Cascade Earth Sciences
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3511 Pacific Blvd. SW
Albany, OR 97321

Ph: 541.926.7737
Fax: 541.967.7619

May 20, 2009

Mr. Bud Baumgartner
Co-Chair
Calapooia Watershed Council
40684 McQueen Drive
Sweet Home, OR 97386

Ms. Tara Putney
Coordinator
Calapooia Watershed Council
P.O. Box 844
Brownsville, Oregon 97327

SUBJECT: Brownsville Irrigation Diversion Restoration Report
Brownsville, Oregon

Dear Mr. Baumgartner and Ms. Putney:

Cascade Earth Sciences (CES) is pleased to present the final report on the restoration of the irrigation diversion necessitated by the removal of the Brownsville diversion dam. The work was completed in September and October of 2008. As requested, we are supplying four copies of the report and an electronic copy by PDF on a compact disk.

If you have any questions, please do not hesitate to contact me at (541) 812-6614 or Steel Maloney at (541) 812-6627. CES has enjoyed working with you on this important watershed improvement project and we look forward to the opportunity to work with you on future projects.

Sincerely,

Cascade Earth Sciences

John D. Martin, R.G., CWRE
Project Manager / Principal Geologist

JDM/

Enc: Brownsville Irrigation Diversion Restoration Report (6)
c: Tara Putney, Calapooia Watershed Council Coordinator
PN: 2724012-005
Doc: Brownsville Irrig Divers Restor Rpt.docm

Brownsville Irrigation Diversion Restoration Report

May 2009

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www.cascade-earth.com

Brownsville Irrigation Diversion Restoration Report

Prepared For:	Calapooia Watershed Council P.O. Box 844 Brownsville, OR 97327
Prepared By:	Cascade Earth Sciences 3511 Pacific Boulevard SW Albany, Oregon 97321 (541) 926-7737
Author:	John Martin, RG, CWRE, Principal Geologist
Reviewed By:	Tim Otis, PE, Senior Engineer
Report Date:	May 20, 2009
Project Number:	2724012
Submitted By:	John Martin, RG, CWRE, Principal Geologist

CES

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CALAPOOIA WATERSHED COUNCIL

ACKNOWLEDGEMENTS

CES would like to acknowledge and thank the following people and agencies for their assistance in the successful completion of the Brownsville Irrigation Diversion Restoration Project:

Bud Baumgartner	Calapooia Watershed Council (CWC), Council Chair, Forester
Tara Putney	CWC, Coordinator
Denise Hoffert-Hay	CWC, Project Manager
Wendy Hudson	OWEB, Regional Program Representative
John Holbrook	Brownsville Canal Company
Bill Nelson	Brownsville Canal Company
Bill Sattler	City of Brownsville, City Planner
Jackie Nichols	Cascade Pacific Resource Conservation & Development Area, Inc. (CPRCD), Fiscal Agent
Karen Strohmeyer	CPRCD, Project Manager
Jared Rubin	Oregon Department of Environmental Quality, Basin Coordinator
Kirk Jarvie	Oregon Department of State Lands, Economic Revitalization Liaison
Susan Novak	National Oceanic and Atmospheric Administration/Marine Fisheries Service (NOAA/NMFS), Engineer
Melissa Jundt	NOAA/NMFS, Fish Passage Engineer
Kerry Griffin	NOAA/NMFS, Restoration Center
Joel Watts	Oregon Department of Fish and Wildlife (ODFW), Fish Passage Engineer
Karen Hans	ODFW, Assistant District Fisheries Biologist
Steve Mamoyac	ODFW, District Fisheries Biologist
Michael Lambert	ODFW, Fish Screening and Passage Program Manager

CONTENTS

SHEETS

APPENDICES

1.0 INTRODUCTION

The Calapooia Watershed Council (CWC) selected Cascade Earth Sciences (CES) and our associates: Northwest Biological Consulting and Schneider Equipment Inc. (referred to herein as the CES Team) to assist them in restoring the irrigation diversion from the Calapooia River to the authorized 2.5 cubic feet per second. The diversion serves the Brownsville Canal Company and the City of Brownsville during each irrigation season. CES previously completed the required permitting in association with CWC, design, and removal of the Brownsville irrigation diversion dam. This report summarizes the irrigation diversion restoration activities.

2.0 SITE DESCRIPTION

2.1 Location and Legal Description

The irrigation diversion project site (Site) is located at river mile 38.8 of the Calapooia River adjacent to the south of Northern Drive, approximately 2.5 miles east of the City of Brownsville, Oregon (Sheet AB-1). The Site is located on tax lot 400, Donation Land Claim (DLC) 58. An approximate location description is the northwest quarter of the northeast quarter of Section 4, Township 14 South, Range 2 West of the Willamette Meridian, Linn County, Oregon. Based on the United States Geological Survey (USGS) 7.5 minute series topographic map of the area (Brownsville Quadrangle), the latitude is 44.3878 north and the longitude is -122.9301 west (USGS, 1988).

The irrigation diversion is a gravity-fed pump station with a fish screen over the intake.

2.2 Historical Irrigation Diversion

The irrigation diversion dates back to the late 1850's when a hand dug canal was constructed to carry water approximately 3 miles from the Calapooia River to the City of Brownsville to operate various mills in the town (e.g., flour, woolen, etc.). The water was diverted by way of a wooden crib dam located near the entrance of the canal. In 1967-68, a gravel-filled, concrete, diversion dam (Brownsville Dam) was constructed to replace the last remaining washed out wooden crib dam. Until 2007, the Brownsville Dam supplied diversion water to the canal and authorized water rights holders during the irrigation season. With the exception of periods of disrepair and non-use, the canal has been used to divert water for industry, irrigation, or aesthetics since its construction in the 1850s.

As a result of habitat pressures on the spring Chinook salmon and winter steelhead coupled with deterioration of the Brownsville Dam, the decision was made to remove the dam and establish another method to supply water to the canal. The dam was removed in 2007 and a pump station was constructed in 2008 to restore the irrigation diversion.

3.0 BROWNSVILLE DAM REMOVAL

3.1 Irrigation Diversion Alternatives Discussion

Representatives of the CWC and CES reviewed three alternative approaches for irrigation diversion. The three alternatives reviewed were upstream passive intake with a gravity-fed pipeline to the canal, an in-stream infiltration gallery and pump, and a gravity-fed intake to a pump vault.

3.1.1 Upstream Passive Intake

The upstream intake alternative would have consisted of a passive intake structure with fish screen positioned far enough upstream to achieve adequate hydraulic head to deliver the river water to the canal entrance. The water would travel from the intake to the canal in a buried pipeline. This alternative was not selected for the following reasons:

- The pipeline cost would have been prohibitive due to the length needed to get adequate hydraulic head and the need for high density polyethylene (HDPE) piping for durability.
- The need for property easements to excavate and place the pipe over a distance of up to three miles.
- State and federal regulatory agencies did not indicate they would approve this type of diversion.

The irrigation diversion serves for irrigation water rights and for City of Brownsville aesthetic purposes.

3.1.2 In-stream Infiltration Gallery

This alternative was the simplest approach consisting of excavating a cavity in the approximate mid-stream area of the Calapooia River near the mouth of the canal. A pump and pipeline would be placed into the cavity, which would be covered by a screen and gravel. The pipeline would extend to the mouth of the canal allowing water to be pumped directly from the river to the canal. This alternative was not selected due to regulatory objection to pumping directly from the river.

3.1.3 Gravity-fed Intake to a Pump Vault

This alternative consisted of a passive intake on the bank, but below the water surface of the Calapooia River near the mouth of the canal. The intake would include a fish screen with cleaning jets to remove debris. Water from the river would enter the intake and flow by gravity to a large vault. A pump within the vault would pump water from the vault through a pipeline and into the canal. This was the selected alternative and is discussed below.

3.2 Permits and Approvals

Permits acquired for the removal of the former Brownsville Dam were also utilized for construction of the irrigation diversion:

- Joint Permit – U.S. Army Corps of Engineers and Oregon Department of State Lands.

  - 401 Water Quality Certification – Oregon Department of Environmental Quality (ODEQ)
  - Biological Opinion – National Oceanic and Atmospheric Administration (NOAA)

- General Permit, National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit 1200-C– ODEQ

Copies of all permits are presented in Appendix A of the Brownsville Dam Removal Report (CES, 2007). In addition to permitting, the following agencies were involved in reviewing proposed alternatives for the irrigation diversion installation, provided technical input, or gave approval for the project:

- NOAA National Marine Fisheries Service and the NOAA Open Rivers Initiative
- Oregon Department of Fish and Wildlife (ODFW)
- Oregon State Historic Preservation Office (SHPO)
- Oregon Watershed Enhancement Board (OWEB)
- Oregon Water Resources Department (OWRD)

3.3 Photopoints and Photographs

Prior to the removal, a series of Photopoints (PP) were established:

- PP1 – located at the east end of the parking lot, looking west at the pump vault construction area.
- PP2 – located on the north abutment of the former dam, looking northeast to the construction area.
- PP3 – located on Northern Drive in line with the planned pump vault location, looking south at the construction area.

Photographs were taken from the photopoints before and after the installation of the intake structure, piping and pump vault. In addition, a number of opportunity photographs were taken of different activities or significant events during the installation. Copies of selected photographs are presented in Appendix A.

3.4 Sediment Control and Monitoring

Sediment and erosion control best management practices used are included in the NPDES permit (CES, 2007, Appendix A). Mr. Scott English, Erosion Control Inspector, completed installation and inspection for the project. Erosion controls included straw waddles, silt fences, and an isolation dam.

Erosion controls included straw waddles, silt fences, and an isolation dam (above).

As required by the Joint Permit, turbidity was monitored approximately every four hours during active work. Monitoring began on September 8, 2008, and ended on October 1, 2008. Monitoring was only conducted on days when there was active excavation occurring at the Site coupled with pumping of turbid water. Monitoring was conducted with a LaMotte Model 2020 Turbidimeter. Readings were collected from a station approximately100 feet upstream

(background) of the work area and approximately 200 feet downstream (compliance). Samples were collected from actively moving water. A comparison was then made between the readings from the two points; a difference of more than 5 nephelometric turbidity units (NTU) would result in taking action to reduce turbidity. The comparison readings varied from a low of -0.3 NTUs to 16 NTUs. Turbidity twice exceeded the lowest action level of 5 NTUs with 11.7 NTUs on 9/17/08 and 16.0 NTUs on 9/25/08. In both cases, work was shut down and the pump discharge hose was moved so that discharge could occur in an upland area (9/17/08) and the canal (9/25/08). A copy of the turbidity log is presented in Appendix B.

3.5 Construction

Construction began on September 8, 2008, with placement of erosion controls and the isolation dam. In-stream construction was completed on October 4, 2008, with final grading, removal of the isolation dam, site cleanup and restoration, and demobilization. Installation work on the pumps and valves continued until the system test on November 11, 2008. One excavator, a large crane, and a small dozer were employed for the construction activities. All work was conducted from the north side of the Calapooia River (see Photographs, Appendix A).

The work area was accessed from the east end of the parking lot in the same area used for access during the dam removal. The sequence of work was to isolate the work area by placing an isolation dam between the north bank and the west end of a gravel bar separating the river from the intake pool area. To control turbidity and based on the amount of sediment in the water, excavation seepage water was pumped out of the work area either into the canal, a plateau on the north side of the river, or directly into the river. Rip rap material in the construction area was moved aside for later replacement and excavation began in the areas of the intake structure and pump vault.

Following excavation the cylinders that comprised the pump vault were lowered into place.

The intake structure was constructed using forms and poured concrete prior to completion of the pump vault excavation. The intake placement was designed so that the structure would not extend into the river beyond the profile of the bank following site restoration. The pump vault was excavated to approximately 25 feet below ground surface. Excavated material primarily consisted of fill and native gravel and silt with some organics. Only minor sandstone bedrock was encountered at the deepest level of the vault excavation. Following excavation of the pump vault, the concrete circular vault base and the concrete cylinders of which the pump vault is comprised were carefully lowered into place using a large crane. The 16" polyvinyl chloride (PVC) pipe connecting the intake structure to the pump vault, and the four 4" PVC backwash pipes were then positioned and all connections were sealed, after which the excavation was backfilled.

When the vault was dewatered for installation of the pumps, two leaks were detected, one between the first and second manhole rings, on the east side, and the other around the 16" PVC inlet pipe from the intake vault. Both were grouted to successfully stop the leaks.

Concurrent with the construction of the intake and pump vault, the canal was excavated for the energy dissipation structure and the structure was constructed using forms and poured concrete. Following backfilling of the pump vault, a trench was excavated from the vault to the energy dissipation structure for the pipeline that would carry the water to the canal. An 8" PVC pipe was subsequently installed, and backfilled, as shown on the as-built plans. An in-line flowmeter was also installed approximately 12 feet west of the pump vault. Pacific Power installed three-phase transformers and set a service pole on October 27, 2008. Final installation activities including valves, pumps and associated piping, fish screen and covers, and electrical connections were completed between October 6 and November 11, 2008.

3.5.1 Construction-Related Activities

Fish Recovery

Following placement of the isolation dam, the pooled water in the work area was slowly pumped out. Site workers with nets were on hand to remove any fish. The only fish observed appeared to be sucker fish (Catostomus macrocheilus), which were removed from the pool and placed in the river.

3.5.2 System Test

On November 11, 2008, members of the CWC and the CES Team met onsite to test system performance. The system test included electrical, pumps, flowmeter, energy dissipation structure, and the fish screen cleaning system. All equipment operated as specified.

4.0 CLEANUP AND RESTORATION

4.1 Site Cleanup

Final cleanup and restoration of the Site began on October 3, 2008, and was completed on October 4, 2008. Cleanup consisted of removal of remaining construction debris.

4.2 Restoration

Site restoration consisted of reshaping the area south of river bank and in front of the intake structure to closely approximate its pre-construction profile and regarding the parking area. Restoration was completed on October 4, 2008. Approximately 70 cubic yards of additional rip-rap was placed to armor the bank upstream of the intake structure. Additional ¾" minus gravel was placed in the access drive to restore a smooth vehicle access road. Finally, the work access area at the east end of the parking area was re-seeded and access blocked with a large log. The same native seed mix used to revegetate following dam removal was used to revegetate the formerly blackberry-covered access area:

The north bank was restored to its previous configuration and re-armored with rip-rap.

59.28%	Blue Wildrye	1.64%	Inert Matter
28.54%	Meadow Barley	0.00%	Weed Seeds
9.98%	California Brome	Noxious	None Found
0.56%	Other Crop		

5.0 CONCLUSIONS

The Brownsville Irrigation Diversion Restoration project successfully met or exceeded project objectives:

- The intake structure, pump vault, and piping system were completed within the planned schedule and budget.
- The system test indicated that all parts of the system operated as designed: intake, pumps, dissipation structure, canal flow, and fish screen cleaning system.
- Turbidity levels exceeded the action level twice, work was stopped and the discharge system altered to successfully reduce turbidity.
- No significant problems were encountered.
- No injuries, accidents, spills or accidental releases into water occurred.
- Very little site disturbance (< 1 acre) occurred and those areas are restored to approximate their pre-construction appearance and condition.

Sheets C-1 through and C-9 show the as-built diagrams of the pump station, fish screen, dissipation structure, and appurtences.

6.0 LIMITATIONS

The conclusions presented in this report are professional opinions based on data described in this report. They are intended only for the purpose, Site location, and project indicated. In addition, CES bases the conclusions presented in this report on the assumption that Site conditions do not deteriorate from those observed during the project and as described in this report. CES prepared this report for the CWC pursuant to an August 22, 2007, agreement and it is accurate to the best of CES' knowledge and belief.

7.0 REFERENCES

USGS, 1988. *United States Geological Survey 7.5 Minute Series Topographic Map, Brownsville, Oregon Quadrangle*. United States Geological Survey, Washington, D.C.

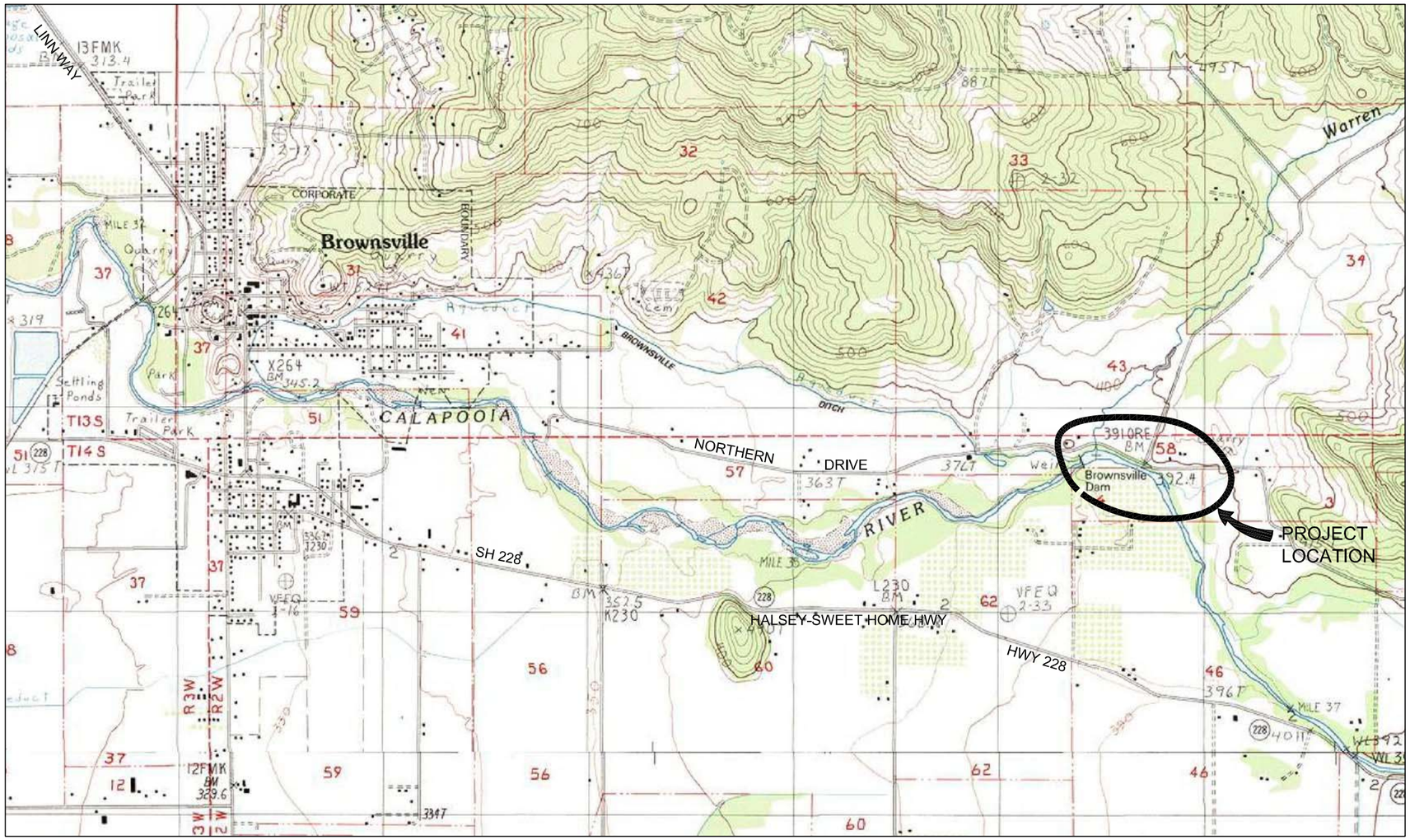
CES, 2007, *Brownsville Dam Removal Report,* Prepared by Cascade Earth Sciences, Albany, Oregon, October 2007

SHEETS

WATER DIVERSION PROJECT

Calapooia River

Brownsville, Oregon



SITE VICINITY MAP

0 1000 2000 FEET

SCALE

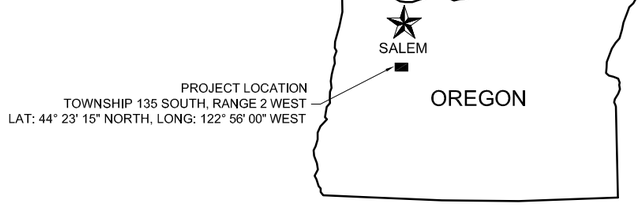
INDEX OF DRAWINGS

GENERAL

SHEET G-1	VICINITY MAP AND SHEET INDEX

CIVIL

SHEET C-1	SITE LAYOUT PLAN VIEW
SHEET C-2	INTAKE STRUCTURE & PUMPING STATION LAYOUT
SHEET C-3	PUMPING INTAKE STRUCTURE PLAN
SHEET C-4	PUMPING INTAKE STRUCTURE SECTIONS
SHEET C-5	INTAKE STRUCTURE PLAN & PROFILE
SHEET C-6	MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 1
SHEET C-7	MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 2
SHEET C-8	MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 3
SHEET C-9	PUMP VAULT PUMP SUPPORT STRUCTURE



PROJECT LOCATION
TOWNSHIP 13S SOUTH, RANGE 2 WEST
LAT: 44° 23' 15" NORTH, LONG: 122° 56' 00" WEST

RECORD DRAWINGS
4/30/09

S:\1PROJECT\2007\2724 WATER RESOURCES\2724012 - BROWNSVILLE DAM REMOVAL\DWG (PUMP STATION)\AS-BUILTS\2724012 G1 ASBLT.DWG ODELL, DAVID E. 4/30/2009

CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	-	-	MO/DAY/YR
2	-	-	MO/DAY/YR
3	-	-	MO/DAY/YR
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

DES. BY 8JW
DRG. BY 8JSG
CHK. BY GLT
DATE CREATED 1/12/07
JOB No. 2724012

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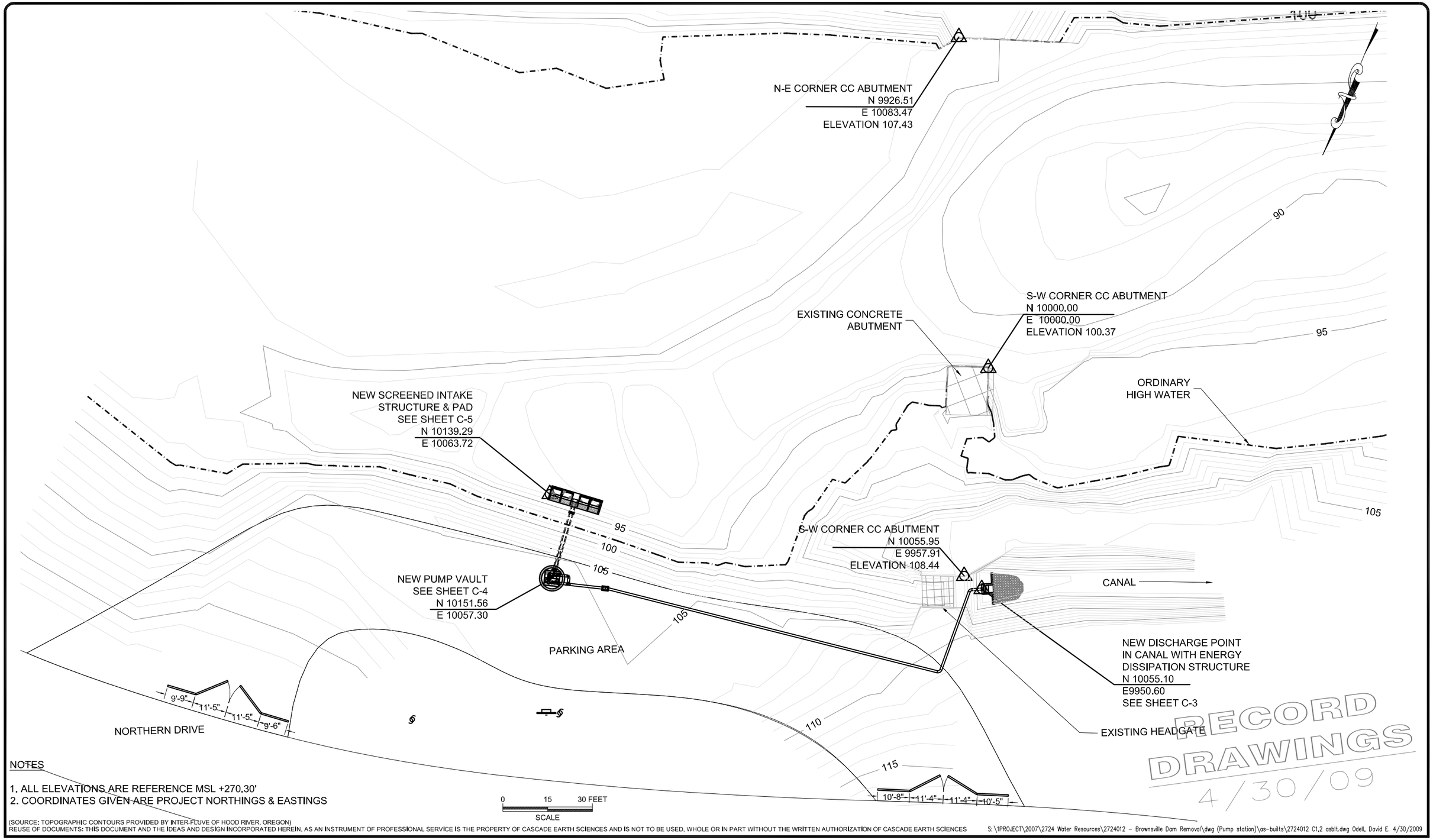
VICINITY MAP AND SHEET INDEX

WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET G-1



NOTES

1. ALL ELEVATIONS ARE REFERENCE MSL +270.30'
2. COORDINATES GIVEN ARE PROJECT NORTHINGS & EASTINGS

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

S:\1PROJECT\2007\2724 Water Resources\2724012 - Brownsville Dam Removal\dwg (Pump station)\as-builts\2724012 C1,2 asblt.dwg Odell, David E. 4/30/2009

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4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

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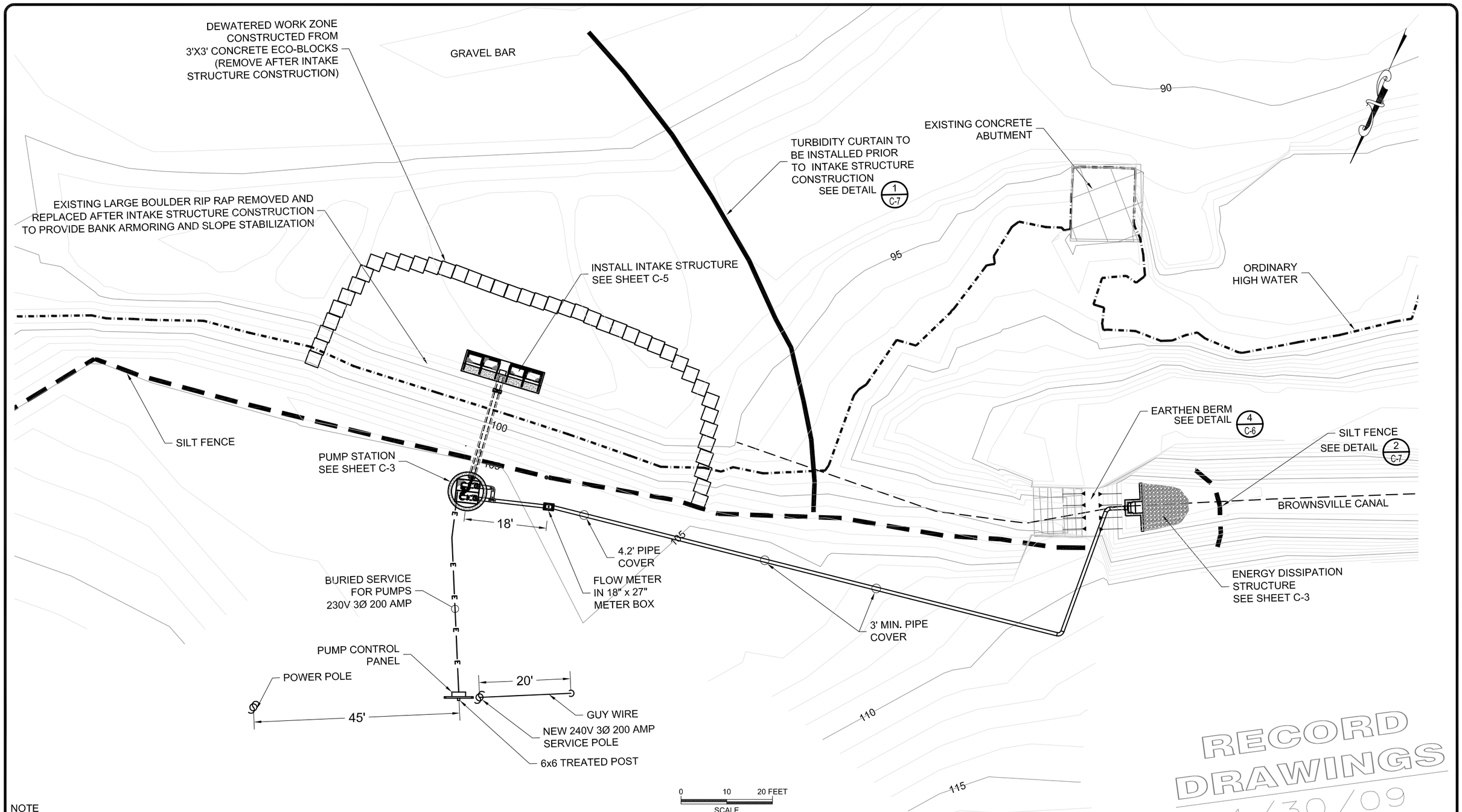
SITE LAYOUT PLAN VIEW

WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET C-1



NOTE
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(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

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RECORD DRAWINGS 4/30/09

CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	-	-	MO/DAY/YR
2	-	-	MO/DAY/YR
3	-	-	MO/DAY/YR
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

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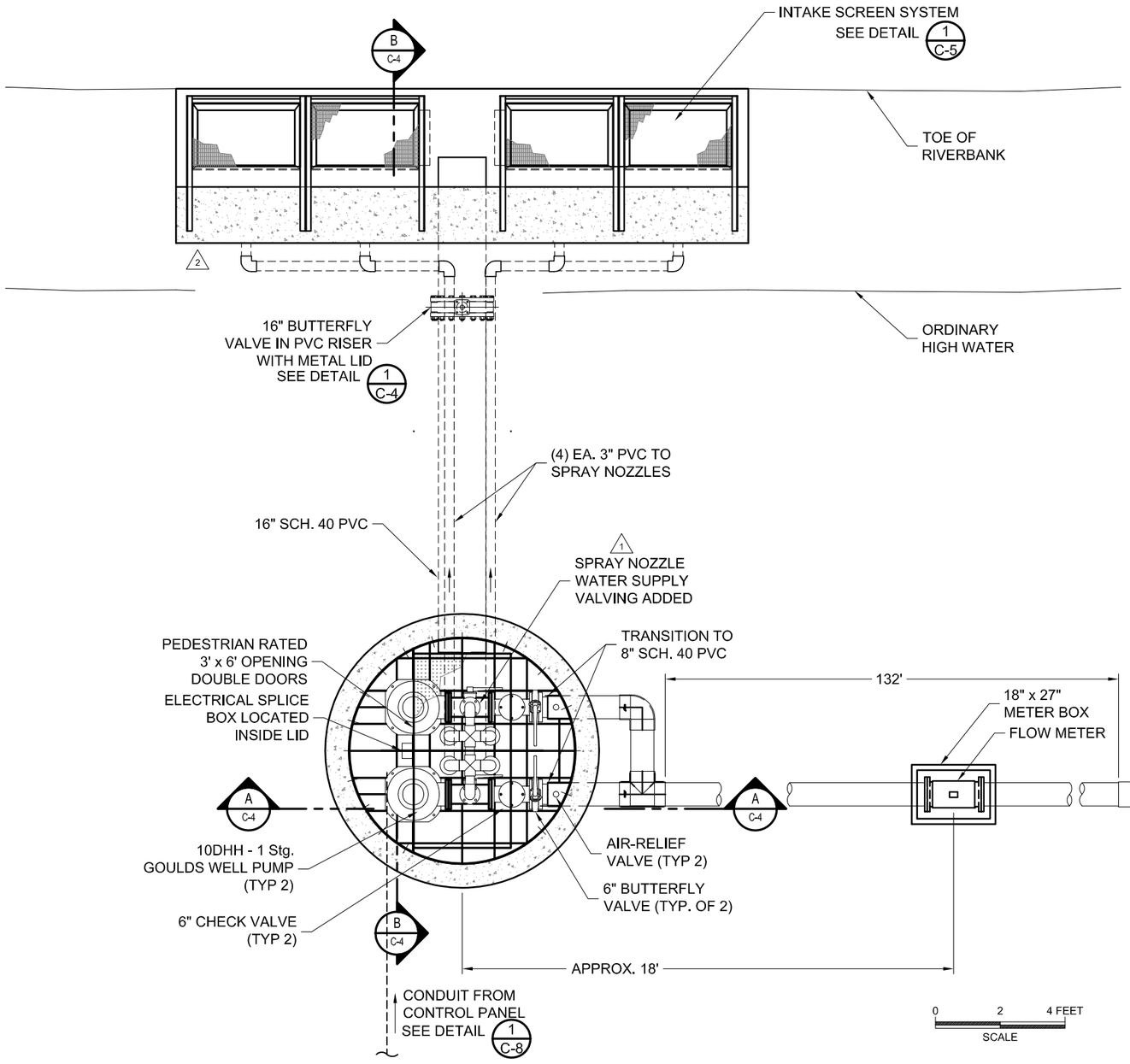
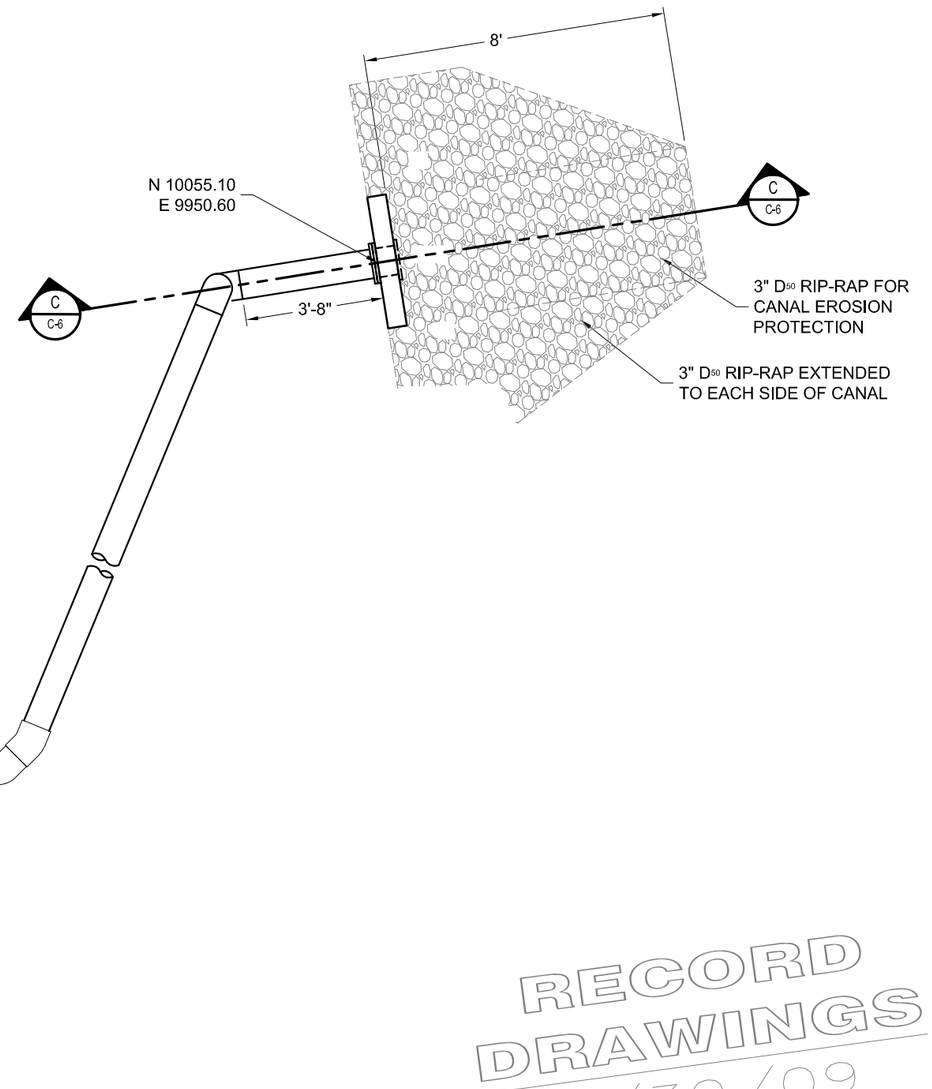
INTAKE STRUCTURE & PUMPING STATION LAYOUT

WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET C-2





RECORD DRAWINGS
4/30/09

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

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CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	SPRAY NOZZLE PUMP REMOVED, VALVES TO NOZZLES ADDED,	8DEO	04/17/08
2	BUTTERFLY VALVE OPTION ADDED	8DEO	04/17/08
3	GATE VALVES CHANGED TO BUTTERFLY VALVES, TRANS TO PVC	8DEO	04/17/08
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

DES. BY 8JSG
DRG. BY 8JSG
CHK. BY GLT
DATE CREATED 12/19/07
JOB No. 2724012

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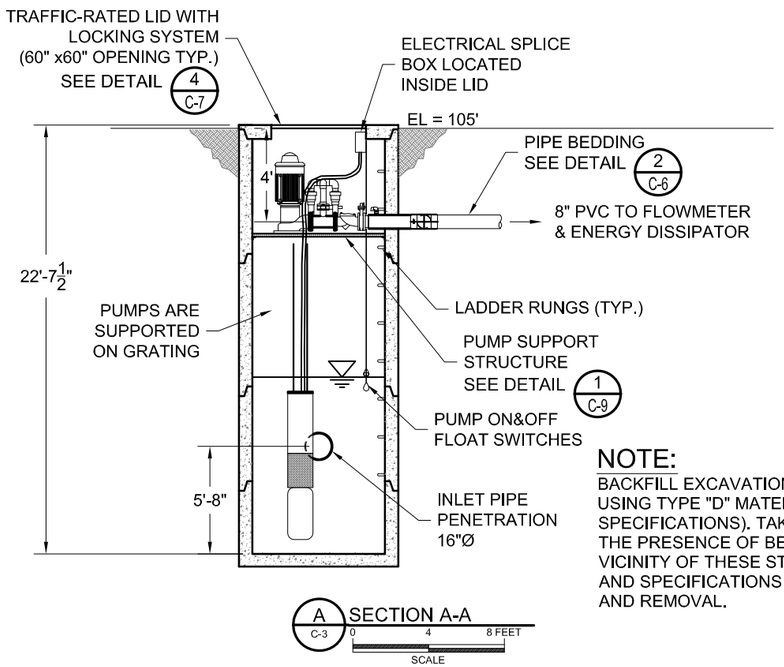
PUMPING INTAKE STRUCTURE PLAN

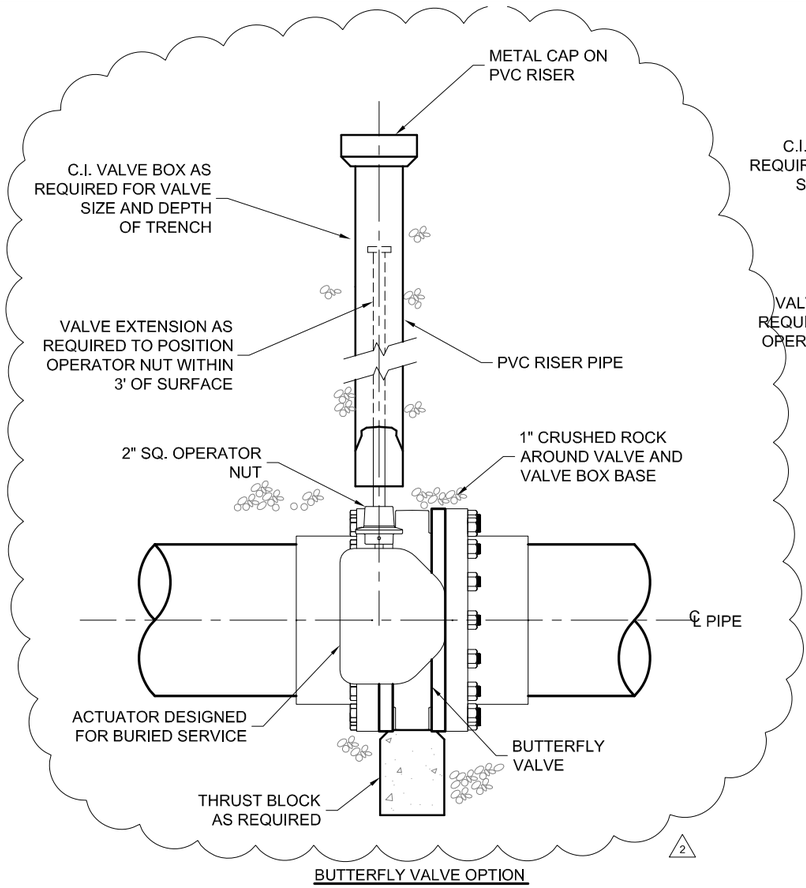
WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET
C-3

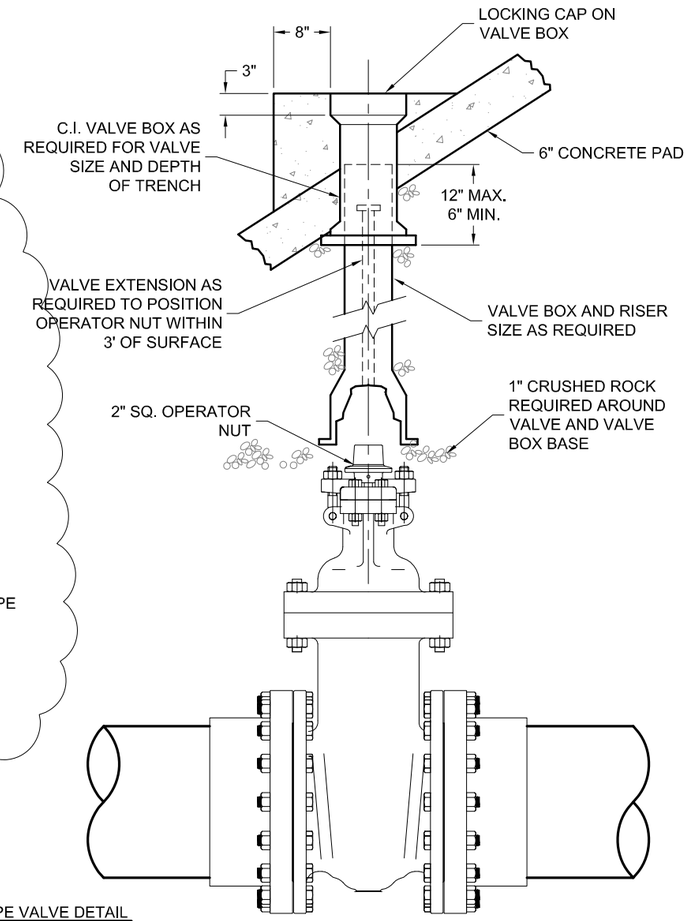


NOTE:

BACKFILL EXCAVATION FOR VAULTS USING TYPE "D" MATERIAL (SEE SPECIFICATIONS). TAKE NOTE OF THE PRESENCE OF BEDROCK IN THE VICINITY OF THESE STRUCTURES AND SPECIFICATIONS FOR BREAKING AND REMOVAL.

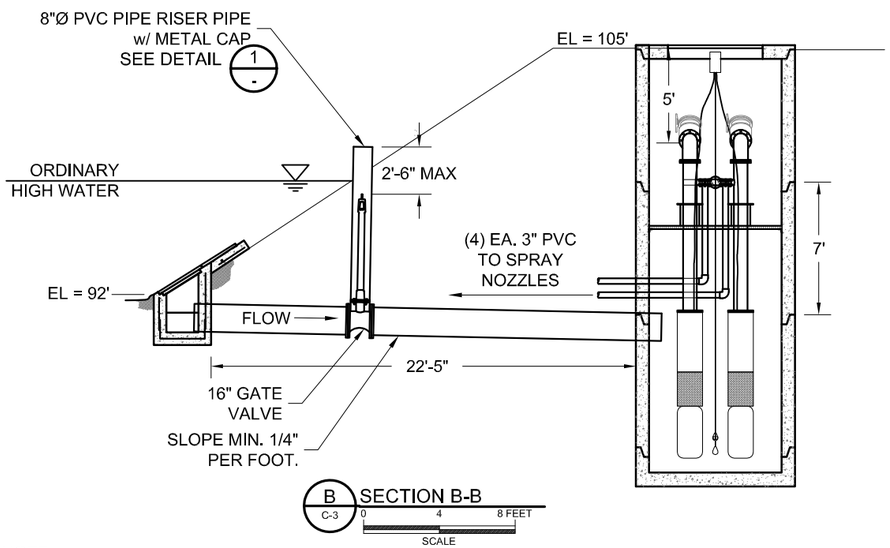


BUTTERFLY VALVE OPTION



GATE VALVE OPTION

1 - 16" SUCTION PIPE VALVE DETAIL
NOT TO SCALE



NOTE

ALL ELEVATIONS ARE REFERENCE MSL +270.30'

RECORD DRAWINGS 4/30/09

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

S:\1PROJECT\2007\2724 Water Resources\2724012 - Brownsville Dam Removal\dwg (Pump station)\as-builts\2724012 C3,4,5,6,7,8,9 asblt.dwg Odell, David E. 4/30/2009

CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	SPRAY NOZZLE PUMP REMOVED, VALVES TO NOZZLES ADDED	8DEO	04/17/08
2	BUTTERFLY VALVE OPTION USED	8DEO	04/17/08
3	GATE VALVES CHANGED TO BUTTERFLY VALVES, TRANS TO PVC	8DEO	04/17/08
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

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CHK. BY GLT
DATE CREATED 12/19/07
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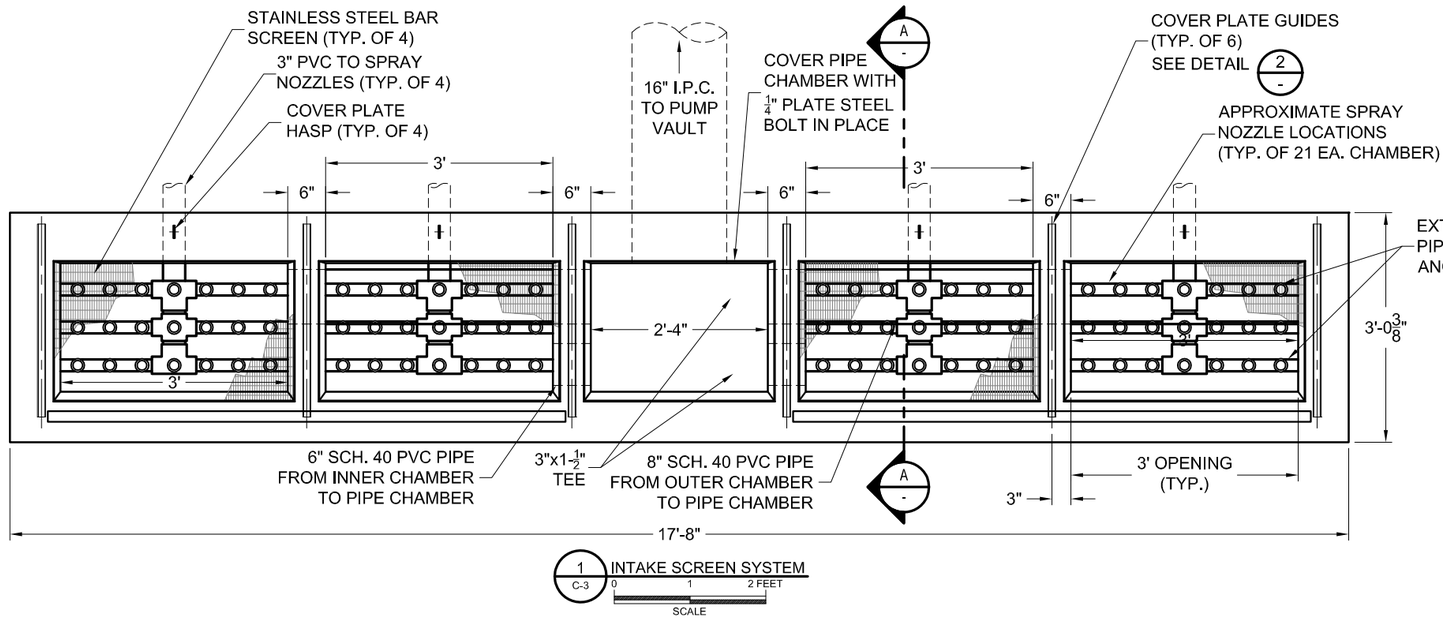
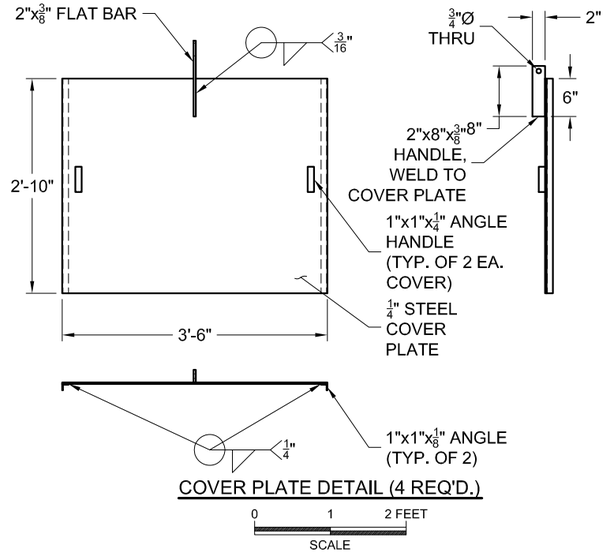
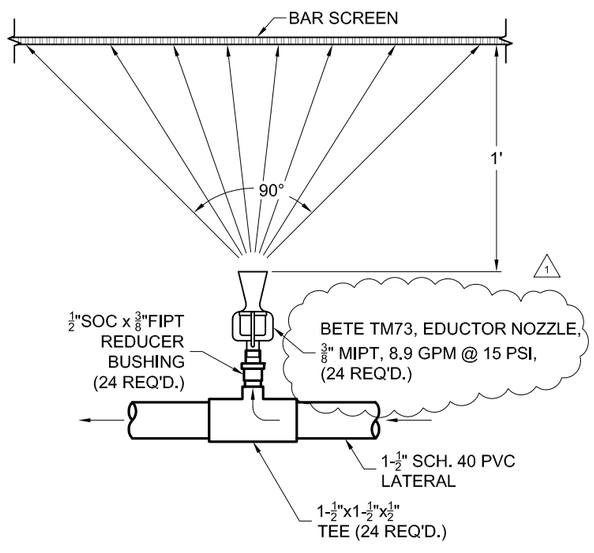
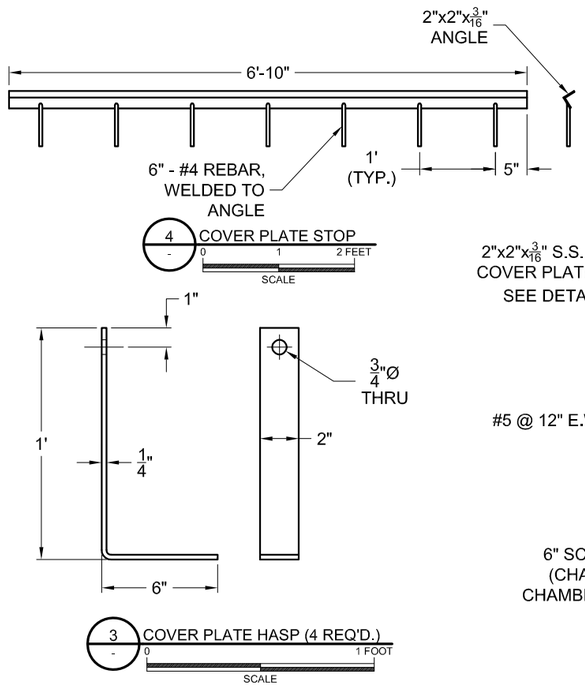
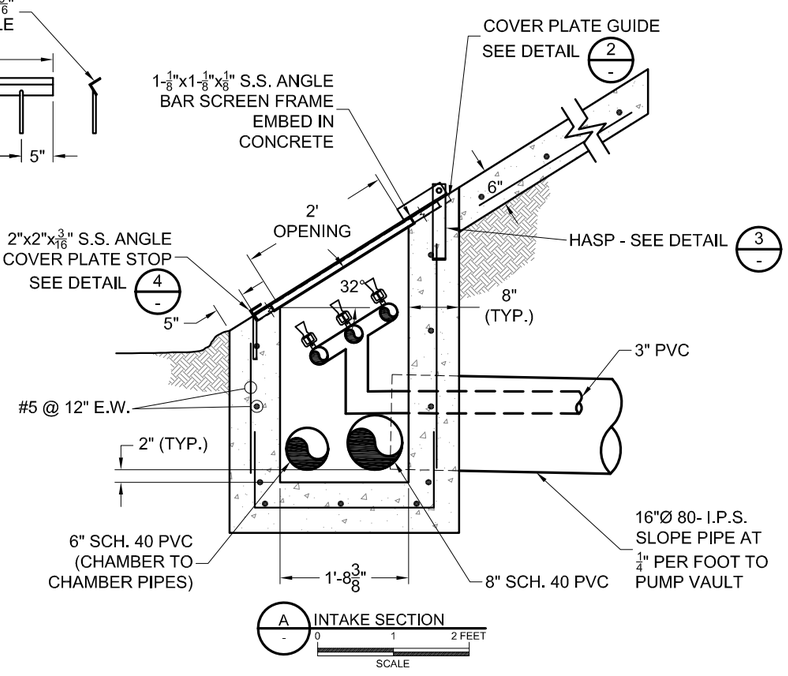
SHEET C-4

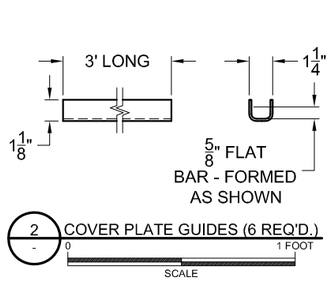












NOTE
ALL ELEVATIONS ARE REFERENCE MSL +270.30'

RECORD DRAWINGS 4/30/09

S:\PROJECT\2007\2724 Water Resources\2724012 - Brownsville Dam Removal\dwg (Pump station)\as-builts\2724012 C3,4,5,6,7,8,9 asblt.dwg Odell, David E. 4/30/2009

CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	NOZZLE PRESSURE REDUCED	BDEO	04/17/08
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3	-	-	MO/DAY/YR
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

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DRG. BY 8JSG
CHK. BY GLT
DATE CREATED 12/19/07
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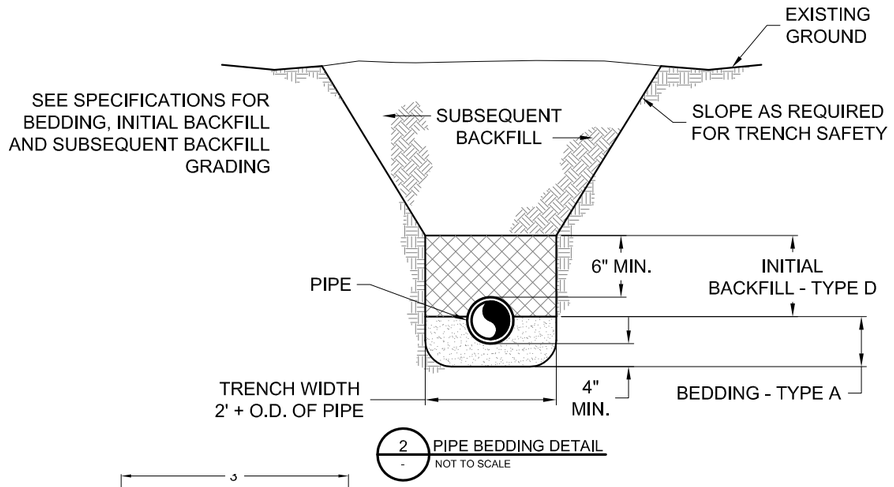
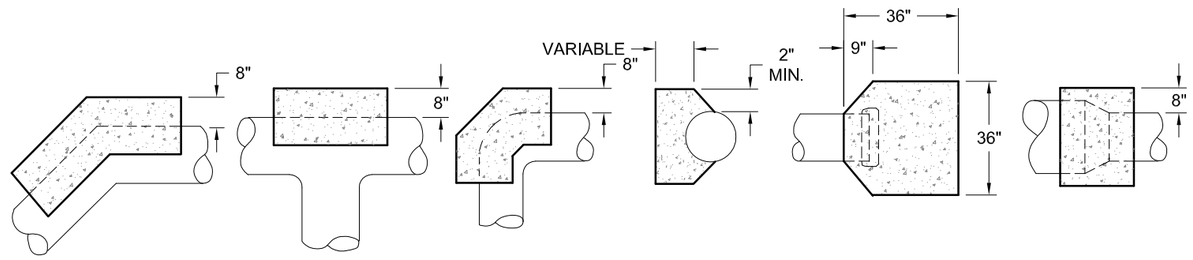
INTAKE STRUCTURE
PLAN & PROFILE

WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET
C-5



2 - PIPE BEDDING DETAIL
NOT TO SCALE

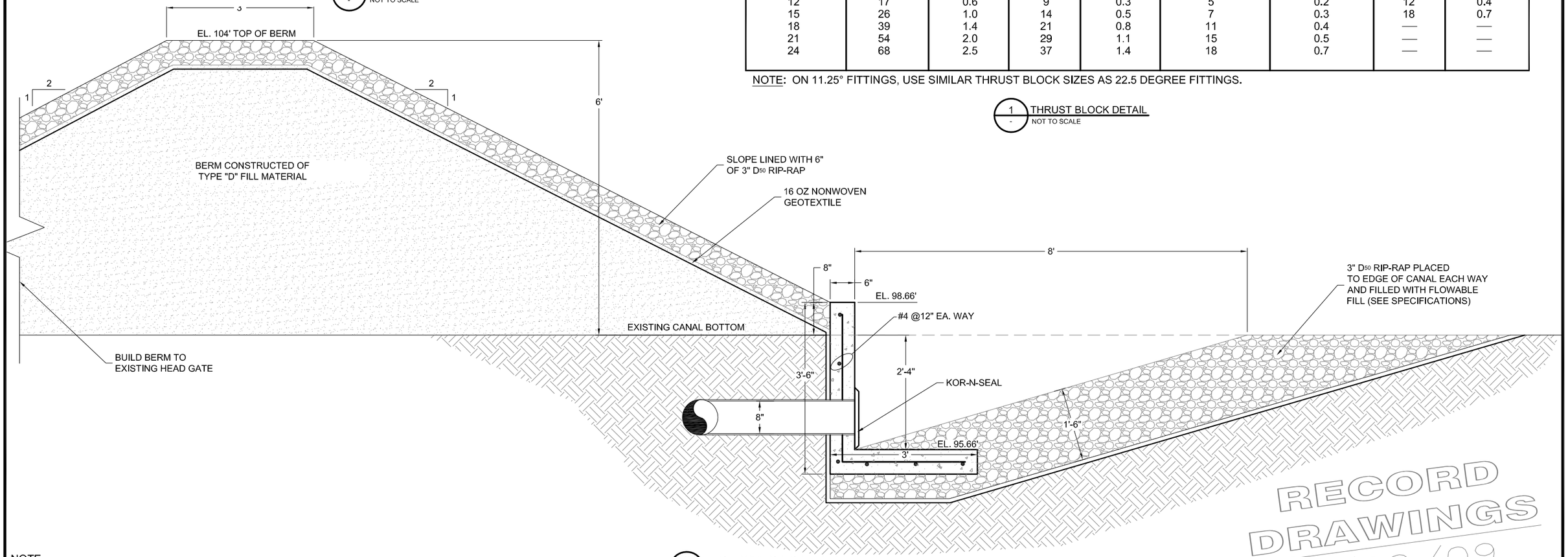


THRUST BLOCK SIZE

PIPE DIAMETER INCHES	90° OR TEE AREA FT^2	90° OR TEE VOLUME CY	45° AREA FT^2	45° VOLUME CY	22.5°/REDUCERS AREA FT^2	22.5°/REDUCERS VOLUME CY	END AREA FT^2	END VOLUME CY
6	4	0.2	2	0.1	1	0.1	3	0.1
8	7	0.3	4	0.1	2	0.1	5	0.2
10	12	0.4	6	0.2	3	0.1	8	0.3
12	17	0.6	9	0.3	5	0.2	12	0.4
15	26	1.0	14	0.5	7	0.3	18	0.7
18	39	1.4	21	0.8	11	0.4	—	—
21	54	2.0	29	1.1	15	0.5	—	—
24	68	2.5	37	1.4	18	0.7	—	—

NOTE: ON 11.25° FITTINGS, USE SIMILAR THRUST BLOCK SIZES AS 22.5 DEGREE FITTINGS.

1 - THRUST BLOCK DETAIL
NOT TO SCALE



C / C-3 - ENERGY DISSIPATOR & BERM
SCALE 0 1 2 FEET

NOTE
ALL ELEVATIONS ARE REFERENCE MSL +270.30'

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

RECORD DRAWINGS 4/30/09

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CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

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5	–	–	MO/DAY/YR

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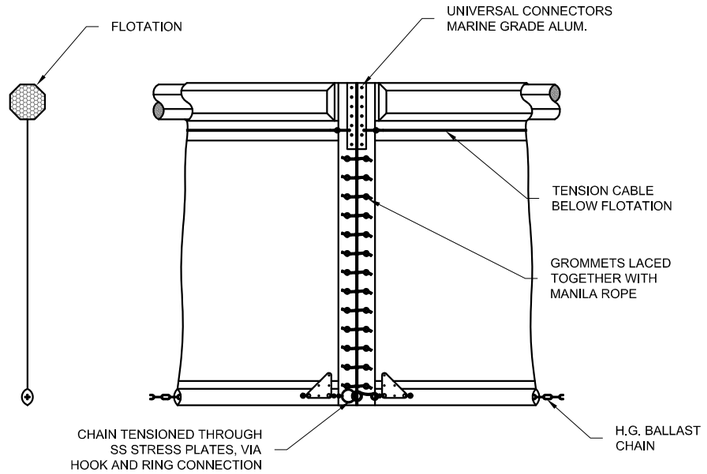
MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 1

WATER DIVERSION PROJECT – AS–BUILT DRAWINGS

SHEET C-6



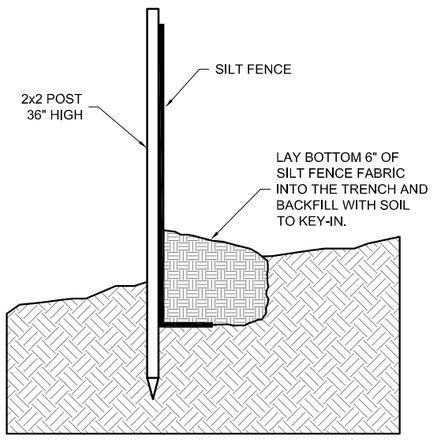
1 C-2 TURBIDITY CURTAIN
SCALE: N.T.S.

WORK AND BMP STANDARDS OVERVIEW:

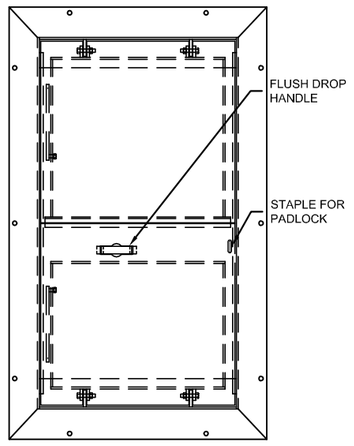
1. OBTAIN WRITTEN PERMISSION FROM EACH LANDOWNER TO STAGE EQUIPMENT, TRANSPORT MATERIALS THROUGH THEIR PROPERTY, AND CONDUCT MINOR GROUND-DISTURBING ACTIVITIES RELATED TO EQUIPMENT ACCESS.
2. PRIOR TO EQUIPMENT MOBILIZATION AND CONSTRUCTION, INSTALL ALL NECESSARY BMP's AND EROSION CONTROL MEASURES. THE 1200C, NPDES PERMIT AND CES ON-SITE MANAGER WILL PROVIDE MORE DETAILS. THE BMP's AND EROSION CONTROL MEASURES INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

- INSTALL PARTIALLY-SPANNING TURBIDITY CURTAIN TO MINIMIZE SEDIMENTATION WHILE ALLOWING FISH PASSAGE.
- INSTALL SILT FENCING AT LOCATIONS WHERE THE EARTH WILL BE DISTURBED AND POSSIBLY DRAIN INTO ADJACENT CHANNELS.
- PROVIDE A GRAVELED ACCESS AREA TO MINIMIZE DUST AND DIRT FROM TRUCKS ENTERING COUNTY AND STATE ROADS.
- PORTABLE PUMPS WILL BE AVAILABLE ON SITE TO PROVIDE DEWATERING AS NECESSARY.
- PROVIDE EMERGENCY SPILL KITS ON SITE TO CONTAIN ANY POTENTIAL FLUID SPILLS.
- NON-TOXIC VEGETABLE OIL OR OTHER OIL APPROVED FOR USE IN AND AROUND WATERWAYS WILL BE UTILIZED IN PLACE OF PETROLEUM HYDRAULIC FLUID IN EQUIPMENT OPERATING IN THE CALAPOOIA RIVER.
- FENCE OFF EQUIPMENT STAGING AREAS TO RESTRICT PUBLIC ACCESS DURING CONSTRUCTION.
- ALL EQUIPMENT WILL BE INSPECTED EVERY MORNING TO INSURE THAT THERE ARE NO FLUID LEAKS AND THAT ALL THE EQUIPMENT IS FUNCTIONING PROPERLY. ANY EQUIPMENT THAT DOES NOT FUNCTION PROPERLY WILL BE REMOVED FROM THE JOB AND REPLACED.

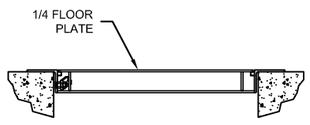
3. IMPLEMENT ON-SITE SAFETY MEETING WITH ALL PERSONNEL INVOLVED WITH THE PROJECT, PRIOR TO STARTING CONSTRUCTION WORK, SAFETY MEETINGS WILL FOCUS ON ISSUES RELATED TO WORKING AROUND HEAVY EQUIPMENT, HARD-HAT-ZONE, RESTRICT PUBLIC ACCESS WITHIN THE ACTIVE WORK ZONE, EMERGENCY COMMUNICATIONS, AND OTHER ISSUES THAT MAY ARISE. SAFETY TAIL-GATE MEETING WIL BE HELD EVERY MORNING WITH THE WORK AND INSPECTION CREWS TO PROVIDE FOR A CONTINUOUS SAFETY EFFORT THROUGHOUT THE PROJECT.
4. THE PROJECT DESIGN AND WORK-PLAN WILL BE REVIEWED ON SITE BY THE CONSTRUCTION AND MANAGEMENT CREWS. EQUIPMENT STAGING/ACCESS ROUTES, LOCATIONS OF TEMPORARY DIVERSIONS, WATER QUALITY SAMPLING LOCATIONS, AND OTHER PROJECT LOCATIONS WILL BE FLAGGED ON SITE AND REVIEWED/APPROVED BY THE PROJECT STAFF PRIOR TO STAGING THE EQUIPMENT.
5. AN AS-BUILT REPORT WILL BE COMPLETED TO DOCUMENT THE EXTENT OF THE WORK.



2 C-2 SILT FENCE
SCALE: N.T.S.



PLAN VIEW



4 C-3 VAULT DOOR
NOT TO SCALE

ACCESS DOOR SPECIFICATION:

COVERS: 1/4-INCH (6.4MM) THICK STEEL DIAMOND PLATE DESIGNED AND REINFORCED FOR OFF STREET LOCATIONS WHICH MAY OCCASIONALLY RECEIVE H-20 WHEEL LOADS.

EQUIPPED WITH STEEL FLUSH LIFTING HANDLE THAT DOES NOT PROTRUDE ABOVE THE COVER, AND 316 STAINLESS STEEL HOLD OPEN ARMS WITH MECHANISM THAT AUTOMATICALLY KEEPS THE COVERS IN THEIR OPEN/UPRIGHT POSITIONS.

FRAME: 1/4-INCH (6.4MM) STEEL ANGLE (NO BEVELED EDGE ON HORIZONTAL FLANGE) WITH 9/16-INCH (14MM) DIAMETER HOLES FOR BOLTING FLANGE TO VAULT TOP.

HARDWARE: SHALL BE TAMPER RESISTANT HINGES WITH RECESSED STAINLESS STEEL PINS AND LUGS.

SECURITY: A STEEL STAPLE SHALL PROTRUDE THROUGH COVER FOR USER SUPPLIED PADLOCK.

FINISH: COVERS AND FRAME SHALL HAVE ONE COAT OF SHOP PRIMER AND MINIMUM ONE COAT OF FINISH PAINT COLOR IN BATTLESHIP GRAY.

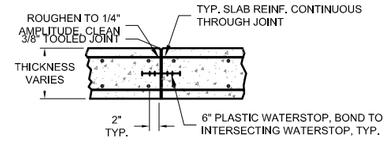
INSTALLATION: INSTALLATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

WARRANTY: MANUFACTURER SHALL GUARANTEE AGAINST DEFECTS IN MATERIALS AND WORKMANSHIP FOR A PERIOD OF FIVE YEARS.

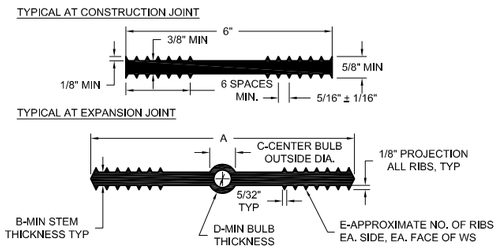
ACCEPTABLE PRODUCTS: SHALL BE MODEL APD AS MANUFACTURED BY U.S.F. FABRICATION, INC., SIZE AS SPECIFIED ON THE PLANS. OTHER AS APPROVED BY PROJECT ENGINEER.

NOTE

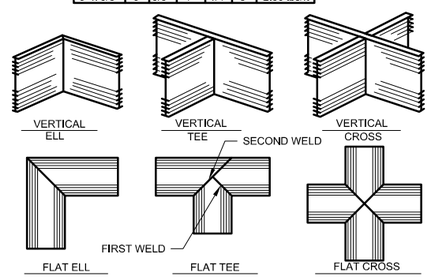
FLOWMETER VAULT TO BE EQUIPED WITH SINGLE DOOR RATE FOR PEDESTRIAN LOADING (300 PSF), PUMP STATION VAULTS TO BE EQUIPED WITH DOUBLE DOORS RATED FOR OCCASIONAL H20 WHEEL LOADS.



4 - CONSTRUCTION JOINT
NOT TO SCALE



SIZE	A	B	C	D	E	MIN. WT.
6" x 3/8"	6"	3/8"	7/8"	1/4"	6	1.62 lbs/ft
9" x 3/8"	9"	3/8"	1"	1/4"	8	2.30 lbs/ft



3 - WATERSTOP JOINTS
NOT TO SCALE

RECORD DRAWINGS 4/30/09

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

S:\1PROJECT\2007\2724 Water Resources\2724012 - Brownsville Dam Removal\dwg (Pump station)\as-builts\2724012 C3,4,5,6,7,8,9 asblt.dwg Odell, David E. 4/30/2009

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DATE CREATED 12/19/07
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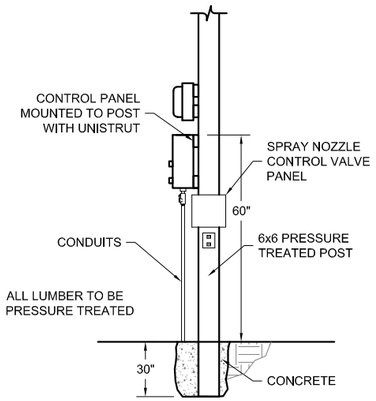
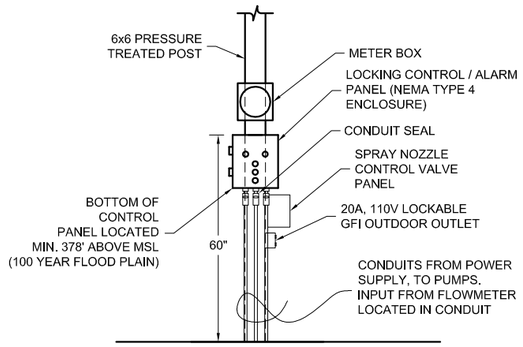
MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 2

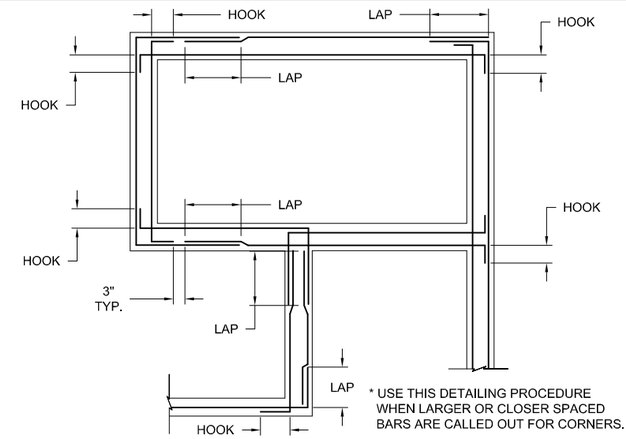
WATER DIVERSION PROJECT – AS-BUILT DRAWINGS

SHEET C-7

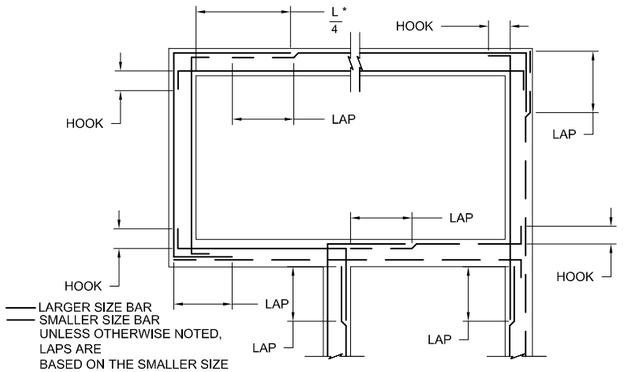




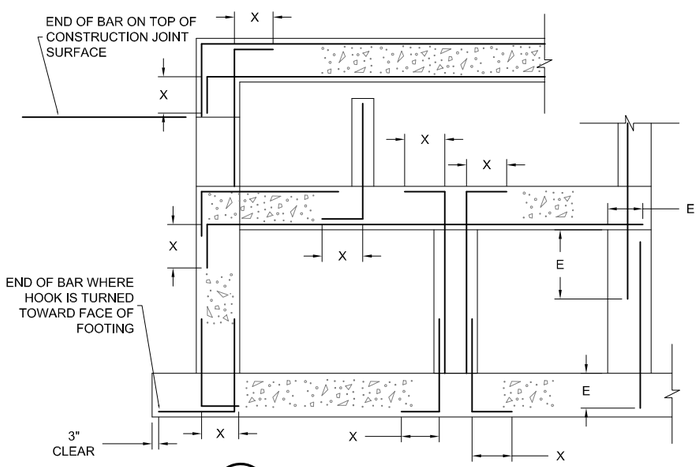
1 C-3 PUMP CONTROL PANEL DETAIL
NOT TO SCALE



* USE THIS DETAILING PROCEDURE WHEN LARGER OR CLOSER SPACED BARS ARE CALLED OUT FOR CORNERS.



LARGER SIZE BAR
SMALLER SIZE BAR
UNLESS OTHERWISE NOTED, LAPS ARE BASED ON THE SMALLER SIZE BAR.
L = CLEAR SPAN



2 - STANDARD 90° HOOKS AND LAPS
NOT TO SCALE

CONCRETE REINFORCING:

1. THE MINIMUM REINFORCING FOR ALL CONCRETE WALLS AND SLABS SHALL BE AS FOLLOWS UNLESS SHOWN OTHERWISE:

WALL THICKNESS	REIN. EACH WAY	LOCATION
6"	#4@12"	CENTERED
8"	#5@12"	CENTERED
10"	#4@12"	EACH FACE
12"	#5@12"	EACH FACE

PROVIDE LARGER SIZES AND MORE REINFORCING IN ALL SECTIONS OF CONCRETE WHERE REQUIRED BY THE DETAILS ON THE DRAWINGS OR BY THE SPECIFICATIONS.

2. CLEARANCE FOR REINFORCEMENT BARS, UNLESS SHOWN OTHERWISE, SHALL BE:
*WHEN PLACED ON GROUND: 3"
*ALL OTHER CONCRETE SURFACES:
#5 BAR OR SMALLER 11/2"
#6 BAR OR LARGER 2"

3. REFER TO WALL CORNER AND WALL INTERSECTION REINFORCING DETAILS 3303. IN GENERAL, THE WALL CORNER REINFORCING SIZES MD SPACINGS SHALL BE CALLED OUT ON THE PLANS AND REFERENCED TO THESE DETAILS AND THE TYPICAL HORIZONTAL WALL REINFORCING SHALL LAP WITH THE CORNER HORIZONTAL REINFORCING.

4. ALL BENDS, UNLESS OTHERWISE SHOWN, SHALL BE A 90 DEGREE STANDARD HOOK AS DEFINED IN LATEST EDITION OF ACI318.

5. ALL WALL CORNER AND WALL INTERSECTION REINFORCEMENT BARS SHALL BE CONTINUOUS AROUND CORNERS AND THROUGH COLUMNS OR PILASTERS. REINFORCEMENT SHALL BE EXTENDED INTO CONNECTING WALLS AND LAPPED ON THE OPPOSITE FACE OF THE CONNECTING WALLS, AS INDICATED ELSEWHERE ON THIS SHEET.

6. VERTICAL WALL BARS SHALL BE LAPPED WITH DOWELS FROM BASE SLABS AND EXTENDED INTO THE TOP FACE OF ROOF SLABS AND LAPPED WITH TOP SLAB REINFORCEMENT FOR HYDRAULIC STRUCTURES, PROVIDE A MINIMUM OF TWO FULL HEIGHT VERTICAL BARS WITH MATCHING DOWELS AT WALL ENDS, CORNERS AND INTERSECTIONS WITH SIZE TO MATCH TYPICAL VERTICAL REINFORCING STEEL SHOWN OR REQUIRED BY NOTES ABOVE. FOR BUILDING STRUCTURES. SIMILARLY PROVIDE A MINIMUM OF FOUR BARS.

7. UNLESS INDICATED OTHERWISE, CONTRACTOR MAY SPLICE CONTINUOUS SLAB OR LONGITUDINAL BEAM BARS AT LOCATIONS OF HIS CHOOSING, EXCEPT THAT TOP BAR SPLICES SHALL BE LOCATED AT MID-SPAN AND BOTTOM BAR SPLICES SHALL BE LOCATED AT SUPPORTS. ALL REINFORCEMENT BENDS AND LAPS, UNLESS OTHERWISE NOTED, SHALL SATISFY THE FOLLOWING MINIMUM REQUIREMENTS:

CONCRETE DESIGN STRENGTH = 4,000 PSI		GRADE 60 REINFORCING STEEL								
BAR SIZE		#3	#4	#5	#6	#7	#8	#9	#10	#11
LAP SPLICE LENGTH										
SPACING <6"	TOP BAR *	1'-4"	2'-0"	3'-0"	4'-0"	5'-10"	6'-8"	7'-6"	8'-4"	9'-2"
	OTHER BAR	1'-4"	1'-7"	2'-3"	3'-1"	4'-6"	5'-2"	5'-10"	6'-5"	7'-1"
SPACING > 6"	TOP BAR *	1'-4"	1'-7"	2'-0"	2'-5"	3'-6"	4'-0"	5'-0"	6'-0"	7'-1"
	OTHER BAR	1'-4"	1'-4"	1'-7"	1'-10"	2'-9"	3'-1"	3'-10"	4'-7"	5'-5"
EMBEDMENT LENGTH										
SPACING <6"	TOP BAR *	1'-0"	1'-7"	2'-3"	3'-1"	4'-6"	5'-2"	5'-10"	6'-5"	7'-1"
	OTHER BAR	1'-0"	1'-2"	1'-9"	2'-5"	3'-6"	4'-0"	4'-6"	5'-0"	5'-5"
SPACING > 6"	TOP BAR *	1'-0"	1'-3"	1'-7"	1'-10"	2'-9"	3'-1"	3'-10"	4'-7"	5'-5"
	OTHER BAR	1'-0"	1'-0"	1'-2"	1'-5"	2'-1"	2'-5"	2'-11"	3'-7"	4'-2"
HOOK LENGTH MINIMUM (UNLESS OTHERWISE NOTED)										
SPACING < 6"		6"	8"	10"	1'-0"	1'-2"	1'-4"	1'-7"	1'-10"	2'-0"

* TOP BARS SHALL BE DEFINED AS ANY HORIZONTAL BARS PLACED SUCH THAT MORE THAN 12" OF FRESH CONCRETE IS CAST IN THE MEMBER BELOW THE BAR, IN ANY SINGLE POUR. HORIZONTAL WALL BARS ARE CONSIDERED TOP BARS.

8. CONTINUOUS WATERSTOP. AS SPECIFIED, SHALL BE INSTALLED IN ALL CONSTRUCTION JOINTS IN WALLS OF WATER HOLDING BASINS AND CHANNELS AND IN ALL JOINTS IN BELOW GRADE WALLS EXCEPT WHERE INDICATED OTHERWISE.
9. USE LAP LENGTH AS DETERMINED FROM THESE TABLES UNLESS SHOWN OTHERWISE.
10. MULTIPLY THE LAP AND EMBEDMENT SHOWN BY 1.3 FOR WALL HORIZONTAL REBARS AND SLAB BARS WITH 12" OR MORE FRESH CONCRETE UNDERNEATH.
11. WHEN BARS OF DIFFERENT SIZE ARE LAP SPLICED, LAP LENGTH SHALL BE THE LARGER OF:
EMBEDMENT LENGTH OF LARGER BARS
LAP LENGTH OF SMALLER BARS
12. ALL DOWEL PAIRS SHALL EXTEND AN EMBEDMENT LENGTH INTO ANOTHER MEMBER OR ACROSS A CONSTRUCTION JOINT UNLESS SHOWN TO SPLICE WITH OTHER BARS OR TO EXTEND TO THE FAR FACE OF THE MEMBER AND END WITH A STANDARD HOOK.

RECORD DRAWINGS 4/30/09

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

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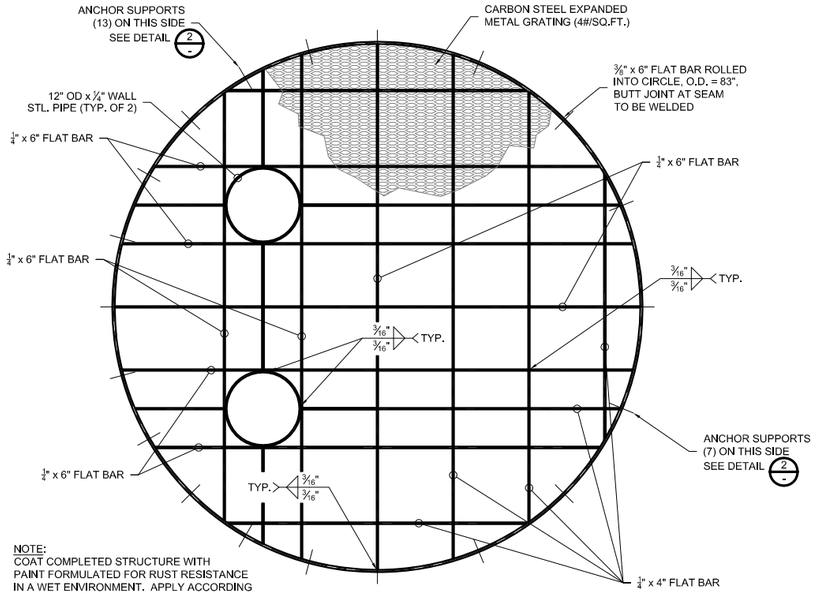
MISCELLANEOUS CONSTRUCTION DETAILS - SHEET 3

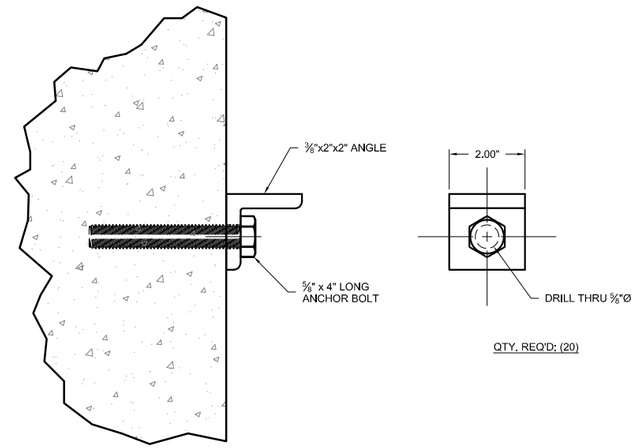
WATER DIVERSION PROJECT – AS-BUILT DRAWINGS

SHEET C-8



NOTE:
COAT COMPLETED STRUCTURE WITH
PAINT FORMULATED FOR RUST RESISTANCE
IN A WET ENVIRONMENT. APPLY ACCORDING
TO MANUFACTURER'S DIRECTIONS.

1/- PUMP SUPPORT STRUCTURE
0 1 2 FEET
SCALE



QTY. REQ'D: (20)

2/- ANCHOR SUPPORT DETAIL
0 2 4 INCHES
SCALE

RECORD
DRAWINGS
4/30/09

(SOURCE: TOPOGRAPHIC CONTOURS PROVIDED BY INTER-FLUVE OF HOOD RIVER, OREGON)

S:\1PROJECT\2007\2724 Water Resources\2724012 - Brownsville Dam Removal\dwg (Pump station)\as-builts\2724012 C3,4,5,6,7,8,9 asblt.dwg Odell, David E. 4/30/2009

CALAPOOIA WATERSHED COUNCIL
BROWNSVILLE, OREGON

REV #	DESCRIPTION	BY	DATE
1	-	-	MO/DAY/YR
2	-	-	MO/DAY/YR
3	-	-	MO/DAY/YR
4	-	-	MO/DAY/YR
5	-	-	MO/DAY/YR

DES. BY 8DEO
DRG. BY 8DEO
CHK. BY 1TLO
DATE CREATED 9/16/2008
JOB No. 2724012

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PUMP SUPPORT STRUCTURE

WATER DIVERSION PROJECT - AS-BUILT DRAWINGS

SHEET
C-9

APPENDICES

Appendix A. Photographs
Appendix B. Turbidity Log

Appendix A.

Photographs

Photograph 1: West from PP1 toward vault area prior to installation (9/2/08).

Photograph 2: West from PP2 toward vault area following installation (11/11/08).

Photograph 3: Northeast from PP2 prior to installation (9/2/08).

Photograph 4: Northeast from PP2 following installation (11/11/08).

Photograph 5: Northeast from PP3 prior to installation (9/2/08).

Photograph 6: Northeast from PP3 following installation (11/11/08).

Photograph 7: Northeast to initial excavation and intake structure base (9/12/08).

Photograph 8: View north at intake structure with fish screen cleaning jets installed (9/26/08).

Photograph 9: View east at installation of pump vault and pipe from intake structure (on right) (9/26/08).

Photograph 10: View east at pump vault, pipe, and intake structure (9/27/08).

Photograph 11: Northeast from PP2 during re-establishment of the north bank following installation of the fish screen and pump vault (10/03/08).

Photograph 12: View east at fish screen and intake structure after bank restoration. Note screen cover plate at the top of the photo (11/07/08).

Photograph 13: View west from canal gate structure at installation of the dissipation structure in the canal (9/12/08).

Photograph 14: View east at the completed dissipation structure in the canal with soil and rock berm above the structure (10/15/08).

Photograph 15: View west of water entering canal during system test (11/11/08).

Photograph 16: View west at pump vault with doors open. Note small flowmeter vault with cover off near top middle of photo (11/11/08).

Photograph 17: View inside flowmeter vault at flowmeter and piping (11/11/08).

Photograph 18: View east from north bank during removal of fish screen cover plates prior to system test (11/11/08).

Photograph 19: View east at intake structure during test of fish screen cleaning jets (11/11/08).

Appendix B.

Turbidity Log

Cascade Earth Sciences

Brownsville Dam Removal: Turbidity Log

Sampler Name	Date	Time	NTU Comparison[1]	Action Taken [2]
Martin	9/8/2008	1043	0.05	none
Martin	9/8/2008	1515	2.65	none
Martin	9/9/2008	1000	3.1	none
Otis	9/9/2008	1410	4.35	shut down
Otis	9/10/2008	1020	0.30	none
Otis	9/10/2008	1415	1.85	none
Otis	9/11/2008	1010	2.70	none
Otis	9/11/2008	1440	0.10	none
Smyth	9/12/2008	1200	0.65	none
Smyth	9/12/2008	1410	0.1	none
Martin	9/15/2008	1530	-0.03	none
Smyth	9/16/2008	1545	1.05	none
Smyth	9/17/2008	1120	**11.7**	Shut down, moved discharge to upland area
Martin	9/24/2008	900	0.76	none
Martin	9/24/2008	1410	0.84	none
Martin	9/25/2008	1405	**16**	Shut down, moved discharge to upland area ant then the canal
Smyth	9/29/2008	1700	0.05	none
Smyth	10/1/2008	845	0.41	none

Notes

NTU = Nephelometric turbidity unit

[1] Difference between background and compliance NTU

[2] See Action Table below

Bold = exceeded one or more action levels

Action Table (Difference between Background and Compliance NTUs)

Level Above Background (NTUs)	1st Interval	2nd Interval
0 - 5	Monitor every 4 hours	Monitor every 4 hours
5 - 29	Modify BMPs and monitor every 4 hours	Stop work after 8 hours of 5 - 39
30 - 49	Modify BMPs and monitor every 2 hours	Stop work after 8 hours of 30 - 49
50 or greater	Stop work	Stop work