

Completion Report Salmon River S-11/12 and S-13/14 Irrigation Diversion and Fish Screen Consolidation Project

Upper Salmon Subbasin Salmon, Idaho



Prepared for
Lemhi Soil and
Water Conservation District
Salmon, Idaho

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

August 2006

S-11/12 fish screen and ramp flume completed project (August 2006)

S-13/14 fish screen after consolidation (August 2006)

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.

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Attachment A: Construction Photographs

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1. Introduction

Throughout the Salmon 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 the late 1990s near Salmon, Idaho, four existing rock wing (push-up) dam diversions in the Salmon River were identified as having potential for causing harm to resident and migratory fish.

The primary objective of this project was to implement actions to improve the passage of adult and juvenile salmon and steelhead in the Salmon River. The Salmon 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 Oceanic and Atmospheric Administrative Fisheries Services (NOAA Fisheries), 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. NOAA Fisheries 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 NOAA Fisheries was completed on these ESUs and a Biological Opinion (BiOp) was 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 upper Salmon subbasin typically use push-up 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 or

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.

streambed 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.

The four diversions near Salmon spanned the entire width of the river channel and contributed to fish passage problems such as stream channel dewatering, migration impediment, and entrainment of fish in ditches. Additionally, the diversions created obstacles in the river for boaters. Each diversion also required entering the river channel with heavy equipment to conduct annual maintenance or reconstruction. Existing ditch fish screens were outdated, did not meet NOAA Fisheries screening criteria, and lacked measurement devices. The headgates were also in disrepair.

In 1999, Reclamation and the Idaho Department of Fish and Game Anadromous Fish Screen Shop (Screen Shop) in Salmon identified four irrigation diversions on the Salmon River as having potential for consolidation. Those diversions, S-11, S-12, S-13, and S-14, were located in close enough proximity to each other to allow for consolidation into two points of diversion. Diversions S-11 and S-12 were proposed to be consolidated into a single diversion and headworks structure as was S-13 and S-14.

Initially the S-11 and S-12 irrigators were receptive to the idea of consolidation; however, they were uncomfortable with the idea of sharing a diversion and headworks structure. Consequently, the irrigators temporarily withdrew from participation in the project opting instead to review the final results of the consolidation of S-13 and S-14 (phase 1). Due to their initial reluctance to participate, the project was completed in two phases. Upon successful completion of the first phase (S-13/14 consolidation), the S-11/12 irrigators agreed to consolidation a year later (phase 2).

1.2 Problems and Solutions

The S-11 diversion and headworks structure was abandoned and consolidated with the S-12 diversion and headworks structure. The existing S-12 diversion weir and headworks structure was replaced and enlarged. A bifurcation structure was installed and a pipe was buried to separate and direct flows into the S-11 and S-12 irrigation canals. The existing fish screen on each irrigation canal was replaced.

Approximately 2 miles upstream, the S-13 diversion weir and headworks structure was abandoned and consolidated with the S-14 diversion weir and headworks structure. The existing S-14 push-up dam and headworks structure was replaced. A portion of the S-14 canal was enlarged to accommodate the combined flow, a bifurcation structure installed, and a connector canal constructed to separate and direct a portion of the combined flow

into the S-13 and S-14 canals. The existing S-13 fish screen was removed and replaced with a combined S-13/14 fish screen located on the enlarged section of the S-14 canal.

1.3 Participation and Cooperation

Reclamation implemented the Tributary Habitat Program for the Salmon 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 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.

Planning for the S-11/12 and S-13/14 consolidation project was initiated prior to the NOAA Fisheries FCRPS 2000 BiOp and formation of the Tributary Habitat Program. Therefore, Reclamation assistance for this project was funded under the direction of the Snake River Area Office (SRAO) Planning Program which provided coordination, environmental compliance, inspection, and design assistance.

Funding for construction was provided by Bonneville Power Administration (BPA).³ Additionally, BPA provided financial support for the Screen Shop's involvement in the project. Distribution of BPA funding and construction contract administration was provided by the Lemhi Soil and Water Conservation Districts (LSWCD). The Natural Resource Conservation Service (NRCS) provided an engineer to serve as inspector/project manager on behalf of the LSWCD for the diversion construction contract. As part of the LSWCD contract, the Screen Shop provided an inspector to oversee construction of the fish screens.

1.4 Environmental Compliance

The SRAO staff person in the Salmon Field Office provided local coordination assistance and completed the National Environmental Policy Act (NEPA) and Section 7 ESA compliance documents on behalf of BPA, LSWCD, and IDFG. Since major project features for S-13/14 are located on Federal land, additional NEPA was required and completed by the Bureau of Land Management (BLM) for that phase of the project. Work in the river to replace the diversions and construct new headworks was authorized

³ Contract title Upper Salmon River Diversion Consolidation, Contract # 1996-007-00.

pursuant to the Clean Water Act (CWA) and Idaho Department of Water Resources (IDWR) permit exemptions. This exemption, referred to locally as the “irrigators exemption,” authorizes irrigators to perform maintenance on diversions and appurtenances without need for obtaining a permit from the Army Corps of Engineers (Corps) or State. BLM issued a Right-of-Way Grant to the Screen Shop for long-term operation of the diversion facility and fish screen on BLM land. The Screen Shop also provided funds to BLM for weed control at S-13/14 for a 30-year period.

1.5 Contract Specifications and Bidding

Phase 1 – S-13/14 Diversion Consolidation

Reclamation’s Pacific Northwest (PN) Region design office developed project drawings and contract specifications for construction of the following features: consolidated diversion structure, headworks/spillway, access road and crossing, water measurement device, Highway 93 culvert extension, and canal bifurcation structure. Design and contract specifications for the fish screen were developed by the Screen Shop.

Phase 2 – S-11/12 Diversion Consolidation

Reclamation’s PN Regional design office prepared drawings and contract specifications for all of phase 2 which included separate fish screens for each ditch. Additional project features included: consolidated diversion structure with overshot wasteway, headworks/bifurcation structure, water measurement devices, ditch cleanout, and removal of the existing river diversions.

2. Project Description

The project is located on the Salmon River in central Idaho, approximately 6 miles south of the town of Salmon, in Lemhi County (Drawing 1720-100-25). The project encompasses the following four irrigation diversions/headgate structures: Edward (S-11) at river mile (RM) 264, Kane-Ramey (S-12) at RM 265; Mintzer (S-13) at RM 265.5; and Pope (S-14) at RM 266. The S-11 and S-12 diversions are located on privately owned lands. The S-13 and S-14 diversions are located on public land administered by the BLM.

The primary purpose of the S-13/14 and S-11/12 diversion consolidation was to reduce the impacts of the irrigation diversions to anadromous salmonids and resident fish species during the irrigation season. In addition to reducing the number of diversions on the Salmon River, the existing fish screen structures were consolidated and upgraded to meet current NOAA Fisheries fish screening criteria.

2.1 Phase 1 – S-13/14 Diversion Consolidation

Construction of the diversion and fish screen was separated into two contracts; both administered by the LSWCD. Construction oversight was provided by NRCS for the diversion/headworks and Screen Shop provided oversight for the fish screen.

Reclamation and the Screen Shop worked together to coordinate with the irrigators, watermaster, and landowners in the acquisition of easements and development of an acceptable design for a consolidated diversion, headworks, and bifurcation structure for diversion S-13 and S-14. In addition to a consolidated diversion, removal of the outdated existing fish screens and construction of an enlarged, single fish screen was completed to screen fish from the consolidated irrigation canal. Some additional measures were required by BLM to mitigate for impacts to the landscape including planting shrubs and trees, removal of rock stockpiled onsite by irrigators, constructing fencing around the fish screen, and painting the culvert.

2.1.1 Construction

The construction contract for the S-13/14 diversion, headworks, and canal enlargement was awarded to Tupper Construction, Challis, Idaho. Construction of the S-13/14 phase began in January 2001 and was completed in April 2001. During construction of the diversion and headworks, construction inspection and contract management was provided by a local NRCS engineer on behalf of the LSWCD. The Screen Shop provided inspection and contract management on behalf of the LSWCD for construction of the fish screen foundation. Close coordination between Reclamation, Screen Shop, NRCS, BLM, and the irrigators was necessary to ensure the successful completion of this first phase of the project. Reclamation staff in Salmon and Boise were involved throughout construction.

Construction for S-13/14 involved:

- Removal of the old S-13 and S-14 rock diversions;
- Construction of a single, 150-foot-long engineered wing dam at the former location of S-14;
- Construction of a rock wing dam with an inverted steel “T Plate” embedded along the entire length. Rock was then placed on the top and on both sides of the “T Plate.”
- Construction of a concrete-steel headgate/wasteway structure with trashrack at the inlet to the ditch;

- Installation of two 6-foot diameter corrugated metal pipes (CMPs) in the ditch behind the headgate structure to provide for a road crossing and access for construction and future maintenance of the new fish screen;
- Installation of ramp flumes in the pipes for water measurement.

To convey the combined diversion flow of 156 cfs, the S-14 ditch was enlarged approximately 1,800 feet to the location of an eight-bay, rotary-drum fish screen. The foundation for the fish screen structure was being constructed concurrently under separate contract by Jordan Construction, Salmon, Idaho. The fish screen was later fabricated and installed by the Screen Shop. Ditch enlargement continued another 800 feet beyond the fish screen to the point where a concrete bifurcation structure was constructed. The bifurcation structure included headgates and stilling wells to allow for separate control, distribution, and measurement of water into the S-13 and S-14 ditches. Between the headworks and fish screen, a 35-foot-long CMP extension was added to an existing 5-foot-diameter CMP drain under Highway 93 to convey runoff water over the irrigation canal and into the Salmon River.

2.2 Phase 2 – S-11/12 Diversion Consolidation

Upon completion of phase 1 (S-13/14 consolidation), Reclamation worked closely with the Screen Shop to coordinate with the landowner and irrigators to develop an acceptable design and acquire easements for a consolidation of the S-11 and S-12 diversions.

The S-11 and S-12 irrigators were agreeable to sharing a diversion and headworks structure, but were unwilling to share a fish screen. Therefore, separate fish screens were designed for each ditch. Within phase 2, major features were located on private land; therefore, additional measures beyond normal reseeding of disturbed areas were requested by the landowner to mitigate for construction-related impacts to the landscape. Mitigation measures included reseeding-contouring pastures, planting shrubs and trees, and constructing fences.

2.2.1 Construction

For this second phase, the LSWCD awarded the construction contract to Westfall Construction, Salmon, Idaho. One contract was awarded for construction of the entire project including fish screen foundations. Construction began in November 2001 and was completed in early April 2002 prior to the beginning of the irrigation season. Reclamation provided an inspector from the Yakima Field Office. Construction management was provided by the local NRCS acting on behalf of the LSWCD. Throughout this second phase of construction, Reclamation and Screen Shop were involved in daily coordination with landowners and irrigators.

Major project features for the second phase included:

- Removal of old river control and fish screen structures.
- Construction of a single, 900-foot-long diversion rock berm with inverted steel “T Plate” and geomembrane liner, and a combined concrete/steel headworks structure with an overshot gate wasteway.
- Installation and burial of three 5-foot-diameter pipes behind the headworks to convey water into the S-11 and 12 ditches. Both ditches were cleaned out and reshaped up to and beyond the location of the fish screens.
- Construction of ramp flumes for water measurement.
- Formation and pouring of foundations for a fish screen in each ditch.
- Fabrication and installation of drums and other metalwork by the Screen Shop.

3. Conclusions

3.1 S-13/14 Consolidation

Numerous problems, primarily associated with the winter temperatures, were encountered during the S-13/14 diversion consolidation. Tents and heaters were necessary to form and cure concrete. An ice dam developed in the river downstream backing up surface ice/water into the site resulting in additional measures taken by the contractor to dewater the site where the headworks were being constructed. This culminated in the contractor filing a claim requesting additional compensation for pumping cost and cofferdam construction. Only a portion of the claim was approved for payment by LSWCD.

During the later stages of construction, the Corps commented to NOAA Fisheries that additional effort was needed to protect the riparian zone and control erosion during construction. Additional measures to address the Corps concerns were never implemented.

The round CMPs located in the canal behind the headworks were slightly compressed when heavy equipment was driven over the area during construction of the fish screen. This was a result of wet soil conditions and inadequate compaction during the installation of the culverts.

Following project completion, the following issues were also identified:

- Significant leakage was observed in the ditch upon completion and closure of the headgates. – Measures were not taken to correct the problem. Leakage was observed through the river bank from the enlarged canal probably as a result of inadequate compaction of the embankment by the contractor. Concern that the canal embankment would fail resulted in the irrigators hiring someone to make repairs.
- Irrigator concern about insufficient water delivery by the new system. – Measures were taken to line the upstream face of the diversion with plastic irrigation fabric. Inspection by the Reclamation design engineer determined that the system was delivering the designed flow. Improper operation of the check structures on the fish screens was interfering with canal flow. The Screen Shop was notified and the problem was corrected.
- Concern regarding possible erosion due to lack of riprap around canal features. – The Screen Shop corrected this by purchasing rock for use by the irrigators in armoring canal embankments and repairing the damaged section of the diversion.
- Concern regarding the color of the road base material and culvert drain pipe, lack of fencing around the fish screen, and inadequate site rehabilitation. – The Screen Shop resolved these issues by repainting the culvert, installing fencing around the fish screen, and planting shrubs and trees.

Reclamation staff also noted evidence of damage to the “T Plate” near the headgate that probably occurred during rock placement. This resulted in water leakage between the steel plate and concrete. The Screen Shop paid for placement of additional rock to close the gap.

Overall, the outcome of the project was successful. The project resulted in the elimination of one diversion structure and stabilization of another. The new diversion does not extend across the river channel and therefore, improves navigation for boaters. The new headworks provided a means for control and measurement of water delivery for irrigation, and a new fish screen that meets NOAA Fisheries screening criteria.

3.2 S-11/12 Consolidation

Problems encountered during the first phase of construction were nonexistent during the construction of S-11/12. Observations during and after completion of S-13/14 enabled project coordinators and designers to make changes ultimately leading to minor post-construction problems and successful completion of the second phase of the project.

While the project was successfully completed and the landowner and water users satisfied, irrigators noted the following deficiencies.

- Sloughing of rock riprap away from the metal “T Plate” on the canal side shortly after completion. – This appears to be the result of the placement of undersized rock on the canal side of the T Plate. However, it did not seem to affect operation of the diversion structure.
- Sloughing of the river embankment into the diversion canal upstream from the headworks. – Efforts have been made by the landowner to reconstruct the river embankment; however, stabilization is still needed.
- Annual recruitment of stream gravels transported and deposited in front of the headgates during highwater. – This problem may be exacerbated by the accumulation of large woody debris in front of the headgates and delay in removal by the irrigators.
- Entry into the river with heavy equipment to add large rock at the upstream end of the diversion. – This has been required on two separate occasions for the purpose of directing more water into the diversion canal.

Overall, this phase of the project was considered very successful with few problems noted by irrigators. The project resulted in the elimination of one diversion berm, stabilization of another, and elimination of annual entry into the river with heavy equipment for maintenance. The new headworks provided a means for control and measurement of irrigation water, and two new fish screens now meet NOAA Fisheries screening criteria.

**Completion Report
Salmon River S-11/12 and S-13/14
Irrigation Diversion and Fish Screen Consolidation Project
Upper Salmon Subbasin
Salmon, Idaho**

**Attachment A
Construction Photographs**

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



Photograph 1. Typical “push-up” diversion dam; old S-13 diversion before consolidation



Photograph 2. Top photo - old S-13 headgate prior to project;

Bottom photo - old S-14 diversion



**Photograph 3. Top photo - old S-13 fish screen;
Bottom photo - old S-13 headgate**



Photograph 4. Top photo - old S-14 rock wall headgate in ditch;

Bottom photo – old S-14 headgate



Photograph 5. S-13/14 fish screen after construction



Photograph 6. View showing vegetation growth at the S-13/14 fish screen 5 years after project completion



Photograph 7. Highway culvert over S-13/14 canal before painting



Photograph 8. Painted culvert over S-13/14 canal



Photograph 9. Repainted culvert that replaced rock flume over old headgate in S-14 canal



Photograph 10. Leakage behind S-14 headgate



Photograph 11. S-13/14 diversion 5 years after project completion



Photograph 12. S-13/14 bifurcation structure



Photograph 13. S-13/14 canal vegetation growth 5 years after project completion



Photograph 14. S-13/14 headworks completed project



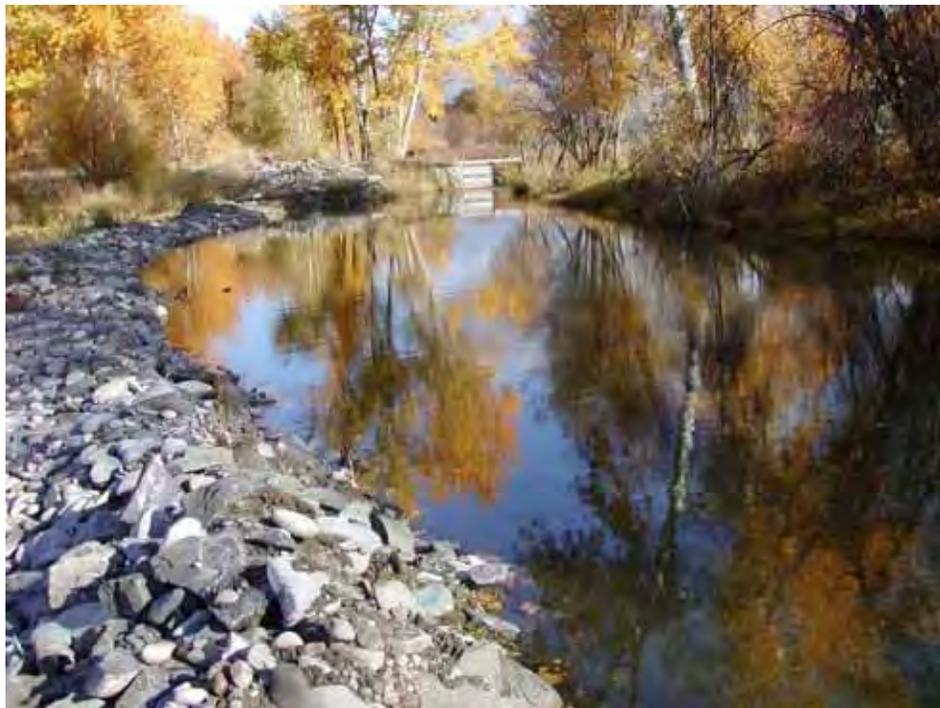
Photograph 15. Typical “push-up” diversion dams; S-11 and S/12 diversions before consolidation



Photograph 16. S-11/12 diversions before construction



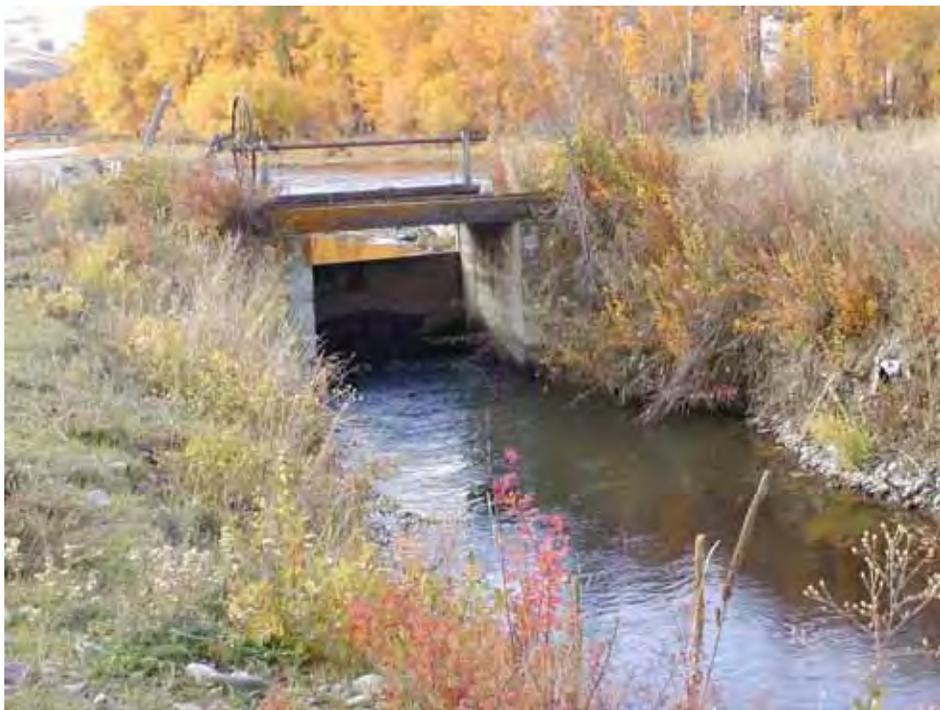
Photograph 17. Old S-11 fish screen



Photograph 18. Old S-11 headgate



Photograph 19. Old S-12 fish screen



Photograph 20. Old S-12 headgate



Photograph 21. T-Plate exposed at S-11/12 diversion berm



Photograph 22. S-11/12 headworks after construction



Photograph 23. S-11/12 overshoot gate



Photograph 24. S-11 fish screen after construction



Photograph 25. S-11 fish screen and ramp flume completed project



Photograph 26. S-11/12 site rehab after construction



Photograph 27. S-11/12 site reveg after completed project



Photograph 28. View showing rock added to the end of the S-11/12 diversion



Photograph 29. Upstream view of the S-11/12 diversion

Attachment B
Final Design Drawings (includes location map)

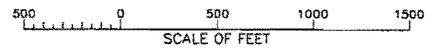
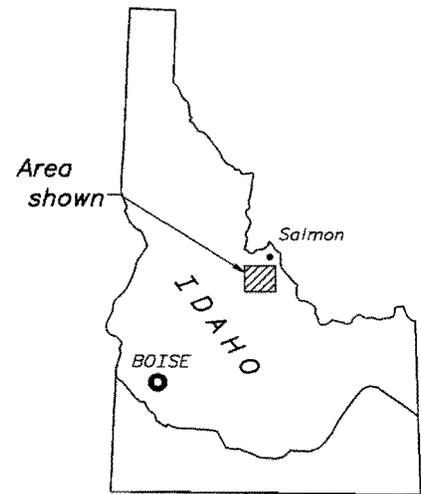
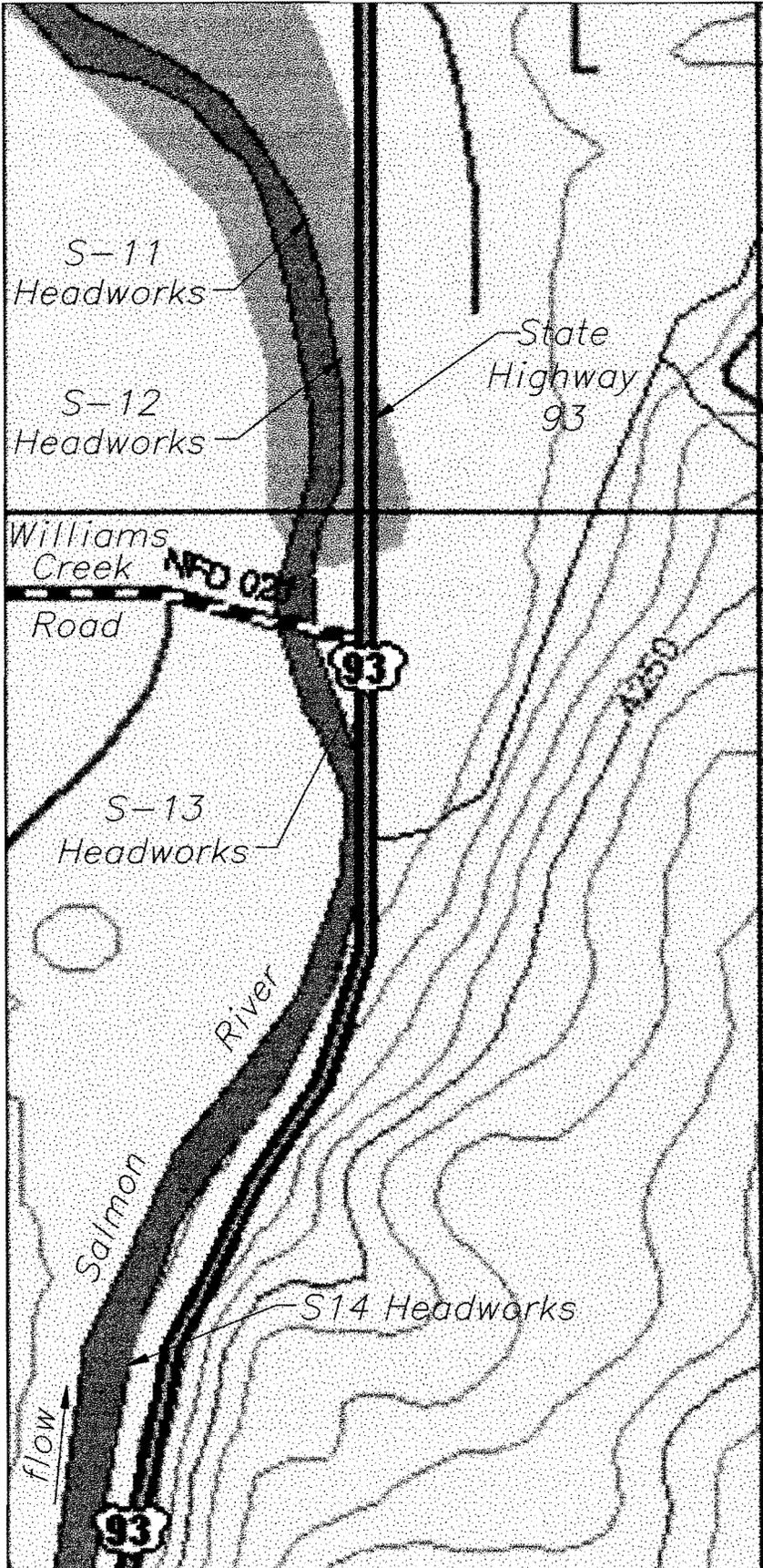
Final Design Drawings S/11 & S/12 Consolidation

1720-100-25	Location Map
1720-100-54	General Plan
1720-100-38	Headworks – Site Plan and Diversion Berm Sections
1720-100-26	Headworks – Plan, Sections, and Details
1720-100-27	Headworks – Sections
1720-100-28	Headworks – Metalwork – Sections and Elevation
1720-100-55	Headworks – Metalwork – Sections and Elevation
1720-100-29	Headworks – Handrail and Grating – Plan, Elevation, and Detail
1720-100-36	Headworks – Pipes and Ramp Flume – Plan and Section
1720-100-45	S11 Canal – Plan and Profile
1720-100-46	S12 Canal – Plan and Profile
1720-100-44	Typical Canal Sections
1720-100-56	Site Plan and Sections
1720-100-57	Screen and Bypass Profiles
1720-100-58	S11 Fishscreen Structure, Plan
1720-100-59	S12 Fishscreen Structure, Plan
1720-100-60	Details

Final Design Drawings S/13 & S/14 Consolidation

1720-100-42	General Plan
1720-100-39	Headworks – Site Plan and Diversion Berm Sections
1720-100-30	Headworks – Plan, Sections, and Details
1720-100-31	Headworks – Sections
1720-100-32	Headworks – Metalwork – Sections and Elevation
1720-100-33	Headworks – Handrail and Grating – Plan, Elevation, and Detail
1720-100-37	Canal Road Crossing and Ramp Flume – Plan and Section
1720-100-41	Canal and Highway Drainage CMP - Plan and Sections
1720-100-40	Bifurcation Structure – Site Plan and Section
1720-100-34	Bifurcation Structure – Plan
1720-100-35	Bifurcation Structure – Sections
1720-100-47	S13 Canal – Plan and Profile
1720-100-48	S14 Canal – Plan and Profile – Station 3+25 to Station 14+50
1720-100-49	S14 Canal – Plan and Profile – Station 14+50 to Station 25+80
1720-100-50	S14 Canal – Plan and Profile – Station 25+80 to Station 37+20.19
1720-100-43	Typical Canal Sections

Salmon 5 miles



ALWAYS THINK SAFETY

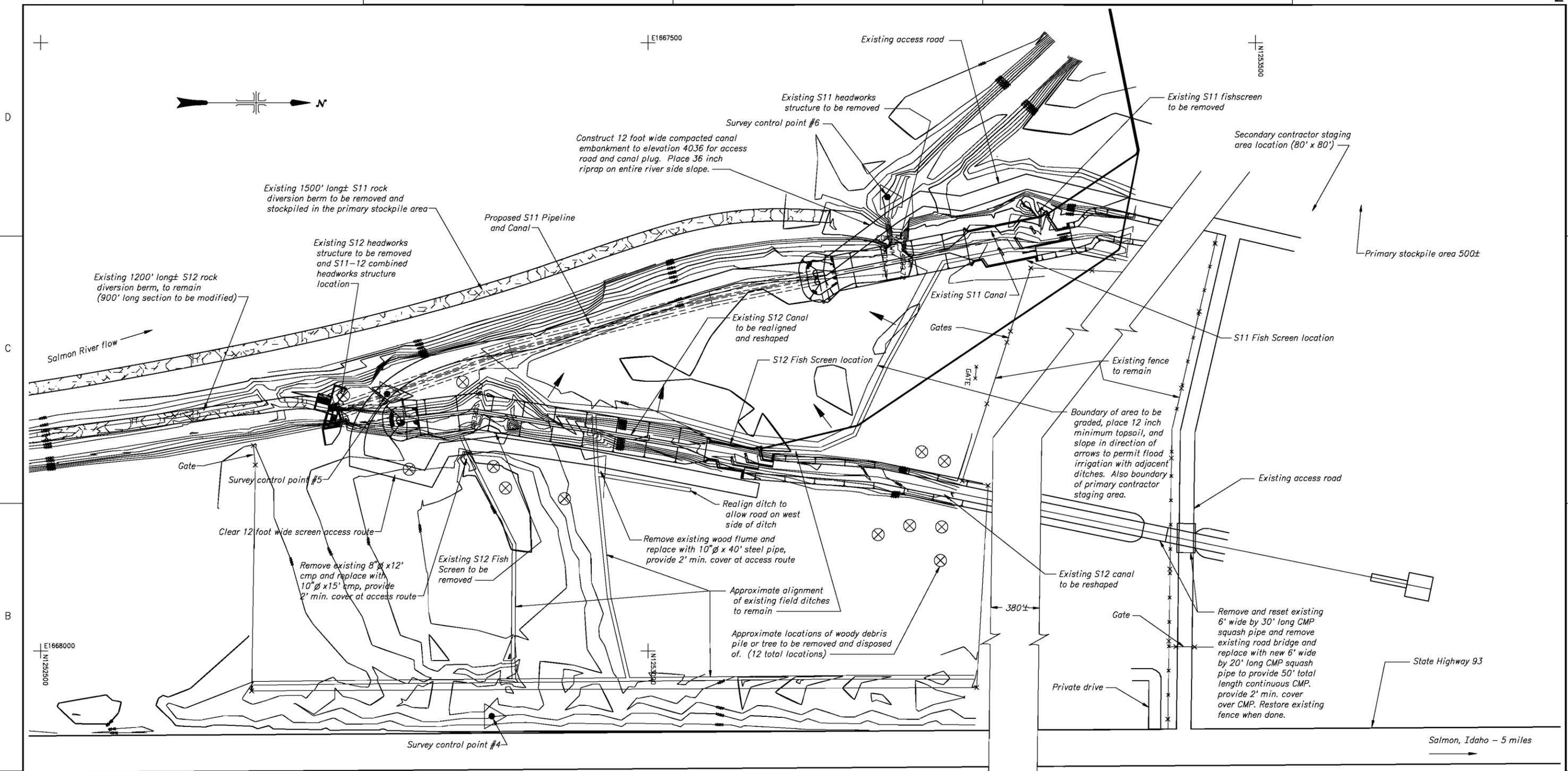
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S11-14 CANAL CONSOLIDATION
LOCATION MAP

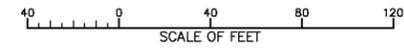
DESIGNED _____ CHECKED _____
 DRAWN Ed Mordhorst TECH. APPROVAL _____ PROGRAM MANAGER _____

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Challis 54 miles



Note: All features outside of the topography are estimated.



SURVEY CONTROL POINTS			
Point #	Northing	Easting	Elevation
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5	1252785.17	1667788.88	4038.31
6	1253197.03	1667627.01	4035.48

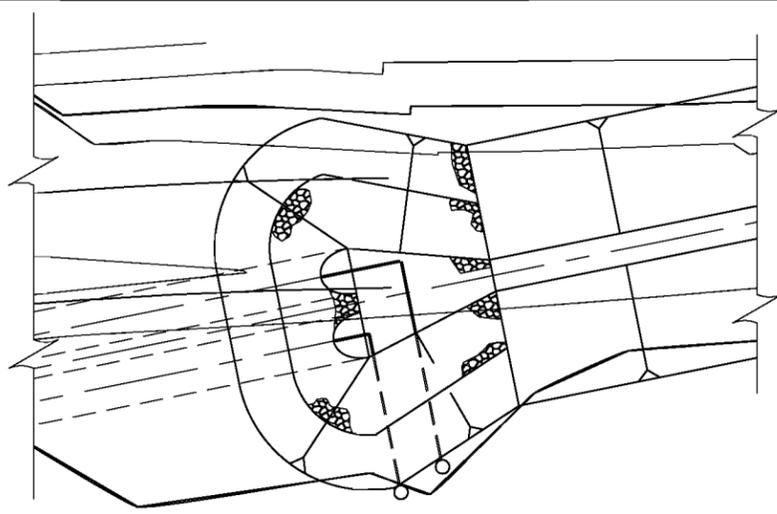
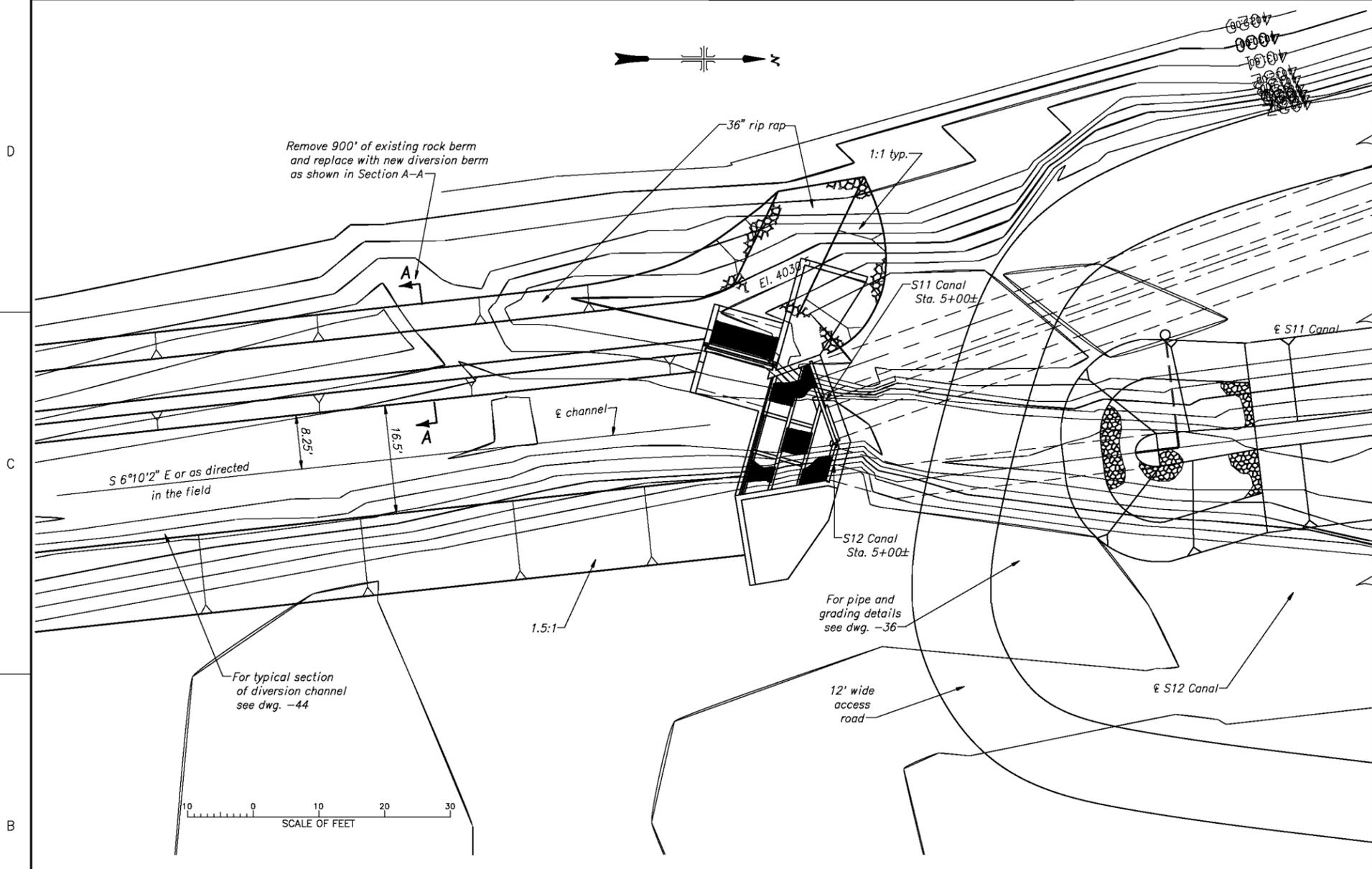
Date of survey June 28, 1999

ALWAYS THINK SAFETY
 UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION
 UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S11-12 CANAL CONSOLIDATION
GENERAL PLAN

DESIGNED: Phil Mann CHECKED: Phil Mann
 DRAWN: EDM/MS/PMM TECH. APPROVAL: Dave Jennings
 PROGRAM MANAGER

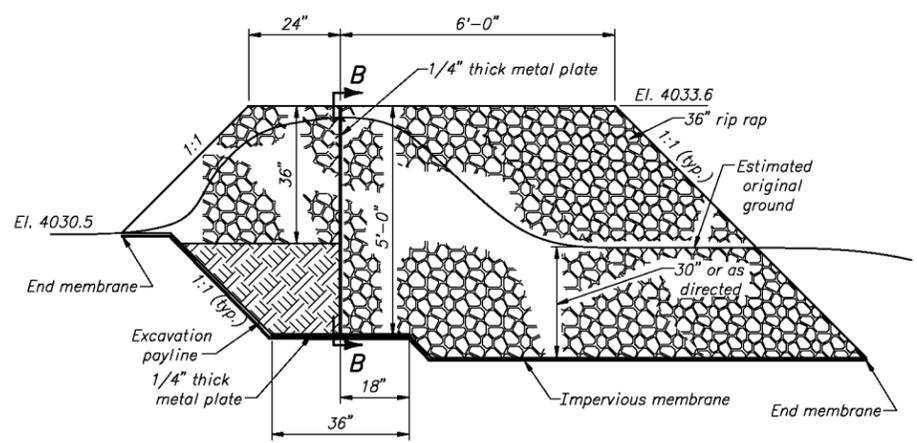
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PLAN VIEW

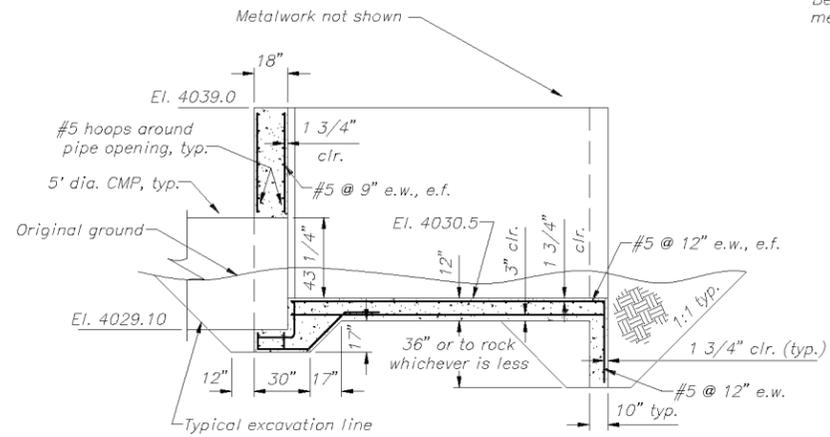
SECTION B-B TYPICAL END VIEW



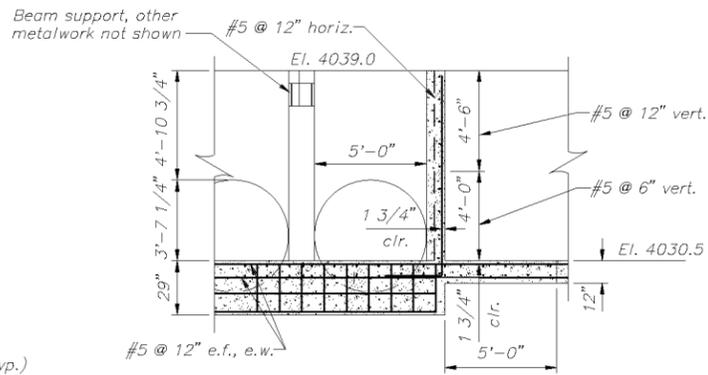
SECTION A-A DIVERSION BERM TYPICAL SECTION

- NOTES:**
1. Exact location and alignment of diversion berm plates as directed in field.
 2. Total berm length = 900'
 3. Individual plate lengths determined by contractor.
 4. Trim base of metal plate as required to provide 1" max. gap between end of vertical metal plate and concrete wall of wasteway structure.
 5. 2' minimum overlap of membrane against concrete wall to provide seal.

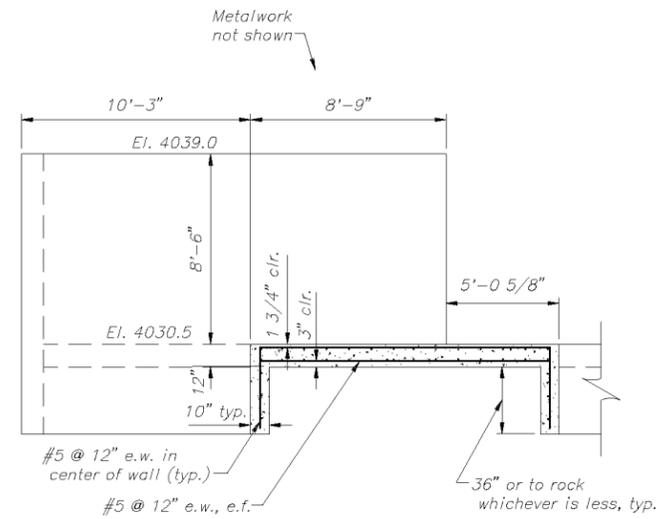
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 CANALS HEADWORKS SITE PLAN AND DIVERSION BERM SECTIONS		
DESIGNED: <u>Phil Mann</u>	CHECKED: <u>Phil Mann</u>	
DRAWN: <u>Ed Merdherst</u>	TECH. APPROVAL: <u>Dave Jennings</u> PROGRAM MANAGER	
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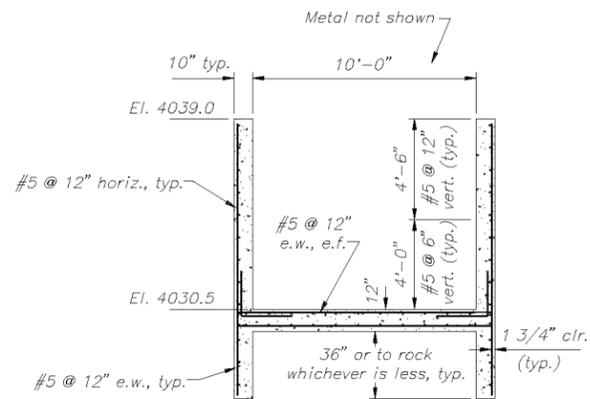
SECTION G-G (26)



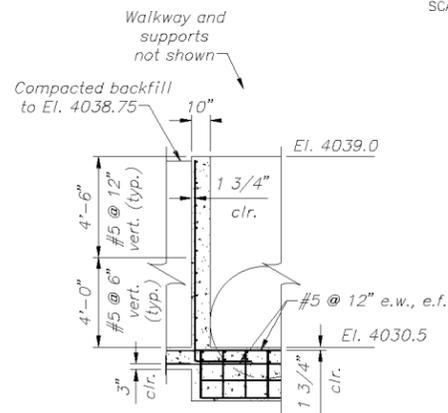
SECTION J-J (26)



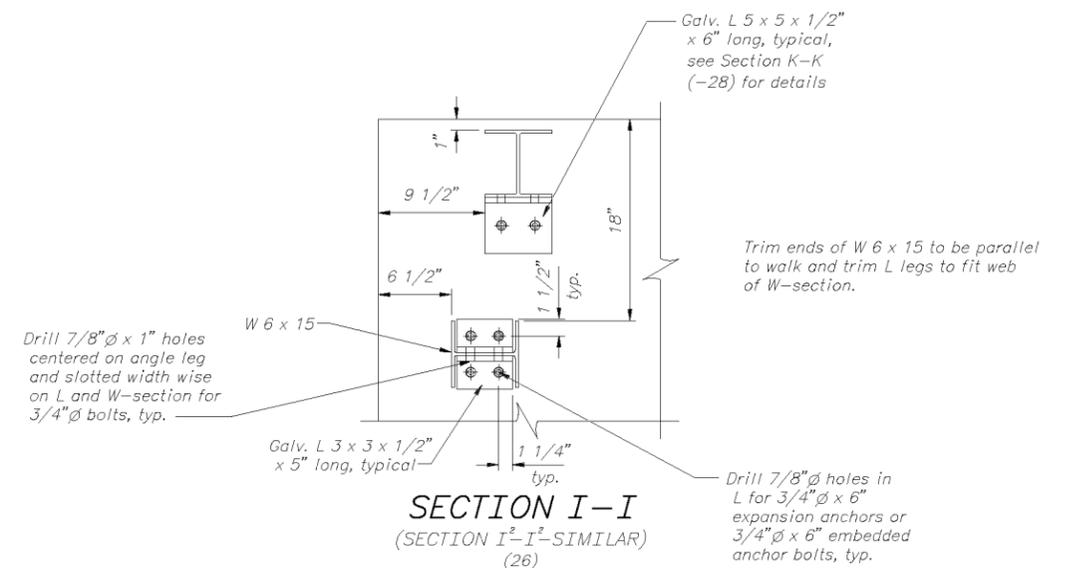
SECTION C-C (26)



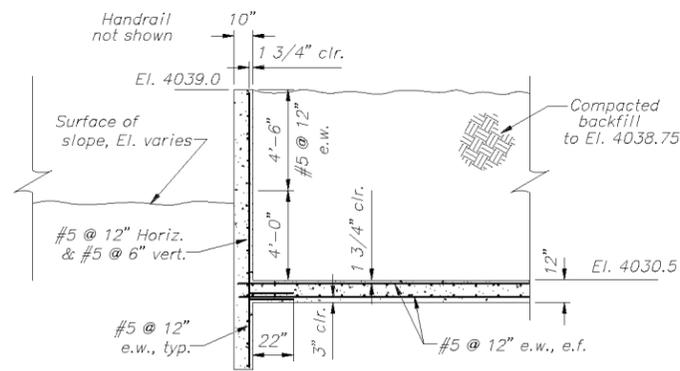
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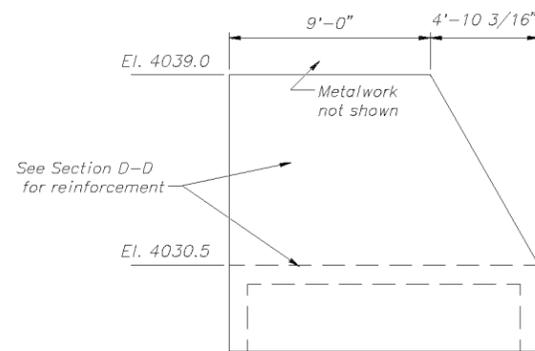
SECTION E-E (26)



SECTION I-I (SECTION I^2-I^2-SIMILAR) (26)



SECTION F-F (26)



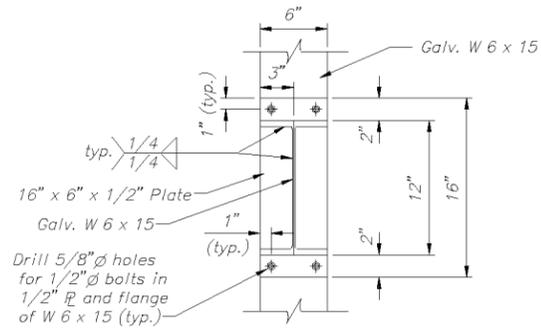
SECTION H-H (26)

ALWAYS THINK SAFETY

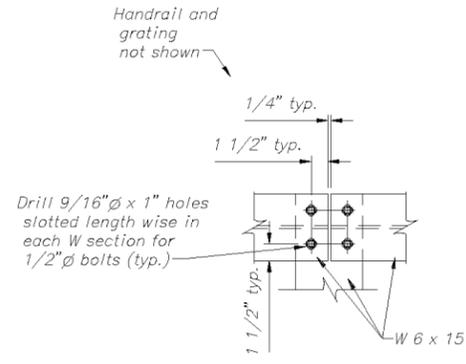
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S11-12 CANAL CONSOLIDATION
S11-12 HEADWORKS
SECTIONS

DESIGNED Phil Mann CHECKED Phil Mann
DRAWN Ed Mordherst TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

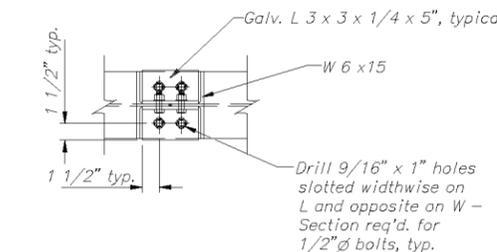
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BOISE, IDAHO AUGUST 2006 1720-100-27



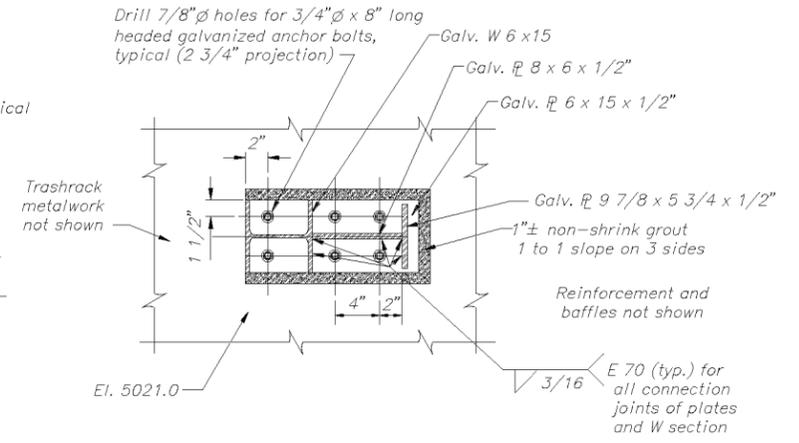
SECTION O-O



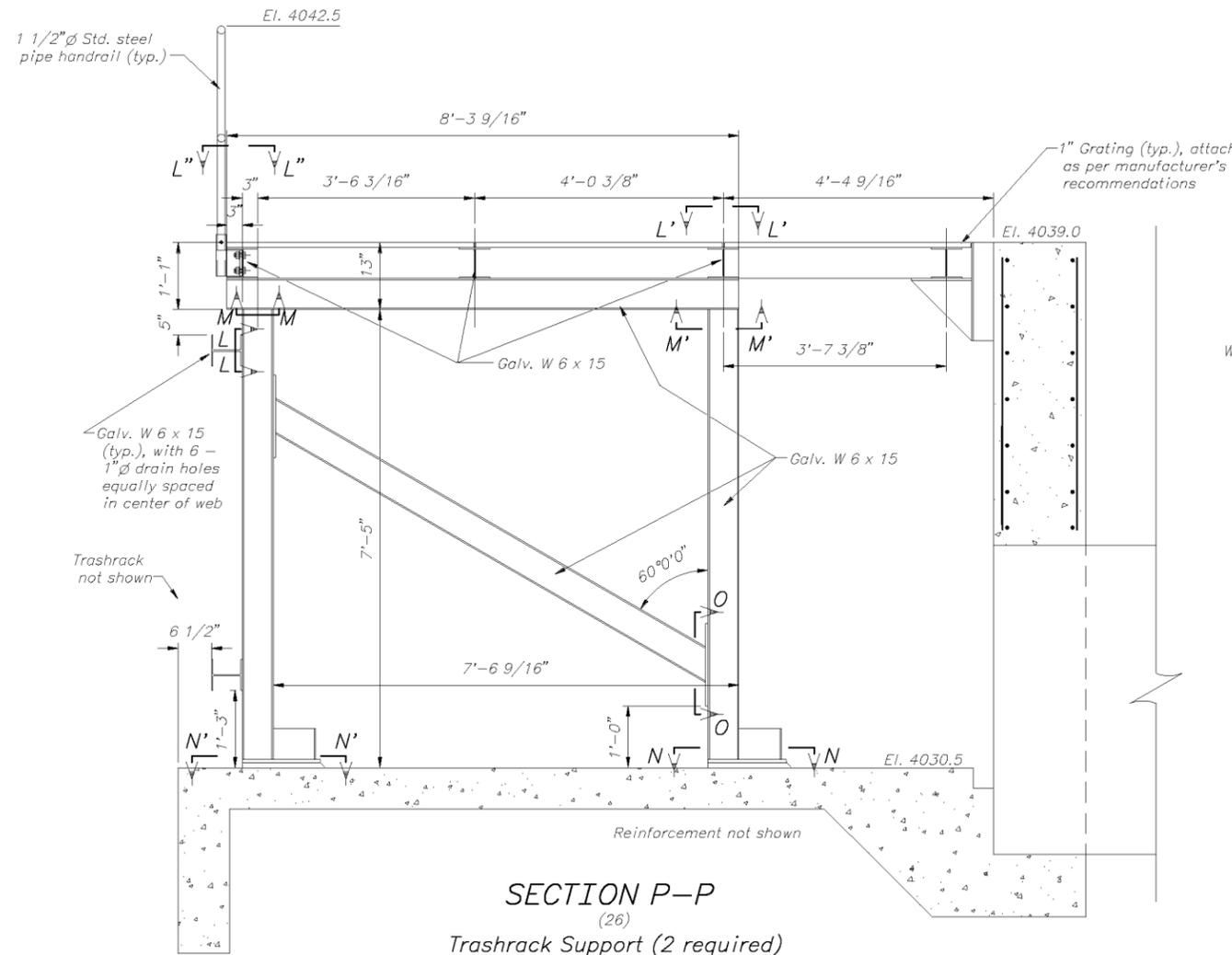
SECTION L-L
(SECTION L'-L' and L''-L'' Similar)



SECTION M-M
(SECTION M'-M' Similar)

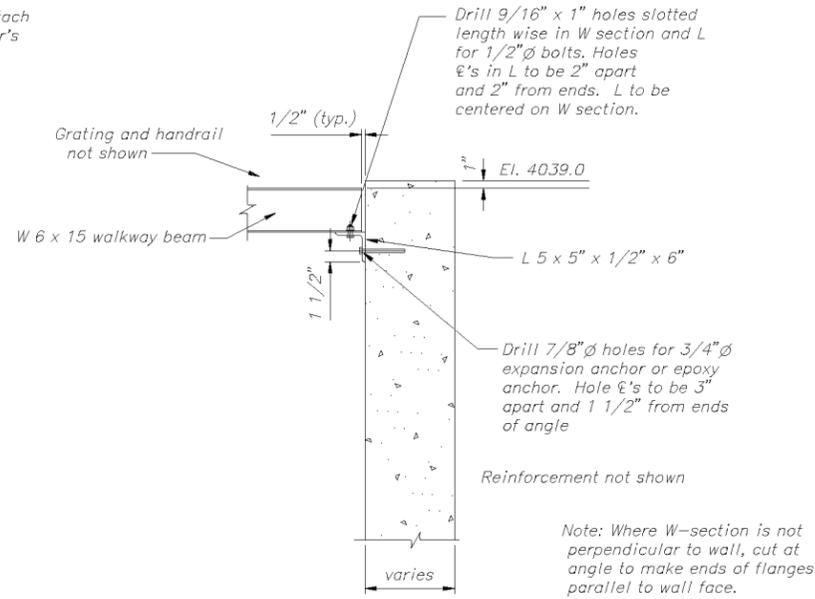


SECTION N-N
(SECTION N'-N' Similar)



SECTION P-P
(26)

Trashrack Support (2 required)

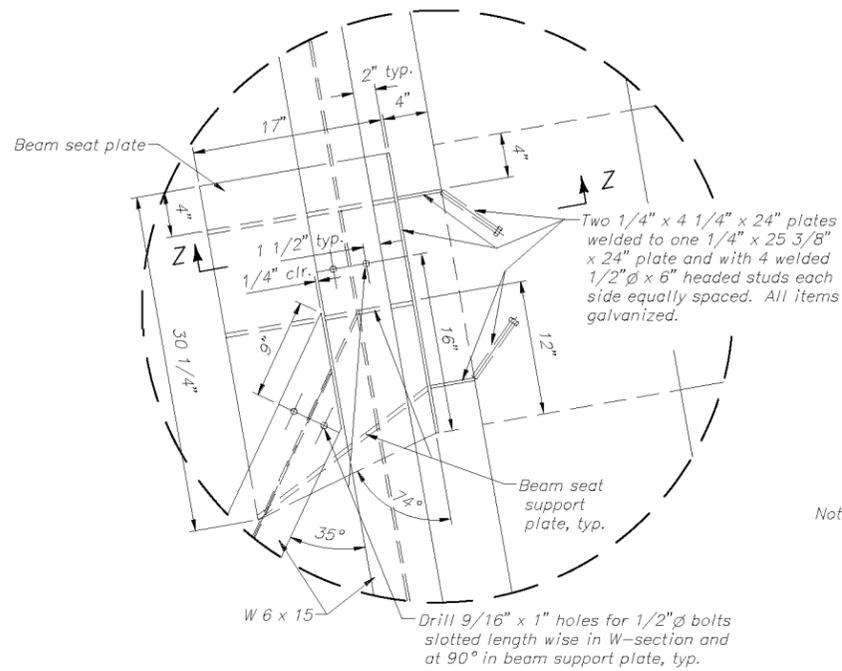


SECTION K-K
(26)
(11 Locations)



NOTE: 1" Grating to be 1" bar type grating, live load capacity of 100 psf, banding bar on perimeter of each panel.

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 HEADWORKS METALWORK SECTIONS AND ELEVATION		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Mordherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 18.0 BOISE, IDAHO	CADD FILENAME 1720-100-28.DWG AUGUST 2008	DATE AND TIME PLOTTED AUGUST 14, 2008 14:20 1720-100-28

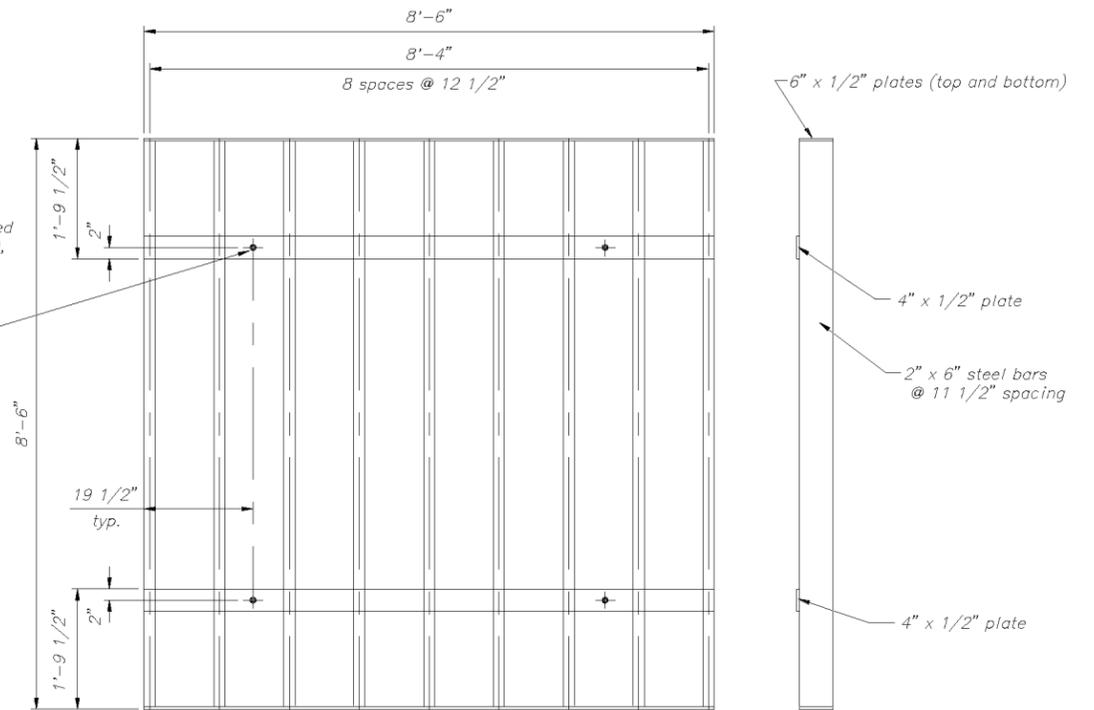


Note: - 4" x 4" gate blockout shown

DETAIL C
(26)



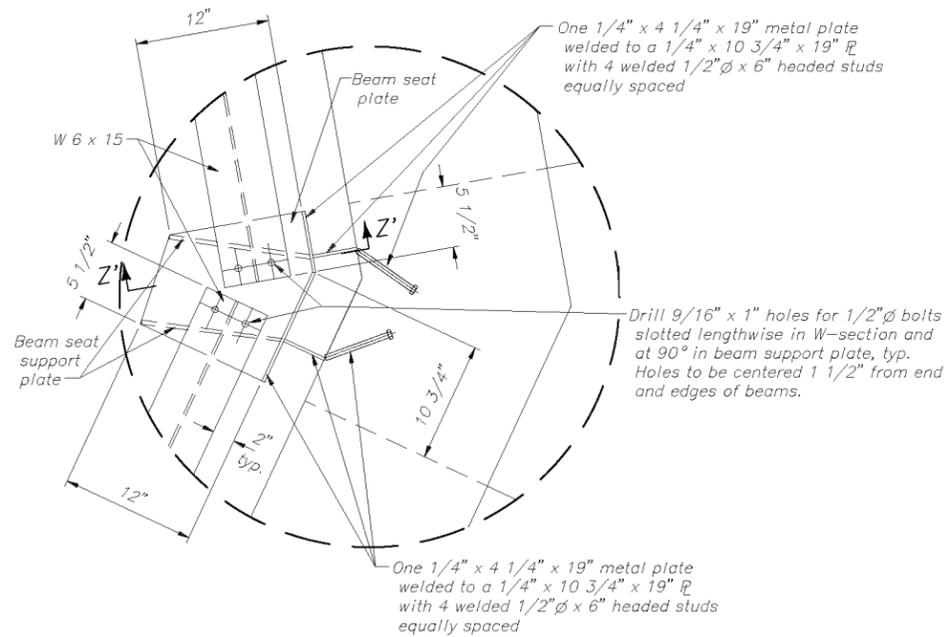
Drill 3/4" ϕ x 1 1/2" ϕ slotted holes for 5/8" ϕ bolts (typ.), slot vertically in 5" x 1/4" plate and horizontally in W 8 x 15. Locate holes in W 8 x 15 to match holes in trashrack panels.



NOTES:

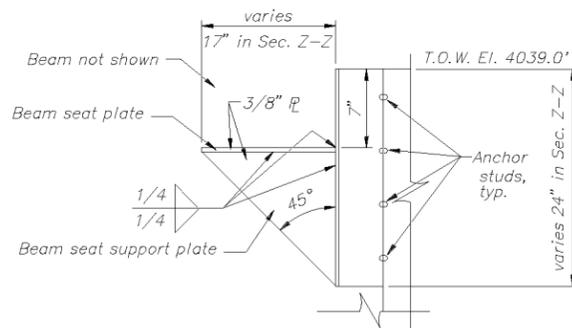
1. Full length, both sides, 1/4" fillet welds at all joints.
2. Diagonal measurements for each panel to be within 1/4".
3. Install panels to provide equal spacing at walls and between panels.

TRASHRACK PANEL - ELEVATION
(2 Required)



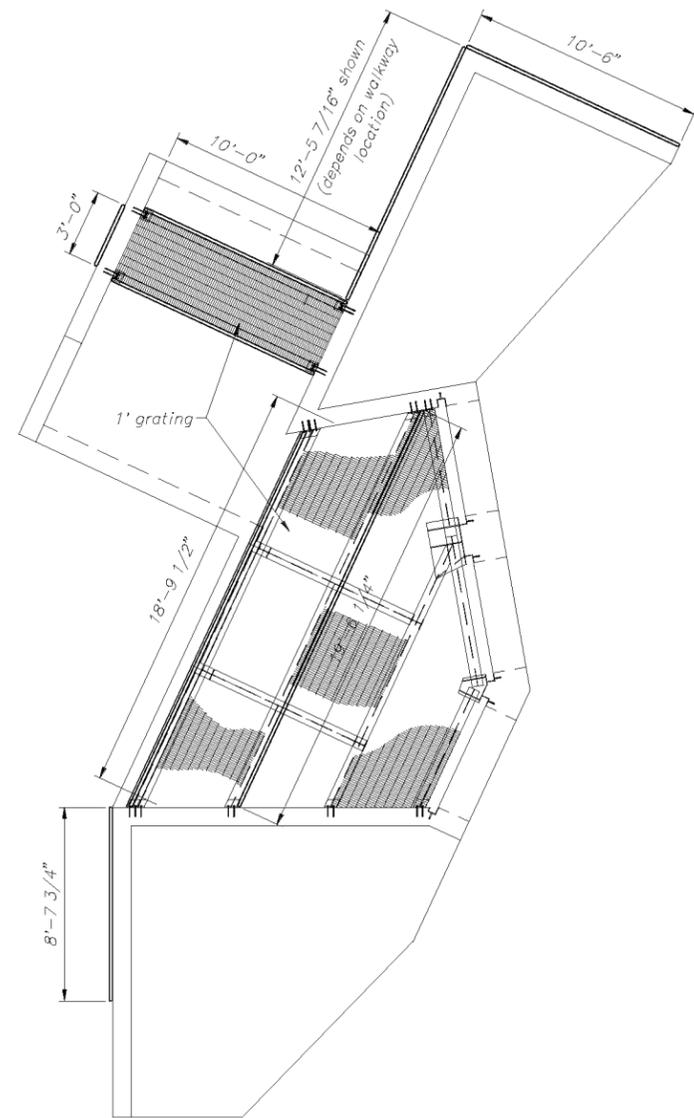
DETAIL E
(26)

- Notes: - Weld 5 1/2" ϕ and 10 3/4" ϕ together
- 4" x 4" gate blockout shown



SECTION Z-Z
(TYPICAL BEAM SEAT AND SUPPORT PLATES)
(SECTION Z'-Z' SIMILAR)

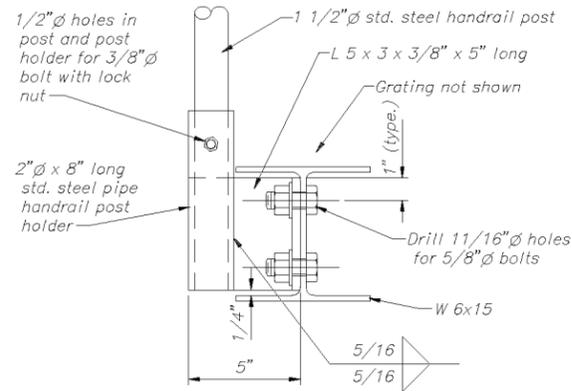
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 HEADWORKS METALWORK SECTIONS AND ELEVATION		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Merdherat</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Rpt. 16.0	CADD FILENAME 1720-100-55.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 14:22
BOISE, IDAHO	AUGUST 2000	1720-100-55



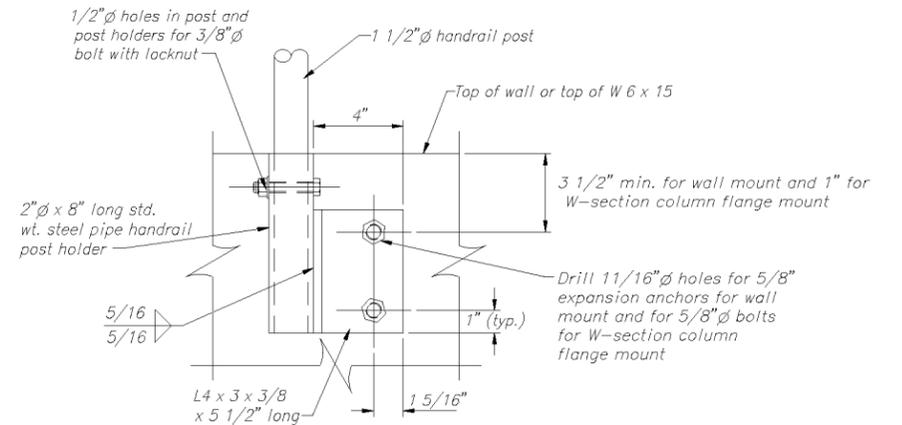
HANDRAIL AND GRATING PLAN

NOTES:

1. Approximate locations and lengths of handrail are shown. Exact location and lengths to be determined in the field.
2. Other metal work not shown.
3. Grating to be the thickness shown, and have a live load capacity of 100 psf with 1/4" maximum deflection, and have banding bars around the perimeter of each grating panel.

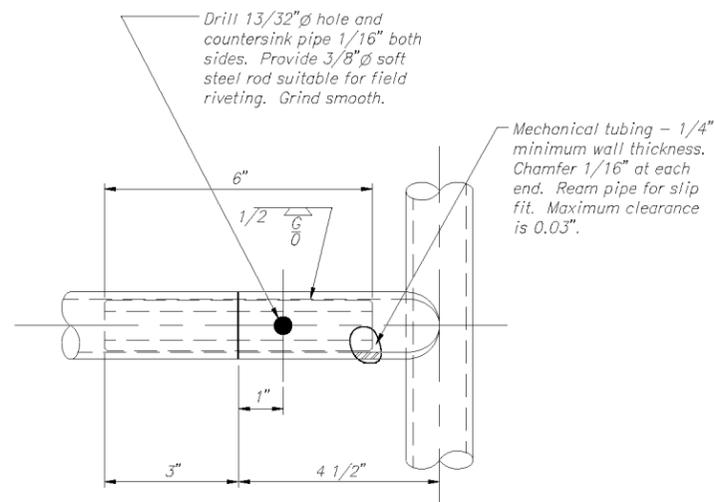


ELEVATION
HANDRAIL POST HOLDER
(For W-section beam web mount removable handrail)



Note: Handrail post holder to be flush with top edge of concrete or W-section column flange.

ELEVATION
HANDRAIL POST HOLDER
(For W-section column or wall mount removable handrail)

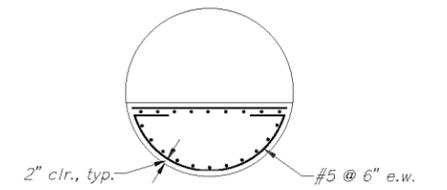
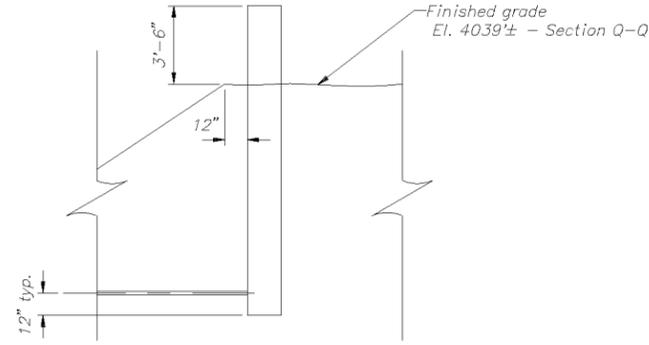
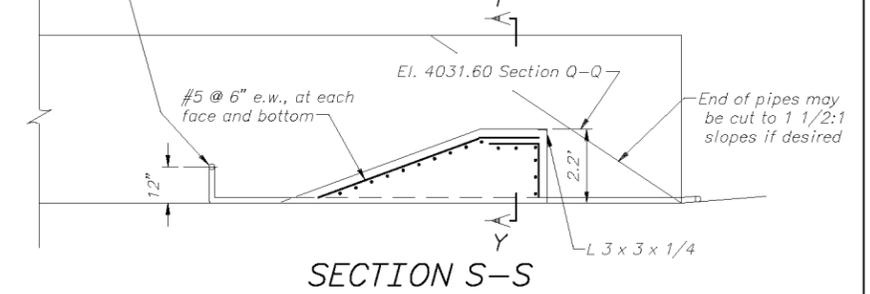
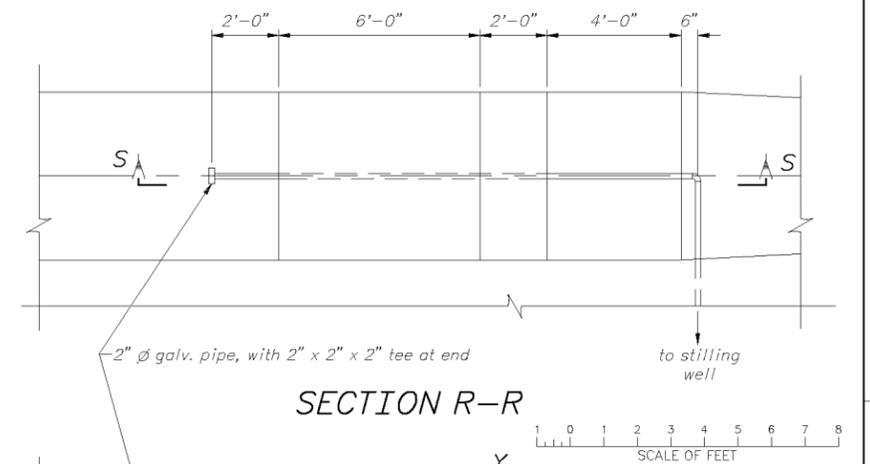
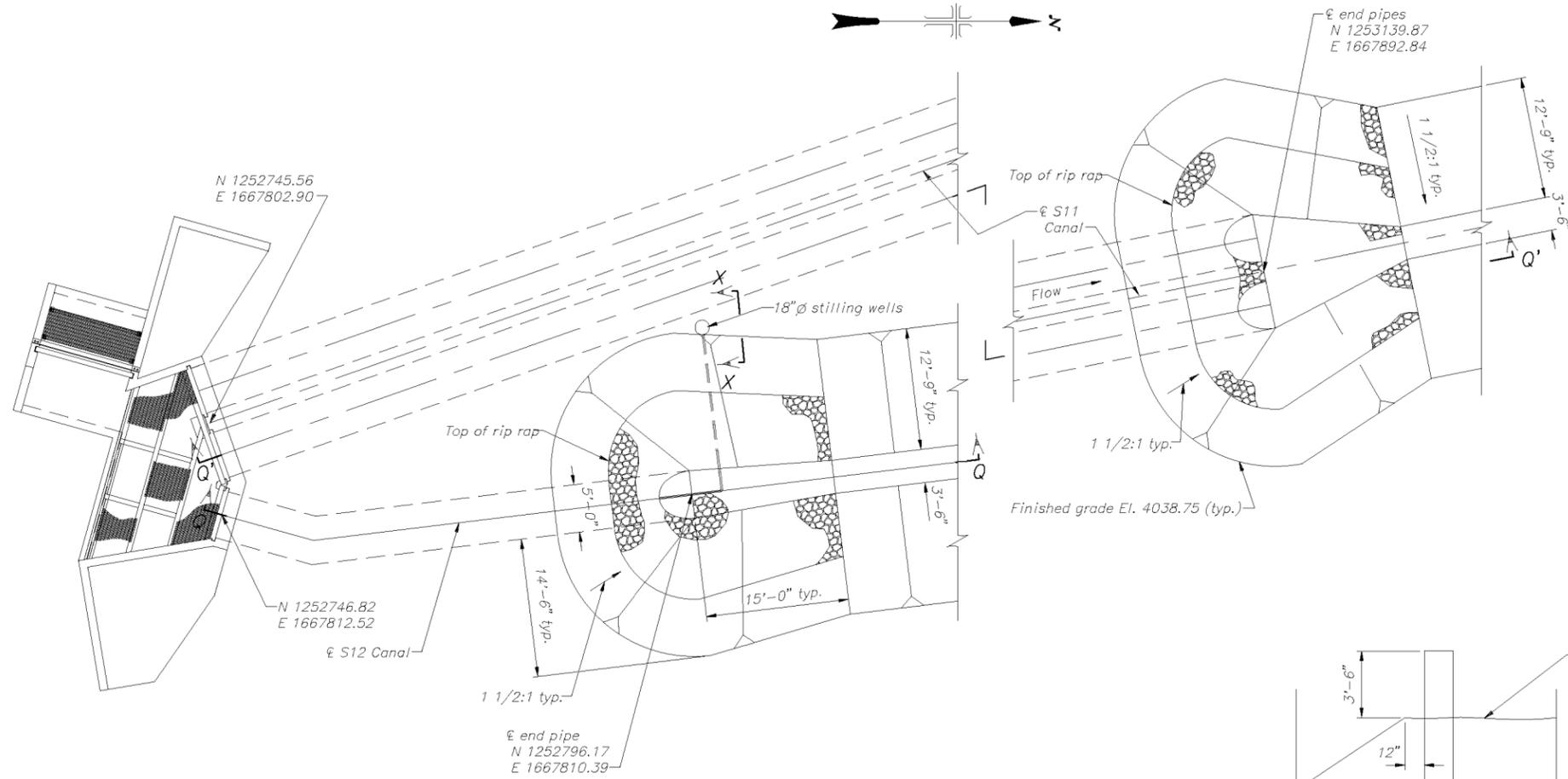


HANDRAIL SPLICE DETAIL

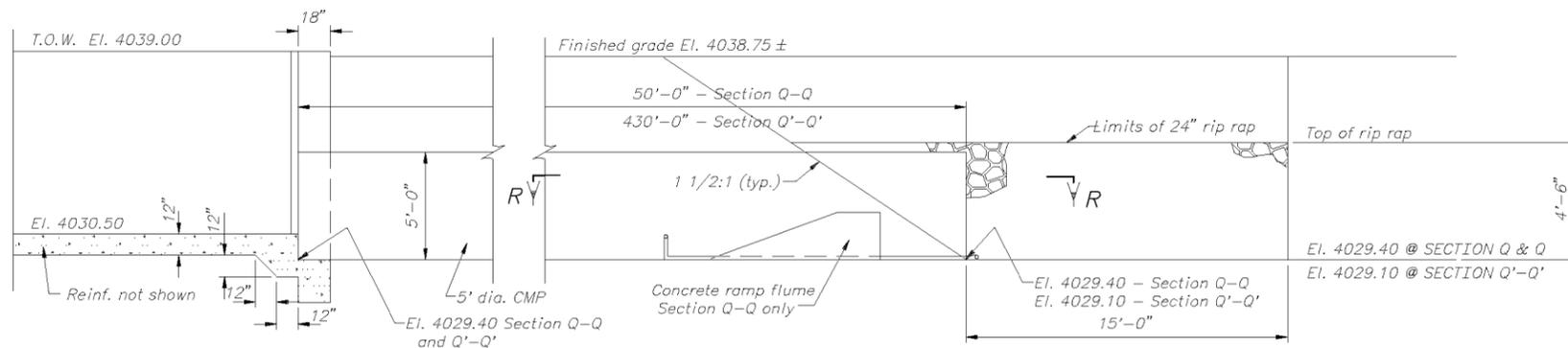
NOTES:

1. Welding symbols apply to the joints of all members of similar identification.
2. Weld all pipe joints with 1/8" reinforced welds and dress smooth.
3. All handrails shall be fabricated with new standard weight black pipe or tubing of sizes as specified on the installation drawings.
4. Corners and edges of all plates, bars, and pipe ends shall be free of burrs.
5. All screws, riveting material, and bolts shall be provided as required for complete installation.
6. Standard handrail rail heights to be 21" and 42" above deck levels.
7. Splice handrail at 16' max. intervals or where shown.
8. Handrail posts and rails to be 1 1/2" std. wt. steel pipe unless otherwise specified.
9. Splice required adjacent to all interior angles of 90° or less and at changes from concrete to metal post supports.
10. Removable handrail post spacing is 8' maximum.
11. Galvanize all metal work unless otherwise specified.

UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 HEADWORKS HANDRAIL AND GRATING PLAN, ELEVATIONS, AND DETAIL		
DESIGNED <u>Phil Mann</u>		CHECKED <u>Phil Mann</u>
DRAWN <u>Ed Mardherst</u>		TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER
CADD SYSTEM AutoCAD Rev. 18.0	CADD FILENAME 1720-100-29.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 15:57
BOISE, IDAHO		AUGUST 2006
1720-100-29		



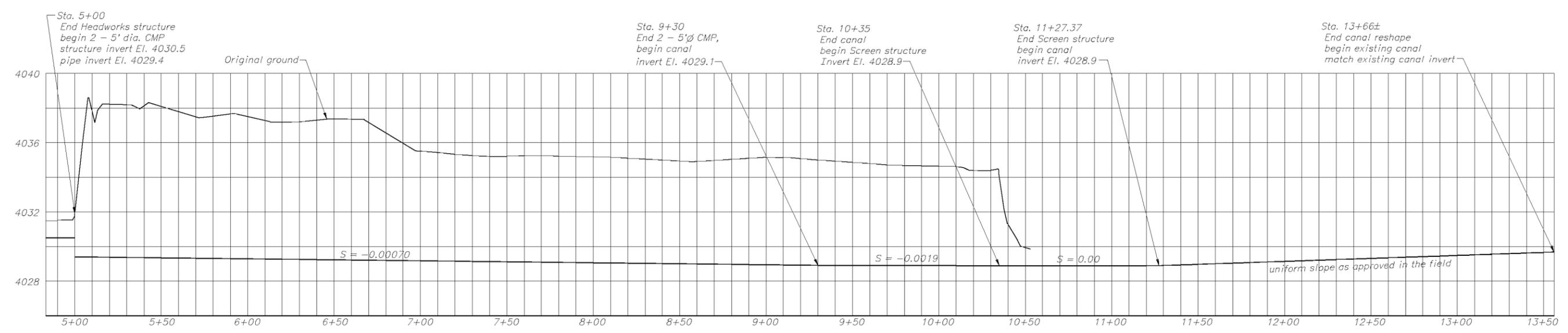
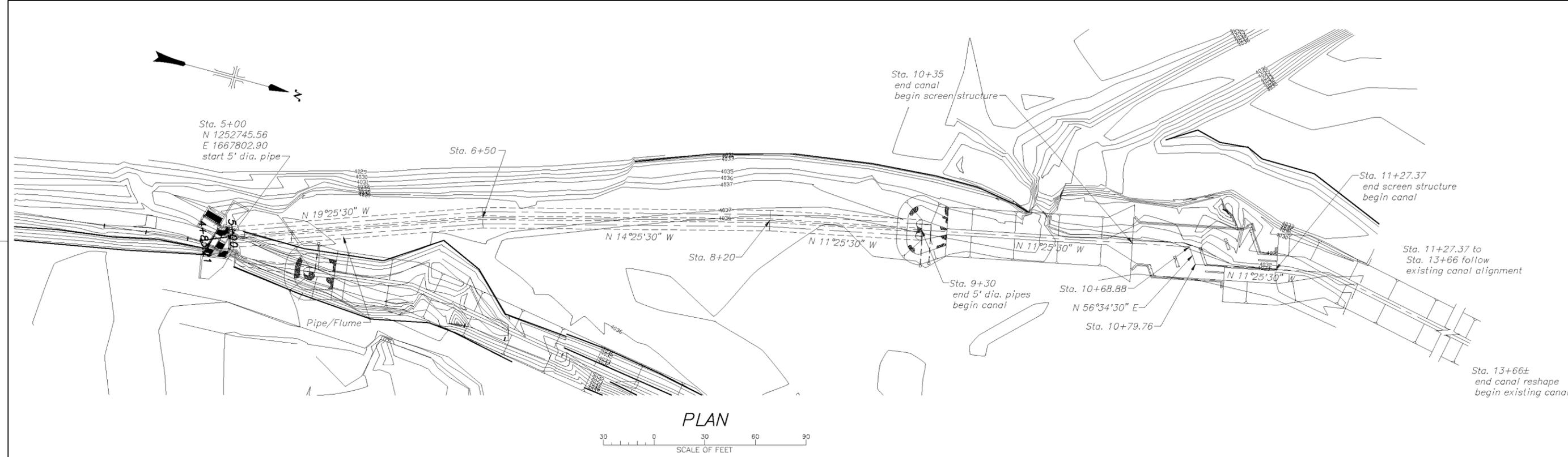
Note: For S11 ramp flume see dwg. 1720-100-61 (sheet 9A).



SECTION Q-Q
SECTION Q'-Q' and Q''-Q'' Similar

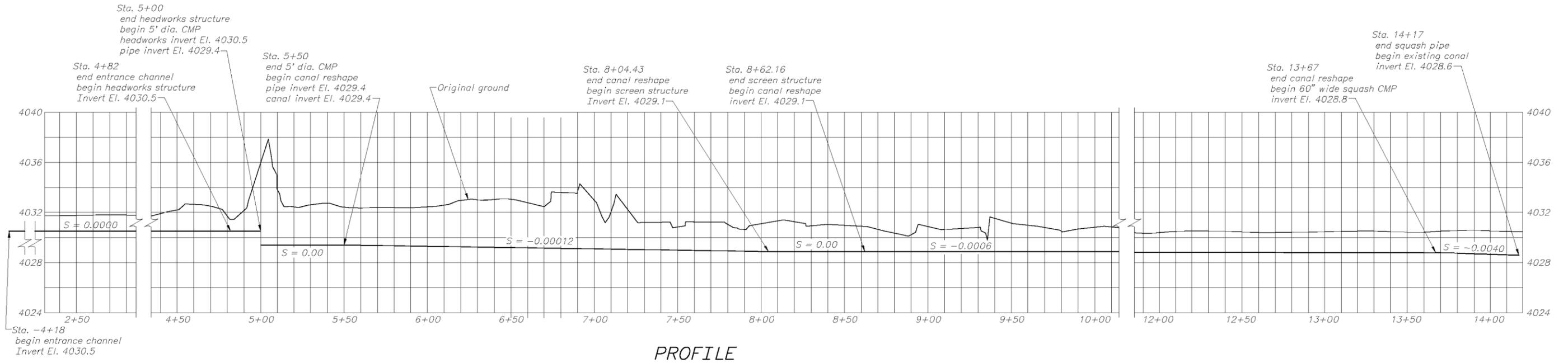
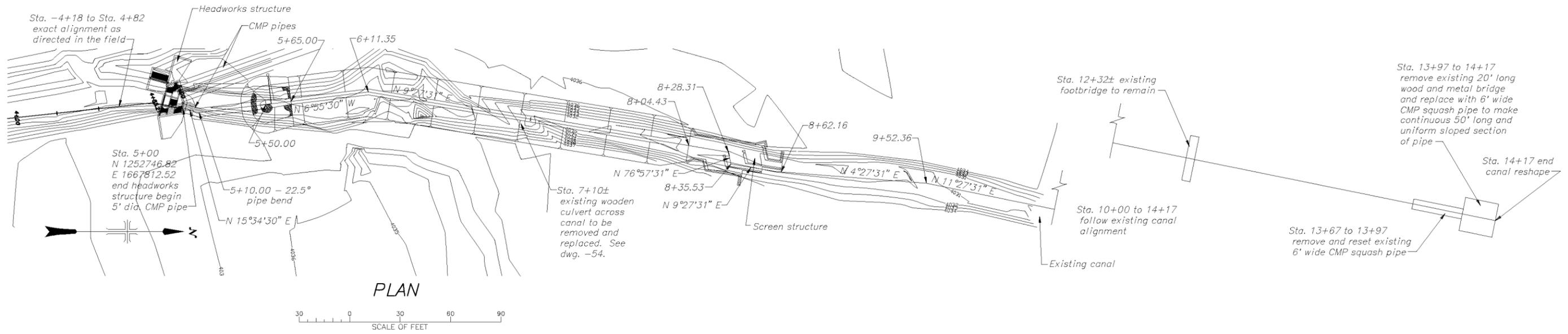


ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 CANALS HEADWORKS PIPES AND RAMP FLUME PLAN AND SECTION		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>M.Solas/EDM</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Rpt. 18.0	CADD FILENAME 1720-100-36.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 15:59
BOISE, IDAHO	SEPTEMBER 2006	1720-100-36



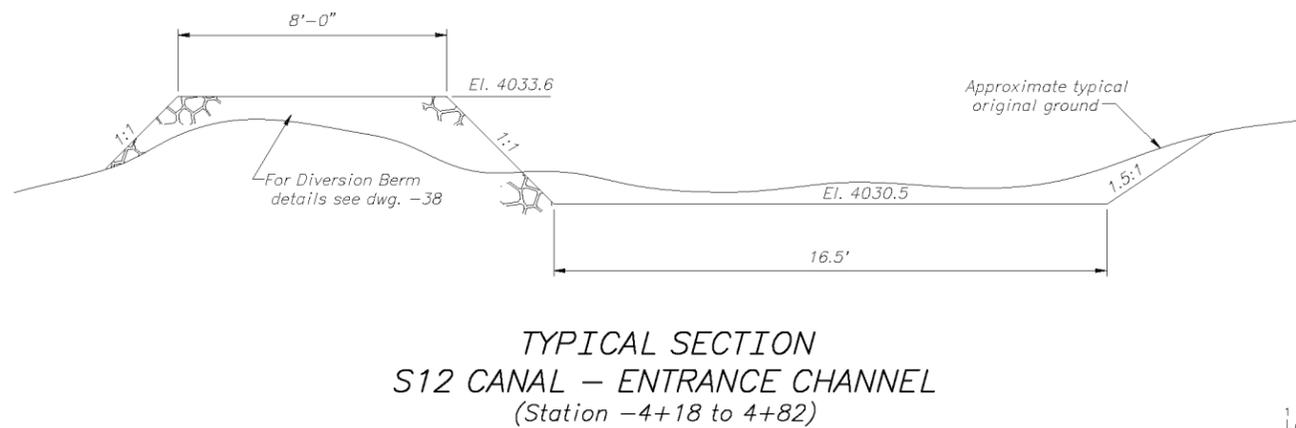
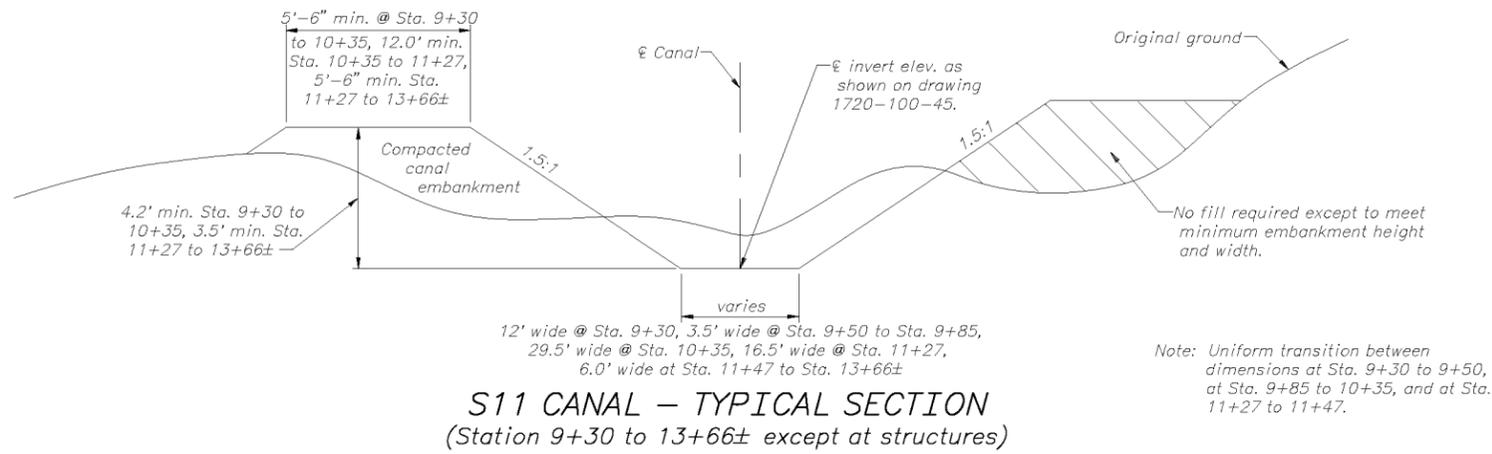
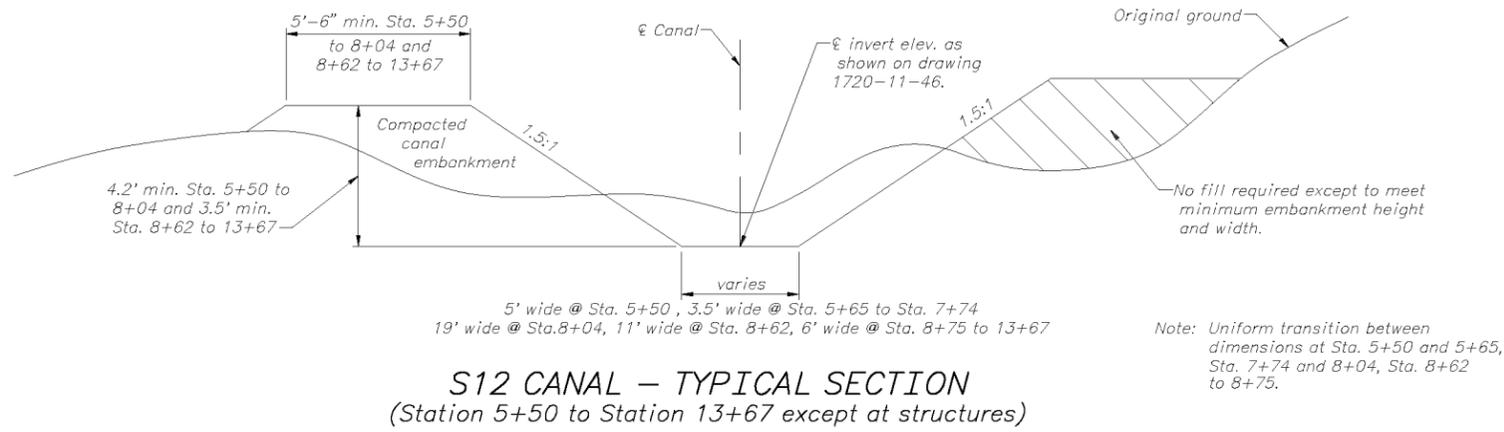
Note: -for pipe bends use pulled joints
 -for open channel bends use 40' radius bends
 -see dwg. -44 for typical canal section
 -no trees to be removed for canal reshape except as directed in the field

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11 CANAL AND PIPE PLAN AND PROFILE		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>REG/EDM</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-45.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 16:02
BOISE, IDAHO	OCTOBER 2000	1720-100-45

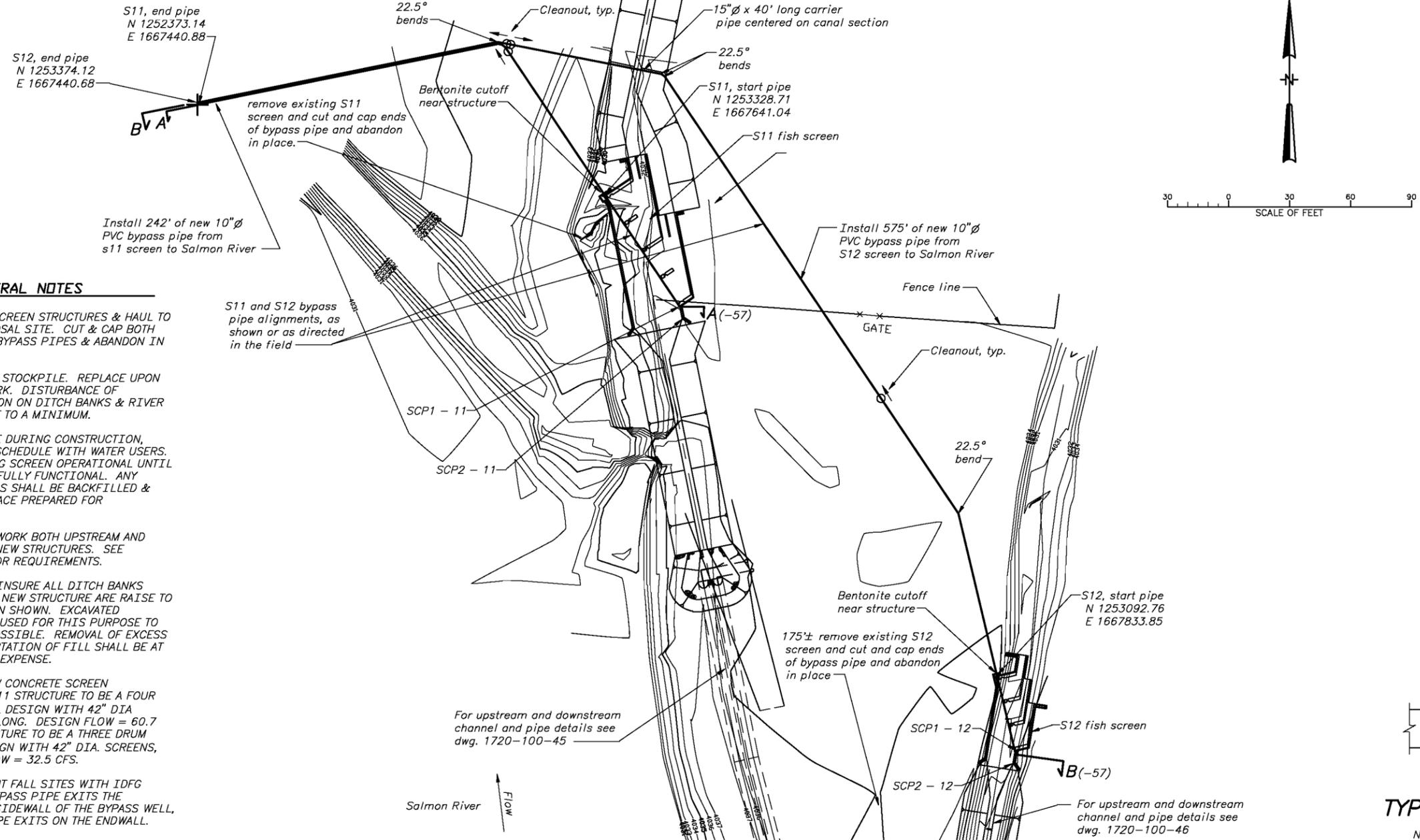


- NOTES:**
- open channel bends use 40' radius bends
 - screen structure bends are abrupt angles
 - see dwg. 1720-100-44 for typical canal section
 - no trees to be removed for canal reshape except as directed in the field. Reshape Station 8+70 to 13+67 all trees to remain.

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S12 CANAL PLAN AND PROFILE		
DESIGNED <u>Phil Mann</u>		CHECKED <u>Phil Mann</u>
DRAWN <u>REG/EDM</u>		TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-46.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 16:04
BOISE, IDAHO		OCTOBER 2000
1720-100-46		



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UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION S11-12 CANALS TYPICAL CANAL SECTIONS	
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>
DRAWN <u>Ed Mortherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-44.DWG
BOISE, IDAHO	DATE AND TIME PLOTTED AUGUST 14, 2006 16:06
SEPTEMBER 2000	1720-100-44



LEGEND

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

LOCATION

South on Hwy. 93 approx. 4.8 miles from intersection of Hwy. 93 and 28 in Salmon Id. Then 0.1 mile west on private dirt access road.

GENERAL NOTES

REMOVE EXISTING SCREEN STRUCTURES & HAUL TO AN APPROVED DISPOSAL SITE. CUT & CAP BOTH ENDS OF EXISTING BYPASS PIPES & ABANDON IN PLACE.

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 & COMPACTED, & SURFACE PREPARED FOR RESEEDING.

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 RAISE 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.

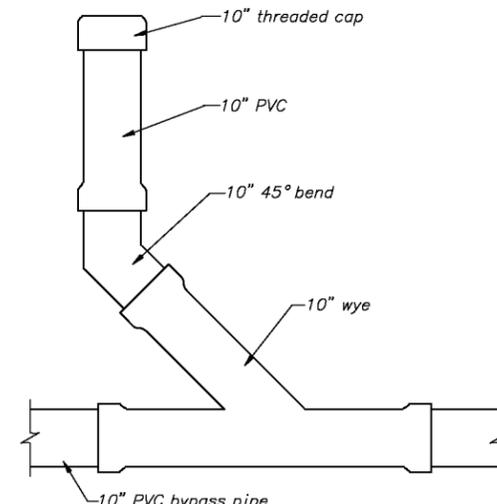
CONSTRUCT TWO NEW CONCRETE SCREEN STRUCTURES. THE S11 STRUCTURE TO BE A FOUR DRUM PADDLE WHEEL DESIGN WITH 42" DIA SCREENS, EACH 14' LONG. DESIGN FLOW = 60.7 CFS. THE S12 STRUCTURE TO BE A THREE DRUM PADDLE WHEEL DESIGN WITH 42" DIA. SCREENS, EACH 10' LONG. FLOW = 32.5 CFS.

CONFIRM BYPASS OUT FALL SITES WITH IDFG PERSONNEL. S11 BYPASS PIPE EXITS THE STRUCTURE ON THE SIDEWALL OF THE BYPASS WELL, AND S12 BYPASS PIPE EXITS ON THE ENDWALL.

A NON-STANDARD ORIFICE PLATE IS REQUIRED AT THIS SITE.

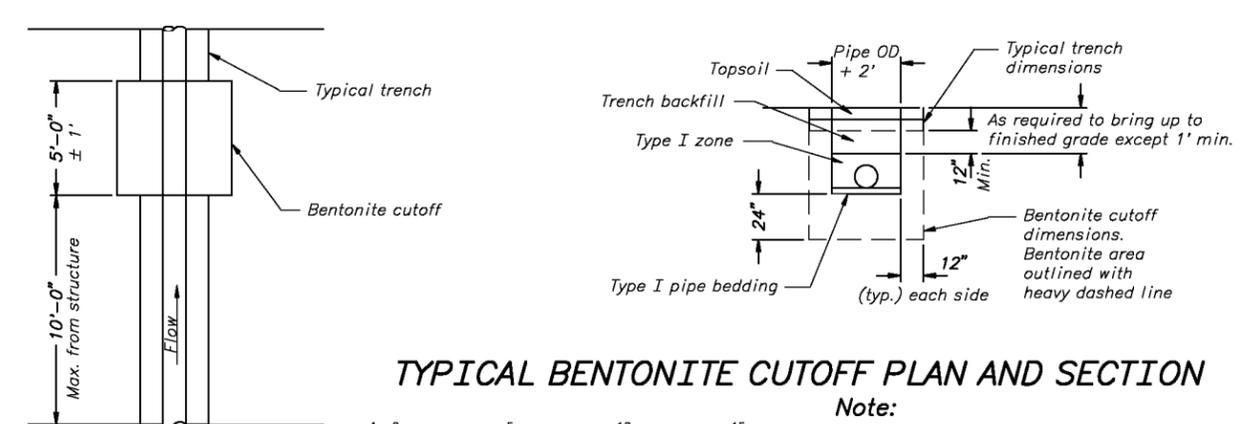
S.C.P. POINTS ARE TO INSIDE CORNERS OF THE STRUCTURE WALL.

FOR GENERAL CONTROL POINTS SEE DWG 1720-100-54.



TYPICAL BYPASS PIPE CLEANOUT

Note: arrows on plan indicate direction to be cleaned



TYPICAL BENTONITE CUTOFF PLAN AND SECTION

Note:

Pipe backfill and bedding not continuous thru cutoff.



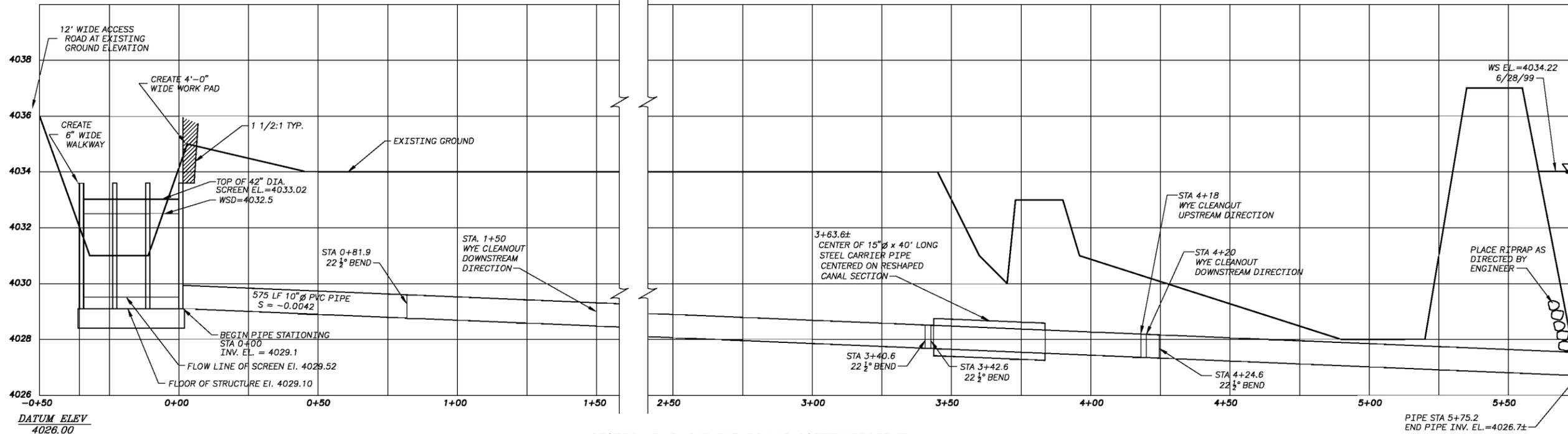
POINT # COORDINATES

POINT #	COORDINATES
S.C.P. 1-11	N 1253275.86 E 1667677.49
S.C.P. 2-11	N 1253268.02 E 1667679.08
S.C.P. 1-12	N 1253057.67 E 1667842.98
S.C.P. 2-12	N 1253049.77 E 1667841.72

SECTION 31, TOWNSHIP 20N, RANGE 22E, B.M.

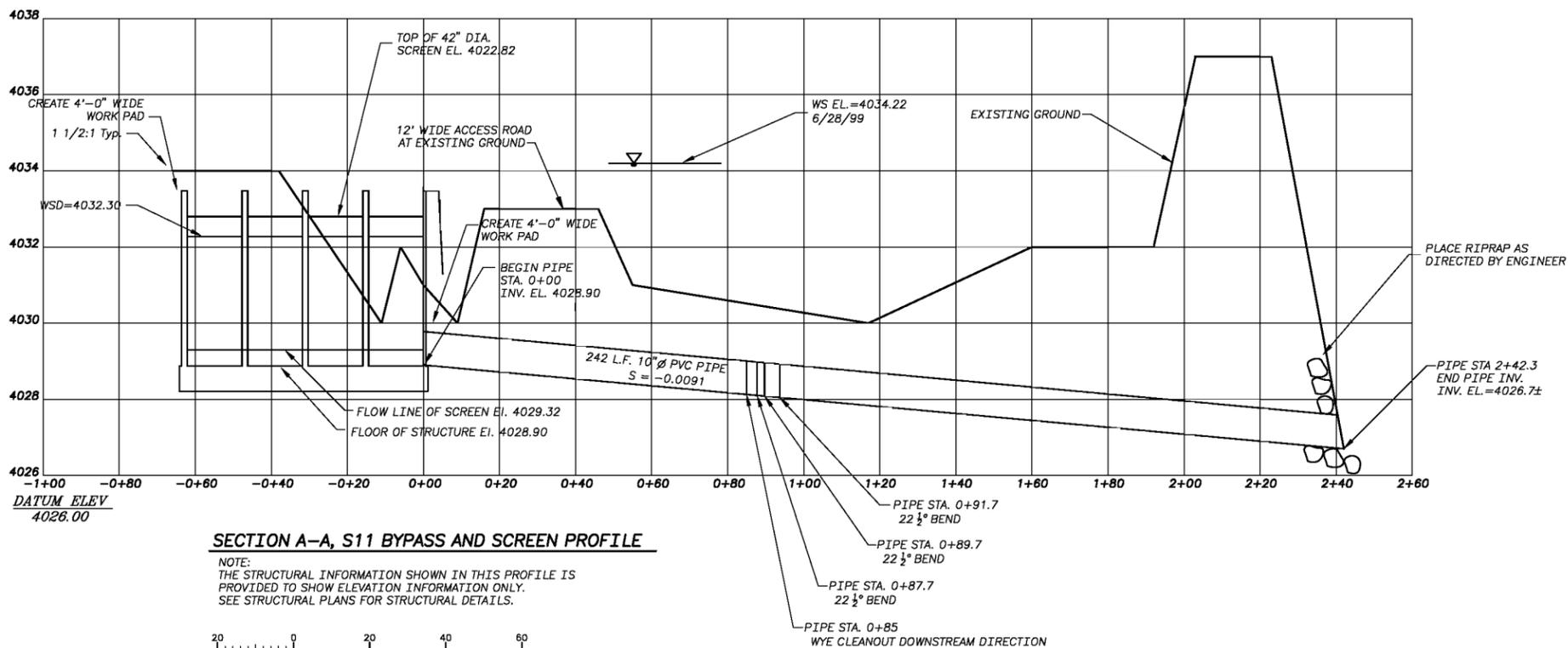
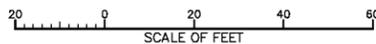
WILLIAMS LAKE 7.5' USGS QUADRANGLE

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION		
UPPER SALMON RIVER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION FISHSCREENS SITE PLAN AND SECTIONS		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN _____	TECH. APPROVAL <u>Dave Jennings</u>	PROGRAM MANAGER
CADD SYSTEM AutoCAD Rel. 16.2s	CADD FILENAME 1720-100-56.DWG	DATE AND TIME PLOTTED AUGUST 10, 2006 11:12
BOISE, IDAHO	8/20/01	1720-100-56



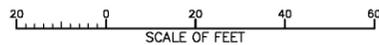
SECTION B-B, S12 BYPASS AND SCREEN PROFILE

NOTE:
THE STRUCTURAL INFORMATION SHOWN IN THIS PROFILE IS PROVIDED TO SHOW ELEVATION INFORMATION ONLY. SEE STRUCTURAL PLANS FOR STRUCTURAL DETAILS.

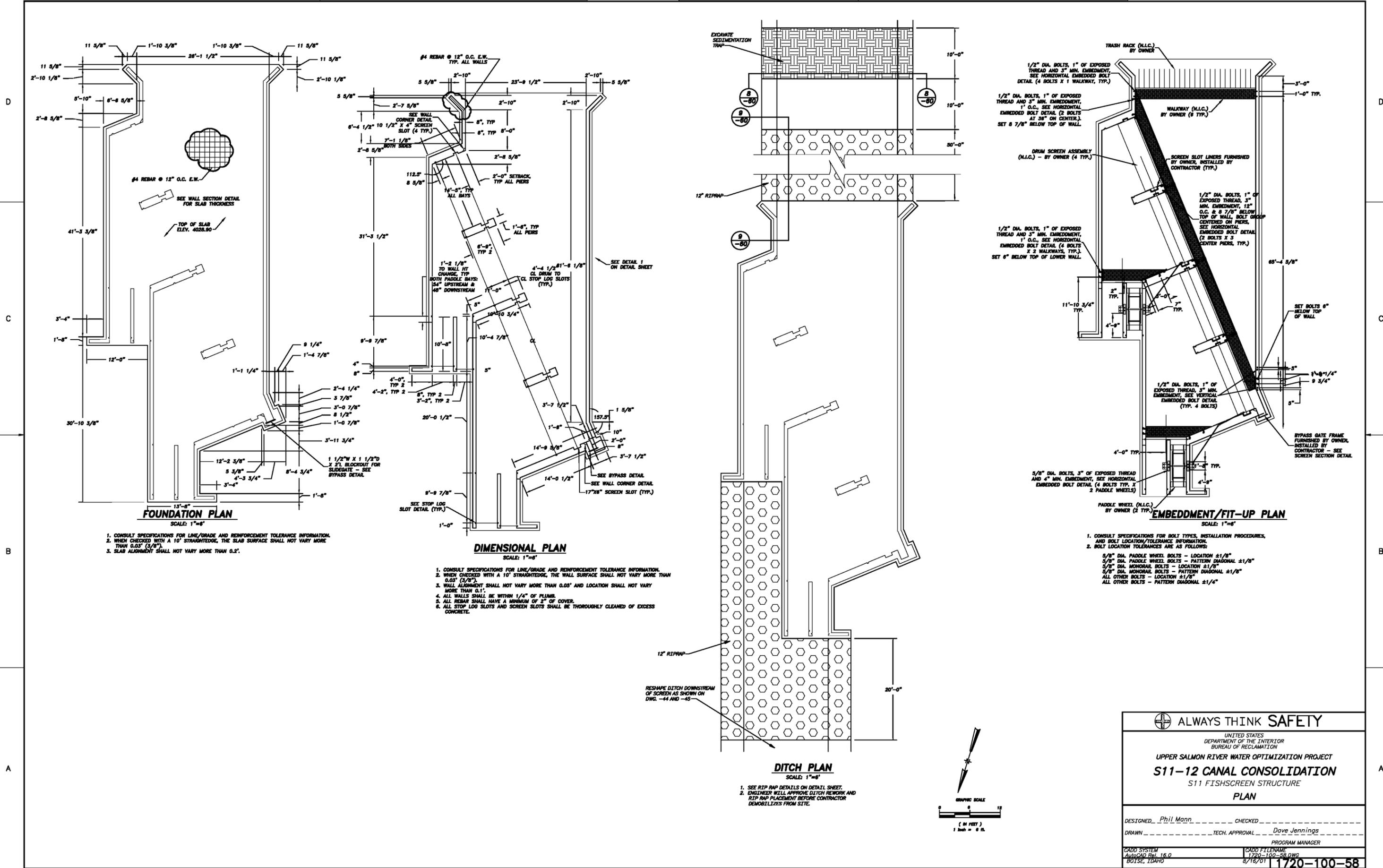


SECTION A-A, S11 BYPASS AND SCREEN PROFILE

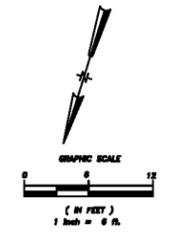
NOTE:
THE STRUCTURAL INFORMATION SHOWN IN THIS PROFILE IS PROVIDED TO SHOW ELEVATION INFORMATION ONLY. SEE STRUCTURAL PLANS FOR STRUCTURAL DETAILS.



UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-12 CANAL CONSOLIDATION FISHSCREENS SCREEN AND BYPASS PROFILES		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>REG/EDM</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD PLOT 18.0	CADD FILENAME 1720-100-57.DWG	DATE AND TIME PLOTTED AUGUST 14, 2008 18:08
BOISE, IDAHO	AUGUST 2008	1720-100-57



DATE AND TIME PLOTTED
 AUGUST 14, 2006 16:10
 PLOTTED BY
 GROOMS



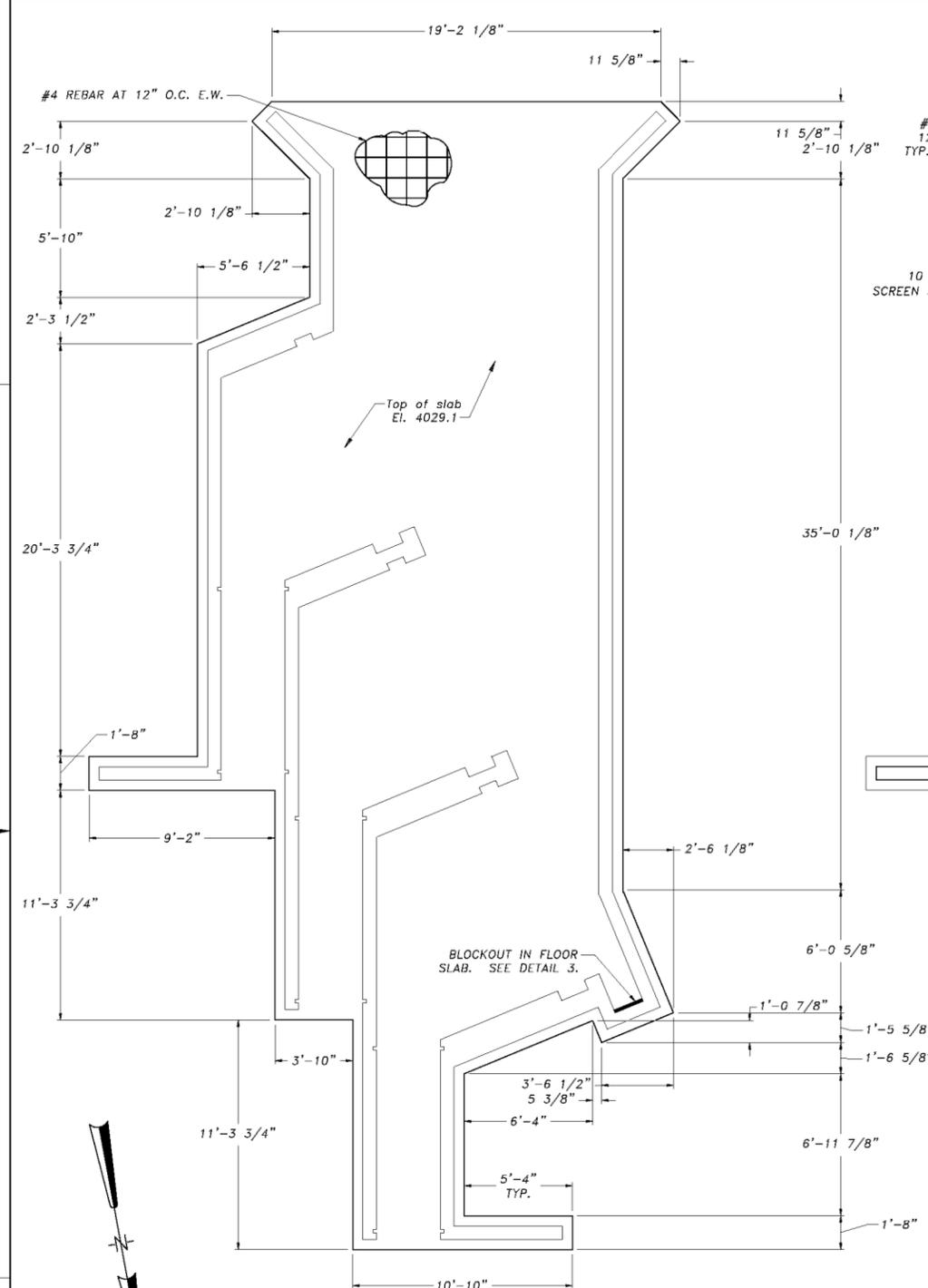
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UNITED STATES
 DEPARTMENT OF THE INTERIOR
 BUREAU OF RECLAMATION

UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S11-12 CANAL CONSOLIDATION
 S11 FISHSCREEN STRUCTURE
PLAN

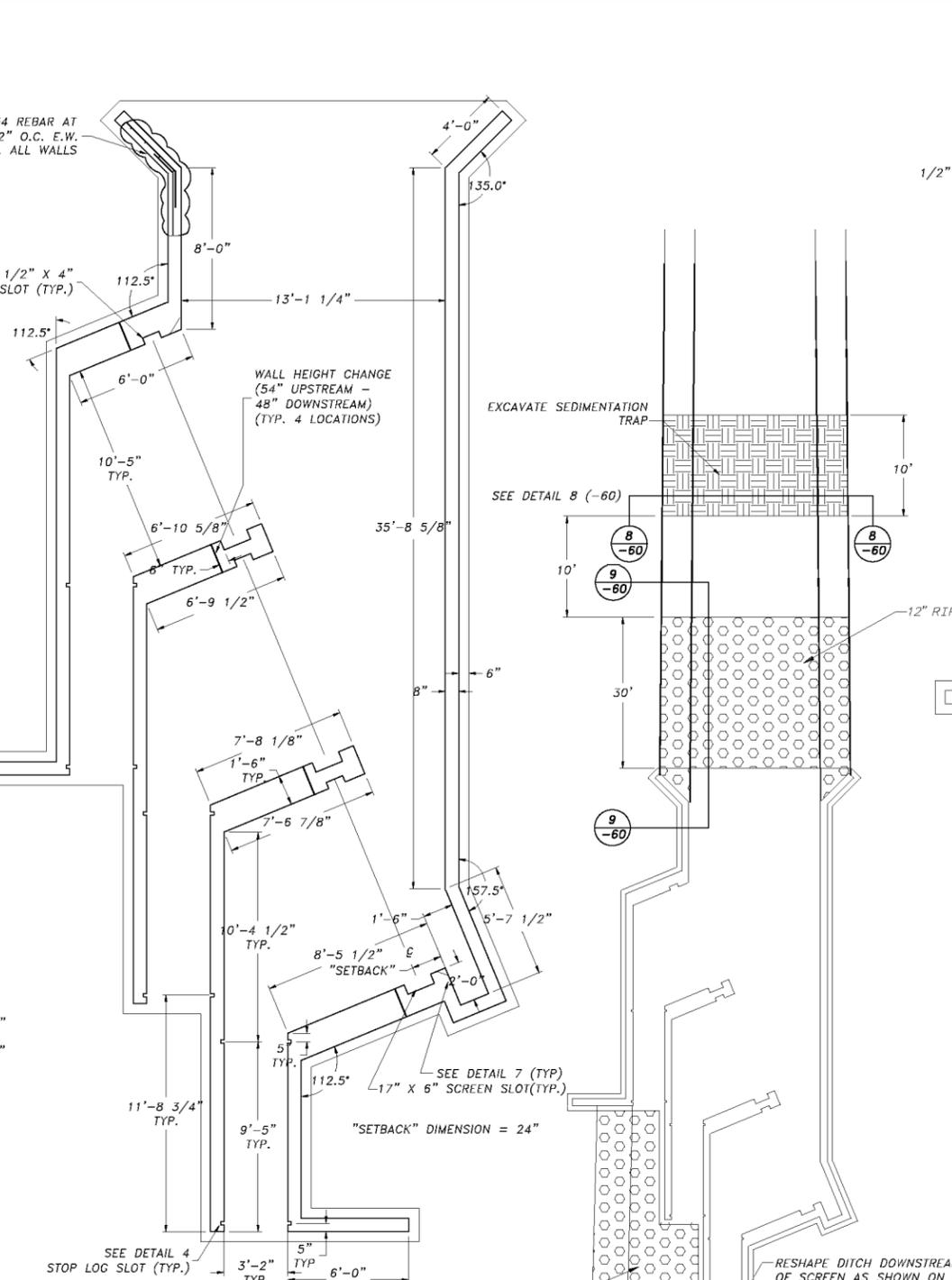
DESIGNED Phil Mann CHECKED _____
 DRAWN _____ TECH. APPROVAL Dave Jennings
 PROGRAM MANAGER

CADD SYSTEM AutoCAD Rev. 16.0 CADD FILENAME 1720-100-58.DWG
 BOISE, IDAHO 8/16/01 1720-100-58



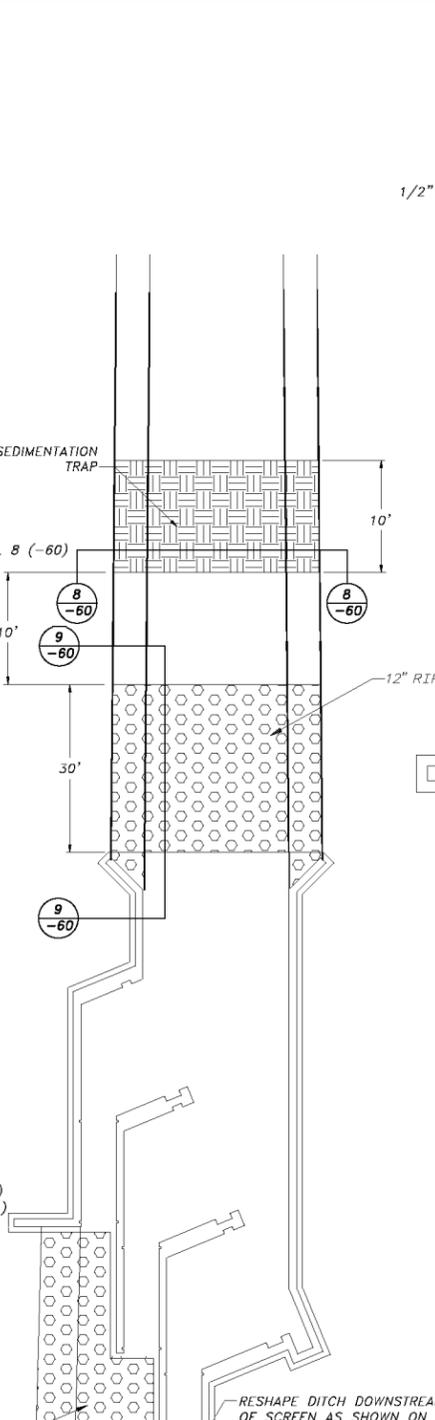
FOUNDATION PLAN
SCALE 1" = 4'-0"

- CONSULT SPECIFICATIONS FOR LINE/GRADE AND REINFORCEMENT TOLERANCE INFORMATION.
- WHEN CHECKED WITH A 10' STRAIGHTEDGE, THE SLAB SURFACE SHALL NOT VARY MORE THAN 0.03 FEET (3/8").
- SLAB ALIGNMENT SHALL NOT VARY MORE THAN 0.2 FEET.
- BLOCKOUT AT BASE OF SLIDE GATE SHALL BE THOROUGHLY CLEANED.



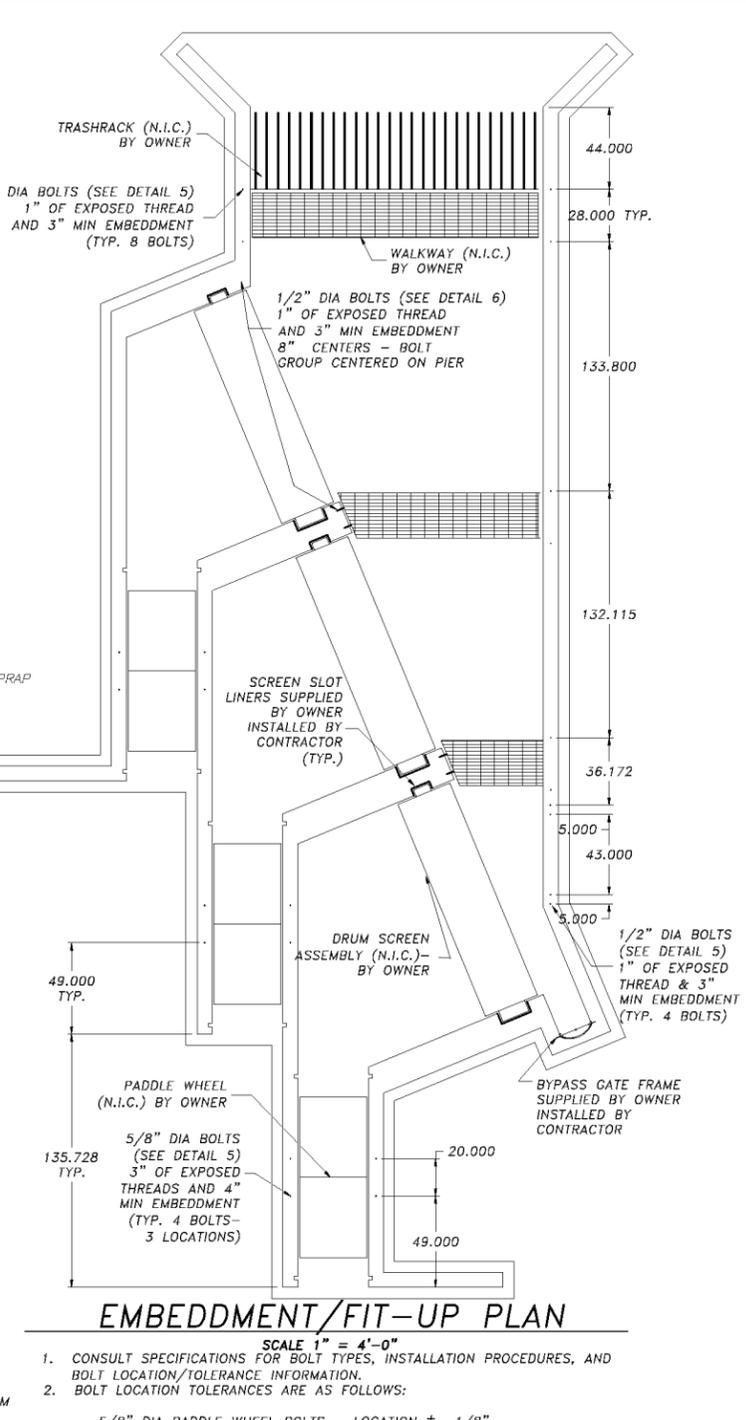
DIMENSIONAL PLAN
SCALE 1" = 4'-0"

- CONSULT SPECIFICATIONS FOR LINE/GRADE AND REINFORCEMENT TOLERANCE INFORMATION.
- WHEN CHECKED WITH A 10' STRAIGHTEDGE, THE WALL SURFACE SHALL NOT VARY MORE THAN 0.03 FEET (3/8").
- WALL ALIGNMENT SHALL NOT VARY MORE THAN 0.05' AND LOCATION SHALL NOT VARY MORE THAN 0.1'.
- ALL WALLS SHALL BE WITHIN 1/4" OF PLUMB.
- ALL REBAR SHALL HAVE A MINIMUM OF 2" OF COVER.
- ALL STOP LOG SLOTS, SCREEN SLOTS, AND SLIDE GATE SLOTS SHALL BE THOROUGHLY CLEANED OF EXCESS CONCRETE.
- PIER NOSE FORMS PROVIDED BY IDFG. CONSULT SPECIFICATIONS



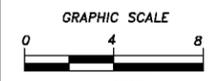
DITCH PLAN
SCALE 1" = 8'-0"

- SEE RIP RAP DETAILS ON DETAIL SHEET.
- ENGINEER WILL APPROVE DITCH REWORK AND RIP RAP PLACEMENT BEFORE CONTRACTOR DEMOBILIZES FROM SITE.



EMBEDMENT/FIT-UP PLAN
SCALE 1" = 4'-0"

- CONSULT SPECIFICATIONS FOR BOLT TYPES, INSTALLATION PROCEDURES, AND BOLT LOCATION/TOLERANCE INFORMATION.
- BOLT LOCATION TOLERANCES ARE AS FOLLOWS:
5/8" DIA PADDLE WHEEL BOLTS - LOCATION ± 1/8"
5/8" DIA PADDLE WHEEL BOLTS - PATTERN DIAGONAL ± 1/8"
ALL OTHER BOLTS - LOCATION ± 1/8"
ALL OTHER BOLTS - PATTERN DIAGONAL ± 1/4"



(IN FEET)
1 inch = 4 ft.
except as noted

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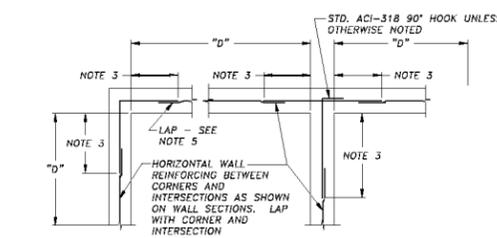
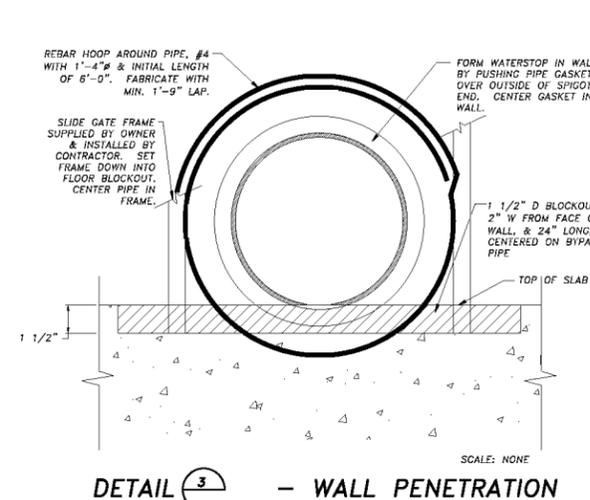
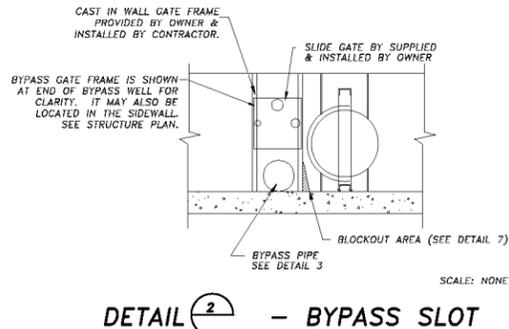
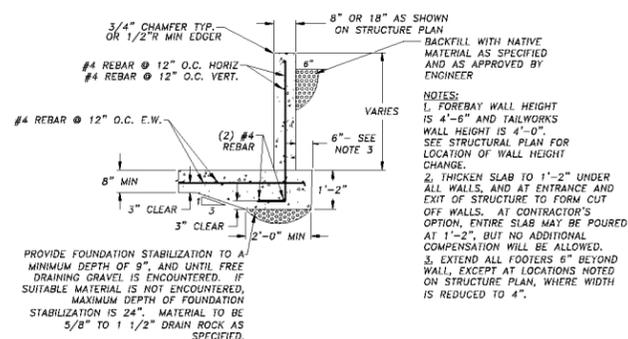
S11-12 CANAL CONSOLIDATION
S12 FISH SCREEN STRUCTURE

PLAN

DESIGNED: Phil Mann CHECKED: _____
DRAWN: _____ TECH. APPROVAL: Dave Jennings
PROGRAM MANAGER

CAUD SYSTEM AutoCAD Rel. 16.0 CAUD FILENAME: 1720-100-59.DWG
BOISE, IDAHO SHEET 16 OF 21 8/16/01 1720-100-59

DATE AND TIME PLOTTED:
AUGUST 14, 2006 1:12:12
PLOTTED BY:
GSPROCM



TYPICAL CORNER AND INTERSECTION REINFORCING

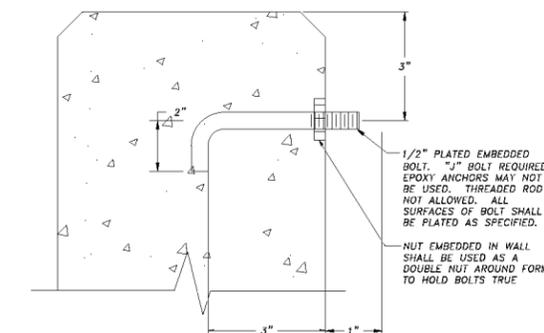
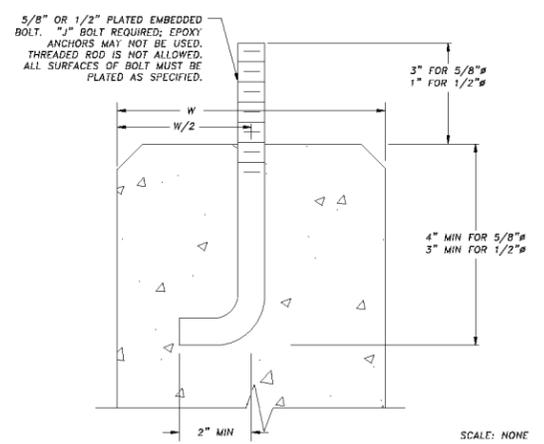
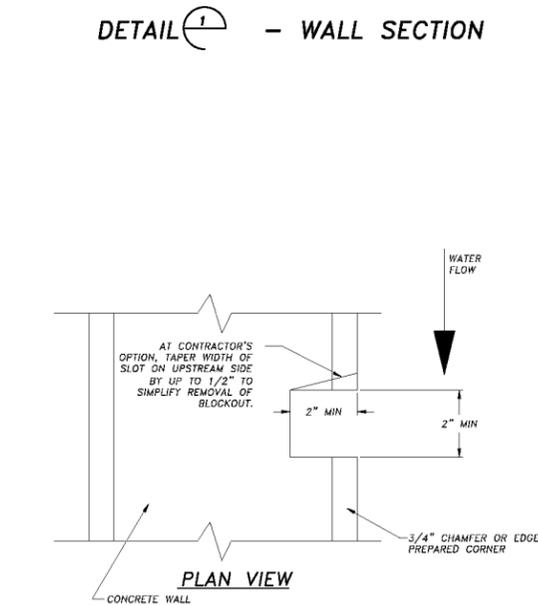
TYPICAL HORIZONTAL WALL CORNER AND INTERSECTION REINFORCING LAYOUT IS SHOWN TO AVOID CONGESTION AND PERMIT PROPER PLACEMENT. FOR SIZE AND SPACING SEE PLANS. ALL HORIZONTAL REINFORCING AT CORNERS AND INTERSECTIONS SHALL BE FABRICATED AND INSTALLED WITH SPLICES LOCATED WHERE SHOWN REGARDLESS OF BAR SIZE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

WHERE THE CORNER OR INTERSECTION REINFORCING SIZE AND SPACING IS NOT SHOWN, NOTED OR FABRICATED ON THE PLANS, THE SIZE AND SPACING SHALL BE THE SAME AS 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 NOTES. USE THE LAP LENGTH AS REQUIRED FOR THE SMALLER OF THE TWO REINFORCING BARS BEING SPLICED.



GENERAL STRUCTURAL NOTES

STRUCTURAL MATERIALS

- REINFORCING MATERIALS:
 - REINFORCING BARS SHALL BE ASTM A615, GRADE 60
- CONCRETE:
 - MINIMUM STRENGTH AT 28 DAYS $f' = 4,000$ PSI
 - MINIMUM CEMENT CONTENT = 554 LBS/CY
 - ALL CONCRETE SHALL BE AIR ENTRAINED, 6% ± 1%
 - CONCRETE SLUMP = 2" TO 4"

FOUNDATIONS

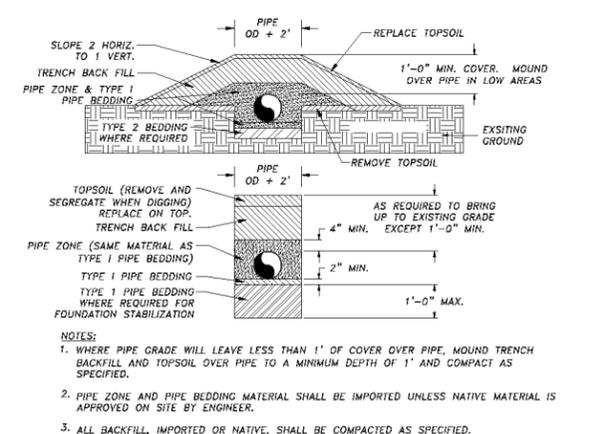
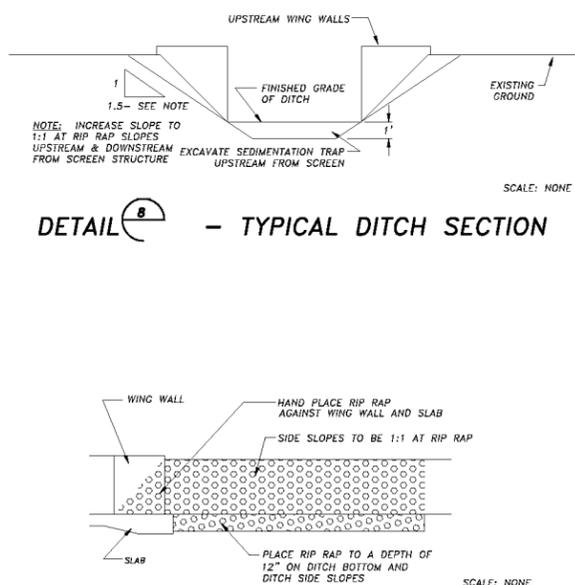
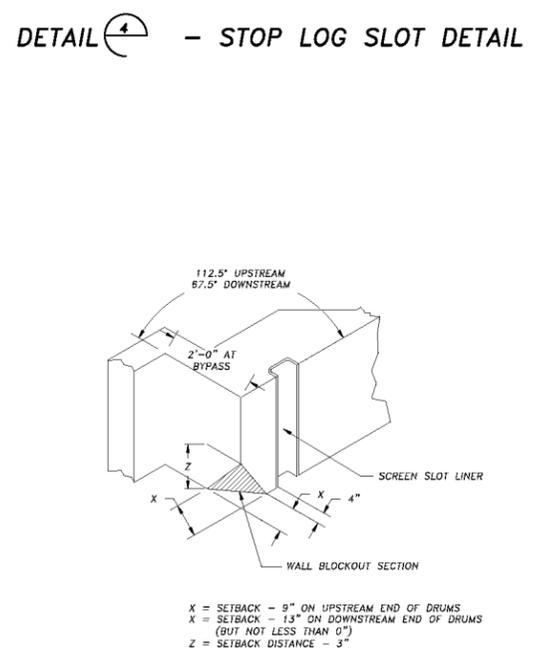
- FOUNDATIONS WERE DESIGNED USING THE FOLLOWING SOILS DATA:
 - MAXIMUM ALLOWABLE SOIL BEARING PRESSURE OF 1500 PSI
 - DESIGN FROST DEPTH BELOW FINISHED GRADE OF 4'-0"
 - LATERAL SOIL PRESSURE OF 50 PCF EQUIVALENT FLUID PRESSURE
- EXCESSIVE WETTING OR DRYING OF THE FOUNDATION EXCAVATION SHALL BE AVOIDED 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 BACKFILLED ON ONE SIDE ONLY SHALL HAVE ALL SUPPORTING SLABS OR OTHER ADEQUATE BRACING IN PLACE, PRIOR TO PLACEMENT OF BACKFILL, AND CONCRETE SHALL HAVE ATTAINED A STRENGTH NOT LESS 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 REENTRANT 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 ENGINEER. REINFORCEMENT SHALL BE LAPPED THE FOLLOWING MINIMUMS AT ALL SPLICES, CORNERS AND INTERSECTIONS UNLESS OTHERWISE INDICATED:
 - #4 REBAR - USE 1'-9"
 - #5 REBAR - USE 2'-2"
 - #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 10 - TYPICAL BYPASS PIPE TRENCH

SCALE: NONE

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UPPER SALMON RIVER WATER OPTIMIZATION PROJECT

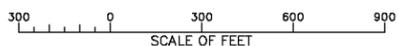
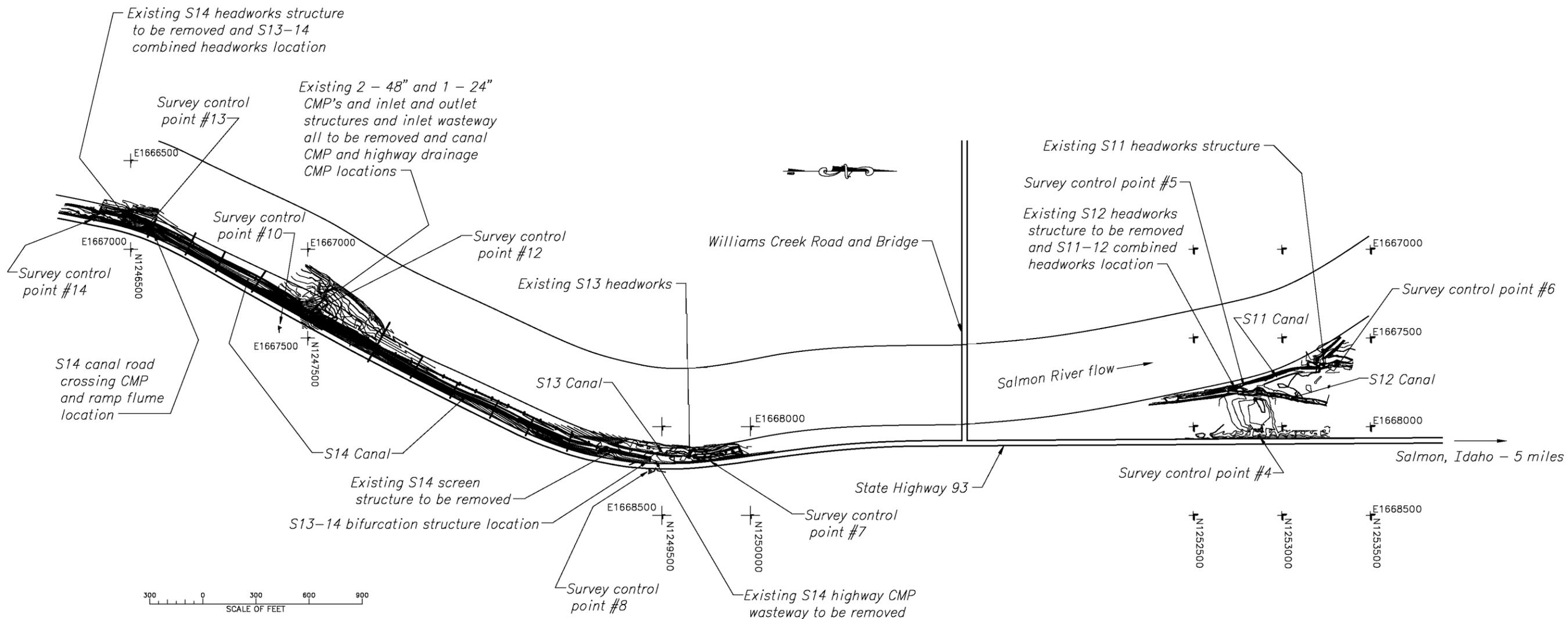
S11-12 CANAL CONSOLIDATION
S11-12 FISH SCREENS

DETAILS

DESIGNED Phil Mann CHECKED _____
DRAWN _____ TECH. APPROVAL Dave Jennings
PROGRAM MANAGER _____

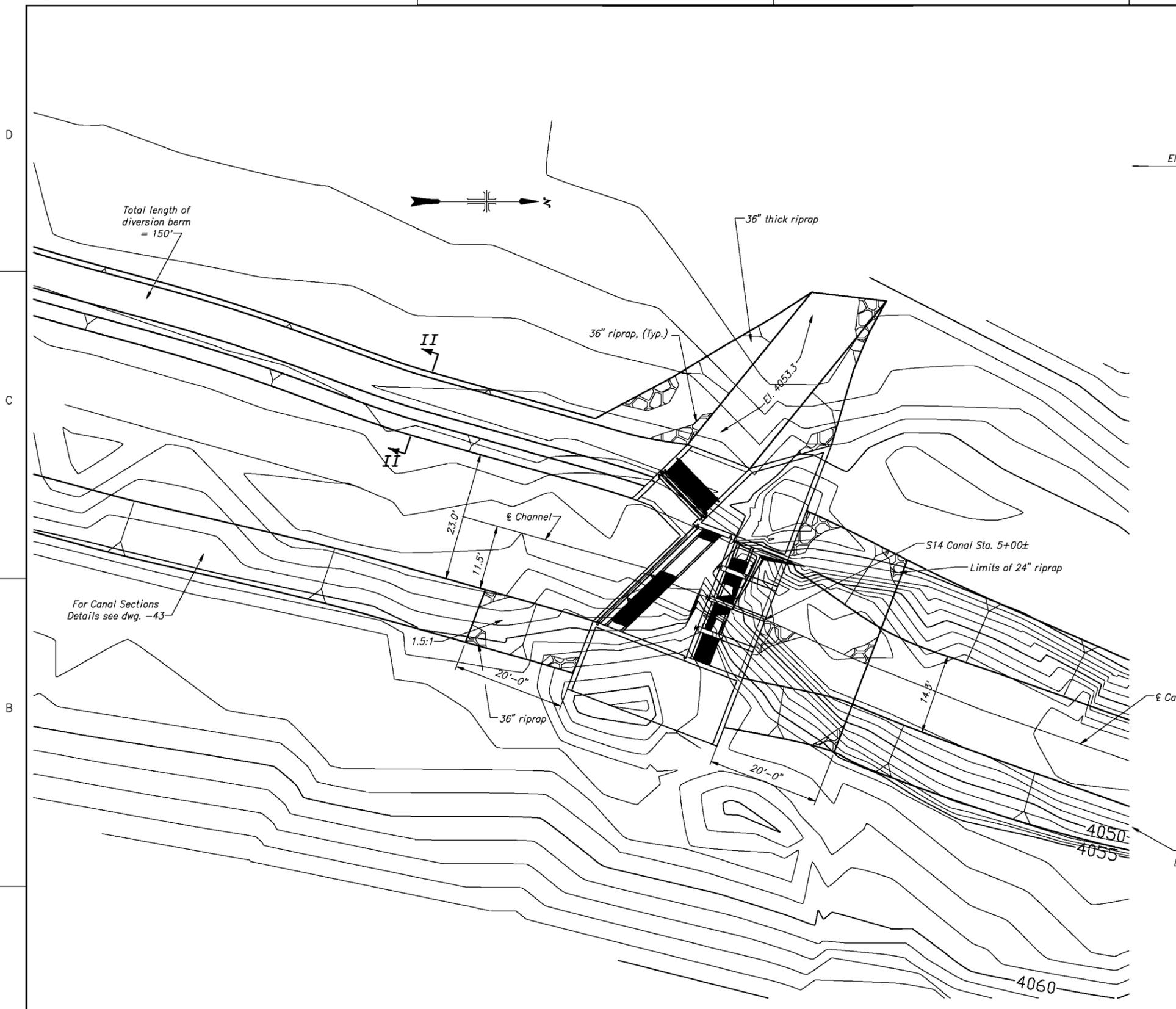
CADD SYSTEM AutoCAD Rev. 16.0 CADD FILENAME 1720-100-60.DWG
BOISE, IDAHO SHEET 17 OF 21 8/16/01 1720-100-60

DATE AND TIME PLOTTED:
AUGUST 14, 2006 16:14
PLOTTED BY:
GSR00MS

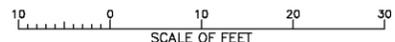


SURVEY CONTROL POINTS			
Point #	Northing	Easting	Elevation
4	1252871.31	1668053.69	4037.93
5	1252785.17	1667788.88	4038.31
6	1253197.03	1667627.01	4035.48
7	1249769.42	1668183.72	4048.45
8	1249430.72	1668247.69	4054.93
10	1247339.33	1667441.45	4109.62
12	1247563.47	1667337.26	4057.85
13	1246573.34	1666896.48	4065.03
14	1246297.04	1666830.75	4062.52

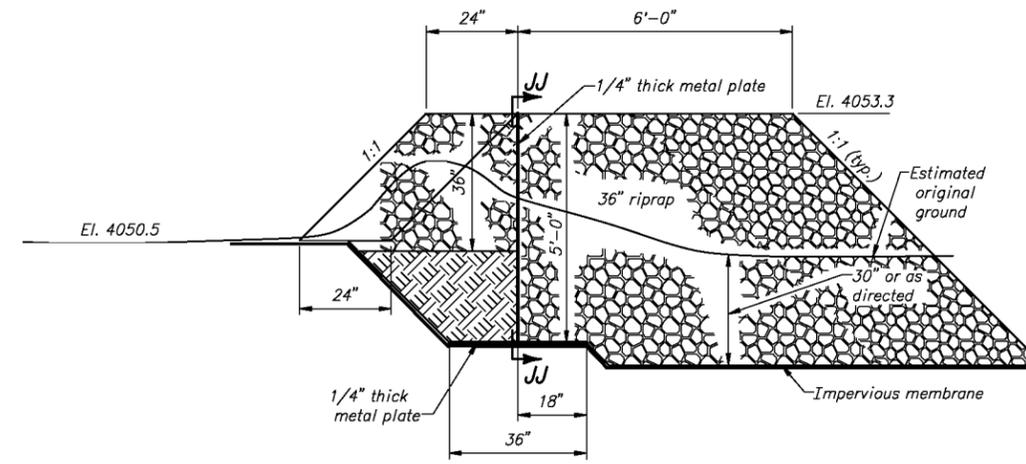
Rev. 100	12/4/00 EDM	Added Survey Control Points 4, 5, and 6.	
ALWAYS THINK SAFETY			
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S11-14 CANAL CONSOLIDATION GENERAL PLAN			
DESIGNED: <u>Phil Mann</u>		CHECKED: <u>Phil Mann</u>	
DRAWN: <u>Ed Merdherst/MS</u>		TECH. APPROVAL: <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Rel. 16.2s BOISE, IDAHO	CADD FILENAME 1720-100-42.DWG SEPTEMBER 2000	DATE AND TIME PLOTTED AUGUST 10, 2006 11:16	1720-100-42



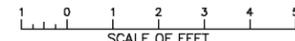
HEADWORKS SITE PLAN



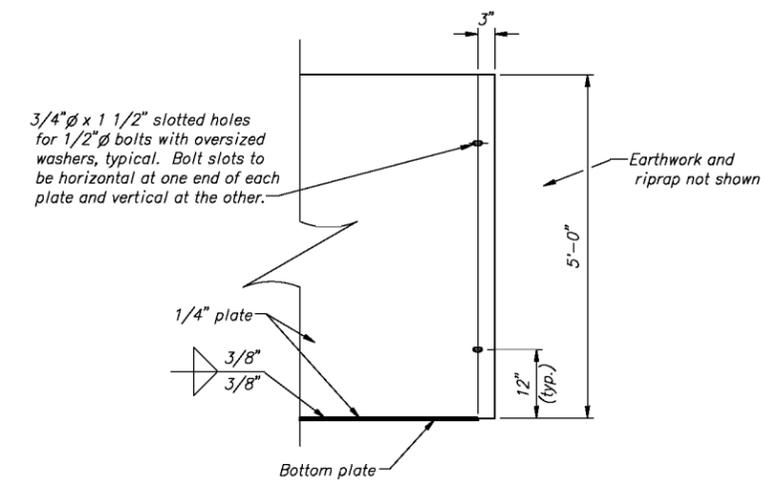
- NOTES:**
 1. Reshape contours shown in bold.
 2. Not all reshape contours shown.



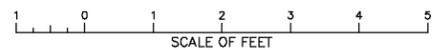
SECTION II-II DIVERSION BERM (Typical Section)



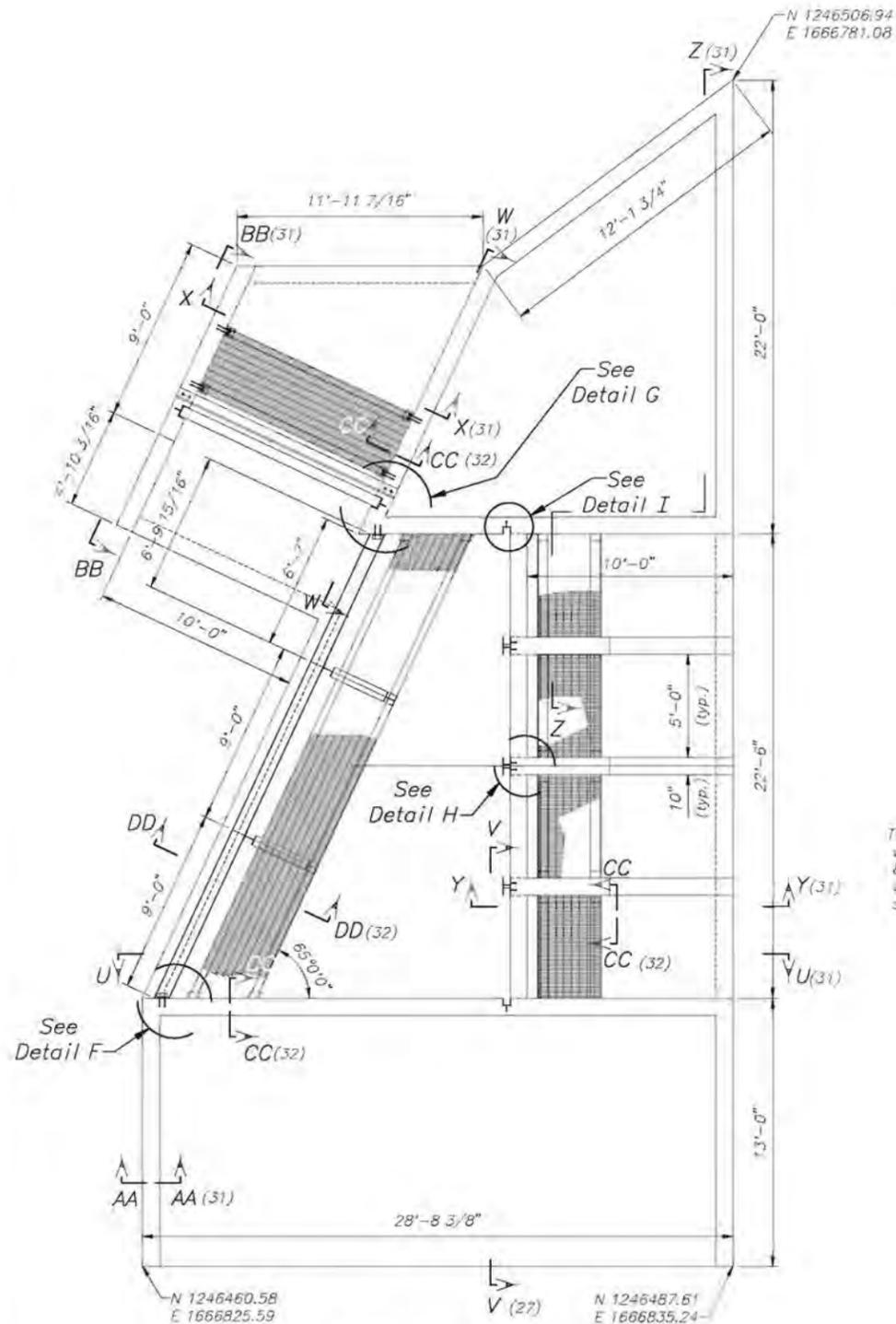
- NOTES:**
 1. Exact location and alignment of diversion berm plates as directed in field.
 2. Total berm length = 150'
 3. Individual plate lengths determined by contractor.



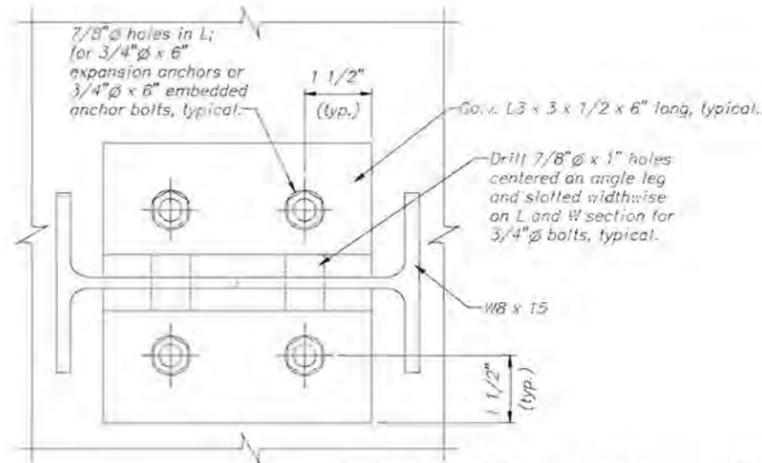
SECTION JJ-JJ TYPICAL END VIEW



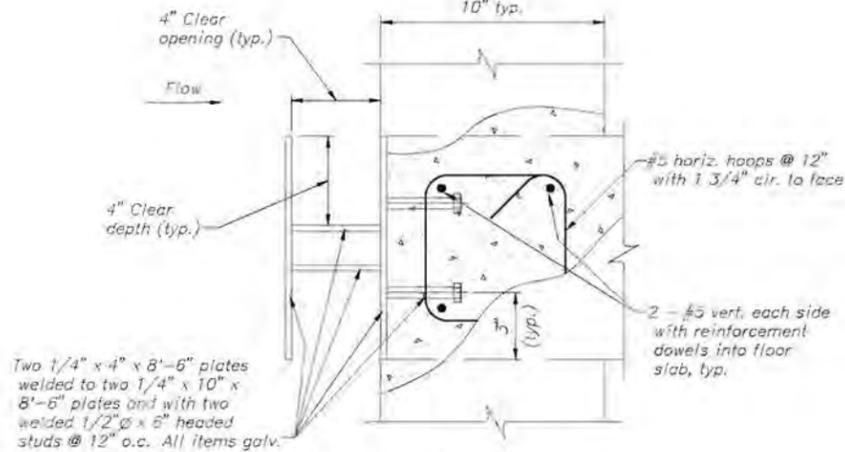
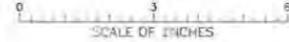
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 CANAL HEADWORKS SITE PLAN AND DIVERSION BERM SECTIONS		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Mardherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.2s BOISE, IDAHO	CADD FILENAME 1720-100-39.DWG SEPTEMBER 2000	DATE AND TIME PLOTTED AUGUST 10, 2006 11:10 1720-100-39



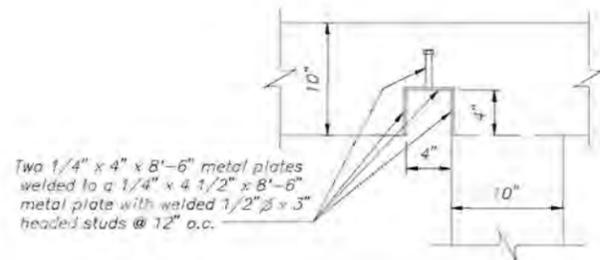
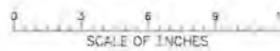
S13-14 CANAL HEADWORKS PLAN



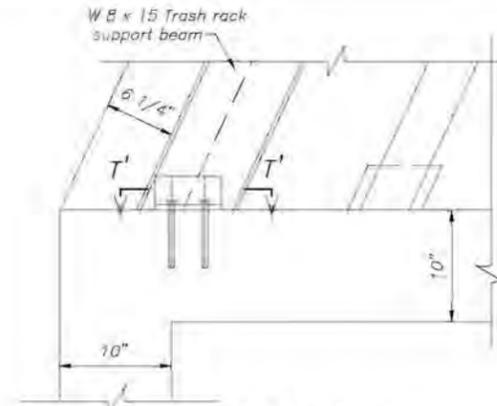
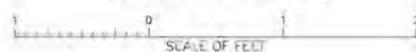
SECTION T-T
SECTION T'-T' SIMILAR
(FOUR LOCATIONS)



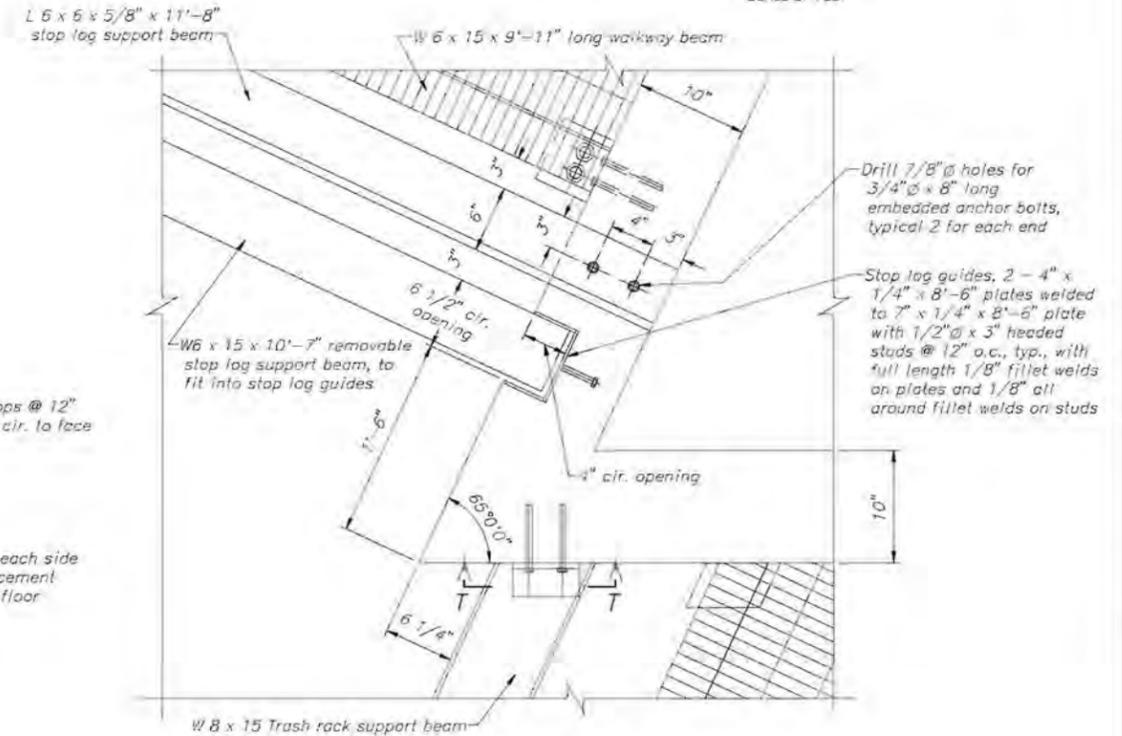
DETAIL H



DETAIL I
(OPPOSITE SIDE SIMILAR)

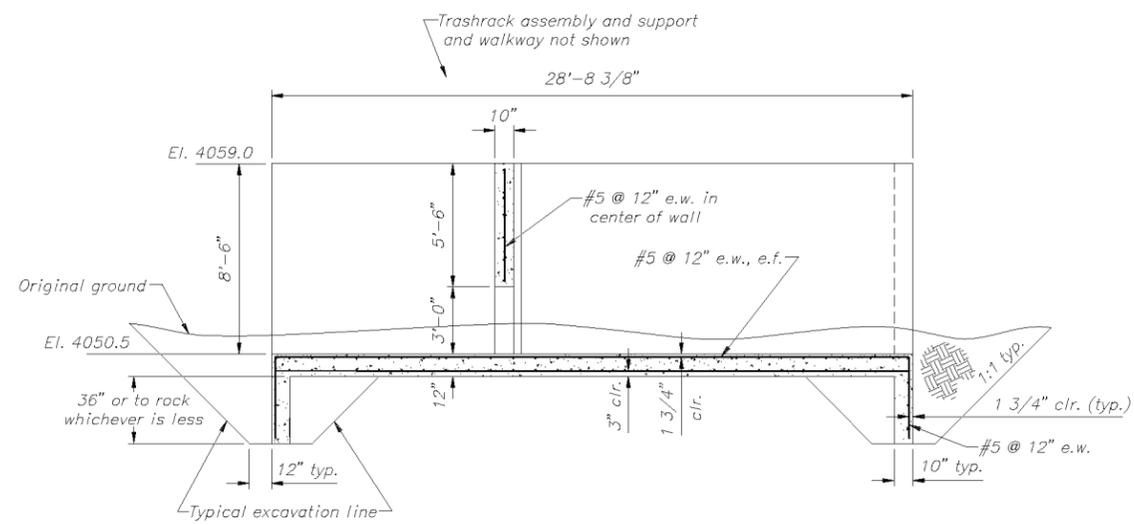


DETAIL F

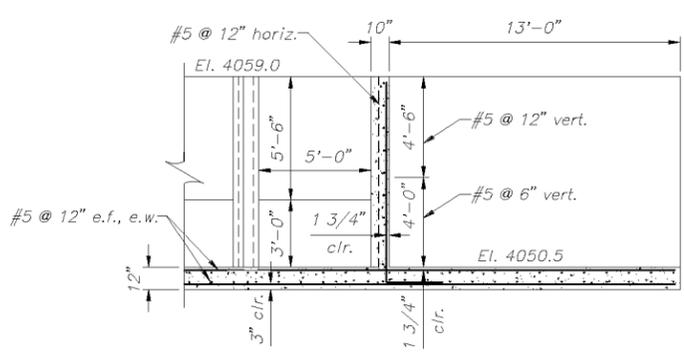


DETAIL G

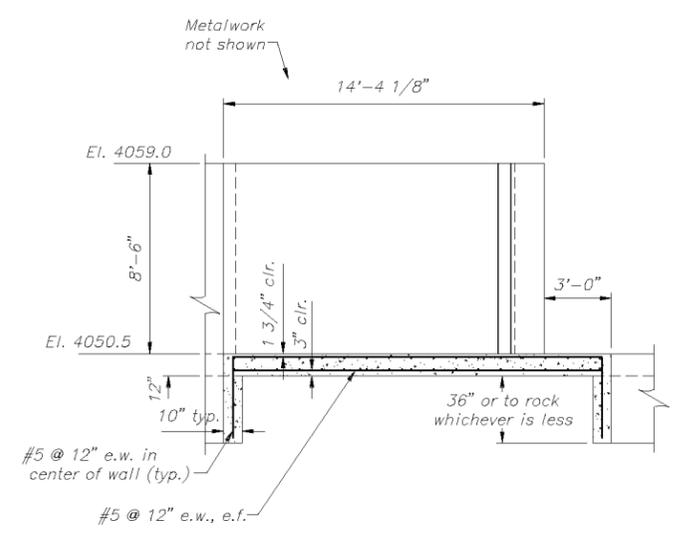
Rev. 100	1/01 EDM	General changes.
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 HEADWORKS PLAN, SECTIONS, AND DETAILS		
DESIGNED: Phil Mann	CHECKED: Phil Mann	
DRAWN: Ed Northrup	TECH. APPROVAL: Dave Jennings PROGRAM MANAGER	
DATA SYSTEM Autodesk Rev. 16.0	CADD FILENAME 1720-100-30.DWG	DATE AND TIME PLOTTED August 14, 2008 13:08
BOISE, IDAHO	SEPTEMBER 2000	1720-100-30



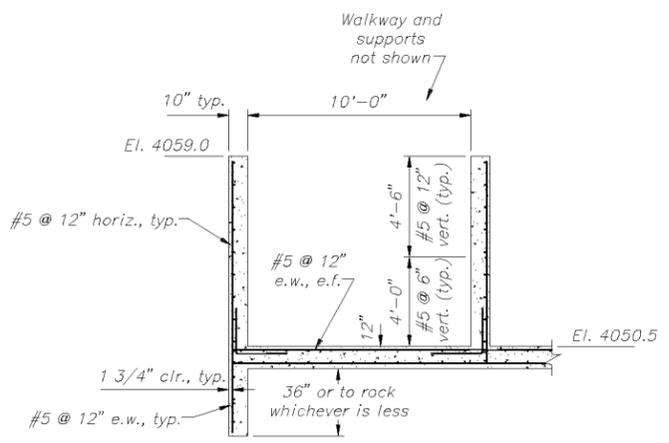
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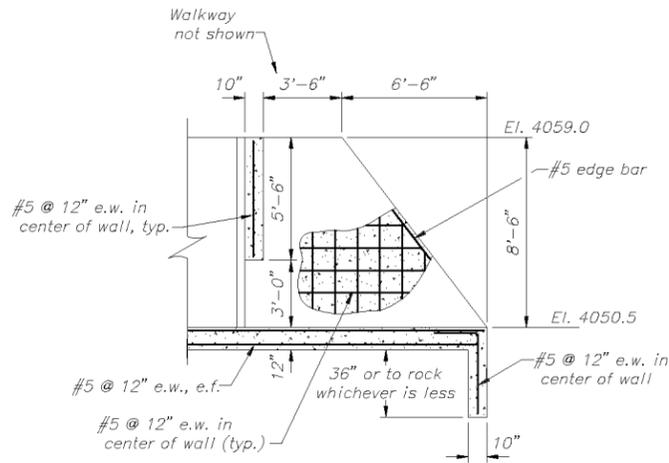
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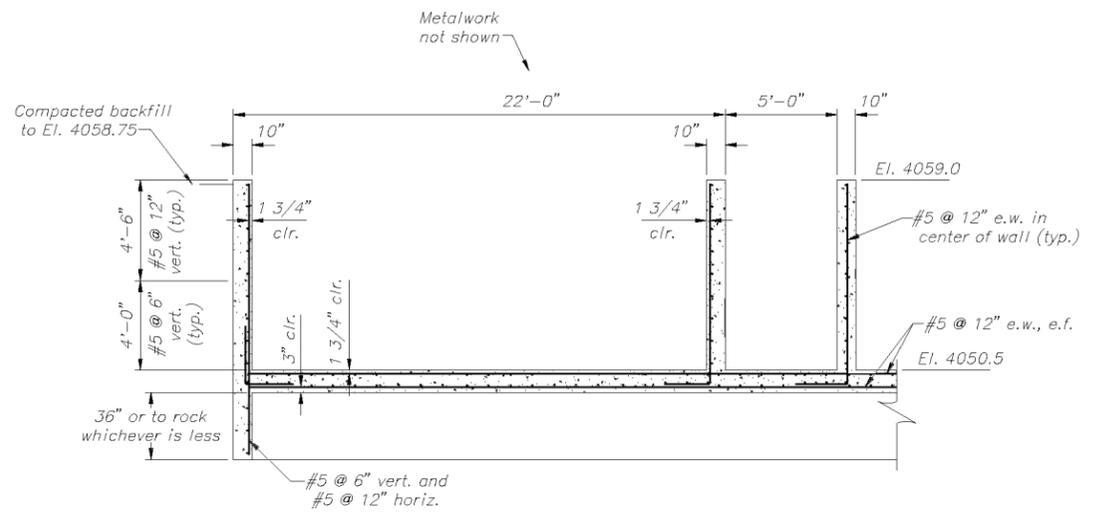
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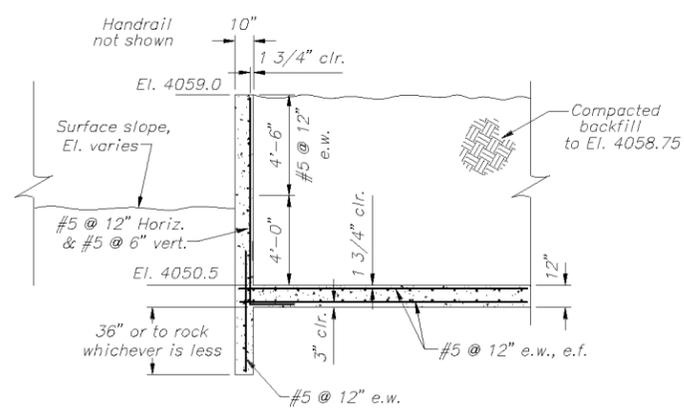
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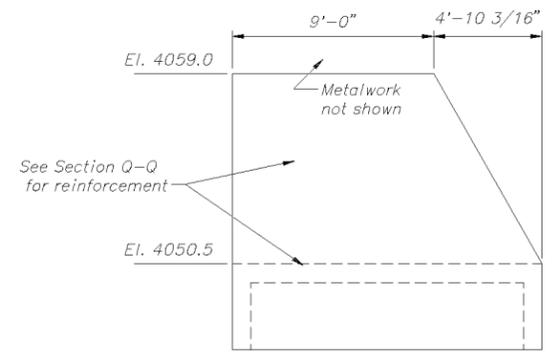
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(30)



SECTION Z-Z
(30)



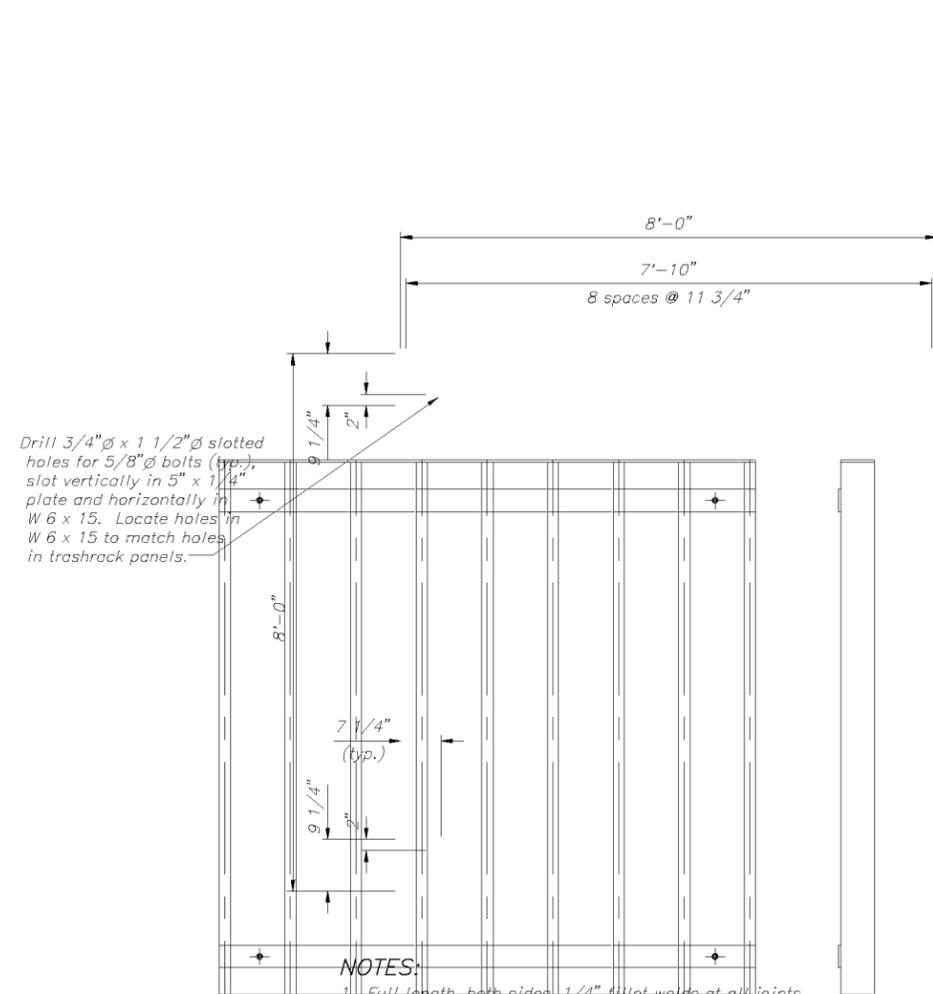
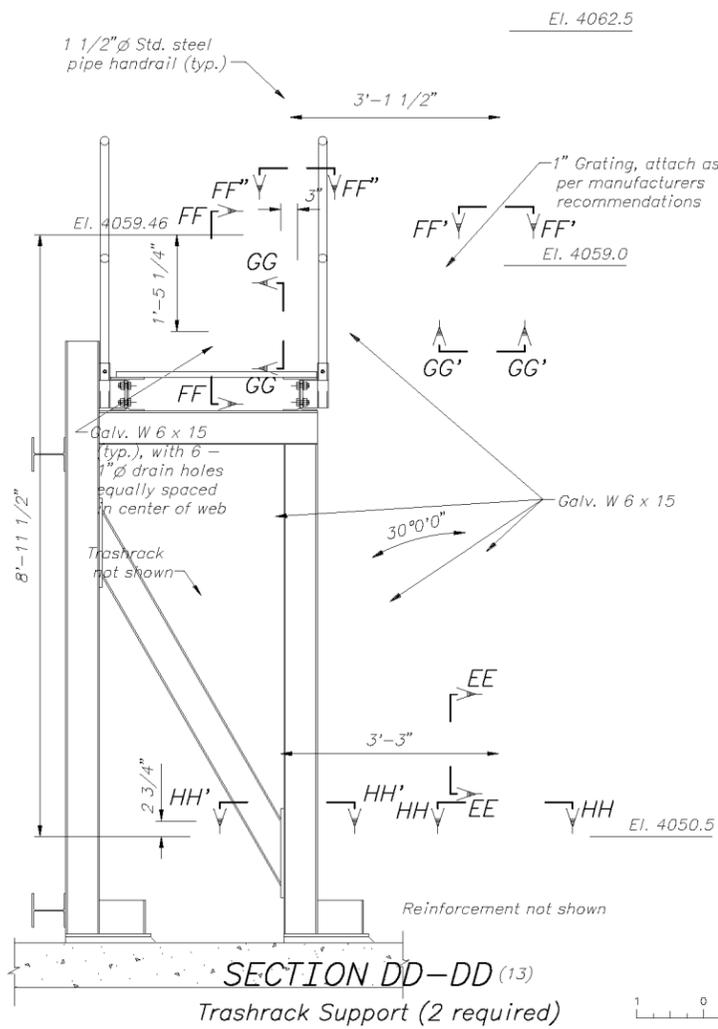
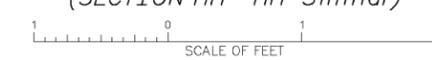
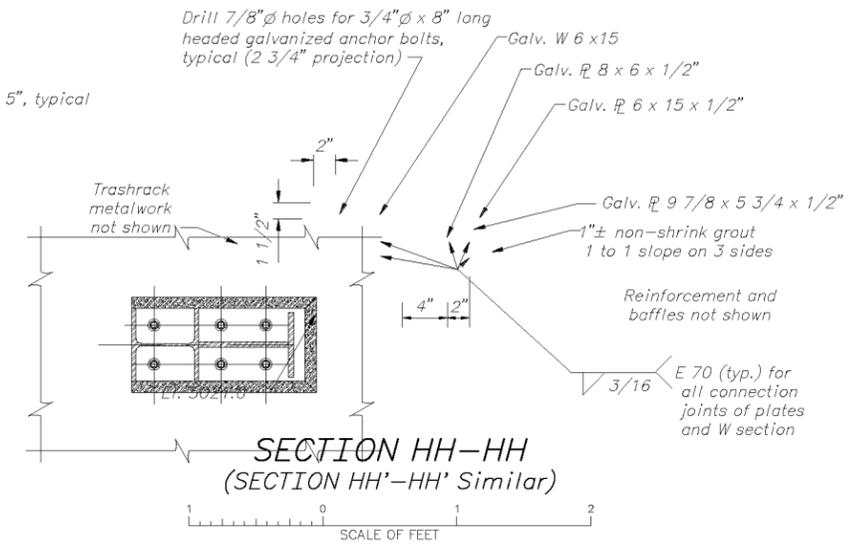
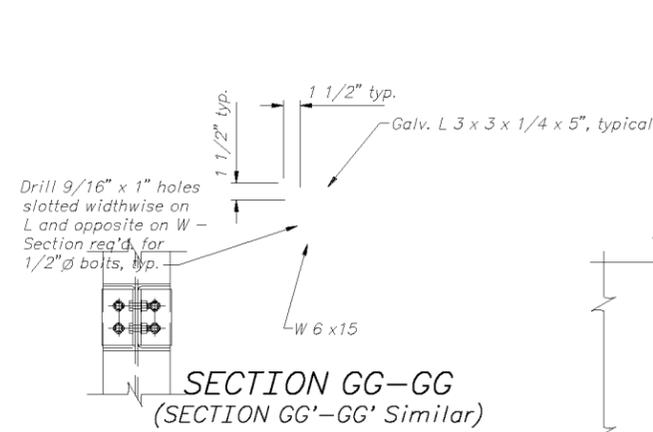
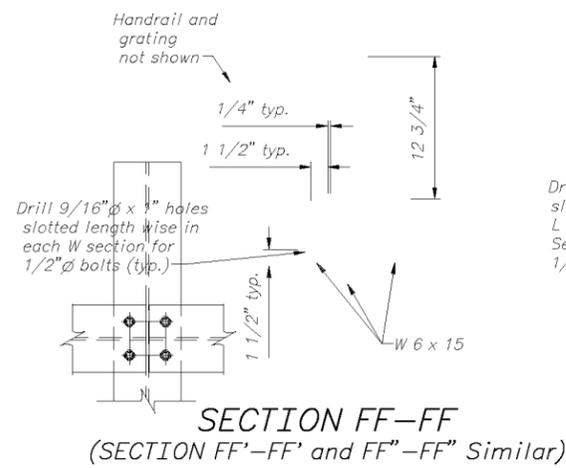
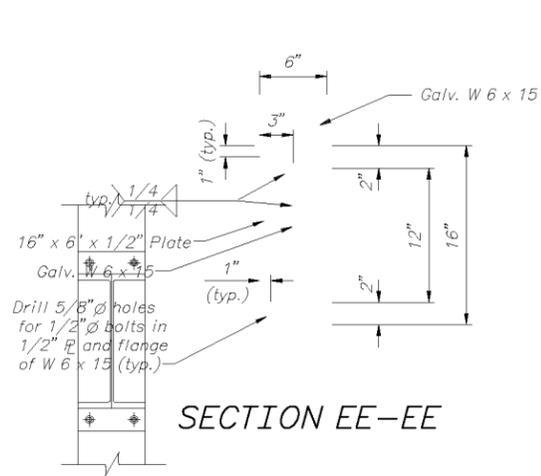
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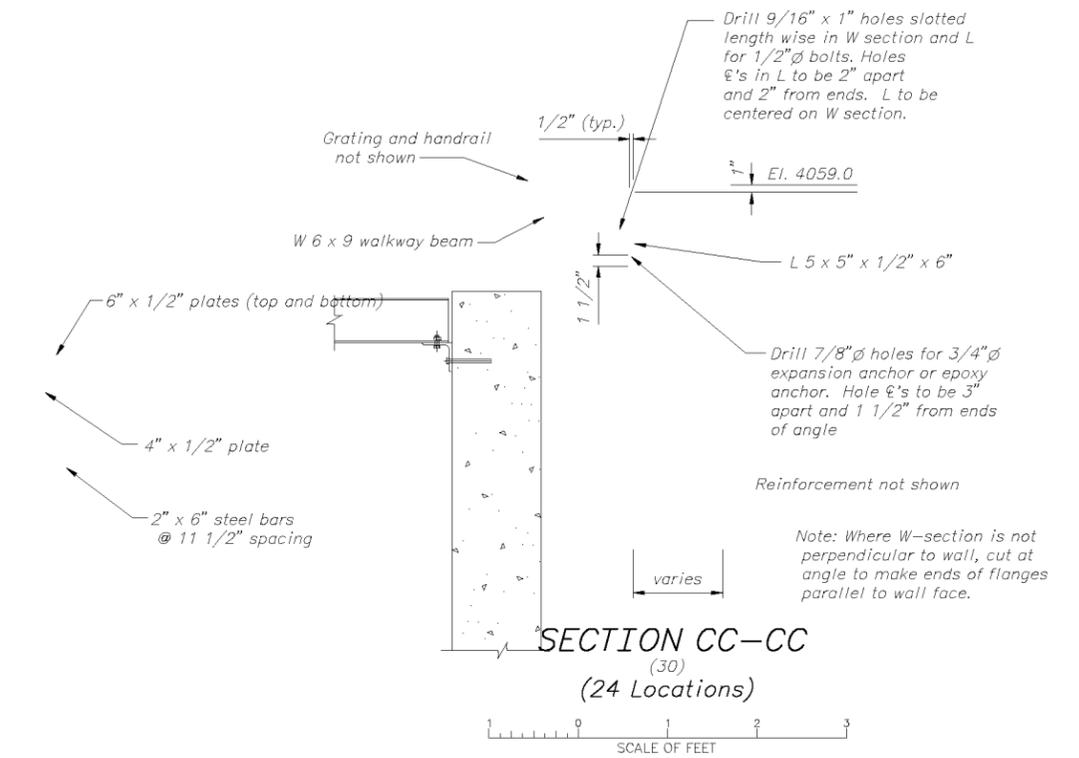
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Rev. 100	1/01 EDW	General changes.
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UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 HEADWORKS SECTIONS		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Mardherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-31.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:12
BOISE, IDAHO	SEPTEMBER 2000	1720-100-31

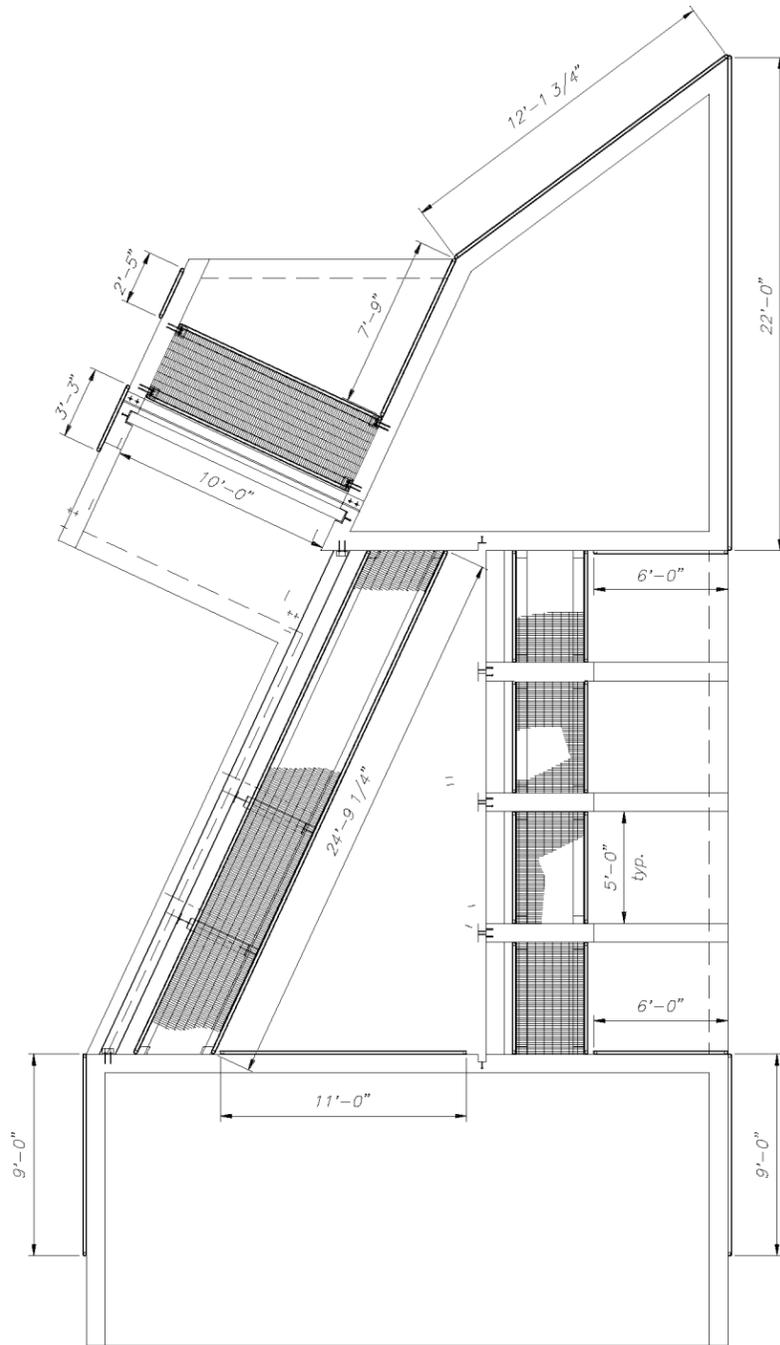


- NOTES:**
1. Full length, both sides, 1/4" fillet welds at all joints.
 2. Diagonal measurements for each panel to be within 1/4".
 3. Install panels to provide equal spacing at walls and between panels.



ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 HEADWORKS METALWORK SECTIONS AND ELEVATION		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Mortherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-32.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:15
BOISE, IDAHO	SEPTEMBER 2000	1720-100-32

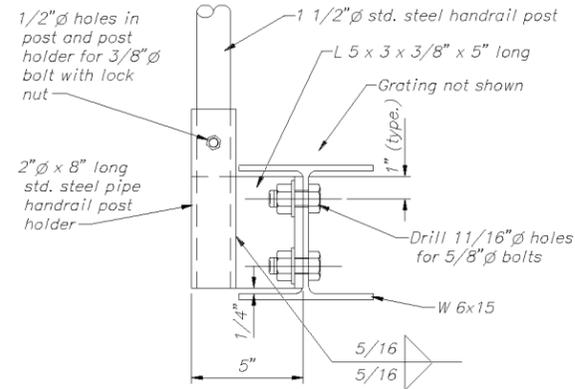
NOTE: 1" Grating to be 1" bar type grating, live load capacity of 100 psf, banding bar on perimeter of each panel.



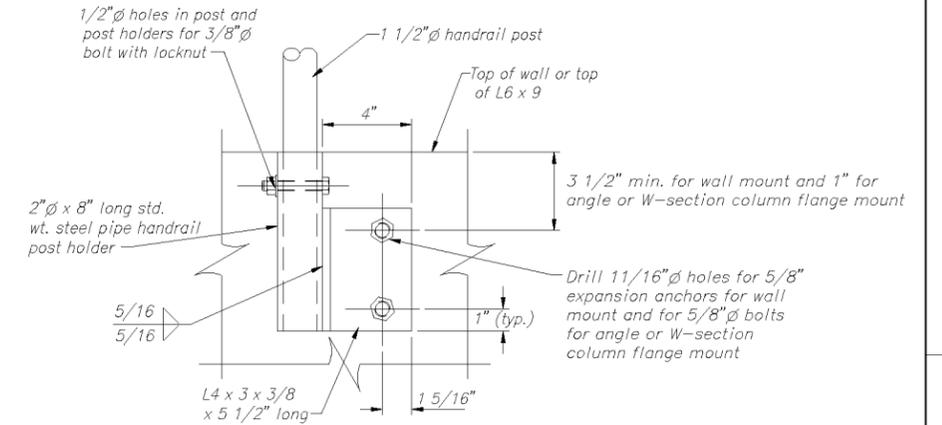
HANDRAIL AND GRATING PLAN

NOTES:

1. Approximate locations and lengths of handrail are shown. Exact location and lengths to be determined in the field.
2. Other metal work not shown.
3. Grating to be the thickness shown, and have a live load capacity of 100 psf with 1/4" max. deflection, and have banding bars around the perimeter of each grating panel.

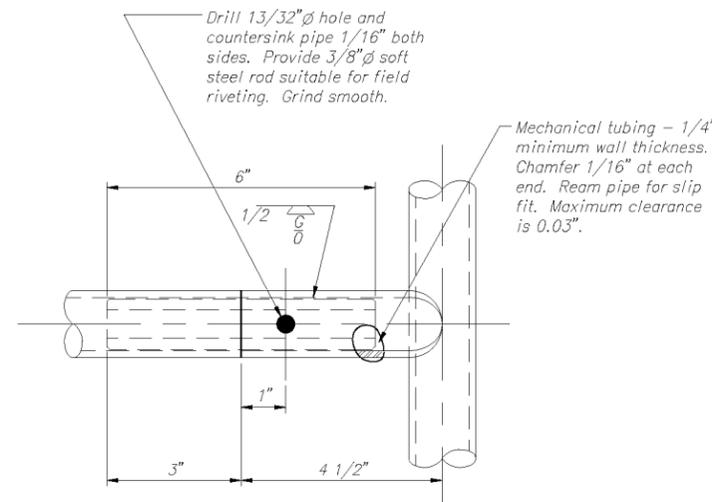


**ELEVATION
HANDRAIL POST HOLDER**
(For W-section beam web mount removable handrail)



**ELEVATION
HANDRAIL POST HOLDER**
(For angle or W-section column flange or side of wall mount removable handrail)

Note: Handrail post holder to be flush with top edge of concrete or angle, or W-section column flange.

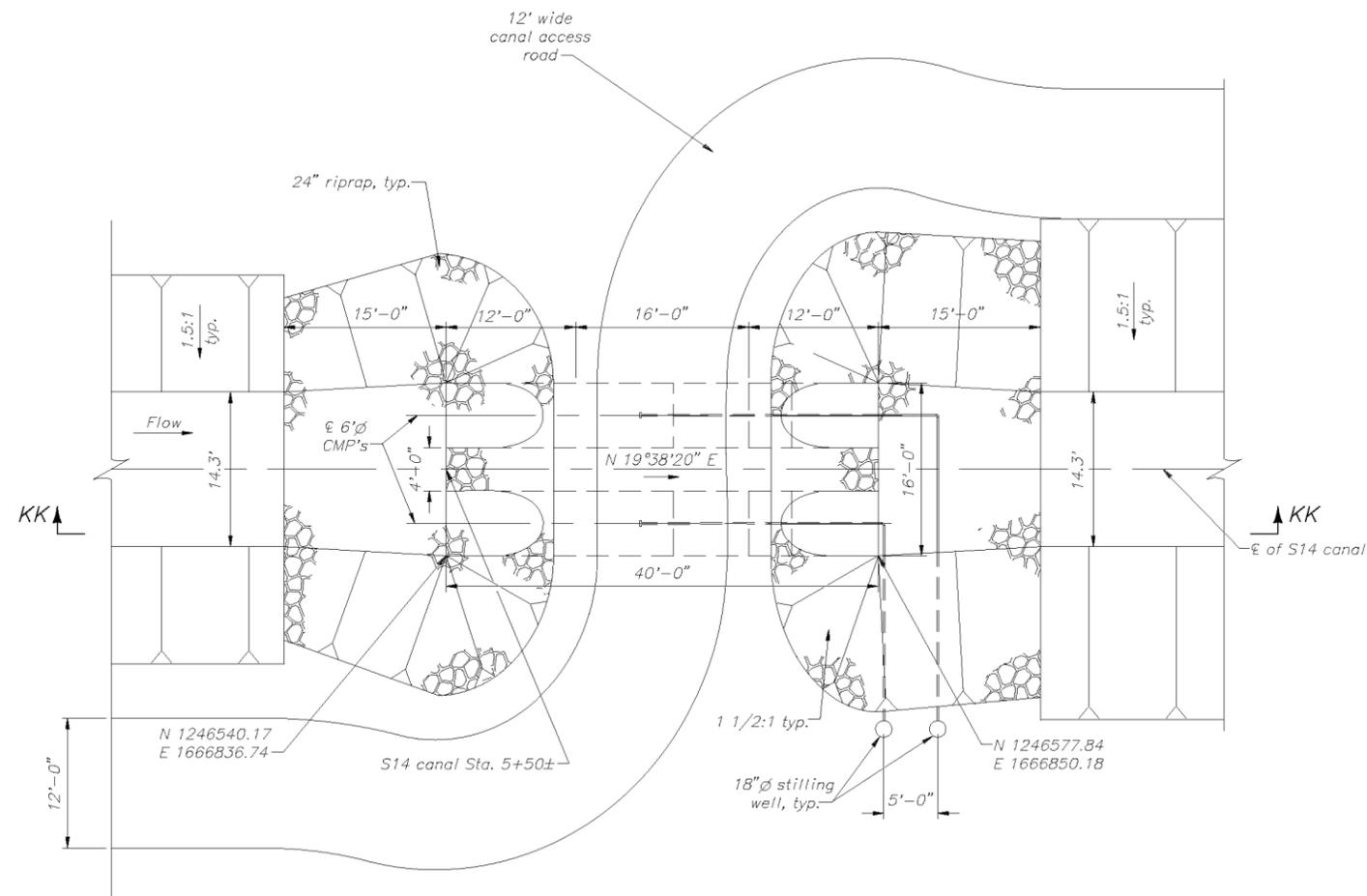


HANDRAIL SPLICE DETAIL

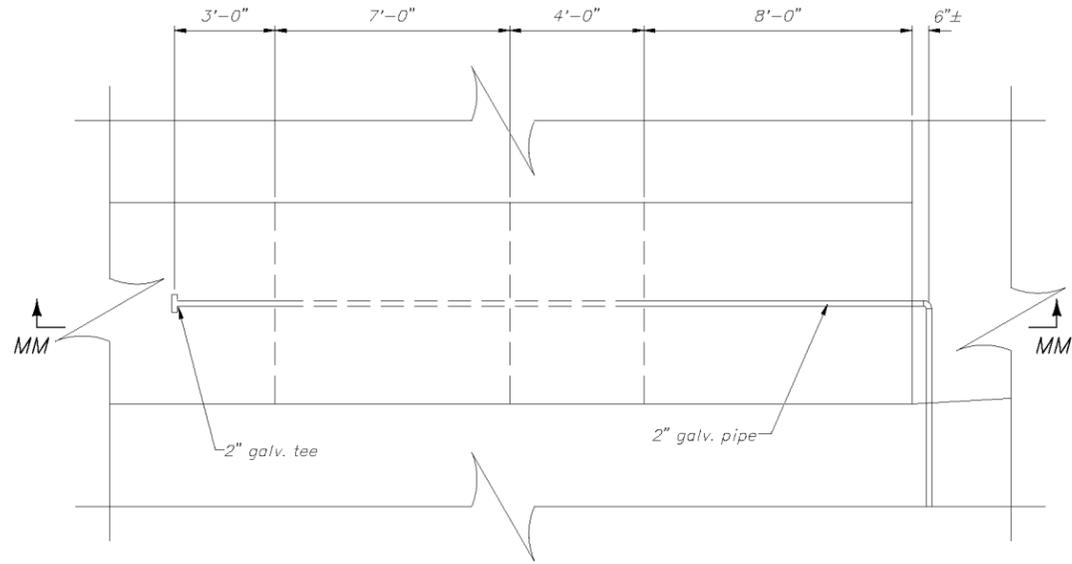
NOTES:

1. Welding symbols apply to the joints of all members of similar identification.
2. Weld all pipe joints with 1/8" reinforced welds and dress smooth.
3. All handrails shall be fabricated with new standard weight black pipe or tubing of sizes as specified on the installation drawings.
4. Corners and edges of all plates, bars, and pipe ends shall be free of burrs.
5. All screws, riveting material, and bolts shall be provided as required for complete installation.
6. Standard handrail rail heights to be 21" and 42" above deck levels.
7. Splice handrail at 16' max. intervals or where shown.
8. Handrail posts and rails to be 1 1/2" std. wt. steel pipe unless otherwise specified.
9. Splice required adjacent to all interior angles of 90° or less and at changes from concrete to metal post supports.
10. Removable handrail post spacing is 8' maximum.
11. Galvanize all metal work unless otherwise specified.

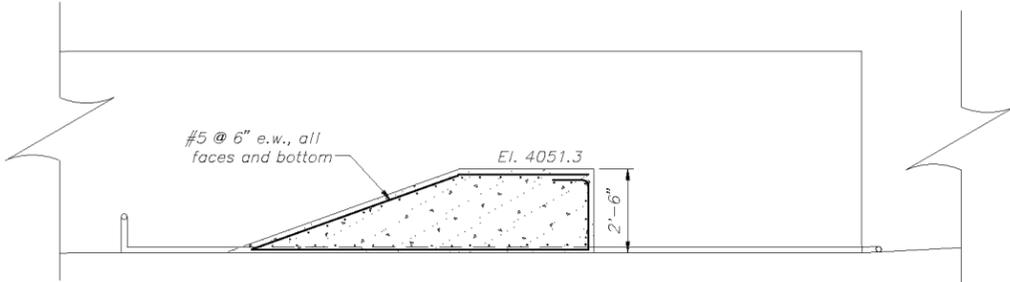
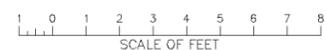
Rev. 100	1/01	General changes.	EDM
ALWAYS THINK SAFETY			
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 HEADWORKS HANDRAIL AND GRATING PLAN, ELEVATIONS, AND DETAIL			
DESIGNED <u>Phil Mann</u>		CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Moratherst</u>		TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-33.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:18	BOISE, IDAHO SEPTEMBER 2000
			1720-100-33



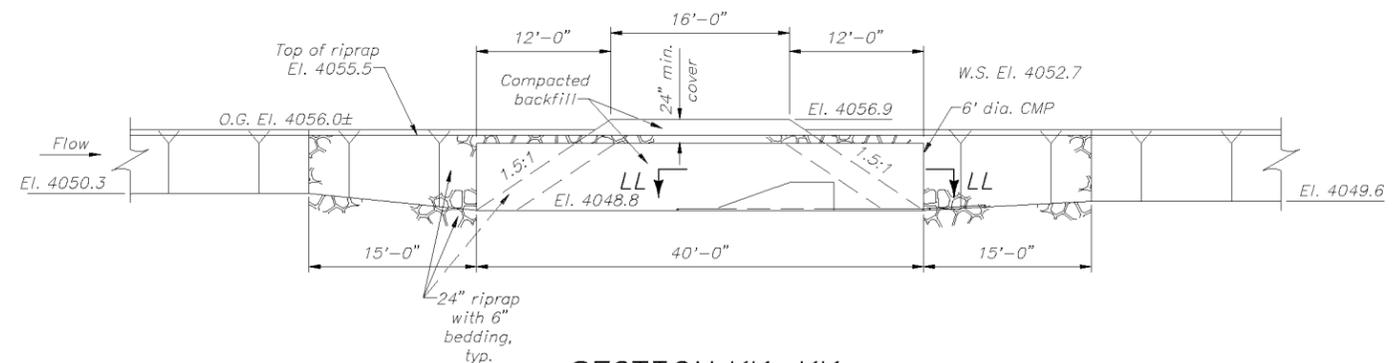
PLAN



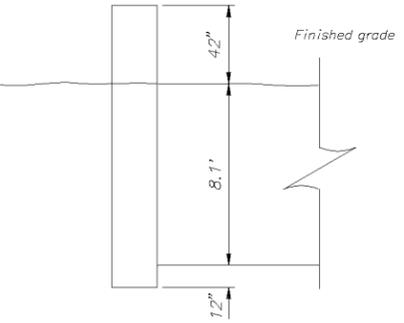
SECTION LL-LL



SECTION MM-MM

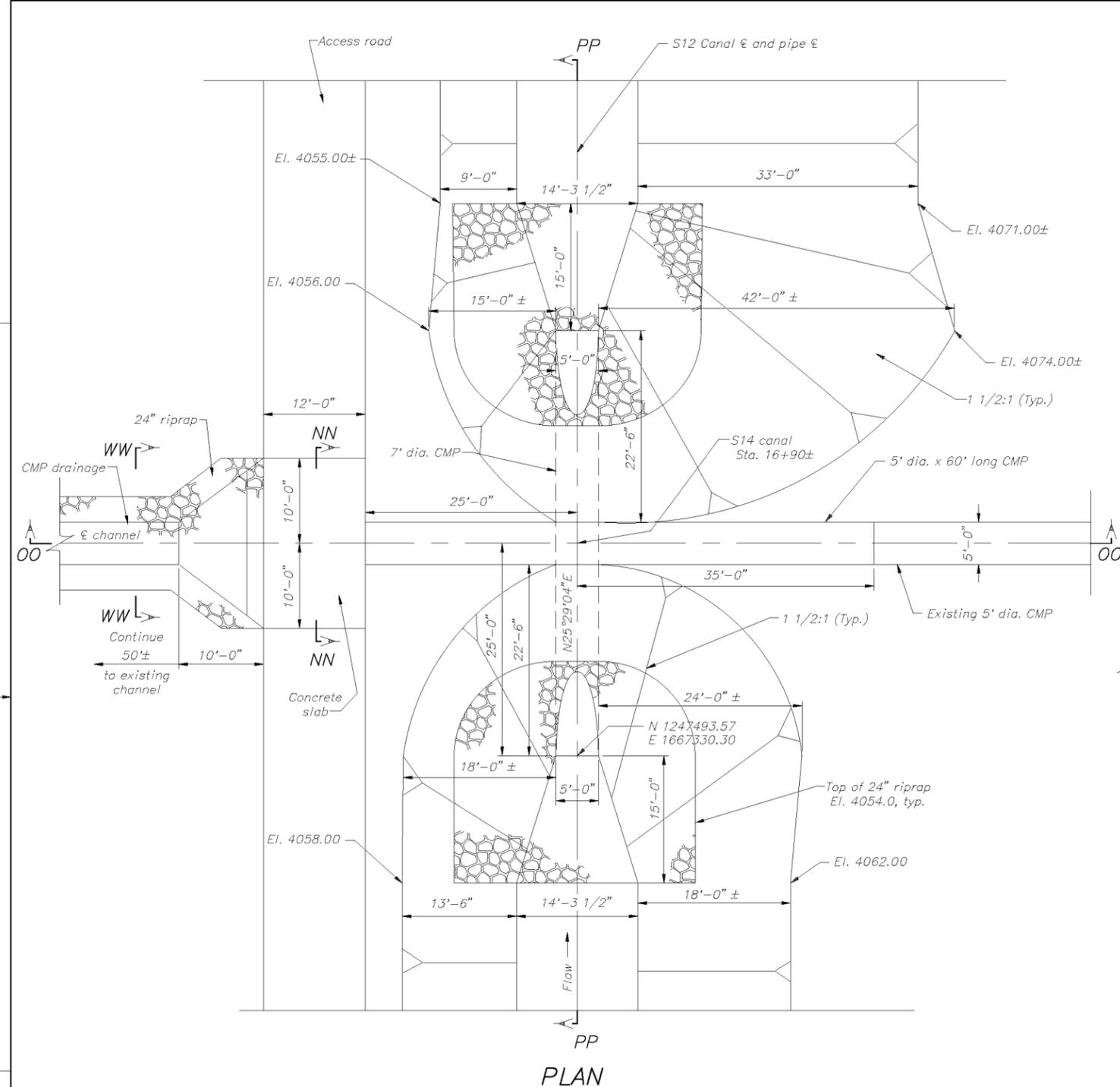


SECTION KK-KK

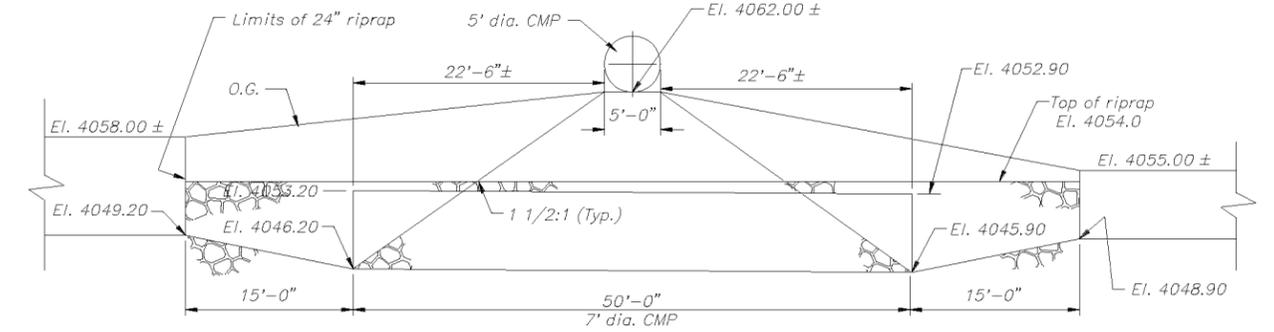


STILLING WELL TYPICAL ELEVATION

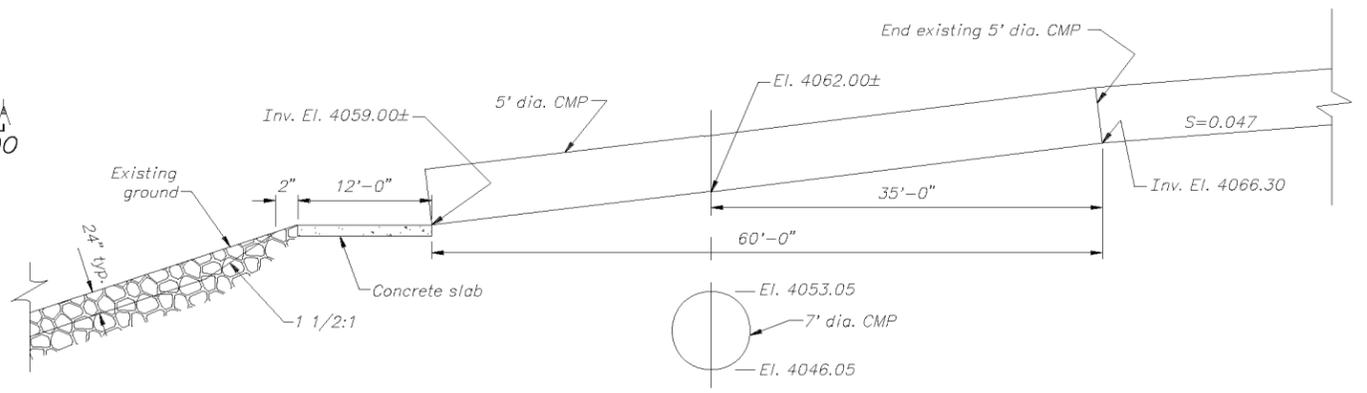
Rev. 100	1/01 EDM	Added Stilling Well Typical Elevation.
ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 CANALS CANAL ROAD CROSSING AND RAMP FLUME PLAN AND SECTION		
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>	
DRAWN <u>Ed Mortherst</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER	
CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-37.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:20
BOISE, IDAHO	SEPTEMBER 2000	1720-100-37



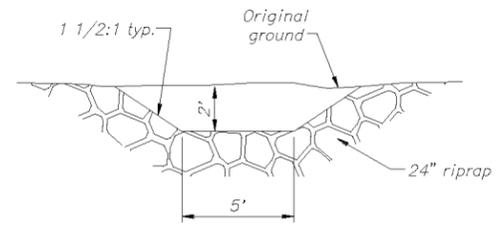
PLAN



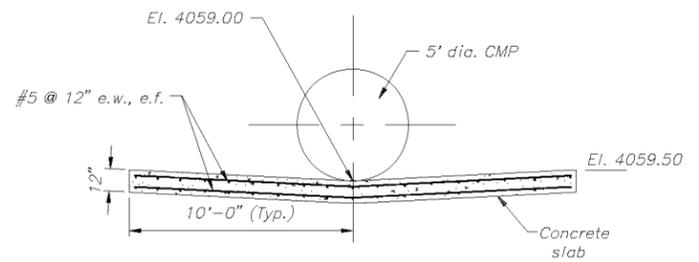
SECTION PP-PP



SECTION OO-OO



SECTION WW-WW

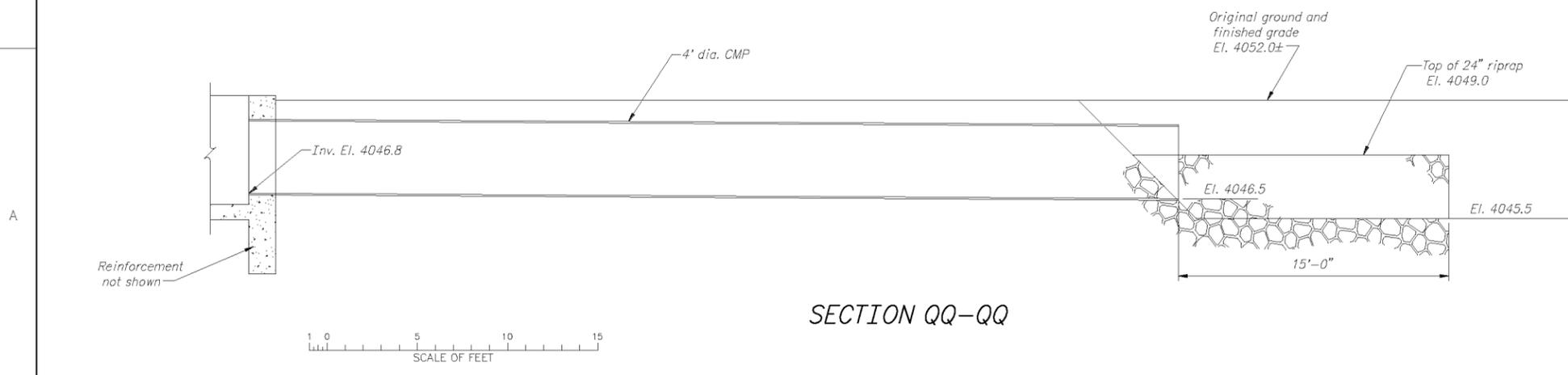
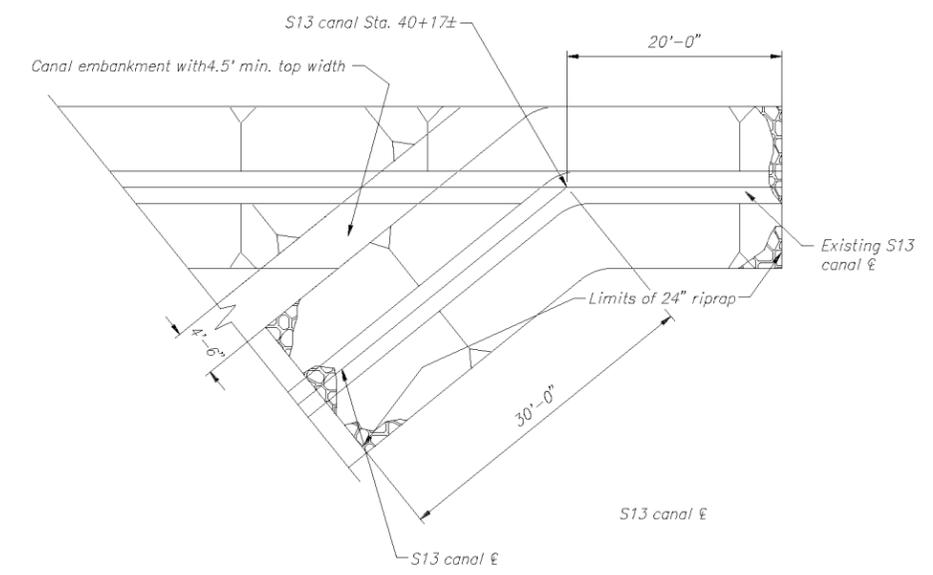
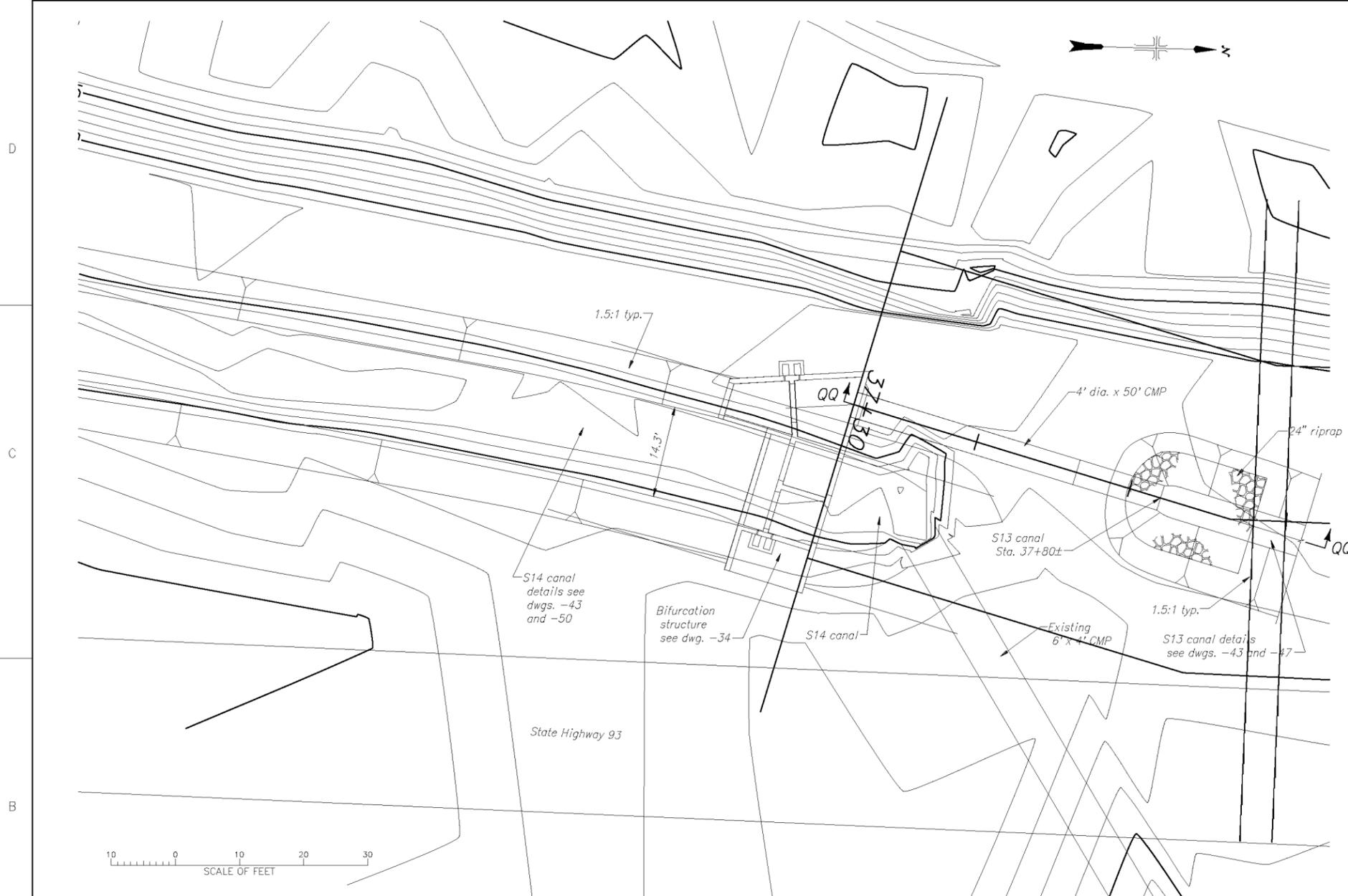


SECTION NN-NN



DATE AND TIME PLOTTED:
 AUGUST 14, 2006 13:24
 PLOTTED BY:
 GROOMS

Rev. 100 1/01 EDM	Changed Bering on Plan.
Rev. 100 12/00 SAW	General revision
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANALS CANAL CMP AND HIGHWAY DRAINAGE CMP PLAN AND SECTIONS	
DESIGNED <u>Phil Mann</u>	CHECKED <u>Phil Mann</u>
DRAWN <u>Manuel Salas</u>	TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER
CADD SYSTEM AutoCAD Rel. 16.0 BOISE, IDAHO	CADD FILENAME 1720-100-41.DWG SEPTEMBER 2000 1720-100-41

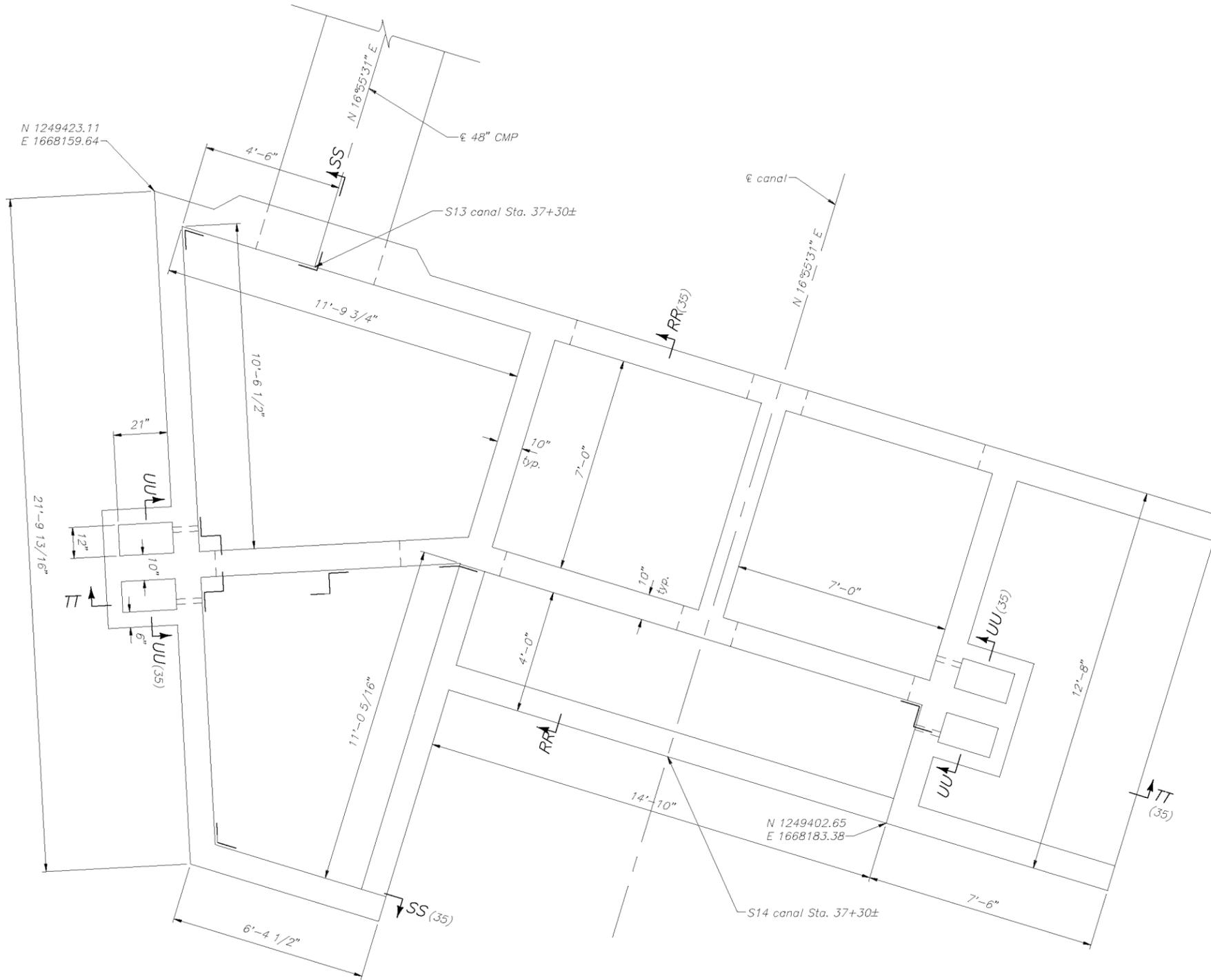


SECTION QQ-QQ

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 BIFURCATION STRUCTURE SITE PLAN AND SECTION		
DESIGNED <i>Phil Mann</i>	CHECKED <i>Phil Mann</i>	
DRAWN <i>Ed Mardherst</i>	TECH. APPROVAL <i>Dave Jennings</i>	PROGRAM MANAGER
CADD SYSTEM AutoCAD Ref. 18.0	CADD FILENAME 1720-100-40.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:48
BOISE, IDAHO	SEPTEMBER 2000	1720-100-40



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E 1668159.64



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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

UPPER SALMON RIVER WATER OPTIMIZATION PROJECT

S13-14 CANAL CONSOLIDATION
S13-14 BIFURCATION STRUCTURE

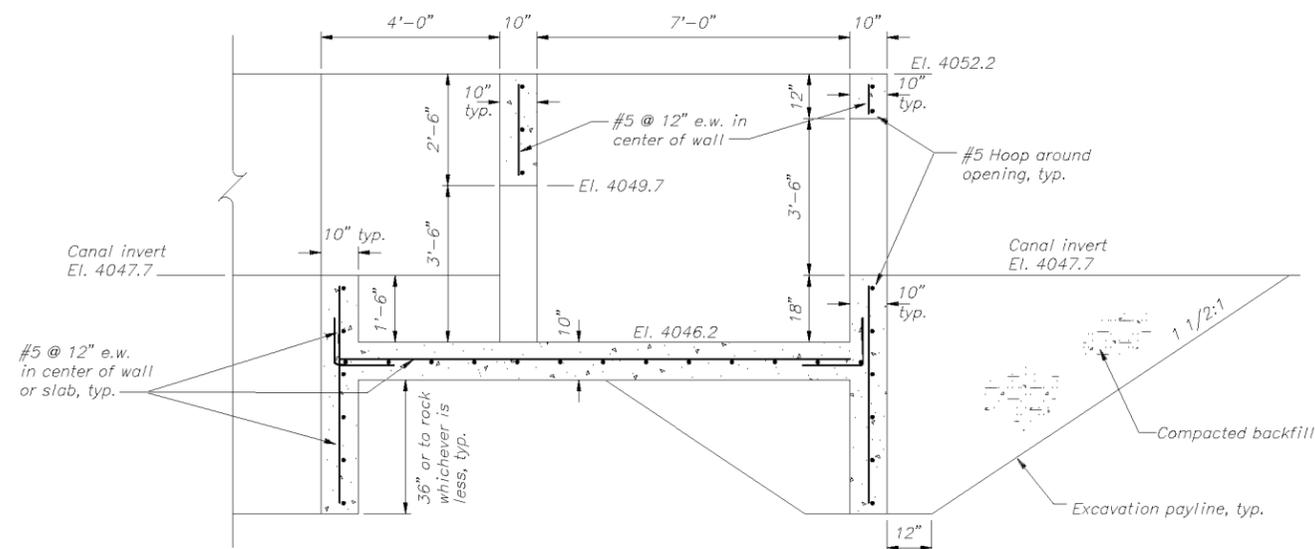
PLAN

DESIGNED Phil Mann CHECKED Phil Mann

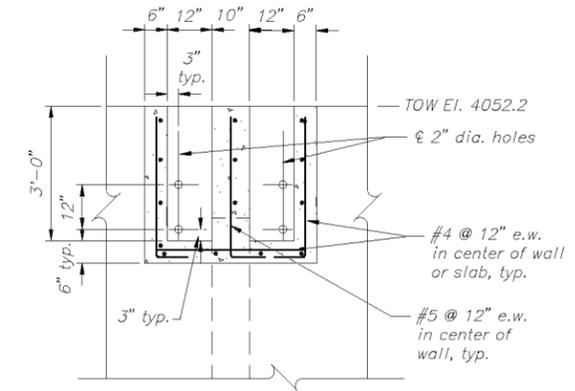
DRAWN Ed Mardherst TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

CADD SYSTEM AutoCAD Rel. 16.0	CADD FILENAME 1720-100-34.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 13:38
BOISE, IDAHO		SEPTEMBER 2000

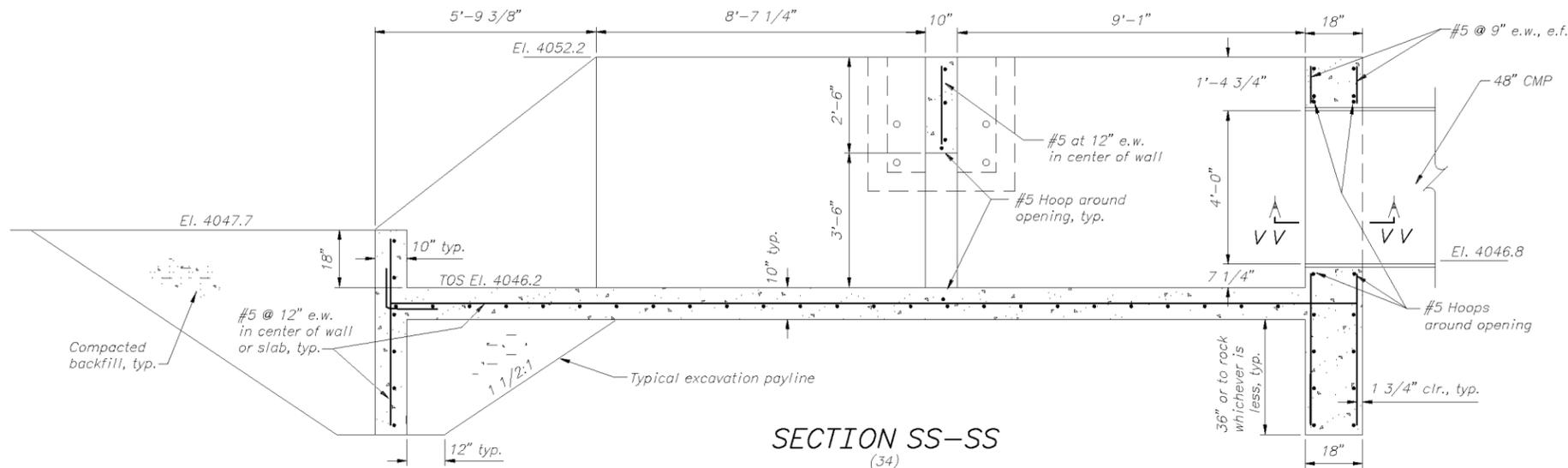
1720-100-34



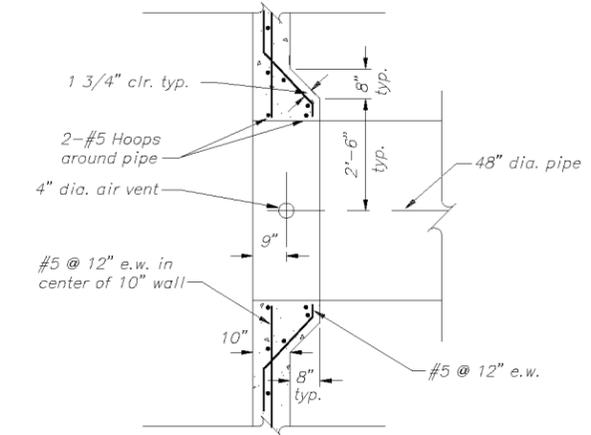
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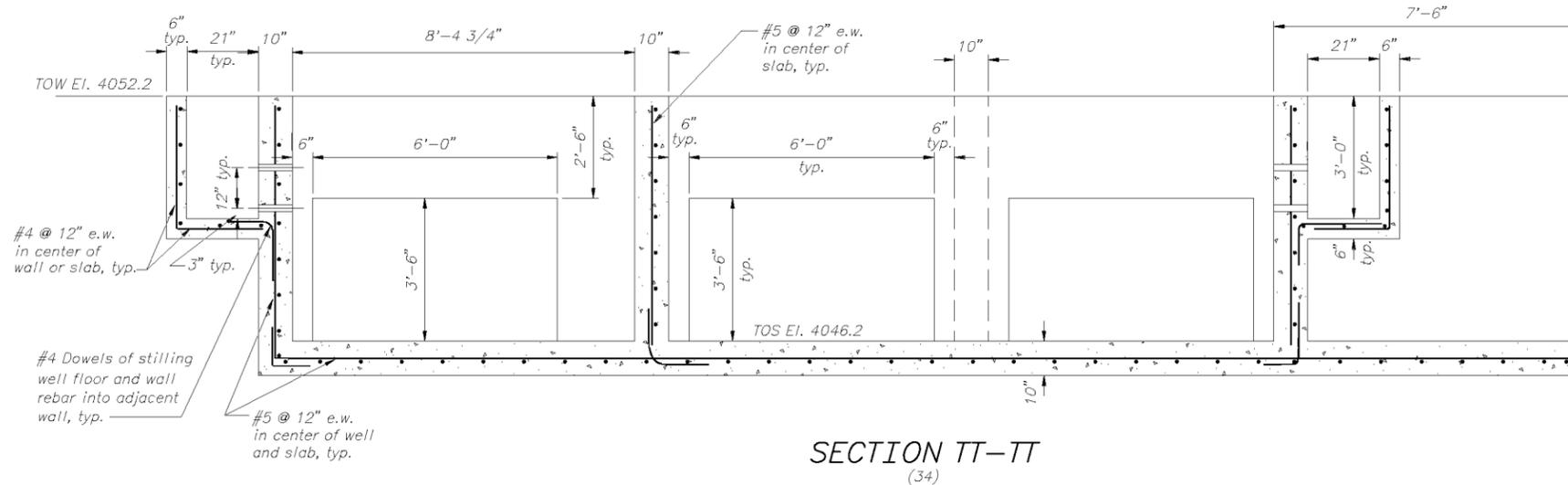
SECTION UU-UU (34)



SECTION SS-SS (34)

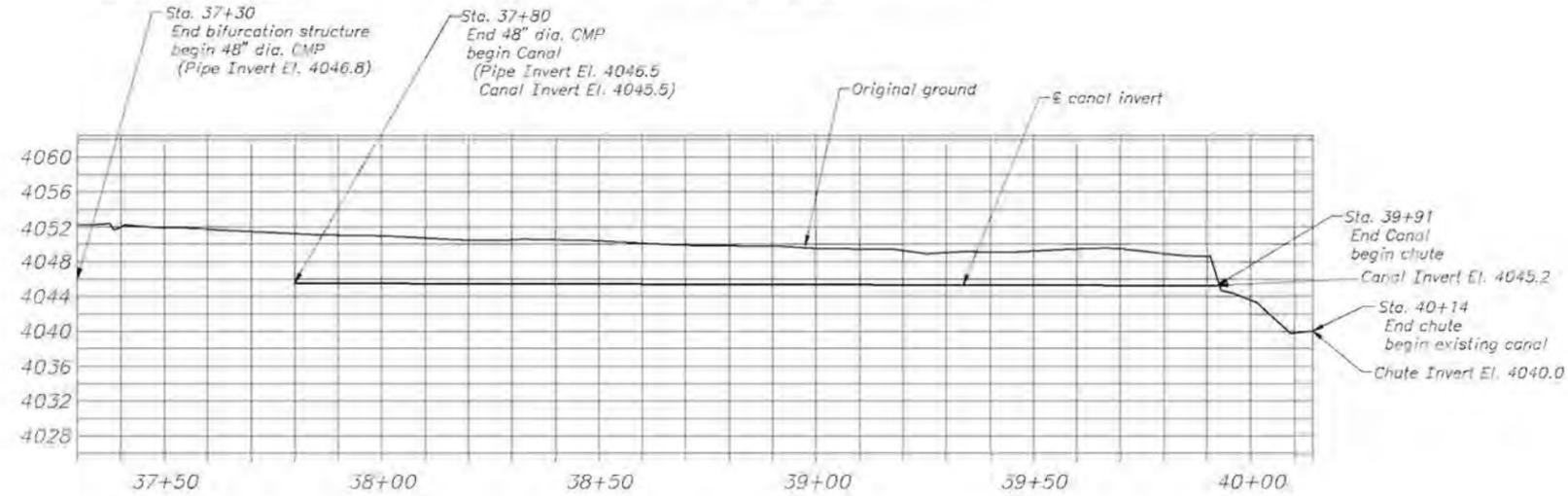
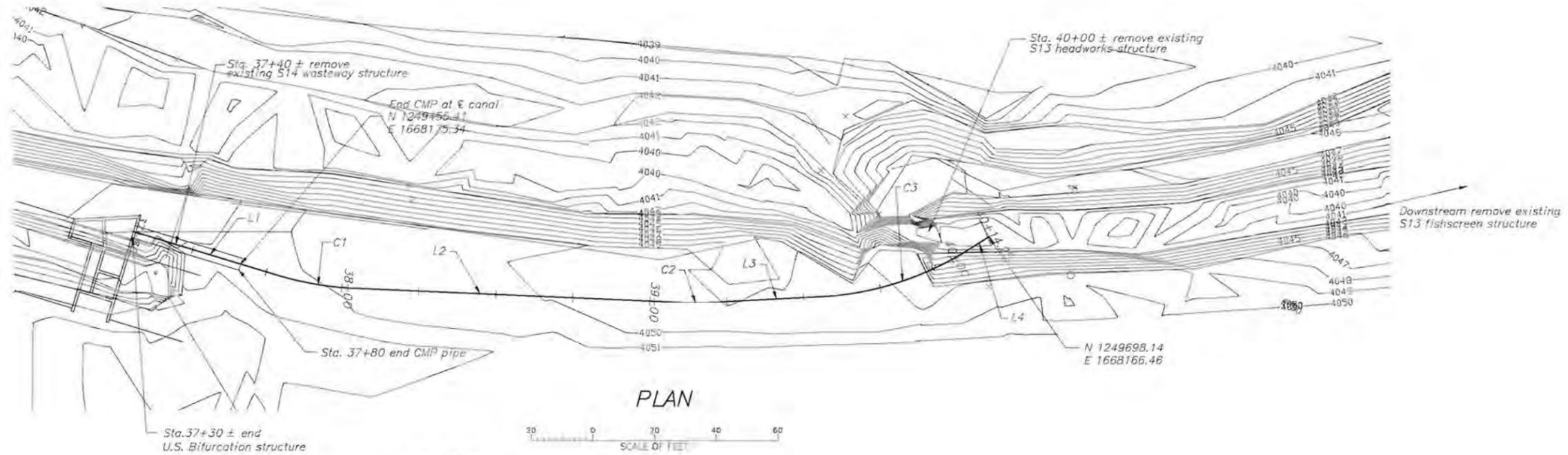


SECTION VV-VV



SECTION TT-TT (34)

ALWAYS THINK SAFETY		
UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION UPPER SALMON RIVER WATER OPTIMIZATION PROJECT S13-14 CANAL CONSOLIDATION S13-14 BIFURCATION STRUCTURE SECTIONS		
DESIGNED <u>Phil Mann</u>		CHECKED <u>Phil Mann</u>
DRAWN <u>Robin Goczycza/EDM</u>		TECH. APPROVAL <u>Dave Jennings</u> PROGRAM MANAGER
CADD SYSTEM AutoCAD Rev. 16.0	CADD FILENAME 1720-100-35.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 14:00
BOISE, IDAHO		SEPTEMBER 2000
1720-100-35		



PROFILE

CURVE TABLE							
	PI	PC	PT	Δ	R	T	L
C1	37+91.52	37+78.95	38+03.95	14°19'27"	100'	12.57'	25.00'
C2	39+15.30	39+10.55	39+20.04	5°26'10"	100'	4.75'	9.49'
C3	39+81.17	39+55.24	40+05.98	29°04'06"	100'	25.93'	50.74'

LINE TABLE				
	START	END	BEARING	DISTANCE
L1	37+30.0	37+78.95	N 16°55'31" E	48.95'
L2	38+03.95	39+10.55	N 2°28'47" E	106.60'
L3	39+20.04	39+55.24	N 2°57'23" W	35.20'
L4	40+05.98	40+14.25	N 32°01'29" W	8.27'

Rev. 100
12/00 SAW General revision

SAFETY

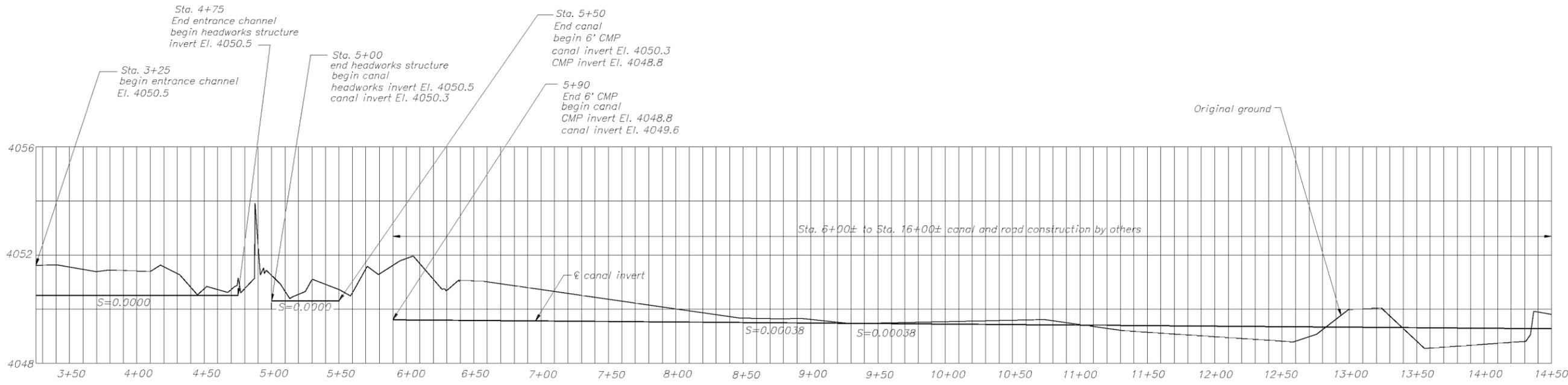
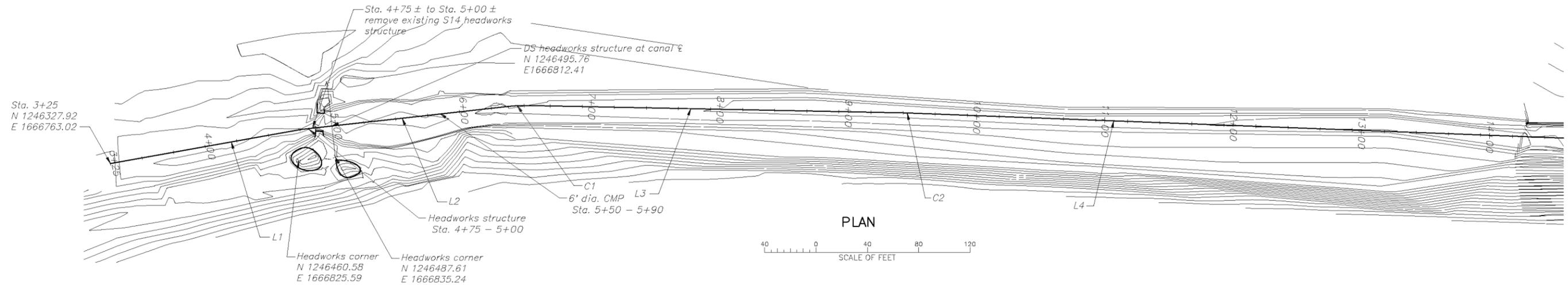
ALWAYS THINK

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S13-14 CANAL CONSOLIDATION
S13 CANAL
PLAN AND PROFILE

DESIGNED: Phil Mann CHECKED: Phil Mann
DRAWN: REG/ITM TECH. APPROVAL: Dave Jennings
PROGRAM MANAGER

CADD SYSTEM: AutoCAD Rev. 16.0 CADD FILENAME: 1720-100-47.DWG DATE AND TIME PLOTTED: AUGUST 14, 2008 14:03
SOURCE: TDAHD OCTOBER 2000 1720-100-47



CURVE TABLE							
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C1	6+45.81	6+39.28	6+52.32	7°28'03"	100'	6.53'	13.04'
C2	9+49.17	9+48.24	9+50.11	1°04'13"	100'	0.93'	1.87'

LINE TABLE				
	START	END	BEARING	DISTANCE
L1	3+25.00	4+76.01	N 15°52'40" E	151.01'
L2	4+76.01	6+39.28	N 19°38'20" E	163.27
L3	6+52.32	9+48.24	N 27°06'23" E	295.92
L4	9+50.11	14+83.08	N 28°10'36" E	532.97

Rev. 100
12/00 SAW General revision

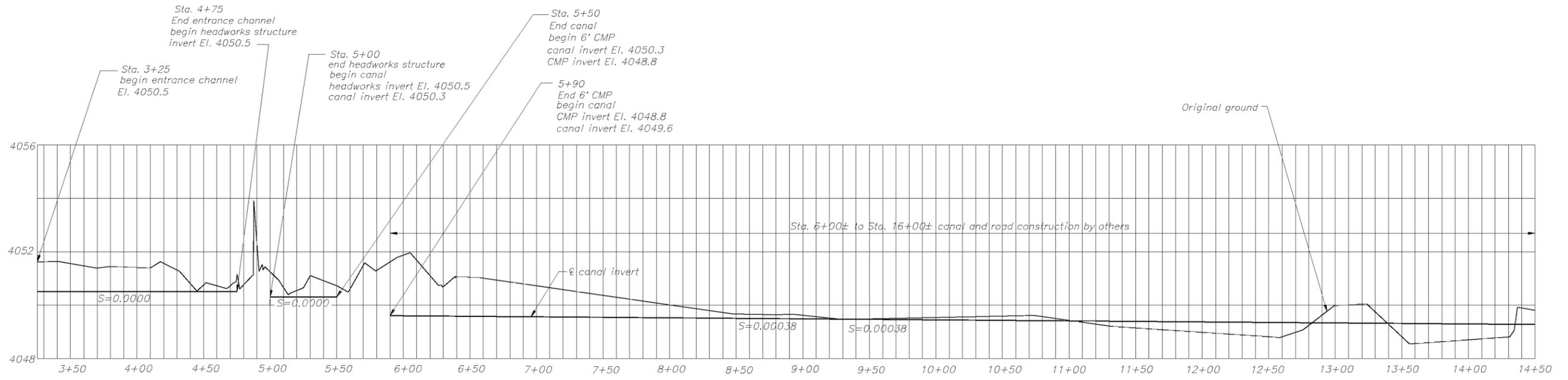
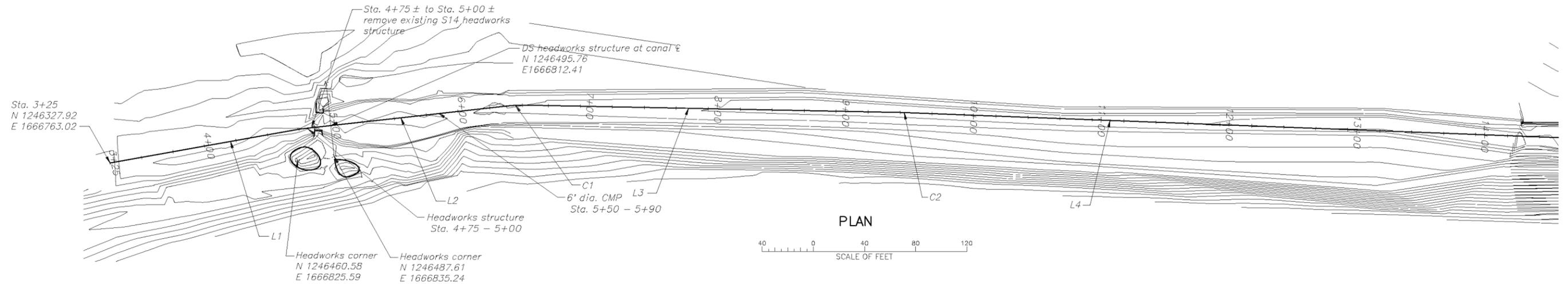
ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER SALMON WATER OPTIMIZATION PROJECT

S13-14 CANAL CONSOLIDATION
STATIONS 3+25 - 14+50
S14 CANAL - PLAN AND PROFILE

DESIGNED Phil Mann CHECKED Phil Mann
DRAWN BEG TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

CADD SYSTEM AutoCAD Rev. 16.0 CADD FILENAME 1720-100-48.DWG DATE AND TIME PLOTTED AUGUST 14, 2006 14:04
BOISE, IDAHO October 2000 **1720-100-48**



CURVE TABLE							
	PI	PC	PT	Δ	R	T	L
C1	6+45.81	6+39.28	6+52.32	7°28'03"	100'	6.53'	13.04'
C2	9+49.17	9+48.24	9+50.11	1°04'13"	100'	0.93'	1.87'

LINE TABLE				
	START	END	BEARING	DISTANCE
L1	3+25.00	4+76.01	N 15°52'40" E	151.01'
L2	4+76.01	6+39.28	N 19°38'20" E	163.27
L3	6+52.32	9+48.24	N 27°06'23" E	295.92
L4	9+50.11	14+83.08	N 28°10'36" E	532.97

Rev. 100
12/00 SAW General revision

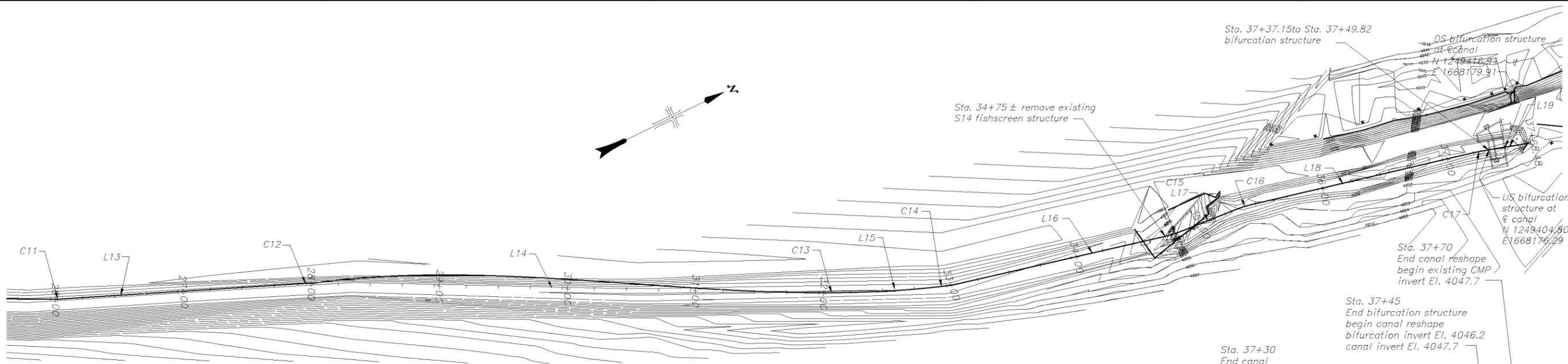
ALWAYS THINK SAFETY

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER SALMON WATER OPTIMIZATION PROJECT

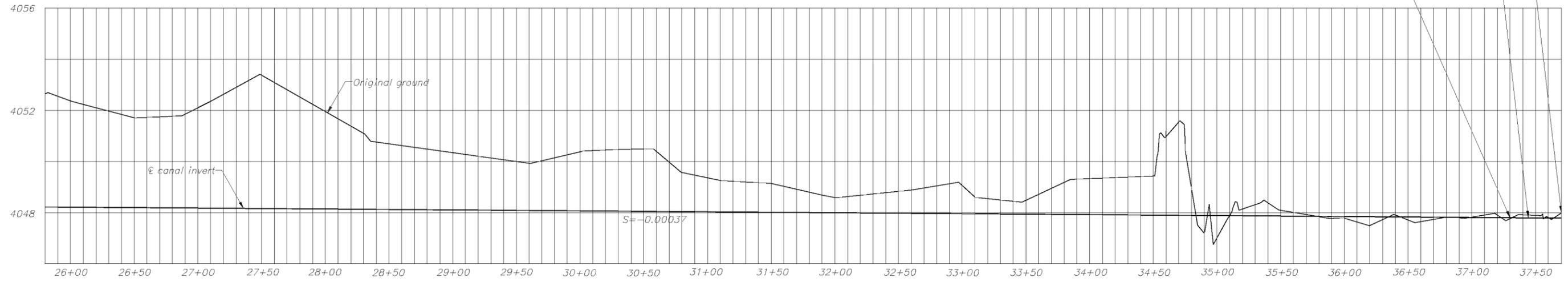
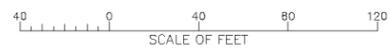
S13-14 CANAL CONSOLIDATION
STATIONS 3+25 - 14+50
S14 CANAL - PLAN AND PROFILE

DESIGNED Phil Mann CHECKED Phil Mann
DRAWN BEG TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

CADD SYSTEM AutoCAD Rev. 16.0 CADD FILENAME 1720-100-48.DWG DATE AND TIME PLOTTED AUGUST 14, 2006 14:04
BOISE, IDAHO October 2000 **1720-100-48**



PLAN



PROFILE

CURVE TABLE							
	PI	PC	PT	Δ	R	T	L
C11	26+05.32	26+01.74	26+08.91	4°06'19"	100'	3.58'	7.17'
C12	28+00.49	27+96.38	28+04.60	4°42'14"	100'	4.11'	8.22'
C13	32+10.32	32+06.55	32+14.09	4°19'16"	100'	3.77'	7.54'
C14	33+00.56	32+92.14	33+08.94	9°37'37"	100'	8.42'	16.80'
C15	34+81.52	34+73.83	34+89.17	8°47'27"	100'	7.69'	15.34'
C16	35+40.47	35+32.99	35+47.92	8°33'14"	100'	7.48'	14.93'
C17	37+28.64	37+25.35	37+31.93	3°46'15"	100'	3.29'	6.58'

LINE TABLE				
	START	END	BEARING	DISTANCE
L13	26+08.91	27+96.38	N 22°19'49" E	187.47'
L14	28+04.60	32+06.55	N 27°02'04" E	401.95'
L15	32+14.09	32+92.14	N 22°42'48" E	78.05'
L16	33+08.94	34.73.83	N 13°05'11" E	164.89'
L17	34+89.17	35+32.99	N 04°17'44" E	43.79'
L18	35+47.92	37+25.35	N 12°50'59" E	177.43'
L19	37+31.93	37+68.48	N 16°37'13" E	36.55'

Rev. 100
12/00 SAW General revision

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

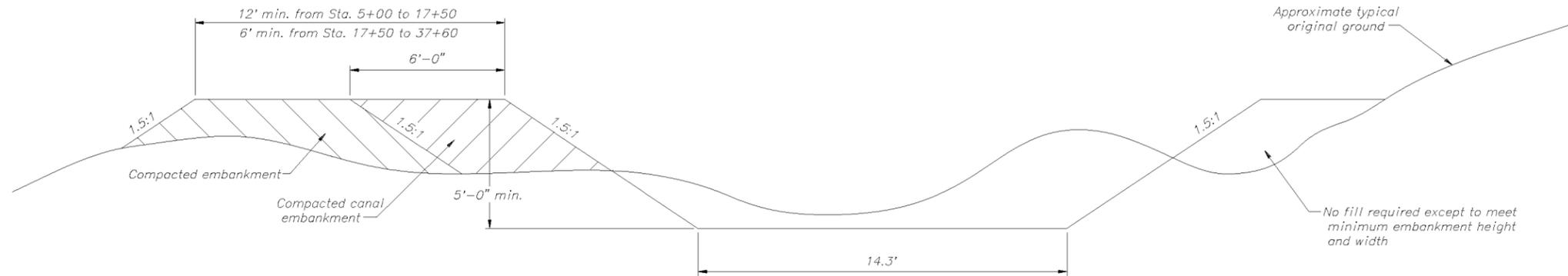
UPPER SALMON WATER OPTIMIZATION PROJECT

S13-14 CANAL CONSOLIDATION
Sta. 25+80 - 37+20.19

S14 CANAL - PLAN AND PROFILE

DESIGNED Phil Mann CHECKED Phil Mann
DRAWN REG TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

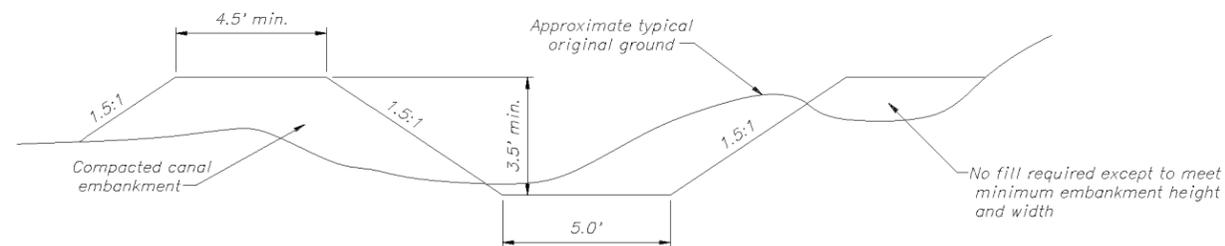
CADD SYSTEM AutoCAD Ref. 16.0 CADD FILENAME 1720-100-50.DWG DATE AND TIME PLOTTED AUGUST 14, 2006 14:09
BOISE, IDAHO October 2000 **1720-100-50**



S14 CANAL – TYPICAL SECTION
(Station 5+00± to 37+60± except at structures)



TYPICAL SECTION S14 CANAL – DIVERSION CHANNEL
(Station 3+25± to 4+75±)



Note: S13 canal stationing is a continuation of S14 canal stationing.

S13 CANAL – TYPICAL SECTION
(Station 37+95± to 40+20± except at structures)

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
UPPER SALMON RIVER WATER OPTIMIZATION PROJECT
S13-14 CANAL CONSOLIDATION
S13-14 CANALS
TYPICAL CANAL SECTIONS

DESIGNED Phil Mann CHECKED Phil Mann
DRAWN Ed Mortherst TECH. APPROVAL Dave Jennings
PROGRAM MANAGER

CADD SYSTEM AutoCAD Ref. 16.0	CADD FILENAME 1720-100-43.DWG	DATE AND TIME PLOTTED AUGUST 14, 2006 14:10
BOISE, IDAHO		SEPTEMBER 2000

