

10507 N. McAlister Rd.
La Grande Oregon 97850

REQUEST FOR PROPOSALS (RFP)

Professional Construction Services
Booth Lane Wet Well Pump Construction
April 15, 2024

Technical Contact: Aaron Bliesner (abliesner@unionswcd.org) (541) 963-1313

Administrative Contact: Jim Webster (jwebster@unionswcd.org) (541) 963-1313

This Request for Proposal is intended to provide necessary information to prospective, qualified respondents to prepare and submit proposals for construction of the Booth Lane Wet Well Pump Construction. Important timeline information is provided in Table 1 for the proposal submission process. The scope of work will be negotiated with the construction firm that ranks highest, based on the quality-based selection criteria described in this document.

Table 1. Critical Proposal and Project Dates.

Advertise Request for Proposal	15 April 2024, Wednesday
Site Tour (Provided Upon Request)	Until 30 April 2024, Tuesday
Written Requests for Clarification Deadline	30 April 2024, Tuesday 5:00 PM PDT
Response to Requests for Clarification	7 May 2024, Tuesday 5:00 PM PDT
Proposal Submission Deadline	16 May 2024, Thursday 4:00 PM PDT
Public Opening	16 May 2024, Thursday 4:05 PM PDT
Completed Proposal Evaluation and Selection	28 May 2024
Executed Contract and Project Initiation	13 June 2024
Contract Closeout	15 December 2024

Part I – Introduction and RFP Process

Project Purpose and Location

The Union Soil and Water Conservation District (USWCD) is requesting proposals from qualified and responsive construction firms (Contractors) for relocation of an irrigation pump located near Booth Lane into a constructed off-channel wet well and installation of fish screens. The selected Contractor will be expected to provide all construction materials and complete all aspects of construction for moving the existing pump and screen located in Catherine Creek, a tributary to the Grande Ronde River near the town of Cove, Oregon (Appendix A). The methods and approach must be completed in a manner consistent with the General Aquatic Conservation Measures as identified in the HIP IV manual of Bonneville Power Administration's (BPA) guidelines for Endangered Species Act (ESA) and identified in the plan set (Appendix B) and all requirements as described in other applicable federal, state, and local permits (CWA 404, USACE Nationwide Permit, NHPA 106, DSL removal- fill permit, and DEQ 401). In addition, the contractor will have to follow laws specified in the Build America Buy America Act (BABA Act) and described in Appendix F. The area of impact from the project including staging, access routes, and work areas for the project site is less than one acre and will not require a DEQ 1200-C permit.

Proposal Development

1. Scope of the RFP

This RFP provides the specific services to be contracted, as well as information concerning the preparation and submittal of proposals. Due to the importance of this construction work to meet high quality standards, quality-based selection process will be used for evaluation of construction proposals. An explanation of the proposal evaluation method is provided, along with terms and conditions of the contract that may be awarded as a result of the RFP. The execution of this contract will be dependent on availability of funds and will be deemed null and void if funding becomes unavailable.

The Project is on private property where farming and ranching activities will be taking place, and the project activities must be completed in a manner that allows irrigation withdrawal from Catherine Creek to continue. Construction is anticipated to occur in 2024 and will be coordinated around Oregon's guidelines for timing of in-water work as July 1 through October 15. The Contractor will be responsible for construction of a wet well located out of the active channel, removal of the existing pump structure and installation into the wet well, construction and installation of intake piping and screens, and reconnection to outlet irrigation system (Appendix B).

The Contractor will be required to isolate all work within the channel from live stream flow and areas where fish are present throughout construction of the project. Construction will include erosion and sediment controls, temporary water isolation, and environmental protections (Appendix C. Project Specifications). All bid items required by the Contractor can be found in Appendix D. Project Bid Sheet.

2. Project Timeline

Project work will begin at a time that is negotiated with the selected Contractor. All instream work within the active channel cannot start until July 1 and must conclude prior to the end of Oregon's guidelines for timing of in-water work on October 15 in 2024.

3. Request for Site Tour

A site tour can be scheduled with individual contractors upon request prior to **April 30, 2024**. To schedule a site tour contact the Project Manager Aaron Bliesner at abliesner@unionswcd.org or by phone at (541) 963-1313 (office) or (541) 805-0705 (cell). Please do not visit the project site without prior contact with the USWCD, as the property is privately owned.

4. Closing Date for Submissions

The Proposal Submission Deadline will be on **May 16, 2024, at 4:00 PM PDT**. Proposals received after the specified time will not be considered.

Proposal Must Include:

- 1. Company and Contractor Name,**
- 2. State Contractor License Number,**
- 3. Employer's Federal Tax ID Number,**
- 4. Proof of Insurance,**
- 5. Project Approach,**
- 6. Construction Equipment to be Used,**
- 7. Dewatering Plan and Equipment,**
- 8. Bid sheet with itemized costs,**
- 9. Project Schedule,**
- 10. References for similar Projects**
- 11. Bid bond for 5% of total bid price**

Contractors must submit all materials either by mail to the physical address below, in person, **OR** by email in electronic file to abliesner@unionswcd.org.

Union Soil and Water Conservation District
Attn: Aaron Bliesner (abliesner@unionswcd.org)
10507 N. McAlister Road
La Grande, OR 97850

Physical mailings must be submitted with 1 paper copy and one digital copy in Adobe Acrobat PDF format saved on a USB Flash Drive (thumb drive). Emailed electronic files must be in Adobe Acrobat PDF format. The outer envelope or email title should clearly read:

“Booth Lane Wet Well Pump Construction– SEALED BID, DO NOT OPEN.”

5. In Writing

Proposals shall be prepared by printer, typewriter, or computer. Information provided by oral, handwritten, telephone, or facsimile means will not be accepted.

6. Necessary Information

Proposals must contain all information requested in the RFP. The USWCD will not consider additional information submitted after the Proposal Submission Deadline and may reject incomplete proposals.

7. Cost of Proposals

The USWCD shall not be liable for any expenses incurred by Contractors in either preparing or submitting proposals, quotes, evaluation/selection, or contract negotiation process.

8. Requests for Clarification

Contractors may submit a written request for clarification via mail or email until close of business on **April 30, 2024, 5:00 pm PDT**. The USWCD will not consider questions submitted after the date specified above. Questions regarding the RFP or request for clarification shall be sent to the Technical Contact, Aaron Bliesner, as listed on the RFP cover page.

9. Response to Requests for Clarification

Responses to questions will be provided by email to all potential Contractors that attend the Site Tour no later than **May 7, 2024, 5:00 pm PDT**.

10. Proposals Constitute Firm Offers

Submission of a proposal constitutes Contractor’s affirmation that all terms and conditions of the proposal constitute a binding offer that shall remain firm for a period of ninety (90) days from the Proposal Submission Deadline.

11. Signature Required: Proposer Affirmations

An authorized representative of the Contractor must sign the original proposal in ink. Contractor’s signature and submission of a signed proposal in response to the RFP constitute Contractor’s affirmation that the Contractor agrees to be bound by the terms and conditions of the RFP and by all terms and conditions of the Contract awarded.

12. Type of Contract

The USWCD shall execute a Contract for Construction Services.

13. Confidential Information

Proposals are confidential until the evaluation and selection process has been completed and the USWCD has issued a notice of tentative award. Any information a Contractor submits in response to the RFP that the Contractor considers a trade secret under ORS 192.501(2) or confidential proprietary information, and Contractor wishes to protect from public disclosure, must be clearly labeled with the following:

“This information constitutes a trade secret under ORS 192.501(2) or confidential proprietary information and is not to be disclosed except in accordance with the Oregon Public Records Law, ORS Chapter 192.”

14. Requests for Further Clarification of Proposals/Quote

The USWCD may request clarification from Contractors on any portion of the Proposal/Bid.

15. Cancellation of RFP

The USWCD may cancel this RFP at any time upon finding that it is in the USWCD’s best interest to do so.

16. Rejection of Proposals

The USWCD may reject a specific proposal or all proposals upon finding that it is in the USWCD’s best interest to do so.

17. Tentative Award and Contract Negotiations

The USWCD will provide a written tentative award notice to the highest-ranking Contractor, selected based on the process described in Part III. The USWCD will enter negotiations with the highest ranked Contractor on the following contract terms: (a) Contract tasks; (b) Staffing; (c) Performance Schedule; and (d) A maximum, not to exceed Contract price, which is consistent with the proposal and fair and reasonable to the USWCD, considering the estimated value, scope, complexity, and nature of the services to be provided. The USWCD may also negotiate the statement of work and, at its discretion, add to the scope of services based on a Contractor’s recommendations (but still within the scope of this RFP) or reduce the scope of services.

Final award will be contingent upon successful negotiation of a contract within 10 days after the tentative award. The USWCD may terminate negotiations with the highest ranked Contractor if they fail to result in a contract within a reasonable time. The USWCD will then enter negotiations with the second ranked Contractor, and if necessary, the third ranked Contractor. If the second or third round of negotiations fails to result in a contract, the USWCD may formally terminate the solicitation.

18. Protest of Tentative Award Selection

A notification of tentative award to the highest-ranked Contractor will be mailed to all Contractors that submitted a proposal in response to this RFP. A Contractor who claims to have been adversely affected by the selection of a competing Contractor shall have seven (7) calendar days after receiving the notice of tentative selection to submit a written protest of the selection to the RFP contact listed in Part 1.4. The USWCD will not consider protests submitted after the date established in this Part. The protest must specify the grounds upon which the protest is based.

19. Award

After expiration of the seven (7) calendar day selection protest period and resolution of all protests, the USWCD will proceed with final award.

20. Investigation of References

The USWCD reserves the right to investigate the references and past performance of any Contractor with respect to its successful performance of similar services, compliance with RFP and contractual obligations, and its lawful payment of suppliers, sub-contractors, and employees. The USWCD may postpone award or execution of the contract after the announcement of the apparent successful Contractor to complete its investigation. The USWCD reserves the right to reject any proposal at any time prior to the execution of any resulting contract.

21. Amendments

The USWCD reserves the right to amend the resulting contract from this RFP. Amendments could include, but are not limited to, changes in the statement of work, extension of time and consideration changes for the Contractor. All amendments shall be in writing and signed by all approving parties before becoming effective. Only the USWCD has the final authority to execute changes, notices, or amendments to Contract.

PART II – SERVICES TO BE PROVIDED

1. Scope of Work

The scope of work includes the following:

- Application of all Environmental Controls to be compliant with HIP IV, permit compliance, and best management practices.
- Mobilization and demobilization to and from the site.
- Clearing, grubbing, stockpiling and disposal of material.
- Temporary work area isolations for existing infrastructure removal and installation.
- The acquisition, delivery, and installation of all materials (see Appendix B for specific dimensions and quantities).
- Install all connections to existing pipe network.
- Install screens.

2. Required RFP Components

Prospective Contractors will submit a proposal package to the USWCD that includes the following components:

- A. Cover letter.
- B. Proposed method of task completion.
 - a. Describe general construction methods and approach including materials acquisition and delivery, environmental controls and site preparation, construction sequencing, site excavation, and structure installation proposed to complete the project.
 - b. Describe all heavy equipment proposed for use to complete the project.
 - c. Explain how the requirements for the HIP IV process (General Aquatic Conservation Measures) will be completed.
 - d. Describe how the work areas will be isolated from fish and active flow.
 - e. Describe the final construction inspection and closeout tasks.
- C. Qualifications and experience.
 - a. Company Profile and Experience: Provide information regarding the company, construction experience within the region, specific experience and expertise in construction for restoring fish passage and habitat.
 - b. Construction Project Manager: Identify the Project Manager or Field Supervisor that will act as the primary contact for the construction contracting company.
Construction Equipment and Support Materials: Provide a description of the equipment and resources available for use in completion of the project.
Describe specific items that may be relevant to environmental regulations, fish passage, and habitat restoration.

- c. Project Examples: Identify and describe a minimum of three fish passage projects, fish habitat, or floodplain restoration construction projects similar to the proposed project, which have been successfully completed within the past five years.
- D. Project Schedule.
- E. Firm References: Provide at least three references including client contact information (addresses, phone numbers, email addresses), project type, contracted cost, and scope of work completed.

3. Required Equipment Standards

- A. Synthetic hydraulics - hydraulic oil in the track-mounted excavators that are utilized during project construction must meet or exceed stringent acute aquatic toxicity (L-50), which is inherently biodegradable. Example: Chevron Clarity or equivalent.
- B. Spill Kits (including rag pads and booms) will always be required on site.
- C. Equipment will be free of leaks, clean, and in good operating condition.

The Contractor may utilize grading equipment outfitted with GPS machine control systems to perform the excavation for this project as indicated on the plans. Digital design data can be provided to the awarded Contractor to aid in the use of automated machine control equipment. The Contractor may use any type of GPS machine control equipment and system that achieves the grading requirements outlined in these specifications. All equipment required to perform GPS machine control grading, including equipment needed to verify the work, shall be provided by the Contractor. All costs, including but not limited to the cost of actual reconstruction of work, that may be incurred due to the application of GPS machine control grading techniques shall be included in the unit price for grading. In the event there is a conflict between the plans and the electronic surface utilized, the plans will take precedence unless determined otherwise by the Contracting Officer.

The digital design files available were created in AutoCAD Civil 3D 2020 and can be provided. The surface and alignment data can be provided in Land XML and ASCII formats. The Contractor shall convert the electronic data provided into the format required by their system.

4. Minimum Equipment Specifications

Proposed equipment quantities and specifications are the responsibility of the Contractor in meeting the project construction and timelines as outlined in the Design Drawings and Construction Specifications (Appendix B).

5. Materials and Services Furnished by the Contractor:

The Contractor must supply all equipment and experienced operators necessary to complete the work specified in the contract. In addition, the contractor must furnish and cover:

- A. All costs of equipment, operation, and transportation.
- B. An experienced, qualified supervisor for crew.
- C. All required safety equipment and training for crew members in use of tools.
- D. Designated representative to supervise contract operations and represent Contractor.
- E. All materials and equipment for BMP implementation.

6. Oil and Fuel Spill Prevention

The Contractor will be allowed to fuel, lubricate, and perform minor maintenance activities to trucks or other heavy machinery at the project site. However, these activities must not occur within 300 feet from any water body or stream in the vicinity of the project site. The USWCD or a designated agent reserves the right to inspect the Contractor's equipment at any time. Equipment must be in good working condition, free from leaks in hydraulic, fuel and power systems and clean enough to allow for close inspection of these systems. The USWCD reserves the right to reject any equipment that does not meet these conditions.

7. Fire Prevention and Control

The Contractor shall be responsible for fighting their own fire(s). The Contractor, acting independently, shall immediately extinguish without expense to the USWCD or the landowner, all fires on or in the vicinity of the project site, which are caused by the Contractor or the Contractors' employees, whether set directly or indirectly as a result of the work on the project. The Contractor may be held liable for damages resulting from fires set or caused by the Contractor's employees or resulting from operation of this contract. If the amount and character of labor, subsistence, supplies and transportation which the Contractor is in a position to furnish promptly for fire suppression prove inadequate, the USWCD or a designated agent is authorized to procure such items and services as may be deemed necessary and charged to the Contractor.

8. Regulations and Permits

The Contractor shall, without additional expense to the USWCD, be responsible for complying with any Federal and State Laws, Codes, and Regulations applicable to the performance of the work.

9. Contractor Bonding, Liability, Licensing, Insurance and Bid Deposit Requirements:

The Contractor shall be held responsible for all damages to persons or property that occur as a result of the Contractors' fault of negligence and shall take proper safety and health precautions to protect the work, the workers, the public, and the property of others. The USWCD will be responsible for providing liability and workers compensation insurance for its employees when they are on the work site.

The Contractor must be a licensed contractor with the State of Oregon (CCB #) and hold liability insurance with the following limits: \$2,000,000 aggregate, and \$1,000,000 per occurrence. Liability insurance must name the USWCD as an additional insured party for the duration of the project. The Contractor must provide Commercial Automobile Liability Insurance in amount equal to the greater of (1) one million dollars for all vehicles used in performance of the

services or (2) any other amount required by applicable law. The Contractor must also provide a certificate of workman comp insurance (if Contractor has employees).

The Contractor shall post Performance and Payment Bonds equal to 100 percent of the contract price before work commences.

A bid deposit of 5% of the total bid must accompany the bid. This must be in the form of a bid bond, certified check, or cashier's check issued to "USWCD". The bid deposit will be returned upon final contract acceptance.

10. Site Maintenance

The Contractor shall dispose of all refuse created by the Contractor's activities and such refuse shall be removed from the project area and disposed of in a lawful manner.

11. BABA Requirements

"The [Build America Buy America Act](#), enacted as part of the Infrastructure Investment and Jobs Act on November 15, 2021, established a domestic content procurement preference for all Federal financial assistance obligated for infrastructure projects after May 14, 2022. The domestic content procurement preference requires that all iron, steel, manufactured products, and construction materials used in covered infrastructure projects are produced in the United States." (For more information see Appendix F.)

<https://www.commerce.gov/oam/build-america-buy-america#:~:text=The%20Build%20America%20Buy%20America,projects%20after%20May%2014%2C%202022>

12. Environmental Effects

The Contractor shall coordinate with the USWCD and direct activities in such a manner to minimize adverse effects on the environment.

13. Furnished Materials and Services

The USWCD or designated agent will acquaint the Contractor with work areas and access roads, administer the contract, and oversee all work elements. In addition, the USWCD will provide:

- A. Daily inspection of work for compliance and certification of Contractors' work.
- B. Map of project area.
- C. Design/Construction details as provided in Appendix B.
- D. Right of way agreements, easements, and any other necessary environmental or cultural clearances.
- E. Digital design files for application in GPS machine control systems.
- F. Fish salvage crews.

14. Bid Itemization

Bid will include itemized costs per bid item component by quantities and unit cost including materials, proposed equipment, equipment hourly rate, operator hourly rate, and personnel hourly rates. The Contractor will provide an itemized price per bid item and total aggregate bid. A Bid Sheet is provided for the Project in Appendix C for simplicity, but the Contractor may use a format that better represents their proposal as needed.

15. Point of Hire and Release

Project point of hire and release shall be at the project site as shown in Appendix A.

16. Acceptance of Work

Acceptance of work will be determined by a 100% inspection of the work by the USWCD. Nonconformance with any specification will classify the work as unsatisfactory, and rework will be required to bring the work up to the standards negotiated and agreed upon in the contract agreement. The Contractor shall always maintain a complete copy of the Contract Agreement and Construction Specifications available on-site, for use by the Contractor and the Contractor's employees, and to provide for reference in discussions with USWCD personnel.

The USWCD or its agent will establish initial horizontal and vertical control points for the project as shown on the plans. The USWCD or its agent will perform spot checks of the machine control grading results, surveying calculations, records, field procedures, and actual staking. Accuracy will be required as outlined in the specifications. If the USWCD determines the work is not being performed in a manner that will assure accurate results, the USWCD may order such work to be redone, to the requirements of the contract documents, at no additional cost to the USWCD.

17. Timeline and Penalties for Unauthorized delays

Project construction will be scheduled with the selected Contractor, pending completion of environmental permits, landowner clearances, and as ground conditions permit. The scheduled date for completion of the Project is **December 15, 2024**. The Contractor must complete all aspects of the work on, or before this date, unless completion is delayed due to conditions mutually agreed upon and designated in writing by the Contractor and the USWCD.

Once work commences, project work shall be ongoing. Work shall be completed on a Monday-Friday schedule unless prior arrangements are made with the USWCD. Any delay in daily production will be discussed and agreed upon with the USWCD.

Work shall not commence until the work schedule is approved, then shall be continuous, unless weather conditions or circumstances beyond Contractor's control prevent working. The USWCD must approve deviation from the approved work schedule in writing.

18. Payment

The Contractor shall invoice the USWCD on a monthly interval or based on tasks completed and approved. Monthly partial payments shall be made to the Contractor within thirty (30) days after receipt of invoice for work performed during the preceding calendar month.

Ten percent of the contractual cost will be withheld until final completion of the project. The Contractor shall contact the USWCD to request final inspection of work for payment. Final payment, including withheld amount, will be provided to the Contractor within sixty (60) days of receipt of final invoice following a final inspection that approves all work.

19. Use of Premises

No camping will be allowed on the project site. The project area shall be cleared of all debris resulting from Contractor's operation as required by the USWCD prior to final payment being issued.

20. Davis-Bacon Act Wage Rates

This project is funded with Federal funds. All employees of the prime Contractor or subcontractor(s) shall be paid wages as per Davis-Bacon Act. It is the responsibility of the Contractor to determine applicable wage determinations (www.wdol.gov/dba.aspx).

PART III – Proposal Evaluation and Selection

1. Selection Criteria

The Contractor selection will be completed through a quality-based selection process (QBS). The following selection criteria will be used to evaluate the content of the written proposals based on a weighted scoring method.

Proposed Method of Completion: 150 points (37.5%)

- Proposal content and applicability of the approach and methodologies for completing the Scope of Work and all requirements of Part II of this RFP within the project time constraints (100)
- Creative, efficient, and/or novel approaches presented (25)
- Adequacy of proposed approach to meet project goal/objectives (25)

Qualifications and Experience: 150 points (37.5%)

- Practical experience of company and personnel in constructing similar fish passage restoration projects (75)
- Technical qualifications and experience of the Contractor Project Manager related to the project performance and successful project implementation (25)
- Equipment and resources directly available to the contracting firm for project implementation (50)

Cost: 100 points (25%)

- Lowest price will be considered for completion of all tasks and purchase/delivery of materials described in Part II and Appendix B, Design Drawings (100). Lowest bid will receive 100 points for this section. That bid will set the value for scoring and all other higher bids will be scored as the percentage of the deviation from that bid.

The USWCD reserves the right to contract all or portions of the work to individual Contractors. Upon completion of the review and ranking process, the USWCD will negotiate with the top-ranked consultant for contract scope and price. The negotiated contract will be based on fair and reasonable compensation for the services required.

2. Bid Reading

A public bid opening will be held on **May 16, 2024, at 4:05pm PDT at the Union SWCD office located at 10507 N. McAlister Road, Island City, Oregon in Room #7**. Bids will be opened, and the bidding firm name and total bid price will be read aloud. Bidders are invited to be present in person or by teleconference to record results. Award decisions will not be made at bid opening.

3. Bid Results

Notes of bid results may be taken at the public reading of the bid, or a personal inspection of the bid files may be made upon appointment. Bid tabulations may be obtained from the USWCD by a written request including the bid number, a self-addressed envelope, and a check for \$1.00 (do not send cash) payable to the Union SWCD, for each request. The request may be included with the bid or mailed separately to the USWCD.

**BIDDER'S CERTIFICATION STATEMENTS AS REQUIRED BY
CERTAIN OREGON REVISED STATUTES (ORS)**

The Bidder, _____ certifies to the following:
(Company Name)

- (1) Bidder is registered with the Oregon Construction Contractors Registration Board in accordance with ORS 701.035 through 701.055. The Bidder certifies that Registration Number _____
- (2) allows his/her company to perform work on Public Works Projects and that this registration is current and valid. The Bidder further certifies that, if awarded the contract, all subcontractors performing work will be registered with the Construction Contractors Registration Board in accordance with ORS 701.035 through 701.055 before the subcontractors commence work under the contract.
- (3) On all public contracts exceeding \$50,000 and not covered under the federal Davis-Bacon Act, Bidder will comply with the applicable provisions of the Oregon Prevailing Wage Law, ORS 279C.800 through ORS 279C.870 which provides input for the payment of not less than the prevailing wage rates or Davis-Bacon wage rates (whichever is greater), including fringe benefits, the posting of wage rates on the jobsite, the furnishing of payroll certifications, and other requirements. In addition, the Bidder will comply with ORS 279C.520 in the hours of employment and the payment of overtime.
- (4) Bidder is in compliance with State of Oregon tax laws in accordance with ORS305.385.
- (5) Bidder, in accordance with ORS 279A.110, does not discriminate against minorities, women, or emerging small business enterprises in obtaining any subcontracts.
- (6) Bidder is a [*Non-resident Bidder*] or [*Resident Bidder*] (**circle correct designation**) as defined in ORS 279A.120. "Resident Bidder" means a bidder that has paid unemployment taxes or income taxes in the State of Oregon during the 12 calendar months immediately preceding submission of the bid and has a business address in the State of Oregon.
- (7) Bidder and Bidder's subcontractors are not on the Oregon Construction Contractors Board list of corporations, partnerships, or other business entity of which the Contractor or subcontractor is an owner, shareholder, or officer of the business or was an owner or officer of the business and who have been determined not to be qualified to hold or participate in a public contract for a public improvement.
- (8) Bidder has an employee drug testing program that meets state [ORS 279C.505(2)] and federal standards.

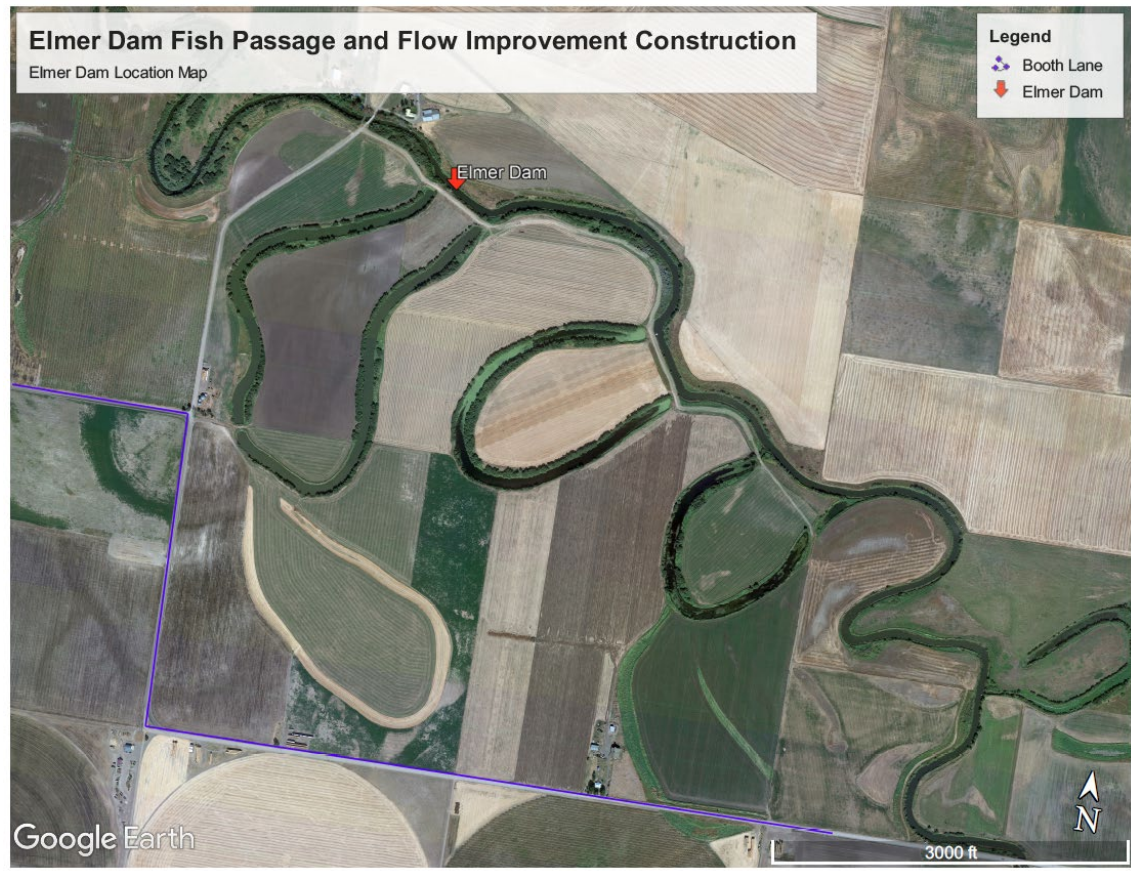
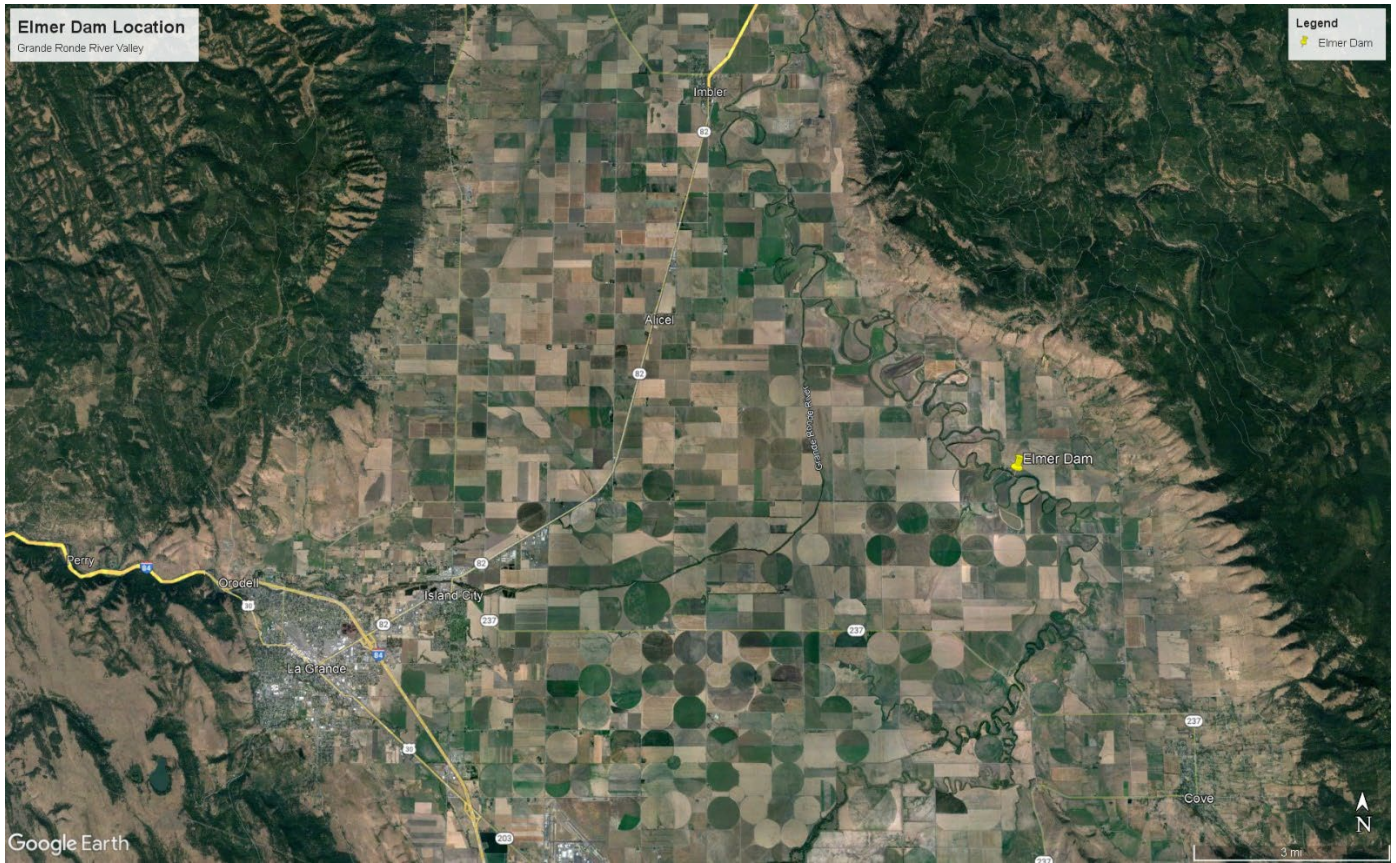
Bidder: _____
(Signature)

Title: _____

Date: _____

Project: _____

Appendix A. Project Location Maps



Appendix B. Final Design Drawings

TROUT UNLIMITED/UNION SOIL AND WATER CONSERVATION DISTRICT ELMER DAM BOOTH LANE PUMP STATION IMPROVEMENTS (GROUP C) ISSUED FOR CONSTRUCTION



VICINITY MAP
NTS



AREA MAP
NTS



PROJECT SITE PLAN
NTS



SHEET INDEX

DWG	SHEET NAME
G01	COVER SHEET AND SHEET INDEX
G02	OVERALL SITE PLAN
G06	STANDARD ABBREVIATIONS AND SYMBOLS
EC1	EROSION AND SEDIMENT CONTROL DETAILS
EC2	EROSION AND SEDIMENT CONTROL NOTES
GC1	HIP IV CONSERVATION MEASURES SHEET 1
GC2	HIP IV CONSERVATION MEASURES SHEET 2
GC3	HIP IV CONSERVATION MEASURES SHEET 3
C31	BOOTH LANE PUMP STATION PLAN AND PROFILE
C51	CIVIL DETAILS
C52	CIVIL DETAILS
GS1	GENERAL STRUCTURAL NOTES



EXPIRATION DATE: 12/31/2025



EXPIRATION DATE: 6-30-25

REV	DATE	BY	DESCRIPTION
1	11/06/23	CCB	ADDED FRP CALLOUTS
0	06/17/22	CCB	ISSUED FOR CONSTRUCTION

WARNING

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



TU/USWCD
ELMER DAM MODIFICATIONS
COVER SHEET AND SHEET INDEX

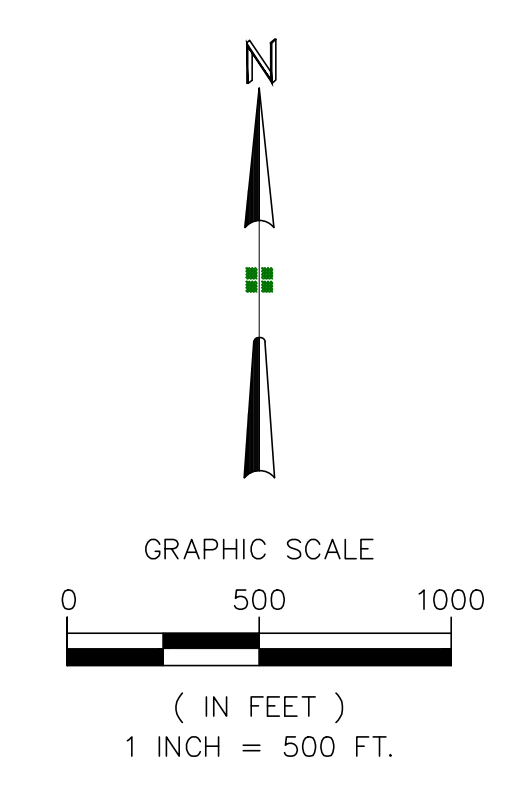
DESIGNED J. WOODBURY
DRAWN J. LAHMOM
CHECKED C. BOYD
ISSUED DATE 11/06/23

DRAWING

G01

SCALE: AS NOTED

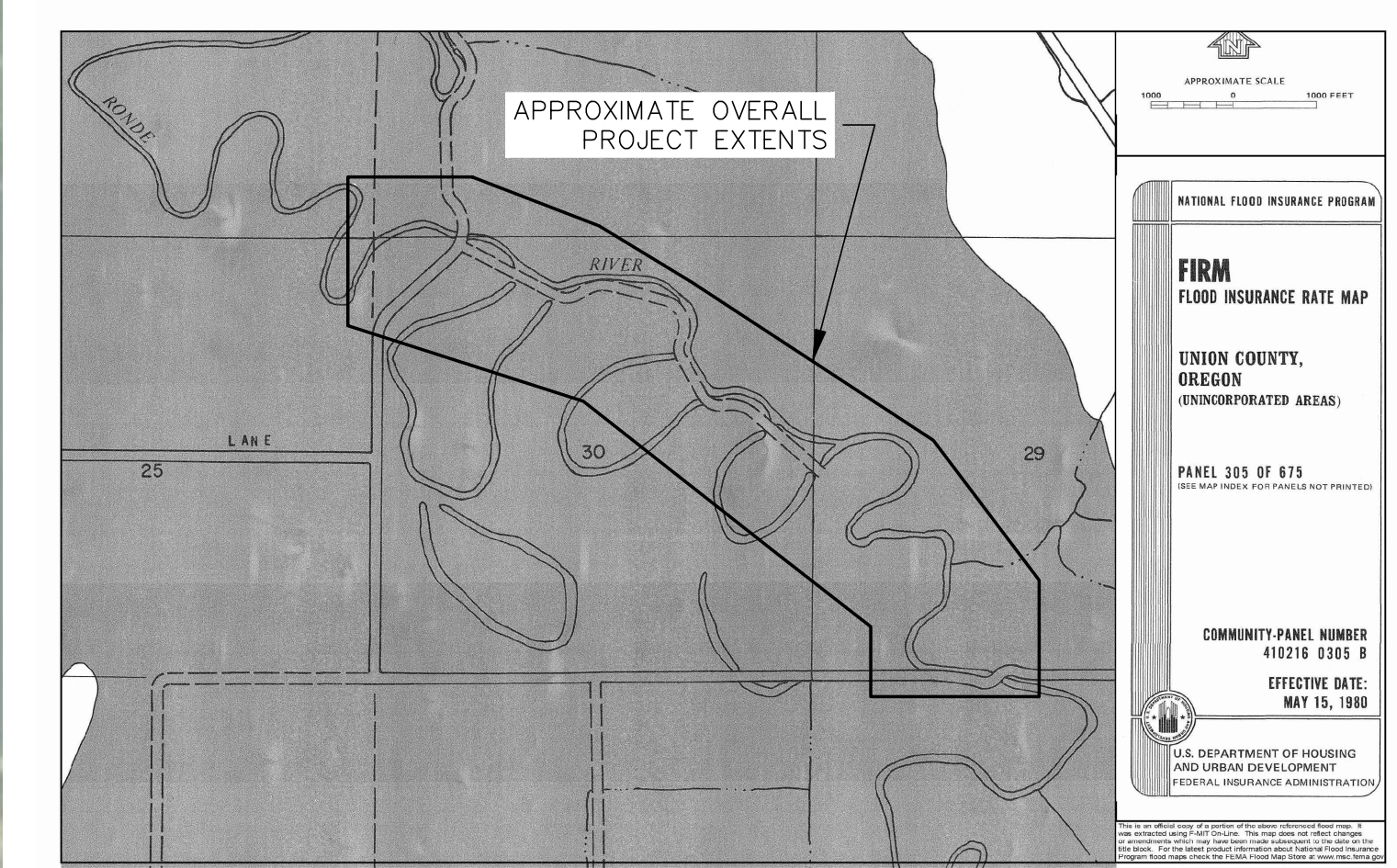
USER: JOHN LOCATION: C:\USERS\JOHN\DESIGN\CONSULTING\WORKSPACE\PROJECTS\ELMER DAM\GROUP\C\LOCAL\ELMERDAM_LL_202509.RWG



LEGEND

	FLOW ARROW
	TOP BANK OF RIVER
	EXISTING IRRIGATION MAINLINES
	PROPOSED PIPELINE

- NOTES**
- PROJECT EXTENTS LIE ENTIRELY WITHIN THE MAPPED 100-YEAR INUNDATION EXTENTS PER FEMA FIRM #410260305B DATED MAY 15, 1980. INUNDATED AREA IS DESIGNATED AS ZONE A WITH NO BASE FLOOD ELEVATIONS CALCULATED.



FLOOD INSURANCE RATE MAP (FIRM) EFFECTIVE MAY 15, 1980



**ELMER DAM
OVERALL SITE PLAN**

PROJECT NO. 703-19
SCALE: 1" = 500'
COVE

CHECKED BY: NK
PLOT DATE: 6/29/22

DATE	DESCRIPTION

HATCH SYMBOLS	
	ROCK, TYPE AS NOTED (PLAN/SECTION)
	BED ROCK
	EXISTING GRADE (SECTION)
	NEW SOIL (SECTION)
	CONCRETE (SECTION/PLAN)
	SAND, GROUT (PLAN/SECTION)
	STEEL (SECTION)
	GRATING (PLAN)
	MASONRY (PLAN)
	WOOD, SIZE/TYPE AS NOTED (PLAN)
	WOOD, SIZE/TYPE AS NOTED (SECTION)
	RIP RAP (PLAN/SECTION)
	ASPHALT CONCRETE PAVEMENT SURFACE (PLAN/SECTION)
	GRASS/VEGETATION (PLAN)

SITE PLAN LINETYPES	
	FENCE LINE
	OVERHEAD POWER
	MAJOR CONTOUR
	MINOR CONTOUR
	DITCH CENTERLINE
	TOE OF BANK
	TOP OF BANK
	SANITARY SEWER
	STORM DRAIN
	EDGE OF PAVEMENT
	EDGE OF GRAVEL
	EDGE OF WATER
	WATTLE
	SILT FENCE
	CONSTRUCTION FENCE
	GAS LINE
	ORDINARY HIGH WATER MARK
	AREA OF POTENTIAL EFFECT

SHEET SYMBOLS

PLAN
SCALE: 1/2" = 1'-0"

SECTION IDENTIFICATION

(1) SECTION CUT ON DRAWING C102:

(2) ON DRAWING C103 THIS SECTION IS IDENTIFIED AS:

SECTION VIEW
SCALE: 1/2" = 1'-0"

DETAIL IDENTIFICATION

(1) DETAIL CALL-OUT ON DRAWING C102:

(2) ON DRAWING C103 THIS SECTION IS IDENTIFIED AS:

DETAIL
SCALE: 1/2" = 1'-0"

STANDARD DETAIL IDENTIFICATION

(1) DETAIL CALL-OUT ON PLAN OR SECTION:

(2) ON DETAIL DRAWINGS, IDENTIFIED AS:

DETAIL

ELEVATION/IMAGE IDENTIFICATION

A/C	AIR CONDITIONING	EST	ESTIMATE
A/E	ARCHITECT/ENGINEER	EW	EACH WAY, EMERGENCY EYE/FACE WASH
AB	ANCHOR BOLT	EWEF	EACH WAY, EACH FACE
ABC	AGGREGATE BASE COURSE	EWTB	EACH WAY, TOP AND BOTTOM
AC	ALTERNATING CURRENT	EXC	EXCAVATION
ADDL	ADDITIONAL	EXIST	EXISTING
ADH	ADHESIVE	EXP	EXPANSION, EXPOSED
ADJ	ADJUSTABLE, ADJACENT	EXT	EXTERIOR, EXTERNAL, EXTENSION
AFF	ABOVE FINISH FLOOR		
AFG	ABOVE FINISH GRADE	F TO F	FACE TO FACE
AGGR	AGGREGATE	FAB	FABRICATE
ALIG	ALIGNMENT	FBO	FURNISHED BY OWNER
ALUM	ALUMINUM	FD	FLOOR DRAIN
ALT	ALTERNATE, ALTITUDE	FE	FLANGED END
ANC	ANCHOR	FF	FAR FACE, FACTORY FINISH, FLAT FACE
APRX	APPROXIMATE	FG	FINISHED GRADE
ASSY	ASSEMBLY	FIG	FIGURE
ATM	ATMOSPHERE	FIN	FINISH
AUTO	AUTOMATIC	FL	FLOW, FLOW LINE
AUX	AUXILIARY	FLEX	FLEXIBLE
AVE	AVENUE	FLG	FLANGE
AVG	AVERAGE	FLR	FLOOR
		FND	FOUNDATION
BE	BOTH ENDS, BELL END	FO	FINISHED OPENING
BF	BOTH FACES, BOTTOM FACE, BLIND FLANGE, BOARD FEET	FOC	FACE OF CONCRETE, FACE OF CURB, FIBER OPTIC CABLE
BFV	BUTTERFLY VALVE	FOM	FACE OF MASONRY
BITUM	BITUMINOUS	FOS	FACE OF STUDS
BL	BASE LINE	FPT	FEMALE PIPE THREAD
BLDG	BUILDING	FR	FRAME
BLKG	BLOCKING	FRP	FIBERGLASS REINFORCED PLASTIC
BM	BENCHMARK, BEAM	FS	FLOOR SINK, FAR SIDE
BOC	BACK OF CURB	FT	FEET, FOOT
BOT	BOTTOM	FTG	FOOTING, FITTING FUR FURRED, FURRING
BP	BASE PLATE	FURN	FURNITURE, FURNISH
BRG	BEARING	FW	FIELD WELD, FIRE WALL
BS	BOTH SIDES	FWD	FORWARD
BTU	BRITISH THERMAL UNIT		
BTW	BETWEEN	G	GRILLE, GROUND
BV	BALL VALVE	GA	GAGE (METAL THICKNESS)
BW	BOTH WAYS	GAL	GALLON
		GALV	GALVANIZED
C TO C	CENTER TO CENTER	GB	GRADE BREAK
C&G	CURB & GUTTER	GEN	GENERAL
C	CHANNEL SHAPE, CENTIGRADE, CONDUIT	GR	GRADE
CB	CATCH BASIN	GRND	GROUND
CCW	COUNTER CLOCKWISE	GRTG	GRATING
CF	CUBIC FEET (FOOT)		
CI	CURB INLET	HC	HORIZONTAL CENTERLINE
CIP	CAST-IN-PLACE	HDR	HEADER
CIRC	CIRCULATION, CIRCULAR	HDW	HARDWARE
CJ	CONSTRUCTION JOINT, CONTROL JOINT	HEX	HEXAGONAL
CL	CENTERLINE, CLASS, CLOSE	HORIZ	HORIZONTAL
CLR	CLEAR	HP	HIGH POINT, HORSEPOWER
CMU	CONCRETE MASONRY UNIT	HR	HOUR
COL	COLUMN	HS	HEADED STUD, HIGH STRENGTH
COMB	COMBINATION	HSS	HOLLOW STRUCTURAL SHAPE
CONC	CONCENTRIC, CONCRETE	HT	HEIGHT
CONN	CONNECTION	HVAC	HEATING, VENTILATION & AIR CONDITIONING
CONST	CONSTRUCTION	HWL	HIGH WATER LEVEL
CONT	CONTINUOUS, CONTINUED		
COORD	COORDINATE	ID	INSIDE DIAMETER, INTERIOR DIMENSION
CPLG	COUPLING	IE	INVERT ELEVATION
CSK	COUNTERSINK	IF	INSIDE FACE
CTR	CENTER	INCH	INCH
CTRL	CONTROL	INC	INCLUDE, INCANDESCENT
CU	COPPER, CUBIC	INT	INTERIOR, INTERSECTION
CW	CLOCKWISE	INTR	INTERMEDIATE, INTERIOR
CY	CUBIC YARD	INV	INVERT
		IPS	IRON PIPE SIZE
d	PENNY (NAIL MEASURE)	IPT	INTERNAL PIPE THREAD
DBA	DEFORMED BAR ANCHOR	IRR	IRRIGATION
DBL	DOUBLE	ISO	ISOMETRIC
DEG	DEGREE		
DEG C	DEGREE CENTIGRADE	JF	JOINT FILLER
DEG F	DEGREE FAHRENHEIT	JT	JOINT
DEMO	DEMOLITION		
DEPT	DEPARTMENT	K	KIP
DET	DETAIL	KSI	KIPS PER SQUARE INCH
DI	DROP INLET, DUCTILE IRON		
DIA	DIAMETER	L	ANGLE, LENGTH, LAVATORY
DIAG	DIAGONAL, DIAGRAM	LAM	LAMINATE
DIFF	DIFFERENTIAL, DIFFERENCE	LB	LAG BOLT, POUND
DIM	DIMENSION	LDR	LEADER
DIST	DISTANCE, DISTRIBUTION	LF	LINEAR FOOT
DL	DEAD LOAD	LG	LONG
DN	DOWN	LH	LEFT HAND
DT	DOUBLE TEE, DRIP TRAP ASSEMBLY	LIN	LINEAR
DUP	DUPLICATE	LL	LIVE LOAD
DWG	DRAWING	LLH	LONG LEG HORIZONTAL
DWL	DOWEL	LLV	LONG LEG VERTICAL
		LNG	LONGITUDINAL
E	EAST	LOC	LOCATION
EA	EACH, EXHAUST AIR	LT	LEFT
ECC	ECCENTRIC	LTD	LIMITED
EE	EACH END	LTG	LIGHTING
EF	EACH FACE	LTL	LINTEL
EG	EXISTING GRADE	LVR	LOUVER
EGL	ENERGY GRADE LINE	LW	LIGHTWEIGHT
EJ	EXPANSION JOINT	LWC	LIGHTWEIGHT CONCRETE
EL	ELBOW, ELEVATION	LWL	LOW WATER LEVEL
ELEC	ELECTRICAL		
EMBD	EMBEDDED	MAINT	MAINTENANCE
ENCL	ENCLOSURE	MAN	MANUAL
ENGR	ENGINEER	MATL	MATERIAL
ENR	ENTRANCE	MAX	MAXIMUM
EOP	EDGE OF PAVEMENT	MB	MACHINE BOLT
EOW	EDGE OF WATER	MCJ	MASONRY CONTROL JOINT
EQ	EQUAL	MECH	MECHANICAL
EQUIP	EQUIPMENT	MED	MEDIUM
EQUIV	EQUIVALENT	MFR	MANUFACTURER
ES	EACH SIDE, EQUAL SPACE, EMERGENCY SHOWER	MH	MANHOLE, METAL HALIDE

MIN	MINIMUM	MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT	MOD	MODULAR, MODIFY
MON	MONUMENT	MPT	MALE PIPE THREAD
MSL	MEAN SEA LEVEL	MU	MASONRY UNIT
MW	MONITORING WELL		
N	NORTH, NEUTRAL		
NA	NOT APPLICABLE		
NAT	NATURAL		
NC	NORMALLY CLOSED		
NEG	NEGATIVE		
NF	NEAR FACE, NON-FUSED		
NG	NATURAL GAS		
NIC	NOT IN CONTRACT		
NOM	NOMINAL		
NPS	NOMINAL PIPE SIZE		
NPT	NATIONAL PIPE THREAD		
NS	NEAR SIDE		
NTS	NOT TO SCALE		
O TO O	OUT-TO-OUT		
OC	ON CENTER		
OD	OUTSIDE DIAMETER		
OH	OVERHEAD		
OPNG	OPENING		
OPP	OPPOSITE		
OPT	OPTIONAL		
ORIG	ORIGINAL		
OVFL	OVERFLOW		
OVHNG	OVERHANG		
OZ	OUNCE		
P	PAINT		
PAR	PARALLEL, PARAPET		
PC	POINT OF CURVE, PIECE, PRECAST		
PCC	POINT OF COMPOUND CURVATURE		
PCF	POUNDS PER CUBIC FOOT		
PCT	PERCENT		
PE	PLAIN END		
PED	PEDestal		
PEN	PENETRATION		
PERF	PERFORATED		
PERM	PERMANENT		
PERP	PERPENDICULAR		
PI	POINT OF INTERSECTION		
PKG	PACKAGE		
PL	PLATE, PROPERTY LINE		
PLF	POUNDS PER LINEAR FOOT		
POS	POSITIVE, POSITION		
PRC	POINT OF REVERSE CURVATURE		
PREF	PREFINISHED		
PREFAB	PREFABRICATED		
PRELIM	PRELIMINARY		
PREP	PREPARE		
PROP	PROPERTY		
PSF	POUNDS PER SQUARE FOOT		
PSI	POUNDS PER SQUARE INCH		
PSIA	POUNDS PER SQUARE INCH ABSOLUTE		
PSIG	POUNDS PER SQUARE INCH GAGE		
PT	POINT, POINT OF TANGENCY		
PVC	POLYVINYL CHLORIDE		
PWMT	PAVEMENT		
PZ	PIEZOMETER		
Q	RATE OF FLOW		
QTR	QUARTER		
QTY	QUANTITY		
QUAL	QUALITY		
R&R	REMOVE AND REPLACE		
R	RADIUS, REGISTER, RISER		
RCPT	RECEPTACLE		
RECD	RECEIVED		
RECT	RECTANGULAR		
REF	REFERENCE		
REINF	REINFORCING		
REQD	REQUIRED		
RET	RETAINING, RETURN		
REV	REVISION, REVERSE		
RND	ROUND		
RO	ROUGH OPENING		
ROW	RIGHT-OF-WAY		
RPM	REVOLUTIONS PER MINUTE		
RR	RAILROAD		
RT	RIGHT		
S	SOUTH, SINK		
SCH	SCHEDULE		
SCHEM	SCHEMATIC		
SCRN	SCREEN		
SEC	SECONDARY, SECONDS		
SECT	SECTION		
SF	SQUARE FOOT		
SHT	SHEET		
SHTG	SHEATHING		
SIM	SIMILAR		
SL	SLOPE		
SLTD	SLOTTED		
SLV	SLEEVE		
SOG	SLAB ON GRADE		
SP	SOUNDPROOF, STANDPIPE		
SPC	SPACING		
SPEC	SPECIFICATION		
SQ	SQUARE		
SST	STAINLESS STEEL		
ST	STREET		

ABBREVIATIONS	
STA	STATION
STD	STANDARD
STIF	STIFFENER
STIR	STIRRUP
STL	STEEL
STOR	STORAGE
STR	STRUCTURAL, STRAIGHT
SUB	SUBSTITUTE
SY	SQUARE YARD
SYM	SYMBOL
SYMM	SYMMETRICAL
SYS	SYSTEM
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TAN	TANGENT
TBM	TEMPORARY BENCHMARK
TEMP	TEMPORARY, TEMPERATURE
THK	THICK
THRD	THREAD
THRU	THROUGH
TOB	TOP OF BOLT, TOP OF BANK, TOP OF BEAM
TOC	TOP OF CURB, TOP OF CONCRETE
TOF	TOP OF FOOTING
TOG	TOP OF GRATING
TOM	TOP OF MASONRY
TOP	TOP OF PLATE
TOPO	TOPOGRAPHY
TOS	TOP OF SLAB, TOP OF STEEL
TOW	TOP OF WALL
TRANS	TRANSITION
TYP	TYPICAL
UG	UNDERGROUND
ULT	ULTIMATE
UNFN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
UTIL	UTILITY
V	VENT, VELOCITY, VOLT
VAC	VACUUM
VAR	VARNISH, VARIABLE, VOLT AMPERES REACTIVE
VB	VAPOR BARRIER, VINYL BASE, VALVE BOX
VC	VERTICAL CURVE
VEL	VELOCITY
VENT	VENTILATION
VERT	VERTICAL
VS	VERSES, VAPOR SEAL
VOL	VOLUME
VPC	VERTICAL POINT OF CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
W/	WITH
W/O	WITHOUT
W	WATT, WEST, WIDE, WINDOW, WIRE, WIDE FLANGE BEAM
WF	WIDE FLANGE, WASH FOUNTAIN
WL	WATER LEVEL
WLD	WELDED
WP	WATERPROOF, WORKING POINT
WS	WATERSTOP, WATER SURFACE
WSEL	WATER SURFACE ELEVATION
WT	WEIGHT, WATER TIGHT
WWF	WELDED WIRE FABRIC
XS	EXTRA STRONG
XXS	DOUBLE EXTRA STRONG
XSECT	CROSS SECTION
YH	YARD HYDRANT
YS	YIELD STRENGTH

GENERAL NOTES:

- THESE ABBREVIATIONS APPLY TO THE ENTIRE SET OF CONTRACT DRAWINGS.
- LISTING OF ABBREVIATIONS DOES NOT IMPLY ALL ABBREVIATIONS ARE USED IN THE CONTRACT DRAWINGS.
- ABBREVIATIONS SHOWN ON THIS SHEET INCLUDE VARIATIONS OF THE WORD. FOR EXAMPLE, "MOD" MAY MEAN MODIFY OR MODIFICATION; "INC" MAY MEAN INCLUDED OR INCLUDING; "REINF" MAY MEAN EITHER REINFORCE OR REINFORCING.
- SCREENING OR SHADING OF WORK IS USED TO INDICATE EXISTING COMPONENTS OR TO DE-EMPHASIZE PROPOSED IMPROVEMENTS TO HIGHLIGHT SELECTED TRADE WORK. REFER TO CONTEXT OF EACH SHEET FOR USAGE.

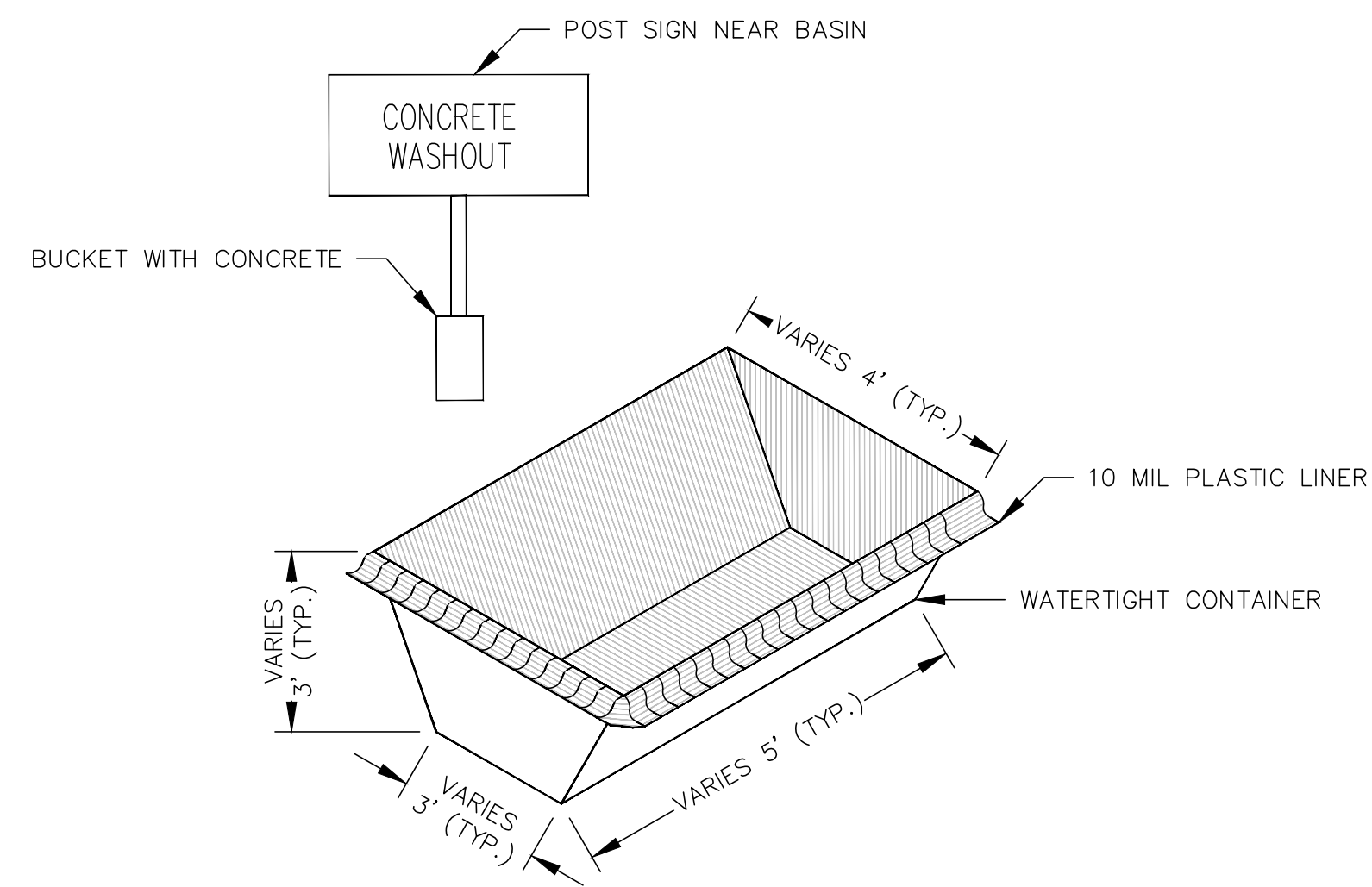
REV	DATE	BY	DESCRIPTION
1	11/06/23	CCB	ADDED FRP CALLOUTS
0	06/17/22	CCB	ISSUED FOR CONSTRUCTION

WARNING

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

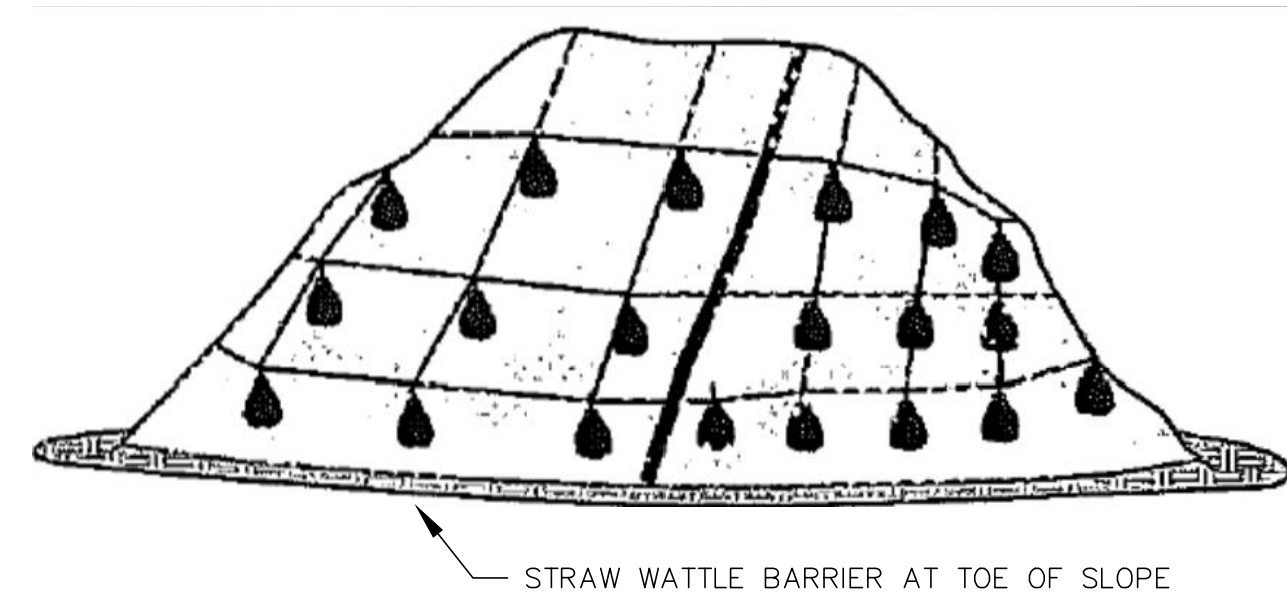
TU/USWCD
ELMER DAM MODIFICATIONS
STANDARD ABBREVIATIONS AND SYMBOLS

DRAWING	
DESIGNED	J. WOODBURY
DRAWN	J. LAHMEN
CHECKED	C. BOYD
ISSUED DATE	11/06/23
SCALE:	AS NOTED



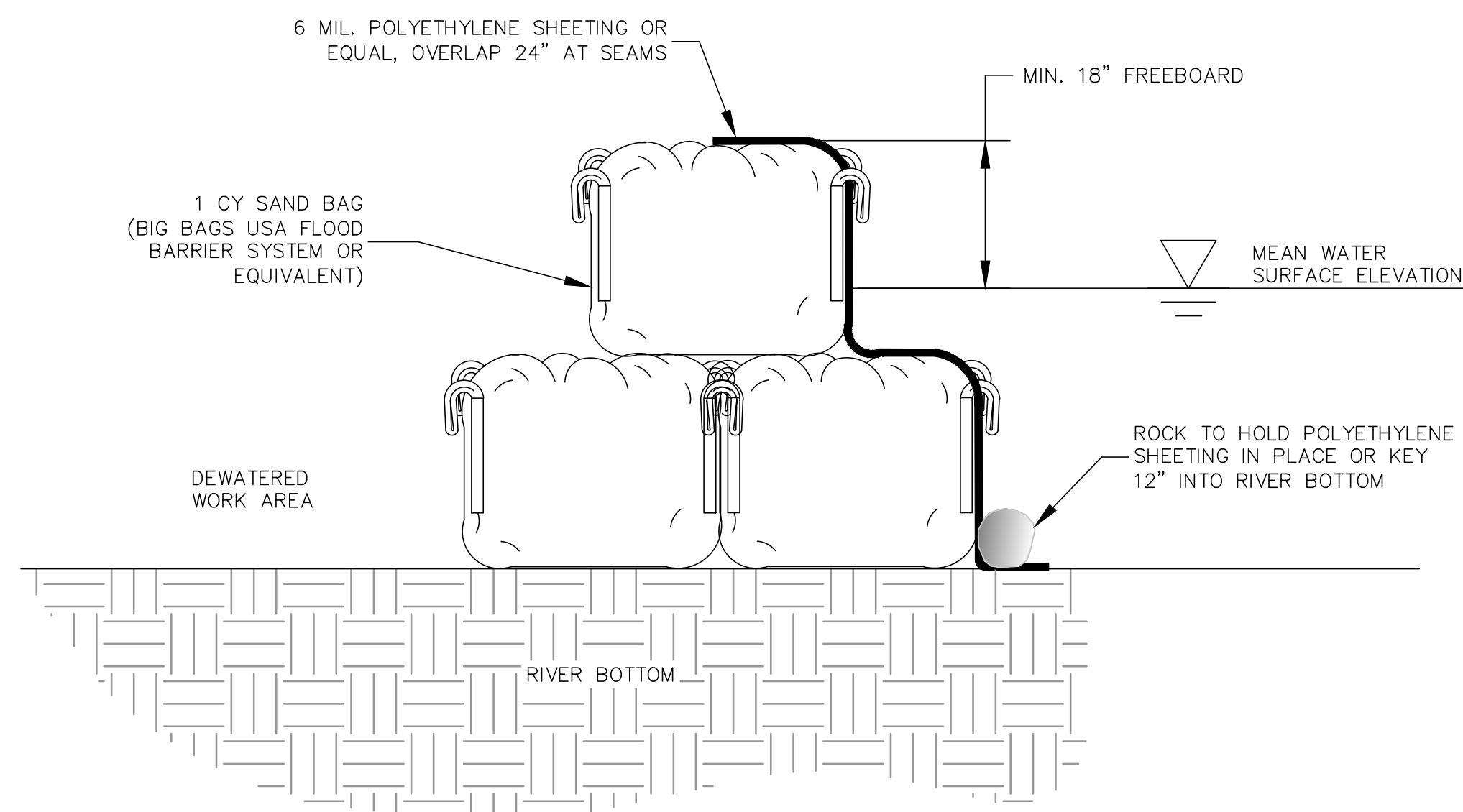
NOTES:
1. DIMENSIONS VARY. RESPONSIBLE PERSON SHALL SIZE BASIN APPROPRIATELY.

CONCRETE WASHOUT
NTS



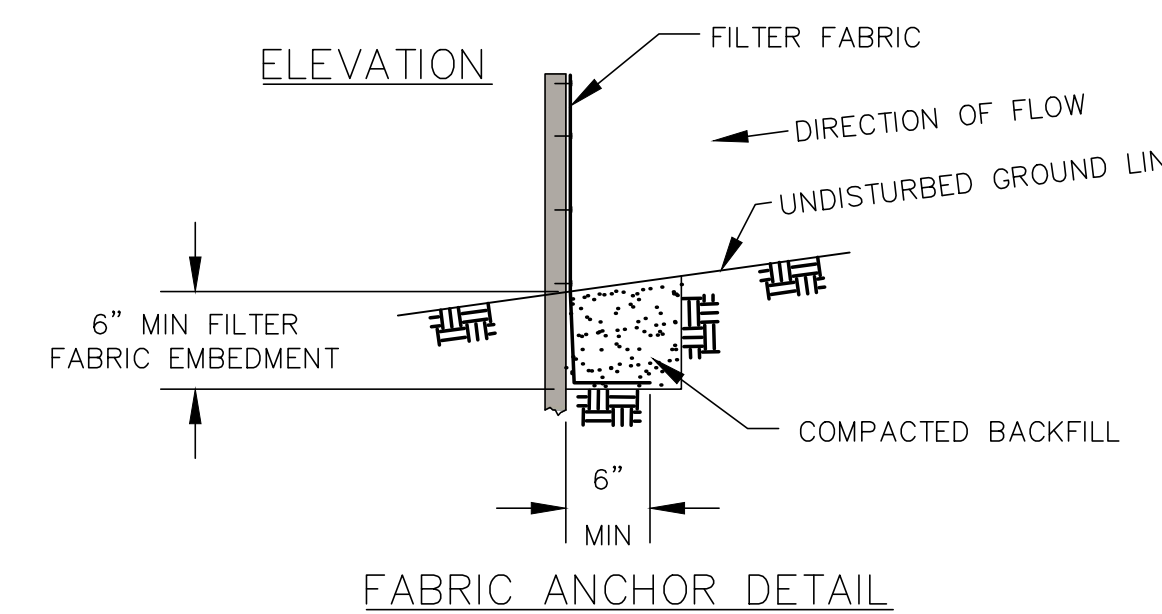
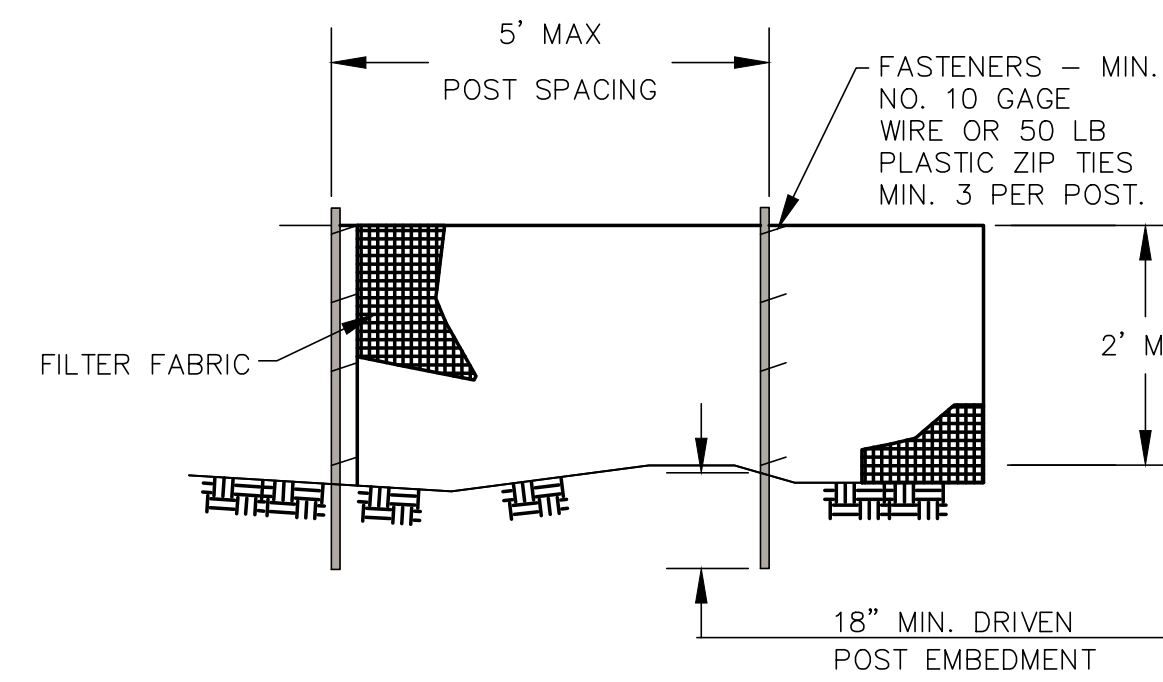
NOTES:
1. MINIMUM 12" OVERLAP OF ALL SEAMS REQUIRED.
2. STRAW WATTLE BARRIER REQUIRED @ TOE OF STOCK PILE.
3. COVERING MAINTAINED TIGHTLY IN PLACE BY USING SANDBAGS.
4. ON ROPES WITH A MAXIMUM 10' GRID SPACING IN ALL DIRECTIONS.

PLASTIC SHEETING
NTS



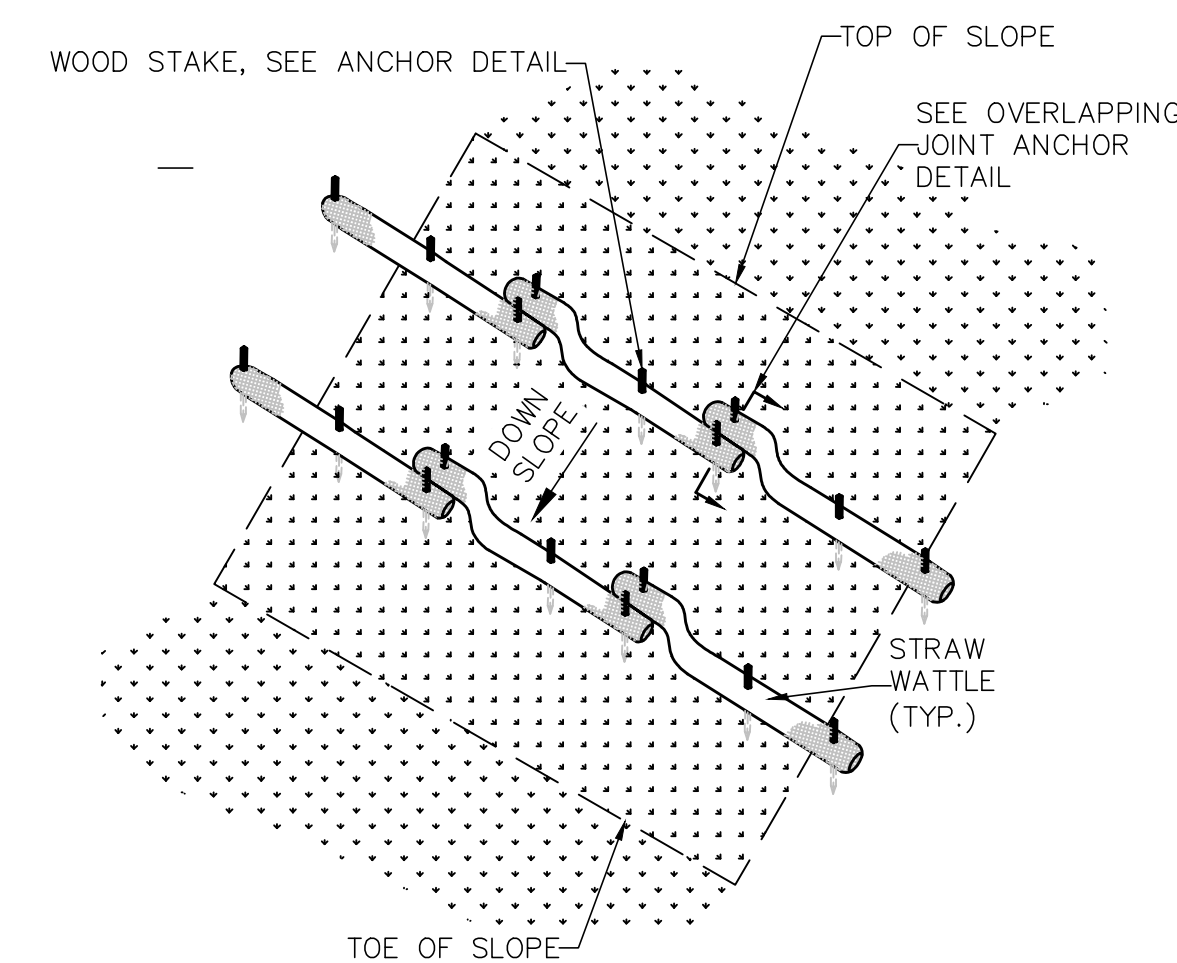
TEMPORARY COFFERDAM DETAIL
NTS

NOTE: PROVIDE ADDITIONAL SAND BAG TIER AS NECESSARY TO ACCOMMODATE DEEPER WATER DEPTHS UP TO A MAXIMUM OF 3 TIERS TOTAL.

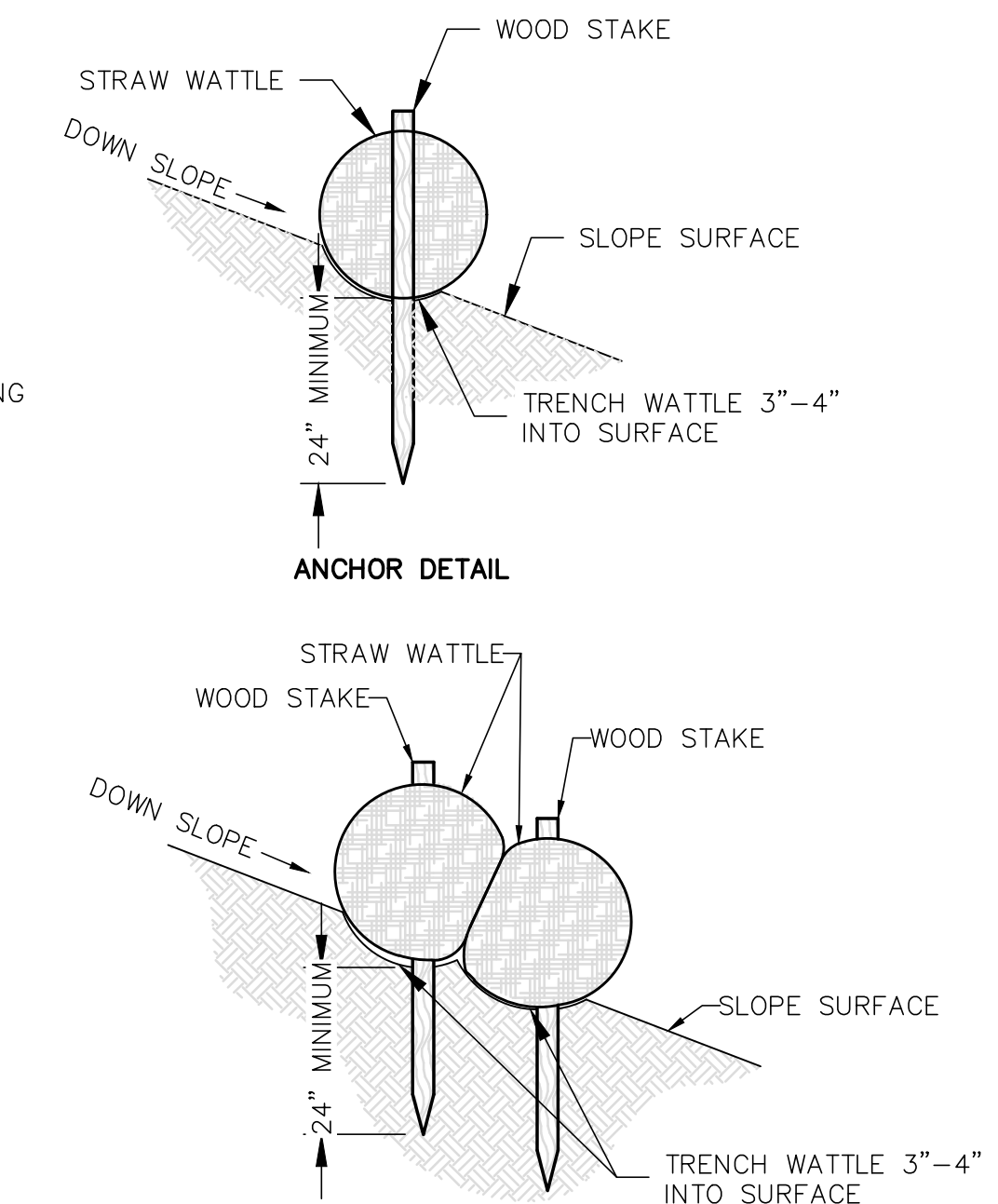


SILT FENCE SEDIMENT CONTROL
NTS

NOTES:
1. TEMPORARY SILT FENCE SHALL BE INSTALLED PRIOR TO ANY GRADING WORK IN THE AREA TO BE PROTECTED. FENCE SHALL BE MAINTAINED THROUGHOUT THE CONSTRUCTION PERIOD AND REMOVED IN CONJUNCTION WITH THE FINAL GRADING AND SITE STABILIZATION.
2. INSTALLATION OF THE SILT FENCE SHALL BE IN ACCORDANCE WITH ASTM D 6462, THE MANUFACTURER'S RECOMMENDATIONS AND THE DETAILS SHOWN ON THIS SHEET. POST SPACING SHOWN IS MAXIMUM FOR UNSUPPORTED INSTALLATION WITH ELONGATION <50% (ASTM D 4632). FOR SILT FENCE MATERIAL WITH ELONGATION >50% AND SUPPORTED SILT FENCES, THE MAXIMUM POST SPACING IS 4 FEET.
3. FENCE POSTS SHALL BE EITHER WOOD WITH A MINIMUM CROSS-SECTIONAL AREA OF 1.5" X 1.5" OR A STANDARD STEEL POST.
4. WHEN SPLICES ARE NECESSARY, MAKE SPLICE AT POST ACCORDING TO SPLICE DETAIL. PLACE THE END POST OF THE SECOND FENCE INSIDE THE END POST OF THE FIRST FENCE. ROTATE BOTH POSTS TOGETHER AT LEAST 180 DEGREES TO CREATE A TIGHT SEAL WITH THE FABRIC MATERIAL. CUT THE FABRIC NEAR THE BOTTOM OF THE POSTS TO ACCOMMODATE THE 6 INCH FLAP, THEN DRIVE BOTH POSTS AND BURY THE FLAP. COMPACT BACKFILL WELL.



STRAW WATTLE SEDIMENT CONTROL
NTS



OVERLAPPING JOINT ANCHOR DETAIL

ODEQ STANDARD EROSION AND SEDIMENT CONTROL NOTES:

1. HOLD A PRE-CONSTRUCTION MEETING OF PROJECT CONSTRUCTION PERSONNEL THAT INCLUDES THE INSPECTOR TO DISCUSS EROSION AND SEDIMENT CONTROL MEASURES AND CONSTRUCTION LIMITS. (SCHEDULE A.8.C.I.(3))
2. ALL INSPECTIONS MUST BE MADE IN ACCORDANCE WITH DEQ 1200-C PERMIT REQUIREMENTS. (SCHEDULE A.12.B AND SCHEDULE B.1)
3. INSPECTION LOGS MUST BE KEPT IN ACCORDANCE WITH DEQ'S 1200-C PERMIT REQUIREMENTS. (SCHEDULE B.1.C AND B.2)
4. RETAIN A COPY OF THE EROSION AND SEDIMENT CONTROL PLAN (ESCP) AND ALL REVISIONS ON SITE AND MAKE IT AVAILABLE ON REQUEST TO DEQ, AGENT, OR THE LOCAL MUNICIPALITY. DURING INACTIVE PERIODS OF GREATER THAN SEVEN (7) CONSECUTIVE CALENDAR DAYS, THE ABOVE RECORDS MUST BE RETAINED BY THE PERMIT REGISTRANT BUT DO NOT NEED TO BE AT THE CONSTRUCTION SITE. (SCHEDULE B.2.C)
5. ALL PERMIT REGISTRANTS MUST IMPLEMENT THE ESCP. FAILURE TO IMPLEMENT ANY OF THE CONTROL MEASURES OR PRACTICES DESCRIBED IN THE ESCP IS A VIOLATION OF THE PERMIT. (SCHEDULE A.8.A)
6. THE ESCP MUST BE ACCURATE AND REFLECT SITE CONDITIONS. (SCHEDULE A.12.C.I)
7. SUBMISSION OF ALL ESCP REVISIONS IS NOT REQUIRED. SUBMITTAL OF THE ESCP REVISIONS IS ONLY UNDER SPECIFIC CONDITIONS. SUBMIT ALL NECESSARY REVISION TO DEQ OR AGENT WITHIN 10 DAYS. (SCHEDULE A.12.C.IV. AND V)
8. PHASE CLEARING AND GRADING TO THE MAXIMUM EXTENT PRACTICAL TO PREVENT EXPOSED INACTIVE AREAS FROM BECOMING A SOURCE OF EROSION. (SCHEDULE A.7.A.III)
9. IDENTIFY, MARK, AND PROTECT (BY CONSTRUCTION FENCING OR OTHER MEANS) CRITICAL RIPARIAN AREAS AND VEGETATION INCLUDING IMPORTANT TREES AND ASSOCIATED ROOTING ZONES, AND VEGETATION AREAS TO BE PRESERVED. IDENTIFY VEGETATIVE BUFFER ZONES BETWEEN THE SITE AND SENSITIVE AREAS (E.G., WETLANDS), AND OTHER AREAS TO BE PRESERVED, ESPECIALLY IN PERIMETER AREAS. (SCHEDULE A.8.C.I.(1) AND (2))
10. PRESERVE EXISTING VEGETATION WHEN PRACTICAL AND RE-VEGETATE OPEN AREAS. RE-VEGETATE OPEN AREAS WHEN PRACTICABLE BEFORE AND AFTER GRADING OR CONSTRUCTION.
11. MAINTAIN AND DELINEATE ANY EXISTING NATURAL BUFFER WITHIN 50- FEET OF WATERS OF THE STATE. (SCHEDULE A.7.B.I AND (2)(A)(B))
12. INSTALL PERIMETER SEDIMENT CONTROL, INCLUDING STORM DRAIN INLET PROTECTION AS WELL AS ALL SEDIMENT BASINS, TRAPS, AND BARRIERS PRIOR TO LAND DISTURBANCE. (SCHEDULE A.8.C.I.(5))
13. CONTROL BOTH PEAK FLOW RATES AND TOTAL STORMWATER VOLUME TO MINIMIZE EROSION AT OUTLETS AND DOWNSTREAM CHANNELS AND STREAMBANKS. (SCHEDULE A.7.C)
14. CONTROL SEDIMENT AS NEEDED ALONG THE SITE PERIMETER AND AT ALL OPERATIONAL INTERNAL STORM DRAIN INLETS AT ALL TIMES DURING CONSTRUCTION, BOTH INTERNALLY AND AT THE SITE BOUNDARY. (SCHEDULE A.7.D.I)
15. ESTABLISH CONCRETE TRUCK AND OTHER CONCRETE EQUIPMENT WASHOUT AREAS BEFORE BEGINNING CONCRETE WORK. (SCHEDULE A.8.C.I.(6))
16. APPLY TEMPORARY AND/OR PERMANENT SOIL STABILIZATION MEASURES IMMEDIATELY ON ALL DISTURBED AREAS AS GRADING PROGRESSES. TEMPORARY OR PERMANENT STABILIZATION MEASURES ARE NOT REQUIRED FOR AREAS THAT ARE INTENDED TO BE LEFT UNVEGETATED, SUCH AS DIRT ACCESS ROADS.
17. ESTABLISH MATERIAL AND WASTE STORAGE AREAS, AND OTHER NON-STORMWATER CONTROLS. (SCHEDULE A.8.C.I.(7))
18. PREVENT TRACKING OF SEDIMENT ONTO PUBLIC OR PRIVATE ROADS USING BMPS SUCH AS: CONSTRUCTION ENTRANCE, GRAVELED (OR PAVED) EXITS AND PARKING AREAS, GRAVEL ALL UNPAVED ROADS LOCATED ON SITE, OR USE AN EXIT TIRE WASH. THESE BMPS MUST BE IN PLACE PRIOR TO LAND-DISTURBING ACTIVITIES. (SCHEDULE A.7.D.II AND A.8.C.I.(4))
19. WHEN TRUCKING SATURATED SOILS FROM THE SITE, EITHER USE WATER-TIGHT TRUCKS OR DRAIN LOADS ON SITE. (SCHEDULE A.7.D.II.(5))
20. CONTROL PROHIBITED DISCHARGES FROM LEAVING THE CONSTRUCTION SITE, I.E., CONCRETE WASH-OUT, WASTEWATER FROM CLEANOUT OF STUCCO, PAINT AND CURING COMPOUNDS. (SCHEDULE A.6)
21. USE BMPS TO PREVENT OR MINIMIZE STORMWATER EXPOSURE TO POLLUTANTS FROM SPILLS; VEHICLE AND EQUIPMENT FUELING, MAINTENANCE, AND STORAGE; OTHER CLEANING AND MAINTENANCE ACTIVITIES; AND WASTE HANDLING ACTIVITIES. THESE POLLUTANTS INCLUDE FUEL, HYDRAULIC FLUID, AND OTHER OILS FROM VEHICLES AND MACHINERY, AS WELL AS DEBRIS, FERTILIZER, PESTICIDES AND HERBICIDES, PAINTS, SOLVENTS, CURING COMPOUNDS AND ADHESIVES FROM CONSTRUCTION OPERATIONS. (SCHEDULE A.7.E.I.(2))
22. IMPLEMENT THE FOLLOWING BMPS WHEN APPLICABLE: WRITTEN SPILL PREVENTION AND RESPONSE PROCEDURES, EMPLOYEE TRAINING ON SPILL PREVENTION AND PROPER DISPOSAL PROCEDURES, SPILL KITS IN ALL VEHICLES, REGULAR MAINTENANCE SCHEDULE FOR VEHICLES AND MACHINERY, MATERIAL DELIVERY AND STORAGE CONTROLS, TRAINING AND SIGNAGE, AND COVERED STORAGE AREAS FOR WASTE AND SUPPLIES. (SCHEDULE A.7.E.III.)
23. USE WATER, SOIL-BINDING AGENT OR OTHER DUST CONTROL TECHNIQUE AS NEEDED TO AVOID WIND-BLOWN SOIL. (SCHEDULE A.7.A.IV)
24. THE APPLICATION RATE OF FERTILIZERS USED TO REESTABLISH VEGETATION MUST FOLLOW MANUFACTURER'S RECOMMENDATIONS TO MINIMIZE NUTRIENT RELEASES TO SURFACE WATERS. EXERCISE CAUTION WHEN USING TIME-RELEASE FERTILIZERS WITHIN ANY WATERWAY RIPARIAN ZONE. (SCHEDULE A.9.B.III)
25. IF AN ACTIVE TREATMENT SYSTEM (FOR EXAMPLE, ELECTRO-COAGULATION, FLOCCULATION, FILTRATION, ETC.) FOR SEDIMENT OR OTHER POLLUTANT REMOVAL IS EMPLOYED, SUBMIT AN OPERATION AND MAINTENANCE PLAN (INCLUDING SYSTEM SCHEMATIC, LOCATION OF SYSTEM, LOCATION OF INLET, LOCATION OF DISCHARGE, DISCHARGE DISPERSION DEVICE DESIGN, AND A SAMPLING PLAN AND FREQUENCY) BEFORE OPERATING THE TREATMENT SYSTEM. OBTAIN PLAN APPROVAL BEFORE OPERATING THE TREATMENT SYSTEM. OPERATE AND MAINTAIN THE TREATMENT SYSTEM ACCORDING TO MANUFACTURER'S SPECIFICATIONS. (SCHEDULE A.9.D)
26. TEMPORARILY STABILIZE SOILS AT THE END OF THE SHIFT BEFORE HOLIDAYS AND WEEKENDS, IF NEEDED. THE REGISTRANT IS RESPONSIBLE FOR ENSURING THAT SOILS ARE STABLE DURING RAIN EVENTS AT ALL TIMES OF THE YEAR. (SCHEDULE A.7.B)
27. AS NEEDED BASED ON WEATHER CONDITIONS, AT THE END OF EACH WORKDAY SOIL STOCKPILES MUST BE STABILIZED OR COVERED, OR OTHER BMPS MUST BE IMPLEMENTED TO PREVENT DISCHARGES TO SURFACE WATERS OR CONVEYANCE SYSTEMS LEADING TO SURFACE WATERS. (SCHEDULE A.7.E.II.(2))
28. CONSTRUCTION ACTIVITIES MUST AVOID OR MINIMIZE EXCAVATION AND BARE GROUND ACTIVITIES DURING WET WEATHER. (SCHEDULE A.7.A.I)
29. SEDIMENT FENCE: REMOVE TRAPPED SEDIMENT BEFORE IT REACHES ONE THIRD OF THE ABOVE GROUND FENCE HEIGHT AND BEFORE FENCE REMOVAL. (SCHEDULE A.9.C.I)
30. OTHER SEDIMENT BARRIERS (SUCH AS BIOBAGS): REMOVE SEDIMENT BEFORE IT REACHES TWO INCHES DEPTH ABOVE GROUND HEIGHT AND BEFORE BMP REMOVAL. (SCHEDULE A.9.C.I)
31. CATCH BASINS: CLEAN BEFORE RETENTION CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT. SEDIMENT BASINS AND SEDIMENT TRAPS: REMOVE TRAPPED SEDIMENTS BEFORE DESIGN CAPACITY HAS BEEN REDUCED BY FIFTY PERCENT AND AT COMPLETION OF PROJECT. (SCHEDULE A.9.C.III& IV)
32. WITHIN 24 HOURS, SIGNIFICANT SEDIMENT THAT HAS LEFT THE CONSTRUCTION SITE, MUST BE REMEDIATED. INVESTIGATE THE CAUSE OF THE SEDIMENT RELEASE AND IMPLEMENT STEPS TO PREVENT A RECURRENCE OF THE DISCHARGE WITHIN THE SAME 24 HOURS. ANY IN-STREAM CLEAN-UP OF SEDIMENT SHALL BE PERFORMED ACCORDING TO THE OREGON DIVISION OF STATE LANDS REQUIRED TIMEFRAME. (SCHEDULE A.9.B.I)
33. THE INTENTIONAL WASHING OF SEDIMENT INTO STORM SEWERS OR DRAINAGE WAYS MUST NOT OCCUR. VACUUMING OR DRY SWEEPING AND MATERIAL PICKUP MUST BE USED TO CLEANUP RELEASED SEDIMENTS. (SCHEDULE A.9.B.II)
34. THE ENTIRE SITE MUST BE TEMPORARILY STABILIZED USING VEGETATION OR A HEAVY MULCH LAYER, TEMPORARY SEEDING, OR OTHER METHOD SHOULD ALL CONSTRUCTION ACTIVITIES CEASE FOR 30 DAYS OR MORE. (SCHEDULE A.7.F.I)
35. PROVIDE TEMPORARY STABILIZATION FOR THAT PORTION OF THE SITE WHERE CONSTRUCTION ACTIVITIES CEASE FOR 14 DAYS OR MORE WITH A COVERING OF BLOWN STRAW AND A TACKIFIER, LOOSE STRAW, OR AN ADEQUATE COVERING OF COMPOST MULCH UNTIL WORK RESUMES ON THAT PORTION OF THE SITE. (SCHEDULE A.7.F.II)
36. DO NOT REMOVE TEMPORARY SEDIMENT CONTROL PRACTICES UNTIL PERMANENT VEGETATION OR OTHER COVER OF EXPOSED AREAS IS ESTABLISHED. ONCE CONSTRUCTION IS COMPLETE AND THE SITE IS STABILIZED, ALL TEMPORARY EROSION CONTROLS AND RETAINED SOILS MUST BE REMOVED AND DISPOSED OF PROPERLY, UNLESS DOING SO CONFLICTS WITH LOCAL REQUIREMENTS. (SCHEDULE A.8.C.III(1) AND D.3.C.II AND III)

ODEQ STANDARD INSPECTION SCHEDULE:

Site Condition	Minimum Frequency
1. Active Period	Daily when stormwater runoff, including runoff from snow melt is occurring. At least once every 14 days, regardless of whether stormwater runoff is occurring.
2. Prior to the site becoming inactive or in anticipation of site inaccessibility	Once to ensure that erosion and sediment control measures are in working order. Any necessary maintenance and repair must be made prior to leaving the site.
3. Inactive periods greater than 14 consecutive calendar days	Once every month.
4. Periods during which the site is inaccessible due to inclement weather.	If practical, inspections must occur daily at a relevant and accessible discharge point of downstream location.
5. Periods during which discharge is unlikely due to frozen conditions.	Monthly. Resume monitoring immediately upon melt, or when weather conditions make discharges likely.



**ELMER DAM
EROSION AND SEDIMENT CONTROL NOTES**

OREGON PROJECT NO. 703-19 SCALE: NTS COVE

CHECKED BY: NK
PLOT DATE: 6/29/22

DESIGNED BY: JB/LA/KD
DRAWN BY: DATE DESCRIPTION

SHEET EC2



EXPIRATION DATE: 6-30-25

HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

1. STATE AND FEDERAL PERMITS.

- A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.

2. TIMING OF IN-WATER WORK.

- A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
- B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
- C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
- D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
- E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS.

- A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
- B. THE SITE ASSESSMENT WILL SUMMARIZE:
 - 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
 - 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
 - 3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
 - 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING.

- A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
- B. AREAS TO BE FLAGGED WILL INCLUDE:
 - 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
 - 2. EQUIPMENT ENTRY AND EXIT POINTS;
 - 3. ROAD AND STREAM CROSSING ALIGNMENTS;
 - 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
 - 5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS.

- A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.
- B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.
- C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
- D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
- E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
- F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL ESA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.

6. TEMPORARY STREAM CROSSINGS.

- A. EXISTING STREAM CROSSINGS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
- B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
- C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
 - 1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
 - 2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
 - 3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
 - 4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS.

- A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND. STAGING AREAS CLOSER THAN 150 FEET WILL BE APPROVED BY THE EC LEAD.
- B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
- C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
- D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT.

- A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
- B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES;

- C. EQUIPMENT WILL BE REFUELED IN A VEHICLE STAGING AREA OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);
- D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
- E. EQUIPMENT WILL BE INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND
- F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

9. EROSION CONTROL.

- A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
 - 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
 - 2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
 - 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
 - 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
 - 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
 - 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 - 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 - 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT.

- A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.
- B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
- C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.
- D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
- E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
- F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.



EXPIRATION DATE: 6-30-25

PROJECT DESIGN AND SITE PREPARATION (CONTINUED).

11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES

- A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
- B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
- C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
- D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
- E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.
- F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

12. INVASIVE SPECIES CONTROL

- A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
- B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
- C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

WORK AREA ISOLATION AND FISH SALVAGE

1. WORK AREA ISOLATION

- A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300- FEET UPSTREAM FROM KNOWN SPAWNING HABITATS.
- B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.
- C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).
- D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

2. FISH SALVAGE

- A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).
- B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, TYPICALLY PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES WHICH OCCUR IN THE MORNING VERSUS LATE IN THE DAY.
- C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODOLOGIES, AND CONSERVATION MEASURES SPECIFIED BELOW:
 - 1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLITIONALLY.
 - 2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
 - 3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.
 - 4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE.

- 5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.
 - 6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.
 - 7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
 - 8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
 - 9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
 - 10. ELECTROFISH TO CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.
 - 11. CONTINUE TO SLOWLY DEWATER STREAM REACH.
 - 12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.
 - 13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.
 - 14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.
 - 15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.
 - 16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.
 - 17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.
- D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH.

- 1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.
- 2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION.
- 3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
- 4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.
- 5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.
- 6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).
- 7. SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).
- 8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.
- 9. MUSSELS MAY BE TRANSFERRED IN COOLERS.
- 10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT.

3. ELECTROFISHING

- A. INITIAL SITE SURVEY AND INITIAL SETTINGS.
 - 1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID.
 - 2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18 DEGREES CELSIUS.
 - 3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.
 - 4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.
 - 5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK.

B. ELECTROFISHING TECHNIQUE.

- 1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.
- 2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.
- 3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.
- 4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS. MAXIMUM PULSE RATE IS 70 HERTZ
- 5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.
- 6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.
- 7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.
- 8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).
- 9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.

C. SAMPLE PROCESSING.

- 1. FISH SHOULD BE SORTED BY SIZE TO AVOID PREDATION DURING SAMPLING.
- 2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.
- 3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES
- 4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

D. BULL TROUT ELECTROFISHING.

- 1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN FMO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.
- 2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.

E. LARVAL LAMPREY ELECTROFISHING.

- 1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.
- 2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".
- 3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS). BURSTED PULSES (THREE SLOW AND ONE SKIPPED) RECOMMENDED TO INCREASE EMERGENCE.
- 4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.
- 5. USE DIP NETS FOR VISIBLE LAMPREY. SIENES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.
- 6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.
- 7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.
- 8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).

USER:JOHN LOCATION:C:\USERS\JOHN\ONE CONSULTING\WORK - DOCUMENTS\ELMER DAM\GROUP - ELMER DAM\GAD\PROJECTS - DOCUMENTS\ELMER DAM\ELM.DWG:220628.DWG

OREGON
 ELMER DAM
 HIP IV CONSERVATION MEASURES SHEET 2
 PROJECT NO. 703-19
 SCALE: NTS
 COVE

DESIGNED BY: BK	CHECKED BY: NK
DRAWN BY: JB/LA/KD	PLOT DATE: 6/29/22
DATE	DESCRIPTION



WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).

4. DEWATERING.

- A. DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- B. WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- C. WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- D. DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- E. SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.

1. FISH PASSAGE.

- A. FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVISEMENT BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER.

- A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
- C. CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

3. TIME AND EXTENT OF DISTURBANCE.

- A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
- B. MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

4. CESSATION OF WORK.

- A. PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).
- B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

5. SITE RESTORATION.

- A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
- B. PROJECT-RELATED WASTE WILL BE REMOVED.
- C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
- D. THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

6. REVEGETATION.

- A. PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

- B. A MIX OF NATIVE SPECIES (INVASIVE SPECIES NOT ALLOWED) APPROPRIATE TO THE SITE WILL BE USED TO REESTABLISH VEGETATION, PROVIDE SHADE, AND REDUCE EROSION. REESTABLISHED VEGETATION SHOULD BE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN THREE YEARS.
- C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.
- D. SHORT-TERM STABILIZATION MEASURE MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, OR OTHER SIMILAR TECHNIQUES.
- E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.
- F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
- G. INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY THREE YEARS POST-CONSTRUCTION).

7. SITE ACCESS AND IMPLEMENTATION MONITORING.

- A. THE PROJECT SPONSOR WILL PROVIDE CONSTRUCTION MONITORING DURING IMPLEMENTATION TO ENSURE ALL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED, EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED, AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.
- B. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL SUBMIT THE PROJECT COMPLETION FORM (PCF) WITHIN 30 DAYS OF PROJECT COMPLETION.

8. CWA SECTION 401 WATER QUALITY CERTIFICATION.

- A. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS (SEE TURBIDITY MONITORING) TO ENSURE IN-WATER WORK IS NOT DEGRADING WATER QUALITY.
- B. DURING CONSTRUCTION, WATER QUALITY PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

9. STAGED REWATERING PLAN.

- A. WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- B. THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
 - 1. TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
 - 2. PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
 - 3. INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
 - 4. STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
 - 5. INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
 - 6. REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
 - 7. INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
 - 8. INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
 - 9. IN LAMPREY SYSTEMS, PERFORM LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

10. TURBIDITY MONITORING.

- A. RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- B. RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
 - 1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
 - 2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
 - 3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
 - 4. 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
- C. TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- D. IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- E. IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- F. IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- G. FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

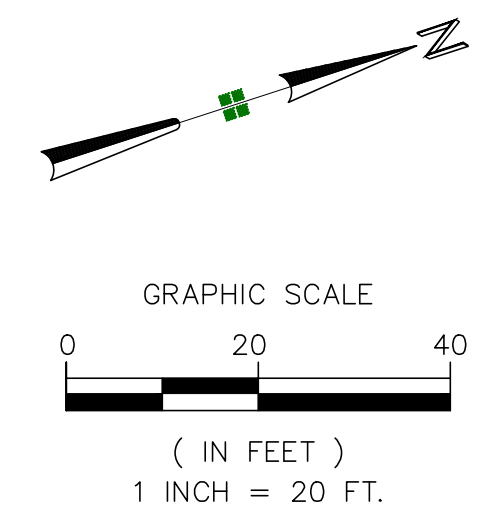
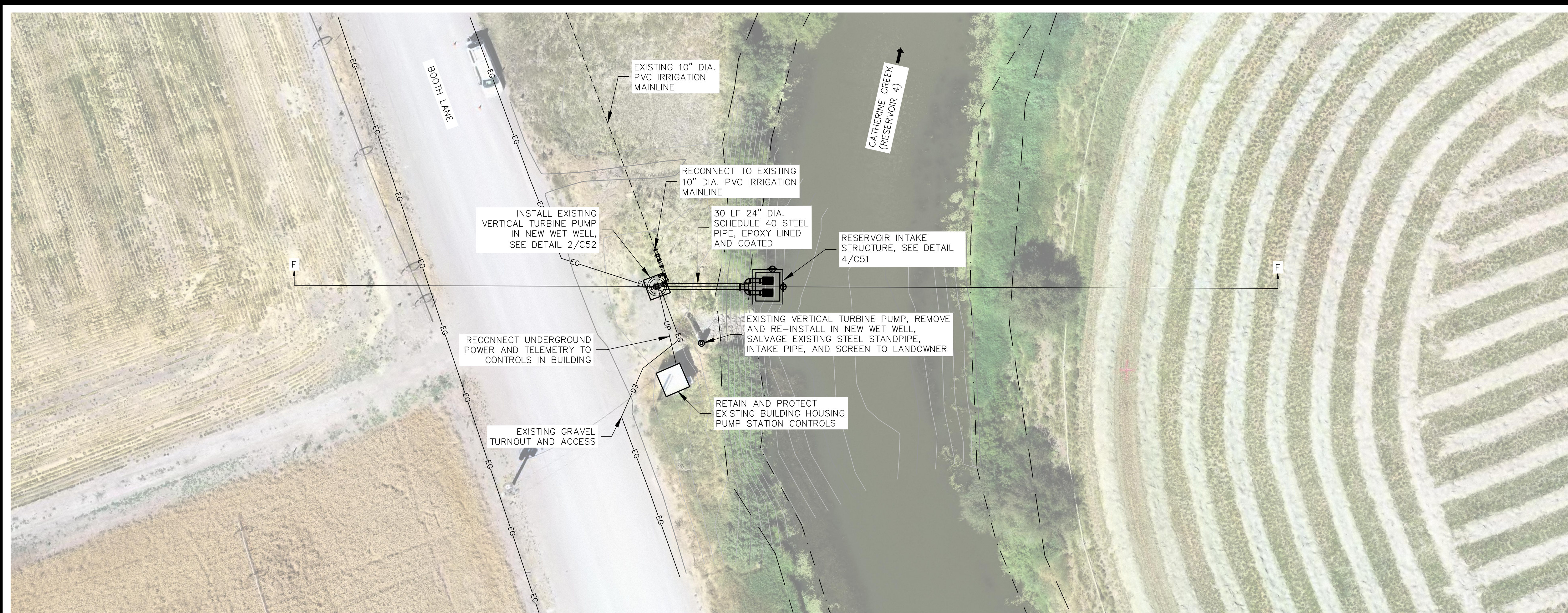
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OREGON
 ELMER DAM
 HIP IV CONSERVATION MEASURES SHEET 3
 PROJECT NO. 703-19
 SCALE: NTS
 COVE

DESIGNED BY: [BLANK]	CHECKED BY: NK
DRAWN BY: [BLANK]	PLOT DATE: 6/29/22
DATE	DESCRIPTION



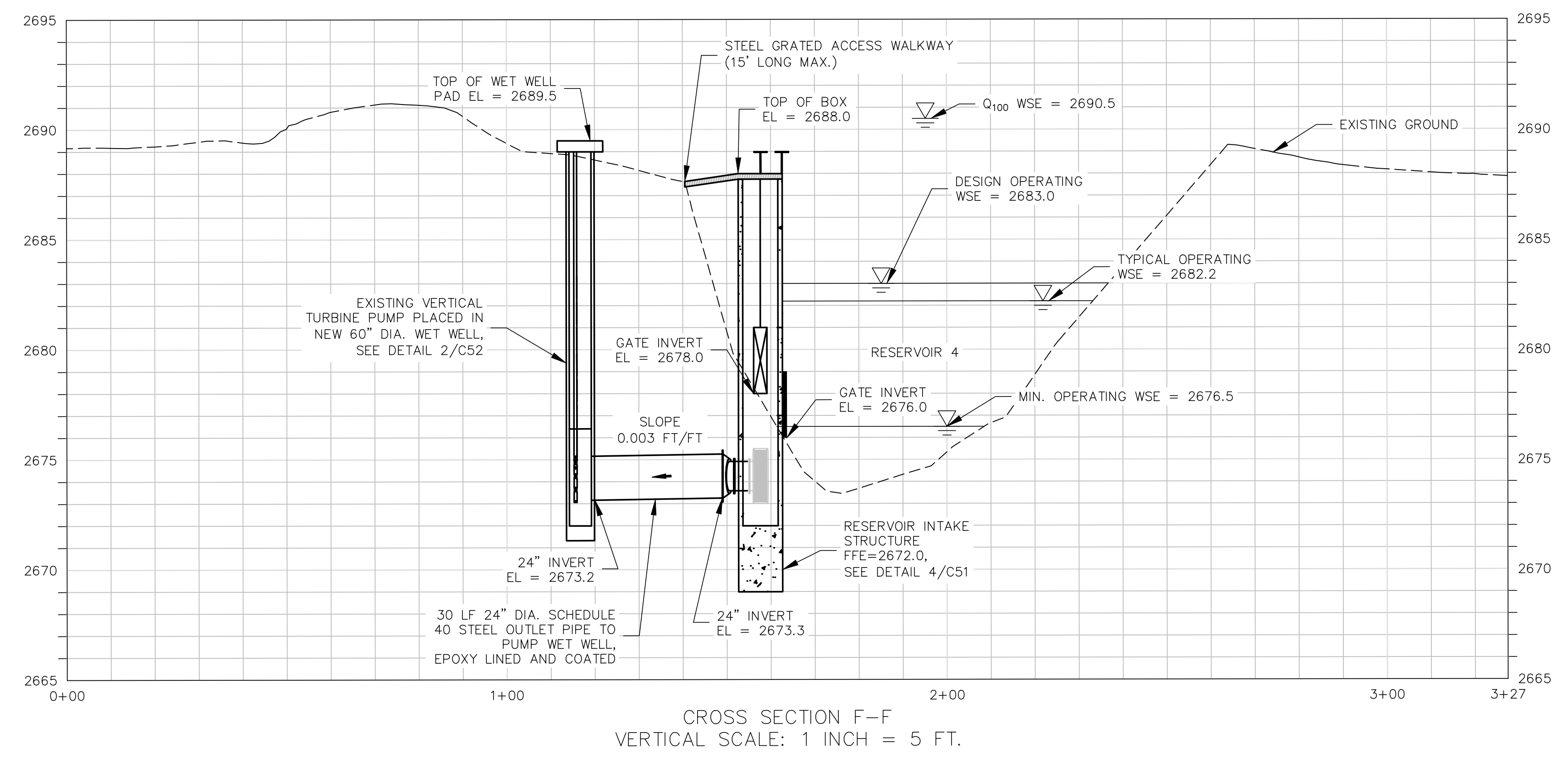
EXPIRATION DATE: 6-30-25



- LEGEND**
- FLOW ARROW
 - TOP BANK OF RIVER/RESERVOIR
 - - - TOE OF RIVER/RESERVOIR
 - - - EXISTING IRRIGATION MAINLINES
 - EG — EDGE OF EXISTING ROAD

RESERVOIR INTAKE DESIGN NOTES

1. Q_{max} AT PUMP STATION = 2000 GPM (4.46 CFS)
2. INTAKE SCREEN APPROACH VELOCITY = 0.2 FT/S MAX.



- GENERAL CONSTRUCTION NOTES**
1. LOCATIONS OF EXISTING IRRIGATION PIPELINES SHOWN ON THIS PLAN ARE APPROXIMATE. CONTRACTOR SHALL FIELD VERIFY AND ADJUST NEW PIPELINE LENGTHS AND LOCATIONS AS NECESSARY TO MAKE CONNECTIONS.
 2. PROVIDE AND INSTALL ALL PRESSURIZED PIPELINE FITTINGS AS NECESSARY TO COMPLETE NEW PRESSURIZED IRRIGATION INFRASTRUCTURE AND FOR CONNECTION TO EXISTING SYSTEM.



EXISTING VERTICAL TURBINE PUMP

USER:JOHN LOCATION: C:\USERS\JOHN\ONE DRIVE\PROJECTS - DOCUMENTS\TUXXXX - ELMER DAM (CAD)_GROUP\CAD\ELMER DAM\BOOTH_LANE\202503.DWG

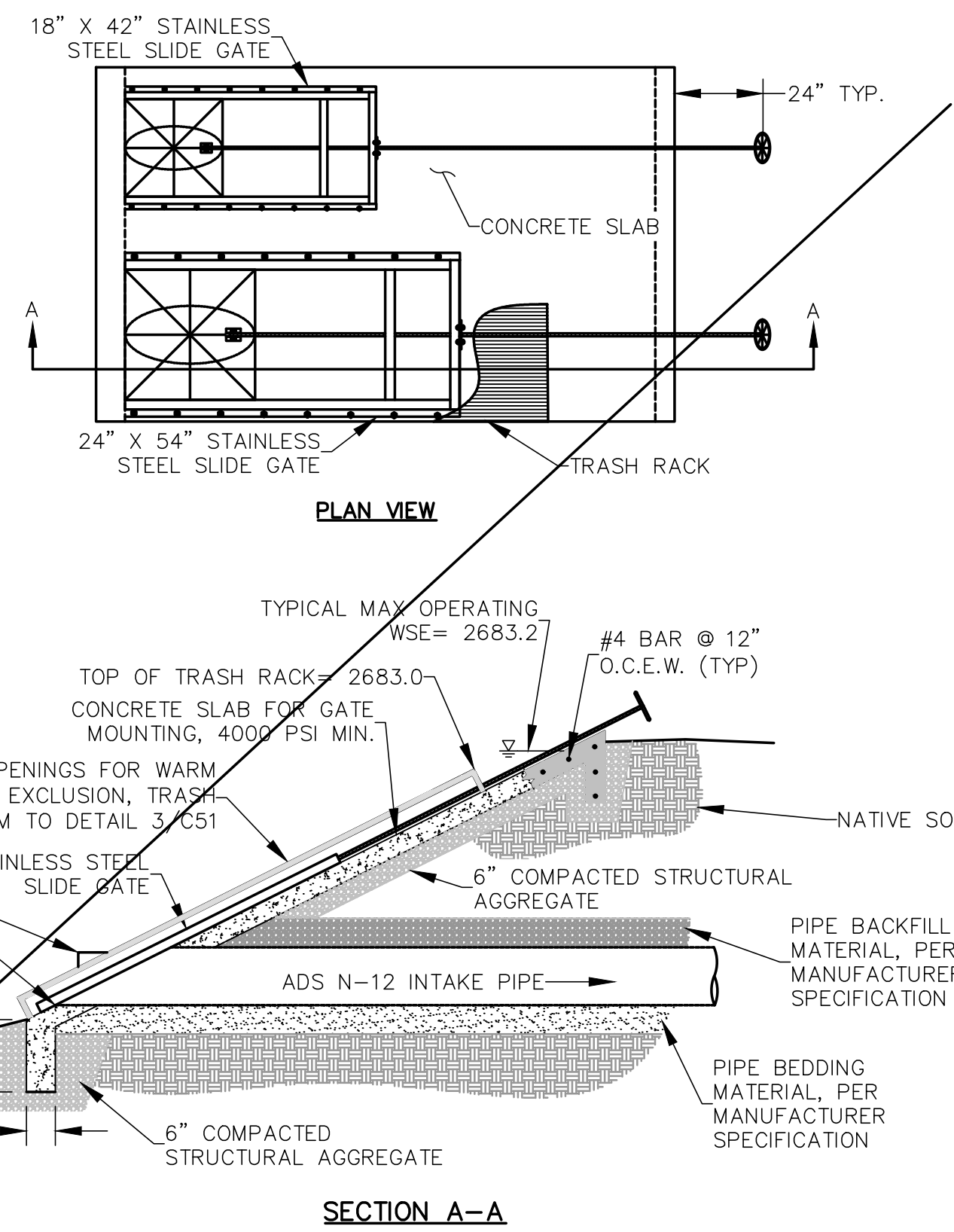
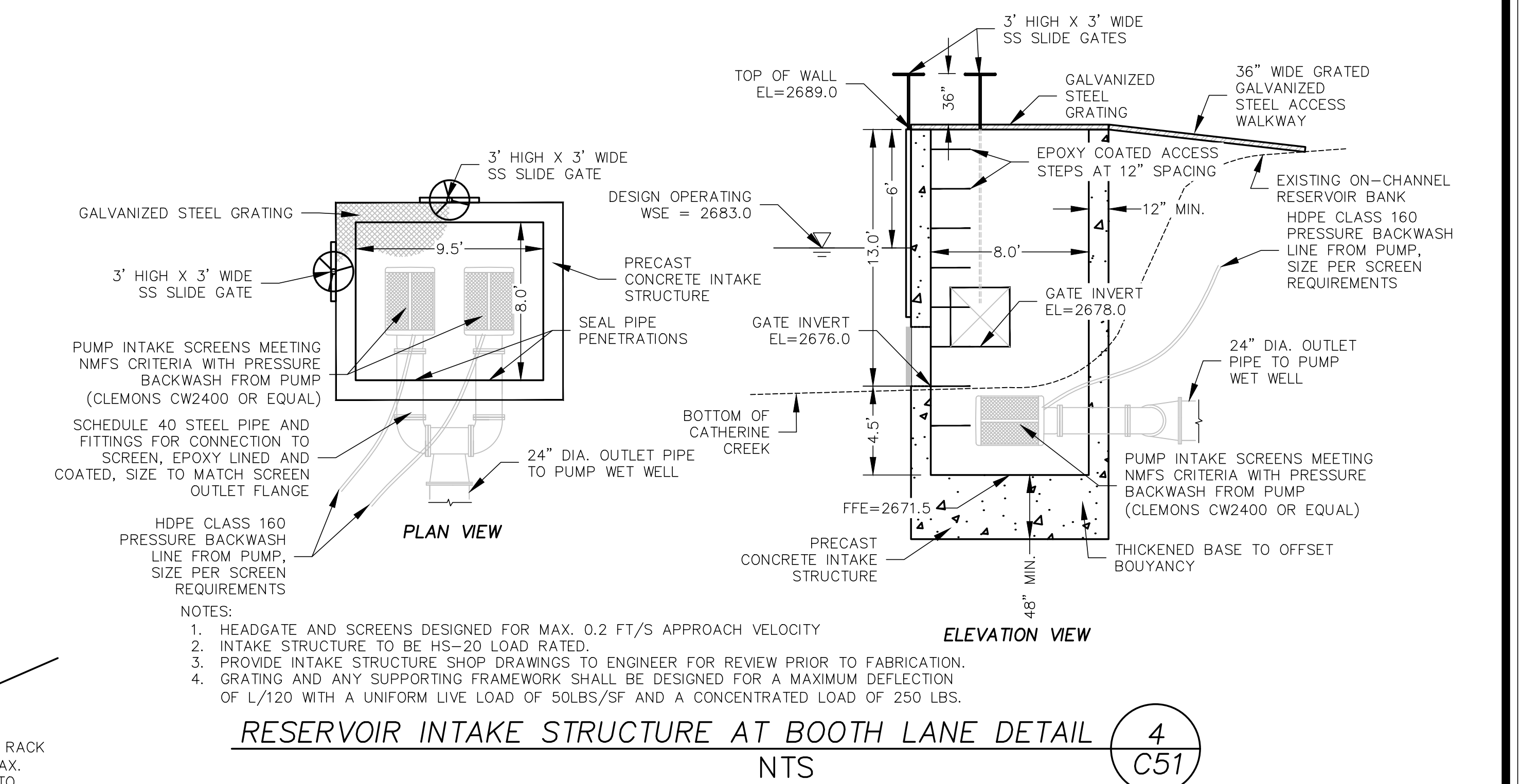
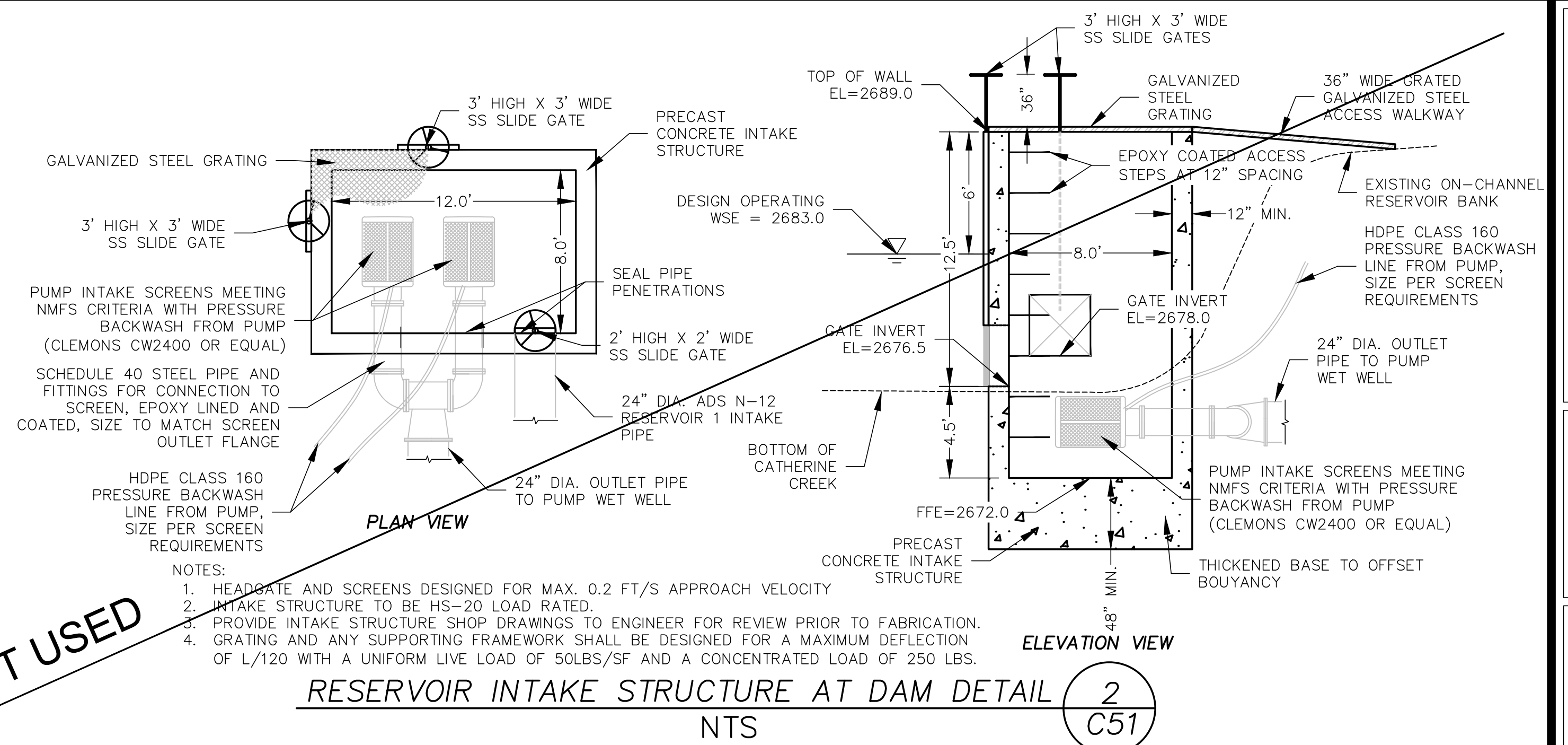


ELMER DAM
BOOTH LANE PUMP STATION PLAN AND PROFILE

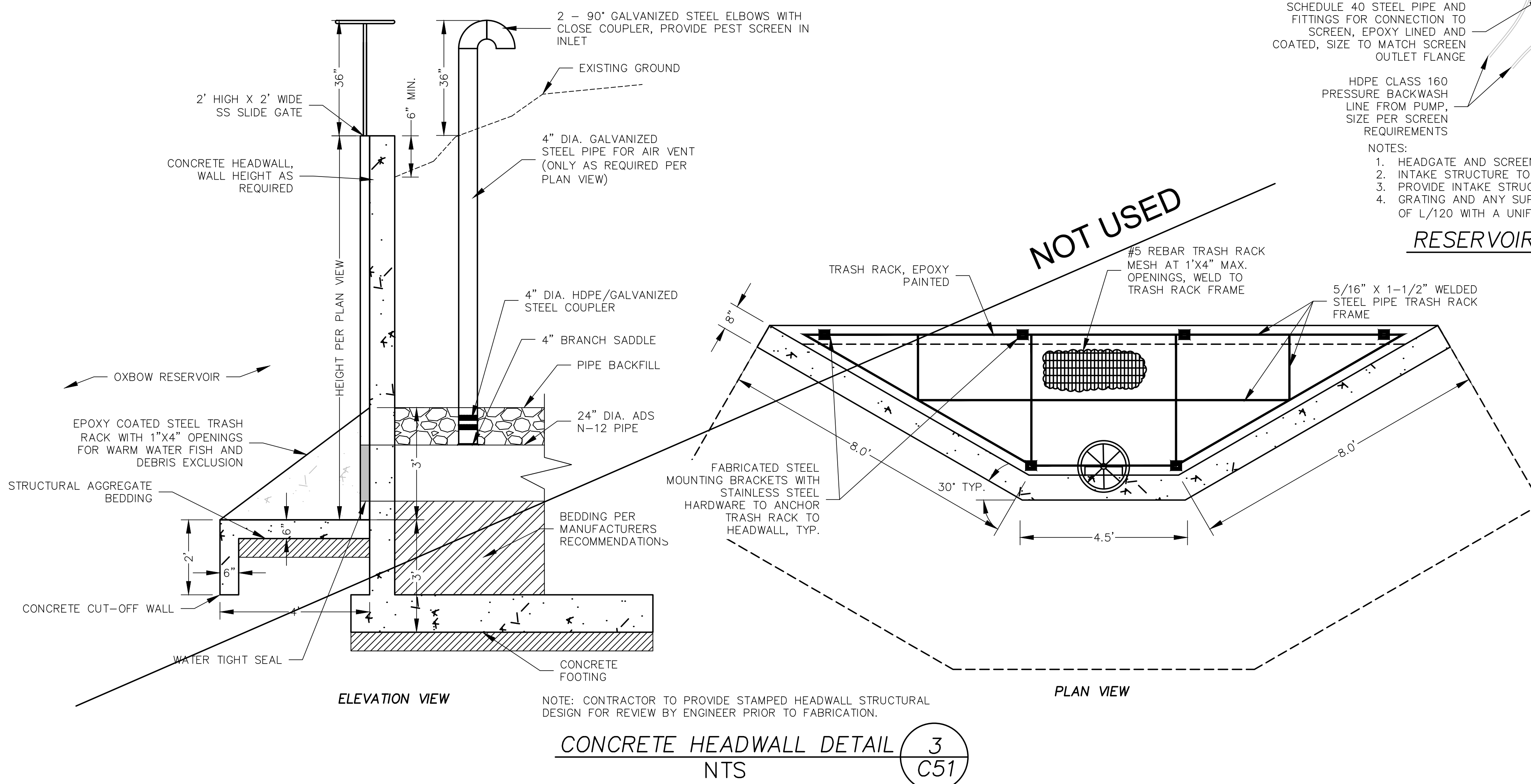
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DATE: 6/29/22	DESCRIPTION:



EXPIRATION DATE: 6-30-25

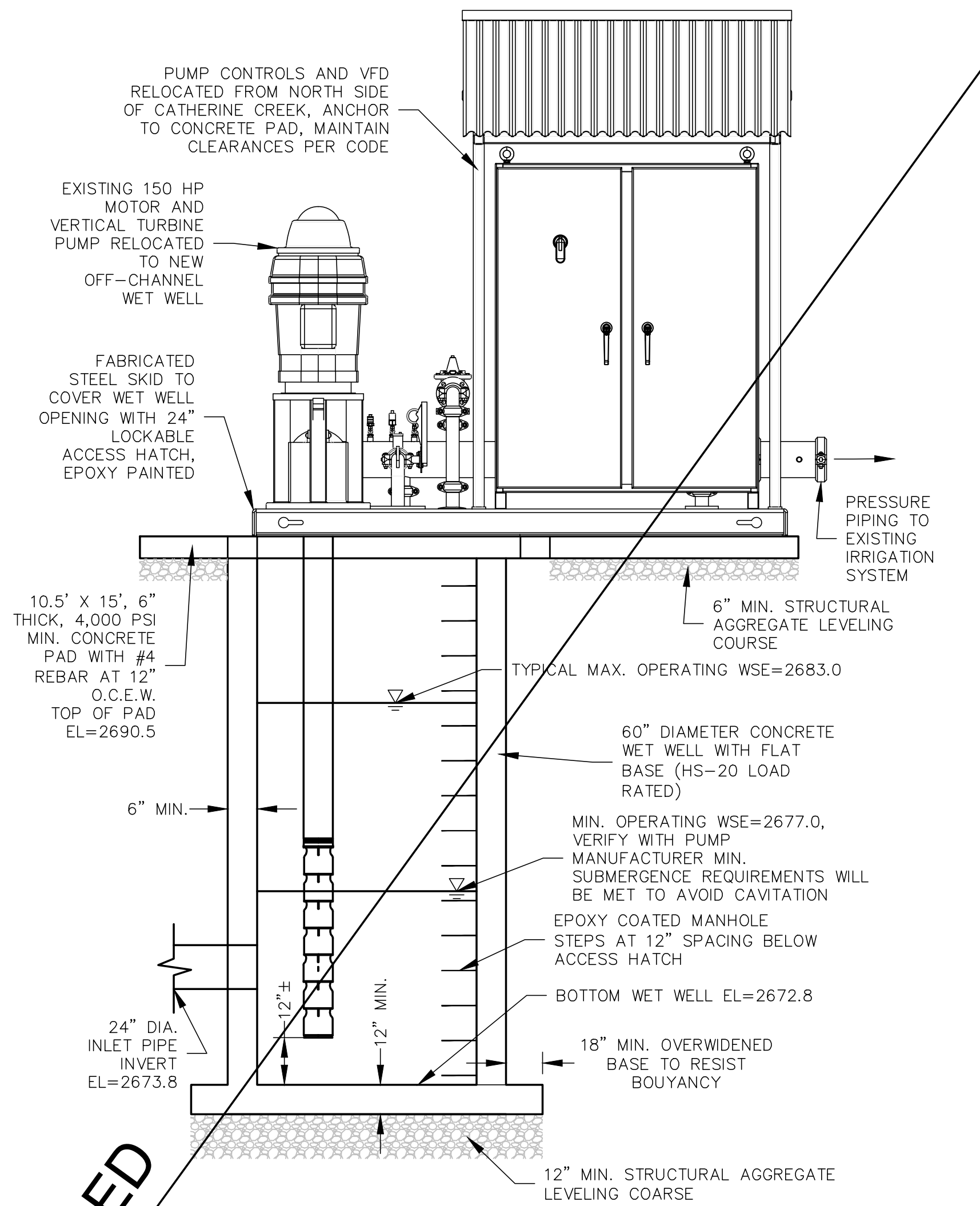


CONCRETE GATE SUPPORT 1
NTS



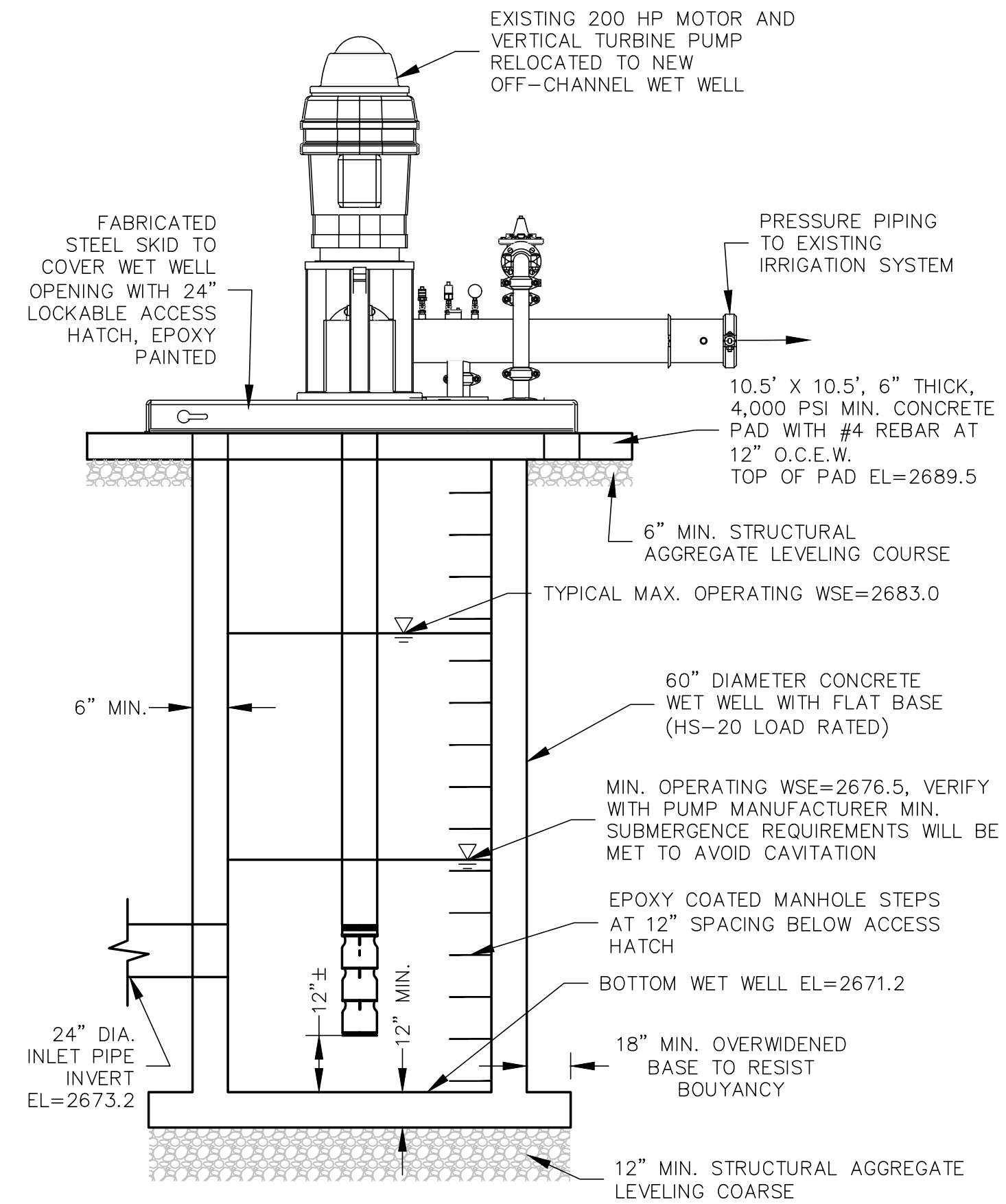
CONCRETE HEADWALL DETAIL 3
NTS

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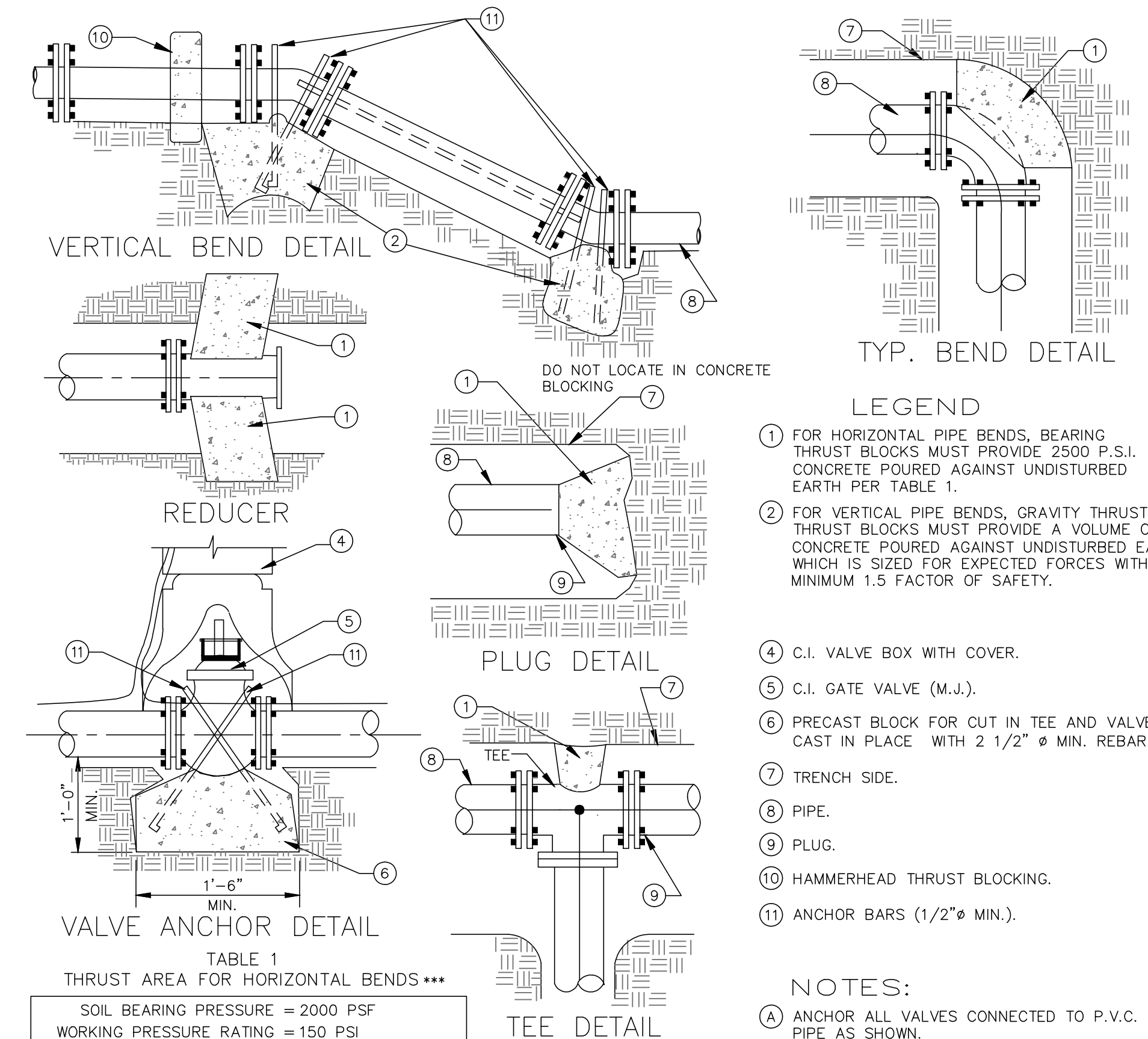
PUMP RE-INSTALLATION AT DAM
NTS

1
C52



PUMP RE-INSTALLATION AT BOOTH LANE
NTS

2
C52



CONCRETE THRUST BLOCK
NTS

3
C52

TABLE 1
THRUST AREA FOR HORIZONTAL BENDS***

SOIL BEARING PRESSURE = 2000 PSF
WORKING PRESSURE RATING = 150 PSI
SAFETY FACTOR = 1.5

PIPE SIZE	MINIMUM SQUARE FEET OF THRUST AREA ONTO UNDISTURBED EARTH*			
	TEE, PLUG OR VALVE	90° BEND**	45° BEND	22.5°, 11.25° BENDS OR REDUCER
3	0.8	1.1	0.6	0.3
4	1.4	2.0	1.1	0.6
6	3.2	4.5	2.4	1.2
8	5.7	8.0	4.3	2.2
10	8.8	12.5	6.8	3.4
12	12.7	18.0	9.7	5.0
14	17.3	24.5	13.3	6.8
16	22.6	32.0	17.3	8.8
18	28.6	40.5	21.9	11.2

* MUST BE INCREASED BASED ON DIFFERENT CONDITIONS (HIGHER WORKING PRESSURE OR LOWER SOIL BEARING STRENGTH).
** OR TEE ACTING AS A 90° BEND.
*** THRUST BLOCK DEPTH TO BE A MINIMUM OF 12" FOR PIPE SIZES 3"-8" AND 18" FOR PIPE SIZES 10"-18" OR THE SQUARE ROOT OF THE REQUIRED BEARING AREA, WHICHEVER IS GREATER.

NOT USED

USER: JAHN LOCATION: C:\USERS\JAHN\ONE CONSULTING\PROJECTS - DOCUMENTS\TULUOKO - ELMER DAM\DWG - GROUP 01\ELMER DAM DETAILS - 04-220223.DWG



EXPIRATION DATE: 6-30-25

GENERAL STRUCTURAL NOTES:

THE FOLLOWING NOTES ARE GENERAL AND APPLY TO THE ENTIRE PROJECT, UNLESS SPECIFICALLY NOTED OTHERWISE (UNO)

1) GENERAL:

- A. CONSTRUCTION DOCUMENTS:
1. THE CONTRACTOR SHALL REVIEW THE APPROVED CONTRACT DOCUMENTS AND NOTIFY THE ENGINEER OF ANY ERRORS OR DISCREPANCIES PRIOR TO THE START OF CONSTRUCTION.
 2. THE CONTRACTOR SHALL FURNISH AND INSTALL EVERYTHING REQUIRED TO PROVIDE A COMPLETE STRUCTURE AS SHOWN HEREIN. IF THERE IS AN OMISSION ON THE PLANS, SUCH OMISSION SHALL NOT BE CONSTRUED TO MEAN THAT THE CONTRACTOR IS NOT REQUIRED TO FURNISH OR PROVIDE EVERYTHING THAT IS NECESSARY TO COMPLETE THE PROJECT TO THE MINIMUM REQUIREMENTS OF THE IBC AND ALL OTHER SPECIFICATIONS, CODES AND STANDARDS NOTED ON THE APPROVED CONTRACT DOCUMENTS.
 3. THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY IF ANY UNIDENTIFIED EXISTING UNDERGROUND UTILITIES ARE DISCOVERED. THE ENGINEER IS NOT RESPONSIBLE FOR THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES WHETHER OR NOT SHOWN ON THE DRAWINGS.
 4. THE STRUCTURAL CONTRACT DOCUMENTS REPRESENT THE FINISHED STRUCTURE. THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT ARE NOT LIMITED TO, BRACING AND/OR SHORING FOR LOADS DUE TO CONSTRUCTION EQUIPMENT, ETC. CONTRACTOR AT HIS/HER OWN EXPENSE SHALL ENGAGE PROPERLY QUALIFIED PERSONS TO DESIGN BRACING, SHORING, ETC. OBSERVATION VISITS TO THE SITE BY THE ENGINEER SHALL NOT INCLUDE OBSERVATION OF THE ABOVE NOTED ITEMS.
 5. UNDER NO CIRCUMSTANCES CAN STRUCTURAL COMPONENTS BE SUBSTITUTED, OMITTED, OR ALTERED FROM THE APPROVED SET OF CONSTRUCTION DOCUMENTS WITHOUT WRITTEN APPROVAL FROM THE ENGINEER.

- B. DIMENSIONS AND NOTATIONS:
1. WRITTEN DIMENSIONS SHALL TAKE PRECEDENCE OVER SCALED DIMENSIONS. DO NOT SCALE DRAWINGS.
 2. ABBREVIATIONS USED ON THE APPROVED CONTRACT DOCUMENTS SHALL BE CONSIDERED TYPICAL ABBREVIATIONS FOR THE INDUSTRY. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY THE ENGINEER IMMEDIATELY OF ANY ABBREVIATIONS THAT ARE UNKNOWN TO THE CONTRACTOR.

- C. SHOP DRAWINGS:
1. SHOP DRAWINGS, AS REQUIRED PER THESE STRUCTURAL NOTES, SHALL BE SUBMITTED TO THE ENGINEER IN A TIMELY FASHION PRIOR TO FABRICATION TO ALLOW FOR PROPER REVIEW.
 2. SHOP DRAWING ITEMS SHALL NOT BE INSTALLED UNTIL THE CONSTRUCTION DOCUMENTS HAVE BEEN APPROVED BY THE BUILDING OFFICIAL AND SHOP DRAWINGS HAVE BEEN APPROVED BY THE ENGINEER.
 3. DURING SHOP DRAWING REVIEW, DIMENSIONS AND QUANTITIES ARE NOT REVIEWED BY THE ENGINEER AND MUST BE VERIFIED BY THE CONTRACTOR. THE CONTRACTOR SHALL REVIEW AND STAMP SHOP DRAWINGS PRIOR TO REVIEW BY ENGINEER.

- D. SPECIAL INSPECTION:
1. THE OWNER SHALL EMPLOY A SPECIAL INSPECTION SERVICE AS REQUIRED PER THESE STRUCTURAL NOTES.

- E. TYPICAL NOTES AND DETAILS:
1. SPECIFIC NOTES AND DETAILS SHALL TAKE PRECEDENCE OVER STANDARD TYPICAL NOTES AND DETAILS.
 2. STANDARD TYPICAL NOTES AND DETAILS ARE TO BE USED WHEN REFERRED TO OR WHEN NO OTHER MORE RESTRICTIVE OR DIFFERENT DETAILS ARE SHOWN ON THE DRAWINGS.
 3. WORK NOT PARTICULARLY SHOWN OR SPECIFIED SHALL BE THE SAME AS SIMILAR PARTS THAT ARE SHOWN OR SPECIFIED.

- F. CODE REQUIREMENTS:
1. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING CODES:
 - 2019 OREGON STRUCTURAL SPECIALTY CODE
 - 2018 INTERNATIONAL BUILDING CODE (IBC)
 - ANY OTHER REGULATING AGENCIES WHICH MAY HAVE AUTHORITY OVER ANY PORTION OF THE WORK.
 2. SPECIFICATIONS, CODES AND STANDARDS NOTED SHALL BE OF THE LATEST APPROVED ISSUE, INCLUDING SUPPLEMENTS, UNLESS NOTED OTHERWISE.

2) FOUNDATIONS AND GEOTECHNICAL:

- A. GEOTECHNICAL DESIGN CRITERIA IS BASED ON THE RECOMMENDATIONS CONTAINED IN THE GEOTECHNICAL INVESTIGATION, ELMER DAM RENOVATIONS BY ATLAS TECHNICAL CONSULTANTS, LLC. DATED MAY 19, 2021.
- B. FOR FROST PROTECTION, THE BOTTOM OF ALL EXTERIOR FOOTINGS SHALL BE 24 INCHES MINIMUM BELOW ADJACENT FINISHED GRADE, UNO.
- C. STRUCTURAL BACKFILL SHALL BE COMPACTED TO 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D1557.

3) STRUCTURAL AND MISCELLANEOUS STEEL:

- A. ALL STRUCTURAL STEEL WORK SHALL CONFORM TO THE LATEST EDITION OF THE AISC SPECIFICATIONS.
- B. WELDS: PROVIDE 70ksi LOW HYDROGEN ELECTRODE OR PROCESS IN ACCORDANCE WITH AWS A5.1.
- C. EPOXY BOLT OR EXPANSION BOLT SUBSTITUTIONS FOR EMBEDDED BOLTS IS PROHIBITED WITHOUT WRITTEN CONSENT FROM THE ENGINEER.
- D. ALL STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH THE AISC CODE OF STANDARD PRACTICE, EXCEPT AS MODIFIED IN THESE NOTES AND THE PROJECT SPECIFICATIONS.
- E. SPICING OF STEEL MEMBERS, UNLESS SHOWN ON THE DRAWINGS, IS PROHIBITED WITHOUT WRITTEN APPROVAL OF THE PROJECT ENGINEER.
- F. ALL STEEL SHALL BE GALVANIZED AFTER FABRICATION.

STRUCTURAL AND MISCELLANEOUS STEEL	
WIDE FLANGE SHAPES	ASTM A992
SHAPES, PLATES, BARS	ASTM A36
HSS	ASTM A500, GRADE B
PIPE	ASTM A53, GRADE B
BOLTS	
STEEL TO CONCRETE CONNECTIONS	ASTM A307
STEEL TO STEEL CONNECTIONS	ASTM A325N

4) CONCRETE:

- A. ALL CONCRETE WORK SHALL CONFORM TO THE LATEST EDITION OF ACI 301 AND ACI 117, EXCEPT AS MODIFIED BY THE FOLLOWING SUPPLEMENTAL REQUIREMENTS:
- B. ALL CONCRETE SHALL BE NORMAL WEIGHT CONCRETE.
- C. CONCRETE MIX DESIGN SHALL BE ESTABLISHED IN ACCORDANCE WITH CHAPTER 5 OF ACI 318.
- D. APPROVED ADMIXTURES:
1. FLYASH PER ASTM C-618
 2. AIR ENTRAINING PER ASTM C-260
 3. WATER REDUCING PER ASTM C-494

- E. REINFORCEMENT FOR CONCRETE (STEEL):
1. ALL REINFORCING SHALL BE SUPPORTED IN FORMS SPACED WITH NECESSARY ACCESSORIES AND SHALL BE SECURELY WIRED TOGETHER IN ACCORDANCE WITH THE LATEST EDITION OF THE CRSI "MANUAL OF STANDARD PRACTICE"
 - a) DEFORMED BARS - ASTM A615, GRADE 60

- F. MINIMUM CONCRETE COVER OVER REINFORCEMENT:
1. CAST-IN-PLACE CONCRETE
 - a) CONCRETE CAST AGAINST EARTH = 3"
 - b) ALL OTHER CONCRETE = 2"
- G. SLAB-ON-GRADE REINFORCEMENT SHALL BE PLACED AT THE MID-DEPTH OF THE SLAB, UNO.
- H. FORMWORK: DESIGN, ERECT, SUPPORT, BRACE AND MAINTAIN FORMWORK TO SUPPORT VERTICAL, LATERAL, STATIC AND DYNAMIC LOADS THAT MIGHT BE APPLIED UNTIL STRUCTURE CAN SUPPORT SUCH LOADS.

5) GFRP REINFORCEMENT (GLASS FIBER-REINFORCED POLYMER):

- A. ASTM D7957
B. ULTIMATE TENSILE STRENGTH.

BAR NO	DIA (IN)	MIN STRENGTH (K)
4	0.50	21.6
5	0.625	29.1
6	0.75	40.9
7	0.875	54.1

- C. SEE SPECIFICATIONS FOR REINFORCING PLACEMENT REQUIREMENTS.
D. DAMAGED BARS SHALL NOT BE USED.
E. GFRP REINFORCEMENT SHALL MATCH SIZE AND SPACING OF REINFORCEMENT INDICATED ON STRUCTURAL SHEETS.

STANDARD STRUCTURAL SPECIAL INSPECTION			
SPECIAL INSPECTION TABLE			
SPECIAL INSPECTION ITEM	CONTINUOUS INSPECTION	PERIODIC INSPECTION	NOTES
1. STRUCTURAL AND LIGHT GAGE STEEL CONSTRUCTION			
A. STEEL FABRICATED IN AN APPROVED FABRICATION SHOP			FABRICATOR SHALL SUBMIT A CERTIFICATE OF COMPLIANCE STATING THAT THE WORK WAS PERFORMED IN ACCORDANCE WITH THE APPROVED CONSTRUCTION DRAWINGS
B. VERIFY STRUCTURAL STEEL AND METAL DECKING CONFORMS TO AISC AND THE CONSTRUCTION DOCUMENTS		X	
C. HIGH STRENGTH BOLTING			
1) VERIFY IDENTIFICATION MARKINGS AND THE MANUFACTURERS CERTIFICATE OF COMPLIANCE		X	
2) VERIFICATION OF BOLT TENSION		X	
3) VERIFICATION OF BOLT TENSION WHEN "TURN OF THE NUT" OR "CALIBRATED WRENCH" INSTALLATION METHODS ARE USED	X		
D. WELDING			
1) VERIFY IDENTIFICATION MARKINGS AND THE MANUFACTURERS CERTIFICATE OF COMPLIANCE		X	
2) SINGLE PASS FILLET WELDS 3/16" AND LESS, STEEL STUDS AND WELDING OF STEEL DECK		X	
3) WELDING OF STAIRS AND RAILINGS		X	
4) ALL OTHER WELDS	X		
E. VERIFICATION OF STRUCTURAL STEEL FRAME JOINT DETAILS INCLUDING MEMBER LOCATION, APPLICATION OF JOINT DETAILS AND DETAILS SUCH AS BRACING AND STIFFENING			
		X	
2. CONCRETE CONSTRUCTION			
A. ISOLATED SPREAD FOOTINGS FOR STRUCTURES 3 STORIES OR LESS			SPECIAL INSPECTION IS NOT REQUIRED
B. CONTINUOUS SPREAD FOOTING SUPPORTING WALLS OF LIGHT FRAMED CONSTRUCTION OF 3 STORIES OR LESS AND ARE DESIGNED WITH A COMPRESSIVE STRENGTH OF 2,500 PSI OR LESS REGARDLESS OF THE CONCRETE STRENGTH			SPECIAL INSPECTION IS NOT REQUIRED
C. CONCRETE SLABS AND SIDEWALKS DIRECTLY SUPPORTED ON THE GROUND			SPECIAL INSPECTION IS NOT REQUIRED
D. INSPECTION OF FORMWORK FOR SHAPE, SIZE AND LOCATION OF CONCRETE MEMBERS		X	
E. VERIFICATION OF STEEL MATERIAL, SIZE AND LOCATION		X	
F. VERIFICATION OF BOLTS STUDS OR ANCHORS EMBEDDED IN CONCRETE FOR LOCATION, SIZE AND CONFIGURATION	X		SPECIAL INSPECTION IS NOT REQUIRED WHERE BOLTS HAVE BEEN DESIGNED WITH HALF STRESSED
G. VERIFY THE USE OF THE REQUIRED MIX DESIGN		X	
H. SAMPLING OF FRESH CONCRETE FOR COMPRESSIVE STRENGTH, AIR CONTENT, SLUMP, AND TEMPERATURE	X		
I. INSPECTION FOR THE MAINTENANCE OF CURING TEMPERATURE AND TECHNIQUES		X	
J. INSPECTION OF ANCHORS INSTALLED IN HARDENED CONCRETE		X	SPECIAL INSPECTION IS NOT REQUIRED WHERE ANCHORS HAVE BEEN DESIGNED WITH HALF STRESSES

1

REV	DATE	BY	DESCRIPTION
1	11/06/23	CCB	ADDED FRP CALLOUTS
0	06/17/22	CCB	ISSUED FOR CONSTRUCTION

WARNING

0 1/2 1

IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.



TU/USWCD
ELMER DAM MODIFICATIONS
GENERAL STRUCTURAL NOTES

DESIGNED J. FISHER
DRAWN J. LAHMON
CHECKED C. BOYD
ISSUED DATE 11/06/23

DRAWING
GS1
SCALE: AS NOTED



EXPIRATION DATE: 12/31/2025

Appendix C. Final Project Specifications

Booth Lane Wet Well Pump Construction

Technical Specifications Issued For Construction



EXPIRATION DATE: 12/31/2025



EXPIRATION DATE: 6-30-25

Prepared For: Union Soil & Water
Conservation District

Prepared By: QRS Consulting, LLC



April 2024

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Division 35 – Waterway and Marine Construction

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SECTION 02 22 00 - SITE CONDITIONS SURVEYS

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall conduct thorough pre-construction and post-construction Site conditions surveys of the entire Project. Site conditions surveys shall consist of photographs and video tape recordings.

1.2 CONTRACTOR SUBMITTALS

- A. Videotape surveys, photographs, and other data of the preconstruction conditions shall be submitted to the ENGINEER for record purposes prior to, but not more than three weeks before, commencement of any construction activities.
- B. Except as otherwise indicated, post-construction topographic mapping shall be submitted to the ENGINEER within 60 days of completing WORK.
- C. A complete set of all photographs and survey data of the post-construction conditions shall be completed and submitted prior to final inspection by the OWNER and ENGINEER.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PHOTOGRAPHS AND VIDEO RECORDINGS

- A. CONTRACTOR, as a minimum, shall document pre- and post-construction conditions by preparing videotape surveys of the following:
 - 1. Roadways used to access the Site or haul materials and equipment to the Site.
 - 2. Work areas, including actual work sites, materials processing and stockpiling areas, access corridors, disposal areas, and staging areas.
 - 3. Any work completed by other contractors at the Site that will be connected to or otherwise affected by the WORK.
 - 4. Driveways, sidewalks, and buildings which might be affected by the WORK.
- B. Supplement videotape surveys with photographs and spot elevation surveys as required to thoroughly document the original condition and location of existing features and facilities.

- END OF SECTION -

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SECTION 02 41 00 – DEMOLITION, SALVAGE, AND REHABILITATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall demolish and reconstruct existing civil, landscaping, structural, architectural, and mechanical facilities as indicated, in accordance with the Contract Documents.

1.2 COORDINATION

- A. The CONTRACTOR shall carefully coordinate the WORK in areas where existing facilities are interconnected with new facilities and where existing facilities remain operational. The WORK as indicated is not all inclusive, and the CONTRACTOR shall be responsible to perform the reconstruction indicated plus that which can be reasonably inferred from the Contract Documents as necessary to complete the Project. The Specifications and Drawings identify the major facilities that shall be demolished and reconstructed, but auxiliary utilities such as water, air, chemicals, drainage, lubrication, fluid power, electrical wiring, controls, and instrumentation are not necessarily shown.
- B. The CONTRACTOR shall note that the Drawings used to indicate demolition and reconstruction are based on record drawings of the existing facilities. These record drawings have been reproduced to show existing conditions and to clarify the scope of WORK as much as possible. Prior to bidding, the CONTRACTOR shall conduct a comprehensive survey at the Site to verify the correctness and exactness of the Drawings, the scope of WORK, and the extent of auxiliary utilities.
- C. While demolition and reconstruction are being performed, the CONTRACTOR shall provide adequate access for the continued operation and maintenance of the facilities. The CONTRACTOR shall erect and maintain fences, warning signs, barricades, and other devices around the reconstruction as required for the protection of the CONTRACTOR's employees and the OWNER's personne. The CONTRACTOR shall remove such protection when reconstruction activities are complete, or as work progresses, or when directed by the ENGINEER.

1.3 CONTRACTOR SUBMITTALS

- A. Demolition and reconstruction activities and procedures, including operational sequence, shall be submitted to the ENGINEER for approval. The procedures shall provide for safe conduct of the WORK, careful removal and disposition of materials and equipment, protection of existing facilities which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection and reconnection of utility services. The procedures shall include a detailed description and time schedule of the methods and equipment to be used for each operation and the sequence of operation. A storage plan for salvaged items shall be included.

1.4 DEMOLITION

- A. Existing pavement, structures, equipment, piping, valves, and related appurtenances such as anchors, supports, and hardware indicated or required to be demolished as part

of the WORK shall be removed and disposed of unless otherwise indicated. Removal of buried structures, utilities, and appurtenances includes the related excavation and backfill as required. Removed items shall be disposed of offsite by the CONTRACTOR.

1.5 EXISTING LEAD BASED COATING SYSTEMS

- A. It is unknown whether the existing coating systems at the project site, including those that are utilized on the existing miscellaneous metal and hand-rail systems, are lead-based paint (LBP) coatings or not. The CONTRACTOR shall conduct all of the demolition and disposal work in accordance with all local, state, and federal laws and regulations.

1.6 REHABILITATION

- A. Existing civil, landscaping, structural, architectural, mechanical, HVAC, electrical, and instrumentation WORK disturbed or damaged by reconstruction activities shall be repaired and rehabilitated.
- B. Damaged items shall be repaired or replaced with new items to restore items or surfaces to a condition equal to and matching that existing prior to damage.

1.7 DISPOSAL

- A. The CONTRACTOR shall be responsible for the offsite disposal of debris resulting from reconstruction in compliance with local, state, and federal codes and requirements.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 GENERAL

- A. The CONTRACTOR shall coordinate demolition and reconstruction WORK with the OWNER and ENGINEER. Unless otherwise indicated, the CONTRACTOR shall be responsible for the sequence of activities. WORK shall be performed in accordance with applicable safety rules and regulations.
- B. The CONTRACTOR shall verify that any utilities connected to structures, equipment, and facilities to be removed, relocated, salvaged, replaced, or abandoned are rendered inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with demolition and reconstruction.
- C. The CONTRACTOR shall take precautions to avoid damage to adjacent facilities and to limit the WORK activities to the extent indicated. If reconstruction beyond the scope indicated is required, the CONTRACTOR shall obtain approval from the ENGINEER prior to commencing.

3.2 PROTECTION OF EXISTING FACILITIES

- A. Before beginning any reconstruction, the CONTRACTOR shall carefully survey the existing facilities and examine the Specifications and Drawings to determine the extent

of reconstruction and coordination with the WORK. Existing facilities not subject to reconstruction shall be protected and maintained in accordance with the contract requirements. Damaged existing facilities shall be repaired to the previous condition or replaced.

- B. Persons shall be afforded safe passages around areas of demolition.
- C. Structural elements shall not be overloaded. The CONTRACTOR shall be responsible for shoring, bracing, or adding new supports as may be required for adequate structural support as a result of WORK performed under this Section. The CONTRACTOR shall remove temporary protection when the WORK is complete or when so authorized by the ENGINEER.
- D. The CONTRACTOR shall carefully consider bearing loads and capacities before placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the CONTRACTOR shall consult with the ENGINEER prior to the placement of such equipment or material.

3.3 DEMOLITION, SALVAGE, AND RELOCATION

- A. The Contract Documents indicate existing facilities to be demolished, salvaged, and/or relocated. Auxiliary utilities including such services as water, air, chemicals, drainage, lubrication, fluid power, electrical wiring, controls, and instrumentation are not necessarily indicated. The removal of existing facilities for demolition, salvage, and relocation shall include the following requirements:
 - 1. The area shall be thoroughly cleaned such that little or no evidence of the previous equipment installation will remain.
 - 2. Asphalt and concrete pavement, curbs, and gutters shall be removed as necessary to perform reconstruction. The limits of removal shall be sawcut. When the required improvements have been constructed, new asphalt and concrete pavement, curbs, and gutters shall be placed to match the original unless otherwise indicated.
 - 3. Footings, foundation walls, below-grade construction and concrete slabs on grade shall be demolished and removed to a depth which will not interfere with new construction, but not less than 24-inches below existing ground surface or future ground surface, whichever is lower.
 - 4. Below-grade areas and voids resulting from demolition of structures shall be completely filled. Fill and compaction shall be in accordance with Section 31 30 00 - Earthwork. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

3.4 REHABILITATION

- A. Certain areas of existing structures, piping, conduits, and the like will be affected by WORK necessary to complete modifications under this Contract. The CONTRACTOR shall be responsible to rehabilitate those areas affected by its construction activities.

3.5 DISPOSAL

- A. Demolition and removal of debris shall minimize interference with roads, streets, walks, and other adjacent occupied or used facilities which shall not be closed or obstructed without permission from the OWNER. Alternate routes shall be provided around closed or obstructed traffic ways.
- B. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed of. Structures and equipment to be demolished shall be cleaned prior to demolition and the wash water properly disposed of. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.
- C. Refuse, debris, and waste materials resulting from demolition and clearing operations shall not be burned.

3.6 OCCUPANCY AND POLLUTION CONTROL

- A. Water sprinkling, temporary enclosures, chutes, and other suitable methods shall be used to limit dust and dirt rising and scattering in the area. The CONTRACTOR shall comply with government regulations pertaining to environmental protection.
- B. Water shall not be used if it creates hazardous or objectionable conditions such as ice, flooding, or pollution.

3.7 CLEANING

- A. During and upon completion of WORK, the CONTRACTOR shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by WORK in a clean, approved condition.
- B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as directed by the ENGINEER or governing authorities, and adjacent areas shall be returned to condition existing prior to start of WORK.

- END OF SECTION -

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall provide cast-in-place concrete, joints in concrete, reinforcement steel and appurtenant work, formwork, bracing, shoring, supports, and shall design and construct falsework, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with all contract documents.
- B. Contractor Furnished Designs
 - 1. Concrete structures specified to be designed by the Contractor shall be designed by a Professional Engineer licensed in the State of Oregon. The design shall be completed in accordance with the 2022 Oregon Structural Specialty Code and ACI 350 – Code Requirements for Environmental Engineering Concrete Structures.
 - 2. Contractor furnished designs shall be submitted to the Engineer for approval.
- C. Shop Drawings
 - 1. Shop bending diagrams, placing lists, and drawings of reinforcing steel prior to fabrication.
 - 2. Details of the concrete reinforcing steel and concrete inserts shall be submitted at the earliest possible date after receipt by the CONTRACTOR of the Notice to Proceed. The shop bending diagrams shall show the actual lengths of bars, to the nearest inch measured to the intersection of the extensions (tangents for bars of circular cross section) of the outside surface. Include bar placement diagrams which clearly indicate the dimensions of each bar splice.
 - 3. Where mechanical couplers are required or permitted to be used to splice reinforcing steel, submit manufacturer's literature which contains instructions and recommendations for installation for each type of coupler used; certified test reports which verify the load capacity of each type and size of coupler used; and Shop Drawings that show the location of each coupler with details of how they are to be installed in the formwork.
 - 4. Manufacturer's information demonstrating compliance with requirements of the following:
 - a. Preformed joint filler
 - b. Bond breaker
 - c. Form ties and related accessories

- d. Form gaskets
 - e. Form release agent
 - f. List of form materials and locations of use
 - g. Mill tests for cement
 - h. Admixture certification. Chloride ion content shall be included.
 - i. Aggregate gradation test results and certification
 - j. Materials and methods for curing
5. Placement drawings showing the location and type of joints for each structure.
- D. **Mix Designs:** Prior to beginning the WORK, submit preliminary concrete mix designs which shall show the proportions and gradations of materials proposed for each class and type of concrete. When a water reducing admixture is to be used, the CONTRACTOR shall furnish mix designs for concrete both with and without the admixture.
- E. **Delivery Tickets:** Where ready-mix concrete is used, the CONTRACTOR shall furnish certified delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring, and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amounts of water in the aggregate, added at the batching plant, and the amount allowed to be added at the Site for the specific design mix. In addition, each certificate shall state the mix number, total yield in cubic yards, and the time of day to the nearest minute, corresponding to the time when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

1.3 QUALITY CONTROL

A. Testing of Reinforcing Steel

1. If requested by the ENGINEER, the CONTRACTOR shall furnish samples from each heat of reinforcing steel in a quantity adequate for testing. Costs of initial tests will be paid by the OWNER. Costs of additional tests, if material fails initial tests, shall be the CONTRACTOR's responsibility.

B. Testing of Materials

1. Tests on component materials and for compressive strength of concrete will be performed as indicated herein. Tests for determining slump will be in accordance with the requirements of ASTM C 143 - Standard Test Method for Slump of Hydraulic Cement Concrete.
2. Testing for aggregate shall include sand equivalence, organic impurities, abrasion resistance, and soundness in accordance with ASTM C 33 - Concrete Aggregates.

3. The cost of laboratory tests on cement, aggregates, and concrete, will be paid by the OWNER. However, the CONTRACTOR shall pay the cost of any additional tests and investigations on WORK that does not meet the Specifications. The laboratory will meet or exceed the requirements of ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
4. Concrete for testing shall be furnished by the CONTRACTOR at no cost to the OWNER, and the CONTRACTOR shall assist the ENGINEER in obtaining samples and disposal and cleanup of excess material.

C. Field Compression Tests

1. Compression test specimens shall be taken during construction from the first placement of each class of concrete herein and at intervals thereafter as selected by the ENGINEER to insure continued compliance with these Specifications. Each set of test specimens will be a minimum of 4 cylinders.
2. Compression test specimens for concrete will be made in accordance with Section 9.2 of ASTM C 31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field. Specimens will be 6-inches diameter by 12-inches high cylinders.
3. Compression tests will be performed in accordance with ASTM C 39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. One test cylinder will be tested at 7 Days and 2 at 28 Days. The remaining cylinder will be held to verify test results, if needed.

D. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete will be according to the requirements of ACI 350 - Code Requirements for Environmental Engineering Concrete Structures.
2. If any concrete fails to meet these requirements, immediate corrective action shall be taken to increase the compressive strength for subsequent batches of the type of concrete affected.
3. Concrete that fails to meet the ACI requirements and these Specifications is subject to removal and replacement as part of the WORK.

E. **Construction Tolerances:** The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so that the concrete is within the tolerances herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the permissible variation from lines, grades, or dimensions indicated. Where tolerances are not indicated, permissible deviations will be in accordance with ACI 117 - Standard Tolerance for Concrete Construction and Materials.

1. The variation from required lines or grades shall not exceed 1/4-inch in 10-feet and there shall be no offsets or visible waviness in the finished surface.

PART 2 -- PRODUCTS

2.1 FORM AND FALSEWORK MATERIALS

- A. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:
1. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with U.S. Product Standard PS 20 - American Softwood Lumber Standard.
 2. Plywood for concrete formwork shall be new, waterproof, synthetic resin bonded, exterior type Douglas Fir or Southern Yellow Pine plywood manufactured especially for concrete formwork and shall conform to the requirements of PS 1 - Construction and Industrial Plywood for Concrete Forms, Class I, and shall be edge sealed.
 3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade required. Metal forms shall be an approved type that will accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO Ext. Grade.
- B. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to a 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

2.2 FORM TIES

- A. Form ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties or other removable form-tie fasteners having a circular cross-section shall not exceed 1-1/2 inches; and such fasteners shall be such as to leave holes of regular shape for reaming.
- B. Removable taper ties may be used when approved by the ENGINEER.

2.3 REINFORCEMENT STEEL

- A. **General:** Reinforcement steel for cast-in-place reinforced concrete construction shall conform to the following requirements:
1. Bar reinforcement shall conform to the requirements of ASTM A 615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, for Grade 60 Billet Steel Reinforcement, unless otherwise indicated.
 2. Welded wire fabric reinforcement shall conform to the requirements of ASTM A 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement, and the details indicated. Welded wire fabric with longitudinal wire of W4 size wire and smaller shall be either furnished in flat sheets or in rolls with a core diameter of not less than 10-inches. Welded wire fabric with longitudinal wires larger than W4 size shall be furnished in flat sheets only.

B. Accessories

1. Accessories shall include necessary chairs, slab bolsters, concrete blocks, tie wires, dips, supports, spacers, and other devices to position reinforcement during concrete placement. Bar supports shall meet the requirements of the CRSI Manual of Standard Practice including special requirements for supporting epoxy coated reinforcing bars. Wire bar supports shall be CRSI Class 1 for maximum protection with a 1/8-inch minimum thickness of plastic coating which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
2. Concrete blocks (dobies) used to support and position reinforcement steel shall have the same or higher compressive strength than required for the concrete in which they are located. Where concrete blocks are used on concrete surfaces exposed to view, the color and texture of the concrete blocks shall match that required for the finished surface. Wire ties shall be embedded in concrete block bar supports.

2.4 CONCRETE MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.
- B. Materials for the WORK shall comply with the requirements of ACI 350.
- C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.
- D. Materials for concrete shall conform to the following requirements:
 1. Cement shall be standard brand portland cement conforming to ASTM C 150 - Portland Cement for Type II or Type V.
 2. Water shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts, and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.
 3. Aggregates shall conform to ASTM C 33. Maximum size of coarse aggregate shall be as indicated. Lightweight sand for fine aggregate will not be permitted.
 4. Ready-mix concrete shall conform to the requirements of ASTM C 94 - Ready-Mixed Concrete.
 5. Air-entraining agent meeting the requirements of ASTM C 260 – Air Entraining Admixtures for Concrete shall be used. Concrete floors to receive a dry-shake floor hardener shall have an air content not to exceed 3 percent. The OWNER reserves the right, at any time, to sample and test the air-entraining agent. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall

be batched by means of a mechanical batcher capable of accurate measurement. Air content shall be tested at the point of placement.

6. Admixtures: Admixtures may be added at the CONTRACTOR's option to control the set, affect water reduction, and increase workability. In either case, the addition of an admixture shall be at the CONTRACTOR's expense. The use of an admixture shall be subject to acceptance by the ENGINEER. Concrete containing an admixture shall be first placed at a location determined by the ENGINEER. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture. Admixtures shall conform to the requirements of ASTM C 494 - Chemical Admixtures for Concrete. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, shall be non-toxic after 30 Days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
 - a. Concrete shall not contain more than one water-reducing admixture. Concrete containing an admixture shall be first placed at a location determined by the ENGINEER.
 - b. Normal range water reducer shall conform to ASTM C 494, Type A. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
7. Calcium Chloride: Calcium chloride will not be permitted in concrete.

2.5 CURING MATERIALS

- A. Materials for curing concrete shall conform to the following requirements and ASTM C 309 - Liquid Membrane-Forming Compounds for Curing Concrete:
 1. Curing compounds shall be white-pigmented and resin-based. Sodium silicate compounds shall not be allowed. Curing compounds shall meet local VOC requirements.
 2. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6-mils. The loss of moisture when determined in accordance with the requirements of ASTM C 156 - Standard Test Method for Water Retention by Concrete Curing Materials, shall not exceed 0.055 grams per square centimeter of surface.

2.6 JOINT MATERIALS

- A. Materials for joints in concrete shall conform to the following requirements:
 1. Joint filler material shall be of the preformed non-extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction; for Type I, except as otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Epoxy grout for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled.

2.8 CONCRETE DESIGN REQUIREMENTS

A. General

1. Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage, and where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The proportions shall be changed whenever necessary or desirable to meet the required results at no additional cost to the OWNER. Mix changes shall be subject to review by the ENGINEER.
2. The CONTRACTOR is cautioned that the limiting parameters below are **NOT** a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR's construction methods and aggregates. The CONTRACTOR is responsible for providing concrete with the required workability.

- B. **Water-Cement Ratio and Compressive Strength:** The minimum compressive strength and cement content of concrete shall be not less than the following tabulation.

Type of Work / Class of Concrete	Min 28-Day Compressive Strength, (psi)	Max Size Aggregate (inch)	Cement Content, (lbs/cu yd)	Max W/C Ratio (by weight)
Structural concrete	4,000	1	564 to 600	0.45
Lean concrete	2,000	1	376 (min)	0.60

2.9 CONSISTENCY

- A. Consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C 143. The slumps shall be as follows:

Part of Work	Slump (inches)
All concrete unless indicated otherwise	2 to 4
Ductbank and pipe encasement	4 to 6

2.10 MEASUREMENT OF CEMENT AND AGGREGATE

- A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the ENGINEER; provided that, where batches are so proportioned as to contain an integral number of conventional sacks of cement and the cement is delivered at the mixer in the original unbroken sacks, the weight of the cement contained in each sack may be taken without weighing as 94 pounds.

2.11 MEASUREMENT OF WATER

- A. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the ENGINEER and capable of measuring the water in variable amounts within a tolerance of one percent.

2.12 READY-MIXED CONCRETE

- A. At the CONTRACTOR'S option, ready-mixed concrete may be used if it meets the requirements as to materials, batching, mixing, transporting, placing, the supplementary requirements as required herein, and is in accordance with ASTM C 94.
- B. Ready-mixed concrete shall be delivered to the WORK, and discharge shall be completed within one hour after the addition of the cement to the aggregates or before the drum has been revolved 250 revolutions, whichever comes first. In hot weather, under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 45 minutes.
- C. Truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counter shall be actuated at the time of starting the mixer at mixing speed.
- D. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the manufacturer of equipment. Additional mixing, if any, shall be at the speed designated by the manufacturer of the equipment as agitating speed. Materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolutions of mixing.
- E. Each batch of ready-mixed concrete delivered to the WORK shall be accompanied by a delivery ticket furnished to the ENGINEER in accordance with the requirements above.
- F. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. Combination truck and trailer equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the ENGINEER.

PART 3 -- EXECUTION

3.1 GENERAL FORMWORK REQUIREMENTS

- A. Forms to confine the concrete and shape it to the required lines shall be used wherever necessary. The CONTRACTOR shall assume full responsibility for the adequate design of forms, and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and replaced. A sufficient number of forms of each kind shall be available to permit the required rate of progress to be maintained. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state and federal regulations. Design, construction, maintenance, preparation, and removal of forms shall be in accordance with ACI 347 - Guide to Formwork for Concrete and the requirements herein.
- B. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete.

3.2 CONSTRUCTION

- A. **Vertical Surfaces:** Vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member where concrete is permitted to be placed against trimmed ground in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.
- B. **Construction Joints:** When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.
- C. Form Ties
 - 1. **Embedded Ties:** Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties which cause spalling of the concrete upon form stripping or tie removal will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.
 - 2. **Removable Ties:** Where taper ties are approved for use, after the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast

neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink or regular cement grout. Exposed faces of walls shall have at least the outer 2-inches of the exposed face filled with a cement grout which shall match the color and texture of the surrounding wall surface.

3.3 REUSE OF FORMS

- A. Forms may be reused only if in good condition and only if acceptable to the ENGINEER. Light sanding between uses will be required wherever necessary to obtain uniform surface texture on exposed concrete surfaces. Exposed concrete surfaces are defined as surfaces which are permanently exposed to view.

3.4 REMOVAL OF FORMS

- A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete. No heavy loading on green concrete will be permitted. Members which must support their own weight shall not have their forms removed until they have attained at least 75 percent of the 28-Day strength of the concrete. Forms for vertical walls and columns shall remain in place at least 48 hours after the concrete has been placed. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347.

3.5 GENERAL REINFORCEMENT REQUIREMENTS

- A. Reinforcement steel, welded wire fabric, couplers, and other appurtenances shall be fabricated, and placed in accordance with the requirements of the Building Code and the supplementary requirements indicated herein.

3.6 FABRICATION

A. General

1. Reinforcement steel shall be accurately formed to the dimensions and shapes indicated, and the fabricating details shall be prepared in accordance with ACI 315 and ACI 350, except as modified by the Drawings.
2. The CONTRACTOR shall fabricate reinforcement bars for structures in accordance with bending diagrams, placing lists, and placing drawings. Said drawings, diagrams, and lists shall be prepared by the CONTRACTOR.
3. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

- B. **Bending or Straightening:** Reinforcement shall not be straightened or rebent in a manner that will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold unless otherwise permitted by the ENGINEER. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the ENGINEER.

3.7 PLACING

- A. Reinforcement steel shall be accurately positioned as indicated and shall be supported and wired together to prevent displacement, using annealed iron wire ties or suitable clips at intersections. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties which are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.
- B. The portions of accessories in contact with the formwork shall be made of concrete, plastic, or steel coated with a 1/8-inch minimum thickness of plastic which extends at least 1/2-inch from the concrete surface. Plastic shall be gray in color.
- C. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.
- D. Bars additional to those indicated which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR as part of the WORK.
- E. Unless otherwise indicated, reinforcement placing tolerances shall be within the limits specified in ACI 350 except where in conflict with the requirements of the Building Code.
- F. The minimum spacing requirements of ACI 350 shall be followed for reinforcing steel.
- G. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters having gray, plastic-coated standard type legs. Slab bolsters shall be spaced not more than 30-inches on centers, shall extend continuously across the entire width of the reinforcing mat, and shall support the reinforcing mat in the plane indicated.
- H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobbies) spaced not more than 3-feet on centers in any direction. The construction practice of placing welded wire fabric on the ground and hooking into place in the freshly placed concrete shall not be used.

3.8 SPLICING

- A. **General:** Reinforcement bar splices shall only be used at locations indicated. When it is necessary to splice reinforcement at points other than where indicated, the character of the splice shall be reviewed and accepted by the ENGINEER.
- B. Splices of Reinforcement
 - 1. The length of lap for reinforcement bars, unless otherwise indicated, shall be in accordance with ACI 350 for a Class B splice.

2. Laps of welded wire fabric shall be in accordance with the ACI 350. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each 2 running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

3.9 CLEANING AND PROTECTION

- A. Reinforcement steel shall always be protected from conditions conducive to corrosion until concrete is placed around it.
- B. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcing shall be reinspected and, if necessary recleaned.

3.10 PROPORTIONING AND MIXING

- A. **Proportioning:** Proportioning of the concrete mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301.
- B. **Mixing:** Mixing of concrete shall conform to the requirements of Chapter 7 ACI 301.
- C. **Slump:** Slumps shall be as indicated herein.
- D. **Retempering:** Retempering of concrete or mortar which has partially hardened shall not be permitted.

3.11 PREPARATION OF SURFACES FOR CONCRETING

- A. **General:** Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. **Joints in Concrete:** Concrete surfaces upon or against which concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of laitance, loose or defective concrete, and foreign material, and be roughened to a minimum 1/4-inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.
- C. **Placing Interruptions:** When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means, that will secure proper union with subsequent WORK; provided that construction joints shall be made only where acceptable to the ENGINEER.

D. Embedded Items

1. No concrete shall be placed until formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the ENGINEER at least 4 hours before placement of concrete. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.
2. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated or by Shop Drawings and shall be acceptable to the ENGINEER before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.

E. **Casting New Concrete Against Old:** Where concrete is to be cast against old concrete (defined as any concrete which is greater than 60 Days of age), the surface of the old concrete shall be thoroughly cleaned prior to the application of an epoxy bonding agent. Application shall be according to the bonding agent manufacturer's instructions and recommendations.

F. No concrete shall be placed in any structure until water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the WORK. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, shall be subject to the review of the ENGINEER.

G. **Corrosion Protection:** Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

H. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided for during the placing of concrete.

I. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

3.12 HANDLING, TRANSPORTING, AND PLACING

A. **General:** Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this Section.

B. **Non-Conforming WORK or Materials:** Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the WORK. Concrete which is not placed in accordance with these Specifications or which is of inferior quality shall be removed and replaced.

- C. **Unauthorized Placement:** No concrete shall be placed except in the presence of a duly authorized representative of the ENGINEER. The CONTRACTOR shall notify the ENGINEER in writing at least 24 hours in advance of placement of any concrete.
- D. **Placement in Wall and Column Forms**
1. Concrete shall not be dropped through reinforcement steel or into any deep form nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, some means such as the use of hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. In no case shall the free fall of concrete exceed 4-feet in walls and 8-feet in columns below the ends of ducts, chutes, or buggies. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6-feet in horizontal direction. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2-feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5-feet of vertical rise per hour.
 2. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces.
- E. **Conveyor Belts and Chutes:** Ends of chutes, hopper gates, and other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting, and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the ENGINEER. Chutes longer than 50-feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the required consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. Conveyor belts and chutes shall be covered.
- F. **Temperature of Concrete:** The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the required minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water, using ice, or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.

G. Cold Weather Placement

1. Placement of concrete shall conform to ACI - 306.1 - Cold Weather Concreting, and the following.
2. Earth foundations shall be free from frost or ice when concrete is placed upon or against them.
3. Maintain the concrete temperature above 50 degrees F for at least 72-hours after placement.

3.13 PUMPING OF CONCRETE

A. **General:** If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

B. Pumping Equipment

1. The pumping equipment shall have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.
2. The minimum diameter of the hose conduits shall be in accordance with ACI 304.2R - Placing Concrete by Pumping Methods.
3. Pumping equipment and hose conduits that are not functioning properly, shall be replaced.
4. Aluminum conduits for conveying the concrete shall not be permitted.

3.14 TAMPING AND VIBRATING

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be high speed power vibrators (8000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required.

B. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.15 FINISHING CONCRETE SURFACES

- A. **General:** Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions indicated are defined as tolerances and are indicated above. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.
- B. **Formed Surfaces:** No treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects.
- C. **Unformed Surfaces (US):** After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Whenever the air temperature exceeds 85 degrees F or the wind speed exceeds 25 mph at the time of placement, the concrete shall be treated as follows. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each WORK operation as necessary to prevent drying shrinkage cracks. The classes of finish for unformed concrete surfaces are designated and defined as follows:
1. **Finish US1** - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
 2. **Finish US2** - After sufficient stiffening of the screeded concrete, surfaces shall be float finished with wood or metal floats or with a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Surface irregularities shall not exceed 1/4-inch. Joints and edges shall be tooled where indicated or as determined by the ENGINEER.
 3. **Finish US3** - After the Finish U2 surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, steel troweling shall be performed with firm pressure such as will flatten the sandy texture of the floated surface and produce a dense, uniform surface free from blemishes, ripples, and trowel marks. The finish shall be smooth and free of irregularities.
 4. **Finish US4** - Trowel the Finish U3 surface to remove local depressions or high points. In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated. The resulting surface shall be rough enough to provide a nonskid finish.

D. Unformed surfaces shall be finished according to the following schedule:

UNFORMED SURFACE FINISH SCHEDULE	
Area	Finish
Grade slabs and foundations to be covered with concrete or fill material	US1
Slabs	US4
Top surface of walls	US3

3.16 CURING AND DAMPPROOFING

A. **General:** Concrete shall be cured for not less than 7 Days after placing, in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured or Dampproofed	Method
Unstripped forms	1
Construction joints between footings and walls, and between floor slab and columns	2
Encasement and ductbank concrete and thrust blocks	3
Concrete surfaces not specifically provided for elsewhere in this Paragraph	4
Buried slabs and backfilled walls	5

B. **Method 1:** Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used, the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 7 Days of placing the concrete, curing shall be continued in accordance with Method 4 below.

C. **Method 2:** The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

D. **Method 3:** The surface shall be covered with moist earth not less than 4 hours nor more than 24 hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 Days after placement of concrete.

E. **Method 4:** The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the manufacturer's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.
2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7 Day curing period. If the seal is damaged or broken before the expiration of the curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.
3. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.
4. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces, and within 2 hours after removal of forms. Repairs required to be made to formed surfaces shall be made within the said 2 hour period; provided, however, that any such repairs which cannot be made within the said 2 hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.
5. During the curing period, no traffic of any nature and no depositing of any materials, temporary or otherwise, shall be permitted on surfaces coated with curing compound. Foot traffic and the depositing of materials may be allowed after 3 Days if the surface is covered with 5/8-inch plywood placed over polyethylene sheets.

F. **Method 5:** This method applies to both buried slabs and walls to be backfilled.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least 7 Days beginning immediately after the concrete has reached final set or forms have been removed.
2. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water through nozzles that atomize the flow so that the surface is not marred or washed.
3. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held substantially in contact with the concrete surface to prevent being dislodged by wind or any other causes. Edges shall be continuously held in place.
4. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.
5. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, any dry spots shall be rewetted, and curing compound shall be immediately applied in accordance with Method 4 above.

6. The CONTRACTOR shall dispose of excess water from the curing operation to avoid damage to the WORK.
7. Dampproofing: The exterior surfaces of buried roof slabs and backfilled walls shall be dampproofed as follows.
 - a. Immediately after completion of curing, the surface shall be sprayed with a dampproofing agent consisting of an asphalt emulsion. Application shall be in 2 coats. The first coat shall be diluted to one-half strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the undiluted material, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Dampproofing material shall be as indicated above.
 - b. As soon as the material has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used if it produces a uniformly coated white surface and remains until placing of the backfill. If the whitewash fails to remain on the surface until the backfill is placed, the CONTRACTOR shall apply additional whitewash
- G. The CONTRACTOR may submit alternate methods of curing which maintain the concrete in a continuously wet condition for acceptance by the ENGINEER.

3.17 PROTECTION

- A. The CONTRACTOR shall protect concrete against injury until final acceptance.
- B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.18 CURING IN COLD WEATHER

- A. Water curing of concrete may be reduced to 6 Days during periods when the mean daily temperature in the vicinity of the Site is less than 40 degrees F; provided that, during the prescribed period of water curing, when temperatures are such that concrete surfaces may freeze, water curing shall be temporarily discontinued.
- B. Concrete cured by an application of curing compound will require no additional protection from freezing if the protection at 50 degrees F for 72 hours is obtained by means of approved insulation in contact with the forms or concrete surfaces; otherwise, the concrete shall be protected against freezing temperatures for 72 hours immediately following 72 hours protection at 50 degrees F. Concrete cured by water shall be protected against freezing temperatures for 72 hours immediately following the 72 hours of protection at 50 degrees F.
- C. Discontinuance of protection against freezing temperatures shall be such that the drop in temperature of any portion of the concrete will be gradual and will not exceed 40 degrees F in 24 hours. In the spring, when the mean daily temperature rises above 40 degrees F for more than 3 Days, 72 hour protection at a temperature not lower than 50

degrees F may be discontinued for as long as the mean daily temperature remains above 40 degrees F; provided, that the concrete shall be protected against freezing temperatures for not less than 48 hours after placement.

- D. Where artificial heat is employed, special care shall be taken to prevent the concrete from drying. Use of unvented heaters will be permitted only when unformed surfaces of concrete adjacent to the heaters are protected for the first 24 hours from an excessive carbon dioxide atmosphere by application of curing compound; provided, that the use of curing compound for such surfaces is otherwise permitted by these Specifications.

3.19 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, exposed concrete surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall be repaired as indicated below. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced. Repairs and replacements shall be performed promptly.
- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of laitance or soft material, plus not less than 1/32-inch depth of the surface film from hard portions by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends. The material used for repair shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.
- C. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.
- D. Repairs shall be built up and shaped in such a manner that the completed WORK will conform to the requirements of this Section as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

3.20 CARE AND REPAIR OF CONCRETE

- A. The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, which becomes defective at any time prior to the final acceptance of the completed WORK, which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

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SECTION 03 60 00 - GROUT

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall provide grout, complete and in place, in accordance with the Contract Documents
- B. **Grout Types.** The following types of grout are covered in this Section:
 - 1. Non-Shrink Grout
 - 2. Epoxy Anchor Grout for Adhesive Anchors

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the contract documents.
 - 1. Certified testing lab reports for tests indicated herein.
 - 2. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.
 - 3. Certification that grouts used on the project contain no chlorides or other chemicals that cause corrosion.
 - 4. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use. ICBO/ES report shall be submitted for epoxy anchor grout for adhesive anchors.
 - 5. Manufacturer's certification that its non-shrink grout does not contain aluminum, zinc, or magnesium powders as a method of expansion.
 - 6. Submit manufacturer's written warranty as indicated herein.
 - 7. Name and telephone number of grout manufacturer's representative who will give on-Site service. The representative shall have at least one year of experience with the indicated grouts.

1.3 QUALITY CONTROL

A. **Field Tests**

- 1. Compression test specimens will be taken from the first placement of each type of grout, and at intervals thereafter selected by the ENGINEER. The specimens will be made by the ENGINEER or its representative.
- 2. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C 1107 -

Packaged Dry, Hydraulic-Cement Grout (Nonshrink), at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days, 28 Days, and each additional time period as appropriate.

3. Compression tests and fabrication of specimens for topping grout and concrete/grout fill will be performed in accordance with Section 03 30 00- Cast-in-Place Concrete, at intervals during construction selected by the ENGINEER.
4. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C 579 - Test Methods for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing and Polymer Concretes, Method B, at intervals during construction selected by the ENGINEER. A set of 3 specimens will be made for testing at 7 Days and each earlier time period as appropriate.
5. The cost of laboratory tests on grout will be paid by the OWNER except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of Defective Work, and re-testing, all as part of the WORK.
6. The CONTRACTOR shall assist the ENGINEER in obtaining specimens for testing and shall furnish materials necessary for fabricating the test specimens.

B. **Construction Tolerances:** Construction tolerances shall be as indicated in Section 03 30 00 - Cast-in-Place Concrete, unless indicated otherwise.

1.4 SPECIAL CORRECTION OF DEFECTS PROVISIONS

A. **Manufacturer's Warranty**

1. Furnish one year warranty for WORK provided under this section.
2. Manufacturer's warranty shall not contain a disclaimer limiting responsibility to the purchase price of products or materials.

PART 2 -- PRODUCTS

2.1 APPLICATION

A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not.

Application	Type of Grout
Anchor bolts and reinforcing steel.	Non-Shrink or Epoxy Anchor Brout
Beam and column base plates	Non-Shrink
Storage tanks and other non-motorized equipment	Non-Shrink

Application	Type of Grout
Pumps and motorized equipment	Non-Shrink
Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc.	Non-Shrink
Repair of holes and defects in concrete members	Non-Shrink
Any application not listed above, where grout is indicated	Non-Shrink Class I, unless specifically indicated otherwise

2.2 NON-SHRINK GROUTS (cement-based)

A. General

1. Cement-based non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas liberating, non-metallic, cement type grout requiring only the addition of water. Cement from kilns burning metal-rich hazardous waste fuel shall not be used.
2. Manufacturer's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout shall be as recommended by the manufacturer for the particular application.
3. Grout shall not contain chlorides or additives that may contribute to corrosion.
4. Grout shall be formulated to be used at any consistency from fluid to plastic.
5. Cement-based non-shrink grout shall have the following minimum properties when tested at a fluid consistency, at 28 Days:
 - a. Minimum tensile splitting strength of 500-psi per ASTM C 496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
 - b. Minimum flexural strength of 1000 psi per ASTM C 580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes.
 - c. Minimum bond strength (concrete to grout) of 1900-psi per modified ASTM C 882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
 - d. Grout shall be certified for use in freeze/thaw environments.
6. Non-shrink grout shall be a high precision, fluid, extended working time, grout. The minimum 28-Day compressive strength shall be 7500-psi, when mixed at a fluid consistency.

7. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C 827.
8. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C 1090.
9. Non-shrink grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C 827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C 1107.
10. Non-shrink grout shall meet the requirements of ASTM C 1107, Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C 939.
11. The grout when tested shall not bleed or segregate at maximum allowed water content.
12. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.

2.3 EPOXY ANCHOR GROUT

- A. Epoxy anchor grout shall conform to ASTM C 881 - Epoxy-Resin-Base Bonding Systems for Concrete, Type IV, Class A, B and C, Grade 3 with the exception of gel time.
- B. Heat deflection temperature per ASTM D 648 -- Test Method for Deflection Temperature of Plastics Under Flexural Load shall be a minimum 120 degrees F.
- C. Manufacturer shall certify that the epoxy anchor grout will maintain 90 percent of its strength up to a temperature of 125 degrees F.
- D. Grout shall come in a 2 chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
- E. Epoxy anchor grout shall be capable of being used in submersed applications once cured.
- F. Compressive strength per ASTM D 695 - Test Method for Compressive Properties of Rigid Plastics shall be 10,000 psi minimum.
- G. Whenever possible, overhead anchors subject to vibration, anchors in fire-resistive construction or high fire risk areas, and anchors subject to working or operating temperatures above 100 degrees F shall be cast-in-place anchors. Whenever cast-in-place anchors cannot be used in these applications, use cement based non-shrink grout and oversized holes.
- H. Unless specifically noted, embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar. Embedment shall not exceed 67 percent of the member depth.

2.4 CURING MATERIALS

- A. Curing materials shall be in accordance with Section 03 30 00 - Cast-in-Place Concrete and as recommended by the manufacturer of prepackaged grouts.

2.5 CONSISTENCY

- A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is defined such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

2.6 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Grout shall be stored in accordance with manufacturer's recommendations.

3.2 GENERAL

- A. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the ENGINEER.
- B. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of the saturation period, excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.
- C. Surface preparation, curing, and protection of cement grout shall be in accordance with Section 03 30 00 - Cast-in-Place Concrete. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.
- D. Surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete, and other deleterious materials.
- E. Shade the WORK from sunlight for at least 24 hours before and 48 hours after grouting.
- F. Contact the grout manufacturer's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.3 GROUTING PROCEDURES

- A. **General:** Mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- B. **Equipment, Tank, and Pipe Supports.** Structural, equipment, tank, and piping support bases shall be grouted, unless indicated otherwise.

1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout or other thickness if indicated.
2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout through a headbox of appropriate size. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against retaining surfaces, and joints shall be sealed as recommended by the grout manufacturer to be liquid-tight. Forms shall be coated as recommended by the grout manufacturer for easy form release. Where this method of placement is not practical or where required by the ENGINEER, alternate grouting methods shall be submitted for acceptance by the ENGINEER.
3. Concrete equipment pads for equipment bases that will be epoxy-grouted shall be sized so that, when the equipment base is fully grouted, the epoxy grout is stopped not less than 4-inches from the edge of the pad.

C. **Drilled Anchors and Reinforcing Bars**

1. General
 - a. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions.
 - b. The CONTRACTOR shall identify position of reinforcing steel and other embedded items prior to drilling holes. Care shall be exercised in coring and drilling to avoid damaging existing reinforcing or embedded items. Notify the ENGINEER if reinforcing steel or other embedded items are encountered during drilling. Take precautions as necessary to avoid damaging prestressing tendons, electrical and communications conduit, and piping.
2. Epoxy Adhesive Anchors
 - a. Grout shall be proportioned and mixed with automatic equipment.
 - b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICBO/ES report.
 - c. Holes shall be dry.

3. Cement Based Non-Shrink Grout

- a. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the manufacturer's ICBO/ES report.
- b. When the bolt diameter is one-inch or less, the hole diameter should be a minimum of 2-inches. When the bolt diameter is greater than one-inch, the hole diameter should be at least twice the bolt diameter.
- c. Drilled holes shall be saturated with water for not less than 24 hours before installation of anchor/rod/rebar.
- d. The non-shrink grout should be placed in the holes in a non-sag (trowelable) consistency. The grout should be placed in the holes before the anchor and then the anchor inserted and vibrated to ensure proper coverage.

3.4 CONSOLIDATION

- A. Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.5 CURING

- A. Cement based grouts shall be cured per Section 03 30 00 - Cast-in-Place Concrete and per the manufacturer's recommendations.

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SECTION 05 50 00 - MISCELLANEOUS METALWORK

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall provide miscellaneous metalwork and appurtenances, complete and in place, as indicated in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

- A. Furnish submittals in accordance with the contract requirements.

B. **Shop Drawings**

1. Shop Drawings shall conform to AISC recommendations and specifications, and shall show holes, and the like, as may be required for other parts of the WORK.
2. Shop Drawings shall include complete details of members and connections, anchor bolt layouts, schedules for fabrication procedures, and diagrams for the sequence of erection.
3. Grating
 - a. Submit layout drawings for grating, showing the direction of span, type and depth of grating, size and shape of grating panels, support seat angle and ledger details, and details of grating hold down fasteners.
 - b. Submit load and deflection tables for each style and depth of grating used.
4. Anchors
 - a. Submit an ICBO report listing the ultimate load capacity in tension and shear for each size and type of concrete anchor.
 - b. Submit manufacturer's recommended installation instructions and procedures for adhesive anchors.
 - c. Upon review by the ENGINEER, these instructions shall be followed specifically.
 - d. No substitution for the indicated adhesive anchors will be considered unless accompanied with ICBO report verifying strength and material equivalency, including temperature at which load capacity is reduced to 90 percent of that determined at 75 degrees F.

PART 2 -- PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Steel

Wide Flange Shapes	ASTM A 992
Shapes, Plates, Bars	ASTM A 36
Pipe, Pipe Columns, Bollards	ASTM A 53, Type E or S, Grade B standard weight unless indicated otherwise
HSS	ASTM A 500 Grade B

B. Corrosion Protection

1. Unless otherwise indicated, miscellaneous steel metalwork shall be hot-dip galvanized after fabrication.

C. Stainless Steel

1. Unless otherwise indicated, stainless steel metalwork and bolts shall be fabricated from Type 316 stainless steel.

2.2 STEEL PIPE HANDRAILS

- A. Unless specifically noted otherwise, steel pipe handrails shall be standard 1.5-inch black steel pipe made up by welding, and shall be hot-dip galvanized after fabrication.

2.3 METAL GRATING

A. General

1. Metal grating shall be of the indicated design, size, and type.
2. Grating shall be supported around an opening by support members.
3. Where grating is supported on concrete, unless otherwise indicated provide embedded support angles that match the grating material and are mitered and welded at their corners.
4. Banding
 - a. The grating shall be completely banded at edges and cutouts.
 - b. The banding material and cross-section shall be equivalent to the bearing bars.
 - c. The banding shall be welded to each cut bearing bar.

5. The grating pieces shall be fastened to each support in two (2) locations.
6. Where grating forms the landing at the top of a stairway, the edge of the grating that forms the top riser shall have an integral non-slip nosing with a width equal to that of the stairway.
7. Where the grating depth is not indicated, provide grating within allowable stress levels and which shall not exceed a deflection of ¼-inch or the span divided by 180, whichever is less.
8. Design Loading
 - a. For standard duty plank and safety grating, the loading to be used for determining stresses and deflections shall be the uniform live load of the adjacent floor or 100 psf, whichever is greater, or a concentrated load of 600 pounds.

B. Material

1. Bar grating shall be fabricated from galvanized steel.
2. Plank grating shall be fabricated from galvanized steel.

C. Bar Grating

1. No single piece of grating shall weigh more than 80 pounds, unless indicated otherwise.
2. Standard duty grating shall be composed of serrated bar grating.
3. Cross bars shall be welded or mechanically locked tightly into position such that there is no movement between the bearing and cross bars.

D. Safety Grating

1. Safety grating shall be fabricated from sheet metal punched into an open serrated diamond pattern and be formed into plank sections.
2. The open diamond shapes shall be approximately 1.875-inches by 11/16-inches in size.

E. Plank Grating

1. Plank grating shall be fabricated from sheet metal punched into an open serrated diamond pattern and be formed into plank sections.
2. The open diamond shapes shall be approximately 1.875-inches by 11/16-inches in size.
3. Plank grating shall be **Grip Strut**, or equal.

2.4 BOLTS AND ANCHORS

A. **Standard Service (Non-Corrosive Application)**

1. Unless otherwise indicated, bolts, anchor bolts, washers, and nuts shall be fabricated from carbon steel as indicated, and hot dip galvanized after fabrication.
2. Threads on galvanized bolts and nuts shall be formed with suitable taps and dies such that they retain their normal clearance after hot-dip galvanizing.
3. Except as otherwise indicated, steel for bolt material, anchor bolts, and cap screws shall be in accordance with the following requirements:
 - a. Structural Connections: ASTM A 307, Grade A or B, hot-dip galvanized
 - b. Anchor Bolts: ASTM A 307, Grade A or B, or ASTM A 36, hot-dip galvanized
 - c. High-Strength Bolts, where indicated: ASTM A 325
 - d. Pipe and Equipment Flange Bolts: ASTM A 193, Grade B-7

B. **Corrosive Service**

1. Bolts, nuts, and washers in the locations listed below shall be fabricated from Type 316 stainless steel as indicated below, or as indicated otherwise on the Contract Drawings.
 - a. Buried locations
 - b. Submerged locations
 - c. Locations subject to seasonal or occasional flooding
 - d. Inside hydraulic structures below the top of the structure
 - e. Inside buried vaults, manholes, and structures that do not drain through a gravity sewer or to a sump with a pump
 - f. Locations indicated or designated by the ENGINEER to be provided with corrosion resistant steel bolts
2. **Stainless Steel Nuts on SS Bolts.** Unless otherwise indicated, stainless steel bolts, anchor bolts, nuts, and washers shall be fabricated from Type 316 stainless steel, Class 1, conforming to ASTM A 193 for bolts and to ASTM A 194 for nuts.

C. **Anti-seize Lubricant Coating**

1. Threads on stainless steel bolts shall be protected with an antiseize lubricant suitable for submerged stainless steel bolts.
2. Antiseize lubricant shall be classified as acceptable for potable water use by the NSF.

D. Bolt Requirements

1. The bolt and nut material shall be free-cutting steel.
2. The nuts shall be capable of developing the full strength of the bolts.
3. Threads shall be Coarse Thread Series conforming to the requirements of the American Standard for Screw Threads.
4. Bolts and cap screws shall have hexagon heads and nuts.
5. Bolts and nuts shall be installed with washers fabricated from material matching the base material of bolts, except that hardened washers for high-strength bolts shall conform to the requirements of the AISC Specification.
6. The length of each bolt shall be such that the bolt extends at least 1/8-inch beyond the outside face of the nut before tightening, except for anchor bolts which shall be flush with the face of the nut before tightening.

2.5 Drilled Anchors in Concrete

A. General

1. Unless otherwise indicated, drilled concrete anchors shall be adhesive anchors.
2. No substitutions will be considered unless accompanied with an ICBO report verifying strength and material equivalency.
3. Expanding type anchors are not permitted unless specifically indicated otherwise in the Contract Documents.

B. Epoxy Anchors

1. Epoxy adhesive anchors are required for drilled anchors for outdoor installations, in submerged, wet, splash, overhead, and corrosive conditions, and for anchoring handrails and reinforcing bars.
2. Epoxy shall be in accordance with the requirements of Section 03 60 00 - Grout.
3. Threaded rod shall be galvanized for general purpose applications and fabricated from Type 316 stainless steel for use in corrosive applications.
4. Embedment depth shall be as the manufacturer recommends for the load to be supported.

C. Non-Shrink Grouted Anchors

1. Anchors, if indicated or permitted, shall be grouted with a non-shrink cementitious grout in accordance with the manufacturer's recommendations.
2. Embedment depth shall be as the manufacturer recommends for the load to be supported.

PART 3 -- EXECUTION

3.1 FABRICATION AND INSTALLATION REQUIREMENTS

A. Fabrication and Erection

1. Except as otherwise indicated, the fabrication of structural steel shall conform to the requirements of the American Institute of Steel Construction "Manual of Steel Construction."

B. Steel Railings

1. Field welding of steel pipe handrail joints will be permitted only if approved by the ENGINEER, and then only in accordance with the ENGINEER's instructions.

3.2 WELDING

A. Methods & Qualifications

1. Welding shall be performed by the metal-arc method or gas-shielded arc method as described in the American Welding Society "Welding Handbook" as supplemented by other pertinent standards of the AWS.
2. The qualification of the welders shall be in accordance with the AWS Standards.

B. Quality

1. In assembly and during welding, the component parts shall be adequately clamped, supported, and restrained to minimize distortion and for control of dimensions.
2. Weld reinforcement shall be as indicated by the AWS Code.
3. Upon completion of welding, remove weld splatter, flux, slag, and burrs left by attachments.
4. Welds shall be repaired in order to produce a workmanlike appearance, with uniform weld contours and dimensions.
5. Sharp corners of material that is to be painted or coated shall be ground to a minimum of 1/32-inch on the flat.

3.3 GALVANIZING

- A. Structural steel plates shapes, bars, and fabricated assemblies required to be galvanized shall, after the steel has been thoroughly cleaned of rust and scale, be galvanized in accordance with the requirements of ASTM A 123.
- B. Any galvanized part that becomes warped during the galvanizing operation shall be straightened.
- C. Bolts, anchor bolts, nuts, and similar threaded fasteners, after being properly cleaned, shall be galvanized in accordance with the requirements of ASTM A153.

D. Field Repairs

1. Field repairs to damaged galvanizing shall be performed by preparing the surface and applying a coating.
2. Surface preparation shall consist of removing oil, grease, soil, and soluble material by cleaning with water and detergent (SSPC SP1) followed by brush-off blast cleaning (SSPC SP7) over an area extending at least 4 inches into the undamaged area.
3. The coating shall be applied to at least 3 mils dry film thickness.

3.4 DRILLED ANCHORS

- A. Drilled anchors and reinforcing bars shall be installed in strict accordance with the manufacturer's instructions.
- B. Holes shall be roughened with a brush on a power drill, and then cleaned and dried.
- C. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength.
- D. Adhesive anchors shall not be loaded until the adhesive has reached its indicated strength in accordance with the manufacturer's instructions.

- END OF SECTION -

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SECTION 31 11 00 - SITE PREPARATION

PART 1 -- GENERAL

1.1 SUMMARY

- A. In its initial move onto the Site, the CONTRACTOR shall protect existing fences, houses and associated improvements, streets, and utilities downslope of construction areas from damage due to boulders, trees, or other objects dislodged during the construction process and clear, grub, strip; and regrade certain areas, in accordance with the Contract Documents.

1.2 SITE INSPECTION

- A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review maps of the Site and facilities delineating the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PRIMARY SITE ACCESS

- A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.
- B. **Utility Interference:** Where existing utilities interfere with the WORK, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

- A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches and cleared of structures, pavement, sidewalks, concrete or masonry debris, trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Loose boulders within 10-feet of the top of cut lines shall be incorporated in landscaping or removed from the Site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction.
- B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove stumps, roots, buried logs, and other objectionable material. Septic tanks, drain fields, and connection lines and any other underground structures, debris or waste shall be removed if found on the Site. Objectionable material from the clearing and grubbing process shall be removed from the Site and wasted in approved safe locations.

- C. The entire area to be affected by construction shall be stripped and the stripped materials shall be stockpiled and incorporated into landscaped areas or other non-structural embankments.
- D. Unless otherwise indicated, native trees larger than 3-inches in diameter at the base shall not be removed without the ENGINEER's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary, for the CONTRACTOR's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, as part of the WORK.

3.3 OVEREXCAVATION, REGRADING, AND BACKFILL UNDER FILL AREAS

- A. After the fill areas have been cleared, grubbed, and excavated, the areas to receive fill will require over excavation, regrading, and backfill, consisting of the removal and/or stockpiling of undesirable soils. The ground surface shall be recontoured for keying the fill and removing severe or abrupt changes in the topography of the Site.

- END OF SECTION -

SECTION 31 23 19 - DEWATERING

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall dewater trench and structure excavations, in accordance with the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of this Section.
- B. Dewatering plans shall conform to all of the requirements of the project plans, specifications, permits, and all local, state and federal regulations.

1.2 CONTRACTOR SUBMITTALS

- A. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed dewatering plan and operation schedule for dewatering of excavations. The CONTRACTOR shall specify the proposed materials and equipment, and shall verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times.
 - 1. The CONTRACTOR's dewatering plan is subject to review and approval by the ENGINEER.
- B. Structural cofferdam calculations shall be Stamped and Signed by a Professional Engineer licensed in the State of Oregon, and shall be submitted to the ENGINEER for approval.

1.3 QUALITY CONTROL

- A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.
- B. It shall be the sole responsibility of the CONTRACTOR to ensure that the cofferdams and dewatering system is installed and operated in accordance with the approved submittals, and all applicable permits, laws and regulations.
- C. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.
- D. Where critical structures or facilities exist immediately adjacent to areas of proposed dewatering, the responsibility for conducting the dewatering operation in a manner which will protect adjacent structures and facilities rests solely with the CONTRACTOR. The cost of repairing any damage to adjacent structures and restoration of facilities shall be the responsibility of the CONTRACTOR.

PART 2 -- PRODUCTS

2.1 COFFERDAMS

- A. The cost for the design, installation, and removal of the cofferdams are the responsibility of the CONTRACTOR.
- B. It is the CONTRACTOR's responsibility for fully design the cofferdams and dewatering systems in conformance with all project permits and legal requirements.
 - 1. The intake, pump station, and any other cofferdams shall be determined by the CONTRACTOR.
 - 2. The cofferdam design and installation shall conform to all of the requirements of the conservation measures required by the plans and contract documents.

2.2 EQUIPMENT

- A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the Site.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

- A. All instream work shall occur within the in-water work window of July 1 through October 15, or as specifically identified in the contract documents. In the event that conflicting dates are identified for the in-water work window, the CONTRACTOR shall request clarification from the project sponsors as soon as the discrepancy is identified.

3.2 COFFERDAMS

- A. Cofferdams are required for dewatering. The design, installation, and removal of the cofferdams are the responsibility of the CONTRACTOR.
- B. Coordination with the project sponsors and landowner will be required during the installation of the cofferdam and dewatering, including the timing and sequence of the installation and removal of the cofferdams, fish salvage, and disposal of the water.
- C. The cofferdam design and installation shall conform to all of the requirements of the conservation measures required by the plans and contract documents.

3.3 DEWATERING

- A. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment.

- B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.
- C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.
- D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock.
- F. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.
- G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.
- H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sand packed and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.
- I. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system.
- J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.
- K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the various contract prices in the Bid Forms, unless a separate bid item has been established for dewatering.

- END OF SECTION -

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SECTION 31 30 00 - EARTHWORK

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall perform earthwork as indicated and required for construction of the WORK, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

- A. The CONTRACTOR shall submit samples of materials proposed for the WORK in conformance with the requirements of the contract documents. Sample sizes shall be as determined by the testing laboratory.

PART 2 -- PRODUCTS

2.1 FILL AND BACKFILL MATERIAL REQUIREMENTS

A. General

1. Fill, backfill, and embankment materials shall be selected or shall be processed and clean fine earth, rock, gravel, or sand, free from grass, roots, brush, other vegetation and organic matter.
2. Fill and backfill materials that are to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.

B. Suitable Materials

1. Materials not defined below as unsuitable will be considered as suitable materials and may be used in fills, backfilling, and embankment construction, subject to the indicated requirements.
2. If acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.
3. Mixing or blending of materials to obtain a suitable composite is the CONTRACTOR's option but is subject to the approval of the ENGINEER.
4. Suitable materials may be obtained from on-Site excavations, may be processed on-Site materials, or may be imported.
5. If imported materials are required by this Section or are required in order to meet the quantity requirements of the WORK, the CONTRACTOR shall provide the imported materials as part of the WORK.

- C. **Types of Suitable Materials.** The following types of suitable materials are defined:

Type C (Civil Fill) (Not for use beneath concrete foundations): Civil Fill may consist of imported materials or natural on-site materials. Civil Fill may be a combination of Type AS material, Type GF, or Type SF material, or any readily compactible mixture thereof.

Type DRC (Drain-rock Coarse): Crushed rock or gravel meeting the following gradation requirements.

Sieve Size	Percentage Passing
2-inch	100
1-1/2 inch	90 - 100
1-inch	20 - 55
3/4-inch	1 - 15
No. 200	0 - 3

Type DRG (Drain-rock Graded): Drain-rock shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The drainrock shall have a sand equivalent value greater than 75. The finish graded surface of the drainrock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs. The material shall be uniformly graded and shall meet the following gradation requirements:

Sieve Size	Percentage Passing
1-inch	100
3/4-inch	90 – 100
3/8-inch	40 – 100
No. 4	25 – 40
No. 8	18 – 33
No. 30	5 – 15
No. 50	0 – 7
No. 200	0 – 3

The finish graded surface of the drain rock immediately beneath hydraulic structures shall be stabilized to provide a firm, smooth surface upon which to construct reinforced concrete floor slabs.

Type GF (Granular Fill 3/4-inch minus): Angular crushed rock, stone or gravel, and sand conforming to the requirements listed below. Do not use pea gravel as granular backfill: The material shall have a maximum liquid limit of 35 and a maximum plasticity index of 10. The material shall have a sand equivalent value greater than 75. (This material is also known as Class I crushed stone.)

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 6

Type SF (Structural Fill / Foundation Base): Crushed rock structural fill material of such nature that it can be compacted readily by watering and rolling to form a firm, stable base for fill material required beneath concrete foundations. At the option of the CONTRACTOR, the grading for either the 1-1/2 inch maximum size or 3/4-inch maximum size gradation may be used material beneath concrete foundations. The sand equivalent value shall be greater than 22. The material shall meet the following gradation requirements:

Sieve Size	Percentage Passing	
	1-1/2 inch Max Gradation	3/4-inch Max Gradation
2-inch	100	-
1-1/2-inch	90 - 100	-
1-inch	-	100
3/4-inch	81 - 91	90 – 100
No. 4	43 - 53	55 – 67
No. 16	23 - 29	28 – 38
No. 200	4 - 10	4 – 10

Type T (Topsoil): Stockpiled topsoil material which has been obtained at the Site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

Schedule: Earth materials shall be as indicated in the Contract Drawings. Where clear definition in the drawings is not defined, the following schedule may be used to define acceptable fill materials.

Work Area	Material Type
Bedding and Pipe Zone for Dielectrically coated steel, polyethylene encased, non-mortar (rock-shield) coated	GF
Bedding and Pipe Zone for HDPE Pipe	GF
Trench zone and final backfill under structures	Same as Above except where encasement is required
Replace pipeline trench over excavation	DRC with 6-inch top layer of PG, or non-woven filter fabric, or same as pipe zone backfill if trench is above water table.
Under hydraulic or water retaining structures with underdrains	DRG
Embankment Fill	C
Top 6-inches of embankment fills or backfills around structures	T

D. Unsuitable Materials.

1. Soils which, when classified under ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), fall in the classifications of PT, OH, CH, MH, or OL shall be classified as unsuitable materials.
2. In addition to the materials identified as unsuitable in the table above, a material shall be classified as unsuitable if one of the following conditions is present;
 - a. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.
 - b. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.

2.2 MATERIALS TESTING

A. Samples

1. Soils testing of samples submitted by the CONTRACTOR will be performed by a testing laboratory of the OWNER's choice and at the OWNER's CONTRACTOR's expense.
 2. The ENGINEER may direct the CONTRACTOR to supply samples for testing of any material used in the WORK.
- B. Particle size analysis of soils and aggregates will be performed using ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.
- C. Determination of sand equivalent value will be performed using ASTM D 2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- D. Unified Soil Classification System
1. References in this Section to soil classification types and standards shall have the meanings and definitions indicated in ASTM D 2487.
 2. The CONTRACTOR shall be bound by applicable provisions of ASTM D 2487 in the interpretation of soil classifications.
- E. Testing for chloride shall be performed in accordance with AASHTO T291-94 – Standard Method of Test for determining Water-Soluble Chloride Ion Content in Soil.

2.3 IDENTIFICATION TAPE

- A. Unless otherwise indicated, identification tape shall be placed above buried pipelines that are not comprised of magnetic components at least in part.
- B. Identification tape shall be 6-inches wide, yellow in color, composed of polyethylene, and provided with an integral metallic wire.
- C. Tape shall be labeled with CAUTION – BURIED UTILITIES.

PART 3 -- EXECUTION

3.1 EXCAVATION AND BACKFILLING - GENERAL

- A. General
 1. Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions, that would interfere with the proper execution and completion of the WORK.
 2. The removal of such materials shall conform to the lines and grades indicated or ordered.
 3. Unless otherwise indicated, the entire Site shall be stripped of vegetation and debris and shall be grubbed, and such material shall be removed from the Site prior to performing any excavation or placing any fill.

4. The CONTRACTOR shall furnish, place, and maintain supports and shoring that may be required for the sides of excavations.
5. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable state safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).
6. The CONTRACTOR shall provide quantity surveys where so required to verify quantities for Unit Price Contracts.
7. Surveys shall be performed prior to beginning WORK and upon completion by a surveyor licensed in the state where the Site is located.

3.2 OVER-EXCAVATION

A. Indicated

1. Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated.

B. Not Indicated

1. When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the CONTRACTOR shall over-excavate to the dimensions ordered and backfill to the indicated grade.

C. Neither Indicated nor Ordered

1. Any over-excavation carried below the grade that is neither ordered or nor indicated shall be backfilled and compacted to the required grade with the indicated material as part of the WORK

3.3 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Unless otherwise indicated, excess excavated material shall be the property of the CONTRACTOR.

B. The CONTRACTOR shall be responsible for the removal and disposal of excess excavated material.

C. The CONTRACTOR shall remove and dispose of excess excavated material at a location selected by the CONTRACTOR and as approved by the ENGINEER or at an off-Site location selected and arranged for by the CONTRACTOR.

D. The CONTRACTOR shall obtain required permits and landowner and agency approvals for disposal of excess excavated material on-Site or off-Site and shall submit copies of related documents to the ENGINEER for information prior to disposal. CONTRACTOR shall pay costs associated with the removal and disposal

3.4 BACKFILL

A. General

1. Backfill shall not be dropped directly upon any structure or pipe.
 2. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.
 3. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.
- B. Except for drainrock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.
- C. Pre-Placement Conditions
1. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have any loose, sloughing, or caving soil and rock materials removed.
 2. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.
- D. During spreading, each layer shall be thoroughly mixed as necessary in order to promote uniformity of material in each layer.
- E. Moisture Content
1. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved.
 2. Where the backfill material moisture content is too high to permit the indicated degree of compaction, the material shall be dried until the moisture content is satisfactory.
- F. Excavation Beneath Structures and Embankments
1. Except where indicated otherwise for a particular structure or where ordered by the ENGINEER, excavation shall be carried to an elevation 6 inches below the bottom of the footing or slab and brought back to grade with compacted materials acceptable for placement beneath structures.
 2. The area where a fill or embankment is to be constructed shall be cleared of vegetation, roots, and foreign material.
 3. Where indicated or ordered, areas beneath structures or fills shall be over-excavated.
 4. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched.

5. When such over-excavation is indicated, both the over-excavation and the subsequent backfill to the required grade shall be performed by the CONTRACTOR.
6. After the required excavation or over-excavation for fills and embankments has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

G. Notification of ENGINEER

1. The CONTRACTOR shall notify the ENGINEER at least 3 Days in advance of completion of any structure or roadway excavation and shall allow the ENGINEER a review period of at least one day before the exposed foundation is scarified and compacted or is covered with backfill or with any construction materials.

H. Compaction of Fill, Backfill, and Embankment Materials

1. Each layer of backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density.
 2. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.
 3. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of obtaining the required density in 2 passes.
- I. Flooding, ponding, and jetting shall not be used for fill on roofs, backfill around structures, backfill around reservoir walls, for final backfill materials, or aggregate base materials.

J. Layering

1. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers.
2. Each layer shall be moistened and aerated as necessary.
3. Unless otherwise approved by the ENGINEER, no layer shall exceed 6 inches of compacted thickness.
4. The embankment and fill shall be compacted in conformance with Paragraph K, below.

K. Embankments and Fills

1. When an embankment or fill is to be constructed and compacted against hillsides or fill slopes steeper than 4:1, the slopes of the hillsides or fills shall be horizontally benched in order to key the embankment or fill to the underlying ground.

2. A minimum of twelve (12) inches perpendicular to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers.
3. Material thus cut shall be re-compacted along with the new material.
4. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

L. Compaction Requirements

1. The following compaction requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is graded such that ten (10) percent or more passes a No. 4 sieve and in accordance with ASTM D 4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, where the material is coarse granular backfill materials with less than ten (10) percent passing the No. 4 sieve:

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Embankments and fills not identified otherwise	90	55
Embankments and fills beneath paved areas or structures	95	70
Backfill beneath structures and hydraulic structures	95	70
Topsoil	80	NA
Aggregate base or subbase	95	NA

3.5 PIPELINE AND UTILITY TRENCH EXCAVATION AND BACKFILL

A. General

1. Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.

B. Trench Bottom

1. Except where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe.
2. Excavations for pipe bells and welding shall be made as required.

3. Where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.

C. Open Trenches

1. The maximum amount of open trench permitted in any one location shall be 500 feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater.
2. Trenches shall be fully backfilled at the end of each Day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each Day.
3. These requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 100 feet from any traveled roadway or occupied structure; in such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.

D. Embankments, Fills and Structural Backfills

1. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.
2. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.

E. Trench Shield

1. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield such that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls.
2. If the trench walls cave or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.
3. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally.
4. The CONTRACTOR shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

F. Placing and Spreading Of Backfill Materials

1. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory

compactor that is capable of achieving the required density in 2 passes and that is acceptable to the ENGINEER.

2. Where such materials are used for pipe zone backfill, vibratory compaction shall be used at vertical intervals of the lesser of:
 - a. one-half the diameter of the pipe; or
 - b. 24 inches, measured in the uncompacted state.
3. In addition, these materials shall be subjected to vibratory compaction at the springline of the pipe and the top of the pipe zone backfill, regardless of whether that dimension is less than 24 inches or not.
4. Each layer of backfill material with greater than 10 percent passing the No. 4 sieve shall be compacted using mechanical compactors suitable for the WORK.
5. The material shall be placed and compacted under the haunch of the pipe and up each side evenly so as not to move the pipe during the placement of the backfill.
6. The material shall be placed in lifts that will not exceed 6 inches when compacted to the required density.

G. Mechanical Compaction

1. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand-operated vibratory compactors and rollers that do not damage the pipe.
2. After completion of at least 2 feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

H. Pipe And Utility Trench Backfill

1. Pipe Zone Backfill

a. Definitions

- 1) The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe as indicated.
- 2) The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe.
- 3) The embedment is defined as that portion of the pipe zone backfill material between the bedding and a level line as indicated.

b. Final Trim

- 1) After compacting the bedding, the CONTRACTOR shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe.
 - 2) Excavation for pipe bells and welding shall be made as required.
 - c. The pipe zone shall be backfilled with the indicated backfill material.
 - d. Pipe zone backfill materials shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe such that when compacted the pipe zone backfill will provide uniform bearing and side support.
 - e. The CONTRACTOR shall exercise care in order to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations.
2. Trench Zone Backfill
- a. After the pipe zone backfill has been placed, backfilling of the trench zone may proceed.
 - b. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade.
3. Final Backfill
- a. Final backfill is defined as backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, backfill within 18 inches of the roadway subgrade.
- I. Identification Tape
1. Install identification tape as indicated.
 2. Terminate the tape in a precast concrete box either adjacent to or part of the valve box, manhole, vault, or other structure into which the non-metallic pipe enters or at the end of the non-metallic pipeline.
 3. The termination box shall be covered with a cast iron lid.
 4. The box shall be located at grade in paved areas or 6 inches above grade in unpaved areas.
- J. Trench Shield
1. If a moveable trench shield is used during backfill operations, the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer.

2. The CONTRACTOR shall not displace the pipe or backfill while the shield is being moved.

K. Compaction Requirements

1. The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft³) (2,700 kN-m/m³) where the material is graded such that 10 percent or more passes a No. 4 sieve, and in accordance with ASTM D 4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Pipe embedment backfill for flexible pipe.	95	70
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Pipe zone backfill portion above embedment for flexible pipe	95	70
Final backfill, beneath paved areas or structures.	95	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, beneath paved areas and structures, including trench plugs.	95	70
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	95	70

3.6 FIELD TESTING

A. General:

1. Field soils testing will be performed by a testing laboratory of the OWNER's choice at the OWNER's expense, except as indicated below.

B. Density

1. Where soil material is required to be compacted to a percentage of maximum density, the maximum density at optimum moisture content will be determined in accordance with Method C of ASTM D 1557.
2. Where cohesionless, free draining soil material is required to be compacted to a percentage of relative density, the calculation of relative density will be determined in accordance with ASTM D 7382.
3. Field density in-place tests will be performed in accordance with ASTM D 1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method, ASTM D 2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place By Nuclear Methods (Shallow Depth), or by such other means acceptable to the ENGINEER.

C. Remediation

1. In case the test of the fill or backfill shows non-compliance with the required density, the CONTRACTOR shall accomplish such remedy as may be required to ensure compliance.
2. Subsequent testing to show compliance shall be by a testing laboratory selected by the OWNER and paid by the CONTRACTOR.

D. CONTRACTOR's Responsibilities

1. The CONTRACTOR shall provide test trenches and excavations, including excavation, trench support and groundwater removal for the OWNER's field soils testing operations.
2. The trenches and excavations shall be provided at the locations and to the depths as required by the OWNER.
3. Lawn areas destroyed by test trenching and excavation shall be regraded and relandscaped with hydroseeding.

- END OF SECTION -

SECTION 31 35 00 - EROSION AND SEDIMENT CONTROL

PART 1 -- GENERAL

1.1 SUMMARY

- A. Work includes furnishing all labor, materials and equipment required for the installation and maintenance of both permanent and temporary erosion and sediment control measures as shown on the drawings and as specified herein.
- B. Erosion and sediment control measures shall conform to the notes, plans and details included in the project plans and permits.
- C. All temporary erosion and sediment control measures shall be installed prior to commencement of construction.

1.2 SUBMITTALS

- A. Submit Erosion and Sediment Control Plans for acceptance in accordance with the contract documents and permits.
 - 1. Submit an Erosion and Sediment Control Plan for work during construction. Plan shall meet all federal, state, and local requirements.
 - 2. Submit proposed erosion control materials for approval.

PART 2 – PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 INSTALLATION

- A. Install erosion and sediment control measures per manufacturer's directions or as illustrated on the contract drawing or as required by the applicable regulatory agencies.

3.2 MAINTENANCE AND REMOVAL

- B. Repair and reinstall temporary soil erosion control measures as necessary to ensure proper function for the duration of ground disturbing activities and through the warranty period.
- C. Temporary erosion control devices shall be removed only after they have performed their intended function.
- D. All pipes, end sections, drainage curbs, sand bags, sediment fences, wattles and other materials which are removed from temporary erosion control devices and not incorporated into the permanent work shall become the property of the Contractor and shall be removed from the area. Contractor shall confirm when the erosion control devices can be removed.
- E. Straw mulch and grass seed can be used and maintained until the hydromulch and seed can be applied. The depth of straw mulch will need to be approved by the Engineer.

Typically, the straw is raked away and bagged for proper disposal before the final hydromulch and seed is applied.

- END OF SECTION -

**SECTION 35 20 18 – FABRICATED STEEL SLIDE GATES
(AWWA C561 MODIFIED)**

PART 1 -- GENERAL

1.1 SUMMARY

- A. The CONTRACTOR shall provide slide gates, complete and operable, in accordance with the Contract Documents. This specification relates to the design, materials of construction, fabrication, and supply of or stainless-steel slide gates as shown on the Contract Drawings. See the Gate Schedule on the Contract Drawings for individual gate sizes and seating / unseating head requirements.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

AWWA C561	Stainless Steel Slide Gates
ASTM A276	Stainless Steel Bars and Shapes
ASTM B21	Naval Brass Rod, Bar, and Shapes
ASTM B584	Copper Alloy Sand Castings for General Applications

1.3 CONTRACTOR SUBMITTALS

- A. Furnish submittals for ENGINEER's review and approval.

1. Submit the following:

- a. drawings of gates, frames, slides, and actuators
- b. design load calculations for deflection at the maximum expected head
- c. calculations for the lifting force generated by 40 pounds effort on the handwheel or crank in order to operate the gate.

- B. Technical Manuals

1. Submit complete technical manuals, including printed instructions for proper maintenance, lubrication, and complete parts list indicating the various parts by name, number, and exploded view where necessary.
2. A list of recommended spare parts for the OWNER to store at the facility shall be included.

1.4 QUALITY CONTROL

- A. **Leakage Allowance.** The leakage allowance for slide gates under the design seating and unseating heads shall be less than 70 percent of the latest AWWA C561 standard not to exceed 0.07 gpm per foot of sealing perimeter. Leakage tests shall be completed in the field.

B. Equipment Factory Testing

1. Each gate shall be factory-assembled and functionality-tested prior to delivery to the Site.
2. Test certificates shall be submitted.

C. Equipment Field Testing

1. The CONTRACTOR shall be responsible for the coordination of the tests of each hydraulic gate in the presence of the manufacturer's factory service representative.
2. Excessive leaks shall be corrected and the equipment retested until found to be satisfactory.

1.5 MANUFACTURER'S SERVICE REPRESENTATIVE

A. Installation and Startup Assistance

1. Service and testing assistance by the Manufacturer's engineering representative for the gates shall be furnished to the CONTRACTOR during installation and startup. Manufacturer shall assume a minimum of one (1) full days of on-site technical assistance services plus travel time days to and from the project site.

B. Instruction of OWNER's Personnel

1. During the above one (1) on-site days of service, The CONTRACTOR shall arrange for the Manufacturer's engineering representative to provide a minimum of 1 to 2 hour period to instruct the OWNER's personnel in the operation and maintenance of the equipment.

PART 2 -- PRODUCTS

2.1 GENERAL

A. **Standards.** Where this section does not provide specific guidance on gate requirements, the gates shall comply with the following Standards:

1. AWWA C561 Stainless Steel Slide Gates

B. **Dimensions.** Gate actuators shall be sized, selected, and furnished by the gate manufacturer. Nominal gate dimensions shall be for concrete wall openings as shown on the contract drawings.

C. Gates and actuators throughout the project shall be products of a single manufacturer.

D. **Mounting Requirements for Non-Self-Contained Gates in Handrail System.**

1. Actuator position shall be coordinated by the contractor with all handrail to ensure conflicts are not present.

2.2 FABRICATED STAINLESS STEEL SLIDE GATES

A. Construction Materials

1. Materials employed in the manufacture and installation of the hydraulic gates and operators shall be suitable for the intended application. Material not specifically called for shall be high-grade, standard commercial quality, free from defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended.
2. Unless otherwise indicated, materials of construction shall be as indicated below. Aluminum shall not be allowed for use in these gates
3. Materials used in the fabrication of the slide gates shall conform to the material standards indicated below:

Description	Material Standards
Leaf & Stiffeners	ASTM A276, Type 304 Stainless Steel
Yoke Support Beam	ASTM A36 Structural Steel or ASTM A276, Type 304 Stainless Steel
Frame & Guides	ASTM A276, Type 304 Stainless Steel
Stem and Coupling	ASTM A276, Type 304 Stainless Steel
Stem Guides (at base of Yoke or integral to pedestal style)	ASTM A276, Type 304 Stainless Steel with UHMW bushing
Stem Cover	Transparent plastic pipe with UV inhibitors, Sched. 40 minimum
Disc Seats	UHMW Polyethylene, ASTM D4020
Invert (Base) Seal	Frame Mounted Invert Seal, Neoprene / Rubber, ASTM D 2000, Grade AA625.
Side and Top Seals	"J-bulb" Type or Self-Adjusting Neoprene Cord Seals, Neoprene / Rubber, ASTM D 2000, Grade AA625.
Metal Contact Surfaces for Seals (invert sill & J-side seals where used)	ASTM A167, A 276, Type 304 Stainless Steel
Fasteners (including studs, anchors, assembly bolts, nuts and hardware)	ASTM F593, F594, Type 316 Stainless Steel

- B. **Design Hydraulic Loading.** Each slide gate shall be designed for the hydraulic loading characteristics as defined by the plans.
- C. **Gate Design.** All fabricated steel gate components shall have a minimum thickness of 1/4-inch unless specified otherwise.
1. **Leaf and Stiffeners.** The gate leaf shall consist of a flat plate reinforced with structural or formed members welded to the plate.
 - a. The leaf is to be designed to limit deflection of the gate to 1/720 of its span or 1/16-inch at the sealing surface of the gate under maximum specified head.
 - b. The working design stresses shall not exceed the lesser of 40-percent of the yield strength or 25-percent of the ultimate strength of the material.
 2. **Frame / Guides.** The gate frame shall consist of guides, invert member, and a fabricated operator yoke assembly. The guides shall be of a sandwiched type construction built up of plates, angles, and formed shapes. The guide slot shall engage the leaf plate a minimum of 1-inch.
 - a. Leaf and frame shall be designed to resist a hydraulic load of the gate being closed under maximum seating head conditions and also opening the gate under these conditions
 - b. The working stresses shall not exceed the lesser of 40% of the yield strength or 25% of the ultimate strength of the material.
 - c. The leaf and frame design shall be arranged such as to allow simple removal of the disc from the frame, when required for maintenance.
 3. **Steel Yoke Support Beam.** Gate lifting and lowering shall be supported by a steel support framing system (yoke) designed and fabricated by the gate Manufacturer. The yoke shall be designed and fabricated according to the following:
 - a. Designed to span the open width (W) on the top deck as shown on the Contract Drawings.
 - b. Designed for the maximum output of the gate hoist.
 - c. Designed to transmit the full weight of the gate plus the hydraulic (friction) load created when the gate is closed and the seating heads are as defined above. The deflection not to exceed $W/360$, where W equals the width of the opening across which the Yoke is spanning.
 - d. Yoke shall be designed out of parallel C or box-channel members which shall not exceed 12-inches in height. The working stresses shall not exceed the lesser of 40% of the yield strength or 25% of the ultimate strength of the material.

- e. Yoke shall be designed with an integral stem guide to be attached to the bottom of the yoke. Stem guide shall have bronze or UHMW or other approved bushing to guide the stainless steel stem.
4. **Seals.** Resilient seals shall be placed along the top, bottom, and both sides of the gate to prevent leakage. The seal attaching hardware shall be stainless steel and attached in a manner to permit replacement of the seals. The gate side and top seals may be of the "J-bulb" type style or may be designed as a self-adjusting neoprene cord seal as described below.
 - a. For the self-adjusting cord seal, the UHMW seats shall impinge on the slide (disc) by way of a continuous loop neoprene cord seal.
 - b. J-bulb seal corners shall be formed by continuous molded sections. Joints between the molded corners and top or side seals shall be a square butt type located a minimum of 12-inches from the corner. The molded corner shall be bonded to the top and side seal and assembled to the gate disc in the manufacturer's shop. Mitered joints shall not be used.

"J-bulb" type seals or self-adjusting neoprene cord seals shall be retained by the frame to restrict leakage to the following limits:

 - c. Under a design seating head (measured from gate invert), perimeter leakage (in GPM per foot of seating perimeter) shall not exceed 0.07 gpm / lineal foot of gate perimeter.
 - d. Under a design unseating head (measured from gate invert), perimeter leakage (in GPM per foot of seating perimeter) shall not exceed 0.07 gpm / lineal foot of gate perimeter.
 5. **Guide Slots, Sill, and Yoke.** Prefabricated guide slots, sill, and yoke shall be provided as follows:
 - a. Guides shall be extended to support no less than 1.66 times the height of the slide in the open position (as measured from the invert of the gate opening). For self-contained gates the frame shall extend at least 36 inches above the operating platform or as shown in the contract drawings. The yoke shall be designed to support the thrust of the actuator with a minimum safety factor of 4 in regard to the ultimate tensile, compressive and shear strengths of the materials. *(Manufacturer is referred to section 4.4.5.1 of AWWA C561-12)*
 6. **Stems.** Stems shall be of solid construction, of the **rising-stem** type with threads of the cut Acme type. Stems shall be designed to transmit in compression a minimum of two times the rated output of the hoist at 40 pounds effort on the crank or handwheel.
 - a. The L/r ratio of the unsupported stem shall not exceed 200.
 - b. Stem guides, where required to limit the unsupported stem length, shall be UHMW or bronze bushed.

- c. All gates having widths greater than two times their height shall be provided with two lifting devices connected by a tandem shaft for simultaneous operation.
7. **Stem Covers.** Rising stem gates shall be provided with clear stem covers to provide indication of gate position, permit inspection of the stem threads, and to protect the stem from contamination. Vent holes shall be provided to prevent condensation.

D. Anchor / Mounting Bolts

1. The diameter, length, quantity and location of the slide gate anchor hardware shall be determined by the slide gate Manufacturer and clearly shown in installation literature.
2. All anchor hardware including studs, adhesive anchor bolts, other bolts, nuts and washers shall be provided by the gate Manufacturer to the CONTRACTOR for installation. Use of expanding style wedge mechanical anchors shall not be allowed.

E. Lifting Device / Gate Manual Actuator

1. Provide lifting devices complete with stem, lifting nut, intermediate supports with steady bushings, stem cover, indicator, and gear reducer, hand wheel, crank, electric or hydraulic cylinder, where indicated.
2. The lifting devices shall be weatherproof.
3. Pedestal Mounting
 - a. The lifting devices shall be mounted on pedestals constructed of cast iron or fabricated steel.
 - b. The pedestals shall have an ample base or bracket area to evenly distribute the load to the supporting concrete structure or yoke of the gate.
4. The centerline of the manual actuator shall be approximately 3 feet above the base for pedestal-mounted actuators, and approximately 3.5 feet above the floor for frame-mounted actuators.
5. Slide gate hoist heads shall be constructed of cast iron.
6. The operating nut shall be constructed of solid bronze, in accordance with ASTM B 584.
7. Operating thrust shall be taken on roller or ball bearings.
8. Parts shall be provided with an alternative lubrication system.
9. Handwheel Crank

- a. The unit shall be designed for a 40–pound maximum effort on the crank in order to operate the gate.
- b. Clockwise movement of the handwheel shall close the gate.
- c. The operating crank shall be easily removable in order to facilitate the use of a portable power operator.

F. Welding

1. All welding shall be performed in accordance with AWS D1.1. All welders shall be certified with current AWS welder certifications.

G. Coatings

1. Any exposed ferrous surfaces (non stainless steel components) shall be coated with per the manufacturer’s recommendations and suitable for the project application.
2. Components not requiring painting, (e.g., non-metallic seating surfaces and all 316 stainless steel surfaces) shall be protected from overspray during the ferrous surface coating process.

H. Gate Manufacturers, or Equal

1. Convey Keystone
2. Hydro Gate Corp.
3. Waterman Industries.
4. Fresno Valve
5. Golden Harvest

PART 3 -- EXECUTION

3.1 FACTORY TESTING

- A. The slide gates shall be factory tested in accordance with the requirements of this section and AWWA C561.

3.2 WORKMANSHIP AND TOLERANCES

- A. Workmanship and tolerance allowances, metal fits, and finishes when not definitely specified shall conform with the best modern shop practices in the manufacture and fabrication of materials of the type covered by these specifications and also with the governing requirements of AWWA C513.

3.3 STORAGE AND INSTALLATION

- A. The CONTRACTOR shall handle, store, and install the fabricated roller slots, gate operating mechanism, stem guides, and accessories in strict accordance with the Manufacturer's approved shop-drawings and recommendations.
- B. The slide gates shall be installed in accordance with the Manufacturer's detailed technical installation procedures and recommendations
- C. As applicable, Operators shall be located as to avoid interference with handrails and structural members.

- END OF SECTION –

Appendix D. Final Bid Sheet

Booth Lane Pump Station		Quantity	Unit	Unit Cost	Subtotal
1	Mobilization	1	LS		
2	Dewatering	1	LS		
3	Clearing and Grubbing	270	SY		
4	Excavation	400	CY		
5	Structural Backfill	20	CY		
6	Hydroseeding	7200	SF		
7	Pump Intake Structure	1	EA		
8	60" Diameter Concrete Wet Well	1	EA		
9	36" SS Slide Gate	2	EA		
10	Misc. Steel Grating	1	LS		
11	Self-Cleaning Intake Screens	2	EA		
12	24" Dia. Schedule 40 Steel Pipe	30	LF		
13	Relocate and Re-install Vertical Turbine Pump	1	LS		
14	Reconnect Pump to Existing 10" PVC Mainline	1	LS		
15	Reconnect Pump Station Electrical	1	LS		

Subtotal: \$ _____

Appendix F. Build America Buy America Act Requirements

A. Definitions

Components are defined as the articles, materials, or supplies incorporated directly into the end manufactured product(s).

Construction Materials are an article, material, or supply—other than an item primarily of iron or steel; a manufactured product; cement and cementitious materials; aggregates such as stone, sand, or gravel; or aggregate binding agents or additives—that is used in an infrastructure project and is or consists primarily of non-ferrous metals, plastic and polymer-based products (including polyvinyl chloride, composite building materials, and polymers used in fiber optic cables), glass (including optic glass), lumber, drywall, coatings (paints and stains), optical fiber, clay brick; composite building materials; or engineered wood products.

Domestic Content Procurement Preference Requirement- means a requirement that no amounts made available through a program for federal financial assistance may be obligated for an infrastructure project unless—

- i. all iron and steel used in the project are produced in the United States;
- ii. the manufactured products used in the project are produced in the United States; or
- iii. the construction materials used in the project are produced in the United States.

Also referred to as the **Buy America Requirement**.

Infrastructure includes, at a minimum, the structures, facilities, and equipment located in the United States, for: roads, highways, and bridges; public transportation; dams, ports, harbors, and other maritime facilities; intercity passenger and freight railroads; freight and intermodal facilities; airports; water systems, including drinking water and wastewater systems; electrical transmission facilities and systems; utilities; broadband infrastructure; and buildings and real property; and generation, transportation, and distribution of energy -including electric vehicle (EV) charging.

The term “infrastructure” should be interpreted broadly, and the definition provided above should be considered as illustrative and not exhaustive.

Manufactured Products are items used for an infrastructure project made up of components that are not primarily of iron or steel; construction materials; cement and cementitious materials’ aggregates such as stone, sand, or gravel; or aggregate binding agents or additives.

Primarily of iron or steel means greater than 50% iron or steel, measured by cost.

Project- means the construction, alteration, maintenance, or repair of infrastructure in the United States.

Public- The Buy America Requirement does not apply to non-public infrastructure. For purposes of this guidance, infrastructure should be considered “public” if it is: (1) publicly owned or (2) privately owned but utilized primarily for a public purpose. Infrastructure should be considered to be “utilized primarily for a public purpose” if it is privately operated on behalf of the public or is a place of public accommodation.

B. Buy America Requirement

None of the funds provided under this award (federal share or recipient cost-share) may be used for a project for infrastructure unless:

1. All iron and steel used in the project is produced in the United States—this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
2. All manufactured products used in the project are produced in the United States—this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and
3. All construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.

The Buy America Requirement only applies to articles, materials, and supplies that are consumed in, incorporated into, or permanently affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought into the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America Requirement apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment that are used at or within the finished infrastructure project but are not an integral part of the structure or permanently affixed to the infrastructure project.

Recipients are responsible for administering their award in accordance with the terms and conditions, including the Buy America Requirement. The recipient must ensure that the Buy America Requirement flows down to all sub-awards and that the sub-awardees and sub-recipients comply with the Buy America Requirement. The Buy America Requirement term and condition must be included all sub-awards, contracts, sub-contracts, and purchase orders for work performed under the infrastructure project.

C. Certification of Compliance

Recipients must certify or provide equivalent documentation for proof of compliance that a good faith effort was made to solicit bids for domestic products used in the infrastructure project under this award.

Recipients must also maintain certifications or equivalent documentation for proof of compliance that those articles, materials, and supplies that are consumed in, incorporated into, affixed to, or otherwise used in the infrastructure project, not covered by a waiver or exemption, are produced in the United States. The certification or proof of compliance must be provided by the suppliers or manufacturers of the iron, steel, manufactured products and construction materials and flow up from all sub-awardees, contractors and vendors to the recipient. Recipients must keep these certifications with the award/project files and be able to produce them upon request from BPA, auditors or Office of Inspector General.

D. Waiver When necessary, recipients may apply for, and BPA may grant, a waiver from the Buy America Requirement. Requests to waive the application of the Buy America Requirement must be in writing to the Contracting Officer.

Waivers must be based on one of the following justifications:

1. Public Interest- Applying the Buy America Requirement would be inconsistent with the public interest;
2. Non-Availability- The types of iron, steel, manufactured products, or construction materials are not produced in the United States in sufficient and reasonably available quantities or of a satisfactory quality; or
3. Unreasonable Cost- The inclusion of iron, steel, manufactured products, or construction materials produced in the United States will increase the cost of the overall project by more than 25 percent.

Requests to waive the Buy America Requirement must include the following:

- Waiver type (Public Interest, Non-Availability, or Unreasonable Cost);
- Recipient name;
- A brief description of the project, its location, and the specific infrastructure involved;
- Total estimated project cost, with estimated federal share and recipient cost share breakdowns;
- Total estimated infrastructure costs, with estimated federal share and recipient cost share breakdowns;
- List and description of iron or steel item(s), manufactured goods, and/or construction material(s) the recipient seeks to waive from the Buy America Preference, including name, cost, quantity(ies), country(ies) of origin, and relevant Product Service Codes (PSC) and North American Industry Classification System (NAICS) codes for each;
- A detailed justification as to how the non-domestic item(s) is/are essential the project;
- A certification that the recipient made a good faith effort to solicit bids for domestic products supported by terms included in requests for proposals, contracts, and non-proprietary communications with potential suppliers;
- A justification statement—based on one of the applicable justifications outlined above—as to why the listed items cannot be procured domestically, including the due diligence performed (e.g., market research, industry outreach, cost analysis, cost-benefit analysis) by the recipient to attempt to avoid the need for a waiver. This justification may cite, if applicable, the absence of any Buy America-compliant bids received for domestic products in response to a solicitation; and
- Anticipated impact to the project if no waiver is issued.

BPA and OWEB may request, and the recipient must provide, additional information for consideration of this waiver. BPA and OWEB may reject or grant waivers in whole or in part depending on its review, analysis, and/or feedback. BPA's and OWEB's final determination regarding approval or rejection of the waiver request may not be appealed. Waiver requests may take up to 90 calendar days to process.