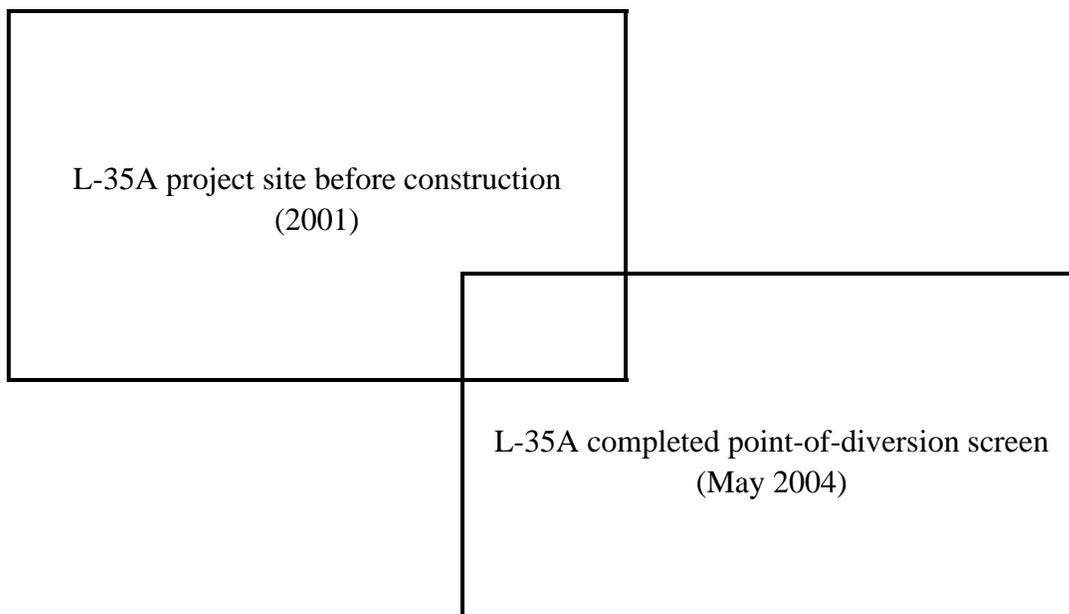


**Completion Report
Lemhi River L-35A
Fish Screen and Headgate Replacement
Lemhi River Subbasin
Salmon, Idaho**



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

October 2007



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	4

Attachments

- Attachment A: Construction Photographs of L-35A Project
- Attachment B: Design Drawings of L-35A Project

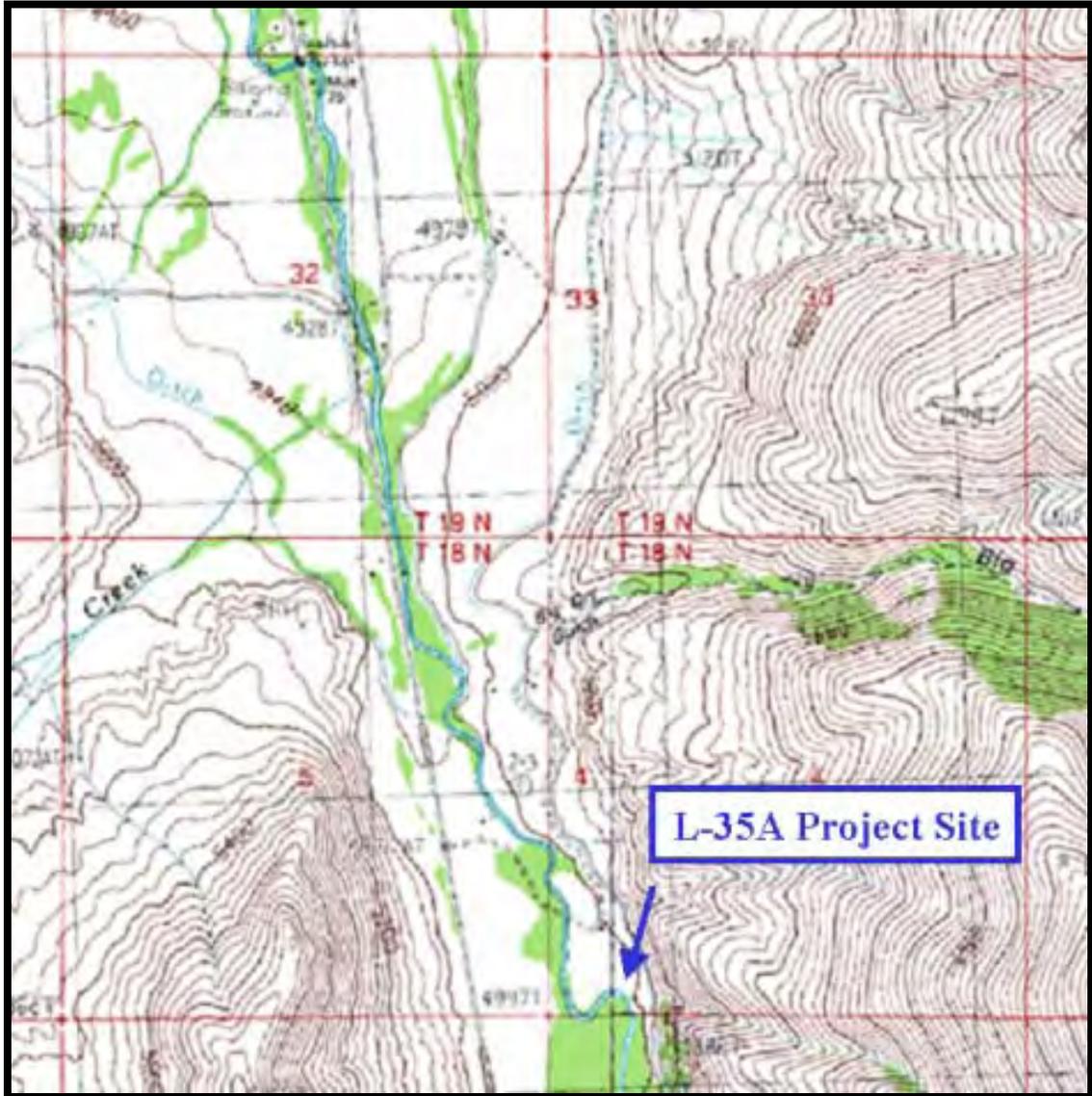


Figure 1. Vicinity map of Lemhi River L-35A screen replacement project

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 2001, 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Fish Screen Shop (Screen Shop) requested the Bureau of Reclamation's (Reclamation) assistance with replacement of an outdated fish screen in a diversion ditch on the Lemhi River.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 dilapidated fixed plate wiper screen located in the L-35A diversion ditch (cover photos), was replaced with a solar powered, point-of-diversion (POD) fish screen. The POD screen, which allows for delivery and control of diverted irrigation water, screens migratory and resident fish from entry into the irrigation ditch, and meets fish screening criteria as set forth by the National Marine Fisheries Service (NMFS).

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-35A 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

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.

diversion dams to raise water levels and/or direct water into irrigation conveyance canals 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-35A diversion, although partially extended into the Lemhi River, did not significantly interfere with fish passage and functioned well for diversion of water into the ditch. Therefore, diversion replacement was unnecessary and not a component of this project. However, the existing fish screen in the ditch was in disrepair and ineffective in preventing entrainment and returning fish to the river. Furthermore, the fish screen did not comply with NMFS screening criteria. The wooden headgate was old and in need of replacement.

In 2002, Reclamation was asked by the project sponsor (IDFG) to provide technical assistance for the design of a new fish screen for L-35A. Reclamation approached the irrigator/landowner representative about screen replacement and obtained permission to pursue project design. Coordination between the irrigator representative, IDFG, Reclamation, and consulting agencies was necessary for development of a screen design that was acceptable. Reclamation engineers determined that a combined headgate/fish screen located at the POD was best suited for this site.

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-35A screen project was funded under the direction of the Tributary Habitat Program. Technical assistance provided by Reclamation included project coordination, environmental compliance assistance, and development of contract design documents.

Funding for construction of the L-35A 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 provided access to private property and participated in design and construction meetings.

1.3 Environmental Compliance

During development of preliminary design, Reclamation's staff person in the Salmon Field Office initiated contact with NMFS and USFWS for ESA compliance. Reclamation's Pacific Northwest Regional Archeologist completed a cultural resource survey of the site and coordinated with the Idaho State Historic Preservation Office (SHPO). Reclamation also contracted with a consulting firm for preparation of a Biological Assessment (BA). The BA was provided to IDFG for use in ESA consultation with NMFS and USFWS. Upon provision of the draft screen design, archeological survey and SHPO clearance, and BA to IDFG, Reclamation had no further involvement in the completion of requirements for in-stream permitting, or compliance with the National Environmental Policy Act (NEPA) or ESA. Compliance with NEPA, 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 27.5 on the Lemhi River in central Idaho, approximately 5 miles southeast of the town of Tendoy, in Lemhi County (Figure 1). The project encompassed replacement of the L-35 headgate and fish screen structures with a consolidated headgate and vertical flat plate fish screen with a solar powered cleaning mechanism. The new screen is located at the former ditch POD.

2.1 Construction

Reclamation was not involved in the construction of the L-35A fish screen. The Snake River Area and Salmon Field Offices provided technical assistance with initial coordination, environmental compliance, and the development of final draft design all of which was provided to IDFG for 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 in the fall of 2003.

3. Conclusions

The L-35A screen replacement project was a success. An outdated, ineffective fish screen and headgate were replaced with a new consolidated headgate and fish screen structure.

Reclamation initiated the project and developed a draft design. The IDFG Screen Shop took that design and continued the project through to completion. The new solar powered, POD fish screen will prevent the entrainment of fish in the ditch and provide the irrigator with a headgate and fish screen that comply with State and Federal requirements for water delivery, screening, and fish passage.

Reclamation is grateful to the IDFG 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 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-35A Irrigation Headgate and
Fish Screen Replacement
Lemhi River Subbasin
Salmon, Idaho**

**Attachment A
Construction Photographs**

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



Photograph 1. Old L-35A wiper screen



Photograph 2. Old L-35A headgate



Photograph 3. L-35A project site before construction



Photograph 4. L-35A project site during construction



Photograph 5. L-35A project site – cofferdam/dewatering looking downstream



Photograph 6. L-35A project site – cofferdam /dewatering looking upstream



Photograph 7. L-35A construction



Photograph 8. L-35A concrete walls poured – cofferdam removed



Photograph 9. L-35A interior view prior to screen installation



Photograph 10. L-35A interior view with screen components



Photograph 11. L-35A interior view with screen components



Photograph 12. L-35A completed point-of-diversion screen

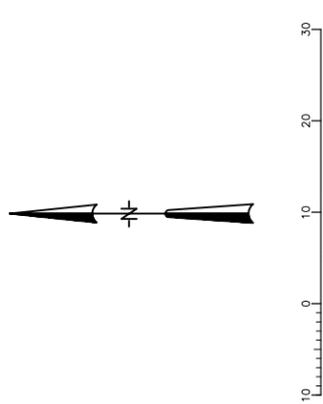
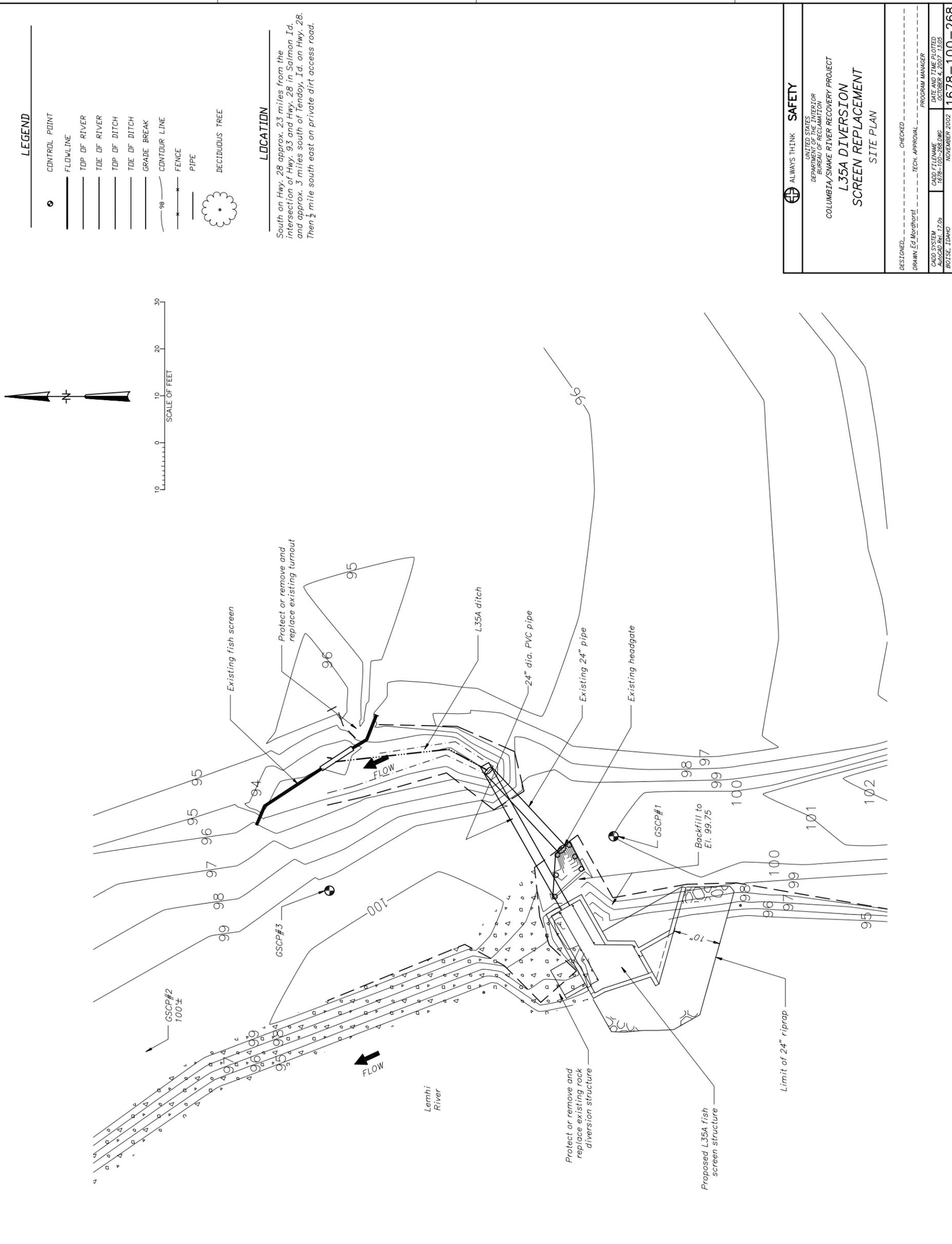


Photograph 13. L-35A completed point-of-diversion screen

Attachment B
Final Design Drawings

Final Design Drawings L-35A Irrigation Headgate and Fish Screen Replacement

1678-100-268	L-35A Diversion Screen Replacement, Site Plan
1678-100-267	L-35A Diversion Screen Replacement, Fish Screen Structure Plans
1678-100-269	L-35A Diversion Screen Replacement, Sections and Details



LEGEND

- CONTROL POINT
- FLOWLINE
- TOP OF RIVER
- TDE OF RIVER
- TOP OF DITCH
- TDE OF DITCH
- GRADE BREAK
- CONTOUR LINE
- FENCE
- PIPE
- ☼ DECIDUOUS TREE

LOCATION

South on Hwy. 28 approx. 2.3 miles from the intersection of Hwy. 93 and Hwy. 28 in Salmon Id. and approx. 3 miles south of Tendency, Id. on Hwy. 28. Then 1/2 mile south east on private dirt access road.

GENERAL NOTES

- REMOVE EXISTING SCREEN STRUCTURE, HEAD GATE STRUCTURE, AND PIPE & HAUL TO AN APPROVED DISPOSAL SITE.
- STRIP TOPSOIL AND STOCKPILE. REPLACE UPON COMPLETION OF WORK. DISTURBANCE OF EXISTING VEGETATION ON DITCH BANKS & 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 & RESEEDING.
- COMPLETE RIP RAP WORK AS SHOWN ON SITE PLAN.
- EXCAVATED MATERIAL SHALL BE RE-USED TO MAXIMUM EXTENT POSSIBLE. REMOVAL OF EXCESS MATERIAL OR IMPORTATION OF FILL SHALL BE AT CONTRACTOR'S SOLE EXPENSE.
- CONSTRUCT NEW CONCRETE SCREEN STRUCTURE. STRUCTURE TO BE A 10' WIDE VERTICAL FLAT PLATE SCREEN WITH A PADDLE WHEEL DRIVE SCREEN CLEANER. DESIGN FLOW = 4.3 CFS.
- STRUCTURE CONTROL POINTS (S.C.P.) ARE TO OUTSIDE CORNERS OF THE STRUCTURE WALL.
- FOR GENERAL SURVEY CONTROL POINTS (GSCP) SEE TABLE BELOW.

POINT # COORDINATES

GSCP#1	N 10000.00 E 5000.00 El. 100.00
GSCP#2	N 10161.68 E 4906.65 El. 99.57
GSCP#3	N 10060.40 E 4988.42 El. 99.71
S.C.P. 1	N 9984.5 E 4989.2
S.C.P. 2	N 9990.2 E 4968.6

SECTION 4, TOWNSHIP 18N, RANGE 24E, 8M.
AGENCY CREEK, ID 7.5' USGS QUADRANGLE

SAFETY

ALWAYS THINK SAFETY

UNITED STATES DEPARTMENT OF AGRICULTURE BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER RECOVERY PROJECT

L35A DIVERSION

SCREEN REPLACEMENT

SITE PLAN

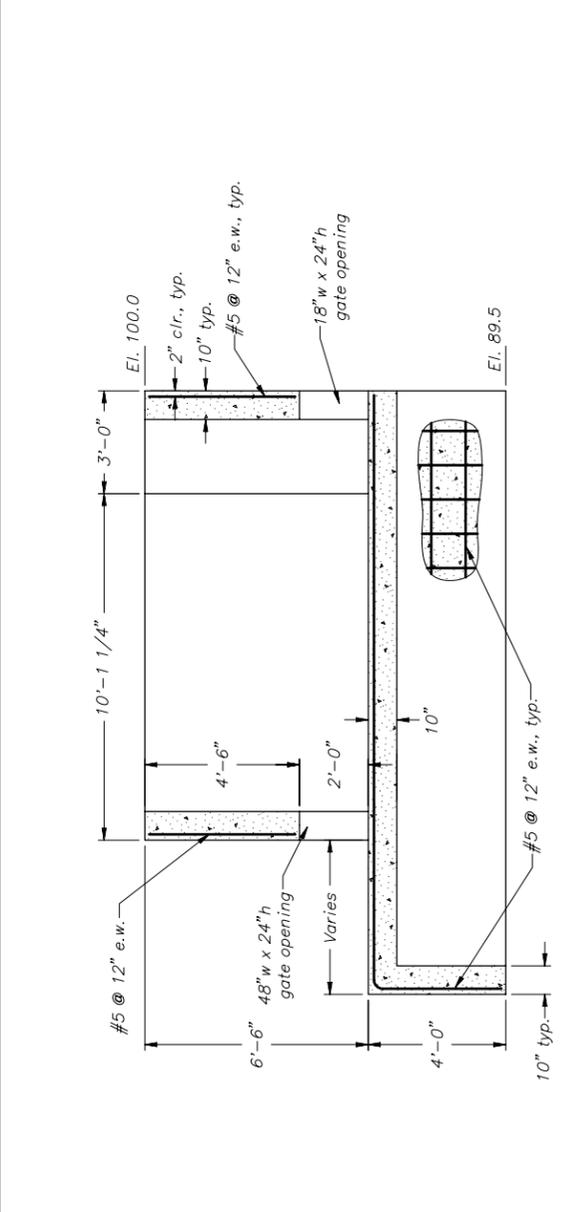
DESIGNED: _____ CHECKED: _____

DRAWN: Ed. Morfines! TECH. APPROVAL: _____ PROGRAM MANAGER: _____

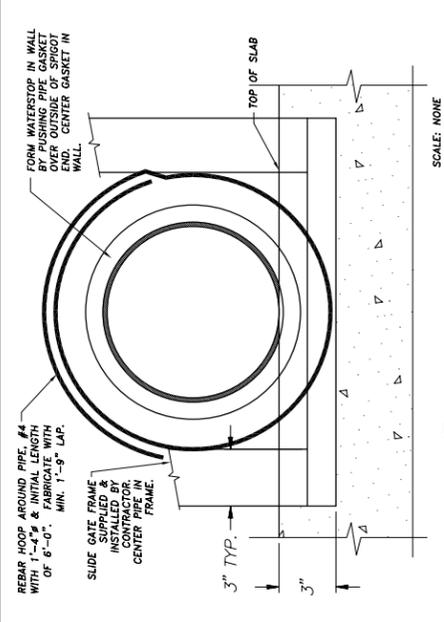
CADD SYSTEM: AutoCAD Rev. 17.0s DATE AND TIME PLOTTED: OCTOBER 4, 2007 13:05

1678-100-268.DWG NOVEMBER 2002

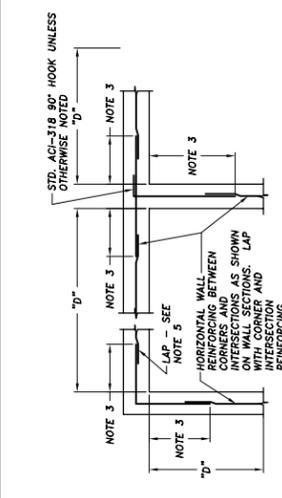
1678-100-268



SECTION 2



DETAIL 1 - WALL PENETRATION



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 AS SHOWN ON THE WALL SECTIONS OR AS NOTED FOR THE WALL HORIZONTAL REINFORCING SHOWN ON 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 $D/4$, 10 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.

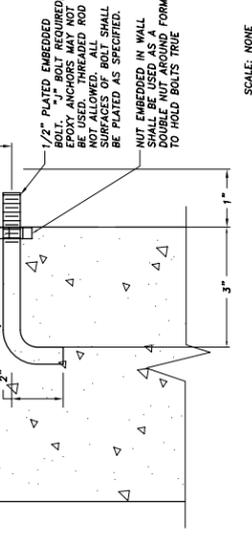
EXCEPT WHERE OTHERWISE SHOWN ON THE DRAWINGS, THE LENGTH INDICATED AS "NOTE 5" SHALL BE EQUAL TO ONE "LAP LENGTH" AS REQUIRED BY THE GENERAL STRUCTURAL REINFORCING BARS BEING SPLICED.

GENERAL STRUCTURAL NOTES

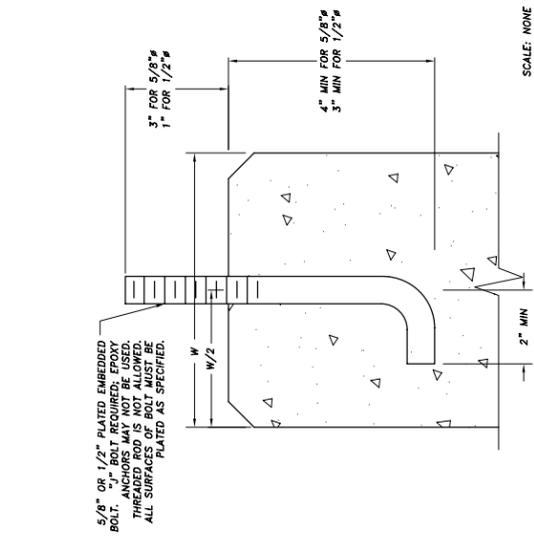
- STRUCTURAL MATERIALS**
- REINFORCING BARS SHALL BE ASTM A615, GRADE 60
 - CONCRETE:
 - REINFORCING BARS SHALL BE ASTM A615, GRADE 60
 - MINIMUM STRENGTH AT 28 DAYS $F' = 4,000$ PSI
 - MINIMUM CEMENT CONTENT = 564 LBS/CY
 - ALL CONCRETE SHALL BE AIR ENTRAINED, 6% # 1X
 - CONCRETE SLUMP - 2" TO 4"
- FOUNDATIONS**
- FOUNDATIONS WERE DESIGNED USING THE FOLLOWING SOIL DATA:
 - MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSI
 - 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 BACK FILLED ON ONE SIDE ONLY SHALL HAVE ALL SUPPORTING SLABS OR OTHER ADEQUATE BRACING IN PLACE PRIOR TO BACKFILLING. BRACING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. BACKFILL SHALL BE AT LEAST 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 ENGINEER. SPLICES SHALL BE STAGGERED WITH MINIMUMS AT ALL SPLICES, 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.

GENERAL STRUCTURAL NOTES

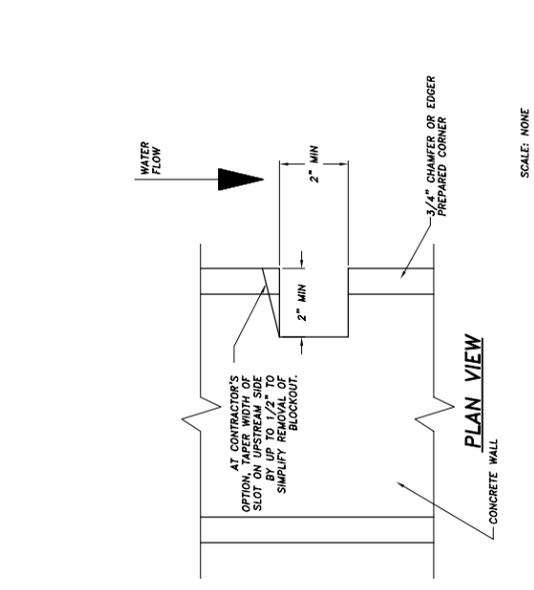
- STRUCTURAL MATERIALS**
- REINFORCING BARS SHALL BE ASTM A615, GRADE 60
 - CONCRETE:
 - REINFORCING BARS SHALL BE ASTM A615, GRADE 60
 - MINIMUM STRENGTH AT 28 DAYS $F' = 4,000$ PSI
 - MINIMUM CEMENT CONTENT = 564 LBS/CY
 - ALL CONCRETE SHALL BE AIR ENTRAINED, 6% # 1X
 - CONCRETE SLUMP - 2" TO 4"
- FOUNDATIONS**
- FOUNDATIONS WERE DESIGNED USING THE FOLLOWING SOIL DATA:
 - MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSI
 - 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 BACK FILLED ON ONE SIDE ONLY SHALL HAVE ALL SUPPORTING SLABS OR OTHER ADEQUATE BRACING IN PLACE PRIOR TO BACKFILLING. BRACING SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION. BACKFILL SHALL BE AT LEAST 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 ENGINEER. SPLICES SHALL BE STAGGERED WITH MINIMUMS AT ALL SPLICES, 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.



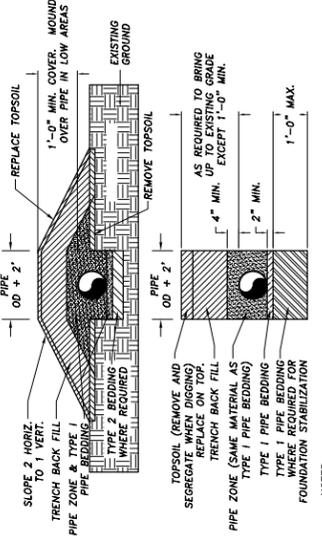
DETAIL 3 - EMBEDDED BOLT DETAIL



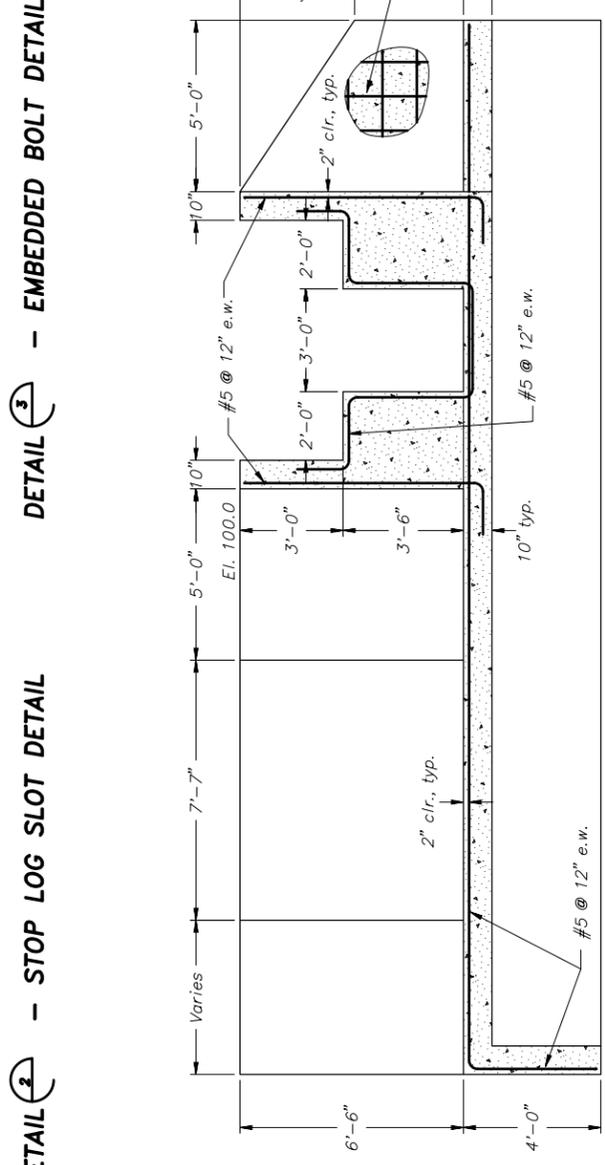
DETAIL 3 - EMBEDDED BOLT DETAIL



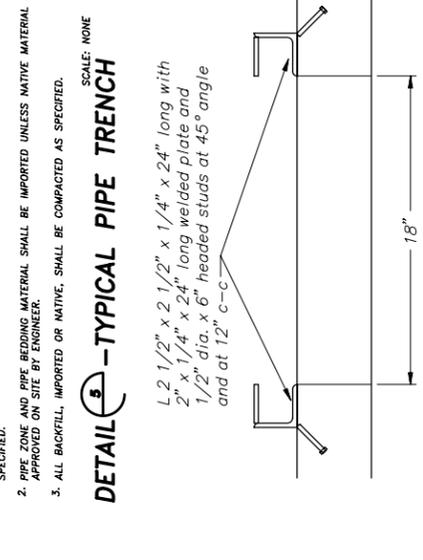
DETAIL 2 - STOP LOG SLOT DETAIL



DETAIL 5 - TYPICAL PIPE TRENCH



SECTION 3



DETAIL 6

ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

**L35A DIVERSION
SCREEN REPLACEMENT
SECTIONS AND DETAILS**

DESIGNED BY: Phil Mann
DRAWN BY: Ed Mordhorst
CHECKED BY: _____
TECH. APPROVAL: _____

PROGRAM MANAGER
COURTNEY M. BROWN
BOISE, IDAHO
NOVEMBER 2002

1678-100-269