Surveyed cross-sectional geometry was supplemented from the three-dimensional topographic LiDAR, as needed. Ineffective flow points were added to cross sections upstream and downstream of the road to impose contraction and expansion zones that delineate effective flow from ineffective. The downstream boundary condition for this model was set to average slope downstream of the last cross-section. Manning's 'n' values, were applied to correspond with various types of land cover and channel characteristics. These 'n' values are consistent with field observations as well as

published guidelines for channel types and vegetation conditions (Arcement & Schneider 1989). Model setup figures and results are attached in Appendix B.

3.6 STABILITY ANALYSES AND COMPUTATIONS FOR PROJECT ELEMENTS, AND COMPREHENSIVE PROJECT PLAN

The road and bridge are designed so that the 100-yr flood water surface will be below the bridge low cord. Neither road overtopping (weir flow) or interference by the bridge deck (pressure flow) is predicted to occur for flows equal to or less than the 100-year flood discharge.
The HEC-RAS bridge scour module predicts that if streambed material has D50=60mm, the live bed scour is 1.61 feet during the 100-year flood. Bridge footings are designed to be at least 3.84 feet below the streambed average long profile. In an abundance of caution, an 18" layer of 12-18" boulders will be applied just above the footings to provide scour refusal in case of unanticipated deep scour due to debris or ice.
The bankfull width of the new channel under the bridge is 25 feet (19'x1.2+2).

3.7 DESCRIPTION OF HOW PRECEDING TECHNICAL ANALYSIS HAS BEEN INCORPORATED INTO AND INTEGRATED WITH THE CONSTRUCTION – CONTRACT DOCUMENTATION

The preceding analyses are the basis for the design. The attached plans represent the final construction design for the grading plans and bridge configuration with no changes expected. Specifications will be added for final construction-contract documentation. The enclosed bridge design is a proposal drawing. Bridge structural design will be provided by the bridge supplier for final construction-contract documentation.

3.8 FOR PROJECTS THAT ADDRESS PROFILE DISCONTINUITIES (GRADE STABILIZATION, SMALL DAM AND STRUCTURE REMOVALS): A LONGITUDINAL PROFILE OF THE STREAM CHANNEL THALWEG FOR 20 CHANNEL WIDTH UPSTREAM AND DOWNSTREAM OF THE STRUCTURE SHALL BE USED TO DETERMINE THE POTENTIAL FOR CHANNEL DEGRADATION

See next Section.

3.9 FOR PROJECTS THAT ADDRESS PROFILE DISCONTINUITIES (GRADE STABILIZATION, SMALL DAM AND STRUCTURE REMOVALS): A MINIMUM OF THREE CROSS-SECTIONS – ONE DOWNSTREAM OF THE STRUCTURE, ONE THROUGH THE RESERVOIR AREA UPSTREAM OF THE STRUCTURE, AND ONE UPSTREAM OF THE RESERVOIR AREA OUTSIDE OF THE INFLUENCE OF THE STRUCTURE) TO CHARACTERIZE THE CHANNEL MORPHOLOGY AND QUANTIFY THE STORED SEDIMENT

The road alignment is along the edge of terrace that flanks the Klickitat River valley. The road crosses the stream on its alluvial fan. Obvious areas of site disturbance suggest road maintenance crews have created push up berms and excavated the channel while repairing the road after previous washout(s). The long profile survey in Piscoe Creek was extended approximately 180 feet downstream and 250 feet upstream of the road (Figure 9).

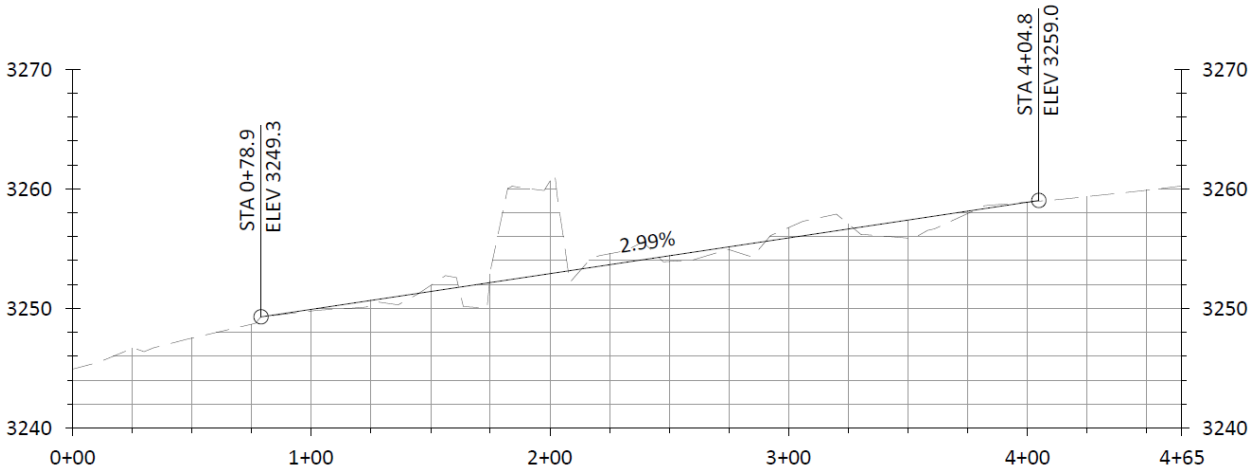


Figure 9. Piscoe Creek long profile

A distinct profile discontinuity was not apparent although some stored sediments were observed in the field and appear in the long profile upstream of the road. An average grade of 2.99% was drawn along the stream centerline to predict the streambed profile once remaining sediment deposits caused by culvert backwater move through. We presume that some of the stored sediment has already been removed by natural downcutting through the alluvial bar (storage) and/or mechanical removal by road maintenance crews. Some adjustments are expected to continue upstream of the road, particularly laterally. The streambanks currently host riparian and wetland vegetation.
We feel that further excavation and removal of alluvium in order to form a larger channel would be an unnecessary disturbance and increase construction duration and turbidity management. The potential alluvial sediments released through natural channel adjustments during flooding will not impair stream function or habitat downstream, but rather it will replenish gravels to areas that were temporarily deprived of natural sediment transport by the undersized culverts. Therefore, the channel grading associated with culvert removal and bridge installation is fairly local to the road area, and largescale profile and streambank edits are not proposed, nor is grade control. The proposed stream bed through the bridge will be left approximately 6 inches above the long profile average grade to allow the channel to settle while winnowing fines and self-armoring. This material will likely partially fill the existing plunge pool caused by the perched culverts. The existing, proposed, and average profiles are shown in the plans.

4. Construction – contract documentation

4.1 INCORPORATION OF HIPIII GENERAL AND CONSTRUCTION CONSERVATION MEASURES

General and construction conservation measures will be included in the stamped construction drawing set submittal at a later date.

4.2 DESIGN – CONSTRUCTION PLAN SET INCLUDING BUT NOT LIMITED TO PLAN, PROFILE, SECTION AND DETAIL SHEETS THAT IDENTIFY ALL PROJECT ELEMENTS AND CONSTRUCTION ACTIVITIES OF SUFFICIENT DETAIL TO GOVERN COMPETENT EXECUTION OF PROJECT BIDDING AND IMPLEMENTATION

See design drawings. Final construction drawings will include plan, profile, section and detail sheets that identify all project elements and construction activities of sufficient detail to govern competent execution of project bidding and implementation.

4.3 LIST OF ALL PROPOSED PROJECT MATERIALS AND QUANTITIES

See design drawings.

4.4 DESCRIPTION OF BEST MANAGEMENT PRACTICES THAT WILL BE IMPLEMENTED AND IMPLEMENTATION RESOURCE PLANS INCLUDING:

The following will be included in the final construction drawings:

- Site access staging and sequencing plan
- Work area isolation and dewatering plan
- Erosion and pollution control plan
- Site reclamation and restoration plan
- List of proposed equipment and fuels management plan

4.5 CALENDAR SCHEDULE FOR CONSTRUCTION/IMPLEMENTATION PROCEDURES

July 15, 2020: RFP solicitation for construction contractors.
August 1, 2020: Select construction contractor.
August 2020: Yakama Nation Contracting period.
September 1, 2020: Construction contractor mobilization to site and begin work.
September 23, 2020: Work completed and contractor demobilization from the site.

4.6 SITE OR PROJECT SPECIFIC MONITORING TO SUPPORT POLLUTION PREVENTION AND/OR ABATEMENT

Standard erosion and pollution control measure are shown and detailed in the stamped construction drawing set.

5. Monitoring and adaptive management plan

5.1 MONITORING

Monitoring of the project will be accomplished through annual site visits for 3 years. Repeat photographs of project elements will be taken along with field notes and sketches to document changes to the project since the last site visit. Project elements to be monitored include the following:

- Bridge
- Road near bridge (approaches)
- Streambanks in the immediate vicinity of the bridge
- Channel conditions under bridge and within 100 feet upstream and downstream of bridge

The objective of photo documentation is to determine if the project is functioning as intended, and trigger "Maintenance and Adaptive Management" action items as required to maintain project function.

5.2 MAINTENANCE AND ADAPTIVE MANAGEMENT

Maintenance and adaptive management actions will be triggered by results from project monitoring. The intensity of adaptive management actions will depend on severity in changes to project element function documented in monitoring. Maintenance and adaptive management actions are identified below for each project element to be monitored. Intensity of adaptive management prescribed will be at the discretion of Yakama Nation monitoring crews.

Bridge: Maintenance related to the structure will be conducted on an as needed basis. Maintenance will be coordinated with the Yakama Nation Roads Department.
Road near bridge (approaches): Maintenance related to road approaches will be conducted on an as needed basis. Maintenance will be coordinated with the Yakama Nation Roads Department.
Streambanks in the immediate vicinity of the bridge: Adaptive management may require action by Yakama Nation hand-crews, or more engineered actions to address severe changes to river bank conditions. Changes in streambanks that would require actions include exposure and scour that could impact the bridge abutment, or severe bank erosion that threatens the road. Maintenance will be coordinated with Yakama Nation Roads Department. Environmental permits will be acquired as needed.
Channel conditions under bridge and within 100 feet upstream and downstream of bridge: Adaptive management may require action by Yakama Nation hand-crews, or more engineered actions to address severe changes to channel bed conditions. Severe changes would include general stream incision that lowers streambed to less than 2 feet above bridge footings, or a debris jam that causes flooding of the road or deep local scour at the bridge. Debris removal will be coordinated with Yakama Nation Roads Department. Incision is not expected to occur, but in the event that it does, new environmental permits will be acquired to do stream repair and grade control measures.

6. References

Arcement, George J. Jr and Verne R. Schneider, 1989 "Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Flood Plains", USGS Water-Supply Paper 2339

Maston, M.C., Konrad, C.P., Veilleux, A.G., and Tecca, A.E., 2016, Magnitude frequency, and trends of floods at gaged and ungagged sites in Washington, based on data through water year 2014 (ver 1.2, November 2017): U.S. Geological Survey Scientific Investigations Report 2016 -5118, 70p.

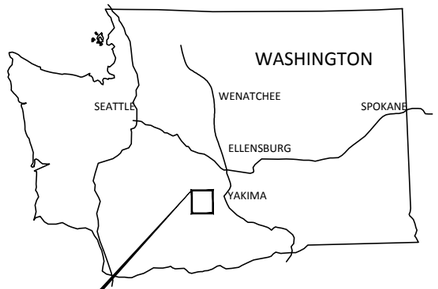
National Marine Fisheries Service (NMFS). 2009. Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan. Prepared by the National Marine Fisheries Service Northwest Region. November 30, 2009.

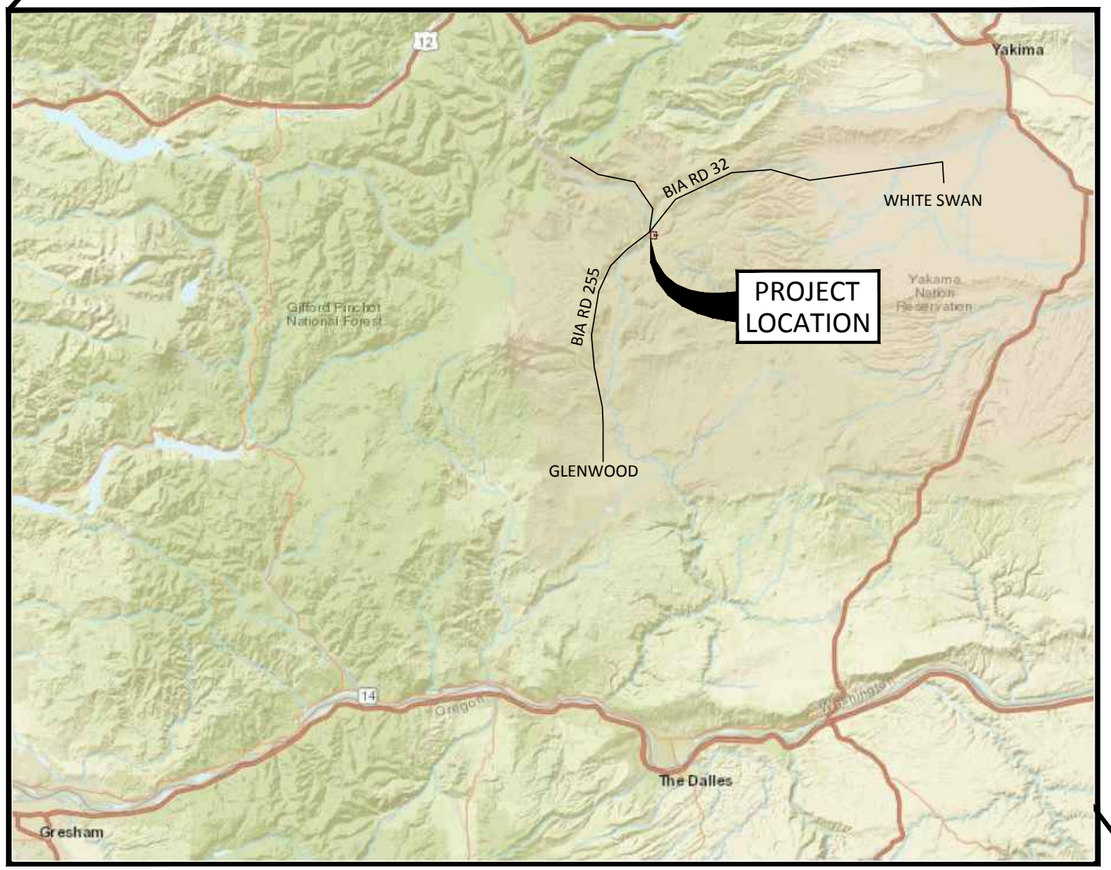
Appendix A: 90% Design Plans

PISCOE CREEK - 80 ROAD CROSSING

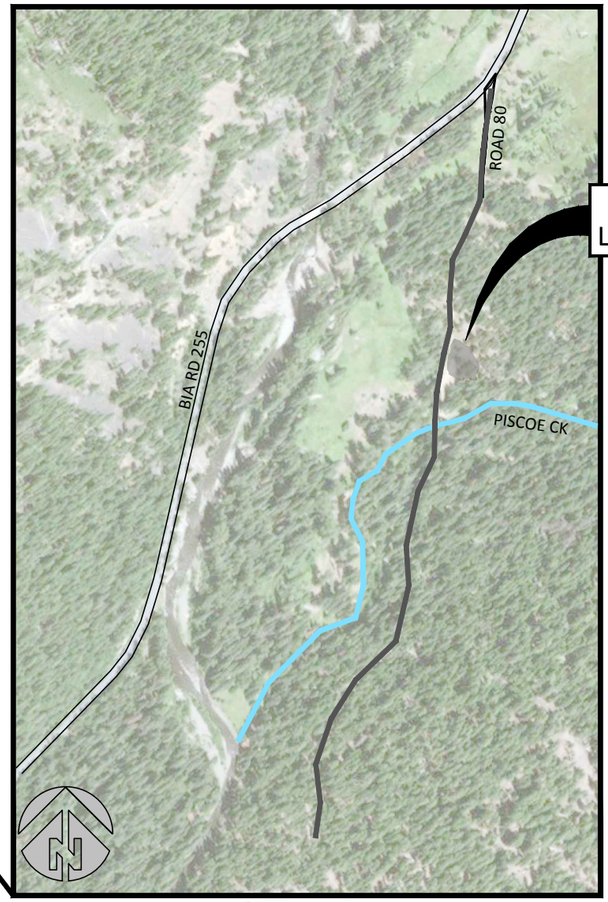
90% DESIGN

YAKIMA COUNTY, WASHINGTON
March, 2020





VICINITY MAP
NO SCALE



SITE MAP
NO SCALE

COORDINATES:
LATITUDE: 46°21'21" N
LONGITUDE: 121°11'28" W

NE¼ NE¼ S16 T10N R13E

WATERBODY: PISCOE CREEK
TRIBUTARY OF: KLICKITAT RIVER

SHEET INDEX

NO.	BY	DATE	REVISION DESCRIPTION

DRAWN	DESIGNED	CHECKED
MM	MM,MB	MM,MB
APPROVED	DATE	PROJECT
MM,MB	03-15-2020	

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

TITLE SHEET, MAP, SHEET INDEX

SHEET 1 OF 11

EXCAVATION/BACKFILL

THIS INCLUDES EARTHWORK ASSOCIATED WITH STREAM CHANNEL, ROAD BED AND NEW BRIDGE INSTALLATION:

- EXCAVATING STREAMBANK MATERIALS TO ACHIEVE DESIGN GRADE.
- TRANSPORT EXCAVATED MATERIAL TO FILL AREAS.
- FILLING AND GRADING NEW ROAD PRISM.
- INSTALL BRIDGE AND BACKFILL WITH SELECT MATERIALS PER MANUFACTURER'S INSTRUCTIONS.

THESE DRAWINGS SHOW THE GENERAL EXTENTS OF EXCAVATION AND BACKFILL. SEGREGATE AND SEPARATELY STOCKPILE FINE MATERIAL (SAND AND GRAVEL) AND COARSE MATERIAL (COBBLE AND BOULDERS). ONLY TREES AND SHRUBS APPROVED AND DESIGNATED FOR REMOVAL BY THE OWNER'S REPRESENTATIVE MAY BE REMOVED TO COMPLETE THE CULVERT INSTALLATION.

EXCAVATION AND BACKFILL QUANTITIES ARE MEASURED IN AUTOCAD AS IN-PLACE, AND ARE NOT FACTORED FOR EXPANSION, WATER CONTENT, CUTTING SIDE-SLOPES, OVERCUTTING, OR CLEANING OUT SLUMPED MATERIALS. IT IS THE CONTRACTOR'S SOLE RESPONSIBILITY TO CALCULATE AND ANTICIPATE THE FINAL VOLUMES BASED ON THE NOTED CONDITIONS.

CONSTRUCTION QUANTITIES			
SITE	CUT (CY)	FILL (CY)	
Northern Road Regrade Area	-	200	
Road Regrade at Bridge	-	450	
Borrow Area	450		
Bridge/Channel	400	200	20 CY BOULDERS

BRIDGE PLANS HEREIN ARE PRELIMINARY. THE CONTRACTOR SHALL USE BRIDGE PLANS AND SPECIFICATIONS PROVIDED BY BRIDGE MANUFACTURER, AT CONTRACTOR'S EXPENSE.

C:\Users\mike m\Desktop\work\white\Piscoe Design - Standard\Transfer from Moren\FPI Piscoe MPI MKF TEMP 3.dwg - mike m - 3/31/20

NO.	BY	DATE	REVISION DESCRIPTION

RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

GENERAL NOTES

HIP III GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIPIII ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. TO MINIMIZE THESE SHORT-TERM ADVERSE EFFECTS AND MAKE THEM PREDICTABLE FOR THE PURPOSES OF PROGRAMMATIC ANALYSIS, BPA WILL INCLUDE IN ALL PROJECTS IMPLEMENTED UNDER THIS HIP III PROPOSED ACTION THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS).

PROJECT DESIGN AND SITE PREPARATION.

1) STATE AND FEDERAL PERMITS. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, AND THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, AND CWA SECTION 401 WATER QUALITY CERTIFICATIONS.

2) TIMING OF IN-WATER WORK. APPROPRIATE STATE (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)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.

A) BULL TROUT - WHILE UTILIZING THE APPROPRIATE STATE DESIGNATED IN-WATER WORK PERIOD WILL LESSEN THE RISK TO BULL TROUT, THIS ALONE MAY NOT BE SUFFICIENT TO ADEQUATELY PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK IS OCCURRING IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE IN THE SUBSTRATE OR CLOSELY ASSOCIATED HABITATS NEARLY YEAR ROUND. SOME AREAS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR IF THEY DO, THEY MAY CONFLICT WITH WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE 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 IN STREAM 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 IN STREAM 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 PROCEDURES OUTLINED IN US FISH AND WILDLIFE SERVICE BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY (2010).

C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED THROUGH THE VARIANCE PROCESS (PAGE 2).

3) 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).

4) SITE LAYOUT AND FLAGGING. PRIOR TO CONSTRUCTION. THE ACTION AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, 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-SPRAY AREAS AND BUFFERS.

5) TEMPORARY ACCESS ROADS AND PATHS.

A) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED TO LESSEN SOIL DISTURBANCE AND 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%, THEN 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 SURFACE AND DITCH, 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.

6) 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 THE STREAM 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) 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.

7) 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 OR 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.

8) 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 WATER BODY 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 ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);

C) BIODEGRADABLE LUBRICANTS AND FLUIDS SHALL BE USED 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.

9) EROSION CONTROL. EROSION CONTROL MEASURES WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

A) TEMPORARY EROSION CONTROLS.

I. TEMPORARY EROSION CONTROLS 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. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL.

IIV. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.

B) EMERGENCY EROSION CONTROLS. 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.

10) DUST ABATEMENT. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES 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 A STREAM CHANNEL 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.

11) SPILL PREVENTION, CONTROL, AND COUNTER MEASURES. 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 MATERIALS 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.

C:\Users\mike m\Desktop\work\white\Piscoe Design - Standard\Transfer from Moran\FI_Piscoe_MPI_MKF_TEMP_3.dwg - mike m - 3/30/20

NO.	BY	DATE	REVISION DESCRIPTION

RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

HIP-III CONSERVATION MEASURES (1 OF 2)

SHEET 3 OF 11

WORK AREA ISOLATION & FISH SALVAGE.

WORK PERIOD SHALL BE DURING THE TYPICAL DRY SEASON WHEN LOW FLOW OR NO FLOW IS EXPECTED. SHOULD WATER BE PRESENT AT ANY TIME DURING THE WORK PERIOD, THE FOLLOWING CONDITIONS SHALL APPLY.

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. 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 2011, 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.

- NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT:
HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF

- U.S. FISH AND WILDLIFE SERVICE. 2010. BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY.
HTTP://WWW.FWS.GOV/PACIFIC/FISHERIES/SPHABCON/LAMPREY/PDF/BEST%20MANAGEMENT%20PRACTICES%20FOR%20PACIFIC%20LAMPREY%20APRIL%202010%20VERSION.PDF

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 ELECTROSHOCKED 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 IN-STREAM 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 US FISH AND WILDLIFE SERVICE (2010)3.

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 FOUR 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.

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 STREAM BANK 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.

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'S ELECTROFISHING GUIDELINES (NMFS 2000).

B) ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) WILL BE USED AND CONDUCTIVITY MUST BE TESTED.

I. IF CONDUCTIVITY IS LESS THAN 100 MS, VOLTAGE RANGES FROM 900 TO 1100 WILL BE USED.

II. FOR CONDUCTIVITY RANGES BETWEEN 100 TO 300 MS, VOLTAGE RANGES WILL BE 500 TO 800.

III. FOR CONDUCTIVITY GREATER THAN 300 MS, VOLTAGE WILL BE LESS THAN 400.

C) ELECTROFISHING WILL BEGIN WITH A MINIMUM PULSE WIDTH AND RECOMMENDED VOLTAGE AND THEN GRADUALLY INCREASE TO THE POINT WHERE FISH ARE IMMOBILIZED.

D) THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.

E) 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.

F) 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 TO REDUCE MORTALITY.

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 PRACTICABLE.

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 THE 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 NMFS'S CURRENT FISH SCREEN CRITERIA (NMFS 20114, OR MOST RECENT VERSION). IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET SECOND (CFS), 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.

4 NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT:
HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF

5) SALVAGE NOTICE. MONITORING AND RECORDING OF 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.

CONSTRUCTION AND POST-CONSTRUCTION CONSERVATION MEASURES.

1) 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 THE FWS FIELD OFFICE SUPERVISOR. PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVESCONSIDERED, WILL BE INCLUDED IN THE VARIANCE REQUEST.

2) 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.

NO.	BY	DATE	REVISION DESCRIPTION

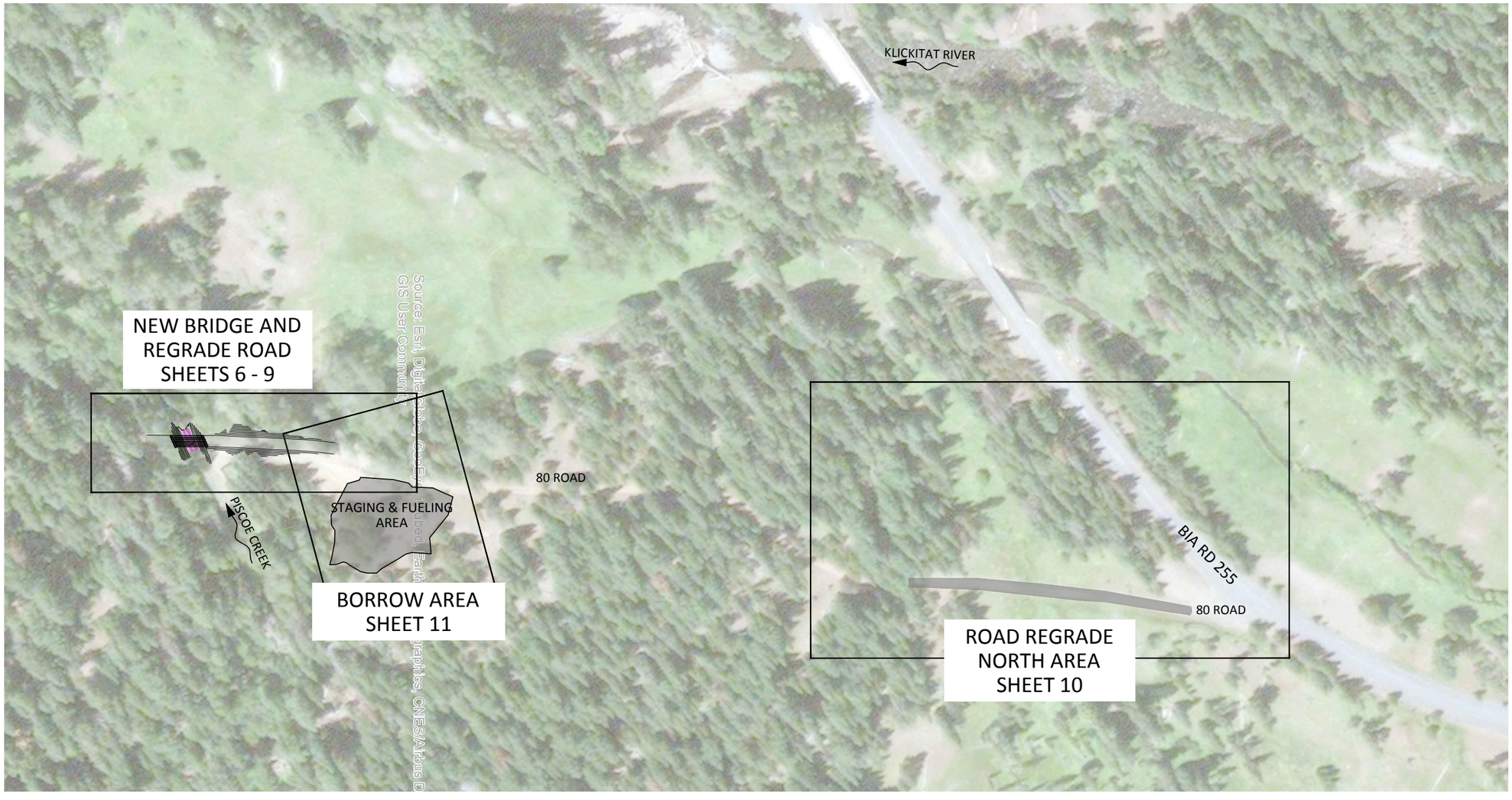
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

HIP-III CONSERVATION MEASURES (2 OF 2)

SHEET 4 OF 11



AERIAL VIEW

0 150 300

SCALE IN FEET

MICHAEL R. McALLISTER
STATE OF WASHINGTON
38189
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 03-25-2020

C:\Users\mike m\Desktop\work\white\Piscoe Design — Standard\Transfer from Maren\YFI_Piscoe_MPL_MKF_TEMP_3.dwg — mike m — 3/30/20

NO.	BY	DATE	REVISION DESCRIPTION

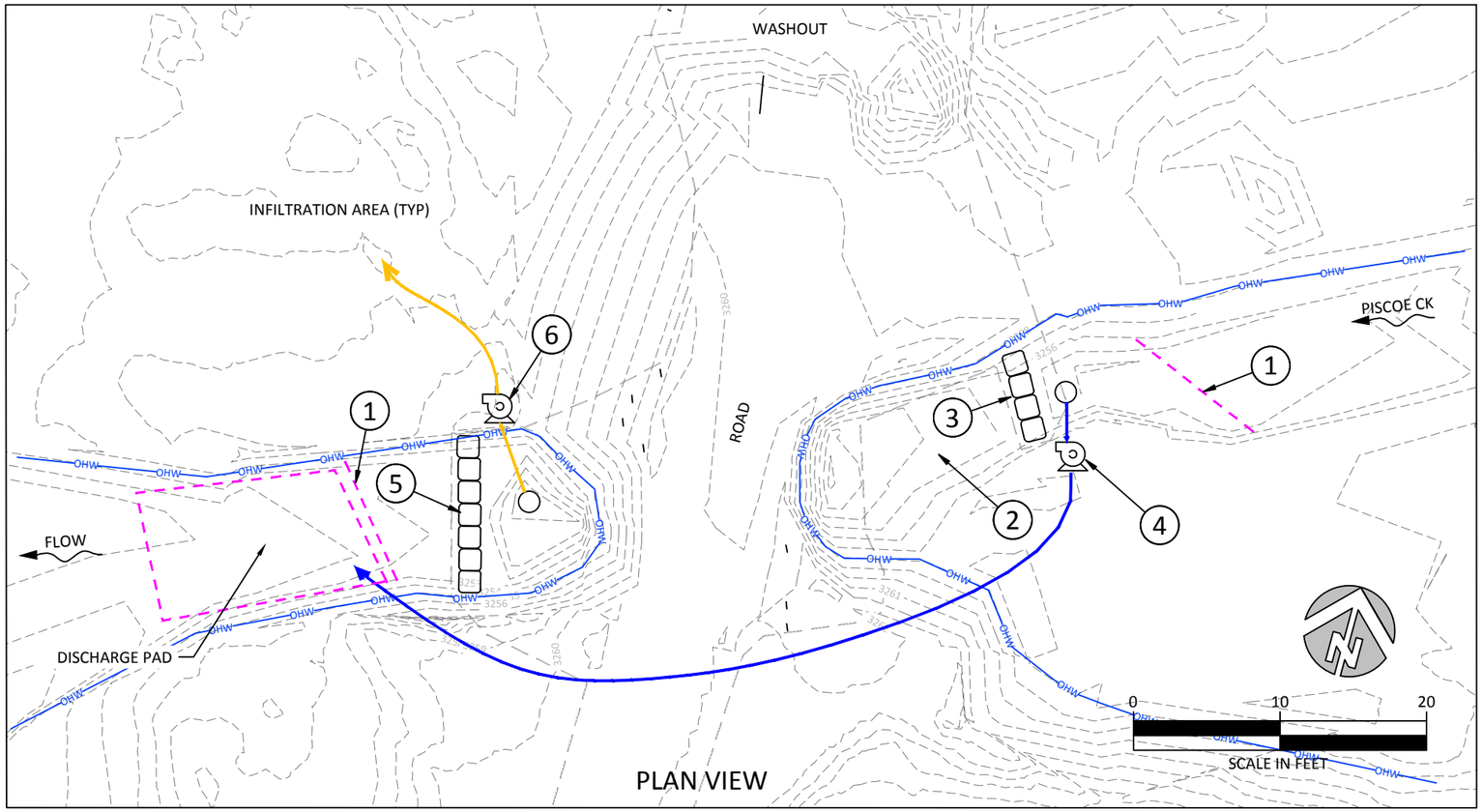
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

EXISTING CONDITIONS, SITE ACCESS

SHEET 5 OF 11



PLAN VIEW

LEGEND

- EXISTING GROUND CONTOUR
- LIMITS OF DISTURBANCE
- OHW — ORDINARY HIGH WATER

CULVERT AREA SITE PREPARATION

1. INSTALL FISH SCREENS
2. PERFORM FISH SALVAGE
3. INSTALL UPSTREAM COFFERDAM
4. INSTALL DIVERSION PUMP
5. INSTALL DOWNSTREAM COFFERDAM
6. INSTALL CONSTRUCTION WATER PUMP

CULVERT AREA CONSTRUCTION SEQUENCE

1. PREPARE SITE (CONTROLS, FISH RESCUE, DESCRIBED ABOVE).
2. MOBILIZE EXCAVATOR TO SITE (SHEET 7). TRUCKS CANNOT ACCESS UNTIL ROAD WASHOUT IS REPAIRED.
3. EXCAVATE TO REMOVE EXISTING CULVERTS. PRESERVE CULVERTS IF POSSIBLE. IF ONE OR BOTH CULVERTS ARE INTACT ONCE REMOVED. INSTALL THEM IN THE WASHOUT AND BACKFILL WITH MATERIALS SALVAGED FROM EXCAVATIONS. TRUCKS CAN NOW MOVE INTO SITE.
4. MONITOR CONSTRUCTION WATER DISCHARGE AREA. MOVE DISCHARGE LOCATION FREQUENTLY TO IMPROVE INFILTRATION. MONITOR FLOW PATHS. TURBIDITY SHALL NOT BE ALLOWED TO ENTER PISCOE CREEK OR KLICKITAT RIVER SIDE CHANNELS. INSTALL ADDITIONAL CONTROLS AS NEEDED TO ENSURE TURBIDITY IS BEING MANAGED EFFECTIVELY.
5. EXCAVATE TO BRIDGE INSTALLATION SUBGRADE. STOCKPILE MATERIALS AT BORROW SITE (SHEET 11). SEPARATE COARSE MATERIALS FROM FINE MATERIALS.
6. INSTALL NEW BRIDGE FOOTINGS AND WALLS PER MANUFACTURER'S INSTRUCTIONS. BEDDING AND BACKFILL SHALL BE PER MANUFACTURER'S INSTRUCTIONS. BACKFILL CHANNEL UTILIZING BOULDERS FROM NEARBY PIT AND SALVAGED STREAMBED MATERIALS FROM STOCKPILE. SHAPE TO LINES AND GRADED SHOWN IN PLANS.
7. GRADUALLY INTRODUCE STREAM FLOW BY DECREASING THROTTLE AT DIVERSION PUMP AND REMOVING A PORTION OF UPSTREAM COFFERDAM. CONTINUE RUNNING CONSTRUCTION WATER PUMP TO REMOVE TURBIDITY GENERATED BY RINSING FLOW. WHEN FLOW RUNS CLEAR, OPEN UPSTREAM COFFERDAM A LITTLE MORE WHILE CONTINUING TO PUMP CONSTRUCTION WATER.
8. REMOVE DOWNSTREAM COFFERDAM AND CONSTRUCTION WATER PUMP.
9. REMOVE UPSTREAM COFFERDAM AND DIVERSION PUMP.
10. INSTALL BRIDGE DECK AND RAILING.
11. REGRADE ROAD. SEE SHEET 9.

NO.	BY	DATE	REVISION DESCRIPTION

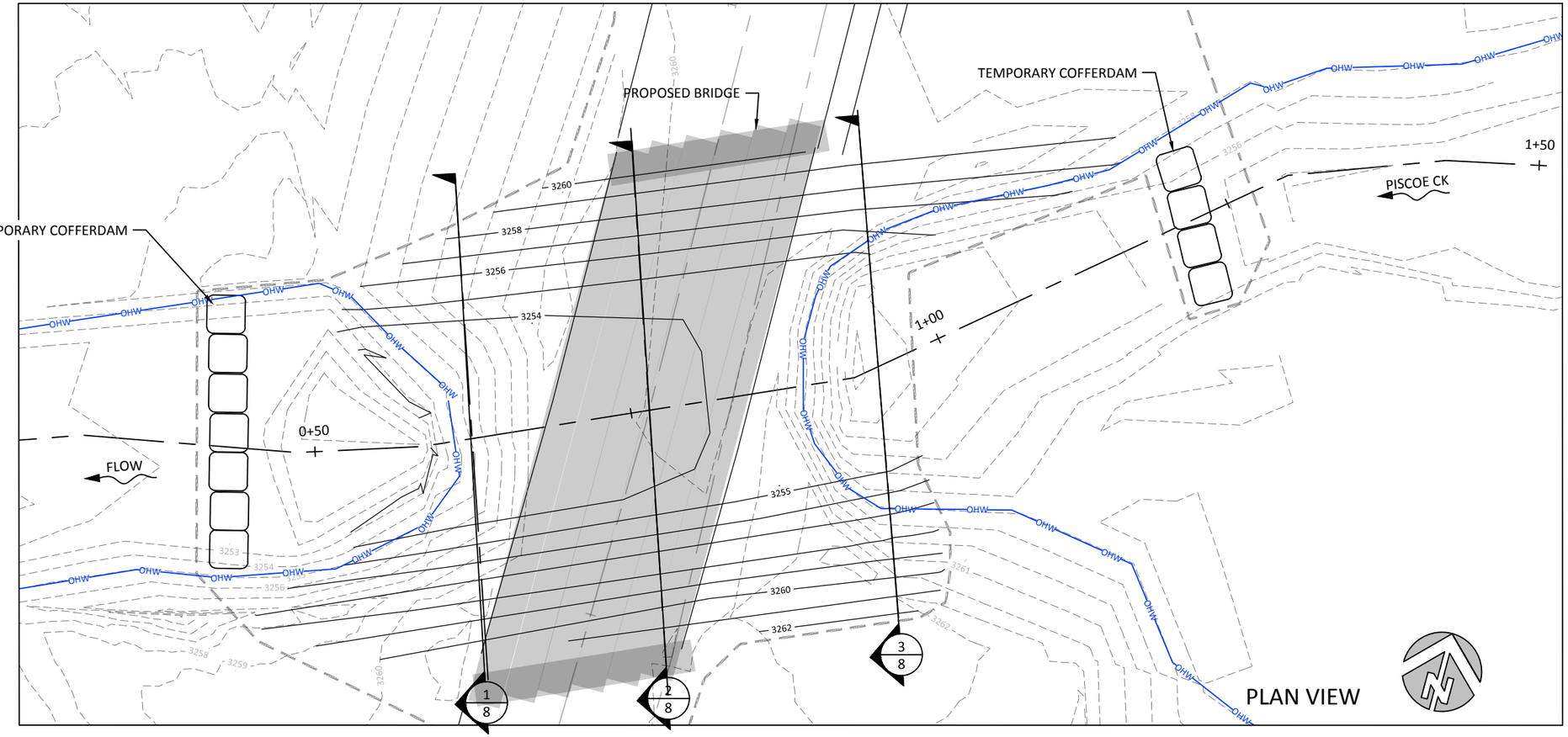
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

DEWATERING & REWATERING PLAN

SHEET 6 OF 11



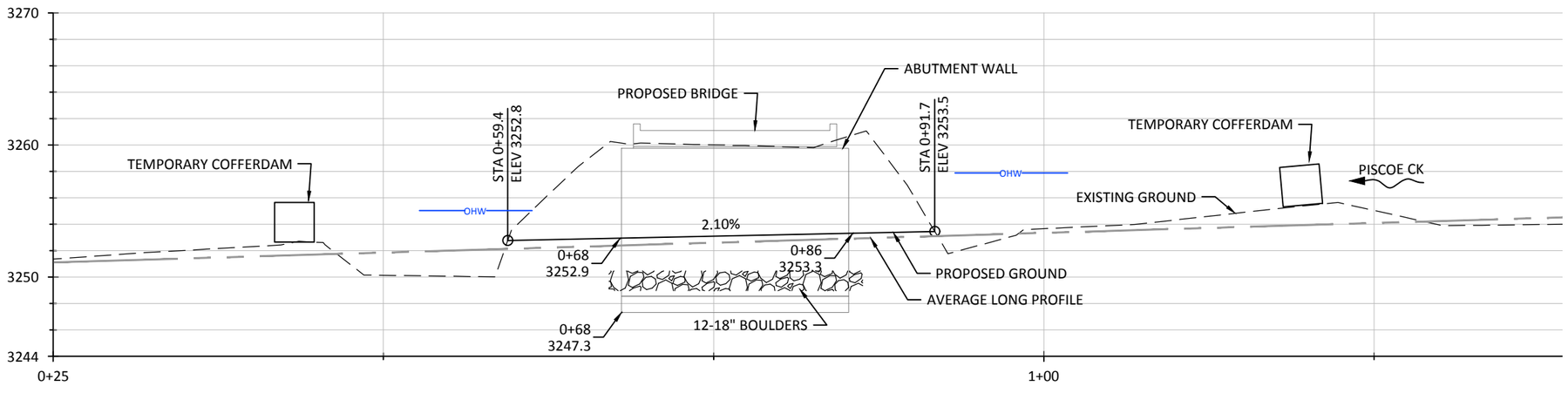
PLAN VIEW

LEGEND

- EXISTING GROUND CONTOUR
- PROPOSED GROUND CONTOUR
- LIMITS OF DISTURBANCE
- OHW — ORDINARY HIGH WATER

0 10 20

SCALE IN FEET



PROFILE VIEW

NO.	BY	DATE	REVISION DESCRIPTION

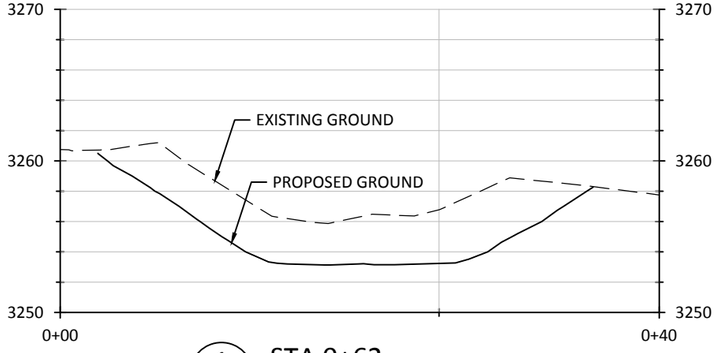
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

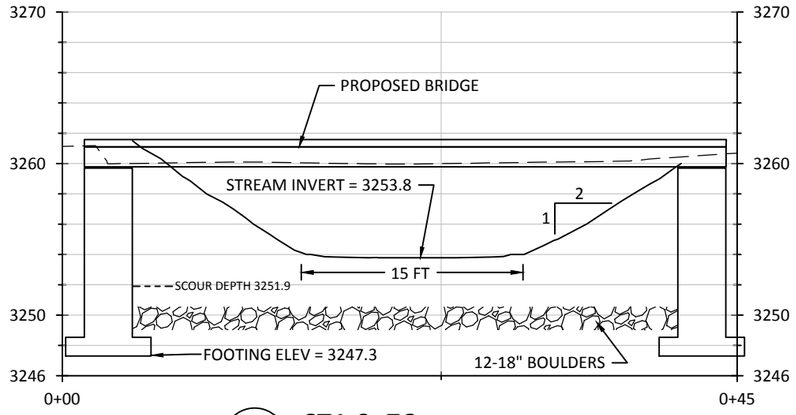
inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

BRIDGE INSTALLATION AREA
PLAN AND PROFILE

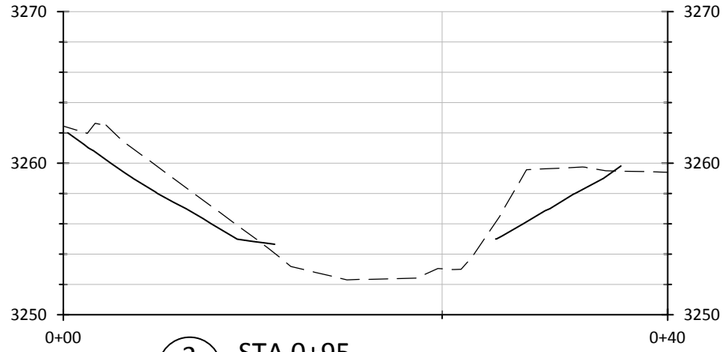
SHEET 7 OF 11



1/7 STA 0+62



2/7 STA 0+76



3/7 STA 0+95

NOTES:
1. SECTION VIEWS ARE LOOKING DOWNSTREAM
2. FOR STREAM ELEVATIONS, SEE PROFILE VIEW, SHEET 7
3. FOR BRIDGE EXCAVATION LIMITS, BEDDING, BACKFILL, REFER TO BRIDGE MANUFACTURER'S PLANS.
4. BOULDERS ARE AVAILABLE FROM PIT ALONG 255 ROAD NEAR BRIDGE OVER KLICKITAT RIVER.

NO.	BY	DATE	REVISION DESCRIPTION

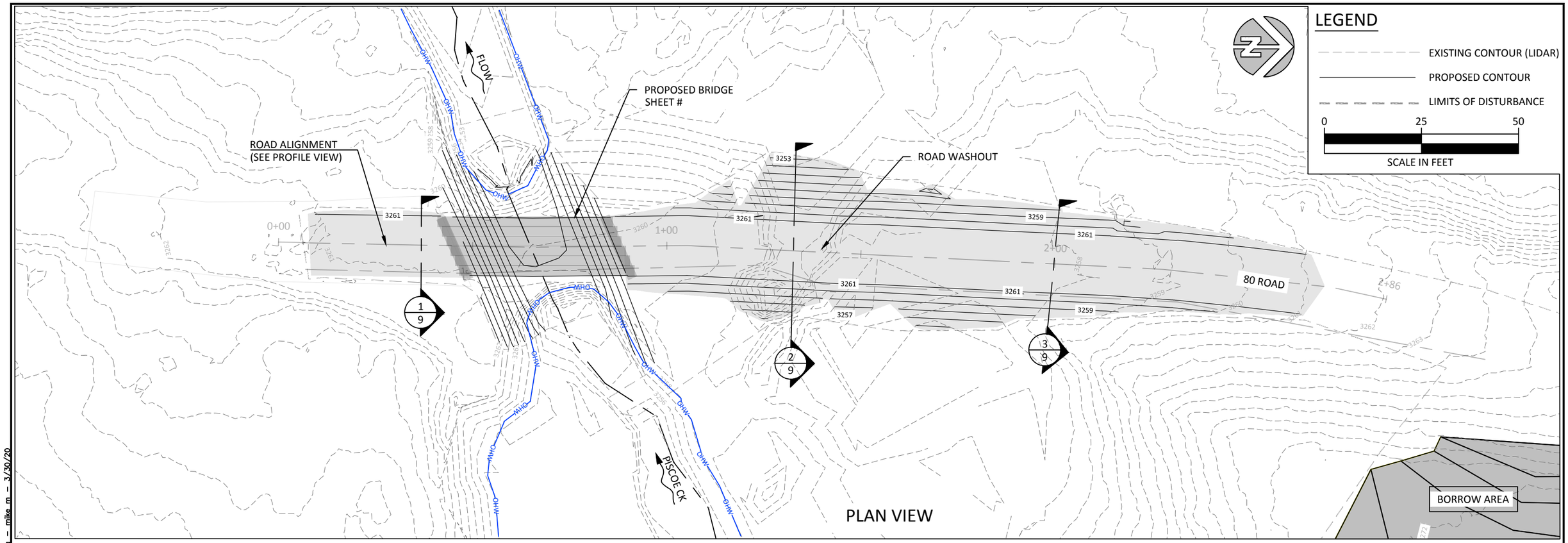
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

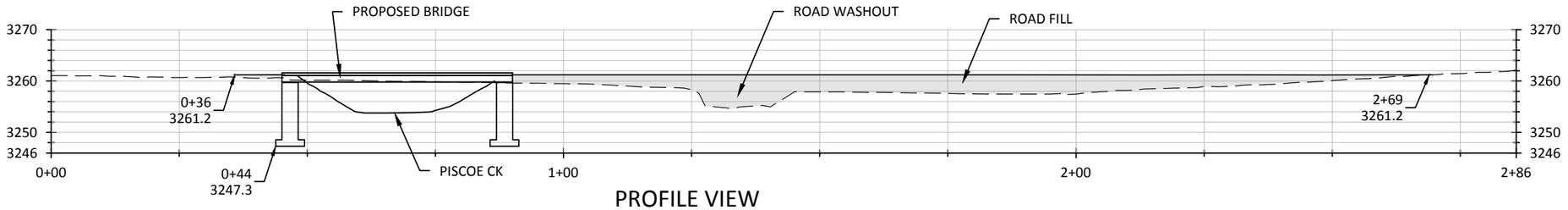
YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

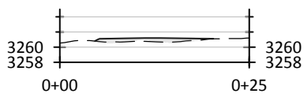
CHANNEL GRADING
CROSS SECTIONS

SHEET
8 OF 11

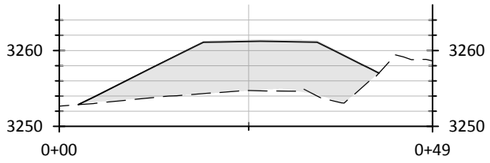




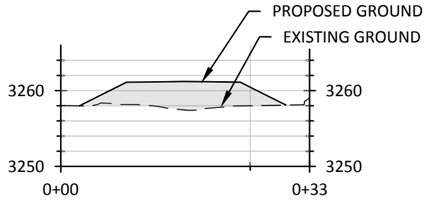
PROFILE VIEW



1/9 STA 0+35



2/9 STA 1+30



3/9 STA 2+00

NO.	BY	DATE	REVISION DESCRIPTION

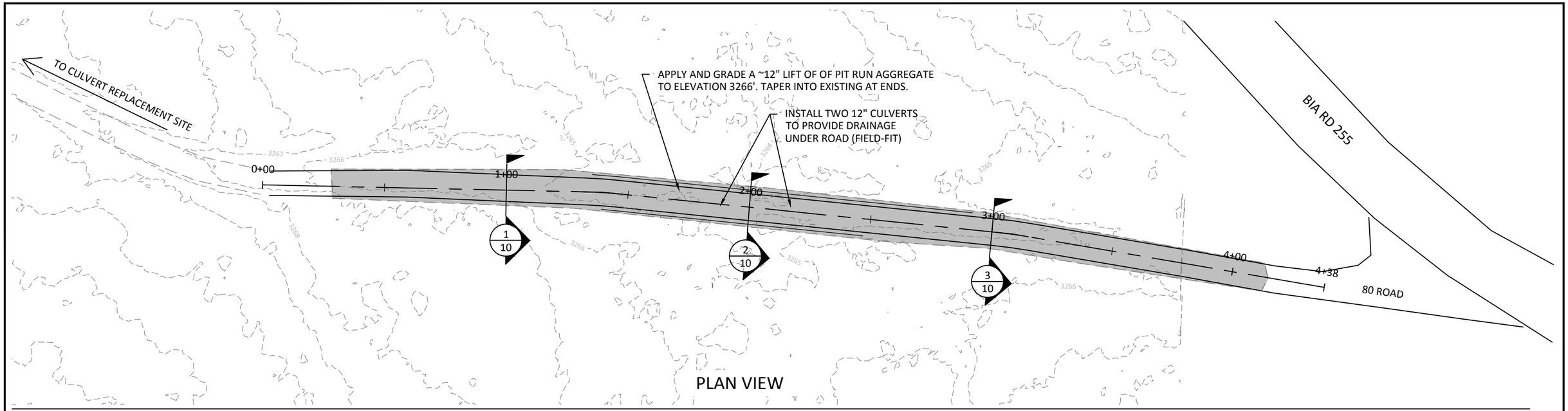
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

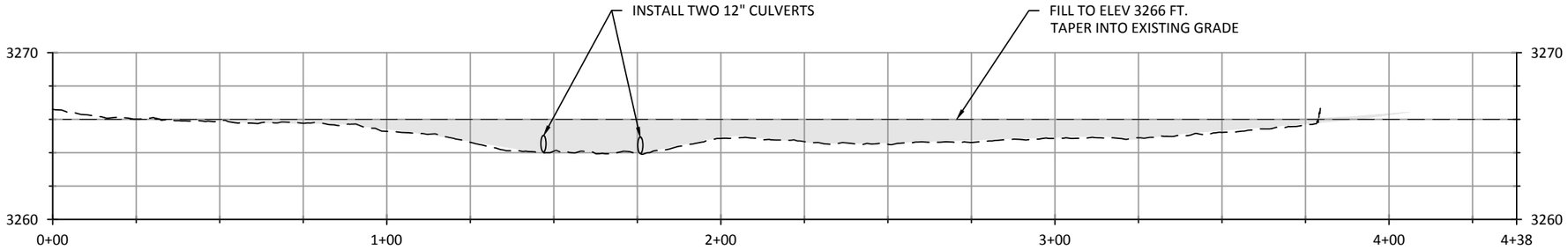
inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

ROAD REGRADE
(BRIDGE AREA)

SHEET
9 OF 11



PLAN VIEW



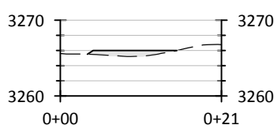
PROFILE VIEW

LEGEND

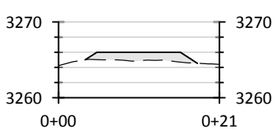
- EXISTING CONTOUR (LIDAR)
- LIMITS OF DISTURBANCE

0 40 80

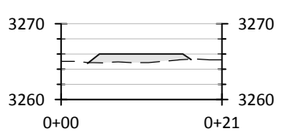
SCALE IN FEET



1/10 STA 1+00



2/10 STA 2+00



3/10 STA 3+00

NO.	BY	DATE	REVISION DESCRIPTION

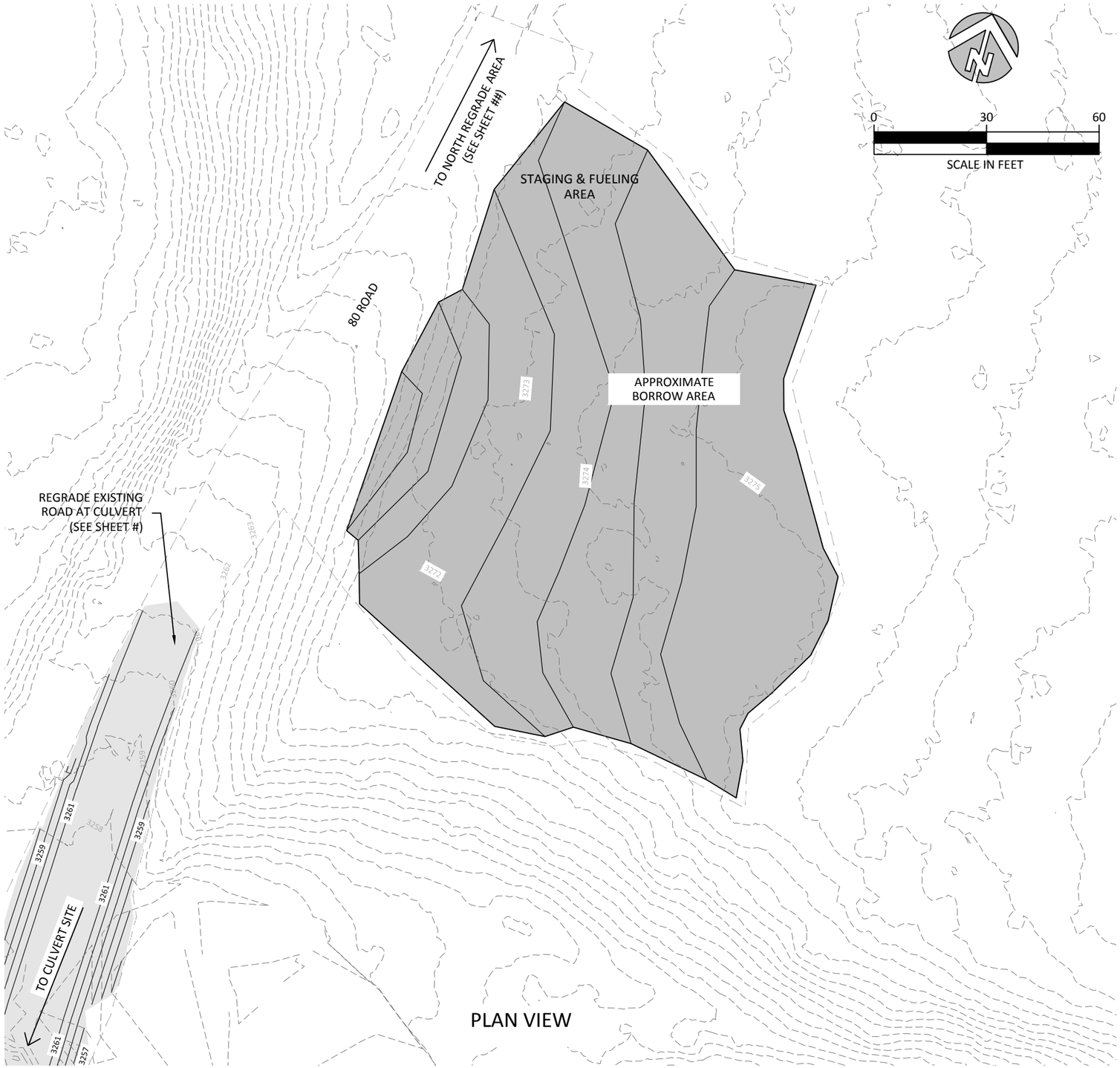
RP	MM,MB	MM,MB
DRAWN	DESIGNED	CHECKED
MM,MB	03-15-2020	
APPROVED	DATE	PROJECT

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

NORTHERN ROAD REGRADE AREA

SHEET 10 OF 11



PLAN VIEW

MICHAEL R. McALLISTER
STATE OF WASHINGTON
38189
REGISTERED
PROFESSIONAL ENGINEER
EXPIRES 09-25-2020

NO.	BY	DATE	REVISION DESCRIPTION

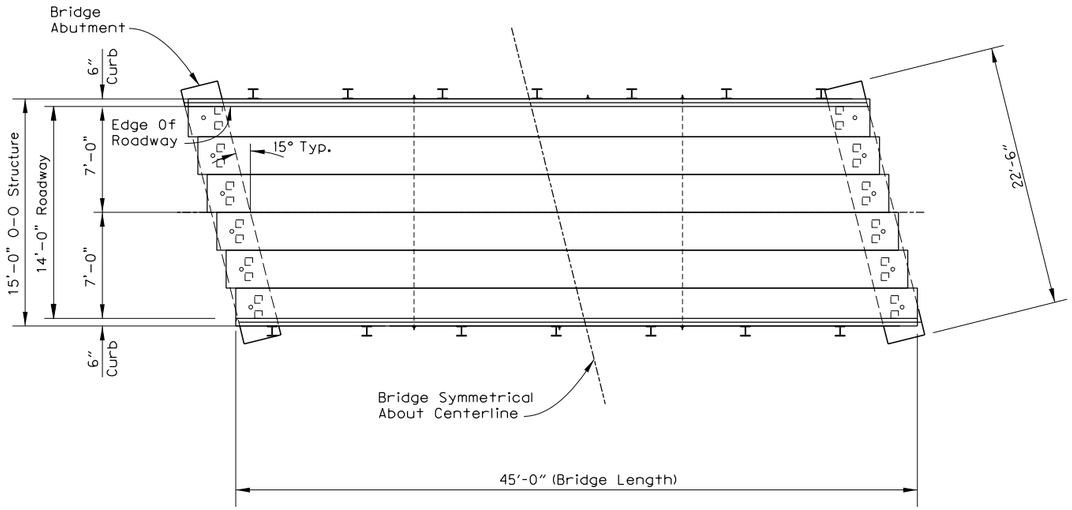
RP	MM,MB	MM,MB	
DRAWN	DESIGNED	CHECKED	
MM,MB	03-15-2020		
APPROVED	DATE	PROJECT	

YAKAMA NATION FISHERIES PROGRAM
PISCOE CREEK - 80 ROAD CROSSING

inter·fluve
501 Portway Avenue, Suite 101
Hood River, OR 97031
541.386.9003
www.interfluve.com

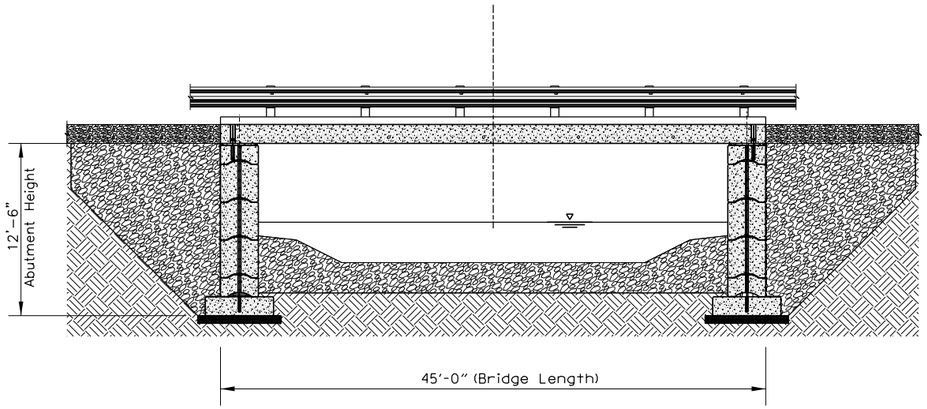
BORROW AREA

SHEET
11 OF 11



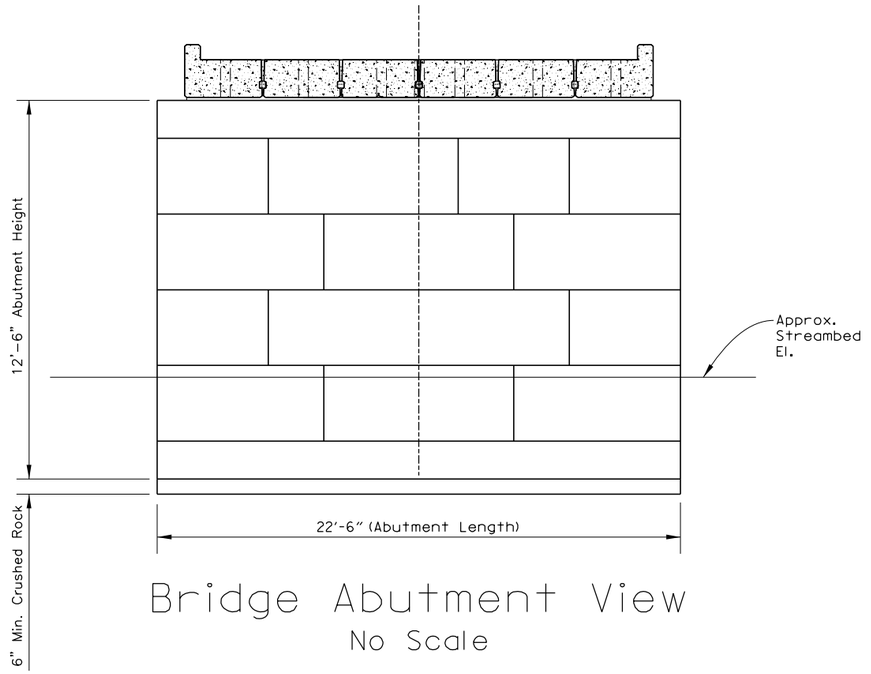
Bridge Layout Plan

No Scale



Bridge Layout Elevation

No Scale



Bridge Abutment View

No Scale

PROJECT:

CLIENT: Pacific Bridge And Construction, Inc. -- Sandy, Oregon -- 503-668-4798

QUINCY ENGINEERING, INC
200 Hawthorne AVE SE, STE E-530
Salem, OR 97301 - 4996
VOICE: 503-763-9995
FAX: 503-763-9981
EMAIL: NICKC@QUINCYENG.COM

CHECKER: | REVIEWER: | DRAFTER: | DESIGNER:

TITLE: BRIDGE LAYOUT

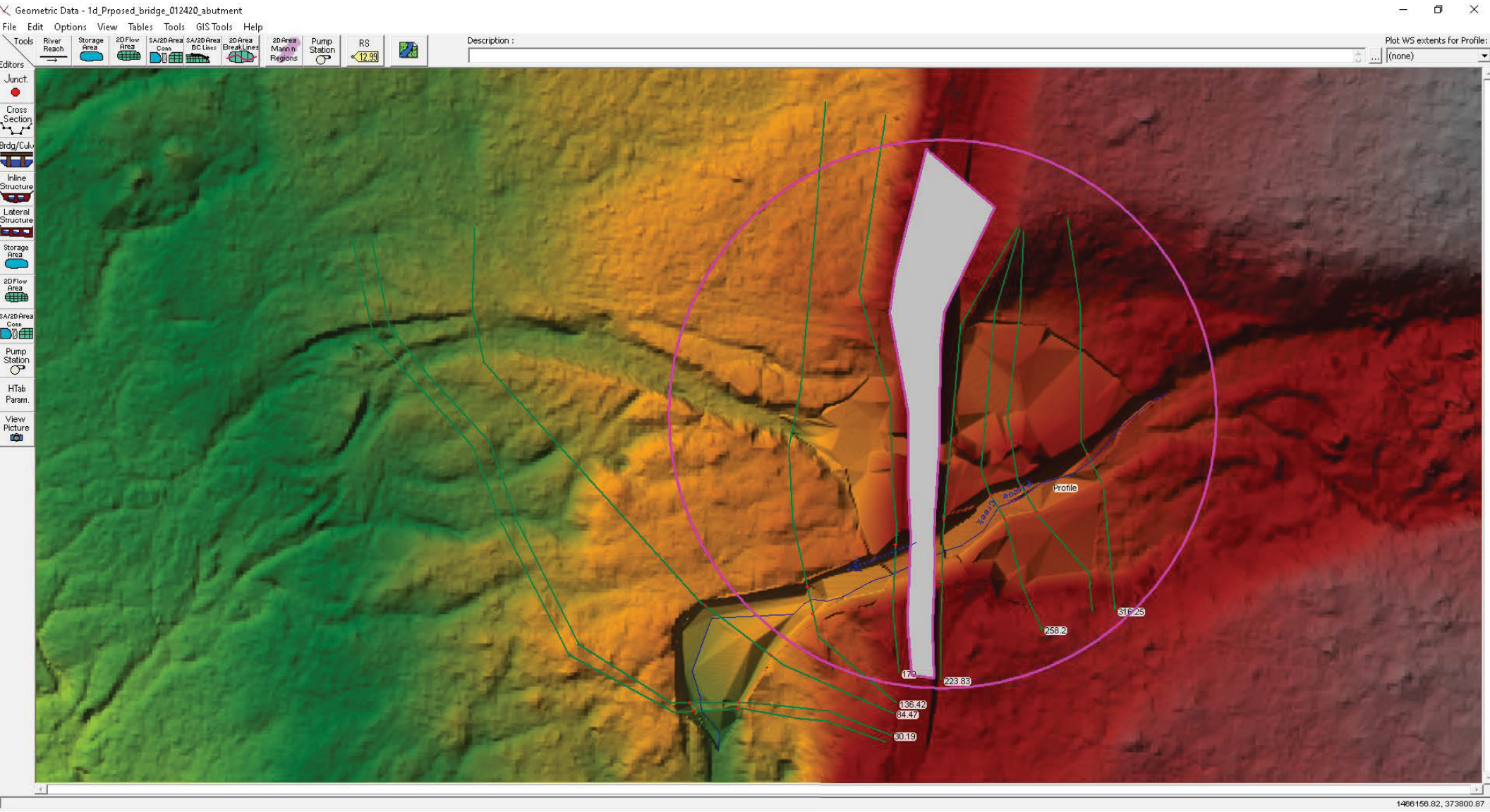
PROJECT NO. | SHEET 1 OF 1

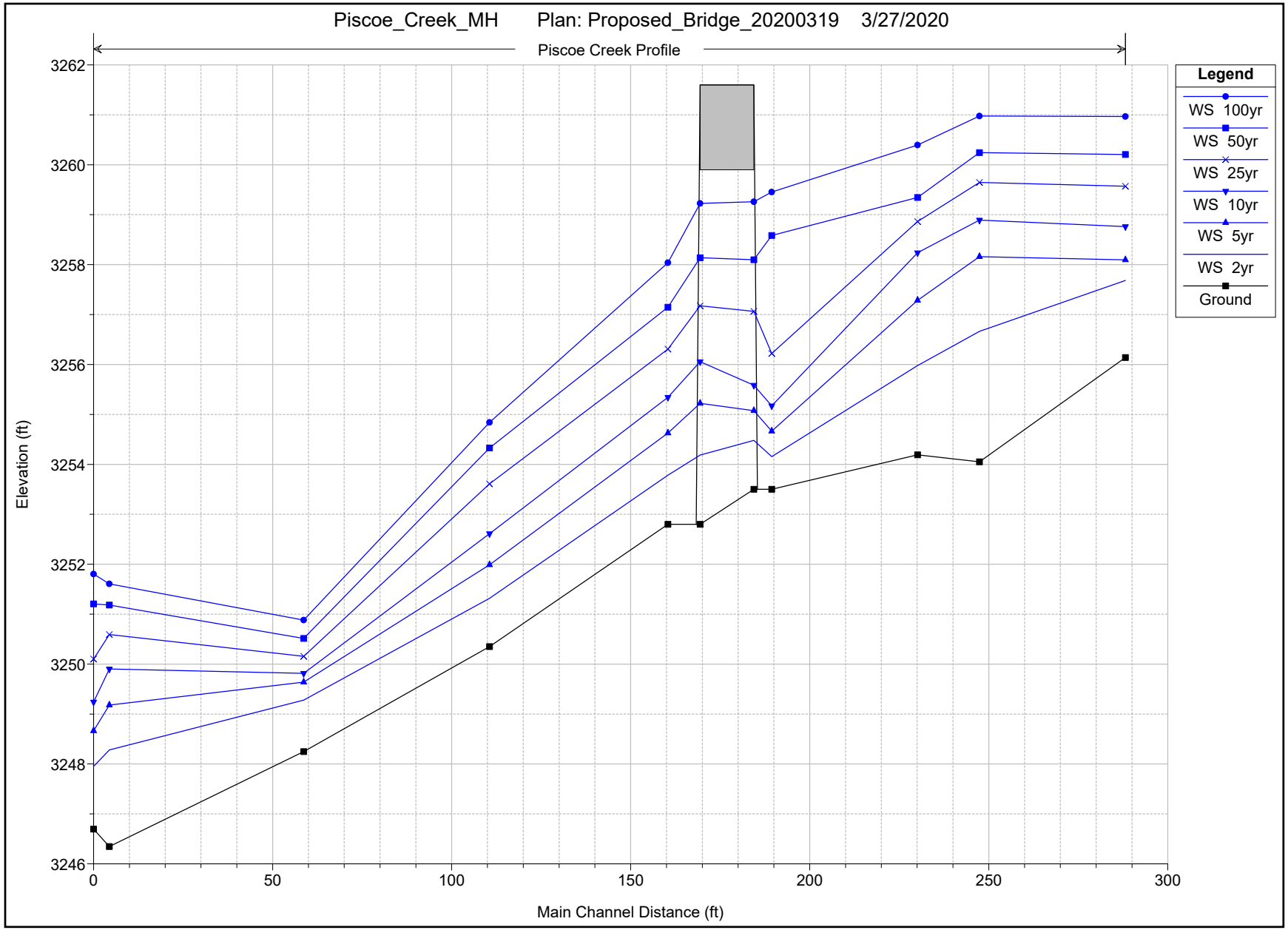
DRAWING DATE:

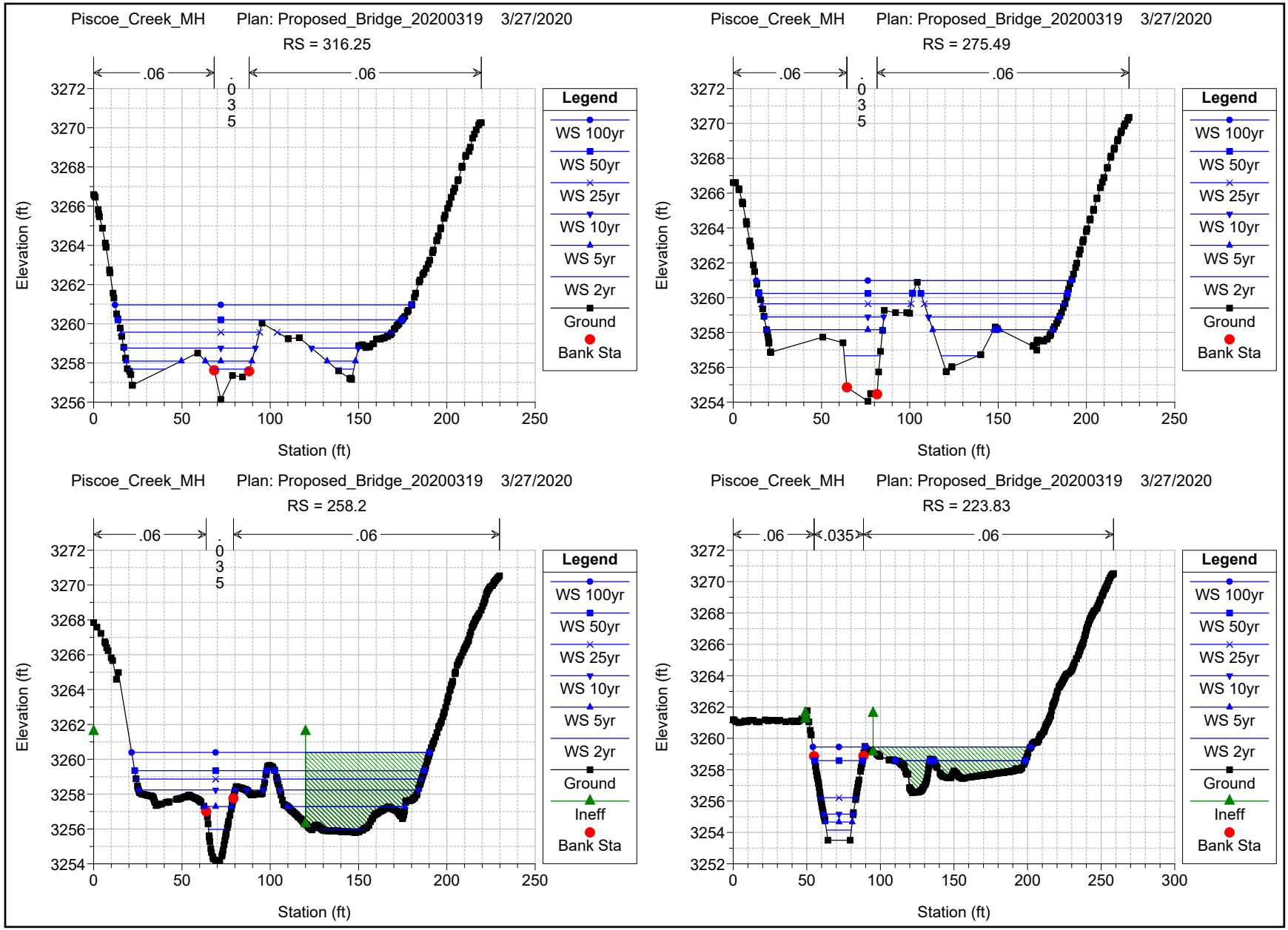
	DATE	REVISION	BY
1			

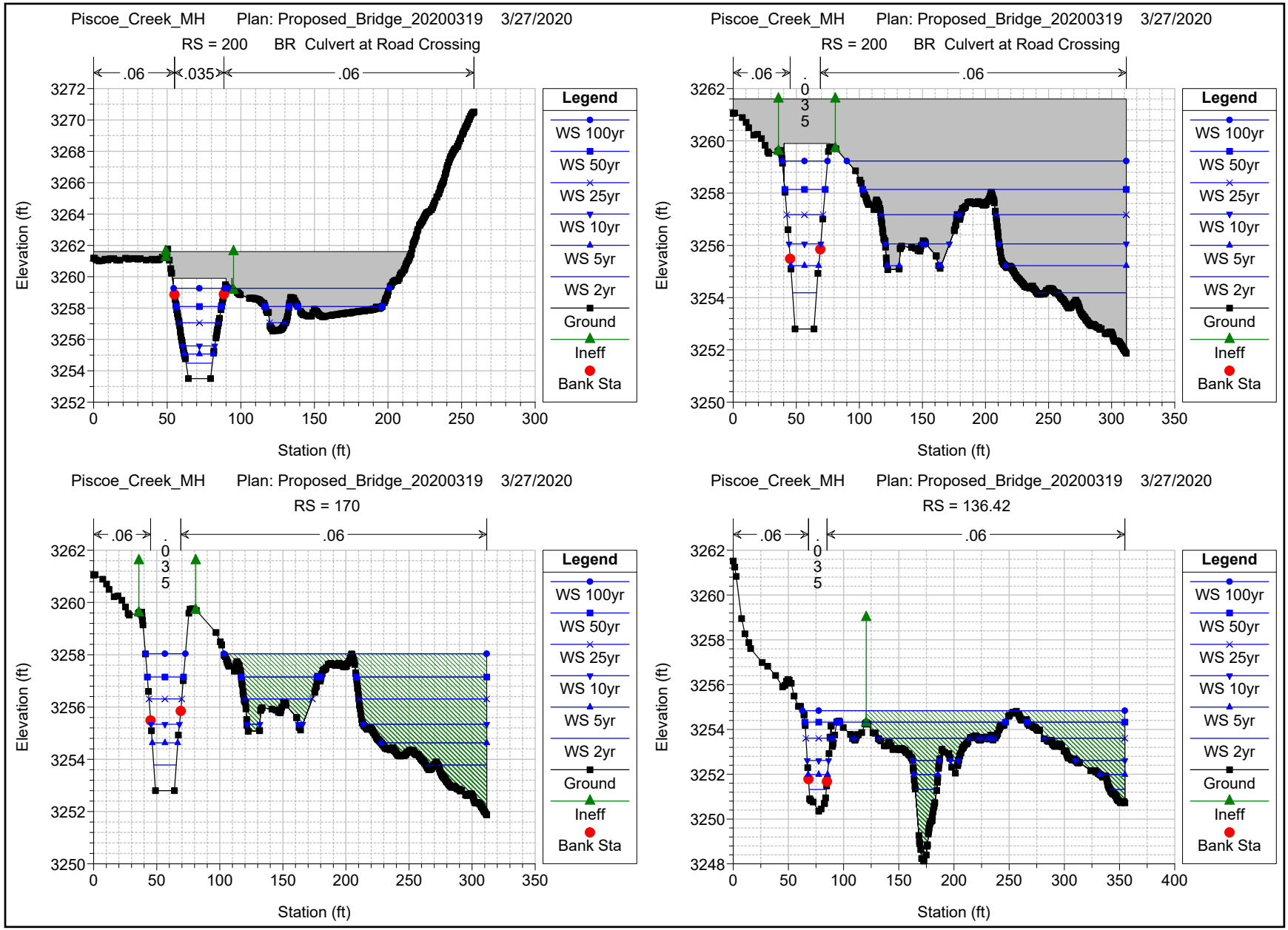
ACCOMPANIED BY DWGS.

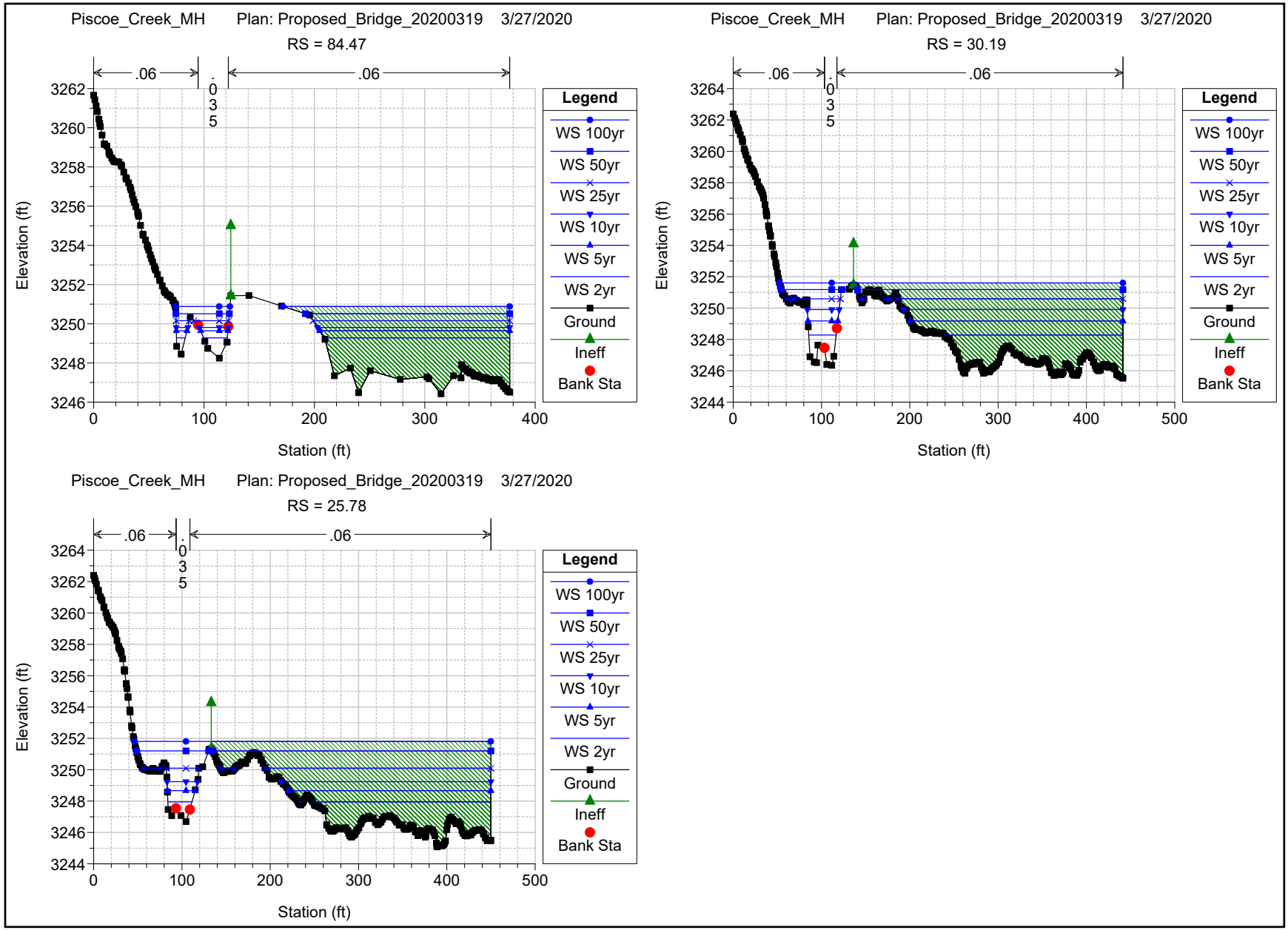
Appendix B: Hydraulic Model Output

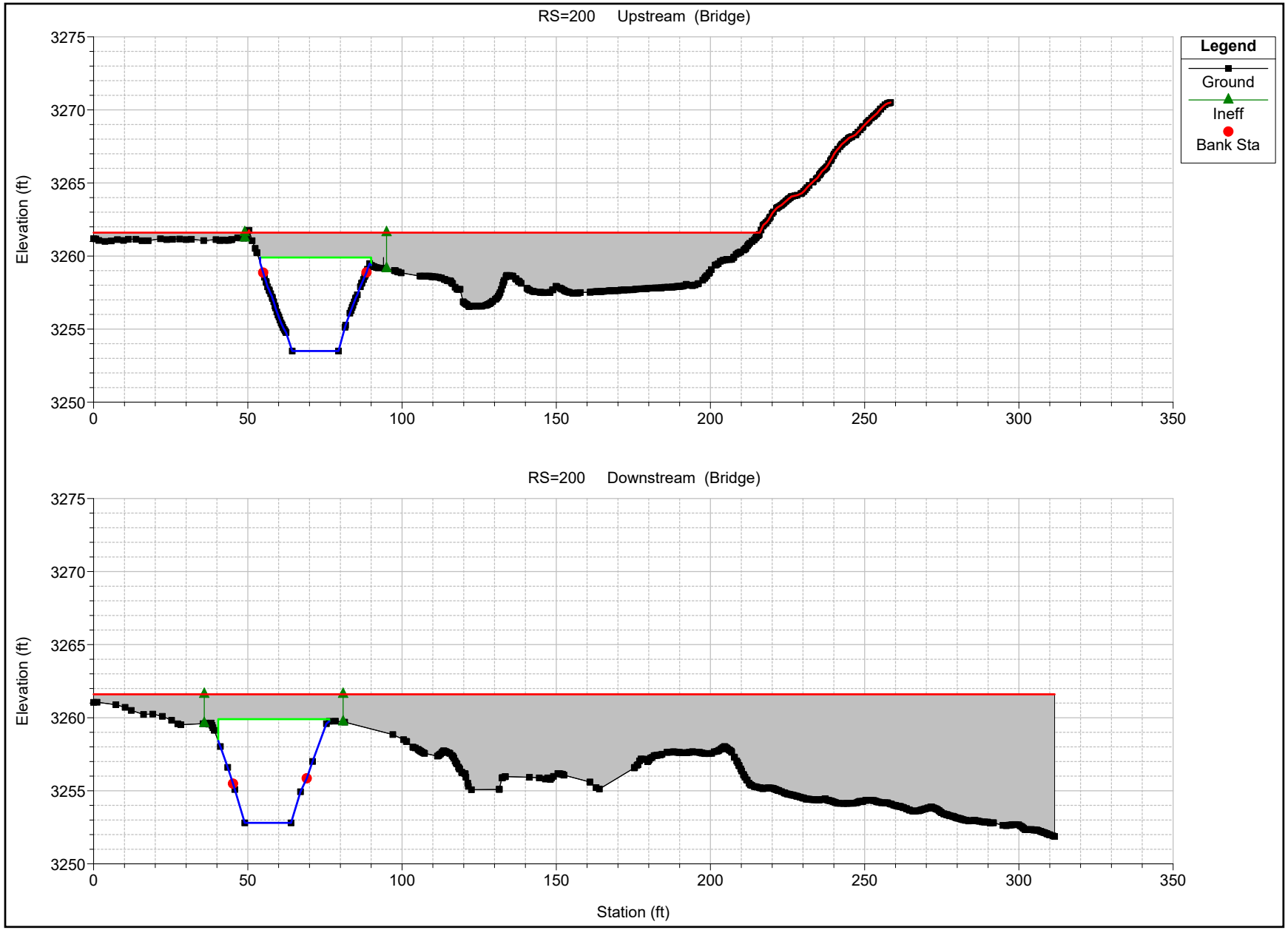

Geometric Data - 1d_Prposed_bridge_012420_abutment
File Edit Options View Tables Tools GIS Tools Help
Tools
Editors
River Reach
Storage Area
2D Flow Area
SA/2D Area Conn
SA/2D Area BC Lines
2D Area Break Lines
2D Area Mann n Regions
Pump Station
RS
12.99
Description :
Plot WS extents for Profile:
(none)
Junct.
Cross Section
Brdg/Culv
Inline Structure
Lateral Structure
Storage Area
2D Flow Area
SA/2D Area Conn
Pump Station
HTab Param.
View Picture
Profile
258.2
223.83
136.42
84.47
30.19
1466156.82, 373800.87


Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
Piscoe Creek Profile
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Elevation (ft)
3262
3260
3258
3256
3254
3252
3250
3248
3246
0
50
100
150
200
250
300
Main Channel Distance (ft)


Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 316.25
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 275.49
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 258.2
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 223.83
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta


Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 200 BR Culvert at Road Crossing
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 200 BR Culvert at Road Crossing
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 170
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 136.42
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta


Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 84.47
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 30.19
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta
Piscoe_Creek_MH Plan: Proposed_Bridge_20200319 3/27/2020
RS = 25.78
.06
.035
.06
Elevation (ft)
Station (ft)
Legend
WS 100yr
WS 50yr
WS 25yr
WS 10yr
WS 5yr
WS 2yr
Ground
Ineff
Bank Sta


RS=200 Upstream (Bridge)
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
3275
3270
3265
3260
3255
3250
0
50
100
150
200
250
300
350
RS=200 Downstream (Bridge)
Elevation (ft)
Station (ft)


Bridge Scour RS = 200
Legend
WS 100yr
Ground
Ineff
Bank Sta
Contr Scour
Total Scour
Elevation (ft)
Station (ft)
3275
3270
3265
3260
3255
3250
0
50
100
150
200
250
300

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	2.55	5.01	2.41
	Approach Velocity (ft/s):	3.39	8.57	3.25
	Br Average Depth (ft):	0.20	4.22	0.18
	BR Opening Flow (cfs):	0.08	1349.85	0.07
	BR Top WD (ft):	0.59	33.50	0.59
	Grain Size D50 (mm):	60.00	60.00	60.00
	Approach Flow (cfs):	365.19	665.18	319.63
	Approach Top WD (ft):	42.18	15.48	40.81
	K1 Coefficient:	0.590	0.590	0.590
Results				
	Scour Depth Ys (ft):	0.00	1.61	0.00
	Critical Velocity (ft/s):	7.60	8.51	7.53
	Equation:	Clear	Live	Clear

Abutment Scour

		Left	Right
Input Data			
	Station at Toe (ft):	54.01	90.00
	Toe Sta at appr (ft):	62.72	80.69
	Abutment Length (ft):	42.18	40.81
	Depth at Toe (ft):	-0.08	0.07
	K1 Shape Coef:	1.00 - Vertical abutment	
	Degree of Skew (degrees):	90.00	90.00
	K2 Skew Coef:	1.00	1.00
	Projected Length L' (ft):	41.79	20.81
	Avg Depth Obstructed Ya (ft):	2.55	2.41
	Flow Obstructed Qe (cfs):	365.19	319.63
	Area Obstructed Ae (sq ft):	107.77	98.44
Results			
	Scour Depth Ys (ft):		0.41
	Froude #:		0.52
	Equation:	Default	HIRE

Combined Scour Depths

Right abutment scour + contraction scour (ft):	0.41

HEC-RAS Plan: PR_20200319 River: Piscoe Creek Reach: Profile

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Hydr Radius C	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
Profile	316.25	2yr	87.00	3256.14	3257.68	3257.73	3258.01	0.030020	5.24	23.06	51.53	1.18	0.60	1.13
Profile	316.25	5yr	232.00	3256.14	3258.10	3258.23	3258.69	0.030005	7.38	48.96	73.79	1.28	1.00	1.88
Profile	316.25	10yr	392.00	3256.14	3258.76	3258.64	3259.12	0.010853	6.19	108.84	100.93	0.84	1.66	1.12
Profile	316.25	25yr	682.00	3256.14	3259.57	3259.10	3259.88	0.006178	6.06	208.11	143.76	0.68	2.45	0.94
Profile	316.25	50yr	984.00	3256.14	3260.21	3259.54	3260.49	0.004588	6.08	305.47	160.86	0.60	3.07	0.88
Profile	316.25	100yr	1350.00	3256.14	3260.97	3259.86	3261.22	0.003207	5.87	430.78	168.02	0.52	3.82	0.76
Profile	275.49	2yr	87.00	3254.05	3256.66	3255.36	3256.73	0.000889	2.15	49.78	41.39	0.25	2.21	0.12
Profile	275.49	5yr	232.00	3254.05	3258.16	3256.27	3258.23	0.000623	2.54	173.92	130.42	0.23	3.70	0.14
Profile	275.49	10yr	392.00	3254.05	3258.89		3258.98	0.000660	2.94	274.82	141.89	0.25	4.43	0.18
Profile	275.49	25yr	682.00	3254.05	3259.65		3259.76	0.000843	3.69	391.46	164.30	0.29	5.18	0.27
Profile	275.49	50yr	984.00	3254.05	3260.24		3260.38	0.000967	4.25	491.60	170.07	0.31	5.78	0.35
Profile	275.49	100yr	1350.00	3254.05	3260.98		3261.13	0.000995	4.67	619.22	178.48	0.32	6.50	0.40
Profile	258.2	2yr	87.00	3254.19	3255.98	3255.98	3256.63	0.018766	6.49	13.41	34.41	1.01	1.18	1.38
Profile	258.2	5yr	232.00	3254.19	3257.29	3257.29	3258.13	0.013785	7.49	34.92	82.07	0.92	1.84	1.59
Profile	258.2	10yr	392.00	3254.19	3258.24	3258.24	3258.89	0.008065	7.14	84.71	142.50	0.75	2.56	1.29
Profile	258.2	25yr	682.00	3254.19	3258.86	3258.86	3259.65	0.008785	8.50	138.58	154.95	0.80	3.12	1.71
Profile	258.2	50yr	984.00	3254.19	3259.35	3259.35	3260.26	0.009374	9.58	182.26	159.44	0.85	3.56	2.08
Profile	258.2	100yr	1350.00	3254.19	3260.40		3261.05	0.005488	8.57	283.81	168.80	0.68	4.50	1.54
Profile	223.83	2yr	87.00	3253.50	3254.16	3254.48	3255.24	0.075667	8.34	10.43	16.88	1.87	0.60	2.85
Profile	223.83	5yr	232.00	3253.50	3254.66	3255.34	3256.88	0.077438	11.95	19.41	18.35	2.05	1.02	4.92
Profile	223.83	10yr	392.00	3253.50	3255.17	3256.03	3257.97	0.065510	13.42	29.20	20.26	1.97	1.37	5.61
Profile	223.83	25yr	682.00	3253.50	3256.22	3257.01	3258.85	0.036195	13.01	52.41	24.06	1.55	2.05	4.62
Profile	223.83	50yr	984.00	3253.50	3258.58	3257.87	3259.65	0.007521	8.27	119.00	118.50	0.76	3.37	1.58
Profile	223.83	100yr	1350.00	3253.50	3259.46	3258.70	3260.74	0.007118	9.11	149.75	147.96	0.76	4.06	1.80
Profile	200		Bridge											
Profile	170	2yr	87.00	3252.80	3253.78	3253.78	3254.24	0.019370	5.40	16.10	62.96	1.00	0.87	1.06
Profile	170	5yr	232.00	3252.80	3254.63	3254.63	3255.44	0.016714	7.21	32.17	103.82	1.01	1.51	1.57
Profile	170	10yr	392.00	3252.80	3255.34	3255.35	3256.40	0.015400	8.26	47.43	134.42	1.01	1.96	1.89
Profile	170	25yr	682.00	3252.80	3256.31	3256.31	3257.77	0.013615	9.70	70.89	181.40	1.00	2.74	2.33
Profile	170	50yr	984.00	3252.80	3257.15	3257.15	3258.96	0.012122	10.82	93.77	194.11	0.98	3.52	2.67
Profile	170	100yr	1350.00	3252.80	3258.04	3258.04	3260.20	0.011023	11.89	120.68	240.07	0.97	4.36	3.00
Profile	136.42	2yr	87.00	3250.35	3251.32	3251.65	3252.40	0.068123	8.35	10.42	48.54	1.80	0.65	2.78
Profile	136.42	5yr	232.00	3250.35	3251.99	3252.53	3253.80	0.049039	10.82	21.54	62.08	1.69	1.23	3.78
Profile	136.42	10yr	392.00	3250.35	3252.61	3253.29	3254.90	0.036528	12.18	33.07	95.77	1.56	1.84	4.20
Profile	136.42	25yr	682.00	3250.35	3253.61	3254.73	3256.44	0.026160	13.66	54.04	191.65	1.41	2.80	4.58
Profile	136.42	50yr	984.00	3250.35	3254.33	3255.51	3257.67	0.023945	15.14	83.10	267.66	1.40	3.50	5.23
Profile	136.42	100yr	1350.00	3250.35	3254.84	3256.11	3258.84	0.025467	17.06	111.95	292.11	1.48	4.00	6.35
Profile	84.47	2yr	87.00	3248.25	3249.28	3249.36	3249.71	0.032477	5.58	17.65	197.62	1.24	0.62	1.26
Profile	84.47	5yr	232.00	3248.25	3249.64	3249.99	3250.78	0.054479	9.06	29.20	206.62	1.70	0.87	2.97
Profile	84.47	10yr	392.00	3248.25	3249.81	3250.31	3252.03	0.090398	12.67	35.39	210.95	2.23	0.99	5.58
Profile	84.47	25yr	682.00	3248.25	3250.16	3251.16	3253.78	0.105033	16.26	48.97	221.80	2.51	1.28	8.42

HEC-RAS Plan: PR_20200319 River: Piscoe Creek Reach: Profile (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl	Hydr Radius C	Shear Chan
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)		(ft)	(lb/sq ft)
Profile	84.47	50yr	984.00	3248.25	3250.51	3251.84	3255.08	0.096793	18.36	65.89	233.51	2.51	1.64	9.90
Profile	84.47	100yr	1350.00	3248.25	3250.88	3252.46	3256.20	0.088080	20.01	83.87	254.73	2.48	2.00	11.00
Profile	30.19	2yr	87.00	3246.35	3248.28	3247.59	3248.38	0.002957	2.93	40.17	233.36	0.42	1.43	0.26
Profile	30.19	5yr	232.00	3246.35	3249.18	3248.35	3249.41	0.003988	4.51	69.36	274.72	0.53	2.18	0.54
Profile	30.19	10yr	392.00	3246.35	3249.90	3248.87	3250.26	0.004388	5.68	94.64	284.53	0.58	2.87	0.79
Profile	30.19	25yr	682.00	3246.35	3250.59	3249.70	3251.43	0.007830	8.70	123.86	325.32	0.80	3.53	1.72
Profile	30.19	50yr	984.00	3246.35	3251.18	3250.50	3252.32	0.009098	10.35	162.22	369.38	0.88	4.09	2.32
Profile	30.19	100yr	1350.00	3246.35	3251.61	3250.51	3253.10	0.011070	12.16	196.49	388.97	0.99	4.49	3.11
Profile	25.78	2yr	87.00	3246.70	3247.95	3247.95	3248.32	0.019373	5.29	19.97	234.90	1.01	0.85	1.03
Profile	25.78	5yr	232.00	3246.70	3248.66	3248.66	3249.33	0.016063	7.23	40.89	260.45	1.02	1.56	1.56
Profile	25.78	10yr	392.00	3246.70	3249.24	3249.24	3250.17	0.015125	8.64	59.80	271.69	1.04	2.13	2.01
Profile	25.78	25yr	682.00	3246.70	3250.10	3250.10	3251.35	0.013528	10.24	93.26	329.35	1.04	2.99	2.52
Profile	25.78	50yr	984.00	3246.70	3251.21	3251.21	3252.25	0.008288	9.87	175.28	397.07	0.86	4.08	2.11
Profile	25.78	100yr	1350.00	3246.70	3251.80	3251.80	3252.94	0.008156	10.72	226.45	403.75	0.87	4.68	2.38