

Completion Report Lemhi River L-13 Irrigation Fish Screen Replacement Lemhi River Subbasin Salmon, Idaho



Prepared by
Bureau of Reclamation
Pacific Northwest Region
Snake River Area Office
Salmon Field Office

October 2007

Old L-13 fish screen looking downstream in
the ditch
(2002)

L-13 new fish screen looking downstream in
the ditch
(May 2004)

This project was initiated and completed through the combined efforts of many entities, public and private. The purpose of the project was to provide for continued use of water while enhancing conditions for anadromous fish listed under the Endangered Species Act. The Bureau of Reclamation prepared this completion report in accordance with the 2004 National Marine Fisheries Service Federal Columbia River Power System Biological Opinion to describe the design and construction of this project.

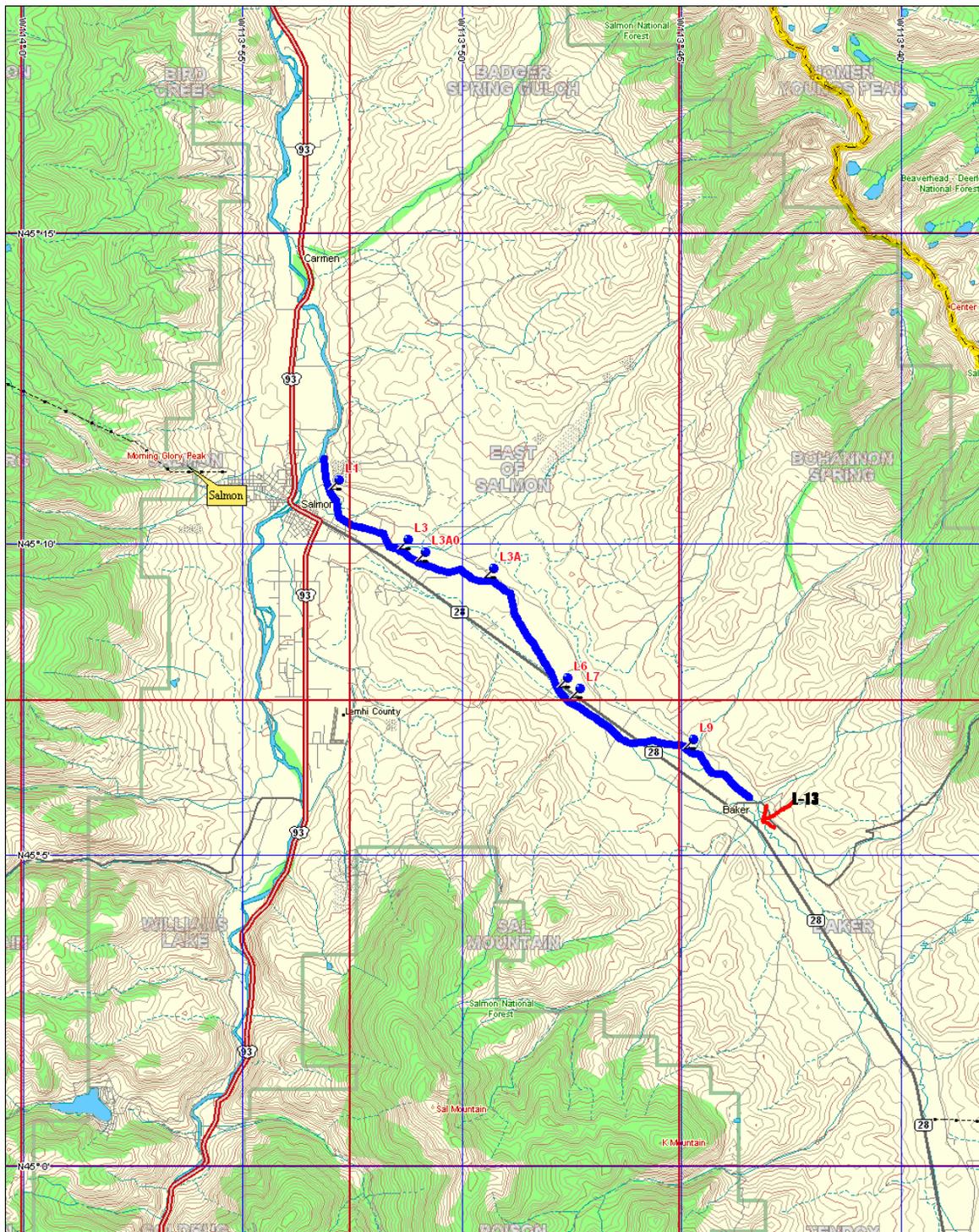
Contents

Location Map	Frontispiece
1. Introduction	1
1.1 Background	1
1.2 Participation and Cooperation	2
1.3 Environmental Compliance.....	3
2. Project Description	3
2.1 Construction	3
3. Conclusions	3

Attachments

Attachment A: Photographs of L-13 Project

Attachment B: Design Drawings of L-13 Project



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096

4500 ft Scale: 1 : 150,000 Detail: 10.4 Datum: WGS84

Figure 1. L-13 project location

1. Introduction

Throughout the Lemhi River subbasin, irrigation diversions, combined with other domestic uses of water, have negatively affected salmonids by reducing water flow and entrapping juvenile fish in the unscreened diversions as they migrate downstream. In 2002, the Idaho Department of Fish and Game's (IDFG) Anadromous Fish Screen Shop (Screen Shop) requested the Bureau of Reclamation's (Reclamation) assistance with replacement of an outdated fish screen in a diversion ditch on the Lemhi River. The old fish screen, located in the L-13 diversion ditch (cover photos), was replaced with a new screen that meets fish screening criteria as set forth by the National Marine Fisheries Service (NMFS). The new screen also provides more effective and safer bypass of fish from the irrigation ditch back into the Lemhi River.

The primary objective of this project was to implement actions to prevent the entrainment of adult and juvenile salmon and steelhead in the Lemhi River at the L-13 irrigation diversion. The Lemhi River provides habitat for several species of fish listed as either threatened or endangered under the Endangered Species Act (ESA), as well as resident fish. Section 7(a)(2) of the ESA requires that all Federal agencies consult with the National Marine Fisheries Service or the U.S. Fish and Wildlife Service (USFWS), to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in adversely modifying their critical habitat. The NMFS oversees the implementation of the ESA for certain listed species including anadromous salmon and steelhead.

Currently, there are 12 listed anadromous evolutionarily significant units (ESU) and one ESU proposed for listing within the Columbia River. Consultation with NMFS was completed on these ESUs and a Biological Opinion (BiOp) was issued in 2002 and a subsequent BiOp issued on November 30, 2004.¹ This consultation contained an Updated Proposed Action by the action agencies including a Tributary Habitat Program.²

1.1 Background

Irrigation diversions have long been identified as having potential for causing harm to resident and migratory fish. Irrigators in the Lemhi subbasin typically use push-up diversion dams to raise water levels and/or direct water into irrigation conveyance canals

¹ Biological Opinion on the Operation of the Federal Columbia River Power System including the 19 Bureau of Reclamation Projects in the Columbia Basin, November 30, 2004 (revised and reissued pursuant to court order, *NWF v. NMFS*, Civ. No. CV 01-640-RE (D. Oregon)).

² Final Updated Proposed Action for the FCRPS Biological Opinion Remand, U.S. Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration, November 24, 2004.

or “ditches.” Push-up diversion dams are usually constructed out of large rock that is placed, or streambed gravel material that is pushed up in a linear fashion across the stream channel. Water diverted from the river or creek channel is then conveyed via the ditch and distributed to agricultural fields. If diverted water is unscreened, fish can be carried into fields or entrapped in ditches.

The L-13 diversion was a typical gravel/rock push-up berm that extended across the Lemhi River. Diverted Lemhi River water is conveyed via a ditch into the Withington Creek channel, diverted again through a wood headgate, and conveyed into the L-13 ditch. The L-13 fish screen did not meet current NMFS fish screening criteria and the fish bypass pipe emptied into the lower reach of Withington Creek channel which was frequently dry during the summer months.

Concurrent with project development for fish screen replacement, Reclamation was also asked by IDFG to pursue design and replacement of the push-up diversion in the river. Reclamation approached the irrigators and landowner about screen and diversion replacement and obtained permission to pursue design development. Efforts to pursue diversion and headgate replacement were eventually abandoned due to conflicts with the landowner's plans for future subdivision of the property on which the structures were located. The landowner was agreeable to relocation and replacement of the fish screen to a different site in the ditch.

Reclamation engineers determined relocation of the fish screen within the ditch was necessary to provide for direct discharge of fish into the Lemhi River as opposed to the old screen's discharge into the Withington Creek channel. Coordination between the irrigator's, IDFG, Reclamation, and the landowner was necessary for development of a screen design and bypass route that was acceptable to all parties involved.

1.2 Participation and Cooperation

Reclamation implemented the Tributary Habitat Program for the Lemhi River subbasin, as set forth in the Updated Proposed Action, as a conservation measure to provide for early actions to assist with recovery of the ESUs within the Columbia River. The upper Salmon and Lemhi subbasin ESUs include the Snake River steelhead and the Snake River spring/summer Chinook. Within these conservation measures, Reclamation addresses limiting factors such as instream flow, barriers, channel morphology, and entrainment. For this program, Reclamation works with willing partners to provide technical assistance and logistical help with implementation of habitat projects leading to correction of tributary and spawning and rearing deficiencies associated with these limiting factors.

Reclamation's participation in the L-13 fish screen project was funded under the direction of the Tributary Habitat Program. Technical assistance provided by Reclamation included project coordination, topographic survey, and development of the fish screen design.

Funding for construction of the L-13 fish screen project was provided by the Columbia River Fisheries Development Program which is administered by NMFS. The IDFG Screen Shop receives funding from NMFS for the construction, operation, and maintenance of fish screens within waters occupied by anadromous fish. Distribution and administration of construction funding and oversight of construction was provided by the IDFG. The landowner and irrigators provided access to private property and participated in development of the design.

1.3 Environmental Compliance

Upon provision of the screen design and Idaho State Historic Preservation Office clearance to IDFG, Reclamation had no further involvement in the replacement of the fish screen. Compliance with National Environmental Policy Act, ESA, and attainment of any necessary local, State, or Federal permits was completed by the IDFG.

2. Project Description

The project was located at River Mile 12.8 on the Lemhi River in central Idaho, approximately 10 miles southeast of the town of Salmon, in Lemhi County (Figure 1- Frontispiece). The project encompassed relocation and replacement of the outdated double bay hydraulic powered drum screen with a triple bay hydraulic powered drum screen that meets NMFS screening criteria and a fish bypass that discharges directly into the Lemhi River. The old screen was removed and in its former location two culverts were installed in the ditch to provide a permanent crossing for construction and maintenance access.

2.1 Construction

Reclamation was not involved in the construction of the L-13 fish screen. The PN Region, Snake River Area office, and Salmon Field office only provided technical assistance to IDFG with initial coordination, topographic survey, and the development of final draft design which was provided to the IDFG for eventual project implementation. The IDFG Screen Shop prepared contract bid documents, administered construction contracts, fabricated, and installed fish screen components. Construction of the fish screen was completed during the winter of 2003/2004.

3. Conclusions

The L-13 screen replacement project replaced an outdated fish screen with a new screen structure that meets NMFS criteria for fish screening and bypass. Reclamation initiated

the project and developed design. The IDFG Screen Shop took that design and continued the project through to completion. The new fish screen prevents the entrainment of fish in the ditch and provides the irrigators with a fish screen that complies with State and Federal requirements for screening of fish from the L-13 irrigation ditch.

Reclamation is grateful to the IDFG Anadromous Screen Shop for the opportunity to participate in this project and for the assistance provided by the staff. Appreciation is also extended to the landowner and irrigators who graciously allowed Reclamation repeated access to private property and assisted with review of project design. Finally, Reclamation wishes to thank the NMFS for providing the funding necessary for the construction of this project.

**Completion Report
Lemhi River L-13 Irrigation Fish Screen
Replacement
Lemhi River Subbasin
Salmon, Idaho**

**Attachment A
Photographs**

**Photographs by the Bureau of Reclamation
Pacific Northwest Region Design Group
Boise, Idaho
and
Salmon Field Office
Salmon, Idaho**



Photograph 1. Old L-13 fish screen looking downstream in the ditch



Photograph 2. Old L-13 fish screen looking upstream in the ditch



Photograph 3. Culvert crossing constructed in ditch at location of old fish screen



Photograph 4. New L-13 fish screen looking downstream in ditch

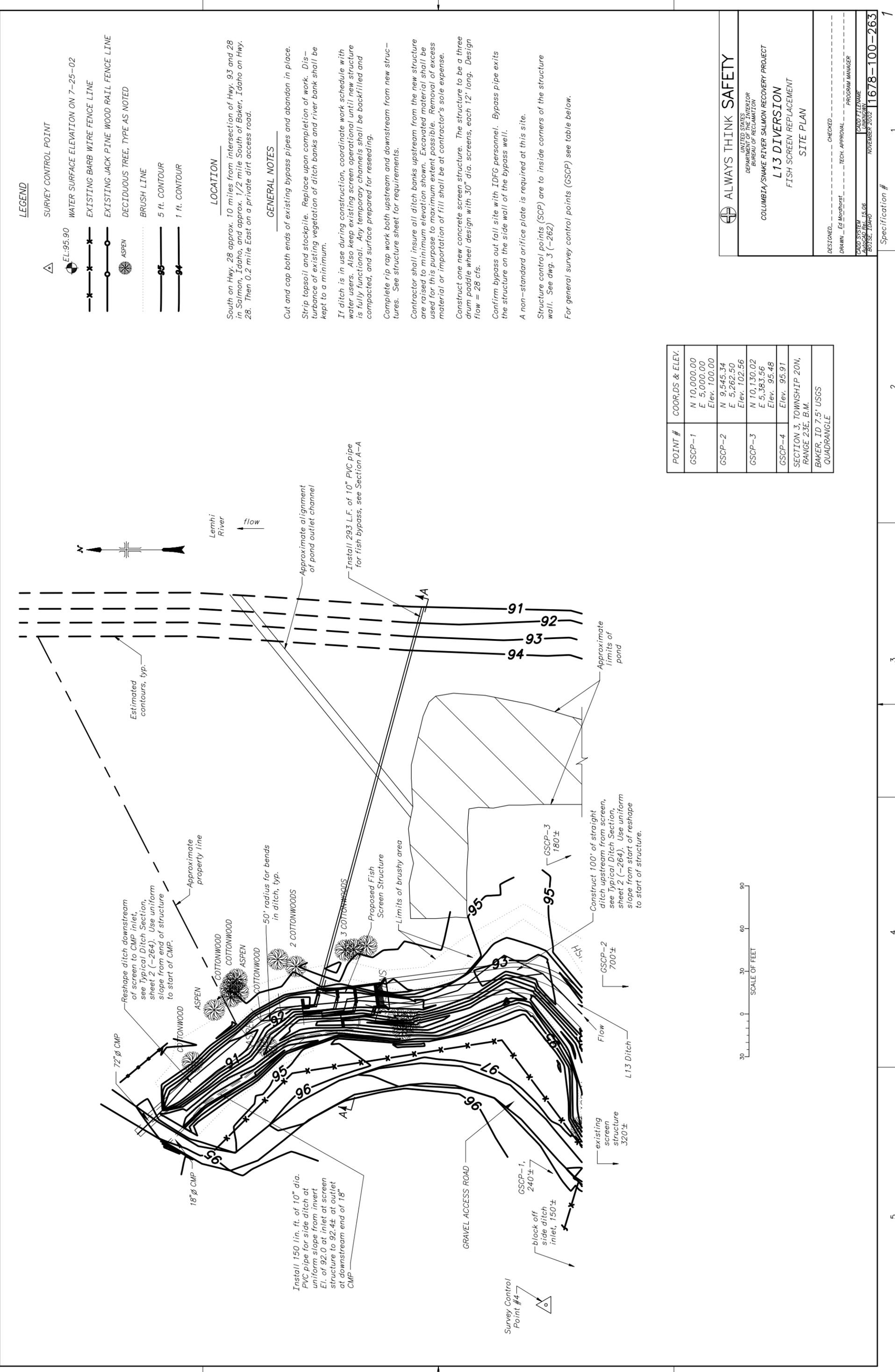


Photograph 5. New L-13 fish screen looking upstream in ditch

Attachment B
Design Drawings

Final Design Drawings L-13 Irrigation Fish Screen Replacement

1678-100-263	L-13 Diversion Fish Screen Screen Replacement, Site Plan
1678-100-264	L-13 Diversion Screen Replacement, Fish Screen Structure, Sections and Details
1678-100-265	L-13 Diversion Screen Replacement, Fish Screen Structure, Plan
1678-100-266	L-13 Diversion Screen Replacement, Details



LEGEND

- ▲ SURVEY CONTROL POINT
- EL: 95.90 WATER SURFACE ELEVATION ON 7-25-02
- x—x—x— EXISTING BARB WIRE FENCE LINE
- o—o—o— EXISTING JACK PINE WOOD RAIL FENCE LINE
- ASPEN DECIDUOUS TREE, TYPE AS NOTED
- ⋯ BRUSH LINE
- 55— 5 ft. CONTOUR
- 94— 1 ft. CONTOUR

LOCATION

South on Hwy. 28 approx. 10 miles from intersection of Hwy. 93 and 28 in Salmon, Idaho, and approx. 1/2 mile South of Baker, Idaho on Hwy. 28. Then 0.2 mile East on a private dirt access road.

GENERAL NOTES

- Cut and cap both ends of existing bypass pipes and abandon in place.
- Strip topsoil and stockpile. Replace upon completion of work. Disturbance of existing vegetation of ditch banks and river bank shall be kept to a minimum.
- If ditch is in use during construction, coordinate work schedule with water users. Also keep existing screen operational until new structure is fully functional. Any temporary channels shall be backfilled and compacted, and surface prepared for reseeded.
- Complete rip rap work both upstream and downstream from new structures. See structure sheet for requirements.
- Contractor shall insure all ditch banks upstream from the new structure are raised to minimum elevation shown. Excavated material shall be used for this purpose to maximum extent possible. Removal of excess material or importation of fill shall be at contractor's sole expense.
- Construct one new concrete screen structure. The structure to be a three drum paddle wheel design with 30" dia. screens, each 12' long. Design flow = 28 cfs.
- Confirm bypass out fall site with IDFG personnel. Bypass pipe exits the structure on the side wall of the bypass well.
- A non-standard orifice plate is required at this site.
- Structure control points (SCP) are to inside corners of the structure wall. See dwg. 3 (-262)
- For general survey control points (GSCP) see table below.

POINT #	COORDS & ELEV.
GSCP-1	N 10,000.00 E 5,000.00 Elev. 100.00
GSCP-2	N 9,545.34 E 5,262.50 Elev. 102.56
GSCP-3	N 10,130.02 E 5,383.56 Elev. 95.48
GSCP-4	Elev. 95.91

SECTION 3, TOWNSHIP 20N,
RANGE 23E, B.M.
BAKER, ID. 7.5' USGS
QUADRANGLE



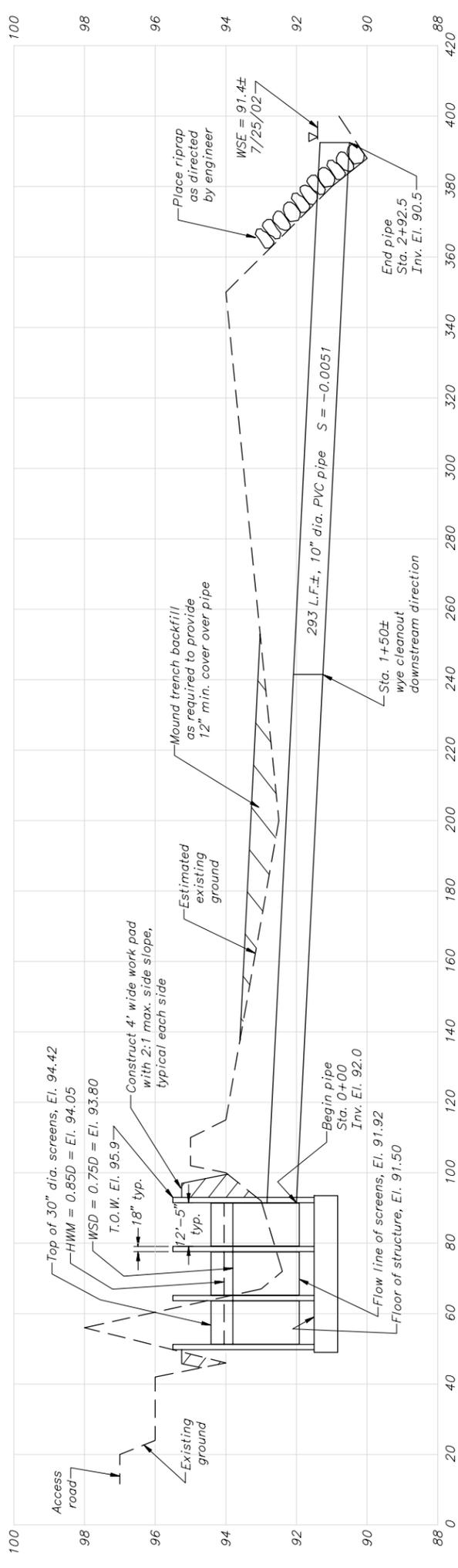
ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

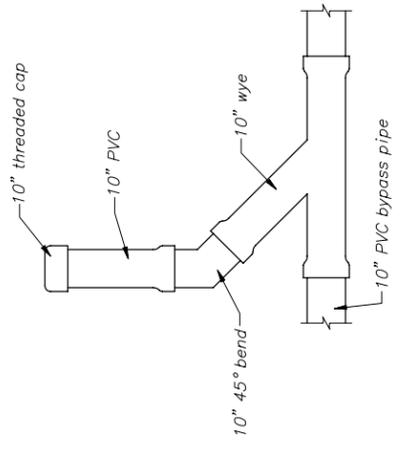
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
L13 DIVERSION
FISH SCREEN REPLACEMENT
SITE PLAN

DESIGNED: _____ CHECKED: _____
DRAWN: Ed Merabost TECH. APPROVAL: _____
PROGRAM MANAGER: _____

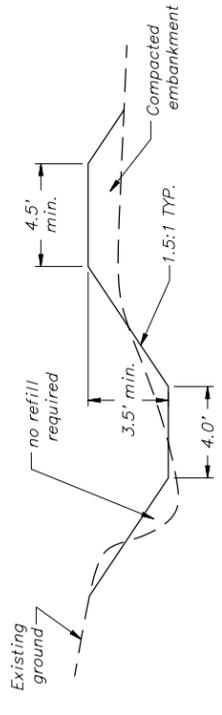
CADD SYSTEM: _____
CADD DATE: 2/15/06
NOVEMBER 2005



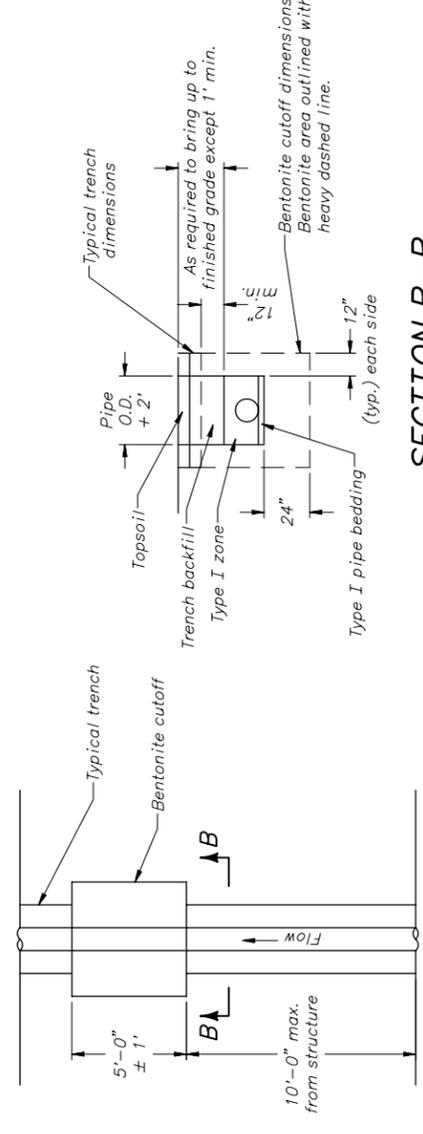
SECTION A-A
FISH BYPASS AND SCREEN PROFILE



TYPICAL DETAIL
BYPASS PIPE CLEANOUT
Note: arrows on plan indicate direction to be cleaned



TYPICAL DITCH SECTION



TYPICAL PLAN
BENTONITE CUTOFF
FOR BYPASS PIPE

SECTION B-B

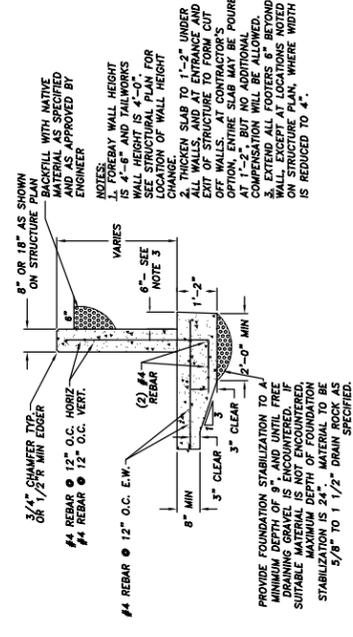
Note: Pipe backfill and bedding not continuous thru cutoff

ALWAYS THINK SAFETY

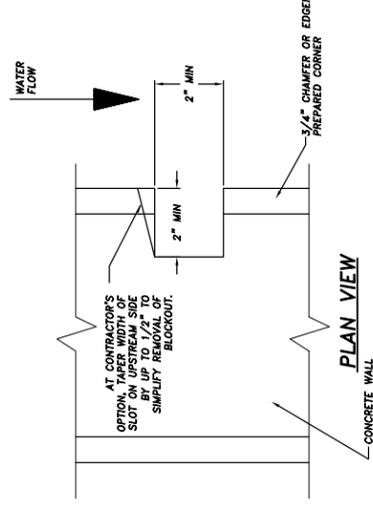
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
FISH SCREEN STRUCTURE
SECTIONS AND DETAILS

DESIGNED: _____ CHECKED: _____
DRAWN: _____ TECH. APPROVAL: _____ PROGRAM MANAGER: _____
CAD SYSTEM: MICROSTATION 2004
DATE: 11/17/18
DRAWN BY: BOB SELO
DATE: NOVEMBER 2002
PROJECT # 1678-100-264

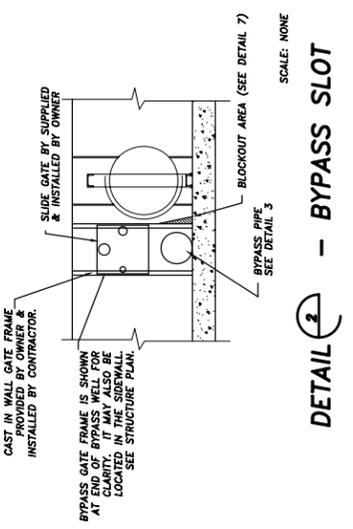
SPECIFICATION #



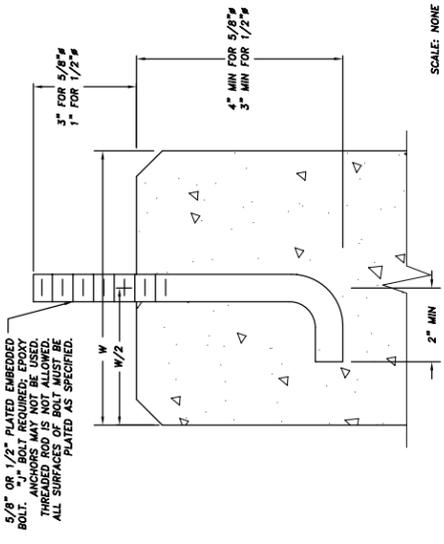
SCALE: NONE
DETAIL 1 - WALL SECTION



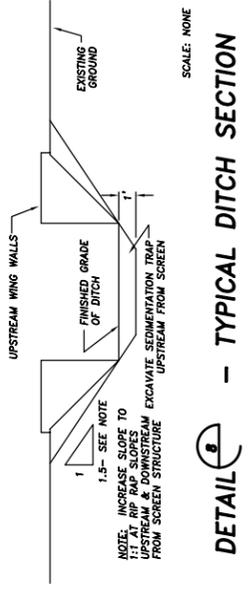
SCALE: NONE
DETAIL 2 - STOP LOG SLOT DETAIL



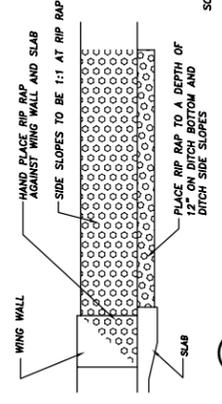
SCALE: NONE
DETAIL 3 - BYPASS SLOT



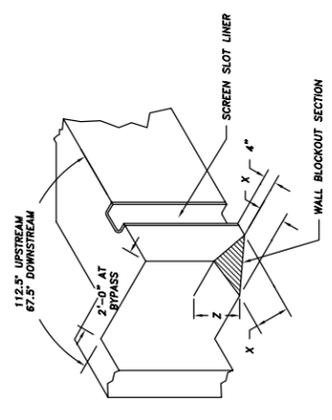
SCALE: NONE
DETAIL 4 - EMBEDDED BOLT DETAIL



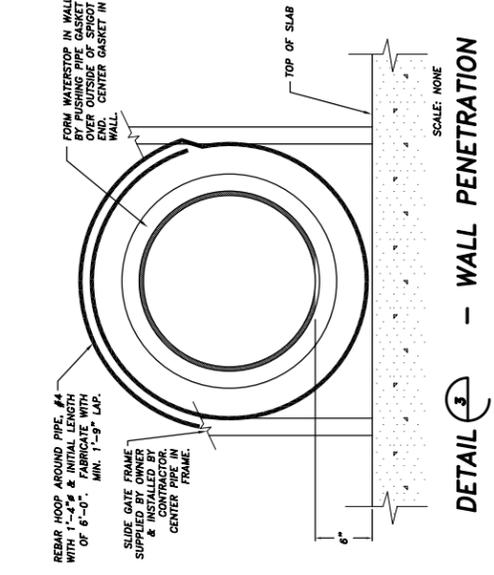
SCALE: NONE
DETAIL 5 - TYPICAL DITCH SECTION



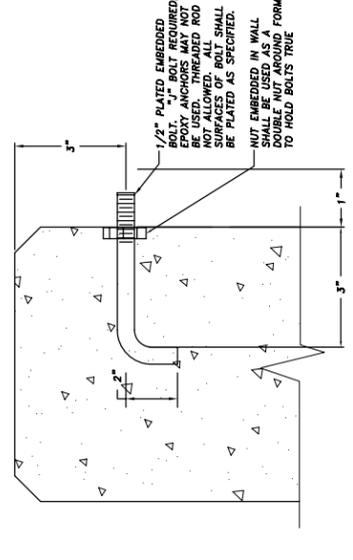
SCALE: NONE
DETAIL 6 - TYPICAL DITCH PROFILE



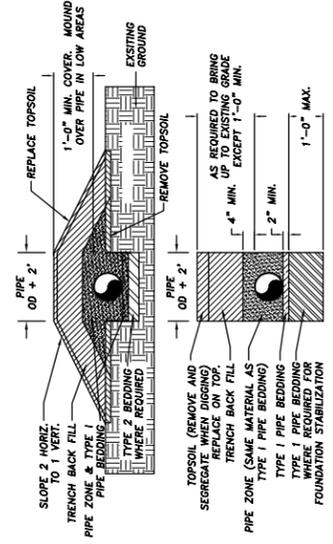
SCALE: NONE
DETAIL 7 - CORNER BLOCKOUT DETAIL



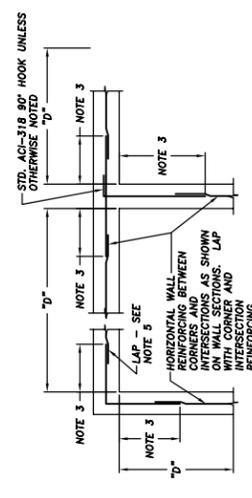
SCALE: NONE
DETAIL 8 - WALL PENETRATION



SCALE: NONE
DETAIL 9 - EMBEDDED BOLT DETAIL



SCALE: NONE
DETAIL 10 - TYPICAL BYPASS PIPE TRENCH



TYPICAL CORNER AND INTERSECTION REINFORCING

TYPICAL HORIZONTAL WALL CORNER AND INTERSECTION REINFORCING LAYOUT IS SHOWN TO AVOID CONGESTION AND PERMIT PROPER PLACEMENT FOR SIZE AND SPACING SEE PLANS. ALL HORIZONTAL REINFORCING AT CORNERS AND INTERSECTIONS SHALL BE FABRICATED AND INSTALLED WITH SPLICES LOCATED WHERE SHOWN REGARDLESS OF SIZE AND SPACING.

WHERE THE CORNER OR INTERSECTION REINFORCING SIZE AND SPACING IS NOT SHOWN, SPLICES SHALL BE LOCATED AT THE MIDPOINT BETWEEN THE WALL SECTIONS OR AS NOTED FOR THE REINFORCING BETWEEN THE CORNERS OR INTERSECTIONS.

EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS, THE LENGTH INDICATED AS "NOTE 3" SHALL BE THE LESSER OF $D/4$ TO FEET, OR 1.0 TIMES THE HEIGHT OF THE WALL, EXCEPT THAT IN NO CASE SHALL IT BE LESS THAN 2.0 FEET.

D - LENGTH OF WALL PARALLEL TO THE BAR LENGTH IN QUESTION.

EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS, THE LENGTH INDICATED AS "NOTE 3" SHALL BE EQUAL TO ONE "LAP LENGTH" AS REQUIRED BY THE GENERAL STRUCTURAL REINFORCING BARS BEING SPLICED.

GENERAL STRUCTURAL NOTES

- STRUCTURAL MATERIALS**
- REINFORCING BARS SHALL BE ASTM A615, GRADE 60
 - CONCRETE:
 - MINIMUM STRENGTH AT 28 DAYS $f' = 4,000$ PSI
 - MINIMUM CEMENT CONTENT = 564 LBS/CY
 - ALL CONCRETE SHALL BE AIR ENTRAINED, $6\% \pm 1\%$
 - CONCRETE SLUMP - 2" TO 4"
- FOUNDATIONS**
- FOUNDATIONS WERE DESIGNED USING THE FOLLOWING SOILS DATA:
 - MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSF
 - DESIGN FROST DEPTH BELOW FINISHED GRADE OF 4'-0"
 - LATERAL SOIL PRESSURE OF 50 PCF EQUIVALENT FLUID PRESSURE
 - EXCESSIVE WETTING OR DRYING OF THE FOUNDATION EXCAVATION SHALL BE AVOIDED DURING CONSTRUCTION.
 - BACKFILL ON WALLS WITH FILL ON BOTH SIDES SHALL BE COMPACTED IN EQUAL LIFTS EACH SIDE OF WALL NOT TO EXCEED 8". WALLS BACKFILLED ON ONE SIDE ONLY SHALL HAVE ALL SUPPORTING SLABS OR OTHER ADEQUATE BRACING IN PLACE PRIOR TO BACKFILLING. BACKFILL SHALL BE COMPACTED TO A MINIMUM OF 95% RELATIVE DENSITY (FOR ALL TYPES OF FILL) OR 75% OF THE SPECIFIED 28 DAY STRENGTH (NORMALLY 7 DAYS MINIMUM CURE TIME), THAN 75% OF THE SPECIFIED 28 DAY STRENGTH (NORMALLY 7 DAYS MINIMUM CURE TIME).
- SLABS ON GRADE**
- SLABS ON GRADE SHALL BE REINFORCED AS NOTED ON THE DRAWINGS.
 - PROVIDE ONE (1) #4 X 4'-0" PARALLEL TO EDGE OF SLAB OPPOSITE THE END OF ALL DISCONTINUED SLAB JOINTS, AND ONE (1) #4 X 4'-0" DIAGONAL BAR AT ALL REINFRANT CORNERS. PLACE BARS MID-DEPTH IN SLAB AND 2" CLEAR FROM EDGE OR CORNER.

- CONCRETE**
- CONCRETE COVER OVER REINFORCEMENT SHALL BE 2" CLEAR, EXCEPT FOR THE FOLLOWING, UNLESS OTHERWISE INDICATED:
 - CONCRETE PLACED PERMANENTLY EXPOSED TO EARTH - 3" CLEAR.
 - REINFORCEMENT SPLICES NOT PERMITTED EXCEPT AS DETAILED OR AUTHORIZED BY THE ARCHITECT. SPLICES SHALL BE LOCATED AT LEAST 10" FROM CORNERS AND INTERSECTIONS UNLESS OTHERWISE INDICATED:
 - #4 REBAR - USE 1'-9"
 - #5 REBAR - USE 1'-6"
 - #6 REBAR - USE 2'-7"
 - ADJACENT REINFORCEMENT LAP SPLICES IN WALLS SHALL BE STAGGERED 18" MIN.
 - ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 3/4", OR EDGED WITH 1/2" RADIUS.
 - FIELD BENDING OF REINFORCING NOT PERMITTED.

ALWAYS THINK SAFETY

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION

L13 DIVERSTON
 SCREEN REPLACEMENT
 DETAILS

DESIGNED: _____ CHECKED: _____
 DRAWN: _____ TECH. APPROVAL: _____

PROGRAM MANAGER
 CODY STEVEN
 CDD-1100-2016-12
 BOISE, IDAHO
 NOVEMBER 2002 **1678-100-266**