

Completion Report Lemhi River L-3 Wasteway Diversion Fish Barrier

Lemhi River Subbasin Salmon, Idaho



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

February 2008

Old L-3 temporary wasteway fish bar screen
(buried under debris)
(Photo taken 9/11/2002)

New L-3 wasteway diversion/fish barrier
after completion
(Photo taken 10/6/2005)

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.

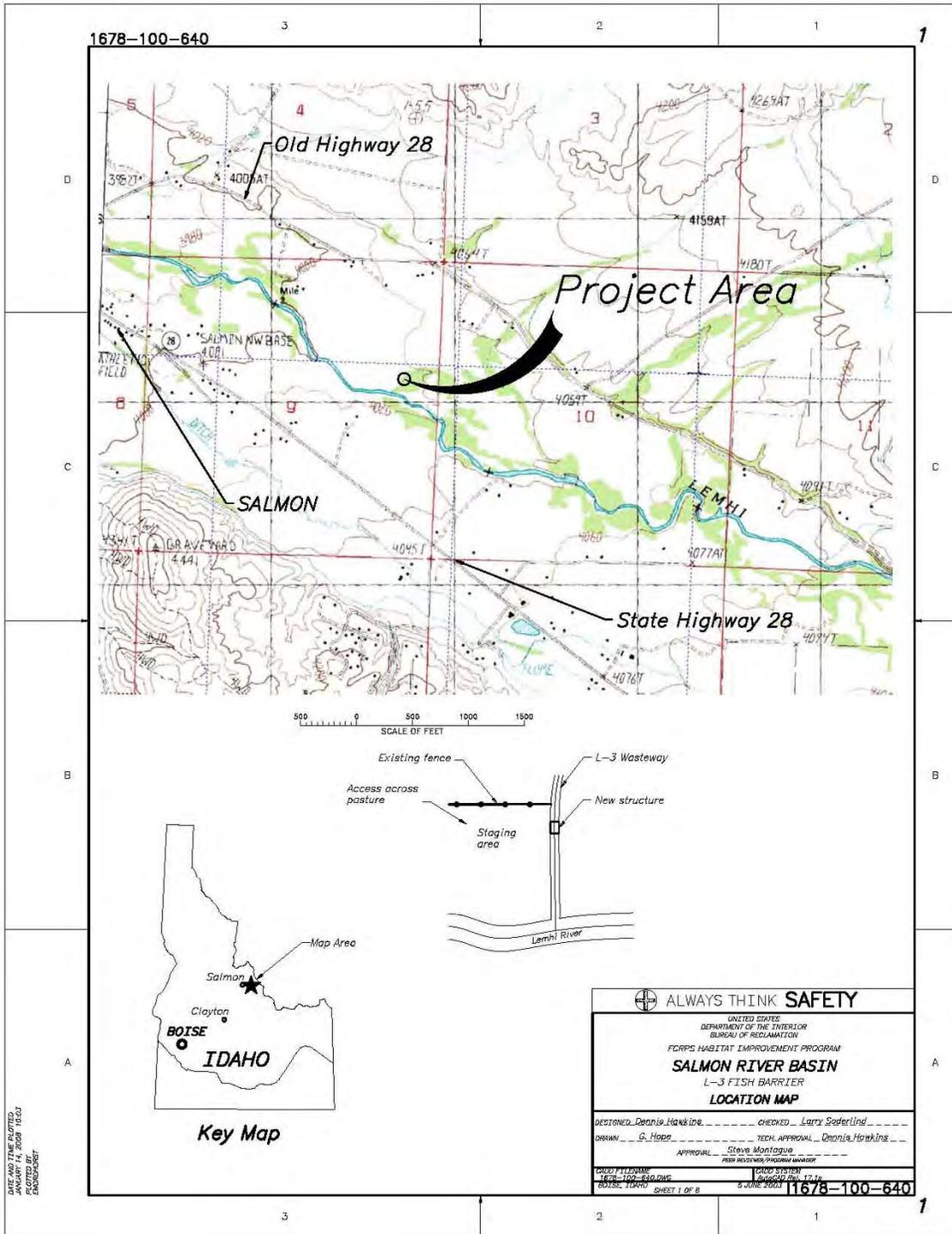


Figure 1. Location map of Lemhi River L-3 wasteway diversion fish barrier project

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Attachments

- Attachment A: Photographs of L-3 Project
- Attachment B: Design Drawings of L-3 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, blocking upstream migration, and entrapping juvenile fish in the unscreened diversions as they migrate downstream. In 2004, the L-3 watermaster requested the Bureau of Reclamation's (Reclamation) assistance with installation of a fish barrier in an irrigation wasteway channel that discharges into the Lemhi River. The new diversion/fish barrier (cover photo), was constructed to meet fish screening criteria as set forth by the National Marine Fisheries Service (NMFS). When in operation, the new structure provides an effective means for blocking fish from entering the upper reaches of the L-3 irrigation ditch system via a wastewater return channel.

The primary objective of this project was to implement actions to prevent the entrainment of adult and juvenile salmon and steelhead in the L-3 irrigation ditch system at a location near where excess water is discharged into the Lemhi River. 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 NMFS 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 typically 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 a ditch and distributed to agricultural fields. If diverted water is unscreened, fish can be carried onto fields or entrapped in ditches.

The L-3 irrigation diversion was a typical gravel/rock push-up berm that extended across the Lemhi River. In 2002, Reclamation and Bonneville Power Administration (BPA), worked with landowners, irrigators and local entities to construct a new river diversion that requires less instream maintenance and provides better fish passage.

Diverted Lemhi River water is conveyed via the L-3 ditch through a fish screen and into a series of check structures, headgates, and lateral ditches that convey water to adjacent fields. Like numerous other Lemhi irrigation ditch diversion systems, water diverted at L-3 in excess of irrigation needs flows back to the Lemhi River via wasteway channels. The L-3 ditch system intercepts and uses the lower portion of a former tributary creek channel for conveyance of irrigation water and for wastewater return to the river. At times, this wasteway channel provides discharge flows and habitat that attract migrating adult salmon and steelhead thereby providing "backdoor" access into the ditch system. In 2001 and 2003, the Idaho Fish and Game (IDFG) discovered dead adult chinook salmon in the upper reaches of the L-3 ditch system. Investigation by IDFG and NMFS revealed that migrating fish probably entered the ditch system via the wasteway channel, swam upstream to the upper reaches into the tailwater area of the hydraulic fish screen where they were struck and killed by the rotating paddle wheels. After each incident, IDFG personnel erected a portable bar screen in a wasteway channel near the confluence with the Lemhi River as a temporary measure to restrict fish entry into the ditch system. Lack of maintenance resulted in debris accumulation against the bar screen causing erosion of adjacent wasteway channel embankments, screen failure, and landowner complaints.

In 2003, IDFG pursued installation of a permanent fish barrier to be placed in the L-3 wasteway and requested Reclamation’s assistance with development of the design. The preliminary structure design did not satisfy operational requirements or maintenance concerns of the irrigators and, therefore, was not accepted. Further efforts to install a permanent fish barrier structure in the L-3 wasteway channel were discontinued.

In 2004, concern about continued risk of injury to ESA-listed fish prompted the L-3 watermaster to contact Reclamation and request assistance with development of a project to fund and construct a permanent fish barrier in the L-3 wasteway. With the watermaster's assistance, permission was obtained from the irrigators and the landowner for Reclamation to pursue the project. BPA was contacted and agreed to provide funding for construction.

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 spawning and rearing deficiencies associated with these limiting factors.

Reclamation's participation in the L-3 wasteway diversion fish barrier project was funded under the direction of the Tributary Habitat Program. Technical assistance provided by Reclamation included project coordination, topographic survey, environmental compliance, engineering design, and construction inspection.

While BPA provided funding for construction of the L-3 wasteway diversion fish barrier, Lemhi Soil and Water Conservation District (LSWCD) served as the project sponsor and handled distribution and administration of BPA funding. The Upper Salmon Basin Watershed Project (USBWP) provided assistance on behalf of the LSWCD with environmental compliance. The L-3 watermaster was very helpful to Reclamation in site selection and development of conceptual and final design. The landowner, irrigators, and neighbors graciously allowed access through private property to the project site.

1.3 Environmental Compliance

The BPA was the lead agency with responsibility for environmental compliance but relied upon Reclamation to serve as its local representative. National Environmental Policy Act (NEPA) compliance was jointly completed by Reclamation and BPA.

Consultation with NMFS was conducted in accordance with the 2004 BPA/NMFS Habitat Improvement Program Biological Opinion (HIP BiOp) which included development of a monitoring plan. Prior construction of a permanent fish barrier structure intended to block "backdoor" entry of anadromous fish into ditch systems had never been attempted in the Lemhi subbasin. Therefore, BPA's funding was contingent upon development and implementation of a monitoring plan to ascertain the effectiveness of this structure to prevent "backdoor" access by fish. The premise being that if the project was successful, it could serve as a "pilot" for the design and construction of similar projects in the future. Input was solicited from the watermaster, BPA, IDFG, NMFS, and USFWS during development of design. Informal ESA consultation with the USFWS resulted in a "No Effect" determination.

The local Natural Resource Conservation Service and the Boise National Forest provided assistance with cultural resource review and consultation for the site.

Informal consultation with State and Federal permit agencies revealed application for instream work permits was unnecessary since construction was occurring within an irrigation channel.

The USBWP assisted with HIP BiOp compliance and together with IDFG, agreed to monitor the effectiveness of the barrier after construction. Irrigators agreed to assume ownership of the structure and responsibility for maintenance and daily operation for irrigation, wastewater return, and fish screening.

1.4 Contract Specifications and Bidding

Reclamation's Pacific Northwest (PN) Region design office developed and provided to the LSWCD separate draft and final project drawings. Preliminary and draft designs were widely circulated by Reclamation for review and comment prior to finalization and project implementation.

Contract design specifications developed for the L-3 wasteway project called for the construction of a concrete diversion with an adjustable overshot gate and an adjustable fish barrier/bar screen. The LSWCD distributed an advertisement for sealed bids in area newspapers. A pre-bid tour was held onsite during the advertisement period. Down to Earth Construction of Salmon, Idaho was the only bidder for the project and was awarded a contract to complete construction.

2. Project Description

The L-3 wasteway project is located on private land adjacent to the Lemhi River near River Mile 2.5 in central Idaho, near the town of Salmon, in Lemhi County (Figure 1-Frontispiece). To facilitate operation and maintenance by the irrigators, the fish barrier was constructed at the site of an old wooden diversion/check structure located in the wasteway channel approximately 100 yards from the confluence with the river. The check structure was removed and in its place a combination diversion/fish barrier was constructed that utilizes an overshot gate for control of water surface elevation and diversion into a lateral ditch. The new structure includes an adjustable bar screen below the gate to restrict upstream passage of adult salmon and steelhead when excess water is not diverted for irrigation. The gate and bar screen can be operated independently or in tandem for water diversion, debris removal, and fish screening.

2.1 Construction

During construction of the L-3 wasteway diversion fish barrier, Reclamation provided onsite inspection and field engineering assistance from the Salmon Field Office. The design engineer from the PN Region office was also available for consultation during construction.

Construction began in the late summer of 2005 during the irrigation season. Site dewatering was maintained by diversion of water into lateral ditches upstream of the construction area. Construction was completed in early October 2005.

Vegetation removal from channel embankments was negligible. To minimize construction impacts, only existing roads or paths were utilized. Minor ground contouring and replacement of a farm gate were necessary to facilitate construction access across pasture land. Rock riprap was placed on channel embankments upstream of the structure for armoring and erosion control. Upon completion of construction, disturbed soils were seeded and mulched.

3. Conclusions

The L-3 wasteway diversion/fish barrier project provides the irrigators with a dual purpose structure in a wasteway channel that can block the backdoor entry of migrating anadromous salmon and steelhead into the upper reaches of the ditch system. The new diversion fish barrier structure improves control and diversion of irrigation water in the wasteway channel. The bar screen also provides an effective wasteway fish barrier at times when excess water in the wasteway channel is not being diverted for irrigation purposes.

Reclamation is grateful to BPA for providing the funding necessary for the construction of this project and for the help provided by its staff. Appreciation is also extended to the local NRCS, USBWP, and LSWCD for assistance provided with environmental compliance and contract administration. Thanks are extended to the landowner, irrigators, and neighbors who graciously allowed Reclamation access to private property. Finally, special thanks to the L-3 watermaster for providing invaluable assistance throughout the development of this project.

**Completion Report
Lemhi River L-3 Wasteway Diversion
Fish Barrier
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. Wasteway channel near confluence with Lemhi River



Photograph 2. Portable bar screen in wasteway channel buried under debris



Photograph 3. Old wooden irrigation check structure in wasteway channel



Photograph 4. Sideview of old wooden check structure and lateral ditch headgates



Photograph 5. Conceptual model of the new diversion/fish barrier (prepared by watermaster)



Photograph 6. During construction – concrete placement for floor of new diversion/fish barrier



Photograph 7. During construction – smoothing concrete floor of new diversion/fish barrier



Photograph 8. During construction – walls formed and concrete being poured



Photograph 9. During construction – finished walls and floor of new diversion/fish barrier



Photograph 10. Completed diversion/fish barrier structure



Photograph 11. View of overshot gate in full upright position



Photograph 12. View of irrigation pool behind diversion/fish barrier



Photograph 13. View of overshoot gate in down position



Photograph 14. Overshoot gate and bar screen can be completely raised or removed

Attachment B
Design Drawings

Design Drawings L-3 Fish Barrier

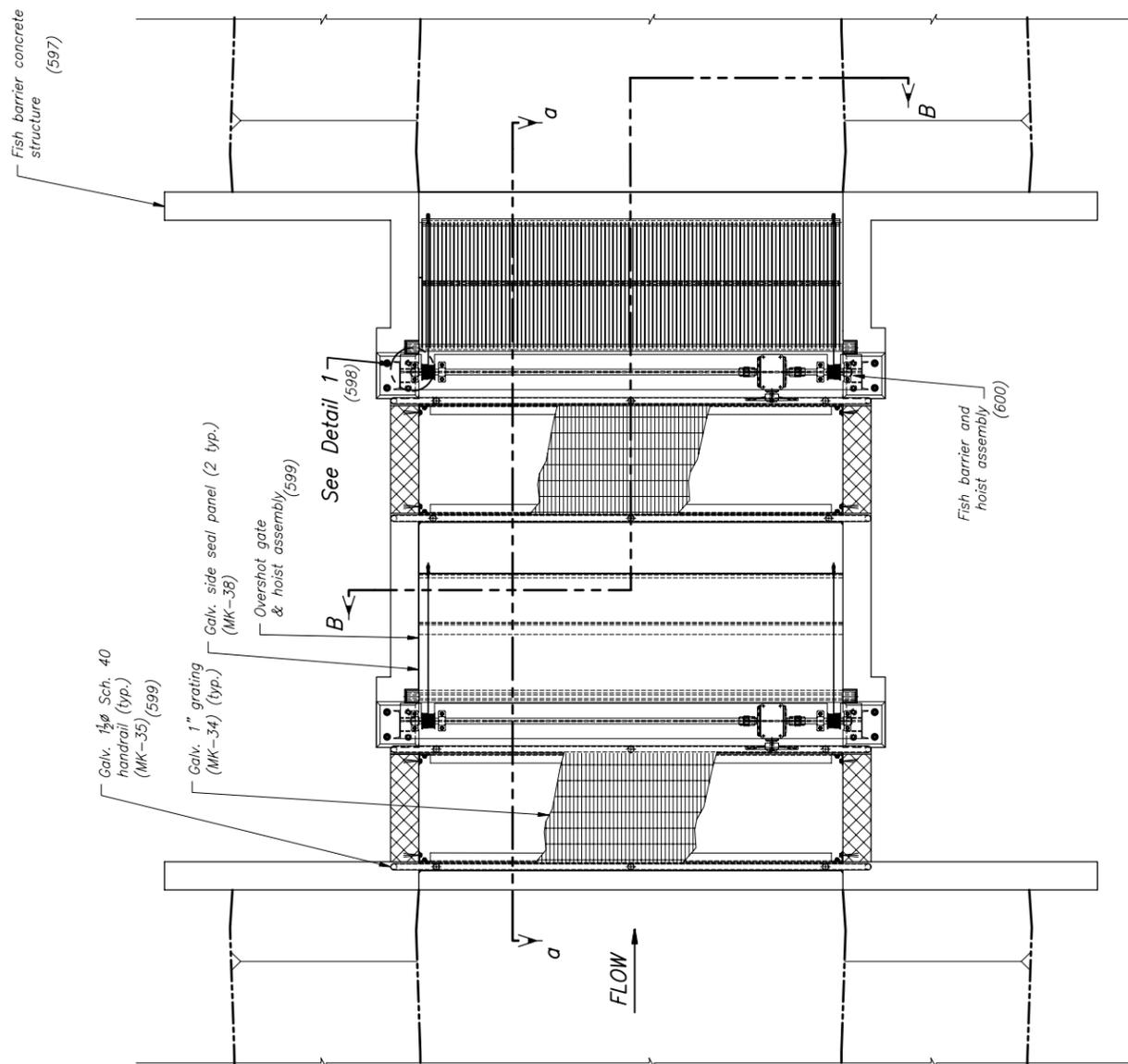
1678-100-596	L-3 Fish Barrier, Plan
1678-100-597	L-3 Fish Barrier, Concrete Structure, Plan, Sections and Details
1678-100-598	L-3 Fish Barrier, Metalwork, Plan, Sections, and Details
1678-100-599	L-3 Fish Barrier, Overshot Gate Metalwork, Plan, Sections, and Details
1678-100-600	L-3 Fish Barrier, Fish Barrier Metalwork, Plan, Sections, and Details
1678-100-638	L-3 Fish Barrier, Overshot Gate Metalwork, Plan, Sections, and Details
1678-100-639	L-3 Fish Barrier, Bill of Materials

D

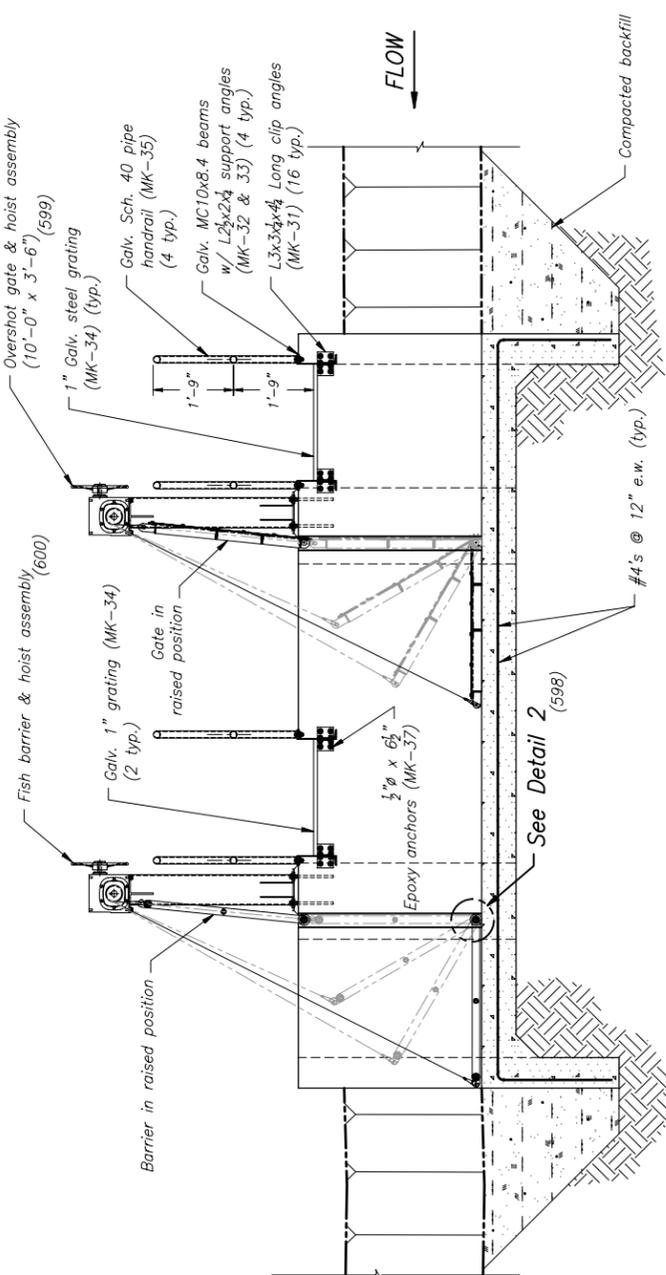
C

B

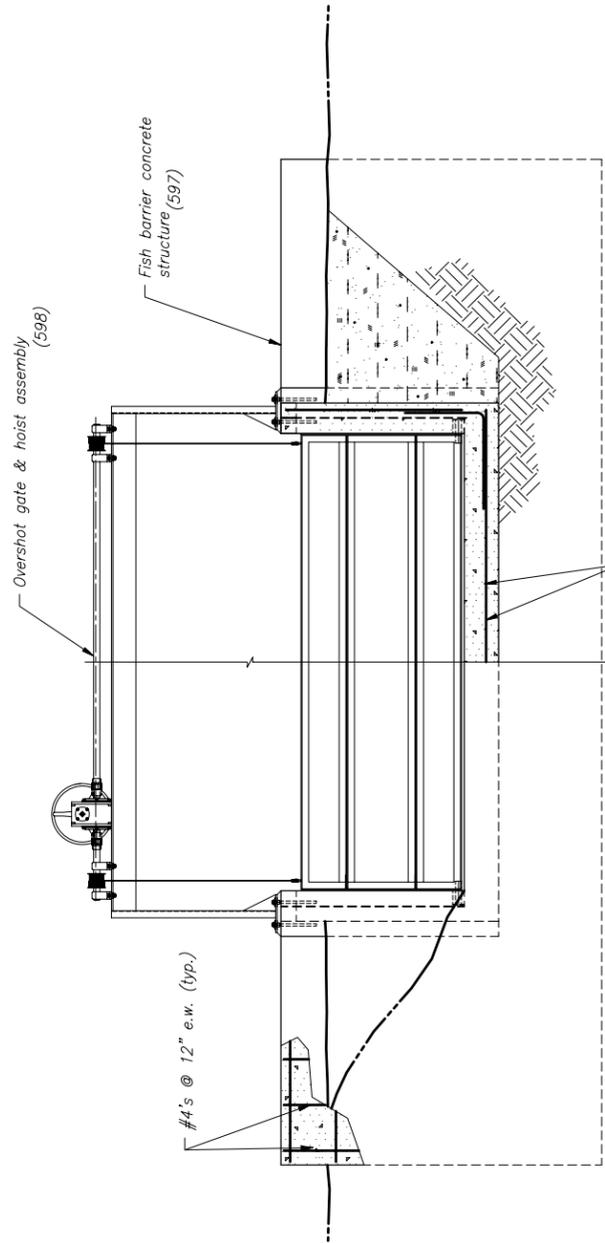
A



PLAN

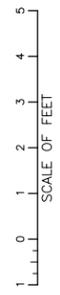


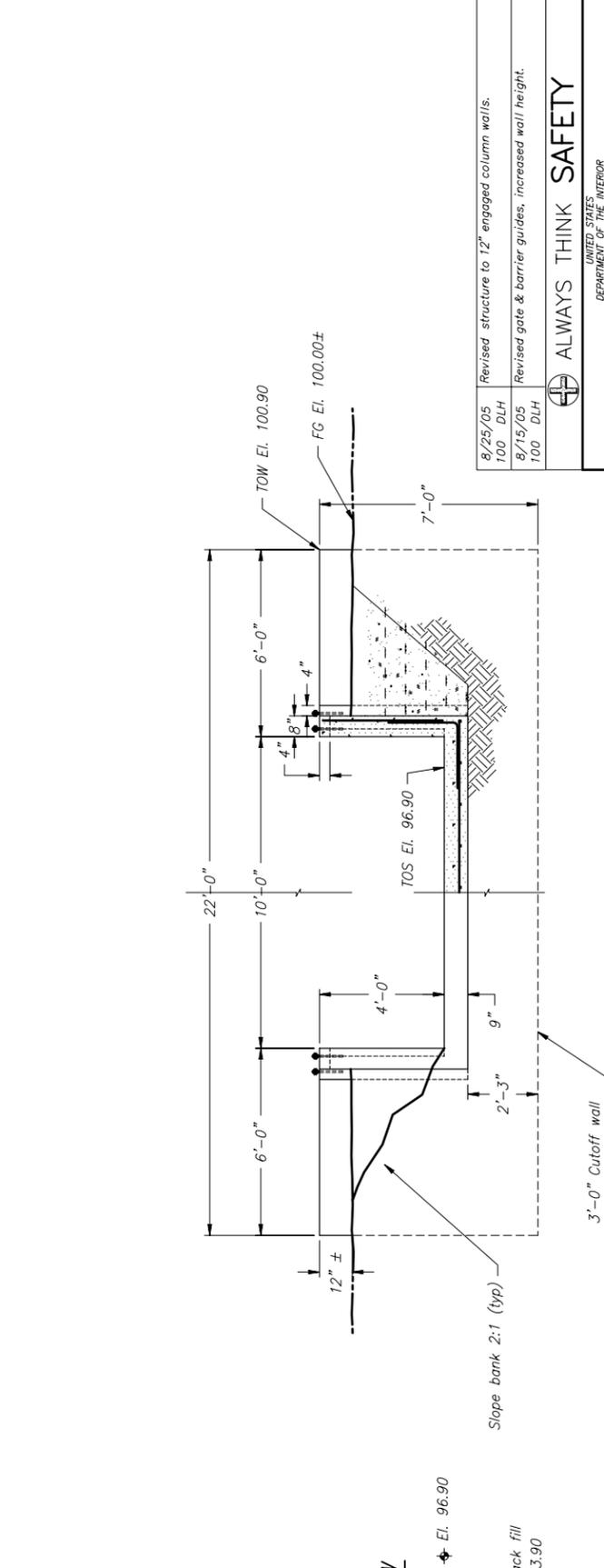
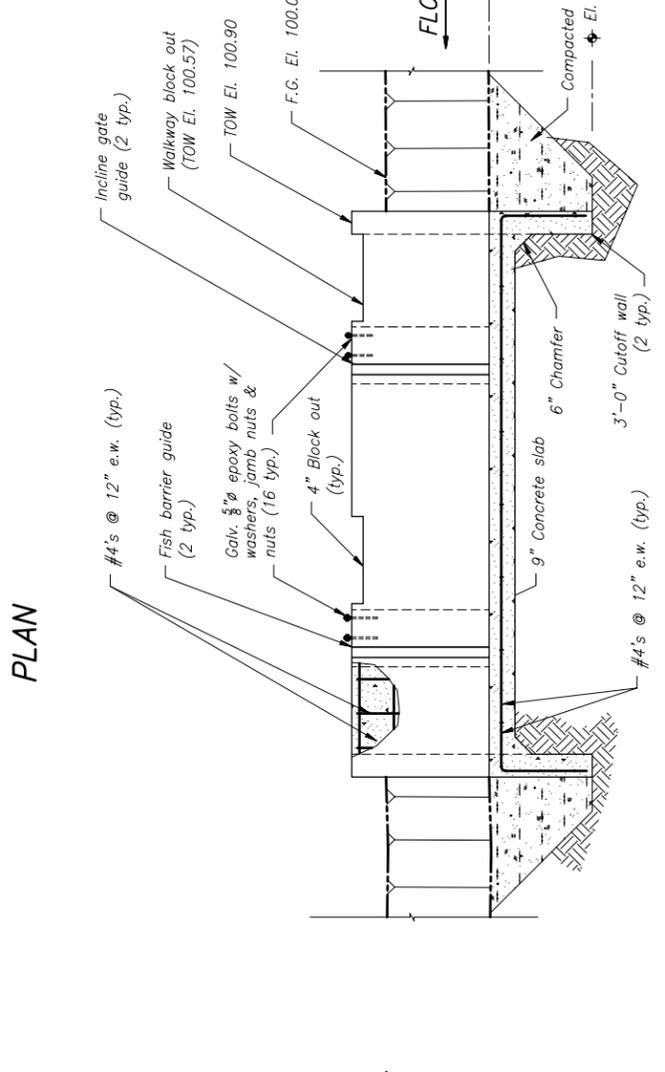
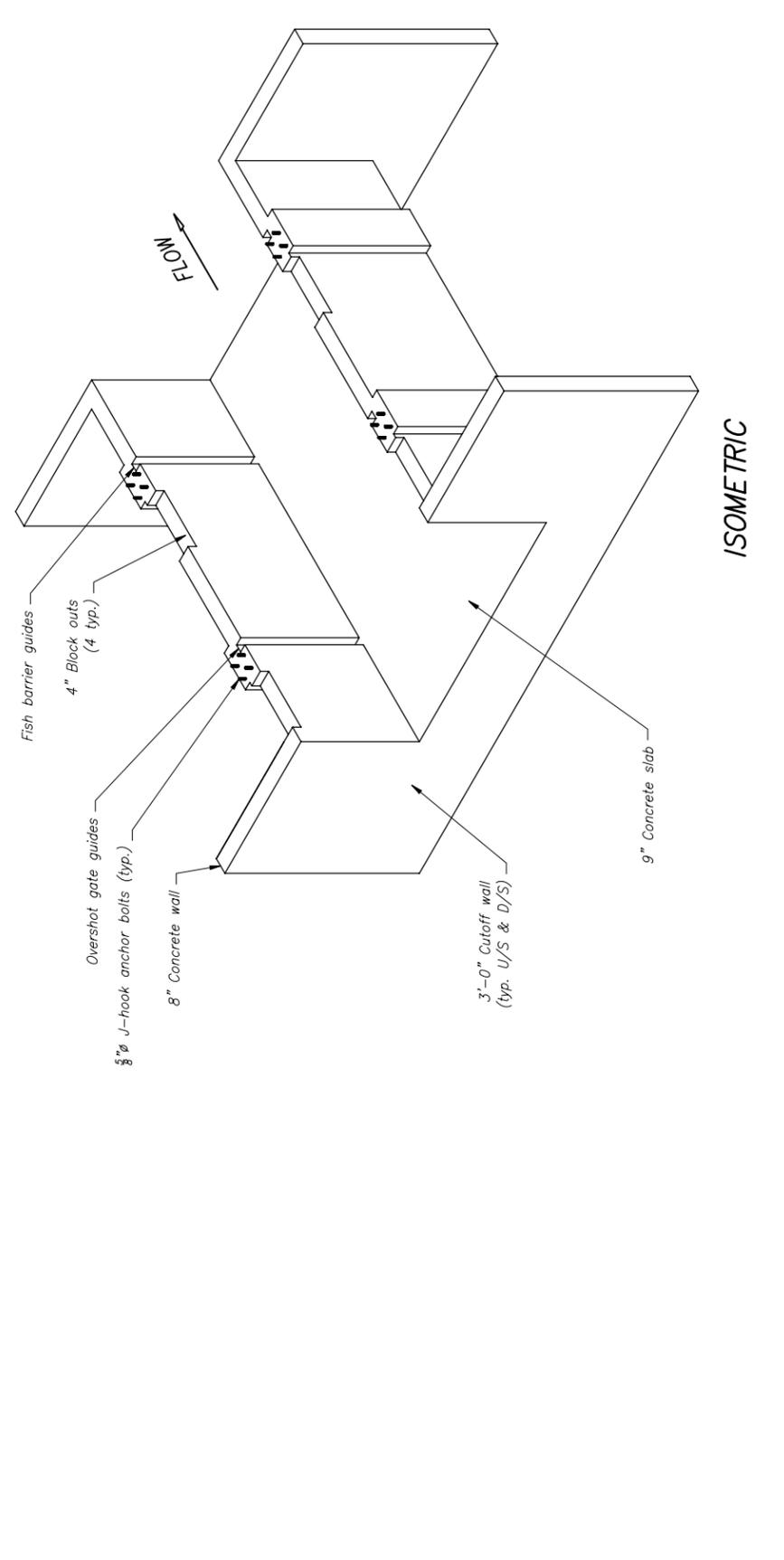
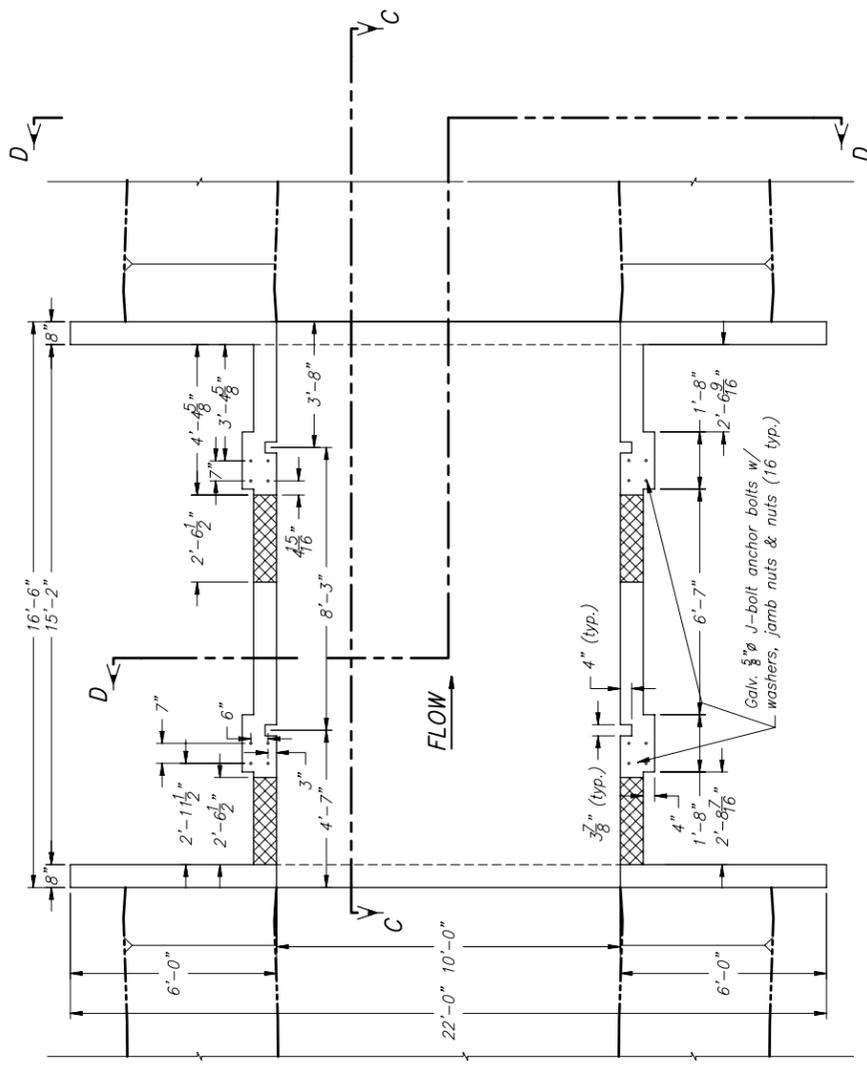
SECTION A-A



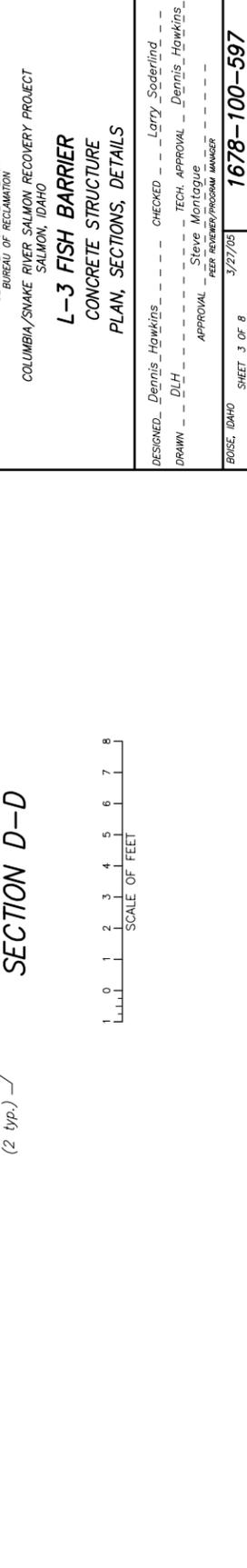
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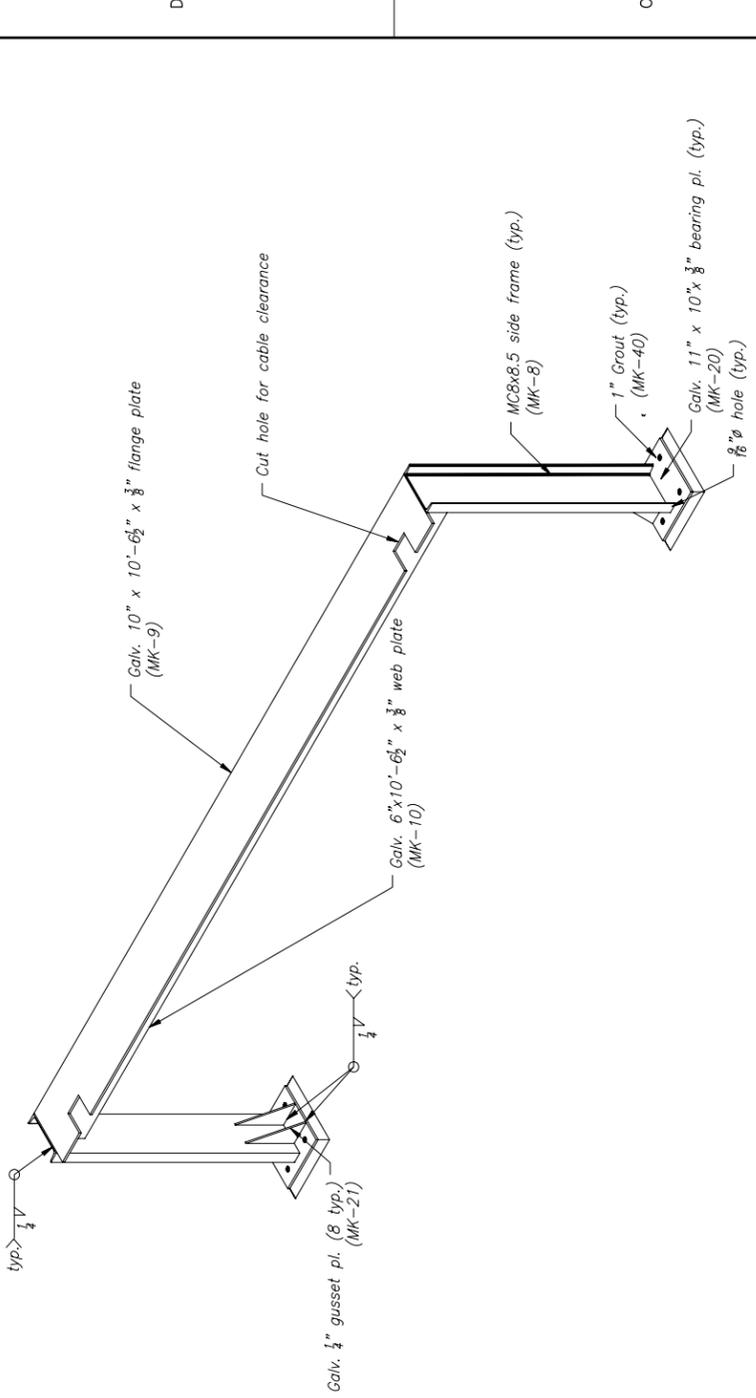
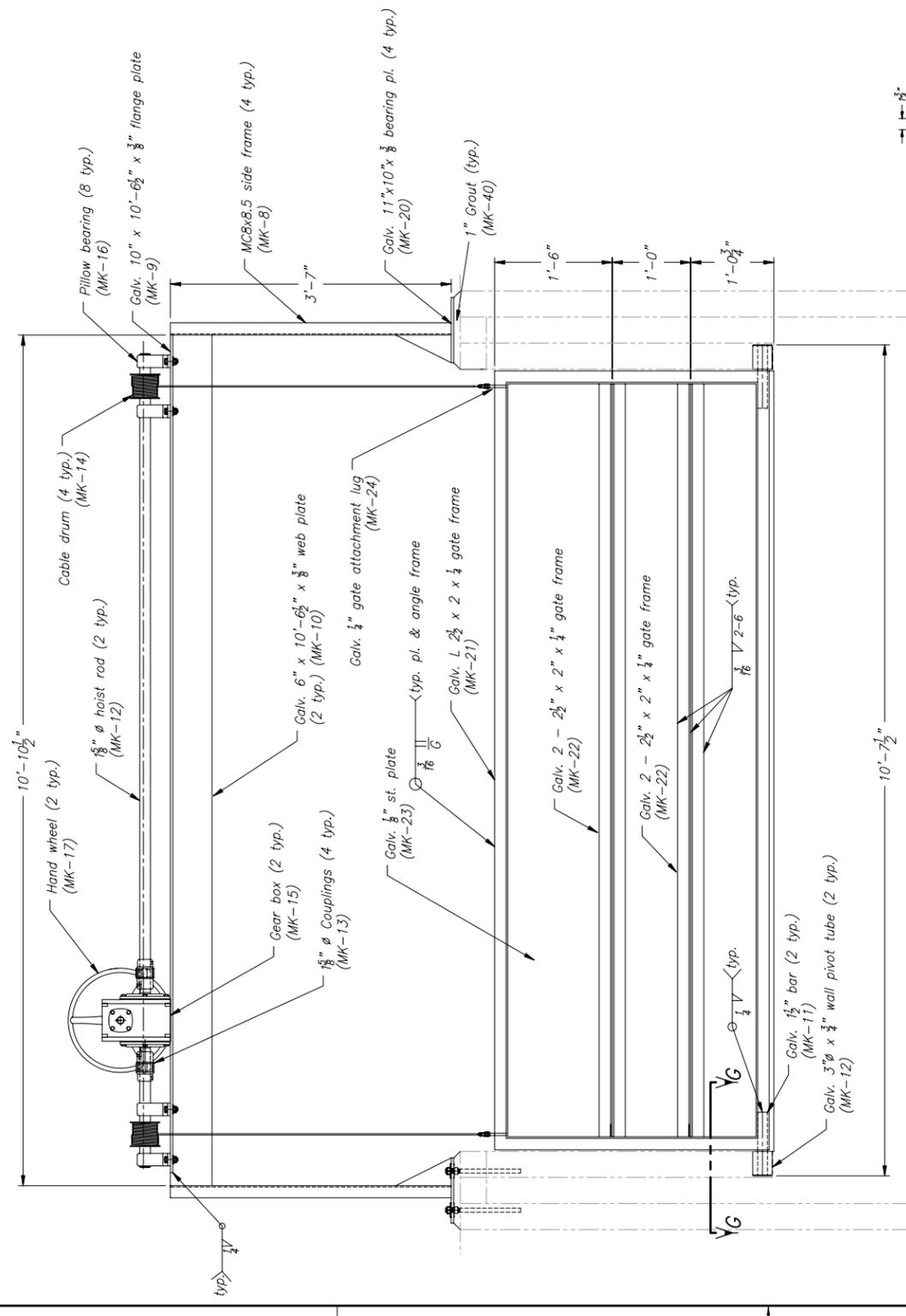
8/25/05 100 DLH	Revised structure to 12" engaged column walls.
8/15/05 100 DLH	Revised gate, barrier, & structure.
ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT SALMON, IDAHO	
L-3 FISH BARRIER PLAN	
DESIGNED: Dennis Hawkins	CHECKED: Larry Soderling
DRAWN: DLH	TECH. APPROVAL: Dennis Hawkins
APPROVAL: Steve Montague	FEED REVISION/PROGRAM MANAGER
BOISE, IDAHO	3/27/05
1678-100-596	





8/25/05 100 DLH	Revised structure to 12" engaged column walls.
8/15/05 100 DLH	Revised gate & barrier guides, increased wall height.
ALWAYS THINK SAFETY	
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION	
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT SALMON, IDAHO	
L-3 FISH BARRIER CONCRETE STRUCTURE PLAN, SECTIONS, DETAILS	
DESIGNED: Dennis Hawkins	CHECKED: Larry Soderling
DRAWN: DLH	TECH. APPROVAL: Dennis Hawkins
APPROVAL: Steve Montague	PEER REVIEWER/PROGRAM MANAGER
BOISE, IDAHO	3/27/05
1678-100-597	



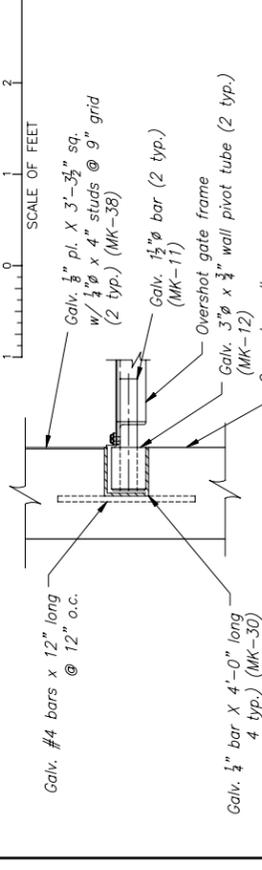


FRAME ASSEMBLY ISOMETRIC

(1 Shown - 2 Req'd.)

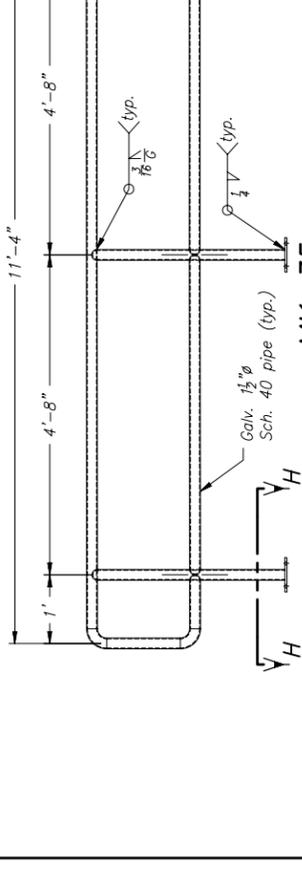


OVERSHOT GATE

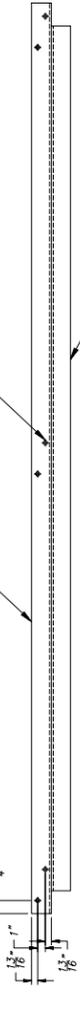


SECTION G-G

SCALE OF FEET



NOTE: Provide 1/2" dia drain holes for galvanizing as required.



MK-32 (PLAN)

(1 Shown - 16 Req'd. - 8 Opp. Hd.)



SECTION H-H

SCALE OF INCHES



MK-31

(1 Shown - 16 Req'd. - 8 Opp. Hd.)

8/25/05 DLH
 100 DLH
 8/15/05 DLH
 100 DLH
 Revised MK-9 & 10, and bearing plate MK-20.
 Revised overshot gate pivot tube and frame.

ALWAYS THINK SAFETY

UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
 SALMON, IDAHO

L-3 FISH BARRIER
 OVERSHOT GATE METALWORK
 PLAN, SECTIONS, AND DETAILS

DESIGNED: Dennis Hawkins
 DRAWN: DLH
 APPROVAL: Steve Montague
 PEER REVIEWER/PROGRAM MANAGER: Steve Montague
 CHECKED: Larry Soderling
 TECH. APPROVAL: Dennis Hawkins
 BOISE, IDAHO SHEET 5 OF 8 3/27/05

1678-100-599

BILL OF MATERIALS						
MARK NO.	MATERIAL	SIZE	QUANTITY	DESCRIPTION	TOTAL WT. (lbs)	DRAWING LOCATION
1	A-36	1/2" x 2" x 3'-6 3/8" Bar	104	Fish barrier bar	298	1678-100-600
2	A-36	2" x 1/2" wall tube	1	Fish barrier bottom hinge tube	80	1678-100-600
3	A-36	3/8" x 1/2" wall x 3 1/2" Tube	2	Fish barrier pivot tube	8	1678-100-600
4	A-36	1/2" x 2 3/8" Bar	2	Fish barrier attachment lugs	0.2	1678-100-600
5	A-36	1 1/8" x 1 1/8" wall tube	1	Fish barrier brace tube	17	1678-100-600
6	A-36	1 1/2" x 1 1/2" Gauge wall	105	Fish barrier spacer tube	18	1678-100-600
7	A-36	2" x 1/2" wall tube	1	Fish barrier top support tube	80	1678-100-600
8	A-36	MC 8x8.5 x 3'-7" Channel	4	Fish barrier & overshoot gate side frames	122	1678-100-600
9	A-36	10" x 10'-10 1/2" x 3/8" Plate	2	Fish barrier & overshoot gate top flange plate	270	1678-100-638
10	A-36	6" x 10'-10 1/2" x 3/8" Web Plate	4	Fish barrier & overshoot gate top web plate	162	1678-100-600
11	A-36	1 1/2" x 9 1/2" Bar	2	Overshoot gate bottom axle bar	51	1678-100-599
12	A-36	3" x 3" x 1/2" Wall Tube	2	Overshoot gate pivot tube	11	1678-100-599
13	A-36	1 1/2" Couplings	4	Fish barrier & overshoot gate hoist rod couplings	4	1678-100-599
14	A-36	4" x 6" Drum	4	Fish barrier & overshoot gate wire drums	20	1678-100-599
15	A-36	Gear Box	2	Fish barrier & overshoot gear boxes	40	1678-100-599
16	A-36	1 1/2" Pillow bearings	4	Fish barrier & overshoot gate pillow bearings	4	1678-100-599
17	A-36	15" Handwheel	2	Fish barrier & overshoot gate gearbox hand wheel	8	1678-100-599
18	A-36	1/2" Machined clevis ends	4	Fish barrier & overshoot gate wire rope clevis	2	1678-100-598
19	SST	1/2" Wire rope	4	Fish barrier & overshoot gate wire rope	2	1678-100-598
20	A-36	11" x 10" x 3/8" Plate	4	Fish barrier & overshoot gate side frame brg. pl.	23	1678-100-600
21	A-36	6 1/2" x 4 1/2" x 1/2" Plate	8	Fish barrier & overshoot side frame gusset pl.	3	1678-100-598
22	A-36	L 2 1/2" x 2" x 1/2"	4	Overshoot gate perimeter frame	98	1678-100-638
23	A-36	LL 2 1/2" x 2" x 1/2"	4	Overshoot gate cross braces	145	1678-100-638
24	A-36	1/2" Plate	1	Overshoot gate skin plate	179	1678-100-638
25	A-36	1/2" x 4 1/2" Bar	2	Overshoot gate lug	1	1678-100-638
26	A-36	1 1/8" x 1" Bar	4	Overshoot gate seal retaining bar	3.6	1678-100-638
27	Neoprene	1/8" Thick	3	Overshoot gate seals	-	1678-100-638
28	A-36	3/8" x 16 UNC Panhead screw	27	Overshoot gate seal retaining bar screws	-	1678-100-638
29	Concrete	4000 psi Concrete	8	Concrete fish barrier structure	-	1678-100-597
30	A-36	1/2" x 3/8" x 4" Bar w/rebar anchors	4	Fish barrier & overshoot gate guides	182	1678-100-600
31	A-36	L 3" x 3" x 1/2"	16	Grating beam clip angles	26	1678-100-596
32	A-36	MC 10 x 8.4	4	Grating beams	335	1678-100-599
33	A-36	L 2 1/2" x 2" x 1/2"	4	Grating support angles	137	1678-100-599
34	A-36	1" Grating	60	1" Grating	210	1678-100-596
35	A-36	1 1/2" Schedule 40 pipe	45	1 1/2" Sch. 40 Handrailing	450	1678-100-599
36	A307	1/2" x 13 UNC Bolts w/washers & nuts	34	1" Grating support angle bolts	3	1678-100-599
37	A307	1/2" x 6 1/2" Epoxy bolts w/washers & nuts	32	1/2" Epoxy anchor bolts	6	1678-100-596
38	-	DELETED			130	1678-100-597
39	A307	3/8" x 12" J-bolt anchors w/washers, jamb nuts, & nuts (cast-in-place)	16	1/2" Epoxy anchor bolts	6	1678-100-597
40	-	1" Grout pad	4	1" Self-leveling grout	-	1678-100-599

8/25/05 100 DLH	Revised MK-9,10, 20, & 39. Deleted MK-38.
8/15/05 100 DLH	Revised bill of materials list.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
SALMON, IDAHO

L-3 FISH BARRIER BILL OF MATERIALS

DESIGNED	Dennis Hawkins	CHECKED	Larry Soderling
DRAWN	DLH	TECH. APPROVAL	Dennis Hawkins
APPROVAL	Steve Montague	PEER REVIEWER/PROGRAM MANAGER	
BOISE, IDAHO	3/27/05		1678-100-639

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8	A-36	MC 8x8.5 x 3'-7" Channel	4	Fish barrier & overshoot gate side frames	122	1678-100-600
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20	A-36	11" x 10" x 3/8" Plate	4	Fish barrier & overshoot gate side frame brg. pl.	23	1678-100-600
21	A-36	6 1/2" x 4 1/2" x 1/2" Plate	8	Fish barrier & overshoot side frame gusset pl.	3	1678-100-598
22	A-36	L 2 1/2" x 2" x 1/2"	4	Overshoot gate perimeter frame	98	1678-100-638
23	A-36	LL 2 1/2" x 2" x 1/2"	4	Overshoot gate cross braces	145	1678-100-638
24	A-36	1/2" Plate	1	Overshoot gate skin plate	179	1678-100-638
25	A-36	1/2" x 4 1/2" Bar	2	Overshoot gate lug	1	1678-100-638
26	A-36	1 1/8" x 1" Bar	4	Overshoot gate seal retaining bar	3.6	1678-100-638
27	Neoprene	1/8" Thick	3	Overshoot gate seals	-	1678-100-638
28	A-36	3/8" x 16 UNC Panhead screw	27	Overshoot gate seal retaining bar screws	-	1678-100-638
29	Concrete	4000 psi Concrete	8	Concrete fish barrier structure	-	1678-100-597
30	A-36	1/2" x 3/8" x 4" Bar w/rebar anchors	4	Fish barrier & overshoot gate guides	182	1678-100-600
31	A-36	L 3" x 3" x 1/2"	16	Grating beam clip angles	26	1678-100-596
32	A-36	MC 10 x 8.4	4	Grating beams	335	1678-100-599
33	A-36	L 2 1/2" x 2" x 1/2"	4	Grating support angles	137	1678-100-599
34	A-36	1" Grating	60	1" Grating	210	1678-100-596
35	A-36	1 1/2" Schedule 40 pipe	45	1 1/2" Sch. 40 Handrailing	450	1678-100-599
36	A307	1/2" x 13 UNC Bolts w/washers & nuts	34	1" Grating support angle bolts	3	1678-100-599
37	A307	1/2" x 6 1/2" Epoxy bolts w/washers & nuts	32	1/2" Epoxy anchor bolts	6	1678-100-596
38	-	DELETED			130	1678-100-597
39	A307	3/8" x 12" J-bolt anchors w/washers, jamb nuts, & nuts (cast-in-place)	16	1/2" Epoxy anchor bolts	6	1678-100-597
40	-	1" Grout pad	4	1" Self-leveling grout	-	1678-100-599

8/25/05 100 DLH	Revised MK-9,10, 20, & 39. Deleted MK-38.
8/15/05 100 DLH	Revised bill of materials list.



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROJECT
SALMON, IDAHO

L-3 FISH BARRIER BILL OF MATERIALS

DESIGNED	Dennis Hawkins	CHECKED	Larry Soderling
DRAWN	DLH	TECH. APPROVAL	Dennis Hawkins
APPROVAL	Steve Montague	PEER REVIEWER/PROGRAM MANAGER	
BOISE, IDAHO	3/27/05		1678-100-639