IDL RFSOQ 21-235-041004

GNA Quartz Creek Aquatic Organism Passage (AOP) Survey and Design

REQUEST FOR STATEMENT OF QUALIFICATIONS AND INSTRUCTIONS

Statement of Qualifications (SOQ) will be received by the Idaho Department of Lands **until 3:00 PM P.T. on October 1, 2020**, for the following:

1. The Idaho Department of Lands (IDL) is seeking qualified firms to submit a Statement of Qualifications (SOQ) demonstrating the ability to provide plans, specifications, and an engineer's estimate for the installation of an instream structure to allow for Aquatic Organism Passage (AOP).

STATEMENT OF QUALIFICATIONS DEADLINE AND DELIVERY REQUIREMENTS

SOQ must be received, by email before 3:00 PM P.T. on October 1, 2020. The Department of Lands is not responsible for lost or undelivered SOQ or for failure of any email or internet service to deliver SOQ to the Idaho Department of Lands by the deadline. **Late SOQ will not be accepted. Faxed SOQ will not be accepted. Mailed SOQ will not be accepted.**

- Note: IDL has made the decision to allow only electronic responses to this RFSOQ. This decision primarily reflects the safety of our employees during the ongoing pandemic. **IF your submission will exceed 20 MB, please contact the solicitation lead, Sherry Groeschl by email, so that we can find a way to accommodate receipt of a file that size. IDL's internal server has specific transmission limits.**

Delivery Address:

Idaho Department of Lands
ATTN: Sherry Groeschl
sgroeschl@idl.idaho.gov

SOQ are to be emailed and are to be marked in the Subject Line with the following information:

IDL RFSOQ for: 21-235-041004 – GNA-Quartz Creek Aquatic Organism Passage Survey & Design

QUESTIONS

Further information is available by contacting Sherry Groeschl, Senior Buyer, at (208) 666-8619 or by email at sgroeschl@idl.idaho.gov.

CONTRACT #21-235-041004
PROJECT DESCRIPTION

PROJECT NAME: Quartz Creek Aquatic Organism Passage Survey and Design

PROJECT NUMBER: 21-235-041004

SUPERVISORY AREA: Idaho Panhandle NF

PROJECT LOCATION: The existing stream crossing is located on an unnamed tributary of Quartz Creek at approximately Latitude 48.32558 N, Longitude -116.91867 W, T57N R05W S02 NENE. The project area is in Bonner County Idaho, approximately 12 miles north of the town of Priest River, on National Forest Road 416. See attached vicinity map.

SCOPE OF WORK: The intent of this project is to complete the following tasks:

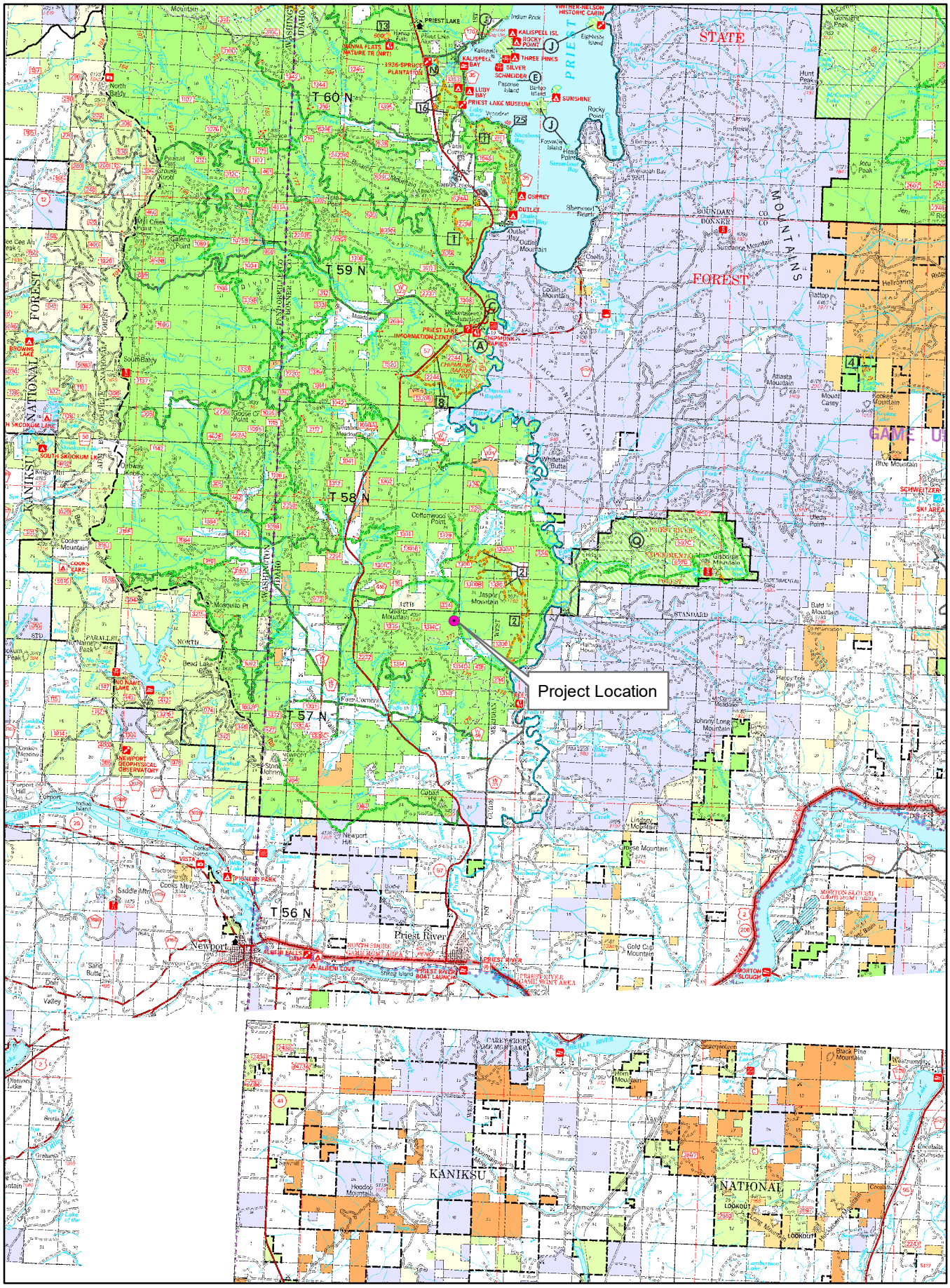
1. Provide plans, specifications, and an engineer's estimate for the installation of an instream structure to allow for Aquatic Organism Passage (AOP).
2. The plans and specifications shall be stamped by a licensed professional engineer.
3. Deliverables shall include hard copy documents and an electronic copy (AutoCAD and pdf format).
4. Prior to final submission, make one submittal in draft format for a joint review by the U.S. Forest Service and Idaho Department of Lands.

TECHNICAL SPECIFICATIONS: The design requirements are described in the attached Idaho Department of Lands Memo dated 1-10-20 and the USFS AOP Design requirements.

INSPECTION AND ACCEPTANCE: IDL and/or USFS will review all work and provide feedback to the Contractor as required. IDL will consult with USFS to approve finalized documents prior to submitting an invoice for payment.

PERIOD OF PERFORMANCE: The Contractor will have 45 days from the date of the pre-work meeting to conduct field work and submit draft documents to IDL and USFS. IDL and USFS will review the documents and provide comment back to the contractor within 15 days. The Contractor will have an additional 15 days to make any edits necessary and submit the final documents to IDL and USFS.

CONTRACT PERSONNEL: This information will be provided in final contract documents.


Project Location
T 60 N
T 59 N
T 58 N
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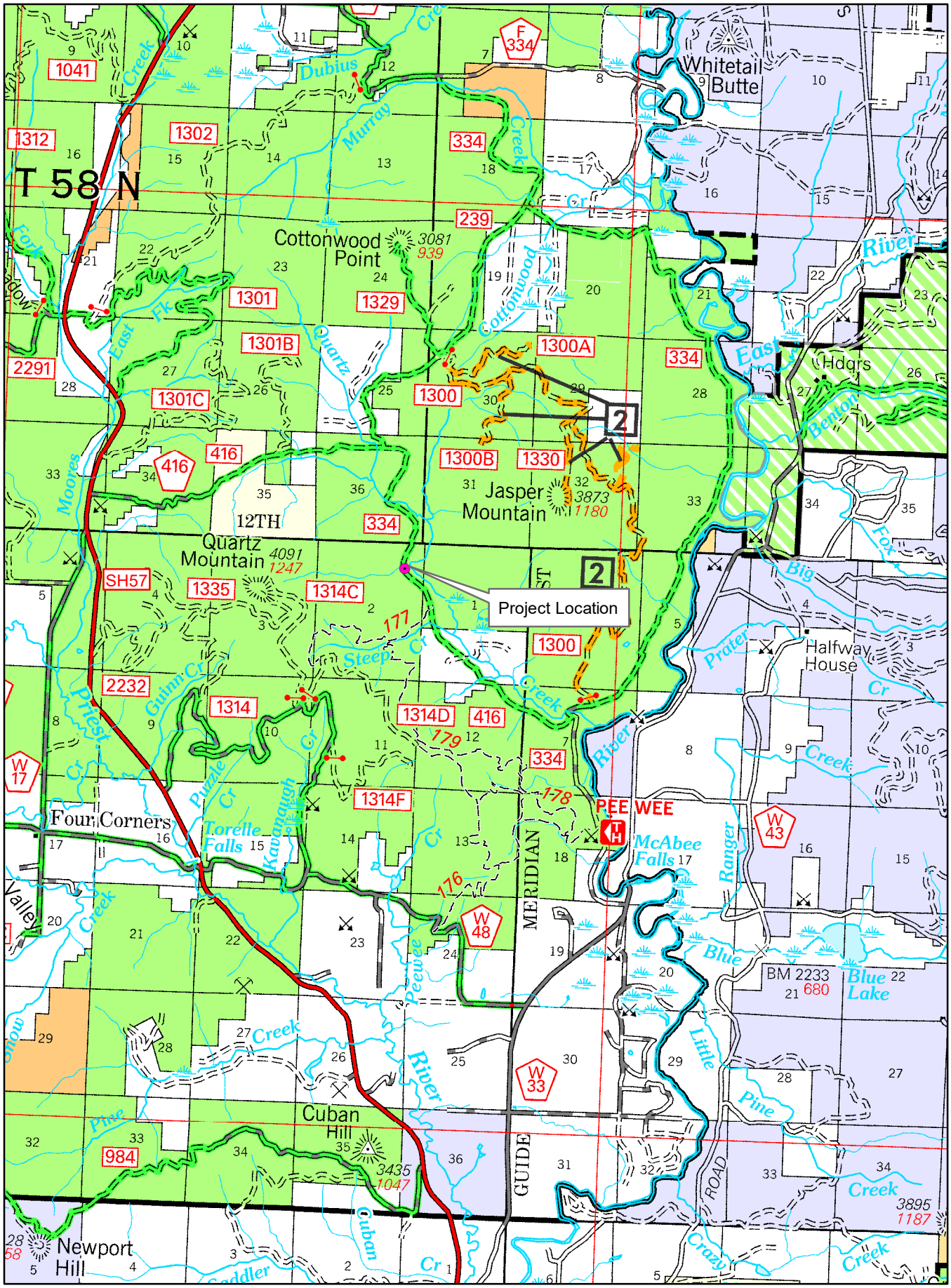
T 56 N
PRIEST LAKE
Priest River
Newport
KANIKSU
NATIONAL
FOREST
STATE
MOUNTAINS


T 58 N
Whitetail Butte
Cottonwood Point
3081
939
Jasper Mountain
3873
1180
Quartz Mountain
4091
1247
12TH
Project Location
Four Corners
Torelle Falls
McAbee Falls
PEE WEE
Halfway House
Hdqrs
Cuban Hill
3435
1047
Newport Hill
3895
1187
BM 2233
680
Blue Lake
MERIDIAN
GUIDE
ROAD
Dubius
Murray
Cottonwood
Quartz
East Fk
Moores
Priest
Guinn Cr
Steep Cr
Puzzle Cr
Kavanaugh Cr
Peewee
Cuban Cr
Saddler
Pine Creek
Little Pine Creek
Crazy Creek
Ranger
Big Fox
Prater Cr
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USFS AOP Design Requirements

Design Review Template Schedule

The following outlines a series of milestones that require an in depth review between the IDL and Forest Engineer. Please note that communication between the two agencies should be continuous and spanning the time between the following milestones.

- Onsite pre design meeting will need to occur between the Forest and IDL after initial proposal for AOP design, and before any preliminary design work is undertaken.
- After hydraulics analysis is completed, a review by the Forest Engineer needs to occur before structure selection and site layout can occur.
- After a draft set of plans, specifications, and cost estimate (PS&E) are prepared, a review by the Forest Engineer needs to occur before final draft development can occur.
- One last review by the Forest Engineer needs to be performed after final draft and before solicitation of said project occurs.
- Forest Engineer or delegated Point of Contact (POC) needs to be continuously involved in solicitation, selection, and implementation (construction) of the AOP Culvert Replacement.

PS&E Required Considerations for Forest Service AOP's

The following bulleted items are requirements outlined within Forest Service Direction for consideration in the design of AOP's.

- Planning Considerations
  - Design Load Vehicle: HL-93 or otherwise determined by Forest
  - Design vehicle curve widening: lowboy, log truck, or otherwise determined by Forest
- Site Survey
  - Ground Control: Five control points must be established at a minimum.
  - Longitudinal Stream Profile: Length of stream profile survey needs to be done five channel widths upstream and downstream minimum.
  - Cross Sections: At a minimum one cross section needs to be taken upstream of the proposed structure and one downstream, to show the relative change in water depth and velocity as the flow makes the transition from the stream through the culvert or bridge section and back to streamflow again. This is necessary to show if backwater depths will affect culvert capacity, if velocity changes will cause scouring and erosion, or if fish passage will be impeded. The cross-section location should be outside the influence of the existing structure.
- Hydrology
  - At a minimum Provide Flow data for Q2, Q10, Q100.
  - USGS Stream Stats shall be used to generate flow estimates for the specified return intervals or otherwise approved method by Forest.
- Hydraulics
  - Freeboard: A minimum of three feet is required, unless local conditions dictate more.
  - Modeling: Use HEC-RAS to model hydraulics. The Idaho Department of Lands may use an alternate hydraulic modeling program for the Quartz Creek AOP if necessary.
  - Velocity: Q10 will be the design flow for the stream, and will not be exceeded through the structure
  - Minimum Water Depth: Q1 will dictate the minimum water depth. This is to assure aquatic organism passage during low flows.
- Grade control structures shall be considered as needed to avoid or control vertical instability, head cutting, and undermining of structure components

- Hydraulic Analysis. The following all need to be considered as requirements while performing the hydraulic analysis:
    - Headwater elevation immediately upstream from the proposed structure.
    - Water surface profile upstream from the structure, with and without the proposed structure.
    - Freeboard clearance.
    - Depth of water surface overtopping of the road or trail and the associated design discharge.
    - Scour Potential: Validate the predicted scour with existing channel information. Evaluate the longitudinal profile and sediment size and mobility in the reference channel reaches to provide a check of scour depth that occurs naturally in the stream. Investigate local maximum scour depths in the existing channel, realizing that substrate deposition during recession of the peak flood commonly occurs, which reduces the measured maximum scour. Placement of structure elements in dynamic stream channels commonly has greater scour potential at flood flows than the natural stream because of greater flow constriction and higher shear stresses.
    - Velocity of flow transitioning upstream, through the bridge opening, and downstream.
- Culvert Shapes
    - Squashed pipes require special consideration under approval by Forest engineer. Preference is given towards round pipes
    - Example structures: buried round pipes, box culverts (bottomless and with bottom), bottomless arch
    - Structure opening width, as a minimum, should not constrict the stream or accelerate velocity at bankfull flow.

Coeur d'Alene Offices
3284 W. Industrial Loop
Coeur d'Alene, ID 83815
Telephone (208) 769-1525
Fax No. (208) 769-1524

MEMORANDUM

TO: Jon Songster, Bureau Chief Good Neighbor Authority

FROM: Joel Clark, Forest Hydrologist

DATE: January 10, 2020

SUBJECT: Observations and Opinions Regarding a crossing of an unnamed tributary of Quartz Creek, a tributary to Priest River.

OBSERVATIONS

The unnamed tributary of Quartz Creek is known to be class I (fish bearing) and fish were observed in the stream during the site visit. The crossing is located at approximately 48.32558, -116.91867, approximately 12 miles north of Priest River, Idaho (Plate 1, Appendix). Currently there is a 36 inch diameter culvert which is undersized to pass the 100 year peak flow. The stream gradient through the crossing is approximately 1.5% and the culvert is installed at 3.7%. The allowable gradient for a bare culvert to provide for fish passage in this drainage is 1% (Chart 1 Idaho Foresters Forum No. 12 https://www.idl.idaho.gov/forestry/forester-forums/fpa12_rev.pdf). The culvert has developed a small outlet drop but there is no jump pool to allow for fish to enter the culvert at some flows (Photograph 1). The alignment of the current culvert is not ideal for passing peak flow and has the potential to cause subgrade saturation issues to the roadway (Figure 1).

HYDROLOGIC ANALYSIS

At the crossing of NF Road #416 the drainage area contributing to the unnamed tributary of Quartz Creek is approximately 0.58 square miles or 371 acres. The drainage area and 100-year peak flow was calculated using the US Geological Survey tool StreamStats. The 100-year peak flow determined for the crossing location is 27.7 cubic feet per second. Based on the super-critical flow nomographs for corrugated metal pipes, a 48 inch (12.57 square feet of open area) diameter round or equivalent pipe-arch, installed with a projecting entrance type at a 1.0 headwater depth, would be required to pass the 100-year peak flow.

DISCUSSION AND RECOMMENDATIONS

The gradual stream gradient would allow for the use of hydraulic design (bare) culvert to be installed and be fish passable, if care is taken during the installation process. A stream simulation crossing is better suited for this location and will provide for habitat access for other aquatic species not limited to fish. Therefore, I recommend a 72" CMP installed partially buried for the proposed crossing of the unnamed tributary to Quartz Creek.

Figure 1: The blue line is the current stream alignment at the crossing flowing northeast (up and to the right in the image). The orange line is to proposed new culvert location and the yellow line is the ~35 feet of new channel to be created.

The following recommendations apply to the installation of a buried culvert. The recommendations are fairly specific, but do not include every detail.

1) Purchase and transport 40-feet of CMP with a minimum load rating of H20 to the chosen location, approximately 41 feet northwest of the existing culvert. Both the inlet and outlet of the culvert will extend past the toe of the fill material approximately 4 feet on both sides.

2) Divert the flow away from the proposed excavation location using the existing culvert and stream channel. This will require a temporary stream diversion in order to de-water the site for proper bedding preparation and culvert installation. All work should be performed during periods of low flow.

3) Using an excavator, carefully excavate so that the inlet of the culvert will be set at 8.5 feet below the existing road grade and over excavate for the entire length of the CMP.

4) Prepare a bed for the culvert using crushed bedding aggregate so that it is installed at a gradient of 1.5%, which requires the use of survey equipment during installation. A slight camber upward is acceptable (see Figure 2)

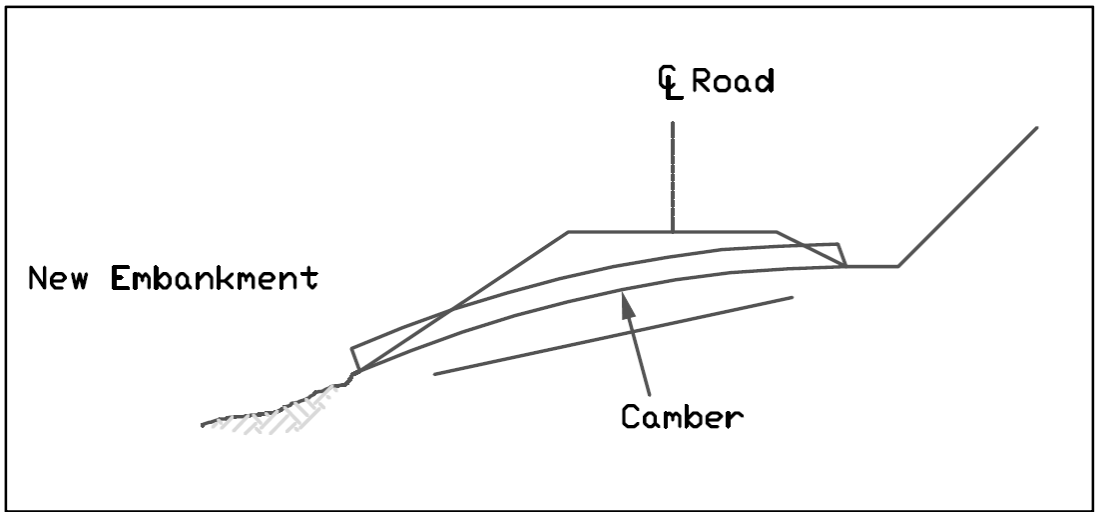

Figure 2: Camber diagram. Camber 1% of pipe length, not to exceed ¾ of pipe span.

5) Place the culvert in the prepared crossing, carefully place clean, 2-inch minus granular backfill material in 6-inch lifts and compact until the top of the structure is reached (see Figure 3).

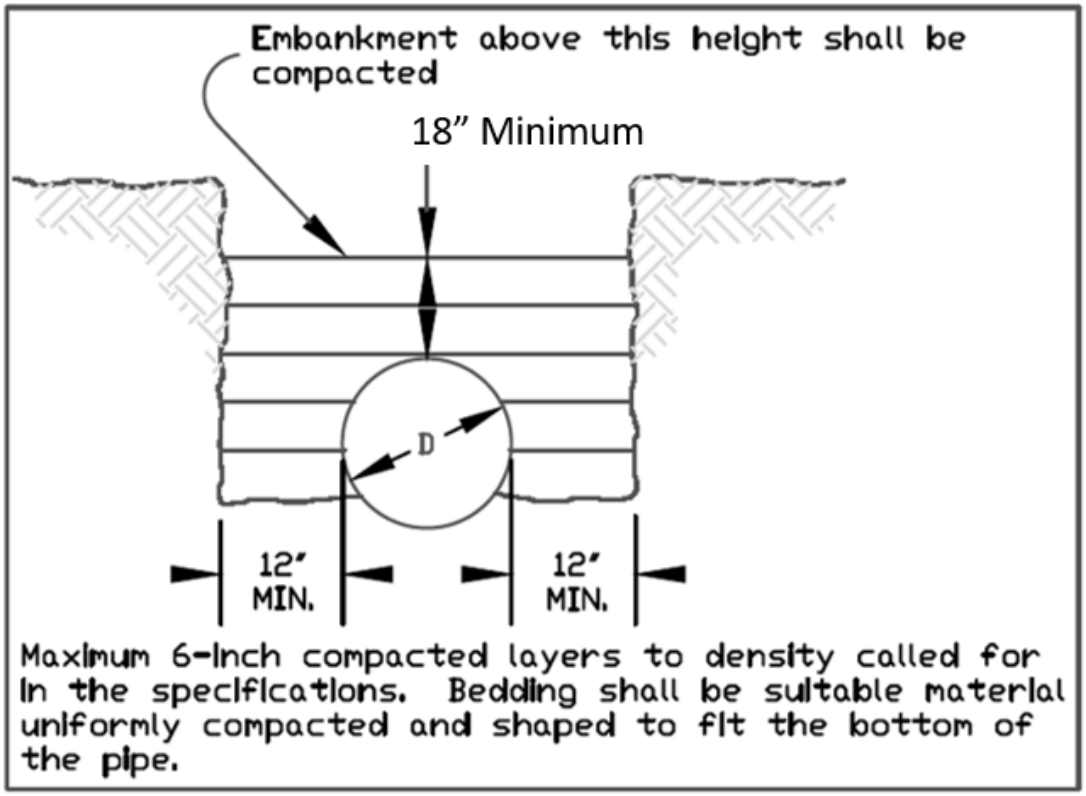

Figure 3: Backfill diagram.

6) Continue applying fill over the top of CMP until a minimum fill height cover of 18 inches is achieved. Apply fill until the finished grade is achieved, approximately 2.5 feet total. Minimum and maximum cover depth is specified by each manufacturer but in general a 72 inch corrugated steel pipe requires a minimum of 12 inches and a maximum of 75 inches to meet the H20 load rating.

7) The interior of the 72 inch culvert will be filled approximately 36" deep with class 2 bedding rock fill. The fill will include three constructed rock weirs and a low flow channel (see Plate 2) The remaining open area of the culvert will be approximately 14.1 square feet which exceeds the 12.57 square feet required to pass the 100-year peak flow.

8) Install non-woven geotextile filter fabric and place a lift of 8 to 15-inch diameter angular rock rip-rap on the fill slope around the entrance of the culvert, in order to reduce sediment inputs and prevent scour erosion. The fill and riprap material at the ends of the pipe arch culvert should be kept to a 1 ½:1 (horizontal to vertical) slope.

9) Construct approximately 35 feet of new stream channel connecting the outlet of the new culvert to the stream channel. A hydrologist and/or fish biologist from IDL or the USFS should be on site during this process to insure proper channel features are constructed. The stream width should mimic the current adjacent stream width.

10) Remove the diversion and allow the flow to enter the new culvert. Construct a 1 foot tall levy restricting access to the old stream channel paralleling the road. Leave the existing culvert in place.

11) Grass seed and mulch all disturbed areas

If there are any questions, please contact me.

Photographs

Photograph 1: Culvert outlet with small outlet drop and minimal jump pool.

Photograph 2: Culvert inlet.

Photograph 3: Upstream of culvert inlet.

Photograph 4: Looking northwest of existing culvert along National Forest Road 416.

Photograph 5: Looking southeast of existing culvert along National Forest Road 416.

Appendix

Tributary to Quartz Creek Crossing

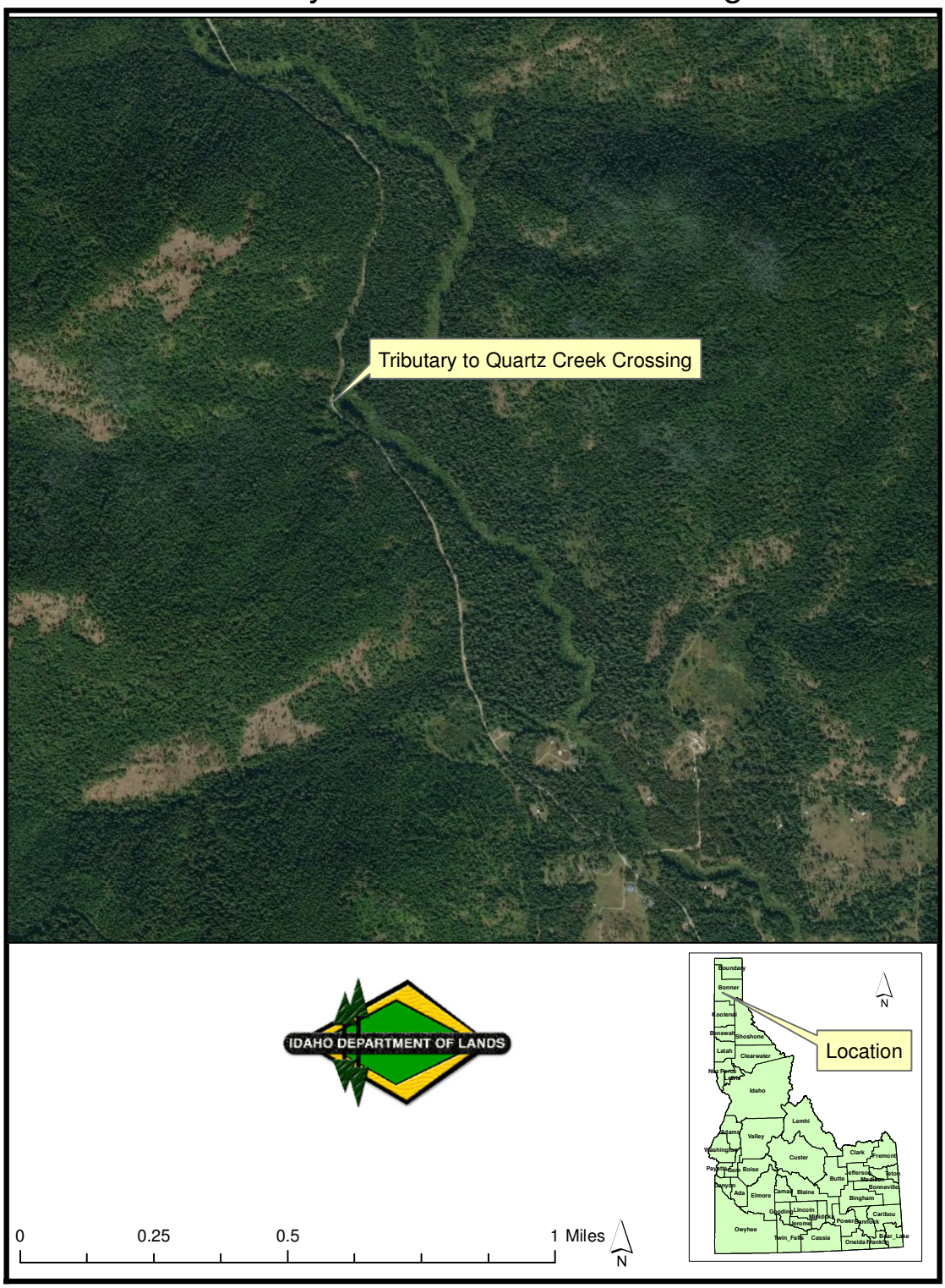

Plate 1. Crossing location of the unnamed tributary to Quartz Creek.

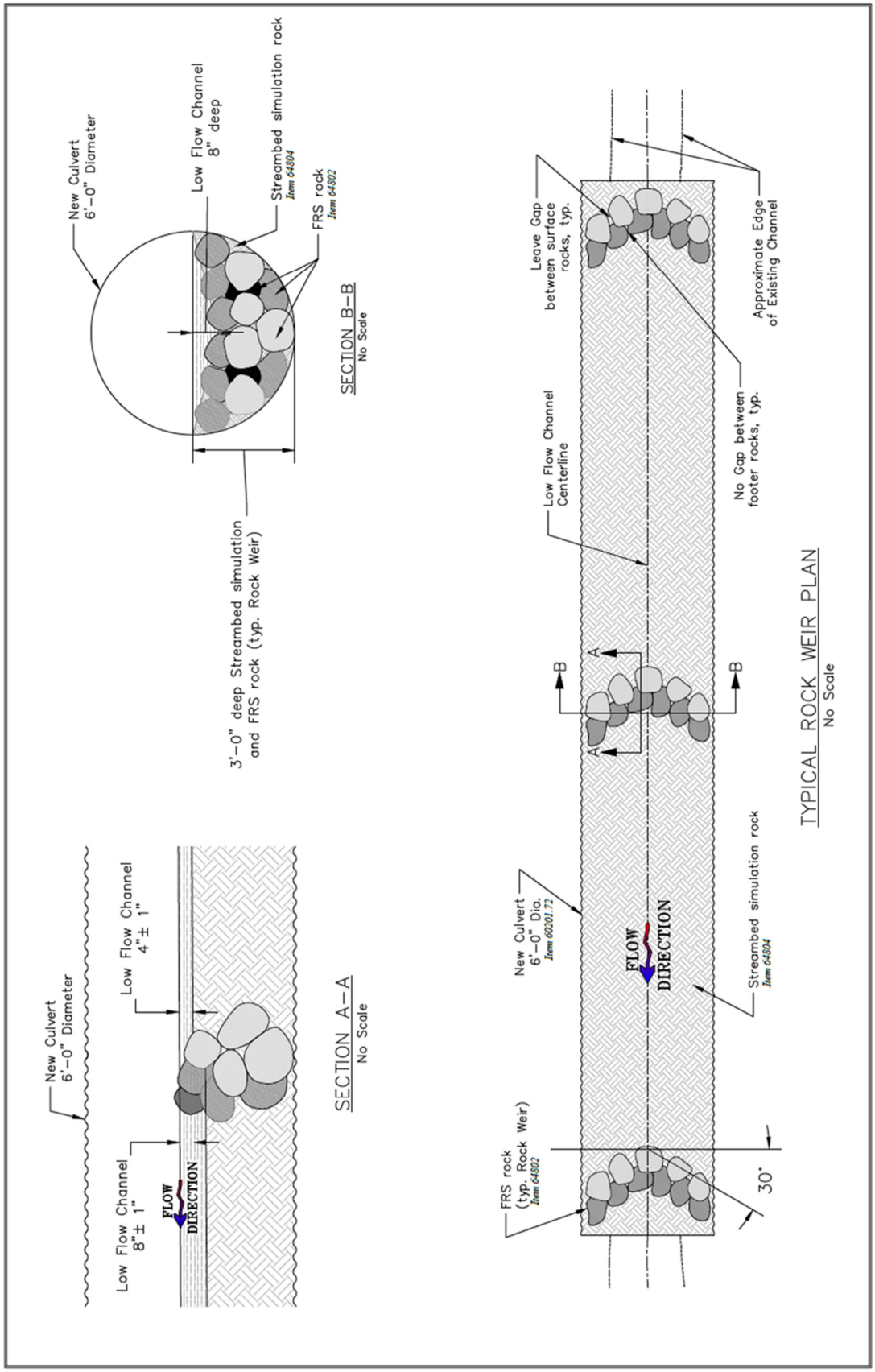

Plate 2. Typical rock weir and culvert fill plan for a buried culvert.