Peshastin Irrigation District Piping Project
Wenatchee River Basin, Washington
Columbia/Snake River Salmon Recovery Program

Specifications and Drawings
07-1678-WA-007

DRAFT

Prepared/Designed By:

U.S. Department of the Interior
Bureau of Reclamation
Pacific Northwest Region
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Contracting Agency:

Chelan County Natural Resources Department
316 Washington Street, Suite 401
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BID SCHEDULE A
PESHASTIN IRRIGATION DISTRICT PIPING PROJECT
STATION 10+00 TO STATION 70+55
WENATCHEE RIVER BASIN, WASHINGTON

Item	Spec. Section	Work or Material	Quantity and Unit		Unit Price	Amount
1	02100	Mobilization/Demobilization	1	LS		
2	01563	Temporary Water Pollution/Erosion Control	1	LS		
3	01721	Surveying	1	LS		
4	02200	Removal and Disposal of Existing Features	1	LS		
5	02232	Clearing and Grubbing	1	LS		
6	02317	Trench Excavation	1	LS		
7	02317	Pipe Bedding	610	CY		
8	02317	Select Backfill	4500	CY		
9	02317	Final Backfill	1	LS		
10	02621	36-inch Diam. Corrugated Type S Low-Head HDPE Pipe	5920	LF		
11	02621	24-inch Diam. Corrugated Type S Low-Head HDPE Pipe	1	LS		
12	02621	36-inch Diam. Access Riser Fitting	11	EA		
13	02621	Turnout Connection to HDPE Pipe – Single Turnout	10	EA		
14	02621	Turnout Connection to HDPE Pipe – Multiple Turnouts	7	EA		
15	02622	10-inch Diam. Class 160 PVC Pipe	5	LF		
16	02710	Asphalt Paving	13	TN		
17	02730	Crushed Rock Surfacing	51	TN		
18	02930	Seeding	1	LS		
19	03300	Reinforced Concrete Flow Control Structure – Station 69+45	1	LS		
20	03600	Settling Basin With Shotcrete/Geotextile Lining – Station 10+00	1	LS		
21	15110	10-inch Gate Valve	1	EA		
				Sales Tax	7.70%	
				Total For Schedule		

BID SCHEDULE B
PESHASTIN IRRIGATION DISTRICT PIPING PROJECT
STATION 101+11 TO STATION 144+40
WENATCHEE RIVER BASIN, WASHINGTON

Item	Spec. Section	Work or Material	Quantity and Unit		Unit Price	Amount
1	02100	Mobilization/Demobilization	1	LS		
2	01563	Temporary Water Pollution/Erosion Control	1	LS		
3	01721	Surveying	1	LS		
4	02200	Removal and Disposal of Existing Features	1	LS		
5	02232	Clearing and Grubbing	1	LS		
6	02317	Trench Excavation	1	LS		
7	02317	Pipe Bedding	220	CY		
8	02317	Select Backfill	520	CY		
9	02317	Final Backfill	1	LS		
10	02622	10-inch Diam. Class 160 PVC Pipe	3477	LF		
11	02622	8-inch Diam. Class 160 PVC Pipe	541	LF		
12	02622	Turnout Connection to Pressure Pipe	19	EA		
13	02622	2-inch Air Vent Assembly	1	LS		
14	02623	8-inch Diam. SDR 11, DIPS HDPE Pipe	414	LF		
15	02623	12-inch Diam. SDR 32.5, IPS HDPE Pipe for Overflow	342	LF		
16	02631	Flush Manhole Assembly With Valve and Adjacent Piping	1	LS		
17	02710	Asphalt Paving	4	TN		
18	02730	Crushed Rock Surfacing	150	TN		
19	02930	Seeding	1	LS		
20	03300	Grout Fill Annular Space in Existing 24-inch Pipe	1	LS		
21	15110	10-inch Gate Valve	5	EA		
22	15110	1-inch Air and Vacuum Valve Assembly	2	EA		
				Sales Tax	7.70%	
		Total For Schedule				

Signature _____

Taxpayer Id No. _____

Date _____

NOTE: ALL OTHER EXCAVATION, BACKFILLING, ETC. SHALL BE SUBSIDIARY TO ONE OR MORE OF THE PAY ITEMS ABOVE AND THERE IS NO ADDITIONAL COMPENSATION FOR THESE OPERATIONS.

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DIVISION 1 – GENERAL

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SECTION 01010 – SUMMARY

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. Governing Regulations

1. Perform work in accordance with all applicable laws, codes, ordinances, and regulations. Work shall be completed in accordance with the following:
   a. The Contract Documents
   b. Applicable permits, laws, codes, ordinances, and regulations
   c. The Washington State Department of Transportation (WSDOT)/ American Public Works Association (APWA) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition), the American Society for Testing and Materials (ASTM) Standards (Latest Edition), the American Water Works Association (AWWA) Standards (Latest Edition), and any other standards referenced in these Specifications
   d. According to the manufacturer's recommendations
2. The Contractor shall have an approved set of the Contract Documents on site at all times. The Contractor shall also have a copy of applicable permits and licenses, and the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition) on the site at all times.
3. Protection of natural resources: All work should be carried out in a manner consistent with the goal of achieving proposed development with the least possible disturbance to vegetation, wildlife, steep slopes, wetlands, streams, and their buffers. No disturbance, including access or storage of materials, is to occur within designated wetlands or below ordinary high water.

B. Contractor Responsibilities

1. Coordinate, furnish, and pay for all items, articles, materials, and operations listed, including all labor, materials, equipment, and incidentals required for their completion, except as noted in paragraph C below. The Contractor is responsible for all construction means and methods and for the general coordination of the work of all trades.
2. Pay the required taxes.
3. Secure and pay for, as necessary for proper execution and completion of work:
   a. Permits
   b. Foundation
   c. Fees
   d. Licenses
   e. Bonds
4. Give required notices.

5. Enforce strict discipline and good order among employees and coordination of the work by subcontractors.
6. Use new materials, except as noted or otherwise approved by the Contracting Officer.
7. Maintain required ingress and egress and other access as required by the Owner in accordance with governing Codes and Ordinances throughout the work.
8. Comply with all requirements noted in approved permits. Advise the Contracting Officer of any conflicts between permit conditions and the Contract Documents.
9. The Contractor is, in general, the custodian of the site of the project and it is his responsibility to provide access, storage, and work space for all those engaged in the work. The site shall be maintained in an orderly manner with debris and trash removed daily.
10. All materials, methods, and equipment shall comply with the requirements of applicable codes and the Contract Documents, including requirements of all incorporated standards. The Contractor shall furnish, as a part of the Contract, certification of code compliance if requested by the Owner, Contracting Officer, or Code Enforcing Agency.
11. Personnel: Protect personnel, whether passers-by, occupants, or visitors to the site, from harm and injury.
12. Construction: Protect existing and adjoining structures and site features where noted, including: vegetation, access points, utilities and work of any kind which is to remain from damage, defacement, or interruption of service, except as may be specially directed or authorized. All streets and access roads shall be repaired, if damaged, and left in a condition equal to or better than the original condition.
13. Existing utilities. Protect existing utilities from any damage or interruption of service. If necessary obtain permission from utility owners and relocate as required for completion of the work.

1.02 WORK UNDER THIS CONTRACT

A. The work consists of furnishing all labor, equipment, and materials necessary for and performing all operations and improvements to the project site in accordance with the Specifications and Drawings, and subject to the terms and conditions of the Contract.

1.03 CONTRACT TIME

A. The work of this Contract shall commence immediately upon the receipt of Notice to Proceed, and shall be substantially complete within the Contract time defined in the General Conditions of the Contract. Completion of Final Punch List shall be achieved within the time period required in the Certificate of Substantial Completion.

B. Contract time may be changed by Change Order only. Contract time shall be amended by Change Order to account for weather-related delays.

1.04 LIQUIDATED DAMAGES

A. For each calendar day after the day fixed for substantial completion of the project and/or the day fixed in the Certificate of Substantial Completion for the completion of the Final Punch List, the Contractor shall pay the Owner the sum of $1,000.00 per day as fixed, agreed, liquidated damages, but not as a penalty.

B. Liquidated damage shall not be assessed when the delay in completion of the work is due to an act of Force Majeure, or when a time extension has been granted by the Owner per Section 01010 – Summary, paragraph 1.03 B.

1.05 HAZARDOUS MATERIAL

A. No toxic or hazardous chemicals or materials are expected to be encountered during scheduled construction activities. Should any work activities by this Contract discover/disturb any hazardous material, the Contractor is directed to immediately cease work activity in the area found to be potentially hazardous, notify the Contracting Officer, and await the Contracting Officer's direction.

1.06 CUTTING AND PATCHING

A. General: The Contractor shall be responsible for all cutting and fitting or patching that may be required to complete the work or to make several parts fit together properly. Execute cutting, fitting, and patching required to uncover work; provide for installation of ill-timed work; remove and replace defective work; remove and replace work not conforming to requirements of the Contract Documents; remove samples of work as specified for testing; and install specified work in existing construction.

1.07 SPECIFICATION FORMATS AND CONVENTIONS

A. Specification Format: The Specifications are generally organized into Divisions and Sections using the 16-division format and Construction Specifications Institute's (CSI's) "MasterFormat" numbering system.

1. Section Identification: The Specifications use section numbers and titles to help cross referencing in the Contract Documents. Sections in the Contract Documents are in numeric sequence; however, unused Sections are not included. Consult the table of contents at the beginning of the Contract Documents to determine numbers and names of sections in the Contract Documents.

B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

1.08 DEFINITIONS

A. The words "Plans" and "Drawings" are used interchangeably and in all cases shall refer to the approved Contract Drawings.

B. Contract Documents: Shall include the approved Contract Drawings, these Specifications, the Contract, and Bidding Documentation.

C. Owner: The Agency that will own and operate the completed project, Peshastin Irrigation District.

D. Contracting Agency: The Agency that is a party to the Contract, Chelan County Natural Resources Department.

E. Contracting Officer: The Contracting Agency's Designated Representative.

F. Engineer: The Agency responsible for the design of the project, the United States Bureau of Reclamation, and their designated representative and/or consultant.

G. Provide: Means to "furnish and install" as specified and shown on the Contract Drawings.

1.09 PROJECT TEAM

A. Lines of Communication:
The Contractor is to communicate directly with the Contracting Officer unless authorized in writing to contact other listed project personnel.

B. Contracting Officer:
Chelan County Natural Resources Department
316 Washington Street, Suite 401
Wenatchee, WA 98801
Phone: (509) 667-6533

C. Owner:
Peshastin Irrigation District
P.O. Box 371
Cashmere, WA 98815-0371
Phone: (509) 782-2561

D. Engineer:
United Status Department of Interior
Bureau of Reclamation
Pacific Northwest Region
1150 North Curtis Road, Suite 100
Boise, ID 83706-1234
Phone: (208) 378-5251

E. Engineer's Consultant:
Anchor QEA, LLC
811 Kirkland Avenue, Suite 200
Kirkland, WA 98033
Phone: (425) 827-3243

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01110 – SUMMARY OF WORK

PART 1 GENERAL

1.01 REQUIREMENT

A. Construct and complete in accordance with the Contract provisions, these Specifications, and the Drawings listed in Section 01111 – Drawings, Peshastin Irrigation District Piping Project, Columbia/Snake River Salmon Recovery Program, Wenatchee River Basin, Washington.

1.02 LOCATION

A. All work is on or adjacent to a portion of the Peshastin Irrigation District Ditch, near Cashmere, Washington. The upstream end of the project is the Peshastin Irrigation District Ditch north of the west end of Tigner Road. The downstream extent of the project is the downstream end of the ditch at Pioneer Drive, east of Wohlers Road.

1.03 INTENT

A. The general intent of this work is to replace the existing Peshastin Irrigation Ditch with piping to reduce the amount of water lost through seepage and evaporation.

B. The above work is to be performed for Chelan County Natural Resources Department, hereafter referred to as the "Contracting Agency". The Contracting Agency will appoint a project staff member, hereafter referred to as "Contracting Officer", who will have the responsibility to issue a Contract to construct the above work and will administer the Contract and funds for the project.

C. The United States Bureau of Reclamation, hereafter referred to as the "Engineer" is the Contracting Agency's representative who has designed the project and provides oversight during construction. The Engineer makes recommendations to the Contracting Officer regarding whether all the work is in compliance with the construction Specifications. The Engineer also reviews all construction changes and makes recommendations to the Contracting Officer prior to the Contracting Officer's approval of the changes.

1.04 SEQUENCE OF WORK

A. Construction on the project will start on October 15, 2009 and end by April 15, 2010.

B. The Contractor shall complete all construction activities in the Peshastin Irrigation Ditch during the non-irrigation season. The maximum irrigation season begins on April 15 and ends on October 15 each year.

C. Substantial completion shall be accomplished by the completion date established in the Proposal.

1.05 PRINCIPAL COMPONENTS OF WORK

A. The major items of work to be completed include the following:

1. Site preparation, including placement and maintenance of erosion and sediment control measures and clearing and grubbing areas to be excavated and backfilled.
2. Demolition, removal, and disposal of existing culverts, structures, canal linings, and other obstructions.
3. Diversion and control of water during construction.
4. Installing, maintaining during construction, and removing at construction completion sediment and erosion control measures.
5. Survey, excavation, trenching, backfilling, and compaction for installation of irrigation pipe, control structures, and related appurtenances.
6. Furnishing and installing approximately 5,920 feet of 36-inch Corrugated Type S Low-Head high density polyethylene (HDPE) pipe and fittings.
7. Furnishing and installing approximately 99 feet of 24-inch Corrugated Type S Low-Head HDPE pipe and fittings.
8. Furnishing and installing approximately 3,482 feet of 10-inch Class 150 polyvinyl chloride (PVC) pipe and fittings.
9. Furnishing and installing approximately 541 feet of 8-inch Class 150 polyvinyl chloride (PVC) pipe and fittings.
10. Furnishing and installing approximately 414 feet of 8-inch SDR 11, DIPS HDPE pipe and fittings, including installing approximately 302 feet inside an existing 24-inch pipe.
11. Furnishing and installing approximately 342 feet of 12-inch SDR 32.5, IPS HDPE pipe and fittings for ditch overflow, including installing approximately 302 feet inside the existing 24-inch pipe referenced as part of the previous item.
12. Filling the annular space in the existing 24-inch pipe around the 8-inch and 12-inch HDPE pipes with non-shrink grout.
13. Furnishing and installing connections to existing irrigation turnouts.
14. Furnishing and installing 11 access riser assemblies.
15. Furnishing and placing concrete, reinforcement, metalwork, and other miscellaneous appurtenances for concrete structures, including a settling basin lined with geotextile and shotcrete and a reinforced concrete flow control structure.
16. Furnishing and installing a valve, manhole, and connection to the existing spill structure for flushing the irrigation pipeline.
17. Furnishing and installing valves and valve boxes.
18. Furnishing and placing crushed rock surfacing at driveway and roadway crossings.
19. Furnishing and placing asphalt at county roadway crossings.
20. Furnishing and placing seed to restore areas disturbed by construction activities.

1.06 MINIMUM AREA

A. Construction impacts will be confined to the clearing limits shown on the Drawings, unless otherwise approved by the Contracting Officer. All material stockpiles, equipment storage, employee parking, and other related construction support activities shall be confined to the limits shown on the Drawings.

1.07 MAINTAINING NORMAL IRRIGATION FLOWS

A. Work shall not take place while the Peshastin Irrigation Ditch is in use.

1.08 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 01110-1, Safety Plan
   a. The Contractor shall develop and maintain a safety program and submit a safety plan to the Contracting Officer not less than 10 days prior to mobilization. In addition to the normal safety procedures for the type of work and equipment being used, the safety plan must address specific hazards of the site including heat exposure, poisonous snakes, and other site-specific hazards.
2. RSN 01110-2, Progress Schedule
   a. The Contractor shall develop and submit a progress schedule, highlighting timelines of critical work tasks and milestones no later than 15 days after the Contract is executed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01111 – DRAWINGS

PART 1 GENERAL

1.01 COST

A. Include all costs in prices offered in the schedule for other items not specifically identified but necessary to complete the work.

1.02 QUALITY ASSURANCE

A. Inform the Contracting Officer of any discrepancies, errors, or omissions discovered on Drawings prior to the start of work.

1.03 PROJECT CONDITIONS

A. Where there are minor differences, as determined by the Contracting Officer, between details and dimensions shown on the Drawings and details and dimensions of existing features at the jobsite, use details and dimensions of existing features at the jobsite.

1.04 COPIES OF DRAWINGS

A. One set of full-size Drawings, except standard Drawings, will be furnished to the Contractor for construction purposes, if requested.

B. Additional half-size copies of standard Ddrawings will be furnished upon request to the Contractor for construction purposes.

1.05 LIST OF DRAWINGS

A. Drawings listed in Table 01111A – List of Drawings, are made a part of these Specifications.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

Table 01111A – List of Drawings

Sheet No.	Title
1	Cover Sheet
2	General Notes
3	Plan and Profile, Station 9+00 to Station 22+00
4	Plan and Profile, Station 22+00 to Station 35+00
5	Plan and Profile, Station 35+00 to Station 48+00
6	Plan and Profile, Station 48+00 to Station 61+00
7	Plan and Profile, Station 61+00 to Station 71+00
8	Plan and Profile, Station 99+00 to Station 112+00
9	Plan and Profile, Station 112+00 to Station 125+00
10	Plan and Profile, Station 125+00 to Station 133+00
11	Plan and Profile, Station 133+00 to End
12	Typical Sections and Materials List
13	Pipeline Details
14	Settling Basin Structure
15	Flow Control Structure
16	Typical Turnout Connections
17	Miscellaneous Details
18	TESC Plan and Details

END OF SECTION

SECTION 01141 – USE OF SITE

PART 1 GENERAL

1.01 PROJECT CONDTIONS

A. Peshastin Irrigation District easements may be used for required construction facilities.

B. If private land is used for construction facilities or other construction purposes, make necessary arrangements and pay rental and other costs associated with use of private land.

C. Location, construction, operation, maintenance and removal of construction facilities on Peshastin Irrigation District easements will be subject to approval of the Contracting Officer and Peshastin Irrigation District.

D. Housing for construction personnel will not be permitted on Peshastin Irrigation District easements, unless otherwise approved by the Contracting Officer and Peshastin Irrigation District.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01330 – SUBMITTALS

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items not specifically identified but necessary to complete the work.

1.02 DEFINITIONS

A. Days: Calendar days.

B. Required Submittal Number (RSN): RSN identifies items to be submitted together as a complete submittal.

1.03 SUBMITTAL REQUIREMENTS

A. In case of conflict between the requirements of this section and requirements included elsewhere in these Specifications, requirements listed elsewhere shall take precedence.

B. Professional Certifications:

1. Sign and seal submittals requiring certification by a registered professional.

C. Drawings and data:

1. Prepare Drawings and data in English.
2. Label Drawings and data with the Contract number and bidding schedule item number(s).
3. Mark items to be furnished on manufacturer's data for commercial products or equipment, such as catalog cut sheets. Identify manufacturer's name, type, model, size, and characteristics. Illustrate that the product or equipment meets the requirements of these Specifications.
4. Drawings:
    a. Minimum identification in title block:
        1) Contract number and title.
        2) Contractor's or supplier's title and Drawing's number.
    b. Size: D size or smaller
    c. Draw to scale with neat lettering using drafting equipment or computer drafting equipment.
    d. Measurement units: US customary Units

1.04 SUBMITTAL PROCEDURES

A. Submit only checked submittals. Submittals without evidence of Contractor's approval will be returned for resubmission.

B. Submit complete sets of required materials for each RSN as specified in "Submittals Required" column of Table 01330A – List of Submittals. A complete set includes all listed items for RSNs with multiple parts.

C. Submit number of sets specified in "No. of sets to be set to:" column in Table 01330A – List of Submittals.

D. Include the following information in transmittal letters:

1. Contract number and title.
2. Responsible code.
3. RSN for each attached submittal.
4. Number of sets for each RSN.
5. Identify submittal as initial or resubmittal.

E. More than one RSN may be submitted under a transmittal letter, provided the responsible code is the same.

1.05 REVIEW OF SUBMITTALS

A. Time required:

1. Time required to review submittals shall be 15 days.
2. Time required for review of each submittal or resubmittal begins when the Contracting Officer receives complete sets of materials required for a particular RSN and extends through return mailing postmark date.

B. Return of Submittals

1. One set of submittals required for approval will be returned either approved, not approved, or conditionally approved.
2. Revise and resubmit for approval submittals that are not approved. Show changes and revisions with revision date. Describe reasons for significant changes in transmittal letter.
3. Resubmit returned submittals within 20 days after receiving comments, unless otherwise specified. Requirements for initial submittals apply to resubmittals.
4. Do not change designs without approval of the Contracting Officer after submittal drawings, documentation, and technical data have been approved.

1.06 TRANSMITTAL

A. Send submittals required by Table 01330A – List of Submittals, to the Contracting Officer, Chelan County Natural Resources Department, C/O Alan Schmidt, 316 Washington Street, Suite 401, Wenatchee, WA 98801. The Contracting Agency will retain one copy and disseminate the remaining submittal packages to the Engineer and the Engineer's Consultant.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL

A. Maintain one approved set of submittals at the worksite and provide access to these submittals for the Contracting Officer, Contracting Agency, Engineer, interested Government Agencies, and Owner.

Table 01330A – List of Submittals

RSN	Submittal title	Type*	Submittals required	Approval required by	No. of sets to be sent to: Contracting Officer
01110-1	Safety Plan	A	Safety Plan	Not less than 10 days prior to mobilization	3
01110-2	Progress Schedule	I	Progress Schedule	Not less than 15 days after Contract is executed	3
01335-1	Hazardous Materials	A	List of Hazardous Materials and Materials Safety Data Sheets	Not less than 10 days prior to delivering hazardous materials to the site	3
01563-1	Pollution Control	A	Water Quality Management Plan	Not less than 10 days prior to mobilization	3
01721-1	Surveying	A	Accuracy Check, Quantity Computations	Not less than 10 days prior to mobilization	3
01781-1	As-built Drawings	A	Contractor's As-built Drawings	Not less than 2 weeks following substantial completion	3
02073-1	Geocomposite Liner	A	Certification, Manufacturer Data, Physical Properties	Not less than 14 days prior to use of product	3
02621-1	Corrugated HDPE Pipe	A	Product Data, Pipe Schedule, and Installation Instructions	Not less than 14 days prior to use of product	3
02623-1	Solid Wall HDPE Pipe	A	Product Data and Installation Instructions	Not less than 14 days prior to use of product	3
02631-1	Manhole	A	Catalog Data and Drawings	Not less than 14 days prior to use of product	3

RSN	Submittal title	Type*	Submittals required	Approval required by	No. of sets to be sent to: Contracting Officer
02730-1	Crushed Rock Surfacing	A	Source Information	Not less than 10 days prior to deliver of product	3
02930-1	Seeding	A	Seed Certification and Analysis	Not less than 14 days prior to use of product	3
03200-1	Reinforcement	A	Reinforcement Diagrams and Lists	Not less than 14 days prior to use of product	3
03300-1	Concrete	A	Concrete Mix Design	Not less than 14 days prior to use of product	3
03300-2	Concrete	I	Concrete Delivery Tickets	Same day as delivery	3
03400-1	Pre-Cast Concrete Structures	I	Shipping, Handling, and Installation Procedures	Not less than 14 days prior to fabrication	3
03400-2	Pre-Cast Concrete Structures	A	Precast Drawings and Fabrication Schedule	Not less than 14 days prior to fabrication	3
03600-1	Shotcrete	A	Shotcrete Mix Design	Not less than 14 days prior to use of product	3
03600-2	Shotcrete	I	Shotcrete Delivery Tickets	Same day as delivery	3
05500-1	Metalwork	A	Shop Drawings for Grated Walkways	Not less than 14 days prior to fabrication	3
05500-2	Metalwork	A	Shop Drawings for Miscellaneous Metalwork	Not less than 14 days prior to fabrication	3
11285-1	Gate	A	Gate Drawings, Installation Instructions, and Warranty	Not less than 14 days prior to use of product	3
15100-1	Valves	A	Valve Catalog Data, Installation Instructions, an Certification of Compliance With AWWA	Not less than 14 days prior to use of product	3
*Type: "A" indicates submittals for review and approval and "I" indicates submittals for information.					

END OF SECTION

SECTION 01335 – MATERIAL SAFETY DATA SHEETS

PART 1 GENERAL

1.01 COST

A. Include in applicable prices offered in the schedule for items of work for which hazardous materials are required.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 01335-1, Complete List of Hazardous Materials (LHM) and Material Safety Data Sheets (MSDS).
2. RSN 01335-1, Updated LHM and MSDS.
   a. Submit updated copies of LHM and MSDS to Contracting Officer, at least 10 days before delivering hazardous materials to job site.

1.03 DELIVERY

A. Do not deliver any hazardous material to jobsite which are not included on the original or previously updated LHM and MSDS before receipt of MSDS submission data by Contracting Officer.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 01420 – REFERENCES

PART 1 GENERAL

1.01 REFERENCES

A. Referenced editions of standard specifications, codes, and manuals form a part of these Specifications to the extent they are referenced.

B. These Specifications take precedence when conflicting requirements occur between these Specifications and a referenced standard.

1.02 JOBSITE REFERENCES

A. The Contractor shall maintain a copy of referenced standard specifications, codes, and manuals required for work in progress at the site or fabrication site.

1.03 AVAILABILITY

A. Industrial and Governmental Documents:

1. Addresses for obtaining some industrial and governmental (other than Federal and Bureau of Reclamation specifications and standards) specifications, standards, and codes are listed in Table 01420A – Addresses for Specifications, Standards, and Codes.

Table 01420A – Addresses for Specifications, Standards, and Codes

Acronym	Name and Address	Telephone
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 249 Washington, DC 20001 www.aashto.org	(202) 624-5800 (800) 231-3475
ACI	American Concrete Institute P.O. Box 9094 Farmington Hills, MI 48333 www.aci-int.org	(248) 848-3700
AISC	American Institute of Steel Construction One East Wacker Dr., Suite 3100 Chicago, IL 60601-2001 www.aisc.org	(312) 670-2400
ASME	American Society of Mechanical Engineers 3 Park Ave. New York, NY 10016-5990 www.asme.org	(800) 843-2763

Acronym	Name and Address	Telephone
ASTM	ASTM International 100 Barr Harbor Dr. West Conshohocken, PA 19428-2959 www.astm.org	(601) 832-9585
AWS	American Welding Society 550 NW LeJeune Rd. Miami, FL 33126 www.amweld.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association 6666 W. Quincy Ave. Denver, CO 80235 www.awwa.org	(303) 794-7711
FS	Federal Specifications Unit General Services Administration Federal Supply Service FSS Acquisition Management Center Environmental Programs and Engineering Policy Division Washington, DC 20406 http://pub.fss.gsa.gov	(703) 305-5682
WWPA	Western Wood Products Association 522 SW 5th Ave., Suite 500 Portland, OR 97204-2122 www.wwpa.org	(503) 224-3930

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01452 – QUALITY CONTROL TESTING FOR EARTHWORK AND CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 GENERAL

A. The Contracting Officer will, at his/her discretion, arrange and pay for quality control testing for earthwork and cast-in-place concrete in accordance with these Specifications. The Contractor shall, at the request of the Contracting Officer, provide soil and concrete samples for testing. Quality control testing completed by the Contracting Officer shall not relieve the Contractor from his/her obligation to meet the Contract requirements for the quality, placement, and performance of these materials.

1.02 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1.	ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
2.	ASTM C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
3.	ASTM C 42	Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
4.	ASTM C 143	Standard Test Method for Slump of Hydraulic Cement Concrete
5.	ASTM C 260	Standard Practice for Making and Curing Concrete Test Specimens in the Field
6.	ASTM C 1077	Laboratory Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
7.	ASTM C 1093	Accreditation of Testing Agencies for Unit Masonry
8.	ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
9.	ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft2)
10.	ASTM D 2216	Standard Test Method for Laboratory Determination of Water (Moisture) Control for Soil and Rock by Mass
11.	ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
12.	ASTM D 2488	Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
13.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

14.	ASTM D 3017	Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
15.	ASTM D 3740	Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
16.	ASTM D 4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
17.	ASTM D 4718	Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversized Particles.

1.03 QUALIFICATIONS

A. Testing laboratory and equipment: Employ an ASTM-certified independent laboratory operated under supervision of a Registered Professional Engineer to perform sampling and testing.

1. Testing is to be performed under the supervision of a Registered Professional Engineer and reports are to bear the seal of the Registered Professional Engineer.
2. Testing laboratory organization:
   a. Testing concrete and concrete aggregates: Meet requirements of ASTM C 1077
   b. Testing soil and rock: Meet requirements of ASTM D 3740
3. Calibrate measuring devices, laboratory equipment, and instruments and established intervals.

1.04 TESTING REQUIREMENTS AND MINIMUM FREQUENCY

A. The Contracting Officer will contract with an independent testing laboratory to perform sampling, testing, and reporting, as shown in Table 01452A – Materials Testing Requirements and Frequency - Earthwork, and Table 01452B – Materials Testing Requirements and Frequency - Concrete

Table 01452A – Materials Testing Requirements and Frequency - Earthwork

PROCEDURE	TEST STANDARD	STANDARD TITLE	STANDARD REQUIREMENT	MINIMUM FREQUENCY OF TESTING
Soil Classification	ASTM D 2487	Classification of Soils for Engineering Purposes	Unified Soil Classification System	As required by the Contracting Officer
Gradation	ASTM D 422	Particle-Size Analysis of Soils	As listed in the Specifications	As required by the Contracting Officer
Atterberg Limits	ASTM D 4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils	As listed in the Specifications	As required by the Contracting Officer
Moisture Content	ASTM D 2216	Laboratory Determination of Water (Moisture Content of Soil and Rock by Mass)	+/- 2% of optimum	As required by the Contracting Officer
Laboratory Maximum Density	ASTM D 1557	Laboratory Compaction Characteristics of Soil Using Modified Effort	As listed in Specifications	As required by the Contracting Officer
Nuclear Method – In-place Density	ASTM D 2922	Density of Soil and Rock in Place by Nuclear Methods (Shallow Depth) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)	As listed in Specifications	As required by the Contracting Officer

Table 01452B – Materials Testing Requirements and Frequency - Concrete

PROCEDURE	TEST STANDARD	STANDARD TITLE	STANDARD REQUIREMENT	MINIMUM FREQUENCY OF TESTING
Fresh Concrete	ASTM C 31 ASTM C 143 ASTM C 260	Making and Curing Concrete Test Specimens in the Field Slump of Hydraulic Cement Concrete Air Content of Freshly Mixed Concrete by Pressure Method	As listed in Specifications	As required by the Contracting Officer
Compressive Strength, Cylinders	ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens	90% exceed specified compressive strength at 28 days	As required by the Contracting Officer
Compressive Strength, Cylinders	ASTM C 42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete	Average strength of cores exceeds 85% of the design 28-day compressive strength and no core is less than 75% of the design 28-day compressive strength	As required by the Contracting Officer

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 FIELD QUALITY ASSURANCE

A. Tests performed by the Contracting Officer will be used to verify that work performed by the Contractor conforms to the contract requirements and not as a replacement for the Contractor's own quality control testing.

END OF SECTION

SECTION 01510 – TEMPORARY UTILITIES

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items of work.

1.02 TEMPORARY ELECTRICITY

A. Electric power is not available at the site.

B. Provide generators, transmission lines, distribution circuits, transformers, and other electrical equipment and facilities required for obtaining power and distributing power to points of use.

C. Remove temporary equipment and facilities upon completion of work under this Contract.

D. Refueling of generators shall be done in spill control areas outside of the ordinary high water line with appropriate spill prevention and containment measures, as designated by the Contracting Officer.

1.03 TEMPORARY WATER

A. Arrange for and provide water required for construction purposes.

B. Use water which meets specified requirements for water used in concrete, grouting, and other permanent work.

C. Convey water to points of use.

D. Remove temporary equipment and facilities upon completion of work under this Contract.

1.04 TEMPORARY SANITATION FACILITIES

A. Provide temporary sanitation facilities (i.e., “port-a-potties”) for use by the construction crew.

B. Provide for maintenance of temporary sanitation facilities for duration of construction activities.

C. Provide for removal of temporary sanitation facilities once construction activities are completed.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01550 – VEHICULAR ACCESS AND PARKING

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items of work.

1.02 REGULATORY REQUIREMENTS

A. Meet jurisdictional conditions for use of existing roadways and haul routes; including seasonal or other limitations or restrictions, payment of excess size and weight fees, and posting of bonds conditioned upon repair of damage.

B. Comply with applicable local regulations for haul routes over public highways, roads, or bridges.

1.03 SITE CONDITIONS

A. Rights-of-way for access to work from existing roads will be established by the Contracting Officer.

1. Use only established roadways, parking areas, and haul routes, or temporary roadways, parking areas, or haul routes constructed by the Contractor when and as authorized by the Contracting Officer.
2. Unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials to maintain and repair existing roadways, parking areas, and haul routes: In accordance with requirements of jurisdictional authority.

B. Materials to construct, maintain, and repair temporary roadways, parking areas, and haul routes: As approved by the Contracting Officer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Investigate condition of available public or private roads for clearances, restrictions, bridge-load limits, bond requirements, and other limitations that affect or may affect access and transportation operations to and from the jobsite.

3.02 ESTABLISHED ROADWAYS AND PARKING AREAS

A. Established roadways and parking areas are available for the Contractor's use subject to existing restrictions and approval of the Contracting Officer.

B. Designated areas of existing parking facilities may be used by construction personnel. Temporary parking areas shall meet the following requirements:

1. Arrange for temporary parking areas to accommodate use of construction personnel.
2. Provide additional off-site parking when site space is not adequate.
3. Locate as approved by the Contracting Officer.

3.03 HAUL ROUTES

A. Perform work on rights-of-way established by the Contracting Officer as necessary to construct and maintain any roads, bridges, or drainage structures required for establishment and use of haul routes for construction operations.

B. Use existing available public highways, roads, or bridges as haul routes subject to applicable local regulations.

C. Minimize interference with or congestion of local traffic.

3.04 MAINTENANCE

A. Maintain roadways, parking areas, and haul routes in a sound, reasonably serviceable condition.

B. Maintain roads and parking areas until completion and acceptance of all work under this Contract.

C. Maintain surfacing of gravel-surfaced roads and parking areas in a serviceable condition until completion and acceptance of all work under this Contract.

D. Snow removal for convenience of the Contractor or to facilitate work operations of the Contractor is considered to be normal required maintenance.

3.05 REPAIR

A. Promptly repair ruts, broken pavement, potholes, low areas with standing water, and other deficiencies to maintain road surfacing and drainage in original or specified condition.

3.06 REMOVAL

A. Remove materials used to construct temporary roadways, parking areas, and haul routes prior to contract completion and stabilize the soil.

END OF SECTION

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SECTION 01562 – ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.01 COST

A. Include in the prices offered in the schedule for other items of work, except as specified.

B. Costs for damages and work stoppage resulting from insufficient environmental controls are the sole responsibility of the Contractor.

1.02 REGULATORY REQUIREMENTS

A. Comply with Federal, State, and local laws and regulations.

A. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements.

B. The Contractor shall be responsible for damages resulting from dust originating from Contractor operations.

C. The Contracting Officer may stop any construction activity in violation of Federal, State, or local laws and all additional expenses resulting from work stoppage will be the sole responsibility of the Contractor.

1.03 DUST CONTROL

A. Provide environmentally compatible dust control and abatement during construction.

B. Prevent, control, and abate dust pollution on rights-of-way provided by the Contracting Officer or elsewhere during performance of work.

C. Provide labor, equipment, and materials, and use efficient methods wherever and whenever required to prevent dust nuisance or damage to persons, property, or activities, including, but not limited to crops, orchards, cultivated fields, wildlife habitats, dwellings and residences, agricultural activities, recreational activities, traffic, and similar conditions.

1.04 AIR POLLUTION CONTROL

A. Utilize reasonably available methods and devices to prevent, control, and otherwise minimize atmospheric emissions or discharges of air contaminants.

B. Do not operate equipment and vehicles that show excessive exhaust gas emissions until corrective repairs or adjustments reduce such emissions to acceptable levels.

1.05 LIGHT CONTROL

A. Direct stationary floodlights to shine downward at an angel less than horizontal.

B. Shield floodlights so that floodlights will not be a nuisance to surrounding areas.

C. Direct lighting so that residences are not in direct beam of light.

D. Correct lighting control problems when they occur as approved by the Contracting Officer.

1.06 NOISE

A. Follow the most stringent of noise restrictions in permits, or state or local regulations.

1. Do not exceed 80 decibels (daytime), as measured at noise-sensitive areas such as residences and schools during the hours of 7:00 a.m. to 7:00 p.m. Do not exceed noise levels of 65 decibels (nighttime) during the hours of 7:00 p.m. to 7:00 a.m.
2. Only construction activities approved by Contracting Officer will be allowed during hours of 7:00 p.m. to 7:00 a.m.
3. Provide specialty mufflers for continuously running generators, pumps, and other stationary equipment to meet the decibel requirements above.
4. Compression brakes are not allowed.
5. Perform operations producing high-intensity impact noise only weekdays during the hours of 7:00 a.m. to 7:00 p.m.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01563 – WATER POLLUTION CONTROL

PART 1 GENERAL

1.01 PAYMENT

A. Temporary Water Pollution/Erosion Control

1. Payment: Lump sum price offered in the schedule.

1.02 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 01563-1, Water Quality Management Plan:

a. Detailed Water Quality Management Plan for construction activities in the vicinity of any stream, flowing or dry watercourse, lake, wetland, reservoir, or underground water source.

1) Name of person who will be responsible for implementing and carrying out plan.

2) Relationship of methods and descriptions herein to conditions of required permits specified in article titled "Contractor Responsibilities."

3) Precautions which will be taken to avoid discharge or accidental spills of pollutants into a river, stream, watercourse, or lake.

4) Demonstrated compliance with State and local waste disposal, sanitary sewer, or septic regulations. Methods for preventing or controlling runoff and erosion for construction sites, both during and after construction, including:

a) Access and haul roads;

b) Stockpile, borrow, and waste areas;

c) Construction plant and equipment yards;

d) All excavated surfaces;

e) Buffer zones; and

f) Other impacted areas.

5) Information on vegetative practices, structural control, silt fences, straw dikes, sediment and operator controls, stormwater controls, and solid waste controls. Address stormwater controls for appropriate stormwater management measures including velocity

dissipaters. Address solid waste controls for building materials and offsite tracking of sediment.

1.03 REGULATORY REQUIREMENTS

A. Laws, regulations, and permits:

1. Perform construction operations in such a manner to comply, and ensure subcontractors comply, with:
   a. Applicable Federal, State, and local laws, orders, regulations, and Water Quality Standards concerning control and abatement of water pollution; and
   b. Terms and conditions of applicable permits issued by permit issuing authority. If conflict occurs between Federal, State, and local laws, regulations, and requirements, the most stringent shall apply.

B. Contractor violations:

1. If noncompliance occurs, report noncompliance to the Contracting Officer immediately (orally), with specific information submitted in writing within 2 calendar days.
2. Nonconformance with applicable Federal, State, or local laws, orders, regulations, or Water Quality Standards may result in the Contracting Officer stopping all site activity until compliance is ensured.
3. The Contractor shall not be entitled to any extension of time, claim for damage, or additional compensation by reason of such a work stoppage.
4. Corrective measures required to bring activities into compliance shall be at the Contractor's expense.

1.04 REQUIRED PERMITS

A. The Contracting Officer, or others, will apply for all necessary environmental permits. A copy of the permits will be provided to the Contractor. The Contractor shall become familiar with permit conditions prior to starting work and comply with all permit conditions through completion of work. Any penalties related to violation of permit conditions shall be the sole responsibility of the Contractor.

1.05 CONTRACTOR RESPONSIBILITIES

A. Monitoring:

1. Conduct monitoring in order to meet the requirements of the permits which may include:
   a. Sampling,
   b. Site inspections, and

c. Required laboratory tests to determine effluent characteristics.

B. Reporting results:

1. Report all required monitoring results to appropriate agencies.

C. Recordkeeping:

1. Retain records and data required by permits for the specified time period.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 POLLUTION CONTROLS

A. Control pollutants by use of sediment and erosion controls, wastewater and stormwater management controls, construction site management practices, and other controls including State and local control requirements.

B. Sediment and erosion controls:

1. Establish methods for controlling sediment and erosion which address vegetative practices, structural control, silt fences, straw dikes, sediment controls, and operator controls as appropriate.
2. Institute stormwater management measures as required, including velocity dissipaters, and solid waste controls which address controls for building materials and off-site tracking of sediment.

C. Wastewater and stormwater management controls:

1. Pollution prevention measures:
   a. Use methods of dewatering, unwatering, excavating, or stockpiling earth and rock materials which include prevention measures to control silting and erosion, and which will intercept and settle any runoff of sediment-laden waters.
   b. Prevent wastewater from general construction activities such as drainwater collection, aggregate processing, concrete batching, drilling, grouting, or other construction operations, from entering flowing or dry watercourses without the use of approved turbidity control methods.
   c. Divert stormwater runoff from upslope areas away from disturbed areas.

2. Turbidity prevention measures:
   a. Use methods for prevention of excess turbidity which include, but are not restricted to, intercepting ditches, settling ponds, gravel filter entrapment dikes, flocculating processes, recirculation, combinations thereof, or methods that are not harmful to aquatic life.
   b. Wastewaters discharged into surface waters shall contain the least concentration of settleable material possible.
3. If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.
4. Remove and properly dispose of sediment from erosion controls once it has reached one-third of the exposed height of the control.

D. Construction site management:

1. Contractor construction operations:
   a. Perform construction activities by methods that will prevent entrance or accidental spillage of solid matter, contaminants, debris, or other pollutants or wastes into streams, flowing or dry watercourses, lakes, wetlands, reservoirs, or underground water sources. Such pollutants and wastes include, but are not restricted to: refuse, garbage, cement, sanitary waste, industrial waste, hazardous materials, radioactive substances, oil and other petroleum products, aggregate processing tailings, mineral salts, and thermal pollution.
2. Stockpiled or deposited materials:
   a. Do not stockpile or deposit excavated materials or other construction materials near or on stream banks, lake shorelines, or other watercourse perimeters where they can be washed away by high water or storm runoff, or can in any way encroach upon the watercourse.
3. Oil storage tanks management:
   a. Storage tank placement: Place oil or other petroleum product (hereinafter referred to collectively as oil) storage tanks or containers at least 20 feet from streams, flowing or dry watercourses, lakes, wetlands, reservoirs, and any other water source in a discharge area.
   b. Storage area dikes: Construct storage area dikes at least 12 inches high or graded and sloped to permit safe containment of leaks and spills equal to the capacity located in each area plus a sufficient amount of freeboard to contain the 25-year rainstorm.
   c. Diked area barriers: Provide diked areas with an impermeable barrier at least 50 mils thick. Provide areas used for refueling operations with an impermeable liner at least 50 mils thick buried under 2 to 4 inches of soil.
   d. Underground tank prohibitions: Do not use underground storage tanks.

END OF SECTION

SECTION 01569 – LANDSCAPE PROTECTION AND RESTORATION

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items of work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PRESERVATION AND PROTECTION

A. Preserve natural landscape and preserve and protect existing vegetation not required or otherwise authorized to be removed.

B. Conduct operations to prevent unnecessary destruction, scarring, or defacing of natural surroundings in the vicinity of the work.

C. Move crews and equipment within the rights-of-way and over routes provided for access to the work in a manner to prevent damage to grazing land, crops, or property.

D. Minimize, to the greatest extent practicable, clearings and cuts through vegetation. Irregularly shape authorized clearings and cuts to soften undesirable aesthetic impacts.

E. Do not use trees for anchorages except in emergency cases or as approved by the Contracting Officer. For such use, wrap the trunk with a sufficient thickness of approved protective material before any rope, cable, or wire is placed.

F. Use safety ropes where tree climbing is necessary; do not use climbing spurs.

3.02 REPAIR OR TREATMENT

A. The Contractor is responsible for injuries to vegetation caused by Contractor operations, personnel, or equipment.

B. Repair or treat injured vegetation without delay and as recommended by and under direction of an experienced horticulturist or licensed tree surgeon approved by the Contracting Officer.

C. Restore construction roads to original contours and make impassable to vehicular traffic when no longer required.

D. Scarify and regrade, after completion of work, land used for construction purposes and not required for completed installation so that surfaces blend with natural terrain and are in a condition that will facilitate revegetation, provide proper drainage, and prevent erosion.

3.03 REPLACEMENT

A. Remove and properly dispose of trees or shrubs not required or otherwise authorized to be removed that, in the opinion of the Contracting Officer, are damaged or injured beyond saving by Contractor operations, personnel, or equipment.

B. Replace removed tree or shrub with tree or shrub approved by the Contracting Officer.

END OF SECTION

SECTION 01600 – PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 COST

A. When a separate item which includes furnishing of a material is provided in the offered schedule, include cost of furnishing, hauling, storing, and handling in the price offered in the schedule for the item.

B. When a separate item is not provided in the schedule for furnishing a material, include cost of furnishing, hauling, storing, and handling in the price offered in the schedule for work for which the material is required.

1.02 DEFINITIONS

A. Essential characteristics: As used in these Specifications, the term "essential characteristics" is synonymous with the term "salient characteristics."

B. Salient characteristics: Those qualities of an item that is essential to ensure that the intended use of the item can be satisfactorily realized.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Transport and handle manufactured products in accordance with manufacturer's instructions.

B. Store and protect manufactured products in accordance with manufacturer's instructions. Obtain these instructions from the manufacturer before delivery of materials to jobsite. Maintain a copy of these instructions at jobsite.

C. Protect materials subject to adverse effects from moisture, sunlight, ultraviolet light, or weather during storage at jobsite.

D. Store curing compounds, sealants, adhesives, paints, coatings, sealers, joint compounds, grouts, and similar products at the temperature and environmental conditions recommended by manufacturer.

1.04 MAINTENANCE

A. Extra materials:

1. Furnish additional maintenance materials specified as “extra materials” in the Specifications. Provide maintenance material identical to installed material and provide from the same manufacture’s production lot as installed material.
2. Package extra materials for storage and label with complete product information on packaging.
3. Deliver extra materials to the jobsite and place in storage as directed by the Contracting Officer.

PART 2 PRODUCTS

2.01 MATERIALS

A. Provide materials required for completion of work.

B. Provide type and quality described in these Specifications. Make a diligent effort to procure specified materials from any and all sources.

C. Furnish new materials conforming to referenced standard unless otherwise specified.

D. For materials not covered by Federal or other specifications, furnish materials of standard commercial quality.

E. If materials to be used deviate from or are not covered by recognized specifications and standards, submit, for approval, justification for and exact nature of the deviation, and complete specifications for materials proposed for use.

F. Make parts accurately to standard gauge where possible.

G. Permanently mark fasteners with a symbol identifying the manufacturer and with symbol(s) indicating grade, class, type, and other identifying marks in accordance with reference or applicable standard.

2.02 SUBSTITUTIONS

A. If materials required by these Specifications become unavailable, because of Government priorities or other causes, substitute materials may be used.

A. Obtain written approval to use substitute materials from the Contracting Officer. State in the request for substitution the amount of the adjustment, if any, to be made in favor of the Contracting Officer.

B. The Contracting Officer's determination as to whether substitution will be permitted, and as to what substitute materials may be used, shall be final and conclusive.

C. If approved substitute materials are of less value to the Contracting Officer or involve less cost to the Contractor than specified material, a contract adjustment will be made in favor of the Contracting Officer. Where the amount involved or the importance of substitution warrants, a deductive modification to the Contract will be issued.

D. No payments in excess of prices bid in the schedule will be made because of substitution of one material for another or because of use of one alternate material in place of another.

2.03 WORKMANSHIP

A. Accurately manufacture and fabricate materials in accordance with best modern practice and requirements of these Specifications, notwithstanding minor errors or omissions therein.

B. Use liberal factors of safety and adequate shock-absorbing features in designs, especially for parts subjected to variable stress or shock, including alternating or vibrating stress or shock.

C. Include provisions which prevent components from loosening for shock-absorbing features and parts subject to vibration.

2.04 SOURCE QUALITY ASSURANCE

A. Materials will be subject to inspection at any one or more of the following locations, as determined by the Contracting Officer:

1. At place of production or manufacture.
2. At shipping point.
3. At jobsite.

B. To provide for inspection, provide at time of issuance, copies of purchase orders, including drawings and other pertinent information, covering material on which inspection will be made as advised by the Contracting Officer, or provide other evidence if such purchase orders are issued verbally or by letter.

C. Inspection of materials at any location specified above or waiving of inspection shall not be construed as being conclusive as to whether materials and equipment conform to contract requirements nor shall the Contractor be relieved thereby of the responsibility for furnishing materials meeting the requirements of these Specifications.

D. Acceptance of materials will be made only at the jobsite.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Final inspection and acceptance of materials will be made only at the jobsite after installation and testing.

END OF SECTION

SECTION 01721 – SURVEYING

PART 1 GENERAL

1.01 PAYMENT

A. Surveying:

1. Payment: Lump sum price offered in the schedule.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 01721-1, Accuracy check results: Government-established primary control.
2. RSN 01721-1, Final quantity computations.

1.03 PRIMARY CONTROL AND EXISTING STRUCTURE FEATURES

A. The Government has established primary control to be used for establishing work lines and grades. The Government survey does not include an established benchmark. The Government-established primary control shall be provided in electronic format to the Contractor for use in establishing work lines and grades.

B. Primary control consists of existing features and horizontal control points in the vicinity of the project, as shown on the Drawings.

C. It shall be the Contractor's responsibility to check and verify primary control and resolve discrepancies with the Contracting Officer before beginning the work. The Contractor shall reference an established benchmark for checking and verifying primary control.

D. Preserve and maintain primary control points until otherwise authorized. The Contracting Officer may reestablish damaged or destroyed primary control points and backcharge re-establishment cost to the Contractor.

1.04 QUALITY ASSURANCE

A. Provide experienced construction surveyors under supervision and direction of an engineer or surveyor with minimum of 2 years' experience in charge of construction surveys for construction similar in nature to that required by this Contract.

A. Survey equipment shall include modern electronic equipment and software capable of accuracies required herein and compatible with Autodesk AutoCAD Civil 3D 2009.

PART 2 PRODUCTS

2.01 SURVEYING MATERIALS AND EQUIPMENT

A. Provide materials and equipment required for surveying work, including but not limited to instruments, stakes, spikes, steel pins, templates, platforms, and tools. Except as required to be incorporated in work or left in place, surveying materials and equipment will remain property of the Contractor.

PART 3 EXECUTION

3.01 LAYOUT OF WORK SURVEYS

A. Establish lines and grades for work layout from Government-established primary control points, as corrected by Contractor's check and verification of primary control points.

B. Establish measurements required for work execution to specified tolerances.

C. Provide stakes, markers, and other survey controls necessary to control, check, and guide construction.

D. Electronic surveys shall use a combination of points, lines, and breaklines. Use breaklines for distinct surface features, slope breaks, road and pavement edges, edge of water, structures, and utilities.

3.02 QUANTITY SURVEYS AND COMPUTATIONS

A. Perform surveys and computations to determine actual quantities of work performed or placed during each progress payment period. Progress payment requests will not be considered complete without acceptable computations.

B. Perform final quantity computations using surveys of original structure features and original ground and final paylines shown on the Drawings as directed. Final quantity computations shall include detailed drawings, sections, and computer or hand calculations.

C. Perform quantity surveys in the presence of the Contracting Officer, unless specifically waived. Notify the Contracting Officer at least 24 hours before performing a quantity survey.

D. Quantity survey and computation methods, level of detail, documentation, and presentation shall be clear and understandable, shall produce accuracy within 2%, and are subject to checks and final approval by the Contracting Officer.

3.03 SURVEY REQUIREMENTS

A. Alignment staking: At each change in slope and horizontal angle point.

B. Structures: Stake out structures and turnout locations before and during construction.

C. Quantity surveys: As needed to justify quantity calculations. The Government will provide original ground model and topography in electronic format.

3.04 ACCURACY

A. Degree of accuracy:

1. Horizontal Alignment: Within 0.1 foot at ends of pipeline, structures, and other critical locations, or as directed by the Contracting Officer.
2. Existing structure, original ground, and quantity surveys: Within 0.1 foot, horizontally and vertically.
3. Structure points and anchor bolt locations: Set within 0.1 foot, except where installation or operation considerations require high tolerances.
4. Vertical Elevation and Profile: Within 0.05 feet for structural components and pipeline elevations. The finished pipeline profile shall be free of sags.

3.05 FIELD RECORDS

A. Record original field notes, computations, and other surveying data in field books.

B. Record survey data in accordance with recognized professional surveying standards.

1. Notes or data not in accordance with standard formats will be rejected.
2. Illegible notes or data or erasures on any page of a field book will be sufficient cause for rejection of part or all of field book.
3. Corrections by ruling or lining out errors will be permitted.
4. Copied notes or data will not be permitted.
5. Rejection of part or all of a field book may necessitate resurveying.

C. Notes may be collected on an electronic data collection device with prior approval of the Contracting Officer.

1. Submit notes on compact disk in approved format.
2. Submit paper copies of notes.

END OF SECTION

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SECTION 01725 – PROTECTION OF EXISTING INSTALLATIONS

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items of work, except as specified.

B. Costs for repair of installations damaged by the Contractor's operations are the Contractor's expense.

1.02 PROJECT CONDITIONS

A. Drawings included in these Specifications show existing features and equipment but may not show all equipment and materials existing at the jobsite.

B. The Contractor shall contact the Utility Location Request Center (One Call Center) at 1-800-424-5555 for utility locations not less than 2 business days before the scheduled date for earthwork or trenching that may impact existing utilities.

C. The Contractor shall obtain the location of buried conduit, pipe, cable, ground mat, and other buried items before performing excavation.

D. Note the location and extent of overhead utilities. Caution should be taken when working near overhead utilities. The Contractor shall be responsible for the safety of his/her employees and equipment when working near overhead utilities.

E. The Contractor shall coordinate with adjacent private property owners to locate private irrigation pipe and other installations prior to excavation. The Contractor shall protect existing irrigation installations from damage.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 REPAIR

A. Repair, at the Contractor's expense, damage to existing installations due to the Contractor's operations or the Contractor's failure to provide proper protection. At the Contracting Officer's option, damage may be repaired by the Contracting Officer, and the Contractor will be backcharged repair costs.

B. All areas disturbed by construction shall be returned to the original ground topography before construction ends, unless otherwise shown on the Drawings.

C. If disturbance of private irrigation pipe or installations is required to complete the work, the Contractor shall replace or repair the existing pipe or installation. The Contractor shall coordinate replacement, repair, relocation, or removal of existing installations with the private property owner and the Contracting Officer.

3.02 PROTECTION

A. Provide protection for personnel and existing facilities from harm due to the Contractor's operations. Protection shall be subject to approval of the Contracting Officer.

B. Arrange protective installations to permit operation of existing equipment and facilities while work is in progress.

3.03 REMOVAL OF PROTECTIVE INSTALLATIONS

A. Remove protective installations after purpose has been served. Materials furnished by the Contractor to provide protection remain property of the Contractor.

END OF SECTION

SECTION 01740 – CLEANING

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for other items of work.

1.02 REFERENCES

A. Code of Federal Regulations (CFR)

1. 40 CFR 261.3 Definition of Hazardous Waste
2. 49 CFR 171-179 Transportation - Hazardous Waste Regulations

1.03 DEFINITION

A. Hazardous waste: Defined as hazardous by 40 CFR 261.3; or by other Federal, State, or local laws or regulations.

1.04 REGULATORY REQUIREMENTS

A. Comply with Federal, State, and local laws and regulations.

B. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements.

1.05 PROJECT CONDITIONS

A. Report waste materials discovered at jobsite to the Contracting Officer.

1. If waste is hazardous, the Contracting Officer may order delays in time of performance or changes in work, or both.
2. If such delays or changes are ordered, an equitable adjustment will be made in the Contract in accordance with applicable clauses of the Contract.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 TESTS

A. Test unknown waste materials found at the jobsite which may be hazardous.

3.02 PROGRESS CLEANING

A. Keep work and storage areas free from accumulations of waste materials and rubbish.

3.03 FINAL CLEANUP

A. Remove temporary plant facilities, temporary buildings, concrete footings and slabs, rubbish, unused materials, concrete forms, and other similar waste materials which are not part of permanent work.

3.04 NONHAZARDOUS WASTE DISPOSAL

A. Combustible waste materials: Dispose by removal from jobsite. If permitted by local regulatory agencies, landowner, and Contracting Officer, combustible materials can be burned on site.

B. Noncombustible waste materials: Dispose by removal from jobsite.

C. Disposal by removal:

1. Dispose of waste materials at a permitted landfill. Make arrangements with Contracting Officer for use of landfill and pay required fees.

D. Disposal by burning:

1. Pile materials in designated burning areas to prevent fire from spreading beyond piles burned.
2. Completely burn materials. Dispose of remaining charred pieces.
3. Do not burn tires, plastics, rubber products, asphalt products, hazardous materials, or other materials which could produce heavy black smoke or noxious or nuisance odors.
4. Provide suitable equipment and supplies for preventing and suppressing fires.

3.05 HAZARDOUS WASTE DISPOSAL

A. Recycle hazardous waste whenever possible.

B. Dispose of waste materials known or found to be hazardous at permitted treatment or disposal facilities.

C. Transport hazardous waste in accordance with 49 CFR 171-179.

END OF SECTION

SECTION 01781 – PROJECT CLOSEOUT

PART 1 GENERAL

1.01 GENERAL

A. Prior to commencing demobilization, the Contractor shall review all construction elements with the Contracting Officer, who will give approval of the final site review.

B. Final site review approval is contingent on the successful completion of: construction of design elements, cleaning of the site, removal of all construction access routes and staging areas, restoration of areas disturbed by construction activities, and other tasks as outlined in these Specifications and on the Drawings.

1.02 COST

A. Include in prices offered in the schedule for other items of work.

1.03 REGULATORY REQUIREMENTS

A. Comply with Federal, State, and local laws and regulations.

B. Comply with all construction and project permits, as applicable.

C. Conform to most stringent requirement in cases of conflict between the Specifications and regulatory requirements

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals

1. RSN 01781-1, As-built Drawings

1.05 AS-BUILT DOCUMENTS

A. As-built Drawings:

1. Maintain two sets of full-size prints of Contract Drawings at the jobsite.
    a. Mark and dimension to show variations between actual construction and that indicated or specified in the Contract Documents.
    b. Include buried or concealed construction and utilities.
    c. Include existing items, topographic features, and utility lines revealed during construction which differ from those shown on the Contract Documents.

d. Where choice of materials or methods is permitted in the Specifications, or where variations in scope or character of work from that of the original contract are authorized, mark Drawings to define construction actually provided.

2. Use standard drafting practice to represent changes and include supplementary notes, legends, and details necessary to clearly portray as-built construction.

3. Mark As-built Drawings in the following colors

   a. Red – Additions to original Drawings.

   b. Green – Deletions to original Drawings.

   c. Blue – Notations necessary for explanation of As-built Drawings.

4. The Drawings shall be available for the Contracting Officer's review at all times.

5. Upon completion of the work, sign the marked prints as certified correct.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

A. Final site review shall not commence until the Contractor has satisfactorily completed the construction of all of the design elements as described in these Specifications and as shown on the Drawings or as directed by the Contracting Officer.

B. Once final site review is approved by the Contracting Officer, the Contractor may commence demobilization activities.

END OF SECTION

DIVISION 2 – SITE WORK

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SECTION 02073 - GEOSYNTHETICS

PART 1 GENERAL

1.01 DESCRIPTION

A. The work shall consist of furnishing and placing a geocomposite liner for the settling basin structure.

1.02 COST

A. Include cost of geocomposite liner in lump sum price offered in the schedule for the Settling Basin With Shotcrete/Geotextile Lining – Station 10+00.

1.03 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 02073-1, Canal Liner Certification: Certify liner meets or exceeds requirements of this section, including leak test.
2. RSN 02073-1, Manufacturer's data including physical properties of the geocomposite liner.

1.04 QUALITY ASSURANCE

A. Prior to permanently placing canal liner, Contractor shall perform a 24-hour ponding-leak test. Liner shall be capable of holding a total volume of water not less than 1,000 gallons and a minimum of two (2) feet of depth for a 24-hour period. Water level measurements shall be taken at the beginning and end of the test period. Total change in water depth shall not exceed 2 inches.

PART 2 PRODUCTS

A. Geocomposite Canal Liner

1. Contractor shall furnish and install 20-mil thick ethyl vinyl acetate (EVA) with an 8-ounce per square yard non-woven polyester geotextile laminated to each face of the material. The material shall be Huesker Canal3 8208-PET, or approved equal, and shall meet the following requirements:

a.	Mass Per Unit Area (ASTM D5261)	36 oz/yd2
b.	Membrane Thickness (ASTM D5199)	20 mils
c.	Grab Tensile Strength (MD) (ASTM D4632)	300 lbs
d.	Grab Elongation (MD) (ASTM D4632)	>50%
e.	Trapezoidal Tear Strength (MD) (ASTM D4533)	100 lbs
f.	Puncture Strength (5/16 PIN) (ASTM D4833)	175 lbs

g. Permeability (ASTM D4491) Non-measurable

2. Liner shall be inert to biological degradation and naturally encountered chemicals, alkalies, and acids.

PART 3 EXECUTION

A. Contractor shall field verify dimensions for liner material.

B. Each roll delivered to Project site shall be labeled by supplier for identification.

C. Rolls shall be stored and protected from rain, dirt, dust and ultraviolet light.

D. Liner placement shall be approved in writing by the Contracting Officer prior to commencement of shotcrete placement operations. Liner shall be placed to minimize wrinkles, creases, or other surface features that stress the liner or would make it difficult to apply the shotcrete and maintain the required 3-inch thickness and a relatively smooth surface. Liner shall be placed in one of the following two arrangements:
1. Liner placed perpendicular to the canal centerline.
2. Liner placed parallel to the canal center line so long as the seams are on the invert and not on the slope.

E. Overlap liner 24 inches at each seam. Laps shall be oriented with the upstream liner panel on top of the downstream liner panel.

F. On the side slopes, liner shall be installed using methods recommended by the liner manufacturer.

G. Once liner is placed, no vehicle traffic shall be allowed on installed liner.

H. The Contractor shall be prepared for adverse weather conditions. Heavy rains and wind, snow, and extreme temperatures can be present at the site during various times of the year.

END OF SECTION

SECTION 02100 – MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SCOPE

A. The work shall consist of mobilizing equipment and supplies and securing bonds and permits necessary to do the work as stated in the Contract and/or agreement and demobilization of excess materials and equipment from the work site.

1.02 PAYMENT

A. Mobilization/Demobilization:

1. Payment: Lump sum price offered in the schedule.

1.03 FORCES AND EQUIPMENT

A. Mobilization may include costs for transporting personnel, equipment, operating supplies to the site, establishment of necessary facilities for the Contractor's operation and any permits, insurance, and/or bonds required to do the work.

B. Demobilization may include the removal of equipment and facilities that were necessary to do the work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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SECTION 02200 – DEMOLITION

PART 1 GENERAL

1.01 REQUIREMENT

A. Remove and dispose of the existing culverts, pipe, canal lining, structures, and other obstructions necessary to construct the proposed pipeline and associated improvements.

1.02 PAYMENT

A. Removal and Disposal of Existing Features:

1. Payment: Lump sum price offered in the schedule.

1.03 PROJECT CONDITIONS

A. Cease work immediately if demolition operations come in contact with electrical conduit containing or suspected of containing energized circuits and notify the Chelan County Public Utility District (PUD). Do not resume work until directed by the Chelan County PUD.

B. Coordinate performance of demolition work that will be noisy, malodorous, or create dust with the Contracting Officer to avoid environmental damage or health concerns.

C. Repair or replace existing materials to remain in place if damaged during demolition to the satisfaction of the Contracting Officer.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect existing materials that are shown on the Drawings or designated by the Contracting Officer to remain or to be removed for future installation by others.

B. Verify the location of existing utilities and protect as necessary prior to the start of demolition.

3.02 REPAIR

A. Repair surfaces exposed by demolition operations to provide uniform appearance with surrounding surfaces.

3.03 DISPOSAL

A. Dispose of removed materials in accordance with Section 01740 – Cleaning.

END OF SECTION

SECTION 02232 – CLEARING AND GRUBBING

PART 1 GENERAL

1.01 PAYMENT

A. Clearing and Grubbing:

1. Payment: The lump sum price offered in the schedule shall include clearing, grubbing, and disposal of cleared material.

1.02 DEFINITIONS

A. Vegetation: Trees, shrubs, brush, stumps, exposed roots, down timber, branches, grass, weeds, and rubbish.

1.03 PROJECT CONDITIONS

A. Preserve and protect vegetation designated for preservation within the clearing limits and vegetation outside the clearing limits, as shown on the Drawings and in accordance with Section 01569 – Landscape Protection and Restoration.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 CLEARING

A. Locate and clearly mark the clearing limits and landscape to be preserved.

B. Clear rights-of-way to be occupied by permanent construction and required for access to the work.

C. Clear adjacent to cut and fill sections a minimum distance of 1 foot outside of slope lines. Do not clear beyond the clearing limits shown on the Drawings.

D. Remove vegetation and other debris as determined by the Contracting Officer.

3.02 GRUBBING

A. Remove stumps, roots, and vegetation to a minimum of 12 inches below final excavation lines and grades or until organic matter is removed.

B. Perform grubbing in advance of trenching, excavation, and grading work

3.03 DISPOSAL OF CLEARED MATERIAL

A. Dispose of vegetative material and non-vegetative material in accordance with Section 01740 – Cleaning.

END OF SECTION

SECTION 02236 – STRIPPING

PART 1 GENERAL

1.01 COST

A. Include in prices offered in the schedule for the items for which stripping is required to provide a complete and finished project.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 STRIPPING

A. Strip topsoil from areas to be excavated.

B. Remove topsoil to a depth of 12 inches as directed by the Contracting Officer.

3.02 USE OF TOPSOIL

A. Do not use topsoil removed by stripping for backfill or constructing embankments.

B. Segregate and stockpile topsoil for use in restoration work.

C. Spread remaining topsoil over disturbed construction areas upon completion as directed by the Contracting Officer.

3.03 STOCKPILE

A. Transport and stockpile topsoil as necessary prior to final hauling and placing.

B. Do not compact topsoil in stockpile.

C. Protect stockpile from contamination and erosion.

END OF SECTION

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SECTION 02240 – DIVERSION AND CARE OF WATER

PART 1 GENERAL

1.01 GENERAL

A. No geologic or groundwater information is available at the site. The Contractor shall make his/her own investigations and shall determine the extent and difficulty of removal of water from excavations. The irrigation ditch will not be operational during the period of construction and the Contractor will not need to divert irrigation flows.

1.02 COST

A. Include in applicable prices offered in the schedule for items of work related to new channel excavation and diversion of water.

1.03 REQUIREMENT

A. Furnish, install, maintain, and operate all necessary pumping and other equipment for removal of water from the various parts of the work, and for maintaining the foundations and other parts of the work free from water as required for constructing each part of the work. All water control shall conform to the appropriate construction permit documents.

1.04 DEFINITION

A. Dewatering: Removal and control of groundwater from pores or other open spaces in soil or rock formations to allow construction activities to proceed as intended, and includes relief of groundwater pressure.

B. Unwatering:

1. Control and removal of ponding, seeping, or flowing surface water except as otherwise provided, emerging subsurface water from excavated surfaces, and from precipitation within and adjacent to excavations and construction zones using channels, ditches, gravel drains, gravel blankets, pipes, sumps, pumps, and discharge lines.
2. Includes a controlled discharge of effluent waters.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 DEWATERING

A. Provide, maintain, and operate necessary pumps and other equipment for removal of water from excavations and trenches for structures and pipe that are to be constructed.

B. Accomplish dewatering, as needed, by use of motor or engine-driven pumps with adequate lift capacity, discharge piping, hoses and piping, valves, and intakes.

C. Accomplish dewatering, as needed, by use of motor or engine-driven pumps with adequate lift capacity, discharge piping, hoses and pipelines, valves, and intakes.

D. If a generator is to be used to operate pumping equipment, generator shall be placed above the high water line within an approved spill protection area.

E. Provide dewatering facilities capable of operating in freezing temperatures if freezing weather conditions occur.

F. Monitor and control discharge in accordance with Section 01563 – Water Pollution Control and the permits required under that section.

3.02 DEWATERING BELOW GROUNDWATER LEVEL

A. Where excavation and trenching extends below the groundwater level, dewater the portion below the groundwater level in advance of excavation.

B. Dewater to prevent loss of fines from the foundation, maintain the stability of the excavation, and allow for construction work to be performed in the dry.

3.03 SEEPAGE CONTROL

A. Before excavating to final grade for pipe and structures, bring the water level to an elevation at least 1 foot below the required subgrade elevation.

B. Maintain this water level until pipe has been placed, structures have been completed, and backfill has been placed.

C. After backfill has been placed, with approval of the Contracting Officer, allow groundwater to rise to natural levels.

D. Control pumping and dewatering operations so that the groundwater level rises slowly and uniformly along the entire length of pipe and around each structure.

END OF SECTION

SECTION 02260 – EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for excavation support and protection for trenches and open excavations greater than 4 feet in depth.

1.02 COST

A. Include cost for excavation support and protection in applicable prices offered in the schedule for items of work requiring excavation support and protection.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Occupational Safety and Health Act (OSHA):
   a. Construction Industry Standards.
   b. Occupational Safety and Health Standards.
2. Washington Industrial Safety and Health Act (WISHA).
3. Chapter 296-155, Part N, WAC - Washington Safety Standards for Construction Work; Excavation, Trenching, and Shoring.

1.04 REQUIREMENTS

A. The Contractor shall be responsible for planning, designing, installing, maintaining, and removing support and protection for excavations and trenches in accordance with Chapter 296-155, Part N, WAC and applicable OSHA and WISHA requirements.

B. Excavation support systems shall be designed and installed to protect surrounding property and structures. Excavation support systems shall also be designed so that installation and removal of the support systems does not disturb soil adjacent to or below the required excavation or trench section. Excavation and trenching shall be to the lines shown on the Drawings and as specified in Section 02317 – Trenching, Backfilling, and Compaction, and Section 02318 – Earthwork for Structures.

C. Excavation support systems shall be designed to meet water control requirements, as specified in Section 02240 – Diversion and Care of Water.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 GENERAL

A. Construct the excavation to the lines shown on the Drawings and as specified in Section 02318 – Earthwork for Structures. Install and remove support systems in such a manner as not to disturb soil adjacent to the trench or below the trench or excavation. Installation of horizontal strutting below the barrel of a pipe and use of the pipe as a support are not permitted.

B. Unless otherwise indicated, remove all sheeting, shoring, and bracing after placement and compaction of backfill.

END OF SECTION

SECTION 02317 – TRENCHING, BACKFILLING, AND COMPACTION

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for trenching, backfill, and compaction of backfill material for installation of HDPE and PVC pipe.

1.02 PAYMENT

A. Trench Excavation:
   1. Payment: Lump sum price offered in the schedule.
      a. Includes cost of labor and materials for shoring, sheeting, bracing, timbering, and other temporary construction; of pumping, unwatering, and dewatering; of removing temporary construction where required; of stockpiling excavated material for backfill; and of disposal of unused or wasted excavated materials.
      b. Overexcavation performed beyond specified or directed paylines and backfill and compaction of backfill for such overexcavation shall be at the expense of the Contractor.
      c. Where excavation is performed in backfill, no payment will be made for the resulting excavation, backfill, and compacting backfill.

B. Placement and Compaction of Pipe Bedding:
   1. Measurement: Made to lines and lengths shown on the Drawings, and will be made only for the quantities actually compacted within the excavation paylines for pipe bedding.
      a. Measurement for payment for additional pipe bedding will be made to trench widths shown on the Drawings and to the depth directed by the Contracting Officer.
   2. Payment: Cubic yard price offered in the schedule.
      a. Includes cost of labor and materials necessary to import, as needed, place and compact pipe bedding per the typical trench sections shown in the Drawings.

C. Placement and Compaction of Select Backfill:
   1. Measurement: Made to lines and lengths shown on the Drawings, and will be made only for the quantities actually compacted within the excavation paylines for pipe bedding.
      a. Measurement for payment for additional select backfill will be made to trench widths shown on the Drawings and to the depth directed by the Contracting Officer.
      b. The volume of the pipe will be deducted based on the pipe diameters

shown on the Drawings, regardless of the actual diameters of the pipe furnished.

2. Payment: Cubic yard price offered in the schedule.
   a. Includes cost of labor and materials necessary to import, as needed, place, and compact select backfill per the typical trench sections shown in the Drawings.

D. Placement and Compaction of Final Backfill:
   1. Payment: Lump sum price offered in the schedule.
      a. Includes cost of labor and materials necessary to import, as needed, place, and compact final backfill per the typical trench sections shown in the Drawings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1.	ASTM D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
2.	ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils.
3.	ASTM D 1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft^2).
4.	ASTM D 2922	Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods.

5. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

1.04 REQUIREMENTS

A. The Contractor shall ensure that imported materials are approved by the Contracting Officer before hauling to the site. The Contracting Agency reserves the right to reject materials that, in the opinion of the Contracting Officer, are determined to be substandard for any reason. In the event material is hauled to the site without prior approval and is determined by the Contracting Officer to be unacceptable, all materials shall be removed from the site at no additional cost to the Owner.

1.05 DEFINITIONS

A. Overexcavation: Excavation beyond specified lines as directed by the Contracting Officer to remove unsuitable foundation material.

B. Additional excavation: Excavation performed for the convenience, fault, or operation of the Contractor beyond specified or directed excavation lines.

C. Relative Compaction: The ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined by ASTM D 1557. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by the Contraction Officer.

D. Optimum Moisture Content: Shall be determined in accordance with ASTM D 1557 to determine maximum dry density for relative compaction. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

PART 2 PRODUCTS

2.01 BACKFILL MATERIALS

A. Backfill materials shall be as shown on the Drawings from sources arranged for by the Contractor and approved by the Contracting Officer.

1. The Contracting Agency makes no guarantee that the specified backfill materials are available from materials excavated from pipe trenches.
2. Process as necessary to produce materials meeting the requirements of these Specifications.

B. Pipe Bedding

1. Pipe bedding shall be imported material or suitable native material meeting the requirements of Section 9-03.12(3) of the WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2008 English Edition).

C. Select Backfill

1. Select Backfill shall be imported material or suitable native material meeting the requirements of Section 9-03.12(3) of the WSDOT *Standard Specifications for Road, Bridge and Municipal Construction* (2008 English Edition).

D. Final Backfill

1. Final Backfill shall be suitable native material or imported material free of organic material, frozen lumps, wood, concrete, other debris and rock larger than 6 inches in maximum dimension. Final backfill shall be approved by the Contracting Officer before placement.

PART 3 EXECUTION

3.01 GENERAL

A. Excavate trenches for pipe and appurtenances to the lines, grades, and dimensions shown on the Drawings.

B. Finish the bottom of the trench to the lines and grades shown on the Drawings.

C. Perform trench excavation in the dry. Dewater area to be excavated in accordance with Section 02240 – Diversion and Care of Water.

D. Do not excavate in frozen material without the written approval of the Contracting Officer.

3.02 OVEREXCAVATION

A. If foundation material is excavated beyond lines required to receive the structure, fill overexcavation with suitable materials and compact in accordance with Part 3.05 of this Section.

3.03 STOCKPILE

A. Stockpile excavated materials meeting the material requirements for pipe bedding or backfill until processed or placed as pipe bedding or backfill material.

B. Do not compact stockpiled material.

3.04 DISPOSAL

A. Excess material from excavations for structures constructed above the high water line shall be disposed of at a suitable location off-site, as required by the Contracting Officer, or by spreading and/or mounding the fill within the disturbed area. The Contracting Officer shall approve the method and location of disposal prior to excavation.

B. Dispose of excavated materials which are unsuitable for, or are in excess of, embankment, backfill, or other earthwork requirements, as directed by the Contracting Officer.

3.05 PLACEMENT OF BACKFILL

A. Place pipe bedding in trench to the lines and grades shown on the Drawings. Place pipe bedding in 6-inch lifts and compact to 90 percent of maximum dry density as determined by ASTM D 1557.

B. Place select backfill carefully around the pipe to the lines and grades shown on the Drawings. Select backfill shall be brought up simultaneously on both sides of the pipe to the top of pipe. After the pipe is covered, place select backfill over the pipe to the depth indicated on the Drawings. Place select backfill in 6-inch lifts and compact to 90 percent of maximum dry density as determined by ASTM D 1557.

C. Place final backfill to the top of the trench, as indicated on the Drawings. Place final backfill in 6-inch lifts and compact to 90 percent of maximum dry density as determined by ASTM D 1557.

D. Do not place backfill in pipe trenches when either the material or the surfaces on which the backfill will be placed are frozen.

3.06 COMPACTION OF BACKFILL

A. The Contractor shall compact backfill over pipe by means of an appropriately sized static, vibratory, or impact type compactor suited to the soil and physical restrictions of the area to be compacted. Although the Contractor is responsible for the selection of the method of compaction, selection of an inappropriate method shall not relieve the Contractor of the responsibility to achieve the specified result. Jetting, sluicing, or water settling will not be permitted.

B. The Contracting Officer will perform compaction testing, as needed, to ensure compliance with the compaction requirements of the Specifications, as follows:

1. The Contracting Officer shall, at his/her discretion, obtain and pay for the services of an independent soils testing laboratory to conduct on-site density tests during material placement.
2. The frequency of compaction testing shall be as determined by the Contracting Officer.

C. Compaction testing performed by the Contracting Officer shall not relieve the Contractor of his/her obligation to place and compact trench backfill materials as required in these Contract Documents.

3.07 PROTECTION

A. To provide adequate protection for compacted backfill in and around pipe, the Contracting Officer reserves the right to direct the Contractor to place a sufficient amount of backfill or embankment material over compacted backfill within 72 hours after completion of compacting backfill.

END OF SECTION

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SECTION 02318 – EARTHWORK FOR STRUCTURES

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for excavation, placement, and compaction of backfill material for installation of reinforced concrete structures, including a settling basin structure, flow control structure, and an overflow structure.

1.02 COST

A. Include costs for earthwork in the prices offered for other items of work requiring structural excavation, backfill, and material disposal. Work includes:

1. Excavation, placement, and compaction of backfill for installation of the reinforced concrete settling basin, flow control structure, and overflow structure.
2. Distribution and disposal of excess excavated materials.

1.03 REQUIREMENTS

A. The Contractor shall ensure that imported materials are approved by the Contracting Officer before hauling to the site. The Contractor shall ensure that native soils excavated on site are approved by the Contracting Officer before being used as backfill. The Contracting Agency reserves the right to reject materials that, in the opinion of the Contracting Officer, are determined to be substandard for any reason. In the event material is hauled to the site without prior approval and is determined by the Contracting Officer to be unacceptable, all materials shall be removed from the site at no additional cost to the Owner.

1.04 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM D 422 — Standard Test Method for Particle-Size Analysis of Soils.
2. ASTM D 1557 — Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 lb/ft^2).
3. ASTM D 2922 — Standard Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods.
4. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

1.05 DEFINITIONS

A. Overexcavation: Excavation beyond specified lines as directed by the Contracting Officer to remove unsuitable foundation material.

B. Additional excavation: Excavation performed for the convenience, fault, or operation of the Contractor beyond specified or directed excavation lines.

C. Relative Compaction: The ratio, in percent, of as-compacted field dry density to laboratory maximum dry density as determined by ASTM D 1557. Apply corrections for oversize material to either as-compacted field dry density or maximum dry density, as determined by the Contracting Officer.

D. Optimum Moisture Content: Shall be determined in accordance with ASTM D 1557 to determine maximum dry density for relative compaction. Determine field moisture content on basis of fraction passing 3/4-inch sieve.

PART 2 PRODUCTS

2.01 EXCAVATED MATERIALS

A. The Contractor's operations in excavations shall be such that excavations will yield as much suitable material for use in permanent construction required under these Specifications as practicable.

B. Place excavated materials which are too wet for immediate compaction temporarily in stockpiles until moisture content is reduced sufficiently to permit them to be placed in embankments.

2.02 MATERIAL FOR BACKFILL

A. Type and amount of material used for backfill, and the manner of placing material shall be subject to approval by the Contracting Officer.

B. Use backfill material from material excavated in required excavations for structures, where possible. If sufficient suitable material is not available from on-site excavations, obtain additional material from commercial borrow sources as approved by the Contracting Officer. The Contracting Agency makes no guarantee that the specified backfill materials are available from materials obtained from excavations for structures.

C. Do not place backfill material when either the material or the surfaces on which it is to be placed are frozen.

D. Do not use material removed in stripping or high in organic matter for backfill material. Stockpile instead for use as topsoil.

E. Backfill for Concrete Structures:

1. Structural fill for reinforced concrete structures shall be imported material or suitable native material meeting the requirements of Section 9-03.12(1) of the *WSDOT Standard Specifications for Road, Bridge and Municipal Construction* (2008 English Edition).
2. Backfill to be placed around reinforced concrete structures shall be suitable native material or imported material free of organic material, frozen lumps, wood, concrete, other debris and rock larger than 6 inches in maximum dimension. Final backfill shall be approved by the Contracting Officer before placement.

PART 3 EXECUTION

3.01 STRIPPING

A. Strip areas to remove topsoil prior to structure excavation, in accordance with Section 02236 – Stripping.

3.02 EXCAVATION, GENERAL

A. Excavate foundations to elevations shown on the Drawings or established by the Contracting Officer.

B. The Contracting Officer reserves the right, during progress of work, to vary slopes, grades, and dimensions of excavations from those specified in the Drawings.

C. The Contracting Agency does not represent that excavation performed under these Specifications can be made to or maintained at paylines shown on the Drawings or described in these Specifications.

D. Perform excavation for structures above the high water line in the dry. Dewater excavations for structures above the high water line in accordance with Section 02240 – Diversion and Care of Water.

E. Do not excavate in frozen materials without written approval.

F. Where excavating in backfill and embankment placed under these Specifications, excavate in accordance with applicable provisions for excavation.

G. Blasting: Not allowed.

H. Take precautions to preserve material below and beyond established lines of excavation in the soundest possible condition.

1. Damage to work due to the Contractor's operations shall be repaired by and at the expense of the Contractor.
2. Material beyond required or prescribed excavation lines which is loosened by the Contractor's operations shall be removed by and at the expense of the Contractor.

3.03 PREPARATION OF STRUCTURE FOUNDATIONS

A. Prepare foundations at structure sites by methods which will provide firm foundations for features. Finish bottom and side slopes of excavation, upon or against which the structure is to be placed, to prescribed dimensions. Moisten and tamp prepared surfaces with suitable tools to form firm foundations upon or against which to place the feature.

B. Where unsuitable material is encountered in the foundation for a feature, the Contracting Officer will direct performance of additional excavation to remove unsuitable material.

3.04 OVEREXCAVATION

A. If foundation material is excavated beyond lines required to receive the structure, fill overexcavation with suitable materials and compact in accordance with Part 3.08 of this Section.

B. If foundation material is disturbed or loosened during excavation or otherwise, compact foundation in place or remove and replace it with suitable material and compact in accordance with Part 3.08 of this Section.

3.05 SITE EXCAVATION

A. Excavate for structures as shown on the Drawings or as directed in the field by the Contracting Officer.

3.06 DISPOSAL OF EXCAVATED MATERIALS

A. Excess material from excavations for structures constructed above the high water line shall be disposed of at a suitable location off-site, as required by the Contracting Officer, or utilized in areas of the site to be filled. The Contracting Officer shall approve the method and location of disposal prior to excavation.

B. Dispose of excavated materials which are unsuitable for, or are in excess of, embankment, backfill, or other earthwork requirements, as directed by the Contracting Officer.

3.07 PLACING BACKFILL

A. Place backfill to the lines and grades shown on the Drawings, or as directed by the Contracting Officer.

B. Place backfill in the dry for structures above the high water line. Dewater excavations for structures above the high water line in accordance with Section 02240 – Diversion and Care of Water.

C. Place structural fill below and around reinforced concrete structures to the depth and lines indicated on the Drawings. Place structural fill in 6-inch lifts and compact to 95 percent of maximum dry density as determined by ASTM D 1557.

D. Place additional backfill in excavations for structures to be constructed above the high water line to the depth and lines indicated on the Drawings. Place backfill in 6-inch lifts and compact to 90 percent of maximum dry density as determined by ASTM D 1557.

E. Where backfill is to be placed behind or against concrete structures, compaction of backfill against structures shall not be allowed until the concrete has reached its 7-day strength.

F. Topsoil shall be replaced to match the grades and lines of the existing bank on either side of the excavation. Topsoil backfill should remain loose.

3.08 COMPACTION

A. The Contractor shall compact structural fill and backfill by means of an appropriately sized static, vibratory, or impact type compactor suited to the soil and physical restrictions of the area to be compacted. Although the Contractor is responsible for the selection of the method of compaction, selection of an inappropriate method shall not relieve the Contractor of the responsibility to achieve the specified result. Jetting, sluicing, or water settling will not be permitted.

B. Topsoil shall not be compacted.

C. The Contracting Officer will perform compaction testing, as needed, to ensure compliance with the compaction requirements of the Specifications. The Contracting Officer shall, at his/her discretion, obtain and pay for the services of an independent soils testing laboratory to conduct on-site density tests during material placement. The frequency of compaction testing shall be as determined by the Contracting Officer.

D. Compaction testing performed by the Contracting Officer shall not relieve the Contractor of his/her obligation to place and compact trench backfill materials as required in these Contract Documents.

3.09 PROTECTION

A. To provide adequate protection for compacted backfill around a structure, the Contracting Officer reserves the right to direct the Contractor to place a sufficient amount

of backfill or embankment material over compacted backfill within 72 hours after completion of compacting backfill.

END OF SECTION

SECTION 02319 – SUBRAGE PREPARATION FOR CANAL LINER

PART 1 GENERAL

1.01 DESCRIPTION

A. Work includes preparation of native soil as subgrade for lining that will be installed as part of the settling basin structure.

1.02 COST

A. Included cost of subgrade preparation for canal liner in the lump sum price offered in the schedule for Include cost of geocomposite liner in lump sum price offered in the schedule for the Settling Basin With Shotcrete/Geotextile Lining – Station 10+00.

PART 2 PRODUCTS

A. Subgrade material may be the existing site material if it is free of organic material, solid obstructions, muck, debris, rocks greater than 6 inches in diameter within the top 6 inches, and other unsuitable materials. Unsuitable existing material shall be replaced with suitable material.

PART 3 EXECUTION

3.01 DEPTH

A. Unless otherwise specified or shown on the plans, subgrade shall be prepared at least 6 inches below bottom of base course or bottom of shotcrete.

3.02 COMPACTION

A. Unless otherwise specified or shown on the plans, the density of the prepared subgrade shall be not less than 90 percent relative compaction as determined by ASTM D1557.

3.03 TESTING/QUALITY CONTROL

A. The Contracting Officer will test the subgrade, at his/her discretion, to ensure compliance with the compaction requirements of the specifications.

B. If the Contracting Officer determines that unsatisfactory soil conditions are present, continue excavation and replace with compacted granular fill as specified in Section 02318, Earthwork for Structures, as directed by Contracting Officer.

C. If testing shows that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact until specified compaction is obtained as accepted by the Contracting Officer.

D. Use suitable material from required excavations, or as much thereof as may be required, for backfill or other required earthwork. Temporary potential stockpile locations and procedures for stockpiling shall be subject to approval of the Contracting Officer.

END OF SECTION

SECTION 02324 – DISPOSAL OF EXCAVATED MATERIALS

PART 1 GENERAL

1.01 COST

B. Included cost of disposal of excavated materials in prices offered in the schedule for items requiring excavation.

PART 4 PRODUCTS

Not Used.

PART 5 EXECUTION

5.01 MATERIAL PLACEMENT

A. Use suitable material from required excavations, or as much thereof as may be required, for backfill or other required earthwork. Temporary potential stockpile locations and procedures for stockpiling shall be subject to approval of the Contracting Officer.

5.02 DISPOSAL OF EXCAVATED MATERIALS

A. Dispose of material from required excavations not suitable for or required for backfill, embankment, and topsoil by removal from the site or waste on site as direct by the Contracting Officer. The location of off-site disposal shall be approved by the Contracting Officer prior to excavation.

B. Waste areas for excavated materials shall be as directed by the Contracting Officer.

C. Do not waste material by dumping from the top of slope.

D. Grade waste banks to reasonably even and uniform surfaces that blend with the natural terrain.

1. Minimum slope: 2 percent.
2. Maximum slope: 4 horizontal to 1 vertical (4H:1V).

E. Cover waste banks with topsoil in accordance with Section 02236 – Stripping.

F. Seed surface of waste banks in accordance with Section 02930 – Seeding.

END OF SECTION

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SECTION 02621 – CORRUGATED HDPE IRRIGATION PIPE

PART 1 GENERAL

1.01 GENERAL

A. Section includes the following:

1. Requirements for installation of 24-inch and 36-inch diameter corrugated Type S Low-Head HDPE pipe for irrigation pipe to replace a portion of the Peshastin Irrigation District ditch.
2. Requirements for installation of access riser fittings that will provide maintenance access to the 36-inch diameter corrugated Type S HDPE pipe.
3. Requirements for installation of turnout connections to the 36-inch and 24-inch diameter corrugated Type S HDPE pipe.

1.02 PAYMENT

A. 36-inch Diam. Corrugated Type S Low-Head HDPE Pipe

1. Measurement: Measurement per linear foot of pipe will be made along the centerline of the pipe between the ends of the pipe in place and shall be continuous through joints, fittings, and bends with no allowance for lap at joints.
2. Payment: Unit price per linear foot offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, and install fittings and appurtenances necessary to complete the work.
3. The cost for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

B. 24-inch Diam. Corrugated Type S Low-Head HDPE Pipe

1. Payment: Lump sum price offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, and install fittings and appurtenances necessary to complete the work.
2. The cost for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

C. 36-inch Diam. HDPE Access Riser Fitting

1. Measurement: Measurement will be made per each access riser installed.

2. Payment: Unit price per each offered in the schedule shall include cost required to furnish and install the fitting, join the fitting to adjacent pipe, and install appurtenances necessary to complete each access riser as shown on the Drawings.

D. Turnout Connection to HDPE Pipe – Single Turnout

1. Measurement: Measurement will be made per each turnout connection installed for a single turnout, as shown on the Drawings.
2. Payment: Unit price per each offered in the schedule shall include cost required to furnish and install a tap to the 36-inch or 24-inch HDPE pipe, sump, riser pipe, fittings, and valves necessary to complete the each turnout connection as shown on the Drawings.

E. Turnout Connection to HDPE Pipe – Multiple Turnouts

1. Measurement: Measurement will be made per each turnout connection installed for multiple turnouts, as shown on the Drawings.
2. Payment: Unit price per each offered in the schedule shall include cost required to furnish and install a tap to the 36-inch or 24-inch HDPE pipe, sump, riser pipe, pipe, fittings, and valves necessary to complete the each turnout connection as shown on the Drawings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1.	AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe
2.	ASTM D 1784	Rigid Polyvinyl Chloride (PVC) Compounds and Chlorinated Polyvinyl Chloride (CPVC) Compounds
3.	ASTM D 1785	PVC Plastic Pipe, Schedules 40, 80, and 120
4.	ASTM D 2321	Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
5.	ASTM D 3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
6.	ASTM D 3350	Polyethylene Plastics Pipe and Fittings Materials
7.	ASTM F 2648	Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings
8.	ASTM F 2487	Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene Pipelines
9.	ASTM F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
10.	ASTM F 2306	Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications

1.04 REQUIREMENTS

A. Do not drop pipe or fittings or subject the pipe to unnecessary jarring, impact, or other treatment that could damage the pipe. Follow the manufacturer's recommendations when hauling, unloading, handling and storing the pipe. Do not push or pull pipe and fittings over sharp objects or drop anything onto the pipe and fittings.

B. If any length of pipe shows kinks, buckles, cuts, gouges, or any other damage that, in the opinion of the Contracting Officer, will affect the performance of the pipe, the pipe shall be removed from the worksite and replaced by a length of undamaged pipe of equal or greater design strength at the expense of the Contractor.

C. Do not store pipe in the yard or on the jobsite in direct sun or under any other conditions that would cause degradation of the pipe.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 02621-1, Schedule of Pipe and Fittings, Product data and manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 TYPE S CORRUGATED HDPE PIPE AND FITTINGS

A. Corrugated HDPE Pipe

1. Shall meet the requirements of AASHTO M294 Type S, with a smooth interior wall and annular corrugations.
2. Nominal inside diameter shall be the size indicated on the Drawings.
3. Joints shall be bell and spigot type with gaskets conforming to ASTM F 477.
4. Joints shall be watertight according to the requirements of ASTM D 3212, and shall be watertight under sustained pressures of up to 5 psi.
5. Corrugated exterior shall meet the material specifications of ASTM D 3350. 24-inch culvert shall conform to the minimum requirements of cell classification 435400C as defined and described in the latest version of ASTM D 3350.
6. Carbon black shall not exceed 5%. Carbon black shall not exceed 4% for 24-inch culvert.
7. Interior liner material shall have material designation of PE 3408, as defined by the Plastic Pipe Institute.
8. Material shall be homogeneous and uniform in color, opacity, density, and other properties.
9. Pipe shall be continuously marked with the name of the manufacturer, the nominal pipe size, the manufacturer's standard reference, and the production

code.

10. Pipe shall be Hancor Low-Head Irrigation Pipe, ADS N-12 Low-Head Irrigation Pipe, or approved equal.

B. Fittings

1. Fittings shall be manufactured by the same manufacturer of HDPE pipe and shall be compatible with HDPE pipe, as specified herein.
2. Fitting pieces shall be butt-fused.
3. Joining with adjacent pipe shall be bell and spigot type with gaskets conforming to ASTM F 477. Joints shall be watertight according to the requirements of ASTM D 3212, and shall be watertight under sustained pressures of up to 5 psi.
3. Remove excess material from the thermal butt-fused joints from the interior of the fittings. Interior joints shall be smooth.

2.02 TURNOUT CONNECTIONS

A. Turnout Stub

1. A 6-inch HDPE stub shall be provided for turnout connections, where shown on the Drawings.
2. The turnout stub shall be solid wall, SDR 32.5 maximum, HDPE pipe butt-fused to the main 36-inch or 24-inch HDPE pipe, as shown on the Drawings.

B. Turnout Pipe, Couplings, and Fittings

1. PVC pipe, couplings, and fittings shall be from extruded PVC meeting the material specifications of ASTM D 1784.
2. PVC pipe shall be schedule 40 PVC pipe meeting the requirements of ASTM D 1785.
3. Pipe, couplings, and fittings shall be as shown on the Drawings. Turnout materials shall be approved by the Owner and the Contracting Officer prior to installation.

C. Valves

1. Valves shall be resilient wedge gate valves meeting the material specifications of Section 15110 – Valves.

D. Weir Assembly

1. The weir assembly shall consist of a notched or drilled plate, designed to limit flow to the irrigation turnout.
2. The weir assembly shall be as specified by the Owner and manufactured by S & W Irrigation, or approved equal.

2. The weir assembly shall be designed to make a watertight connection with schedule 40 PVC turnout pipe.

PART 3 EXECUTION

3.01 LAYING PIPE

A. Install HDPE pipe in accordance with ASTM D 2321 and per the manufacturer's recommendations.

B. Lay pipe to lines and grades shown on the Drawings within the following tolerances:

1. Vertical departure – 1/4-inch

C. Keep the pipe trench free of water in accordance with Section 02240 – Diversion and Care of Water

D. Carefully grade the pipe trench to provide uniform support along the bottom of the pipe and place a uniform lift of bedding.

E. Carefully lower pipe and accessories into the trench by means of derrick, rope, belt slings, or other equipment that will not cause damage to the pipe.

F. Rest the full length of each section of pipe solidly upon the compacted pipe bedding.

G. Bring HDPE pipe to within 5° F of earth temperature prior to cutting to length for placement of tees, elbows, or fittings between flanges and place a lift of select backfill up to the pipe spring line.

H. Carefully inspect the bell of the pipe and remove any foreign matter. Lubricate the bell of the pipe with a clean rag or brush. Clean the spigot end of the pipe and remove the protection covering from the gasket. Lubricate the gasket with a clean rag or brush. Do not allow dirt or foreign matter to contact the lubricate bell and spigot sections. Push the spigot into the bell and align per manufacturer's recommendations without damaging pipe ends.

I. Lay the pipe so that the bell end of each piece of pipe is upstream of the spigot end.

J. Take the necessary precautions to avoid floating or otherwise displacing the pipe.

K. During pipe installation, keep the ends of the pipeline closed.

L. Keep the pipe firmly in position so that the installed pipe forms a continuous, watertight conduit with a smooth and uniform interior surface.

3.02 INSTALLATION OF TURNOUT CONNECTIONS

A. Verify the location, type, size, and depth of the landowner's existing turnout and irrigation pipe connection before beginning the installation of the turnout connection.

B. Tap the pipe using a hole saw and tapping fitting according the recommendations of the manufacturer of the tapping fitting, and as shown on the Drawings.

C. Furnish and install pipe and fittings as shown on the Drawings.

D. Take care to carefully place and compact bedding and backfill around each turnout connection as specified in Section 02317 – Trenching, Backfilling, and Compaction to ensure that connections to the pipe are not damaged during compaction and settlement of backfill over the pipe.

E. Install turnout pipe in accordance with the Specifications for laying pipe.

END OF SECTION

SECTION 02622 – PVC IRRIGATION PIPE

PART 1 GENERAL

1.01 GENERAL

A. Section includes the following:

1. Requirements for installation of 10-inch and 8-inch Class 150 PVC pipe for irrigation pipe to replace a portion of the Peshastin Irrigation District ditch.
2. Requirements for installation of 2-inch turnout connections to the 10-inch PVC irrigation pipe, including tapping the pipe and installing pipe, fittings, and valves for connection to existing irrigation turnouts.

1.02 PAYMENT

A. 10-inch Diam. Class 160 PVC Pipe:

1. Measurement: Measurement per linear foot of pipe will be made along the centerline of the pipe between the ends of the pipe in place and shall be continuous through joints, fittings, and bends with no allowance for lap at joints.
2. Payment: Unit price per linear foot offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, install fittings and appurtenances, and test the pipe necessary to complete the work.
3. The cost for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

B. 8-inch Diam. Class 160 PVC Pipe:

1. Measurement: Measurement per linear foot of pipe will be made along the centerline of the pipe between the ends of the pipe in place and shall be continuous through joints, fittings, and bends with no allowance for lap at joints.
2. Payment: Unit price per linear foot offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, install fittings and appurtenances, and test the pipe necessary to complete the work.
3. The cost for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

C. Turnout Connection to Pressure Pipe

1. Measurement: Measurement will be made per each 2-inch turnout connection installed.
2. Payment: Unit price per each offered in the schedule shall include cost required to furnish and install a tap to the 10-inch diameter pressure pipe, pipe, fittings, valves, boxes, and other items necessary to complete the each turnout connection as shown on the Drawings.

D. 2-inch Air Vent Assembly

1. Payment: Lump sum price offered in the schedule shall include cost required to furnish and install a tap to the 10-inch diameter pressure pipe and the air vent piping and appurtenances as shown on the Drawings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1.	ASTM D 1784	Rigid PolyVinyl Chloride (PVC) Compounds and Chlorinated PolyVinyl Chloride (CPVC) Compounds
2.	ASTM D 2241	PolyVinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
3.	ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
4.	AWWA C901	Polyethylene (PE) Pressure Pipe and Tubing, 1/2 in. (13 mm) Through 3 in. (76 mm), for Water Service

5. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

1.04 REQUIREMENTS

A. Do not drop pipe or fittings or subject the pipe to unnecessary jarring, impact, or other treatment that could damage the pipe. Follow the manufacturer's recommendations when hauling, unloading, handling, and storing the pipe. Do not push or pull pipe and fittings over sharp objects or drop anything onto the pipe and fittings.

B. If any length of pipe shows kinks, buckles, cuts, gouges, or any other damage that, in the opinion of the Contracting Officer, will affect the performance of the pipe, the pipe shall be removed from the worksite and replaced by a length of undamaged pipe of equal or greater design strength at the expense of the Contractor.

C. Do not store pipe in the yard or on the jobsite in direct sun or under any other conditions that would cause degradation of the pipe.

PART 2 PRODUCTS

2.01 PVC IRRIGATION PIPE AND FITTINGS

A. PVC irrigation pipe shall be plastic irrigation pipe (PIP) meeting the following specifications:

1. PVC shall meet the requirements of ASTM D 1784.
2. PVC pipe shall meet the requirements of ASTM D 2241.
3. Nominal pipe size shall be the size indicated on the Drawings.
4. Pipe shall have a maximum SDR of 26 (Class 160 PIP or greater).
5. Joints shall be bell and spigot type with gaskets conforming to ASTM F 477.
6. Joints shall be watertight, and shall have a pressure rating equal to or greater than that of the pipe.
7. Material shall be homogeneous and uniform in color, opacity, density, and other properties
8. Pipe shall be continuously marked with the name of the manufacturer, the nominal pipe size, the manufacturer's standard reference, and the production code.
9. Pipe shall be furnished in 20-foot laying lengths.

B. Fittings

1. Fittings shall be compatible with 10-inch PIP, as specified herein.
2. Fittings shall be gasketed. Gaskets shall conform to ASTM F 477.

2.02 TURNOUT CONNECTIONS

A. Tapping Tees and Service Saddles

1. Service Saddle for 2-inch Turnout Connection
   a. Painted ductile iron saddle with two type 304 stainless steel straps
   b. MIPT thread connection
   c. Type 304 or 316 stainless steel hardware
   d. Pressure rating same as pipe
   e. Romac Style "202S", or approved equal

B. Turnout Pipe, Couplings and Fittings

1. 2-inch turnout pipe shall be Class 200 PE Tubing (CTS) meeting the requirements of PE 3408, as defined by the Plastic Pipe Institute.
2. Pipe, couplings, and fittings shall be as shown on the Drawings. Turnout materials shall be approved by the Owner and Contracting Officer prior to installation.

C. Valves

1. Valves shall be resilient wedge gate valves meeting the material specifications of

Section 15110 – Valves.

D. Other

1. The turnout connection shall extend to an angle meter valve in a lockable, watertight meter box, Fog-Tite style 1324-15, or approved equal.

2.03 2-INCH AIR VENT ASSEMBLY

A. Tapping Tees and Service Saddles

1. Service Saddle for 2-inch Air Vent Assembly
   a. Painted ductile iron saddle with two type 304 stainless steel straps
   b. MIPT thread connection
   c. Type 304 or 316 stainless steel hardware
   d. Pressure rating same as pipe
   e. Romac Style "202S", or approved equal

B. Air Vent Piping

1. Galvanized steel pipe, fittings and appurtenances, as shown on the Drawings.

2.04 RELATED ITEMS

A. Detectable Marking Tape and Locating Wire

1. Install detectable marking tape and locating wire over all buried, pressurized plastic irrigation pipe.
2. Tape shall be placed at least 6 inches above the pipe and shall extend along the full length of pressurized pipe.
3. The locating wire shall be placed at least 3 inches above the pipe and shall extend along the full length of the pressurized pipe.
4. Detectable Marking Tape shall meet the requirements of Section 9-15.18 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

B. Concrete Thrust Blocking

1. The Contractor shall be responsible for restraining pressurized pipe against unresolved hydrostatic forces. Concrete thrust blocking shall be used as shown on the Drawings to restrain pipe and fittings. Blocking shall be placed at bends, tees, caps, blind flanges, wyes, valves, and other fittings.
2. Concrete for thrust blocking shall be commercial concrete per Section 6-02.3(2) of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

3. Concrete thrust blocking shall bear against undisturbed native soil at the sides and bottom of the trench excavation and shall be shaped as not to obstruct access to the joints of the pipe or fittings. Where bearing area against undisturbed native soil is not available, the Contractor may use restrained joint fittings. The Contractor shall submit the locations and type of restrained joint fittings to be used for approval by the Contracting Officer prior to installation.

PART 3 EXECUTION

3.01 LAYING PIPE

A. Install PVC pipe in accordance with the manufacturer's recommendations.

B. Lay pipe to lines and grades shown on the Drawings within the following tolerances:

1. Vertical departure – 1/4-inch

C. Keep the pipe trench free of water in accordance with Section 02240 – Diversion and Care of Water

D. Carefully grade the pipe trench to provide uniform support along the bottom of the pipe and place a uniform lift of bedding.

E. Carefully lower pipe and accessories into the trench by means of derrick, rope, belt slings, or other equipment that will not cause damage to the pipe.

F. Rest the full length of each section of pipe solidly upon the compacted pipe bedding and place a lift of select backfill up to the pipe spring line.

G. Carefully inspect the bell of the pipe and remove any foreign matter. Lubricate the bell of the pipe with a clean rag or brush. Clean the spigot end of the pipe and remove the protection covering from the gasket. Lubricate the gasket with a clean rag or brush. Do not allow dirt or foreign matter to contact the lubricate bell and spigot sections. Push the spigot into the bell and align per manufacturer's recommendations without damaging pipe ends.

H. Lay the pipe so that the bell end of each piece of pipe is upstream of the spigot end.

I. Take the necessary precautions to avoid floating or otherwise displacing the pipe.

J. During pipe installation, keep the ends of the pipeline closed.

K. Keep the pipe firmly in position so that the installed pipe forms a continuous, watertight conduit with a smooth and uniform interior surface.

3.02 INSTALLATION OF TURNOUT CONNECTIONS

A. Verify the location, type, size, and depth of the landowner's existing turnout and irrigation pipe connection before beginning the installation of the turnout connection.

B. Tap the pipe according the recommendations of the manufacturer of the tapping sleeve or saddle, and as shown on the Drawings.

C. Furnish pipe and fittings as shown on the Drawings.

D. Take care to carefully place and compact bedding and backfill around each turnout connection as specified in Section 02317 – Trenching, Backfilling, and Compaction to ensure that connections to the pipe are not damaged during compaction and settlement of backfill over the pipe.

E. Install turnout pipe in accordance with the Specifications for laying pipe.

3.03 INSPECTION AND TESTING

A. PVC and HDPE pressure-rated pipe, fittings, and appurtenances shall be tested under a hydrostatic pressure of at least 2 times the maximum working pressure of the pipe. Test pressures shall be as follows:

1.	Station 100+03 to Station 131+00	175 psi
2.	Station 131+00 to End	225 psi

B. Hydrostatic pressure test procedures shall be in accordance with those outlined in Section 7-09.3(23) of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition), except as modified herein.

C. Test sections shall not exceed 1,500 feet in length.

D. The Contractor shall provide pumps, hoses, fittings, and other equipment needed to perform the pressure tests. The Contractor shall also arrange for water to be made available for pressure testing.

END OF SECTION

SECTION 02623 – SOLID WALL HDPE IRRIGATION PIPE

PART 1 GENERAL

1.01 GENERAL

A. Section includes the following:

1. Installation of 8-inch diameter butt-fused, SDR 11, DIPS HDPE pipe for delivery of irrigation water, including installation of pipe within an existing 24-inch irrigation pipe.
2. Installation of 12-inch diameter butt-fused, SDR 32.5, IPS HDPE pipe for conveyance of overflow water, including installation of pipe with 10-inch HDPE irrigation pipe within an existing 24-inch irrigation pipe.

1.02 PAYMENT

A. 8-inch Diam. SDR 11, DIPS HDPE Pipe

1. Measurement: Measurement per linear foot of pipe will be made along the centerline of the pipe between the ends of the pipe in place and shall be continuous through joints, fittings, and bends.
2. Payment: Unit price per linear foot offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, and install fittings and appurtenances necessary to complete the work.
3. Payment for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

B. 12-inch Diam. SDR 32.5, IPS HDPE Pipe for Overflow

1. Measurement: Measurement per linear foot of pipe will be made along the centerline of the pipe between the ends of the pipe in place and shall be continuous through joints, fittings, and bends.
2. Payment: Unit price per linear foot offered in the schedule shall include cost of labor and materials needed to lay the pipe, join the pipe per the manufacturer's recommendations, and install fittings and appurtenances necessary to complete the work.
3. Payment for trenching and placement and compaction of backfill for pipe installation will be made in accordance with Section 02317 – Trenching, Backfilling, and Compaction.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1.	PE3408	Plastic Pipe Institute (PPI) HDPE Material Designation
2.	ASTM D 3350	Polyethylene Plastics Pipe and Fittings Materials
3.	ASTM F 714	Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
4.	ASTM F 2620	Heat Fusion Joining of Polyethylene Pipe and Fittings
5.	AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,575 mm), for Water Distribution and Transmission
6.	Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).	

1.04 REQUIREMENTS

A. Do not drop pipe or fittings or subject the pipe to unnecessary jarring, impact, or other treatment that could damage the pipe. Follow the manufacturer's recommendations when hauling, unloading, handling, and storing the pipe. Do not push or pull pipe and fittings over sharp objects or drop anything onto the pipe and fittings.

B. If any length of pipe shows kinks, buckles, cuts, gouges, or any other damage that, in the opinion of the Contracting Officer, will affect the performance of the pipe, the pipe shall be removed from the worksite and replaced by a length of undamaged pipe of equal or greater design strength at the expense of the Contractor.

C. Do not store pipe in the yard or on the jobsite in direct sun or under any other conditions that would cause degradation of the pipe.

1.05 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 02623-1, Product data and manufacturer's installation instructions.

PART 2 PRODUCTS

2.01 HDPE SOLID WALL PIPE 3 INCHES AND LARGER

A. Pipe shall be manufactured from a PE 3408 resin, as defined by the Plastic Pipe Institute (PPI).

B. The resin material will meet the specifications of ASTM D 3350 with a cell classification of 345464C.

C. Pipe shall have a manufacturing standard of ASTM F 714, and shall meet the requirements of AWWA C906.

D. Pipe shall be provided in the following sizes and thickness ratios:

1. Pressurized Irrigation Pipe – 10-inch ductile iron pipe size (DIPS), SDR 11
2. Overflow Pipe – 12-inch steel pipe size (IPS), SDR 32.5

E. Material shall be homogeneous and uniform in color, opacity, density, and other properties.

F. Pipe shall be continuously marked with the name of the manufacturer, the nominal pipe size, the manufacturer's standard reference, and the production code.

G. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material.

2.02 FITTINGS

A. Where required, HDPE fittings shall be made of the same material as the adjoining pipe.

B. Connections from HDPE to PVC pipe shall be made using a solid, bolted sleeve type coupling designed for joining HDPE to PVC. A stainless steel stiffener shall be used wherever plain end HDPE pipe is coupled to another pipe.

2.03 TURNOUT CONNECTIONS

A. Tapping Tees and Service Saddles

1. Service Saddle for 2-inch Turnout Connection
   a. Painted ductile iron saddle with two type 304 stainless steel straps
   b. MIPT thread connection
   c. Type 304 or 316 stainless steel hardware
   d. Pressure rating same as pipe
   e. Romac Style "202S", or approved equal

B. Turnout Pipe, Couplings, and Fittings

1. 2-inch turnout pipe shall be Class 200 PE Tubing (CTS) meeting the requirements of PE 3408, as defined by the Plastic Pipe Institute.
2. Pipe, couplings, and fittings shall be as shown on the Drawings. Turnout materials shall be approved by the Owner and Contracting Officer prior to installation.

C. Valves

1. Valves shall be resilient wedge gate valves meeting the material Specifications of Section 15110 – Valves.

D. Other

1. The turnout connection shall extend to an angle meter valve in a lockable, watertight meter box, Fog-Tite style 1324-15, or approved equal.

2.04 RELATED ITEMS

A. Detectable Marking Tape and Locating Wire

1. Install detectable marking tape and locating wire over all buried, pressurized plastic irrigation pipe.
2. Tape shall be placed at least 6 inches above the pipe and shall extend along the full length of pressurized pipe.
3. The locating wire shall be placed at least 3 inches above the pipe and shall extend along the full length of the pressurized pipe.
4. Detectable Marking Tape shall meet the requirements of Section 9-15.18 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

B. Concrete Thrust Blocking

1. The Contractor shall be responsible for restraining pressurized pipe against unresolved hydrostatic forces. Concrete thrust blocking shall be used as shown on the Drawings to restrain pipe and fittings. Blocking shall be placed at bends, tees, caps, blind flanges, wyes, valves, and other fittings.
2. Concrete for thrust blocking shall be commercial concrete per Section 6-02.3(2) of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).
3. Concrete thrust blocking shall bear against undisturbed native soil at the sides and bottom of the trench excavation and shall be shaped as not to obstruct access to the joints of the pipe or fittings. Where bearing area against undisturbed native soil is not available, the Contractor may use restrained joint fittings. The Contractor shall submit the locations and type of restrained joint fittings to be used for approval by the Contracting Officer prior to installation.

PART 3 EXECUTION

3.02 LAYING PIPE

A. Keep the pipe trench free of water in accordance with Section 02240 – Diversion and Care of Water

B. Carefully grade the pipe trench to provide uniform support along the bottom of the pipe.

C. Where installing inside an existing pipe:

1. Inspect the interior of the existing pipe prior to pushing or pulling new pipe into it to verify that the new pipe will fit and will not be damaged during installation.

2. Submit proposed installation procedures for approval by the Contracting Officer prior to installation.

D. Bring HDPE pipe to within 5° F of earth temperature prior to cutting to length for placement.

E. Complete joints prior to placing the pipe in the trench or installing the pipe in an existing piping.

F. Bend the pipe, as allowed by the manufacturer, to match the proposed alignment and grade.

3.03 FUSION

A. Clean pipe of all shavings and other debris prior to joining pipe.

B. Join HDPE pipe by the method of thermal butt or side wall fusion, outlined in ASTM D 2657. Perform fusion joining in accordance with the procedures established by the manufacturer.

C. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground.

D. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI.

E. The butt fusion joining shall produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.

F. Do not perform pipe fusion in water or when trench conditions are unsuitable for the work. Prevent water from coming in contact with the fusion heater plate.

G. Socket fusion, hot gas fusion, threading, solvents, and epoxies are not allowed**.**

3.03 INSTALLATION OF TURNOUT CONNECTIONS

A. Verify the location, type, size, and depth of the landowner’s existing turnout and irrigation pipe connection before beginning the installation of the turnout connection.

B. Tap the pipe according the recommendations of the manufacturer of the tapping sleeve or saddle, and as shown on the Drawings.

C. Furnish pipe and fittings as shown on the Drawings.

D. Take care to carefully place and compact bedding and backfill around each turnout connection as specified in Section 02317 – Trenching, Backfilling, and Compaction to ensure that connections to the pipe are not damaged during compaction and settlement of backfill over the pipe.

E. Install turnout pipe in accordance with the specifications for laying pipe.

3.04 INSPECTION AND TESTING

A. PVC and HDPE pressure rated pipe (DR 11 HDPE Pipe), fittings, and appurtenances shall be tested under a hydrostatic pressure of at least 2 times the maximum working pressure of the pipe. Test pressures shall be as follows:

1.	Station 100+03 to Station 131+00	175 psi
2.	Station 131+00 to End	225 psi

B. Hydrostatic pressure test procedures shall be in accordance with those outlined in Section 7-09.3(23) of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition), except as modified herein.

C. Test sections shall not exceed 1,500 feet in length.

D. The Contractor shall provide pumps, hoses, fittings, and other equipment needed to perform the pressure tests. The Contractor shall also arrange for water to be made available for pressure testing.

END OF SECTION

SECTION 02631 – PRE-CAST CONCRETE MANHOLES

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for installation of a pre-cast concrete manhole and associated pipe and fittings needed for flushing the irrigation system and discharging water to the existing spill structure at the downstream end of the existing irrigation system.

1.02 PAYMENT

A. Flush Manhole Assembly With Valve and Adjacent Piping

1. Payment: Lump sum price offered in the schedule shall include furnishing and installing a pre-cast concrete manhole base section with locking, hinged lid; ductile iron pipe fittings; 24-inch HDPE outlet pipe, miscellaneous cast-in-place concrete; excavation; backfill; and grading required to complete the installation of the flush manhole assembly, as shown on the Drawings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).
2. AASHTO M 199 Precast Reinforced Concrete Manhole Sections

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 02631-1, Catalog data and dimensional drawings from manufacturer of pre-cast manhole sections.

PART 2 PRODUCTS

2.01 PRE-CAST CONCRETE MANHOLE

A. Pre-cast concrete manhole sections shall meet the requirements of AASHTO M 199, Section 9-12.4 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

B. The pre-cast concrete manhole base section shall be 48-inch diamter.

C. The pre-cast concrete manhole shall meet the dimension requirements shown on the Drawings.

2.02 OTHER

A. Associated concrete, pipe, fittings, excavation, backfill, and other items associated with the installation of the flush manhole assembly shall be as shown on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION OF PRE-CAST CONCRETE MANHOLE

A. Install pre-cast concrete manholes in accordance with Section 7-05.3 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

B. Fill annular space at pipe penetrations with non-shrink grout. Install a watertight gasket at all manhole penetrations, as shown on the Drawings.

C. Install associated pipe and fittings as shown on the Drawings.

END OF SECTION

SECTION 02710 – ASPHALT PAVING

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for installation of asphalt paving for patching and repair of roadway crossings at Tigner Road.

1.02 PAYMENT

A. Asphalt Paving

1. Measurement: Asphalt paving for patching and repair of roadway crossings will be measured per ton of pavement placed to the neat lines shown on the Drawings.
2. Payment: Unit price per ton offered in the schedule shall include cost of furnishing, placing, compacting, and sealing asphalt paving for patching and repair of roadway crossings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

PART 2 PRODUCTS

2.01 ASPHALT CONCRETE PAVING

A. Asphalt material used for asphalt concrete paving shall meet the requirements of Section 9-02 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

B. Aggregates for asphalt concrete paving shall meet the requirements of Section 9-03.8 of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

PART 3 EXECUTION

3.01 INSTALLATION OF ASPHALT CONCRETE PAVEMENT

A. Install asphalt concrete paving in accordance with the requirements for Hot Mix Asphalt, outlined in Section 5-04 of the WSDOT/APWA *Standard Specifications for Road,*

Bridge and Municipal Construction (2008 Edition).

END OF SECTION

SECTION 02730 – CRUSHED ROCK SURFACING

PART 1 GENERAL

1.01 GENERAL

A. Section includes requirements for installation of crushed rock surfacing for patching and repair of roadway crossings and private driveway crossings.

1.02 PAYMENT

A. Crushed Rock Surfacing

1. Measurement: Crushed rock surfacing for resurfacing of roadway crossings will be measured per ton of crushed rock surfacing placed.
2. Payment: Unit price per ton offered in the schedule shall include cost of furnishing, placing, compacting, and sealing asphalt pavement for patching and repair of roadway crossings.

1.03 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. Washington State Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

1.04 SUBMITTALS

A. Submit in accordance with Section 01330 – Submittals:

1. RSN 02730-1, Crushed Rock Surfacing Source Information: At least 10 days prior to delivery of crushed rock surfacing, notify the Contracting Officer in writing of intended source and provide information satisfactory to the Contracting Officer that the material meets the requirements of the Contract. Provide the Contracting Officer free access to the source.

PART 2 PRODUCTS

2.01 CRUSHED ROCK SURFACING

A. Crushed rock surfacing shall be hard, dense, and durable and shall meet the requirements of Section 9-03.9(3) of the Washington Department of Transportation (WSDOT) *Standard Specifications for Road, Bridge, and Municipal Construction* (2008 Edition).

PART 3 EXECUTION

3.01 PLACEMENT AND SPREADING

A. Crushed rock surfacing shall be dumped and smoothed by moving rocks into position in such a manner as to ensure the material when in place is stable and without tendency to slide.

B. Place and spread in accordance with the requirements for the "Road Mix Method" outlined in Section 4-04.3(4) of the WSDOT/APWA *Standard Specifications for Road, Bridge and Municipal Construction* (2008 Edition).

END OF SECTION

SECTION 02930 – SEEDING

PART 1 GENERAL

1.01 DESCRIPTION

I. Furnish all materials, equipment, and labor necessary for preparation, seeding, mulching, and protection for seeded areas in accordance with the Specifications and Drawings, and subject to the terms and conditions of the Contract. Work includes:

1. Seed, tackifier, soil supplements, and mulch.
2. Drill seed or hydro-seed, and apply soil supplements, mulch or hydro-mulch, and tackify areas designated on the Drawings to be seeded as directed by the Contracting Officer.

1.02 PAYMENT

A. Seeding

1. Payment: Lump sum price offered in the schedule shall include cost of preparation for and furnishing and placing seed, mulch, tackifier, soil supplements, and other materials required for seeding as specified herein.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 02930-1, Seed Certifications: Showing origin of seed mixture and pure live seed content.
2. RSN 02930-1, Seed Analysis: Showing percent purity and percent germination is a minimum of 85 percent, and noxious weed content does not exceed 0.5 percent, by weight.

1.04 QUALITY ASSURANCE

A. Seed shall be furnished in containers that show the following information: seed name, lot number, net weight, percentage of purity, germination, weed seed, and inert material. Seed that has become wet, moldy, or otherwise damaged will not be accepted. Seed shall conform to the requirements of the Washington State Seed Law and, when applicable, the Federal Seed Act and shall be "certified" grade or better.

1.05 FIELD QUALITY CONTROL

A. Inspections: The Contractor shall request a provisional inspection upon completion of

the work. Upon completion of the punchlist, the Contracting Officer will make provisional acceptance of the work in writing.

1.06 GUARANTEE AND REPLACEMENT

A. Seeding is guaranteed as specified in the Specifications. Seeded areas must have a relatively uniform stand of grass with no bare spots over 10 feet square at the time of provisional acceptance. All areas failing to vigorously establish for any reason whatsoever during the 3-year maintenance period shall be reseeded. The Contractor shall reseed at the original rate.

PART 2 PRODUCTS

2.01 SEED

A. Seed shall be packed in clean, sound containers of uniform weight. Upon request, the Contractor shall furnish to the Contracting Officer duplicate copies of a statement signed by the vendor certifying that each lot of seed has been tested by a recognized seed-testing laboratory. Seed that has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

B. Seed shall be locally propagated plants. When possible, seed shall be gathered from areas adjacent to project site.

C. Seed shall be weed free as shown on official seed analysis certification. Weed restrictions:

1. Prohibited noxious weeds: None
2. Restricted noxious weeds: 0.5 percent maximum, by weight.

D. Seed Mixture:
1. Purity: 85 percent minimum
2. Germination:
   a. 85 percent minimum
   b. Germination less than 1 year old at time of seeding
3. Uniform mixture shown in Table 02930A – Seed Mixture

Table 02930A – Seed Mixture

Name	Pure Live Seed (Percent by Weight)
Mountain Brome	30%
Bluebunch Wheatgrass	40%
Great Basin Wildrye	10%
Covar Sheep Fescue	10%
Intermediate Wheatgrass	10%
TOTAL	100%

2.02 HYDROMULCH

A. Mulch shall have the following essential characteristics:
   1. Wood cellulose fiber.
   2. No germination or growth inhibiting factors.
   3. Dyed appropriate color to allow visual metering of application.
   4. Evenly dispersed and suspended when agitated in water.
   5. Forms blotter-like ground cover that readily absorbs water and allows infiltration into underlying soil.
   6. Provide a soil-binding agent (tackifier) free of germination or growth inhibiting factors.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Remove weeds, trash, rocks larger than 6-inch diameter, and other debris that will interfere with seeding or maintenance operations.

B. Fill or smooth topsoil to remove rills, gullies and depressions. Protect topsoil surfaces from erosion and washouts. Repair damaged surfaces as required.

C. Discontinue site preparation for seeding work when soil moisture conditions are not suitable for site preparation, as determined by the Contracting Officer.

D. Notify the Contracting Officer no less than 48 hours in advance of any seeding operation. Following theContracting Officer's approval, seeding of the approved areas shall begin immediately.

3.02 SEEDING SCHEDULE

A. The time period for seeding shall be October 1 to March 15. No seeding shall be done before or after these dates without the Contracting Officer's written approval. No seeding shall take place on weekends or legal holidays.

B. Do not seed or fertilize when the ambient temperature is below 38° F without approval from the Contracting Officer. Do not seed, fertilize, or mulch when the ground is snow-covered or frozen. Do not seed, fertilize, or mulch when wind velocities prevent uniform application of materials.

3.03 SEEDING

A. Seed shall be applied by hand. Mulch shall be applied with approved hydraulic equipment. Both shall be applied in one application. The Contractor shall apply materials at the following rates:

1. Seed: 30 pounds per acre
2. Mulch With Tackifier: 1,200-1,500 pounds per acre

B. The Contractor shall give the Owner and the Contracting Officer 48 hours notice prior to seeding operation. Equipment shall utilize water as carrying agent, utilizing continuous built-in agitation system.

C. Equipment with a gear pump is not acceptable.

D. The Contractor shall pump a continuous, non-fluctuating supply of homogenous slurry to provide a uniform distribution of mulch material over designated areas.

3.04 MAINTENANCE

A. The Contractor shall maintain seeded areas until grass is well established and exhibits a vigorous growing condition.

B. Maintenance may include, but is not limited to:

1. Reseeding areas that do not germinate
2. Applying additional soil supplements
3. Applying water
4. Weeding
5. Maintaining protection fencing

C. Maintenance shall include removal of noxious weeds prior to producing seed heads. Noxious weeds are defined by those species listed on the State of Washington Noxious

Weed List (www.nwcb.wa.gov). Non-noxious weeds shall only be removed if they are directly impeding the success of new plant material.

3.05 PHYSICAL COMPLETION

A. Inspection to determine physical completion of seeded areas will be made by the Contracting Officer upon Contractor's notification of completion. The Contractor may request a specific inspection date provided that the request is made at least 5 working days before requested inspection date.

1. Seeded areas will be accepted, provided all requirements, including maintenance, have been complied with and grass is well-established and exhibits a vigorous growing condition.
2. Areas failing to show a uniform stand of grass shall be reseeded at the Contractor's expense. A uniform stand of grass is defined as vigorous grass growth with no bare spots greater than 10 square feet.

B. Upon physical completion, the Owner will assume maintenance duties.

END OF SECTION

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DIVISION 3 – CONCRETE

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SECTION 03200 – CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 GENERAL

A. The work includes the requirements for manufacture, detailing, cutting, bending, transporting, and placing of all concrete reinforcement and associated items as shown on the Drawings.

1.02 COST

A. Include in prices offered in the schedule for Installation of Reinforced Concrete Settling Basin, in accordance with Section 3300 – Cast-In-Place Concrete.

1.03 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 318/318R Building Code Requirements for Structural Concrete and Commentary.
2. ACI SP-66 Detailing Manual.

B. ASTM International (ASTM):

1. ASTM A185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
2. ASTM A497 Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
3. ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
4. ASTM A706 Deformed and Plain Bars for Concrete Reinforcement.
5. ASTM A767 Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

C. Concrete Reinforcing Steel Institute (CRSI):

1. Placing Reinforcing Bars.
2. Manual of Standard Practice.

D. International Conference of Building Officials (ICBO): ICBO Research Report.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03200-1, Reinforcement Diagrams and Lists:
   a. Supplemental bar-placing diagrams, bar lists, and bar-bending diagrams

required for reinforcement fabrication and placement.

b. Prepare bar-placing diagrams, bar lists, and bar-bending diagrams in accordance with the Drawings.

1.05 REQUIREMENTS

A. Protect reinforcement before, during, and after installation.

B. Store in a manner to prevent fouling with dirt, grease, and other bond-breaking coatings.

C. Use all necessary precautions to maintain identification after the bundles are broken

PART 2 PRODUCTS

2.01 REINFORCMENT

A. Deformed Billet-Steel Reinforcing Bars Includes stirrups, ties, and spirals:

1. ASTM A615, Grade 60.

B. Tie wire:

1. 16-gauge double annealed wire. Provide galvanized tie wire for exposed concrete.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify the Contracting Officer when reinforcing is ready for inspection, and allow sufficient time for inspection prior to placing concrete. Clean reinforcing bars of loose mill scale, oil, earth, and other contaminants.

3.02 INSTALLATION

A. Fabrication:

1. Fabricate steel bar reinforcement to shapes and dimensions as shown and placed as indicated on the Drawings.
2. Form bars in accordance with the requirements of ACI 318. Make bends cold around pin with diameter at least 6 times bar dimension; heating of reinforcement will be permitted only if entire operation is approved. No bending of reinforcement after partial embedment in concrete will be permitted.
3. Obtain approval of all splices not indicated on the Drawings. In general, avoid splices at points of maximum stress. Saw, shear, or flame-cut bar ends; straighten

ends of sheared bars; chip and wire brush ends of flame-cut bars. Wire brush splice area to remove burrs, paint, oil, and other foreign matter before splicing. Splice overlap shall be at least 16 times the diameter of the bars.

B. Placement:

1. Accurately position bars in accordance with the Drawings and approved bar placement diagrams. Secure the bars against displacement.
2. Lap reinforcement as indicated on the Drawings or as directed by the Contracting Officer. Extend reinforcement through, and lap beyond, construction joints.
3. Bundle or space bars, instead of field bending where construction access through reinforcing is necessary.
4. Place reinforcement with a clear distance of 1 inch, minimum, between reinforcement and anchor bolts, form ties, or other embedded metalwork, unless otherwise shown on the Drawings.

C. Tolerances:

1. Maintain concrete cover over reinforcement within 1/2-inch of specified cover where specified cover is greater than 2-1/2 inches.
2. Maintain concrete cover over reinforcement within 1/2-inch of specified cover where specified cover is less than 2-1/2 inches.
3. Maintain spacing of reinforcing bars within 1 inch of required spacing.

D. Tying Reinforcing Bars:

1. Tie every other intersection on mats made up of Nos. 3, 4, 5, and 6 bars to hold them firmly at required spacing.
2. Bend tie wire away from concrete surface to provide clearance of 1 inch from surface of concrete to tie wire.

END OF SECTION

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SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 GENERAL

A. The work shall consist of furnishing materials for and installation of cast-in-place reinforced concrete structures and grout filling the annular space between new pipe and an existing pipe, as shown on the Drawings.

1.02 PAYMENT

A. Reinforced Concrete Flow Control Structure - Station 69+45:

1. Payment: Lump sum price offered in the schedule. The lump sum price offered in the schedule shall include the cost of all labor, materials, tools, and equipment necessary to supply and install the reinforced concrete structure, including, but not limited to, excavation; support and protection of the excavation; placement of concrete, reinforcement, grout, admixtures, and joint material; installation of pipe penetrations, block outs, steel embedments, stop logs and gates; placement of backfill and structural fill; and site grading.

B. Grout Fill Annular Space in Existing 24-inch Pipe

1. Payment: Lump sum price offered in the schedule. The lump sum price offered in the schedule shall include the cost of all labor, materials, tools, and equipment necessary to supply and install non-shrink grout in the annular space around the proposed 8-inch irrigation pipe and 12-inch overflow pipe that will be installed inside an existing 24-inch pipe, as shown on the Drawings.

1.03 REFERENCES

A. American Concrete Institute (ACI):

1. ACI 301 Standard Specification for Structural Concrete.
2. ACI 309R Guide for Consolidation of Concrete.
3. ACI 318/318R Building Code Requirements for Structural Concrete.

B. ASTM International (ASTM):

1. ASTM A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
2. ASTM C31 Making and Curing Concrete Test Specimens in the Field.
3. ASTM C33 Concrete Aggregates.
4. ASTM C39 Compressive Strength of Cylindrical Concrete Specimens.

5.	ASTM C94	Ready-Mixed Concrete.
6.	ASTM C114	Chemical Analysis of Hydraulic Cement.
7.	ASTM C127	Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
8.	ASTM C128	Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
9.	ASTM C138	Density, Yield and Air Content (Gravimetric) of Concrete.
10.	ASTM C143	Slump of Hydraulic Concrete.
11.	ASTM C150	Portland Cement.
12.	ASTM C172	Sampling Freshly Mixed Concrete.
13.	ASTM C183	Sampling and the Amount of Testing of Hydraulic Cement.
14.	ASTM C192	Curing Concrete Test Specimens in the Laboratory.
15.	ASTM C231	Air Content of Freshly Mixed Concrete by the Pressure Method.
16.	ASTM C260	Air-Entraining Admixtures for Concrete.
17.	ASTM C311	Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
18.	ASTM C494	Chemical Admixtures for Concrete.
19.	ASTM C617	Capping Cylindrical Concrete Specimens.
20.	ASTM C311	Coal Fly Ash and Raw or Calcined Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete.
21.	ASTM C1017	Chemical Admixtures for use in Producing Flowing Concrete.
22.	ASTM D1751	Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

C. Bureau of Reclamation (USBR)

1.	USBR M-47	Standard Specification for Repair of Concrete, August 1996

1.04 DEFINITIONS

A. Cementitious Materials: Portland cement, or Portland cement plus pozzolan, or blended hydraulic cement.

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03300-1, Concrete Mix Design
2. RSN 03300-2, Concrete delivery tickets

1.06 REQUIREMENTS

A. The Contractor will be responsible for performing the necessary excavations, placing and compacting structural backfill, and furnishing and placing cast-in-place concrete, rebar,

and other appurtenant materials as required to complete each of the reinforced concrete structures shown on the Drawings.

1.07 QUALITY ASSURANCE

A. The Contracting Officer shall, as needed, test cast-in-place concrete to ensure that it meets the requirements of these Specifications, as follows:

1. The Contracting Officer shall, at his/her discretion, obtain and pay for the services of an independent testing laboratory to perform the following concrete testing:
   a. Fresh concrete shall be sampled and tested in accordance with ASTM C31, ASTM C143, and ASTM C260. Sampling and testing shall be performed from concrete delivered by the first truck load. Concrete shall not be placed until slump, temperature, and entrained air tests indicate that is within acceptable limits. Concrete shall be sampled and tested at least once every 50 cubic yards (CY). A minimum of two cylinders shall be cast for strength testing for each class of concrete used.
   b. Cured concrete cylinders shall be tested in accordance with ASTM C39.
2. The Contractor shall assist the Contracting Officer by providing a suitable sample of concrete for testing.

B. Concrete testing performed by the Contracting Officer shall not relieve the Contractor of his/her obligation to furnish, place, and finish cast-in-place concrete as required in these Contract Documents.

C. The Contractor shall submit the batch ticket with each batch of concrete to the Contracting Officer at the jobsite during batch delivery in accordance with ASTM C 94.

PART 2 PRODUCTS

2.01 CEMENTITIOUS MATERIALS

A. Cementitious material options:

1. Specified Portland Cement only.
2. Specified Portland Cement with 20 percent plus or minus 5 percent, by weight, specified pozzolan.

B. Portland Cement:

1. ASTM C150, Type II.
2. Meet the equivalent alkalis requirements of ASTM C150 – Table 2.
3. Meet false-set requirements of ASTM C150 – Table 4.

C. Pozzolan:

1. ASTM C618, Class F.
2. Sulfur trioxide for Class F, maximum: 4%
3. Loss on ignition, maximum: 2.5%
4. Use pozzolan tested for effectiveness in controlling akali-silica reaction under optimal physical requirements in Table 2 of ASTM C618. Use low-alkali cement for test.
5. Do not decrease sulfate resistance of concrete by use of pozzolan.
   a. Demonstrate pozzolan will have an "R" factor less than 2.5.
      1) R=(C-5)/F
      2) C: Calcium oxide content of pozzolan in percent determined in accordance with ASTM C114.
      3) F: Ferric oxide content of pozzolan in percent determined in accordance with ASTM C114.

2.02 WATER

A. Clean and potable containing less than 500 parts per million (ppm) of chlorides.

2.03 AGGREGATE MATERIALS

A. Fine Aggregate: ASTM C33

B. Course Aggregate: ASTM C33, Size No. 57 or 67

2.04 ADMIXTURES

A. Admixtures: All admixtures shall be supplied by one manufacturer and approved by the Contracting Officer.

1. Air-Entraining Admixture: Conform to ASTM C260.
2. Chemical Admixtures:
   a. ASTM C494, Type A, D, F, or G.
   b. ASTM C494, Type C and E, provided they do not contain chlorides.
   c. ASTM C1017, Type I or II

2.05 CONCRETE MIX

A. Design and adjust concrete mix in accordance with ACI 318.

1. Adjust during work as indicated by the results of concrete testing.

B. Net water/cementitious materials ratio: 0.47 maximum, by weight

C. Slump:

1. 2 to 4 inches at placement
2. Use slump appropriate for placing conditions when ASTM C1017, Type I or II admixtures are used in concrete.

D. Compressive Strength

1. At 28 Days: 4,000 pounds per square inch
2. Determine compressive strength in accordance with ASTM C31 and ASTM C39 for 6 x 12-inch cast cylinders. Acceptance criteria:
   a. 90% of test cylinders exceed specified compressive strength at 28 days.
   b. Average compressive strength of any six consecutive test cylinders exceeds specified compressive strength at 28 days.

E. Air Entrainment: 4 to 6% air by volume of concrete at placement

2.06 NON-SHRINK GROUT

A. Premixed and packaged, non-metallic, tested to comply with ASTM C827 for volume change, ASTM C187 and C143 for workability, and ASTM C39 for compressive strength. The use of powdered aluminum will not be permitted without written permission of the Contracting Officer.

2.07 CONSTRUCTION JOINTS

A. Waterstop: Bentonite/butyl-rubber based water stop with 75% sodium bentonite content.

2.08 EXPANSION JOINTS

A. Joint Filler: Closed-cell round polyethylene foam rod compatible with sealant.

B. Joint Sealant: Single-component pourable polyurethane; ASTM C920, Type S, Grade P, Class 25, use T, with minimum durometer hardness of 35.

PART 3 EXECUTION

3.01 FORMWORK

A. Form Materials:

1. For Footings: Fabricate forms of MDO plywood, metal, or plastic as judged best suited for shapes. Construct with a minimum of joints, sufficiently tight to prevent leakage.
2. For Walls and Exposed Concrete: Fabricate forms of MDO Plywood. The

plywood shall be exterior type without splits or knotholes and sanded smooth. The face grain of the plywood shall run perpendicular to the studs or joists. All joints in surfaces of forms used on exposed concrete surfaces shall be vertical or horizontal. Where possible, use form material with a basic modular size of 4 feet x 8 feet.

3. Forms shall be of such quality and treated so that deterioration or discoloration of formed concrete surfaces due to chemical action, contamination, or uneven absorption of water from concrete is prevented.
4. Inserts/Sleeves: As shown on Drawings.
5. Form Treatments: Line, coat, or treat forms with a suitable bond-breaker to ensure their timely removal with minimum damage to the concrete. Bond-breaker material shall be non-coloring and shall not leave a film on the concrete surface that will prohibit the subsequent finishing activities required to attain the desired appearance.

B. Erect forms to conform accurately to the shapes, dimensions, locations, and profiles indicated; fit joints between adjacent assembled panels and components tightly. Construct forms sufficiently tight to prevent loss of mortar from concrete. Inspect all contact surfaces prior to concrete placement; verify that surfaces are clean, smooth, and free from foreign matter or imperfections affecting appearance of finished concrete.

C. Camber: Design and erect formwork for anticipated deflection due to weight and pressure of fresh concrete. Provide positive means for adjustment of shores and struts to take up settlement during placement.

D. Maintain forms rigidly in position until concrete has hardened sufficiently to prevent damage by form removal. Prying against face of concrete will not be permitted; where mechanical means are necessary to release forms, use wood wedges only and then only as approved by the Contracting Officer.

E. Provide a 3/4-inch chamfer on all exposed outside corners of concrete structures.

3.02 PREPARATION

A. Inspection:

1. Verify that all items to be embedded in concrete are in place, properly oriented, located, and secured.
2. Verify that concrete may be placed to the lines and elevations indicated on the Drawings with all required clearances for reinforcement.

B. General:

1. Thoroughly clean all areas in which concrete is to be placed. Remove standing water, mud, and debris from foundation surfaces to be covered by concrete.
2. Ensure that outdoor foundations are free from frost and ice.

3. Clean, roughen, and dry existing concrete and construction joints to be covered with fresh concrete. Remove laitance, loose or defective concrete, coatings, sand, curing compound and other foreign materials.
4. Clean all transporting and handling equipment of all hardened concrete.

C. Notification: Notify the Contracting Officer at least 48 hours in advance of concrete pour.

3.03 PLACING CONCRETE

A. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

B. Do not use aluminum pipes and chutes for placing or pumping concrete.

C. Do not use concrete which has become so stiff that it cannot be properly placed.

D. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.

E. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 20 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

F. Cold Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing action, or low temperatures.

G. When air temperature has fallen to or is expected to fall below, 40° Fahrenheit (4° Celsius), uniformly heat water and aggregates before mixing, to obtain a concrete

mixture temperature of not less than 50° Fahrenheit (10° Celsius) and not more than 80° Fahrenheit (27° Celsius), at point of placement.

1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen sub-grade or on sub-grade containing frozen materials.
2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

H. Hot Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90° Fahrenheit (32° Celsius). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and sub-grade just before placing concrete. Keep sub-grade moisture uniform without puddles or dry areas.
4. Use water reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to the Contracting Officer.

3.04 FINISHING

A. Finish concrete surfaces in accordance with the procedure specified for each type of surface.

B. Formed Surfaces:

1. Finish F1:
   a. Applies to formed surfaces to be covered by fill material, grout, or concrete, and construction joint surfaces.
   b. Protect form tie rod ends on surfaces in contact with fill material from moisture where they will be below the water table or waterline. Recess tie rod ends and fill recess with dry pack or other material approved by the Contracting Officer.
   c. Cut off tie rod ends flush with formed surface form on surfaces in contact with concrete or fill material and above the maximum water table or waterline elevation.

2. Finish F2:
   a. Applies to formed surfaces not permanently covered by fill material, grout, or concrete and not required to receive finish F3 and to contraction joint and expansion joint surfaces.
3. Finish F3:
   a. Applies to formed surfaces that may be exposed to public view.
   b. The surface shall be ground smooth to remove all fins, protrusions, rock pockets, and tie holes, and shall be repaired by dry-packing. All depressions shall be filled with a one-to-one sand cement grout and sack- or carpet-rubbed with a one-to-one sand/cement dry mix.
   c. The surface plane dimension shall be within a tolerance of plus or minus 1/4-inch of design dimensions, and the surface shall be free of irregularities greater than 3/16-inch in 10 feet in any direction.

C. Unformed Surfaces:

1. Finish U1 (screeded finish):
   a. Applies to unformed surfaces to be covered by fill material, grout, or concrete.
   b. Use as first stage of finish U2 and U3.
   c. Level and screed concrete to produce even uniform surfaces.
2. Finish U2 (floated finish):
   a. Applies to unformed surfaces not permanently covered by fill material, grout, or concrete and not required to receive finish U3.
   b. Use as second stage of finish U3.
   c. Use hand- or power-driven equipment.
   d. The surface shall be rodded across the top of the forms or screeds and smoothed with a wood float to remove irregularities greater than 3/8 inch in depth or variations from a grade of more than 1/2-inch in 10 feet.
   e. Begin floating as soon as screeded surface has sufficiently stiffened and before bleed water forms.
3. Finish U3 (troweled finish):
   a. Applies to unformed surfaces that will be exposed to public view.
   b. The surface shall be rodded across the screeds and smoothed with a light steel trowel to produce a smooth impervious surface, free of trowel marks. The general surface shall have no irregularities greater than 3/16-inch in depth or variations in grade of more than 3/8-inch in 10 feet.
   c. The slab shall be edged or patterned with a 2-inch-wide edging tool having a 3/4-inch corner radius.
   d. Begin steel troweling after bleed water has disappeared and floated surface has sufficiently hardened to prevent an excess of fine material from being drawn to the surface.
   e. Trowel with firm pressure to flatten sandy texture of floated surface.

3.05 JOINTS AND EDGES

A. Construction Joints:

1. Construction joints are joints which are purposely placed in concrete to facilitate construction, reduce initial shrinkage stresses and cracks, allow time for installation of embedded metalwork, or allow for subsequent placing of other concrete.
2. Concrete bond is required at construction joints regardless of whether or not reinforcement is continuous across the joint.
3. Locate joints where shown on the Drawings or approved by the Contracting Officer. Relocation, addition, or elimination of joints will be subject to approval by the Contracting Officer.
4. Roughen surface of concrete at joints and remove laitance to obtain bond before placing next lift; if use of keys is impractical due to congestion or inaccessibility or if it is inadvisable to disturb surface before it has hardened, use only wet sandblast method for preparing surface.
5. Dampen hardened concrete of joints between footings and walls, joints in unexposed walls, and all others not specifically mentioned herein and roughen by air water cutting. Dampen hardened concrete joints in exposed work and roughen by air/water cutting.
6. Install waterstop at construction joints for structures designed to hold or convey water in accordance with the manufacturer’s instructions.
7. Thoroughly cover joint surfaces with neat cement mortar of similar proportions to mortar in concrete; apply mortar as thick as practicable on vertical surfaces and a minimum of 1/2-inch-thick on horizontal surfaces; place next lift before mortar has reached its initial set.
8. For bonding new concrete to existing concrete use a bonding agent. For grouting dowels and reinforcing bars use specified adhesives in accordance with manufacturer's instructions.

B. Expansion Joints:

1. Provide pre-molded 3/8-inch joint filler for expansion joints in concrete sheetpile wall and other fixed objects, unless otherwise indicated.
2. Locate expansion joints as noted on Drawings.
3. Extend joint fillers full width and depth of joint and not less than 1/2-inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Protect top edge of joint filler during concrete placement with a metal or plastic temporary strip. Remove protection after concrete has been placed on both sides of joint before sealant is applied.
4. Fillers and Sealants: Install polyurethane sealant in a continuous, smooth joint, wiping excess sealant from adjacent concrete.

5. Provide expansion joints not more than 30 feet apart in footings. Run no reinforcement or other metal trim continuous through joints, unless otherwise indicated.

3.06 STRIPPING

A. Strip forms within 24 hours of placement, unless required to maintain minimum concrete temperature in accordance with Paragraph 3.08 B.

3.07 WATER LEAKAGE TESTING

A. Perform water leakage testing on all water-holding concrete structures after concrete structure is complete and capable of resisting hydrostatic pressure of water test. Concrete shall have achieved its full design strength.

B. Perform leakage test before coatings, or other work that will cover concrete surfaces has begun.

C. Perform testing as follows:

1. Install temporary bulkheads, cofferdams, and pipe fittings, to create a watertight structure for testing. Inspect each to see that it provides complete seal.
2. Fill the structure with water to maximum expected water level, or within 1 foot of top of structure.
3. Maintain this level for 72 hours prior to start of test to allow water absorption, structural deflection, and temperature to stabilize.
4. Measure the water surface at two points on opposite sides of the structure, when possible where attachments such as ladders exist, at 24-hour intervals.
5. Measure evaporation and precipitation by floating a partially filled, transparent, calibrated, open-top container.

D. Acceptance Criteria:

1. Volume loss shall not exceed 0.5 percent of contained liquid volume in 24-hour period, correcting for evaporation, precipitation, and settlement.
2. No damp spots or seepage shall be visible on exposed surfaces. Damp spot is defined as sufficient moisture to be transferred to dry hand upon touching.

E. When test fails: Dewater the structure; fill leaking cracks with crack repair epoxy; patch areas of damp spots previously recorded; and repeat water leakage test in its entirety until the structure successfully passes the test.

3.08 PROTECTION

A. Protect concrete from damage until final project acceptance.

B. Maintain concrete at a temperature of 50° Fahrenheit (10° Celsius) or greater for 72 hours, minimum, after placement. Vent heater and prevent concrete from drying where artificial heat is employed.

3.09 REPAIR

A. Repair concrete in accordance with USBR M-47.

B. Repair or replace concrete where directed by the Contracting Officer.

END OF SECTION

SECTION 03400 – PRECAST CONCRETE

PART 1 GENERAL

1.01 GENERAL

A. The reinforced concrete structures shown on the Drawings may, at the option of the Contractor, be precast and then placed, fully constructed, at the locations on the Drawings for the structures. Use of precast structures requires approval by the Contracting Officer prior to fabrication.

1.02 COST

A. Furnishing and Placing Precast Concrete Structures:

1. Measurement for payment of cement, concrete, and earthwork for precast concrete structures shall be the same as if cast-in-place structures were constructed. The price for each precast concrete structure shall be included in the lump sum price offered in the schedule for each structure. The cost of additional earthwork, foundation preparation, and mortar required to accommodate a precast structure shall be borne by the Contractor.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03400-1, Shipping, handling, and installation procedures.
2. RSN 03400-2, Precast drawings and a fabrication schedule.

PART 2 PRODUCTS

2.01 MATERIALS

A. Concrete shall meet the material requirements of Section 03300 – Cast-in-Place Concrete.

PART 3 EXECUTION

3.01 INSTALLATION

A. Precast structures shall not be moved from the precasting site sooner than 7 days after the concrete in the structure is placed, unless otherwise approved by the Contracting Officer.

B. Pipe penetration details shall be approved by the Contracting Officer.

C. The foundation of the precast structure shall be prepared as specified in the installation procedures approved by the Contracting Officer.

D. The precast structure shall be leveled and set accurately to the lines and elevations shown on the Drawings.

END OF SECTION

SECTION 03600 - SHOTCRETE

PART 1 GENERAL

1.01 GENERAL

A. This section includes shotcrete applied by wet-mix process for the settling basin structure. This includes shotcrete application to the invert and side slopes of the ditch at the settling basin structure as shown on the Drawings. Alternatively, the Contractor may employ a cast-in-place method based on Engineer approval and in accordance with Section 03300, Cast-in-Place Concrete.

1.02 PAYMENT

A. Settling Basin With Shotcrete/Geotextile Lining - Station 10+00:

1. Payment: Lump sum price offered in the schedule. The lump sum price offered in the schedule shall include the cost of all labor, materials, tools, and equipment necessary to supply and install the settling basin structure, including, but not limited to, excavation; support and protection of the excavation; subgrade preparation, placement of geocomposite liner, placement of shotcrete; placement of backfill; and site grading.

1.03 DEFINITIONS

A. Shotcrete: Mortar or concrete pneumatically projected onto a surface at high velocity.

B. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 03600-1, Shotcrete Mix Design
2. RSN 03600-2, Shotcrete delivery tickets

1.05 QUALITY ASSURANCE

A. Shotcrete Installer Qualifications: Minimum five (5) years experience.

B. Comply with provisions of ACI 506.2, “Specification for Shotcrete,” unless more stringent requirements are indicated.

C. Shotcrete Thickness: The Contractor shall measure and document shotcrete thickness at 5 foot intervals, each direction. Report results to the Contracting Officer within 24 hours of testing.

1.06 PROJECT CONDITIONS

A. Cold-Weather Shotcreting
1. Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:
2. Discontinue shotcreting when ambient temperature is 40 degrees F (4.4 degrees C), or colder, and falling.
3. Uniformly heat water and aggregates as necessary before mixing to obtain a shotcrete shooting temperature of not less than 50 degrees F (10 degrees C) and not more than 90 degrees F (32 degrees C).
4. Do not use frozen materials or materials containing ice or snow.
5. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
6. Do not use calcium chloride, salt, or other materials containing antifreeze agents.

B. Hot-Weather Shotcreting
1. Mix, place, and protect shotcrete according to ACI 305R when hot-weather conditions and high temperatures would seriously impair quality and strength of shotcrete, and as follows:
   a. Cool ingredients before mixing to maintain shotcrete temperature at time of placement below 90 degrees F (32 degrees C). Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:

PART 2 PRODUCTS

2.01 SHOTCRETE MATERIALS

A. Portland Cement:

1. ASTM C150, Type I.
2. Use only one brand and type of cement for Project.

B. Silica Fume:

ASTM C1240, amorphous silica.

2.02 WATER

A. Clean and potable, complying with ASTM C94/C94M, free from deleterious materials that may affect color stability, setting, or strength of shotcrete.

2.03 AGGREGATE MATERIALS

A. ASTM 33, from a single source, and as follows:
   1. Coarse Aggregate: 3/8-inch minus pea gravel.
   2. ASTM C33 Fine Aggregate.
   3. Aggregate shall be of appropriate size to not clog the nozzle.

2.04 SYNTHETIC FIBER

A. Mono-filament fiber engineered and designed for use in shotcrete, complying with ASTM C1116, Type III, not less than 3/4 inch (19 mm) long with a dosage of 1.5 lbs/yd3.

2.05 CURING MATERIALS

A. Water: Potable.

B. Others as approved by Engineer.

2.06 SHOTCRETE MIXTURES GENERAL

A. Prepare design mixes for shotcrete.
   1. Limit use of silica fume to not exceed, in combination, 15 percent of portland cement by weight.

B. Limit water-soluble chloride ions to maximum percentage by weight of cement or cementitious materials permitted by ACI 301.

C. Admixtures: If included in shotcrete design mixes, use admixtures and retarding admixtures according to manufacturer's written instructions.

D. Synthetic Fiber: Uniformly disperse in shotcrete mix, according to manufacturer's written instructions, at a minimum rate of 1.5-lb/cu. yd.

E. Design-Mix Adjustments: Subject to compliance with requirements, shotcrete design-mix adjustments may be proposed when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant

2.07 SHOTCRETE MIXTURES

A. Proportion wet mixtures according to ACI 211.1 and ACI 301, using materials to be used on Project, to provide shotcrete with the following properties:
   1. Compressive Strength (seven (7) days): Minimum of 3,500 psi at seven (7) days. Mix supplier shall certify shotcrete used for work meets or exceeds compressive

strength requirement.

2. 4 percent air entrainment plus or minus 0.5 percent.
3. Slump shall be the minimum required for pumping and placement.

2.08 SHOTCRETE EQUIPMENT

A. Mixing Equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.

B. Wet-Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

C. Application hose shall be of appropriate length to maximize efficiency. 75 feet maximum is recommended.

2.09 BATCHING AND MIXING

A. Wet-Mix Process: Measure, batch, mix, and deliver shotcrete according to ASTM C94/ C94M and furnish batch ticket information to Contractor and District.

PART 3 EXECUTION

3.01 PREPARATION

A. Liner:

1. Clean liner surfaces of loose materials, mud, and other foreign matter that might weaken shotcrete bonding to the satisfaction of the District. Liner shall be installed over well compacted base material free from gaps or other inconsistencies. See Section 02073, Geosynthetics, and Section 02319, Canal Subgrade Preparation.

3.02 FORMS

A. In the event that forms are required, design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.
   1. Fabricate forms to be readily removable without impact, shock, or damage to shotcrete surfaces and adjacent materials.
   2. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorages, inserts, and other features required in the Work.

B. Form openings, chases, recesses, bulkheads, keyways, and screeds in formwork. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.

3.03 JOINTS

A. Construction Joints
   1. Locate and install construction joints tapered to a 1:1 slope.

B. Contraction Joints
   1. Construct contraction joints in shotcrete using saw cuts 1/8 inch (3 mm) wide by 1/3 shotcrete depth
      a. Saw cutting shall take place within 24 hours of shotcrete placement.
      b. Backfill saw cuts with appropriate caulk, as approved by Engineer.
      c. Space joints every twenty-five (25) feet.

3.04 APPLICATION

A. Shotcrete shall be applied to provide a minimum thickness of 3 inches.

B. Apply shotcrete according to ACI 506.2.

C. Apply wet-mix shotcrete materials within ninety (90) minutes after batching.

D. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.

E. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.

F. Do not permit shotcrete to sag, slough, or dislodge.

G. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.

H. Do not disturb shotcrete surfaces before beginning finishing operations.

I. Remove ground wires or other alignment control devices after shotcrete placement.

J. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of two (2).

3.05 FINISHING

A. Finish shotcrete according to descriptions in ACI 506R for a float finish.

3.06 CURING

A. Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.

B. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.

C. Curing Exposed Surfaces: Cure shotcrete by one of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for at least seven (7) days with water, continuous water-fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
   2. Curing Compound: Apply curing compound uniformly in continuous operation by power spray according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.07 FIELD QUALITY CONTROL

A. Shotcrete Temperature: ASTM C1064/C1064M; One (1) test hourly when air temperature is 40 degrees F (4.4 degrees C) and below and when 80 degrees F (27 degrees C) and above, or as directed by Contracting Officer.

3.08 REPAIRS

A. Remove and replace shotcrete that is delaminated or exhibits laminations, voids, or sand/rock pockets exceeding limits for specified core grade of shotcrete.
   1. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces and apply new shotcrete. Repair concrete in accordance with USBR M-47.

3.08 CLEANING

A. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

END OF SECTION

DIVISION 4 – NOT USED

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DIVISION 5 – METALS

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SECTION 05500 – METAL FABRICATIONS

PART 1 GENERAL

1.01 SCOPE

A. The work shall consist of furnishing and installing:

1. Walkway supports and grating
2. Interior steps for concrete structures
3. An exterior stairway at the flow control structure
4. Embedments and other miscellaneous metalwork

1.02 COST

A. Include in lump sum prices offered in the schedule for structures that require miscellaneous metalwork.

1.03 REFERENCES

A. American Institute of Steel Construction (AISC)

1.	AISC M016	Manual of Steel Construction – Allowable Stress Design – 9th Edition

B. American Society of Mechanical Engineers (ASME)

1.	ASME B18.2.1-1996	(with 1999 Addenda) Square and Hex Bolts and Screws (Inch Series)

C. ASTM International (ASTM)

1.	ASTM A36/A36M	Carbon Structural Steel.
2.	ASTM A108	Steel Bars, Carbon, Cold-Finished, Standard Quality
3.	ASTM A123/A123M	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4.	ASTM A153/A153M	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
5.	ASTM A307	Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
6.	ASTM A325	Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.
7.	ASTM A385	Practice for Providing High-Quality Zinc Coatings (Hot-Dip).
8.	ASTM A500/A500M	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

9.	ASTM A501	Hot-Formed and Seamless Carbon Steel Structural Tubing
10.	ASTM A563	Carbon and Alloy Steel Nuts
11.	ASTM A668/A668M	Steel Forgings, Carbon and Alloy, for General Industrial Use
12.	ASTM F436	Hardened Steel Washers
13.	ASTM F844	Washers, Steel, Plain (Flat), Unhardened for General Use

D. American Welding Society, Inc. (AWS)

1.	AWS D1.1/D1.1M	Structural Welding Code – Steel

E. Federal Specifications (FS)

1.	FS FF-S-85C	Screw, Cap, Slotted and Hexagon Head

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 05500-1, Shop and fabrication detail drawings for grated walkways, including grating, supports, and anchors.
2. RSN 05500-2, Shop and fabrication detail drawings for stop log guides and other miscellaneous metal fabrications.

1.05 QUALIFICATION OF WELDERS

A. Welder shall be able to demonstrate prior experience with procedures, materials, and equipment of the type required for the work.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Protect metal fabrications from corrosion, deformation, and other types of damage.

B. Store items in an enclosed area free from contact with soil and weather.

C. Remove and replace damaged items with new items.

PART 2 PRODUCTS

2.01 MATERIALS

A. Bolts, nuts, and washers

1. Eyebolts: Forged steel, ASTM A668, class C.
2. Nuts: ASTM A563.

3. Capscrews: FS FF-S-85
4. Washers:
   a. For use with ASTM A325 bolts: ASTM F436
   b. Unhardened for general use: ASTM F844
5. Bolts:
   a. ASTM A307, except for anchor bolts and studbolts
   b. Provide anchor bolts as shown on the Drawings
   c. ASTM A36 steel
   d. Length of bolt threads: ASME B18.2.1
   e. Thread class: 2 free-fit, American National coarse-thread series.
6. Studbolts:
   a. Suitable for end welding to steel with automatically timed stud-welding equipment.

B. Grating

1. Welded steel bar grating (ASTM A36).
2. Galvanized per ASTM A123.
3. Dimensions and bar spacing as shown on the Drawings.
4. Provide serrated edge on top surface of grating.

C. Stop Log Guides

1. ASTM A36
2. Galvanized per ASTM A123.
3. Headed Anchors, as shown on the Drawings.

D. Stop Logs

1. Non-toxic, pressure treated lumber, 2-inch x 6-inch nominal size.

E. Miscellaneous Structural Steel

1. Angles: ASTM A36.
2. Other Shapes: ASTM A36.
3. Galvanized per ASTM A123.

2.02 ANCHORS

A. Expansion Anchors:

1. AISI Type 316 stainless steel, when submerged in water, or hot-dip galvanized.
2. Self-drilling anchors, snap-off or flush type.
3. Bolt length as shown on the Drawings.

B. Wedge Anchors:

1. AISI Type 316 stainless steel, when submerged in water, or hot-dip galvanized.
2. Bolt length as shown on the Drawings.

C. Stud Anchors:

1. ASTM A108, deformed bar anchors and stud anchors.
2. Flux-filled ends suitable for end welding to steel with automatically timed stud-welding equipment.

2.03 FABRICATION

A. Fabricate metalwork in accordance with AISC M016, and these Specifications.

1. Perform welding in accordance with AWS D1.1.
2. Grind all welds smooth.

B. If straightening is necessary, use methods that will not injure the metal.

C. After shop work completion and before galvanizing, clean material of rust, loose scale, dirt, oil, grease, slag from welded areas, and other foreign substances.

D. Galvanizing:

1. Galvanize items of metalwork unless otherwise specified or shown on the Drawings in accordance with ASTM A123 and A385.
2. Galvanize bolts, nuts, washers, and lockouts in accordance with ASTM A153. Remove excess spelter or centrifugal spinning.
3. Galvanizing Repair:
    a. Redip material with damaged galvanizing unless damage is local and can be repaired by zinc primer.
    b. If the galvanized coating becomes damaged after being dipped twice, material will be rejected.
    c. Repair procedure where local paint repair is authorized:
        1) Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.
        2) Reclean areas with solvent to remove residue.
        3) Apply two or more coats of zinc primer:
            a) Total minimum dry-film thickness: 4 mils
            b) Zinc primer: MIL-DTL-24441/19

PART 3 EXECUTION

3.01 PREPARATION

A. Where locations and dimensions of miscellaneous metalwork shown on the Drawings are tentative and subject to change dependant upon equipment furnished, confirm locations and dimensions prior to fabrication of miscellaneous metalwork.

3.02 INSTALLATION

A. Embedded Metalwork:

1. Accurately locate metalwork to be embedded in concrete. Hold metalwork in correct position and alignment and protect metalwork from damage and displacement during placement and setting of concrete.
2. Unless otherwise specified, use only metal braces, supports and other items to position and align embedded metalwork. Do not use wooden braces, supports, or other items to position and align embedded metalwork if braces and supports will also be embedded in concrete.

B. Anchors:

1. The Contractor may use suitable adhesive, expansion, or wedge anchors meeting the requirements of this section in lieu of embedded anchors shown on Drawings, provided that anchors are approved by the Contracting Office.
2. Drill holes for anchors straight, true, and of the diameter recommended by the anchor manufacturer.
3. Install anchors in accordance with manufacturer's recommendations.
4. Follow manufacturer's recommendations when embedded steel or reinforcement is encountered during drilling of anchors.
5. When drilling water is used, clean surfaces of concrete to remain exposed immediately to prevent discoloration.

C. Galvanizing Repair:

1. Clean damaged areas by wiping with clean rags saturated with mineral spirits or xylene, followed by wire brushing.
2. Reclean areas with solvent to remove residue.
3. Apply two or more coats of zinc primer:
   a. Total minimum dry-film thickness: 4 mils
   b. Zinc primer: MIL-DTL-24441/19

D. Holes in metalwork:

1. Drill, or drill and tap as required, holes in metalwork required for installation.

END OF SECTION

DIVISIONS 6 THROUGH 10 – NOT USED

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DIVISION 11 – EQUIPMENT

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SECTION 11285 – HYDRAULIC GATES

PART 1 GENERAL

1.01 SCOPE

A. The work shall consist of furnishing and installing a 24-inch canal gate at the flow control structure.

1.02 COST

A. Include costs for furnishing and installing a 24-inch canal gate in the prices offered in the schedule for Reinforced Concrete Flow Control Structure, Sta 69+45, in accordance with Section 03300 – Cast-In-Place Concrete.

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 11285-1, Drawings showing the principal dimensions, general construction and materials, and lift mechanisms for the gate.
2. RSN 11285-1, Manufacturer's installation, operation and maintenance instructions for each gate.
3. RSN 11285-1, A copy of the warranty for each gate.

1.04 REQUIREMENTS

A. Leakage:

1. Gates shall be substantially watertight under the design head conditions.
2. Canal Gate:
   a. Under the design seating head, the leakage shall not exceed 0.1 US gallons per minute per foot of seating perimeter.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Exercise the following precautions:

1. Handling: Avoid bending, scraping, or overstressing the gates.
2. Transportation: Loading, transporting, and unloading of the gates shall be conducted such that the gates are kept clean and free from damage.
3. Storage: Provide sheltered onsite storage. Provide blocking, platforms, or skids to protect the gates from contact with the ground. Protect the gates from theft and from damage from construction activities or equipment.

PART 2 PRODUCTS

2.01 MATERIALS

A. Canal Gate:

1. General Design:
   a. The gate shall be a cast iron or ductile iron canal gate designed to control the flow of water from the diversion box into the inlet pipe.
   b. The gate shall be Waterman Model C-10 Canal Gate, or approved equal.
   c. The gate shall be self-contained with a non-rising stem.
   d. The gate shall be mounted on the flanged connection provided in the diversion box, as shown on the Drawings.
2. Frame and Slide:
   a. Cast Iron, per ASTM A126.
3. Seals:
   a. Neoprene Rubber, in accordance with ASTM D 2000
4. Rails and Yoke:
   a. Steel, per ASTM A36
5. Lifting Mechanism:
   a. Stainless steel stem, in accordance with ASTM A276, Type 304 or 304L
   b. The stem shall have a slenderness ratio (L/R) less than 200. The threaded portion of the stem shall have Acme type cold rolled threads with a maximum surface of 16 micro-inches.
   c. Provide operating wheel or hand crank.
6. Coating:
   a. Manufacturer's Standard Coating

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect gates upon delivery at the site to ensure proper working order. Verify that gates operate from the fully opened to fully closed position without sticking or binding. If valves stick or bind, repair or replace before installation.

B. Ensure that concrete structure surfaces and block-out dimensions are suitable for mounting the gates. Repair any damage or irregularities of the concrete surfaces that would weaken the anchoring system or impair gate performance.

3.02 INSTALLATION

A. Install gates as shown on the Drawings and consistent with manufacturer's recommendations and the approved submittal information.

B. Place non-shrink grout between the frame and concrete wall of the structure per the manufacturer's recommendations. Non-shrink grout shall be per Section 03300 – Cast-In-Place Concrete.

C. Gates shall be set plumb. Gates and associate equipment shall be secure.

D. Gates shall be installed prior to leakage testing of water holding structures, per Section 03300 – Cast-In-Place Concrete.

E. After installation is complete, inspect each gate for satisfactory manual operation, alignment, and support. Make adjustments as needed to ensure satisfactory performance.

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DIVISIONS 12 THROUGH 14 – NOT USED

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DIVISION 15 – MECHANICAL

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SECTION 15110 – VALVES

PART 1 GENERAL

1.01 SCOPE

A. The work shall consist of the following:

1. Furnishing and installing 10-inch gate valves for isolation of the 10-inch PVC irrigation main.
2. Furnishing and installing 2-inch, and 4-inch gate valves for control of flow to turnout connections.
3. Furnishing and installing 1-inch air and vacuum valve assemblies at the locations shown on the Drawings.

1.02 PAYMENT

A. Installation of 10-inch Gate Valve

1. Measurement: Measurement shall be made for each 10-inch gate valve installed.
2. Payment: The price per each 10-inch gate valve offered in the schedule shall include all costs for labor, materials, tools, and equipment necessary to furnish and install the specified gate valve, valve box, and associated equipment.

B. Installation of 1-inch Air and Vacuum Valve Assembly

1. Measurement: Measurement shall be made for each air and vacuum valve assembly installed.
2. Payment: The price per each air and vacuum valve assembly offered in the schedule shall include all costs for labor, materials, tools, and equipment necessary to furnish and install the specified valve, box, associated piping, tapping sleeve, and other appurtenances, as shown on the Drawings.

1.03 COST

A. Include costs for furnishing and installing 2-inch, and 4-inch gate valves for control of flow to turnout connections in the prices offered in the schedule for items requiring those valves.

1.04 REFERENCES

A. American Water Works Association (AWWA)

1. AWWA C509 Resilient-Seated Gate Valves for Water Supply Service

2. AWWA C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service

1.05 SUBMITTALS

A. Submit the following in accordance with Section 01330 – Submittals:

1. RSN 15110-1, Catalog data for each kind of gate valve and valve box.
2. RSN 15110-1, A certificate of compliance with AWWA C509 or C515.
4. RSN 15110-1, Manufacturer's installation, operation and maintenance instructions.

PART 2 PRODUCTS

2.01 MATERIALS

A. Gate Valves:

1. Resilient wedge gate valve in accordance with AWWA C509 or C515.
2. Gate valves shall be flanged, with a ductile iron body and a non-rising stem, unless otherwise shown on the Drawings.
3. Gate valves shall have a smooth, unobstructed waterway free from any sediment pockets.
4. Gate valves shall be provided with a square-nut operator and operator extension, as needed.
5. Verify that valve flanges are compatible with adjacent ductile iron pipe flanges.
6. Valves shall be lined and coated at the place of manufacture with fusion-bonded epoxy.
7. Each valve shall have the manufacturer's name, pressure rating, and year of manufacture cast on the body.

B. Valve Boxes.

1. Valve boxes shall be cast iron, two-piece slip type with a 5-1/4 inch minimum inside diameter
2. Covers shall be marked "WATER".
3. Each valve box shall be complete with a cover and shall extend from the valve nut operator to the finished ground surfaces.

C. Air and Vacuum Valve Assemblies

1. Valve, pipe, appurtenances, tapping sleeve, and other associated materials shall be as shown on the Drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. Inspect valves upon delivery at the site to ensure proper working order. Verify that valves operate from the fully opened to fully closed position without sticking or binding. If valves stick or bind, repair or replace the valve before installation.

B. Clean flanges, bolts, and nuts with a wire brush.

C. Lubricate bolts with oil and graphite before installation.

D. Lubricate valve operators in accordance with manufacturer's recommendations.

3.02 INSTALLATION

A. Valves shall be installed in the locations shown on the Drawings and in accordance with the manufacturer's recommendations.

B. Install valves so that bolt holes straddle the horizontal and vertical centerlines of the pipe run to which the valves are connected.

C. Valves and valve boxes shall be set plumb. Valve boxes shall be set flush with the finish ground surface.

END OF SECTION

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DIVISION 16 – NOT USED

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