VOLUME 2
TECHNICAL SPECIFICATIONS

STORM DAMAGE REPAIR 1700 BLOCK MILL STREET

CITY OF ROSEBURG
Douglas County, Oregon

PROJECT NO. 218.01

July 2026

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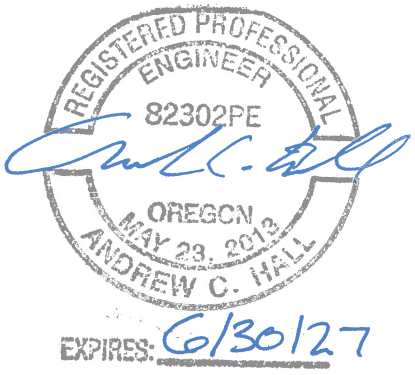

TECHNICAL SPECIFICATIONS

PROJECT DRAWINGS

END OF SECTION

SECTION 01000
DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01010
SUMMARY OF WORK

1. GENERAL

A. The Contractor shall furnish all labor, equipment, and materials necessary to complete all work in accordance with the plans, the specifications, and the terms of the Contract. This section also specifies work constraints relating to sequencing and phasing of the new improvements.

B. Project Location

1. The work is located in the City of Roseburg, Douglas County, Oregon. For more specific locations, see the location and vicinity maps on the Plans.

C. Project Scope - The project scope is briefly described as follows:

1. Base Bid

a. Work includes the following main items.

1. Construction of approximately 142 lineal feet of 18-inch diameter storm line and appurtenances, including 85 lineal feet of 30-inch diameter casing.

2. Construction of two (2) storm drain manholes.

3. Other work includes demolition work, traffic control, installation of storm line appurtenances, abandonment and slurry filling of existing storm lines, manhole removal, and landscaping and restoration.

D. Work Sequence and Constraints

1. The Contractor shall be required to phase the work in order to maintain existing public services and minimize impacts to local residences, other public services, roadway access, railroad access, and travel conditions.

2. Open trenches shall be limited to three-hundred feet in length during construction. No construction or construction vehicles shall enter within 25 feet of the center line of the existing railroad track.

3. The Contractor shall comply with the requirements from all permits issued by the Owner and/or other agencies.

4. All work and materials shall conform to the current edition of the Oregon Standard Specifications for Construction.

5. The contractor shall perform all work necessary to complete this project in accordance with the plans and specifications including such incidentals as may be necessary to meet the intent of the project contract documents and applicable agency requirements.

6. All construction vehicles shall park on the construction site or at a location(s) indicated on the approved plan. Hours of construction for public improvements shall be 8:00 AM to 5:00 PM, Monday through Friday. No construction activities are allowed on Saturdays, Sundays, or government holidays. Construction activities include all field maintenance of equipment, refueling, and pick-up or delivery of equipment as well as the actual construction activity.

7. The contractor shall notify Project Engineer and City of Roseburg inspector forty-eight (48) hours in advance of starting construction and twenty-four (24) hours before resuming work after shut downs, except for normal resumption of work following Saturdays, Sundays, or holidays.

8. The Contractor shall notify Central Oregon & Pacific Railroad - Genesee & Wyoming inspector ten (10) days in advance of starting construction per the permit.

9. The contractor shall keep an approved set of plans on the project site at all times.

10. Any review or inspection by the City of Roseburg, county, state, federal agency, or Project Engineer shall not, in any way relive the contractor from any obligation to perform the work in compliance with the applicable codes and regulations, City of Roseburg standards, and project documents.

11. Traffic control is required when equipment is in the parking lot and the roadway is open to through traffic.

12. The Contractor shall sweep the existing pavement at the end of each day's work.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01025
MEASUREMENT AND PAYMENT

1. GENERAL

A. Measurement of Quantities

1. All Work completed under the Contract will be determined by the Engineer using United States Customary Units of Measurement. The method of measurement and computations to be used in determination of quantities of materials furnished and of work performed under the Contract will be those methods generally recognized as conforming to good engineering practices.

2. The Work completed under this Contract will be measured in accordance with the Contract Documents.

3. The term "Lump Sum" when used as an item of payment will mean full compensation for the Work described in the Contract Documents. When a complete structure or structural unit (in effect, lump sum" work) is specified as the unit of measurement, the unit will be construed to include all necessary fittings and accessories.

B. Scope of Payment

1. Work shown in the Plans or described in Specifications for which no item is listed as part of the Contract Price or included in the payment description in this section shall be included in a Unit Price or Lump Sum item and will be considered to be included in the total Contract Price.

2. The Unit Price and Lump Sum price for furnishing each item of Work listed in the Contract Price shall include all labor, materials, tools, equipment, superintendence, and incidentals necessary to perform and complete the Work, including profit, overhead costs, permit and license fees, royalties, and applicable taxes and fees.

3. Payments for Lump Sum items will be made in proportion to the amount of Work accomplished as determined by the Engineer as of the "period ending date" of each Partial Payment Estimate. Contractor shall provide a schedule of values for each lump sum item over $10,000.

4. Payment for Materials on Hand – Partial payments may be made for materials and equipment on hand.

5. Payment for Work completed shall be made in accordance with this section and other applicable sections.

C. Basic Bid - Unit Price Description

1. Construction Facilities and Temporary Controls

a. Payment for Construction Facilities and Temporary Controls shall be on a lump sum basis. The lump sum payment shall be full compensation for mobilization, temporary utilities, fences and barricades, temporary construction, safety requirements, environmental controls, and restoration and cleanup, record drawing updates, coordination, public

convenience, field engineering, regulatory requirements, special project requirements, construction scheduling, submittals and Contract closeout.

b. Payment shall also include preparation, submittal, and implementation of traffic control plan including placement and removal of temporary signs; placement and removal of all necessary tubular markers; flaggers, all necessary equipment, special apparel, flagging equipment, illumination, signs, cones, and all other traffic control measures as required for completion of the work in accordance with the specifications and applicable permits. All related labor, miscellaneous materials and workmanship needed to maintain the traffic control during the overall construction shall be included in the lump sum payment.

c. Payment for by-pass pumping, erosion control, and control of water shall be included in the lump sum payment.

2. Miscellaneous Demolition and Site Preparation

a. Payment for Miscellaneous Demolition and Site Preparation shall be on a lump sum basis and shall include demolition and the removal and disposal of all structures, and facilities that are not covered by individual bid items.

b. Payment shall include clearing, grubbing, removal and disposal of vegetation including, stumps, roots, shrubs and trees as required for the storm drain improvements. A separate payment will not be made for this work.

c. Payment for removal and disposal of excavated material from the trench as required for the removal of existing storm drain lines, and appurtenances shall be included within the lump sum price.

d. Payment for the removal and disposal of asbestos-containing pipe as required for the new improvements shall be included within the lump sum price for Miscellaneous Demolition and Site Preparation. The overall amount of asbestos containing pipe on the project is unknown. The Contractor shall properly remove and dispose of all existing asbestos containing pipe that is exposed on the project at no additional cost to the Owner. A separate payment will not be made for this work.

e. Payment for complete removal and disposal of existing storm drain manhole frame, lid, and cone shall be included in the lump sum price. Slurry fill and backfill of the existing manhole structure shall also be included in the lump sum price.

f. Existing utilities and infrastructure shall be protected in place. If removal and reinstallation of existing structures is required to complete the work, the existing structure shall be protected from damage during removal and reinstallation. Removal of structures must be approved by Engineer.

3. Slurry Fill Existing Storm Drain Line

a. Payment for Slurry Fill Existing Storm Drain Line under the railroad will be made on a cubic yard basis. No additional payment will be entitled to the Contractor for excess slurry ordered, but not used.

b. Payment shall include all temporary measures, including de-watering, necessary excavation, slurry fill including placement thereof, end caps and associated injection and fill ports, cleanup and all other requirements for a complete abandonment of the existing storm drain line.

4. Rock Excavation

a. Payment for Rock Excavation shall be made on a cubic yard basis – field measurement shall be verified by the Engineer. Payment under this item includes rock excavation required for placement of underground utilities.

b. Rock Excavation shall be approved by the Engineer prior to any work. Rock Excavation is defined in Section 02221.

c. For rock excavation encountered during the trench excavation, the maximum trench width for payment purposes shall not exceed 12-inches outside the diameter of the pipe on each side. Depth shall be field determined, but will not include excavation that exceeds 6-inches below the bottom of pipe. Length shall be field determined.

5. Foundation Stabilization

a. Payment for Foundation Stabilization shall be made on a cubic yard basis, truck measure. Payment shall include all excavation, removal and disposal of existing materials excavated and placement of new foundation material.

b. Foundation Stabilization shall only be placed at the direction of the Engineer.

6. Railroad Crossing (Bore)

a. Payment for Railroad Crossing (Bore) shall be on a lineal foot basis regardless of size, type, and depth of carrier pipe and casing. Payment shall include compensation for excavation of a launching and receiving pit for jacking and boring, backfill, shoring and bracing, dewatering, bypass pumping, casing, carrier pipe, spacers, end seals, fittings, special equipment, and all incidental work required to complete the Railroad Crossing. A separate payment will not be made for these items.

7. Storm Drain Line

a. Payment for Storm Drain Line shall be made on a lineal foot basis regardless of size, type, and depth. Measurement for payment quantities shall be based on measured horizontal length.

b. Payment shall include compensation for demolition, removal and disposal of existing storm lines, pipe, backfill, pipe zone, fittings, pipe slope anchors, transition couplings, connection to existing storm drain lines, compaction, toning wire, locator tape, appurtenances, bypass

pumping, manhole connections, dewatering, testing, television inspection, and all related work.

8. Storm Drain Manhole

   a. Payment for Storm Drain Manhole shall be made on a unit price basis per each, regardless of backfill class or depth, and shall include compensation for excavation, dewatering, bypass pumping, manhole base and sections, frame and lid, gaskets, adjustment rings, aggregate base, shoring, backfill, grout, testing, and all incidental work for a complete installation.

   b. Payment shall also include all inlet and outlet connections, including flexible fittings, pipe sections, connection to the existing and new storm pipe, and grouting pipe connections and channel.

   c. Determination of connection quantity, size, orientation, elevations, pipe material, reviewing findings with Engineer, and allowing for minor design changes based on field conditions shall be included within the unit price.

   d. Payment shall also include the final adjustment of the manhole frame and lid to match finish grades, reinforcing steel, cast-in-place concrete, precast concrete grade rings, steel riser rings, aggregate base, and all necessary work for complete adjustment.

9. Slope Protection

   a. Payment for Slope Protection will be made on a cubic yard basis, truck measure of the new rip rap material. Payment shall include all excavation, removal and disposal of existing materials excavated and placement of new rip rap material.

10. Landscaping & Restoration

   a. Payment for Landscaping shall be made on a lump sum basis. Payment shall include topsoil, hydroseeding, fertilizer, seeding, mulch and other materials and work required for completing the work.

   b. Payment shall include new ditching and ditch restoration as shown on the plans.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01040
COORDINATION

1. GENERAL

A. The Contractor shall coordinate their work with the following:

1. City of Roseburg Public Works
2. Roseburg Urban Sanitary Authority
3. Pacific Power
4. Central Oregon & Pacific Railroad – Genesee & Wyoming
5. Douglas County Public Works Department
6. Charter Communications
7. DFN
8. Private property owners and the public
9. Other affected utilities and agencies

B. The Contractor shall inform all private property owners prior to, during, and upon completion of any work to be performed on private property. The Contractor shall provide a minimum of 24 hours' notice before entering said property.

C. For work sequence and traffic restrictions, refer to Section 01010.

D. The Contractor shall make every reasonable effort to minimize the inconvenience to private property owners.

E. Cleanup and restoration work shall be completed in conjunction with the construction of each part of the project. The Contractor shall exercise every reasonable effort to maintain streets and property clean and clear of excess excavation, debris, dirt, and other materials.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01041
EXISTING UTILITIES AND IMPROVEMENTS

1. GENERAL

A. Any information shown as to the location of existing utilities, topography, or structures has been compiled from the best available sources, but is not guaranteed to be accurate. The Contractor shall investigate and verify the disposition of interfering utilities and structures ahead of the work. Neither the Owner nor its agents will be responsible to the Contractor for damages as a result of underground utilities not shown on the Plans, or being in a location other than that shown on the Plans.

B. Oregon Law requires the Contractor to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 052-001-0010 through OAR 952-001-0000. The contractor may obtain copies of the rules from the center by calling toll free to (877) 668-4001 or by accessing the internet at www.callbeforeyoudig.org. The contractor must notify the center at least two (2) business days, but not more than ten (10) business days, before commencing an excavation. Call toll free to (800) 332-2344.

C. The contractor shall make provisions to keep all existing utilities (including non-locatable) in service and protect them during construction. Contractor shall be responsible for the immediate notification of damage to utilities and the repair or replacement of damaged utilities using materials and methods approved by the utility owner. No service interruptions shall be permitted without prior written agreement with the utility owner. No service interruptions shall be permitted without written agreement with the utility provider.

D. The Contractor shall notify all utility companies concerned at least 48 hours prior to any work in which those utilities may be involved.

E. Any utilities or structure damaged by the Contractor's operation shall be repaired or replaced in accordance with the requirements of the utility company and at the sole expense of the Contractor. Any damage shall be immediately reported to the affected owner or company.

F. If the Contractor encounters existing facilities which will prevent the construction, the Contractor shall promptly notify the Engineer so that field revisions can be made. The expense of any associated delay shall be borne by the Contractor without additional cost to the Owner.

G. At locations where the Contractor's operations may damage or disturb existing facilities, no work shall be started until the Owner of such facilities has arranged for the protection thereof. The Contractor shall be solely responsible to the owners of such facilities for any damage, injury, suits, actions, claims, or expenses resulting from the Contractor's operations.

H. The Contractor shall cooperate with the Owner and shall schedule their work to insure a non-interrupted utility service to the public, private residences, and businesses (if present).

I. All trench excavations and structure excavations within two (2) feet of any existing underground utility shall be performed by hand methods in accordance with state laws.

J. The Contractor shall "pot-hole" existing utilities prior to construction, so that potential conflicts can be minimized or that minor relocations of the new utilities can be made to lessen impact to travel ways or other structures. The Contractor shall coordinate with the Engineer as to when and where the "pot-holes" are to be performed. "Pot-holing" is defined as performing exploratory excavation of existing pipes or other utilities to verify their location and depth. The Contractor shall take all necessary field measurements and otherwise verify all dimensions and existing construction conditions indicated and or shown on the plans. Should any error or inconsistency exist, the Contractor shall not proceed with the work affected until reported to the Project Engineer for clarification or correction.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01042
PUBLIC CONVENIENCE

1. GENERAL

A. The Contractor shall conduct their work in such a manner as to minimize the inconvenience to the public, traffic, and property owners.

B. The Contractor shall confine operations to public easements and right-of-way and property owned by the Owner. Where the Contractor is required to construct improvements on private property, the Contractor shall keep their operations to a minimum. All disturbed areas must be restored to an original or better condition.

C. The Contractor shall maintain and coordinate access satisfactory with the needs of emergency service agencies and all affected properties.

D. Prevent dust nuisance by applying water or other specified materials at times and in locations required by the Engineer.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01050
FIELD ENGINEERING

1. GENERAL

A. All construction staking of public utilities shall be performed by or under the direction of a professional land surveyor registered in the State of Oregon.

B. Construction Stakeout - The Engineer will provide stakeout of the construction in the form of line and grade control as follows:

1. Storm Sewer Lines

a. New Manholes

b. Ends of New Railroad Crossing Casing

c. Outfall of New Storm Drain Line

C. The Contractor will be solely responsible for laying out the work from this stakeout control, and no additional stakeout will be provided except at the expense of the Contractor.

D. The Contractor shall preserve construction and survey stakes for the duration of the construction. If stakeout control is lost or disturbed, and in the judgment of the Engineer needs to be replaced, such replacement shall be by the Engineer at the expense of the Contractor. The Contractor will not be allowed extensions of time or damages caused by loss of control stakes.

E. Survey Monuments

1. All survey monuments on the project's site or that may be subject to disturbance within the construction area, or the construction of any off-site improvements shall be adequately referenced and protected prior to commencement of any construction activity. If the survey monuments are disturbed, moved, relocated, or destroyed as a result of any construction, the contractor shall, at their cost, retain the services of a registered professional land surveyor in the state of Oregon to restore the monument to its original condition and file the necessary surveys as required by Oregon State Law. A copy of any recorded survey shall be submitted to the Engineer.

F. Field Revisions

1. It is expected that minor revisions of the work may be required during the course of construction. The Contractor will not be entitled to additional compensation for minor revisions or relocations.

2. Field revisions and relocations shall only be made as directed by the Engineer.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01060
REGULATORY REQUIREMENTS

1. GENERAL

A. Contractor at all times shall observe and comply with all Federal and State laws, and lawful regulations issued thereunder, and local laws, ordinances and regulations, which in any manner affect the activities of the Contractor under this contract, and further, shall observe and comply with all orders or decrees as exist at present and those which may be enacted later by bodies or tribunals having any jurisdiction or authority over such activities of the Contractor.

B. Contractor shall be responsible and liable for all accidents, damage or injury to any person or property resulting from any activities, duties and obligations of the Contractor under this contract for which the Contractor may be legally liable, and the Contractor shall hold blameless and harmless, and shall indemnify the Owner and its officers, employees and agents against any and all claims, demands, loss, injury, damage, actions and costs of actions whatsoever which they or any of them may sustain by reason of any act, omission or neglect of Contractor or employees, agents, representatives or assignees of Contractor in connection with the activities, duties and obligations of the Contractor under this Contract.

C. Requirement of the City of Roseburg Public Works (Owner)

1. The Contractor shall comply with all requirements of the City of Roseburg Public Works.

2. The Contractor shall provide the City of Roseburg Public Works and Project Engineer a twenty-four (24) hour contact person and number.

3. The Contractor shall notify Project Engineer and City of Roseburg Public Works forty-eight (48) hours in advance of starting construction and twenty-four (24) hours before resuming work after shut downs, except for normal resumption of work following Saturdays, Sundays or holidays.

4. Where the construction work will require a shutdown of any of the City of Roseburg or other utilities (water lines, service lines and sewer laterals), the Contractor shall notify the City of Roseburg, Douglas County, and City of Roseburg a minimum of one week prior to requiring the shutdown.

5. Permits

   a. The Contractor is responsible for the procurement of all applicable permits, licenses and certificates relative to the trades to complete the project and for the use of such work when completed. Compliance shall be at all levels, federal, state, county, and local, relating to the performance of work.

6. Easements

   a. The Contractor shall verify any temporary construction easements prior to construction.

D. Central Oregon & Pacific Railroad

1. The City obtained an Occupancy License and Right of Entry License permit for the railroad crossing. The Contractor is required to conform to all requirements of these permits. If additional railroad permitting is necessary the Contractor shall pay the associated fees and the permits shall be the responsibility of the Contractor.

2. The Contractor shall confirm and coordinate with Central Oregon & Pacific Railroad for all work within the railroad right-of-way. The railroad track shall be operational as designated by Central Oregon & Pacific Railroad.

3. The Contractor shall confirm to allowable working hours and coordinate all flagging with Central Oregon & Pacific Railroad.

E. Erosion and Sediment Control Requirements

1. The Contractor shall provide effective erosion control protection to include, but not limited to, grading, ditching, hay bales, silt fencing, and sediment barriers to minimize erosion and impact to adjacent property.

2. Approval of the erosion and sediment control plan does not constitute an approval of permanent road or drainage design (e.g. Size and location of roads, pipes, structures, channels, detention facilities, utilities, etc.)

3. The erosion and sediment control measures must be constructed in conjunction with all clearing and grading activities, and in such a manner as to insure that sediment and sediment laden water does not enter the storm drainage system, streets, or violate applicable water standards.

4. The Contractor shall call for initial and final erosion and sediment control inspection. Erosion and sediment control inspection shall be approved prior to the start of construction activities. Contractor shall remove trash and sediment deposits prior to final project inspection.

5. The erosion and sediment control measures shall be inspected and maintained daily by the applicant and/or Contractor. Inactive sites shall be inspected and maintained a minimum of once a month or within 24 hours following a storm event.

6. Gravel construction entrances shall be installed at the beginning of construction and maintained for the duration of the project as needed. Additional measures, such as a wheel wash, may be required to ensure that all paved areas are kept clean for the duration of the project. Wheel wash basins shall be periodically drained, cleaned of sediment, and refilled with clean water. At no time shall vehicles exit the site without using wheel wash station, including during maintenance of wheel wash basin.

7. Storm drain inlets, basins, and area drains shall be protected until the completion of the project. Silt sack inserts with bio-bags along curb inlets and catch basins is the preferred measure for inlet protection where applicable. Contractor shall provide and maintain silt sack protection at the nearest catch basin inlet(s) downstream of the projects site. Install inlet protection to new inlets as installed.

8. At no time shall sediment be allowed to accumulate within a trapped catch basin. All silt sacks shall be inspected daily and cleaned or replaced as necessary. All catch basins and conveyance lines shall be cleaned prior to paving. The cleaning operation shall not flush sediment laden water into the downstream storm system.

9. At the completion of construction, all exposed soils must be hydroseeded and/or covered with straw and tacifier. If ground cover is not established by October 15, the open areas shall be protected through the winter with mulch, erosion blankets, or other method(s) approved by the City of Roseburg Public Works. Seeding shall be performed no later than September 31 for each phase of construction.

10. Stockpiles of soil or other erosion prone materials for extended periods must be covered with temporary erosion control measures and protected with silt fencing.

11. During all phases of work the Contractor shall take precautions to abate any dust nuisance. Dust shall be minimized to the extent practicable and prevention measures.

12. No person shall create physical erosion by dragging, dropping, tracking, or otherwise placing or depositing, or permitting to be deposited, mud, dirt, rock, or other debris on a public street, or into any part of the public storm water system and surface water system, or into any part of a private storm water or surface water system that drains or connects to the public storm water and surface water system. Any such deposited material shall be immediately removed by hand labor or mechanical means. No material shall be washed or flushed into any part of the storm water until all mechanical means to remove the debris are exhausted and preventative sediment filtration is in place.

13. All sediment fence shall be installed per manufacturers recommendations and comply with the recent edition of the Oregon Standard Specifications for Construction.

F. Waste Disposal

1. The Contractor will be responsible to locate a suitable and approved location for disposal of all waste materials resulting from the project.

2. Asbestos containing pipe shall be disposed of a specified in Section 02050.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01070
ABBREVIATIONS AND SYMBOLS

1. GENERAL

A. The following abbreviations may be used in the plans or specifications.

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APWA	American Public Works Association
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
AWPA	American Wood Preservers Association
CRSI	Concrete Reinforcing Steel Institute
DEQ	Department of Environmental Quality
ICBO	International Conference of Building Officials
MSS	Manufacturer's Standardization Society
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electric Safety Code
NFPA	National Fire Protection Association
NLMA	National Lumber Manufacturer's Association
NSF	NSF International
ODOT	Oregon Department of Transportation
OSHA	Occupational Safety and Health Act (Federal & State)
SSPC	Steel Structures Painting Council
UBC	Uniform Building Code
UL	Underwriters' Laboratories, Inc.
WWPA	Western Wood Products Association

B. The abbreviations "N.I.C.", if shown in the plans or specifications, signifies work that is "Not in Contract". N.I.C. indicates work to be constructed by the Owner or others and for which the Contractor will not be responsible.

END OF SECTION

SECTION 01100
SPECIAL PROJECT REQUIREMENTS

1. GENERAL

A. Video Record

1. The Contractor shall provide the Engineer with a video recording of the project area on a thumb drive or digital format prior to construction.

2. The Contractor shall provide a pre-construction recording of the existing conditions for every street, parking lot, alley and easement lying within the project area and every street, alley, and access road that the Contractor will utilize for hauling materials. Provide pre-construction recording of the existing condition of each face of an existing structure (house, garages, sheds, fences, etc.) lying within 50 feet of the improvement under this contract. The recording shall show specific existing improvements such as foundation of structure, sidewalks, trees, shrubs, driveway and any other improvements, which may be affected by the Contractor's operation.

3. The recording shall be accomplished during a time of good visibility. Unless otherwise directed by the Engineer, recording will not be allowed during times of precipitation or poor visibility. When available light is not sufficient to produce a clear video image, additional lighting shall be supplied to ensure good image quality. The recording crew shall be able to work independent of any power source, utilizing battery power to operate the camera and lighting.

4. The zoom-in zoom-out rates shall be controlled so that playback will produce a clear video image of the areas recorded.

5. A legible reader-board shall be provided to visually document the date, job title, roadway identification including block number, house address, and other pertinent identification purposes, addresses, and any other audio required or as directed by the Engineer.

6. The Contractor shall submit to the Engineer a sample thumb drive or digital format, which illustrates the quality of their work. In the Engineer's opinion, the video and audio quality of all recording made on the project shall meet or exceed that of the sample thumb drive provided. If the quality of the sample recording is not met on any particular thumb drive, then the Contractor shall re-record that portion of the work.

B. Requirements of Work Outside Public Property

1. If the Contractor decides to use areas outside of the public right-of-way or easement areas for storage of materials, disposal of materials or other construction related activities, the Contractor shall supply written documentation of approval from the property owner to the Engineer. This written documentation shall include the name of the property owner, address, phone number, printed name of authorized representative, and date of authorization.

C. Waste Disposal

1. The Contractor shall be responsible to locate a suitable and approved location for the disposal of all waste materials resulting from the project.

D. Work Limitations

1. The Contractor shall not perform work within the highwater area of the Umpqua River unless proper local, state, and federal permits are obtained.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01225
WORK ZONE TRAFFIC CONTROL

1. GENERAL

A. This section consists of providing temporary traffic control measures and furnishing, installing, moving, operating, maintaining, inspecting and removing traffic control devices throughout the Project area as specified herein and shown on the Plans and as directed by the Engineer. Traffic is defined herein as including motorized vehicles, bicycles and pedestrians.

B. Submittals

1. Traffic Control Plan (TCP)

a. Contractor shall show the overall traffic control, including work zone areas, placement of signs, barricades and other warning devices.

1. The Contractor shall provide a detailed plan to provide access to local residences at all times during construction.

b. TCP shall be in accordance with the Oregon Department of Transportation on Uniform Traffic Control Devices and Supplements thereto.

C. Provide pedestrian safety fencing along sidewalks as required.

D. Contractor shall coordinate and provide minimum 24-hour notice in writing prior to all lane closures that affect residences or businesses.

2. MATERIALS

A. Signs, Barricades, and Other Warning Devices

1. All signs, barricades, lights, tubular markers, temporary plastic drums, flags and other warning and safety devices shall meet the requirements of the safety manual of the Oregon Department of Transportation.

2. Temporary signing shall utilize orange reflectorized sheeting background with non-reflectorized black legend as specified in Section 00225.11 of the 2024 Oregon Standard Specifications for Construction.

B. Equipment for Flaggers

1. Equip flaggers in accordance with Section 00223.21 of the 2024 Oregon Standard Specifications for Construction.

2. All flaggers shall be certified by the state of Oregon.

3. WORKMANSHIP

A. Comply with applicable sections of the current version of the Oregon Standard Specifications for Construction.

B. Temporary Protection and Direction of Traffic

1. Temporary protection and direction of traffic covers all work necessary to provide a safe traffic route along alternate routes and also providing safe working areas for the Contractor's personnel and equipment.

2. The Contractor shall provide a detailed traffic control plan for the work, showing how the work will be phased and still maintaining traffic. This includes the placement and location of temporary signs, tubular markers, barrels and barricades, and related components needed to control and protect the traffic.

3. The Contractor shall provide and maintain such signs, barricades and warning lights as are necessary to warn and protect the public at all times on highways, roads, or streets affected by work operations.

    a. The traffic control shall conform to the current ODOT Manual on Uniform Traffic Control Devices and Supplements thereto.

    b. The Contractor shall also provide all necessary flaggers and guards necessary to warn and protect the public. Flaggers must have a card or certificate indicating their completion of an approved work zone traffic control course.

4. When necessary, public traffic shall be permitted to pass through the work with as little inconvenience and delay as possible.

5. The Contractor shall provide access to private properties at all times, except during urgent stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously. Coordinate all construction activities with the affected property owners.

6. Temporary Trench Plating

    a. Place steel plates with a minimum of twelve (12) inches bearing on all sides of a cut. Anchor steel plates to minimize shifting. Shim the edges of all steel plates with cold mix asphalt.

7. The Contractor shall patrol the traffic-control area and reset all disturbed signs and traffic-control devices immediately and no later than the end of the day, and will remove or cover all nonapplicable signs during periods not needed.

    a. Signs and pedestals shall be placed as near the right-of-way line as practical.

8. The Contractor shall construct and maintain approved temporary detours for the protection of the work and the safe passage of traffic through the work area.

9. At the end of each day, the Contractor shall leave work in such condition that it can be traveled without damage to the work and without danger to the public.

10. Temporary Barricades and Barriers

a. Install in accordance with Section 00226 of the 2024 Oregon Standard Specifications for Construction and as specified herein.

b. Barricades

1. Barricades shall conform to ODOT Standard Drawings.

2. Relocate barriers at completion of each Construction Stage to location shown on the approved TCP.

c. At completion of construction, the Contractor shall promptly remove all barricades, barriers, signs, and attenuators.

11. Tubular Markers and Temporary Plastic Drums

a. The Contractor shall place in accordance with the current version of the Oregon Standard Specifications for Construction. Provide additional tubular markers where required by the Engineer.

END OF SECTION

SECTION 01230
CONSTRUCTION SCHEDULING

1. GENERAL

A. This section specifies detailed scheduling requirements and procedures including overall and weekly schedules.

B. Submittals

1. The Contractor shall submit the following items as specified in this Section.

a. Overall Schedule

b. Weekly Schedule

C. Progress of the Work

1. The Contractor shall execute work with such progress as necessary to prevent delay to the overall completion of the project and with such forces, materials and equipment to assure completion in the time established by the Contract.

2. The Contractor may find it necessary to work overtime, double shifts, weekends and/or holidays if such a schedule is required to complete the project within the time allowed.

D. Overall Schedule

1. The General Contractor shall prepare and submit, within 30 days after the award of Contract, an Overall Schedule composed of all construction operations in connection with the Contract. The Overall Schedule shall be updated monthly as per Section 01230.

2. Overall Schedule shall indicate the sequence of work and the time of starting and completion of each activity. Activities shall include, but not be limited to, the following items as they pertain to the Contract.

a. Each subcontractor's items of work.

b. Submittals from Contractor to Engineer for review and return to the Contractor. Material and equipment order, manufacture and delivery.

c. Provide schedule for each Stage of the work as specified in Section 01010 including each main stage.

d. Final cleanup.

e. Allowance for inclement weather.

3. No activity on the schedule shall have a duration longer than 21 days or assigned value greater than $10,000, except activities comprising only fabrication, and delivery may extend for more than 21 days. Activities which exceed these limits shall be divided into more detailed components. The schedule duration of each

activity shall be based on the work being performed during the normal 40-hour work week with allowances made for legal holidays and normal weather conditions.

4. Upon completion of the Overall Schedule, the Contractor shall submit a digital copy to the Engineer for review. Within seven (7) days after receipt of the submittal, the Engineer shall review the submitted schedule and return a marked-up copy to the Contractor. If the Engineer finds that the submitted schedule does not comply with specified requirements, the corrective revisions will be noted on the submittal returned to the Contractor for corrections and resubmittal.

5. Schedule shall be updated each month.

6. After each revision, the Contractor shall submit the revised schedule to the Engineer.

E. Weekly Schedules

1. The Contractor shall provide weekly schedules to the Engineer, Owner and to businesses that are affected by the work occurring during that week's timeframe.

2. The weekly schedule shall be submitted to the Engineer by Friday 2 p.m. for the next week's work.

3. The schedule shall indicate what area the work will be occurring as well as what type of work is intending to take place.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01300
SUBMITTALS

1. GENERAL

A. This section outlines in general the items the Contractor must prepare or assemble during the progress of the work including technical submittals and record drawings.

B. Technical submittals covered by these specifications include manufacturer's information, shop drawings, test procedures, test results, samples, request for substitutions and miscellaneous work-related submittals.

C. Contractor's Responsibilities

1. The Contractor shall furnish all drawings, specifications, descriptive data, certifications, samples, tests, methods, schedules and manufacturers installation and other instructions as required by the Contract Documents to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the Contract Documents.

2. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements.

3. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where their submittal may affect the work as shown on the Plans.

4. The Contractor shall coordinate submittals among their subcontractors and suppliers.

5. Submittals shall coordinate with the work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals.

6. The Contractor shall not proceed with work related to a submittal until the submittal process is complete.

7. The Contractor shall verify on each submittal document that they have reviewed the submittal, verified final conditions and complied with the Contract Documents. Certification shall be through the use of either of the following verbatim statements.

   a. “We have verified that the material or equipment contained in this submittal meets all the requirements, including coordination with all related work, specified (no exceptions)” or

b. "We have verified that the material or equipment contained in this submittal meets all the requirements specified except for the attached deviations."

8. <u>Failure to provide Contractor's stamp of approval shall result in rejection of the submittal without review.</u>

9. The Contractor may authorize in writing a material or equipment supplier to deal directly with the Engineer. This interaction shall be limited to contract interpretations to clarify and expedite the work.

10. Charges will be documented and the Contractor will be charged for review of multiple non-conforming submittals for any one item in excess of two times.

11. Unless approved by the Engineer in writing, the Contractor shall submit all submittals no later than ten (10) days after the issuance of Notice to Proceed for the project.

D. Request for Substitution

1. Requests for substitution for equipment specified by manufacturer or manufacturer's model number as specified throughout the Contract Documents shall be in writing and be accompanied with sufficient information to allow the Engineer to identify the nature and scope of the request. Information to be provided shall include the following:

a. All submittal information required for the specified equipment, including all deviations from the specified requirements necessitated by the proposed substitution.

b. Materials of construction, including material specifications and references.

c. Performance data including performance curves and guaranteed power consumption, over the range of specified operating conditions.

d. Dimensional drawings, showing required access and clearances, including any changes to the work required to accommodate the proposed substitution.

e. Reason for Substitution

1. If the substitution requires any mechanical, electrical or structural changes, the Contractor will be responsible for costs for evaluating a requested substitution. The cost for such an evaluation will be determined on a case-by-case basis, after receipt of written request. The Engineer will notify the Contractor in writing of said cost. If the Contractor proceeds, they shall advise the Engineer in writing and submit additional information as may be requested. Both the Engineer and Owner must make final approval of a substitution.

E. Review Requirements

1. Review shall not extend to means, methods techniques, sequences or procedures of construction, or to verify quantities, dimensions, weights or gauges, or to fabrication processes, except when specifically indicated or required by the Contract Documents, or to safety precautions or programs.

2. The Contractor shall submit PDFs of submittal material through electronic media and digital format. Microsoft Office documents are also acceptable. Transmission protocols of submittal documents shall be agreed upon by Owner, Engineer, and Contractor. Paper copies will be made available upon request.

3. The following information shall be provided with each submittal.

   a. A copy of the specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check marks shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph, referenced to a detailed written explanation of the reasons for requesting the deviation. The Engineer shall be the final authority for determining acceptability of requested deviations. The remaining portions of the paragraph not underlined will signify compliance on the part of the Contractor with the specifications. Failure to include a copy of the marked-up specification sections, along with justification(s) for any requested deviations to the specification requirements, with the submittal shall be sufficient cause for rejection of the entire submittal with no further consideration.

   b. A copy of the contract document control diagrams and process and instrumentation diagrams relating to the submitted equipment, with addendum updates that apply to the equipment in this section, marked to show specific changes necessary for the equipment proposed in the submittal. If no changes are required, the drawing or drawings shall be marked *"no changes required"*. Failure to include copies of the relevant drawings with the submittal shall be cause for rejection of the entire submittal with no further review.

4. Unless otherwise specified, within two (2) weeks after receipt of submittal, the Engineer will return the marked-up copies. The Contractor shall take appropriate action if the submittal needs to be resubmitted.

5. The approval or disapproval of submittals by the Engineer will be indicated by one of the following designations: "NO EXCEPTIONS TAKEN" (no further action required), "MAKE CORRECTIONS NOTED" (make corrections noted - no further submittal required), "AMEND AND RESUBMIT" (make corrections noted and resubmit for approval), or "REJECTED" (Not Approved as submitted. Do not resubmit the original concept or component as submitted without modification for further consideration).

6. Below is a sample of the stamp provided by the Engineer.

REVIEW IS FOR GENERAL COMPLIANCE WITH CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR DEVIATIONS FROM CONTRACT REQUIREMENTS NOT SPECIFICALLY INDICATED ON THIS SUBMITTAL.

☐ NO EXCEPTIONS TAKEN ☒ MAKE CORRECTIONS NOTED
☐ AMEND AND RESUBMIT ☐ REJECTED

DATE _____ BY _____

7. Review of Contract Documents, method of work or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of their responsibilities for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or Owner. The Contractor shall have no claim under the contract on account of failure or partial failure of the method of work, material or equipment so reviewed.

F. Record Drawings

1. The Contractor shall maintain in a safe place at the site one record copy of all drawings, specifications, addenda, written amendments, change orders, field orders, written interpretations and clarifications, hand shop drawings in good order annotated to show all changes made during construction. In addition, the Contractor shall maintain a booklet during the project showing locations and listing as-built dimensions of all utilities poured in concrete and all underground facilities installed under this Contract. The record shall include locations of all pipe lines, cleanouts, valves, manholes, electrical conduit, elbows and bends as applicable. A detailed site plan showing locations of facilities as actually installed shall be prepared. The plan need not be of draftsman quality, but shall be suitable for preparation of as-built drawings by the Engineer.

2. The Contractor shall allow the Engineer to review their record drawings during the course of construction so that the Engineer can review any changes or notes to the Plans.

3. Failure to maintain record drawings shall be sufficient cause for withholding payment to the Contractor.

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. GENERAL

A. This section includes mobilization, temporary utilities required during construction, temporary construction, safety requirements and temporary environmental controls. Accommodations for traffic control are covered in Section 01225.

B. Submittals

1. The following submittals shall be approved prior to commencement of work:

a. Staging area plan and notification of any obstructions encountered during mobilization.

b. Plans for disposal of waste materials and excavated material not required for fill, including permits as required.

c. Traffic Control Plan in accordance with Section 01225.

d. Temporary Environmental Control Plan

e. Video recording in accordance with Section 01100.

2. MATERIALS

A. Temporary Restroom Facilities - Comply with Section 01500.

3. WORKMANSHIP

A. Mobilization shall include de-mobilization and consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of offices, buildings and other facilities necessary for work on the project; for premiums on bond and insurance for the project, and for other work and operations which the Contractor must perform or costs they must incur before beginning work on the project and after completion of the project.

B. Temporary Utilities

1. Sanitary Facilities

a. The Contractor shall provide chemical toilets of suitable types and maintain them in a sanitary condition at all times, conforming to code requirements and acceptable to the health authorities. They shall be of watertight construction so that no contamination of the area can result from their use. Arrangements shall be made for frequent emptying of the toilets. Upon completion of the work, toilets shall be removed and the area restored to its original condition. One (1) chemical toilet shall be provided for the project with the location to be field located by the Engineer.

2. Water

a. Water is currently available from City of Roseburg water distribution system. The Contractor may acquire a permit and metered connection from the City of Roseburg. The Contractor must meet the terms and conditions of the permit as required by the City of Roseburg. All costs for obtaining and using any water shall be borne by the Contractor.

C. Temporary Construction

1. Provide fences and barricades as necessary to prevent unauthorized entry to construction areas.

2. Access Roads

a. Construction of temporary access roads which will be used for hauling materials, equipment and facilitating the overall construction is dependent upon existing conditions in the field and available access points. Where required by the Engineer to minimize damage to existing vegetation, geotextile fabric shall be placed beneath the fill material.

b. Apply water as required for dust control.

c. At the completion of the road improvements, all fill used for temporary access roads must be removed. The Contractor shall use methods that minimize damage to existing vegetation during this process.

d. All areas where vegetation has been destroyed or damaged shall be re-seeded with the same type of vegetation.

e. All work must comply with Section 01060.

D. Safety Requirements

1. The Contractor shall at their own expense furnish, install and maintain suitable signs, lights, barricades, fences, and other protective devices as may be necessary or as may be directed by the Engineer to ensure the safety of the public and those connected with the work.

2. The Contractor shall be solely responsible for maintaining the reasonable safety precautions and facilities, and failure of the Engineer to so notify the Contractor shall not relieve the Contractor from this responsibility.

3. Whenever the Contractor's operations create a potentially hazardous condition, they shall also furnish flagmen equipped with proper clothing and flagging devices.

4. All signs, barricades, lights, flags, and other warning and safety devices shall meet the requirements of the safety manual of the Oregon Department of Transportation.

5. Access for Police, Fire, Postal and School Bus Service

a. Notify the local fire department, City of Roseburg, police department and, when applicable, the School District before closing any street or

portion thereof, and no closing shall be made without the Engineer's approval.

b. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to any area, such as consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, unless the Contractor obtains special written permission from the chief of the fire department. Conduct operations so as to cause the least interference with any fire station access and at no time prevent such access.

c. The Contractor shall furnish a list of emergency telephone numbers to both the Engineer and the Owner so that contact may be made easily at all times in cases of emergencies.

d. Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the Postal Service, and at the completion of the work in each area, replace them in their original location and in a condition satisfactory to the U.S. Postal Service.

E. Temporary Environmental Controls

1. The Contractor shall maintain affected areas from their construction free from environmental pollution that would be in violation of federal, state or local regulations.

2. Air Pollution Control

a. Minimize air pollution likely to occur from construction operations by wetting down bare soils to control dust and requiring proper combustion emission control devices on construction vehicles.

b. Give unpaved streets, roads, detours or haul roads in the construction area a dust preventative treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.

3. Water Pollution Control and Erosion Control

a. Discharge from dewatering operations shall not directly impact existing water courses (Umpqua River). Refer to Section 02140 for dewatering requirements. No construction in the Umpqua River up to the high-water mark is allowed.

F. Restoration and Cleanup

1. Street Cleanup During Construction

a. Clean all spilled dirt, gravel, or other foreign material caused by the construction operations from all streets and roads at the conclusion of each day's operation. Storm drains, culverts and ditches plugged as a

result of the Contractor's operations shall be restored to the satisfaction of the Engineer at no additional cost to the Owner.

b. Turbidity shall not exceed 10 percent above natural stream turbidities as a result of the project. The turbidity standard may be exceeded for a limited duration, provided all practicable erosion control measures have been implemented, including, but not limited to:

1. Use of filter bags, sediment fences, silt curtains, leave strips or berms, placing mulch and hay bale silt fences, or other measures sufficient to prevent offsite movement of soil.

2. Use of an impervious material to cover stockpiles when unattended or during a rain event.

3. Graveled construction accesses to prevent movement of material offsite via construction vehicles.

4. Sediment traps or catch basins to settle out solids prior to water entering ditches or waterways.

5. Spreading mulch on exposed embankments greater than 3 feet in height.

6. Constructing hay bale silt fence at toe of embankments greater than 10 feet in height. Place bales at any locations where soil erosion potential is evident and as directed by the Engineer.

7. Constructing sediment basins where surface runoff is causing soil erosion or as directed by the Engineer.

c. Erosion control measures shall be maintained as necessary to ensure their continued effectiveness. Temporary erosion and sedimentation controls shall reflect DEQ Best Management Practices (BMP).

d. Petroleum products, chemicals, or other deleterious materials shall not be allowed to enter the water.

e. Material removed from trenches shall be disposed of in an approved manner or stored at the designated staging area.

2. Site Restoration and Cleanup

a. At all times during the work, the premises shall be kept clean and orderly, and upon completion of the work, the project shall be free of rubbish or excess materials of any kind.

b. During construction, the work associated with stockpiling construction materials and excavated trench materials shall proceed in a manner so as to do the least damage to adjacent lawns, grassed areas, gardens, shrubbery, fences or any landscaped area, regardless of whether these are on private property, federal, city, state, or county rights-of-way. Refrain from storing construction materials on grassed or planted and landscaped

areas, and leave these surfaces in a condition equivalent to their original condition and free from all rocks, gravel, boulders, or other foreign material. Restore or replace any ground covering (e.g., trees, shrubs, bark chips, cinders, river rock, etc.) to the original condition or better. Replace topsoiled areas, rake and grade to conform to their original contours. All existing irrigation and drainage ditches and culverts shall be reopened and graded and natural drainage restored. Culverts broken or damaged shall be restored to their original condition and location.

c. Upon completion of pipe laying and backfilling operations in any section, all former grassed and/or planted areas shall be hand-raked and dragged, leaving all disturbed areas free from rocks, gravel, clay, or any other foreign material. The finished surface shall conform to the original surface, and shall be free draining, free from holes, rough spots, or other surface features detrimental to a seeded area. Contractor shall reseed and/or restore ground cover to all areas damaged by construction work.

d. Unless approved in writing by the affected property owner, originally seeded area outside dedicated rights-of-way or easements shall be fertilized and reseeded with first-quality seed approved by the property owner. The Contractor shall be responsible for obtaining a release from the property owner stating the work is acceptable and furnishing the Engineer with a copy of same.

END OF SECTION

SECTION 01620
RECORD DRAWINGS

1. GENERAL

A. This section specifies the Record Drawings that are prepared by the Contractor.

B. Record Drawings refer to those documents maintained and annotated by the Contractor during construction and are defined as (1) a neatly and legibly marked set of contract drawings showing the final location of structures, piping, equipment, electrical conduits, outlet boxes and cables; (2) additional documents such as schedules, lists, drawings, and electrical and instrumentation diagrams included in the specifications; and (3) Contractor layout and installation drawings.

2. MATERIAL - NOT USED

3. WORKMANSHIP

A. The Contractor shall maintain Record Drawings up-to-date at all times. The Record Drawings shall be available for review by the Engineer. Failure to maintain these documents shall be sufficient cause for withholding payment from the Contractor.

B. Record Drawings shall be full size and maintained in a clean, dry, and legible condition. Record documents shall not be used for construction purposes.

C. At the completion of the work, prior to final payment, all Record Drawings shall be submitted to the Engineer.

D. Marking of the drawings shall be kept current and shall be done at the time the material and equipment are installed. Annotations to the record documents shall be made with an erasable colored pencil conforming to the following color code.

1. Additions - Red

2. Deletions - Green

3. Comments - Blue

4. Dimensions - Graphite

    a. Legibly mark to record actual depths, horizontal and vertical location of underground raceways, cables, and appurtenances referenced to permanent surface improvements.

END OF SECTION

SECTION 01780
CLOSEOUT SUBMITTALS

1. GENERAL

A. This section outlines procedures for closeout submittals, revised project documents and delivery and distribution.

B. Final Submittals

1. These Contracts will not be finalized until all of the following have been submitted:

a. Final Shop Drawings

b. Record Drawings

c. Contractor Certification Letter

d. Contractor Certificate of Surety

e. Contractor Warranty Letter

f. Affidavit at Completion of Project

2. MATERIALS - NOT USED

3. WORKMANSHIP - NOT USED

END OF SECTION

SECTION 02000
DIVISION 2 - SITEWORK

SECTION	TITLE
02050	DEMOLITION
02100	SITE PREPARATION
02140	CONTROL OF WATER
02150	SHORING AND BRACING
02160	BYPASS PUMPING
02220	STRUCTURE EXCAVATION
02221	TRENCH EXCAVATION
02222	FOUNDATION STABILIZATION, PIPE ZONE, AND BACKFILL
02270	SLOPE PROTECTION
02300	AGGREGATE BASE
02310	BORING, TUNNELING, AND JACKING
02605	MANHOLES
02725	STORM DRAIN PIPE
02740	STORM DRAIN LINE TELEVISION INSPECTION
02900	LANDSCAPING

SECTION 02050
DEMOLITION

1. GENERAL

A. This section specifies demolition and removal of existing storm drain lines, manholes, slurry filling existing storm drain lines, and other miscellaneous items related to the improvements.

2. MATERIALS

A. Aggregate base shall be 3/4”-0 imported crushed gravel conforming to the requirements of Section 02300-2.

B. Slurry fill shall be a minimum of two (2) sacks of cement per cubic yard of mixture, proportioned with sand, aggregates and sufficient water to form a workable mix. Design yield of mix shall be minimum 1,200 psi.

C. Grout shall be non-shrink as specified in Section 03600.

D. Cast-in-place concrete shall be as specified in Section 03300.

3. WORKMANSHIP

A. Damage to other materials or items not intended to be removed shall be repaired promptly. If Engineer determines it necessary, repairs shall consist of complete replacement of materials affected. The Contractor shall not be entitled to any additional compensation for these repairs.

B. Contractor shall protect in place utilities, structures, and all other infrastructure that is encountered during construction. If any damage or removal of these facilities occur, they shall be repaired, replaced, and reinstalled at the Contractor’s expense.

C. Backfill

1. Backfill for trenches excavated for pipe and related appurtenances removal shall comply with Section 02222.

D. Removal and Disposal of Storm Drain Line and Appurtenances

1. All materials which are removed shall be disposed of by the Contractor in conformance with all laws, regulations and rules legally imposed on such activities.

2. The Contractor shall provide disposal plan to the Engineer outlining methods of disposal and locations of where materials are to be disposed of. The Contractor shall provide written permission to the Engineer and Owner from property owners of where the materials are to be disposed of.

E. Slurry Fill Existing Storm Drain Lines

1. Abandon and slurry fill existing storm drain lines that are not to be removed when placing the storm drain line. See plans and connection details for existing storm drain lines removal limits.

2. After the new storm drain system is online the Contractor shall abandon the existing storm drain lines. The existing storm drain line shall be completely drained to allow for a "dry" installation during placement of the slurry fill in the existing pipe.

3. Placement of the Slurry Fill

   a. Placement of the slurry shall utilize pressure-grouting equipment or concrete pumper trucks that deliver pressurized slurry fill inside the full length of the water line.

   b. To assure placement for the full inside diameter and length of the pipe, the Contractor shall install end caps with injection ports on each end. Each end cap shall utilize a lower and upper port constructed of galvanized iron pipe that protrudes out of the cap. The lower port on the opposite end that the slurry is being injected into is used as a release for any water built up. When the slurry is evident on the downstream side, a galvanized cap shall be secured to the end of the port.

   c. The slurry shall continue to be injected until it is evident that the slurry is coming out of the upper port on the downstream end. At this point, the top port shall have a galvanized cap secured to it.

   d. The Contractor shall cleanup all spilled slurry fill after their operations.

4. See plans for length of pipe to be abandoned and slurry filled.

F. Removal and Disposal of Asbestos-Containing Pipe

1. Removal of Asbestos-Containing Pipe

   a. The majority of the existing water lines are asbestos-containing pipe or unknown unless otherwise stated on the plans.

   b. When existing pipe containing asbestos (i.e., A.C. or Transite) is exposed, all requirements of OR-OSHA, OAR 437, Division 3, Construction, and of the DEQ Asbestos Control Program shall be followed. All existing pipe exposed as a result of the improvements shall be handled in a manner according to the above requirements. The Contractor shall take special precautions to protect the integrity of the asbestos-containing pipe and prevent the release of asbestos during the uncovering, handling and removal of the pipe.

   c. All asbestos-containing pipe that is not removed or otherwise disturbed shall be left or abandoned in place. The location of all such pipe shall be documented by the Contractor on the as-built plans.

2. Disposal of Asbestos-Containing Pipe

   a. All asbestos-containing pipe that is removed from the ground or otherwise disturbed must be disposed of as asbestos waste. The asbestos-containing pipe must be adequately wetted, either double-bagged or

double wrapped in six (6) mil plastic, correctly labeled and tightly sealed. Each layer of the double-bagged or double-wrapped plastic shall be independently sealed to create a leak-proof seal. The seal must be adequately constructed so that the seal will not rupture during off-loading of the encapsulated pipe.

b. The encapsulated asbestos-containing pipe shall be hauled to an approved asbestos landfill and disposed of according to Department of Environmental Quality (DEQ) regulations and the landfill requirements.

c. The Contractor shall take special precautions to protect the integrity of the asbestos-containing pipe and prevent the release of asbestos during the handling, loading and transportation of the pipe.

G. Existing piping and structures being removed shall be disposed of by the Contractor in accordance with all applicable state and federal laws, regulations, and rules legally imposed on such activities. Existing piping to be abandoned in place shall be slurry filled as required by the Engineer and in accordance with railroad permit.

H. The Contractor shall re-construct existing ditches damaged by their operations and incidental ditching as required to maintain existing drainages. The Contractor shall maintain the existing channel widths and side slopes that existed for these areas.

I. Roadway Cleaning

1. The Contractor will be required to clean the existing pavement to remove all dirt, sediment, debris, and other miscellaneous particles. Utilize power-brooms, water flushing methods, hand sweeping, and other suitable methods to fully clean the existing roadway at the end of each day's operations and as needed during the daytime construction. Remove and dispose of excess materials at sites secured by the Contractor.

2. The Contractor shall coordinate the overall roadway/parking lot cleaning with the Engineer, Douglas County, and the City, as the construction proceeds. The Engineer may direct the Contractor to provide additional roadway cleaning as needed to help keep the roadway clean for existing traffic use.

END OF SECTION

SECTION 02100
SITE PREPARATION

1. GENERAL

A. This section specifies site preparation which consists of clearing, grubbing and stripping.

B. The Contractor shall determine the actual condition of the site(s) as it affects this portion of work.

C. Extra care shall be taken when construction occurs on private properties. Disturbed areas shall be kept to a minimum.

D. It is the intent of this specification that all disturbed areas shall be restored to a condition at least equivalent to the condition prior to the Contractor's work.

E. The Contractor shall obtain any and all necessary permits required by the City of Roseburg for clearing, grubbing, and stripping within the City's Right-of-Way and easement areas.

2. MATERIALS - NOT USED

3. WORKMANSHIP

A. The Contractor shall remove and dispose of all trees, stumps, roots, topsoil, and other material and where indicated on the plans. Materials shall be disposed of in such a manner as to meet all applicable regulations. No burning is allowed within City limits.

B. Where noted on the Plans, or directed by the Engineer, the Contractor shall protect existing trees or shrubs in place and utilize methods to minimize disturbance to these trees or shrubs.

C. All cutting and pruning work shall conform to recognized good tree surgery practices. Pruning shall preserve the natural character and shape of the tree.

D. Dispose of all cleared materials by hauling away from project site. The Contractor is responsible for obtaining any required permits.

E. All holes resulting from grubbing shall be filled with suitable material and compacted.

F. Contractor shall comply with all applicable local, State and Federal laws and regulations pertaining to disposal.

G. Remove and replace all improvements and/or facilities damaged or destroyed by Contractor's operations.

H. Existing landscaping which is to be disturbed shall be carefully removed, then replaced after construction. It is the responsibility of the Contractor to protect and maintain the landscaping until the final acceptance of the project.

I. Stripping

1. The Contractor shall strip and remove all existing organic soil and root zones within the project area. Stockpile sufficient amounts of existing topsoil for placement on top of embankments or other disturbed areas.

2. Excessive topsoil not required shall be wasted as directed by the Engineer at no additional expense to the Owner.

3. Stockpiled topsoil shall be protected from erosion. Following the operations of backfilling and embankment placement, stockpiled topsoil shall be uniformly spread over the specified areas so as to attain the indicated finish grades.

J. Clearing and Grubbing

1. Clearing shall consist of the removal and disposal of trees, logs, rotten material, brush, and all other vegetative materials and surface objects in accordance with these specifications and within the limits of the easements shown.

   a. Brush under two (2) feet in height need not be cut within the limits established for clearing.

   b. All standing trees and snags to be cleared shall be felled within the easement limits as required for the waterline construction and specified herein.

   c. Maximum stump height for timber shall not exceed six (6) inches on the uphill side of the stump.

   d. Clearing limits shall extend to the limits of the easements not to exceed thirty (30) feet in width.

2. Grubbing shall consist of the removing and disposing of stumps, roots and other wood material embedded in the ground, and protruding obstacles remaining as a result of the clearing operation.

   a. All stumps and other protruding objects shall be completely removed within seven (7) feet on each side of the new utilities. In addition, stumps overhanging the top of cut banks for construction needs shall also be removed.

   b. All roots and embedded wood material shall be removed to a depth not less than one foot for new utility placement.

3. Clearing and grubbing debris shall not be placed or permitted to remain in or under any embankment sections.

4. Clearing and grubbing debris shall be disposed of by hauling offsite to a location arranged by the Contractor.

END OF SECTION

SECTION 02140
CONTROL OF WATER

1. GENERAL

A. This section covers the control of surface water runoff, dewatering of pipeline trenches and structural excavations, and other elements required for control of water if the site conditions should dictate the need.

2. MATERIALS

A. Materials and equipment required for control of water shall be furnished and maintained as required to perform the construction.

3. WORKMANSHIP

A. The necessary machinery, appliances and equipment shall be provided and operated to keep excavations free from water during construction, and to dispose of the water so as not to cause injury to public or private property or to cause a nuisance or a menace to the public. Sufficient pumping equipment and machinery in good working condition shall be provided for all emergencies including power outage, and sufficient workmen shall be available at all times for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the Engineer.

B. The control of groundwater shall be such that softening of the bottom of excavations, or formation of "quick" conditions or "boils" during excavation, shall be prevented. Dewatering systems shall be designed and operated so as to prevent removal of the natural soils. Natural or compacted soils softened by saturation with groundwater or standing surface water shall be removed and replaced as instructed by the Engineer at no additional expense to the Owner.

C. During construction of structures, installation of pipelines, placing of structure and trench backfill and the placing and setting of concrete, excavations shall be kept free of water. Surface runoff shall be controlled so as to prevent entry or collection of water in excavations.

D. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures and pipelines.

E. Provisions shall be made to take care of surplus water, mud, silt or other runoff pumped from excavations and trenches or resulting from slicking or other operations. Siltation of completed or partially completed structures and pipelines by surface water or by disposal of water from dewatering operations shall be cleaned up at the Contractor's expense.

F. Discharge of ground and surface runoff water shall be to the existing drainage ways and storm systems.

G. If ground water springs or tiled drainage systems are encountered during construction, the contractor shall immediately contact the Project Engineer. The Project Engineer shall direct the Contractor to take measures to ensure that the water is not conveyed through

utility trenches and the natural flow path of the spring is altered as little as practicable. The Project Engineer shall submit a report summarizing the findings to the City of Roseburg. Impacts and mitigation shall be addressed for City approval.

H. The Contractor shall be responsible for any damages to existing on- and off-site facilities and work in-place resulting from mechanical or electrical failure of the dewatering system.

I. Dewatering systems shall be discharged to a storm water detention/retention facility unless otherwise approved by the Engineer.

J. The Contractor shall comply with all applicable local, State, and Federal laws and regulations pertaining to erosion control and discharge of water off-site.

END OF SECTION

SECTION 02150
SHORING AND BRACING

1. GENERAL

A. This section specifies requirements for shoring and bracing of trenches and other excavations as required to furnish safe and acceptable working conditions, protect existing and new structures and vegetation and maintain existing slopes, fills and open excavations.

B. The Contractor shall have sole responsibility to determine the construction means and methods required to satisfy the requirements of this section. The Contractor shall design sheeting, shoring and bracing in accordance with Oregon Occupational Safety and Health Act (OSHA).

C. The Contractor shall furnish a safe place of work pursuant to the provisions of OSHA and the subsequent amendments and regulations and for the protection of the work, structures and other improvements.

D. Shoring and bracing shall include all necessary sheeting, sloping and other means and procedures such as draining and recharging groundwater and routing and disposing of surface runoff, required to maintain the stability of soils.

2. MATERIALS - NOT USED

3. WORKMANSHIP

A. General

1. The construction of sheeting, shoring and bracing shall not disturb the state of soil adjacent to the trench of excavation or below the excavation bottom. Sheeting, shoring and bracing shall be removed after placement and compaction of initial backfill, except as otherwise specified.

B. Structure and Existing Piping

1. The Contractor shall provide support of existing and new structures where shown, specified and at all other locations where excavation infringes on a 1:1 slope extending from the bottom of the footing. Existing piping shall be protected with shoring and bracing where excavation could expose the pipe and/or cause damage to the pipe.

C. Shoring

1. The contractor shall provide all materials, labor, and equipment necessary to adequately shore trenches to protect the work, existing property, utilities, pavement, etc., and to provide safe working conditions in the trench.

2. Cribbing or sheeting that extends below the spring line of rigid pipe or below the crown elevation of flexible pipe shall be left in place, unless a satisfactory means can be demonstrated for reconsolidating bedding or side support that would be disturbed by removing the cribbing or sheeting.

3. If a movable box is used instead of cribbing or sheeting and the bottom cannot be kept above the spring line of the crown elevation of the flexible pipe, the bedding or side support shall be carefully reconsolidated behind the movable box before backfill is placed.

4. The use of horizontal strutting below the barrel of pipe, or the use of pipe as support for trench bracing, will not be permitted.

5. No construction within Umpqua River high water mark is allowed.

D. Damages

1. Any damages to new or existing structures occurring through settlements, water or earth pressures, or other causes due to failure or lack of sheeting, shoring or bracing, or through negligence or fault of the Contractor shall be repaired by the Contractor at their own expense.

END OF SECTION

SECTION 02160
BYPASS PUMPING

1. GENERAL

A. Under this section, the Contractor shall furnish all materials, labor, equipment, power, and maintenance to implement a temporary pumping system for the purpose of diverting the existing flow around the work area for the duration of the project.

B. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor assumes all liability for operation of the by-pass system and shall supervise the system during its operation. The by-pass system shall meet the requirements of all codes and regulatory agencies having jurisdiction of the system operation.

C. Contractor shall submit to Engineer detailed plans and descriptions outlining all provisions and precautions to be taken by the Contractor regarding the handling of existing flows. This plan must be specific and complete, including such items and schedules, locations, elevations, capacities of equipment, materials and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of the access and bypass pumping locations from damage due to the discharge of flows, compliance with regulatory requirements, and the provisions of these Contract. No construction activities shall begin until all provisions and requirements have been reviewed and approved by the Engineer.

1. Submittal shall include, at a minimum, the following:

   a. Staging area for pumps.

   b. Storm water plugging method and types of plugs.

   c. Number, size, material, location and method of installing suction piping.

   d. Number, size, material, method of installation and location of installation of discharge piping.

   e. Bypass pump sizes, capacity, number of each size to be on site and power requirements.

   f. Calculation of static lifts, friction losses, and flow velocity, and pump curves showing pump operating ranges.

   g. Stand-by power generator size, location.

   h. Downstream discharge plan.

   i. Thrust restraint block sizes and locations.

   j. Sections showing suction and discharge piping and plan for burying piping, backfill, or other special requirements necessary to maintain private property access.

   k. Method of noise control for each pump and/or generator.

l. Any temporary pipe supports and anchoring required.

m. Access requirements for by-pass pumping.

n. Calculation for selected bypass pumping pipe size.

o. Schedule for installing and maintaining bypass pumping lines.

p. Plan indicating selection location of bypass pumping line locations.

q. Methods for alarm systems for unsupervised or overnight operations.

2. MATERIALS

A. Pumps

1. All bypass pumps shall be fully automatic self-priming units.

2. All pumps shall be electric, gasoline, or diesel powered and constructed to allow for dry running for long periods of time to accommodate the cyclical nature of storm water flows.

3. Contractor shall supply all necessary stop/start controls for each pump.

4. Provide one stand-by pump of each size to be maintained on site. Back-up pumps shall be on-line and isolated from the primary system by valve.

B. Piping

1. Contractor shall provide temporary discharge piping constructed of rigid pipe with positive restrained joints.

2. No aluminum irrigation type piping to be allowed.

3. Discharge hose may be allowed for short sections with prior Engineers review and approval.

4. Provide watertight pipe system.

3. WORKMANSHIP

A. Performance Requirements and Operation

1. It is essential to the operation of the storm water system that there is no interruption in the flow of storm water throughout the duration of the project.

2. Contractor shall provide, maintain, and operate all temporary facilities such as dams, plugs, primary pumping equipment, alarm systems to indicate pump failure, back-up pumping equipment, conduits, all necessary power, and all other labor and equipment necessary to intercept the storm water flow before it interferes with the work, convey flows past the work area, and return it to the existing manhole downstream of the work. Pumps may be required to operate 24-hours per day.

3. The design, installation, and operation of the temporary pumping systems shall be the Contractor's responsibility. The bypass system shall meet the requirements of the Oregon Department of Environmental Quality and any other State, County, or local agencies having jurisdiction over the operation of such facilities.

4. Operation of bypass facilities shall maintain storm water flow around the work area in a manner that will not cause surcharging of manholes, damage to storm waters, and will protect public property and private property from damage and flooding.

5. The Contractor will not be permitted to stop the mainline flows under any circumstances.

6. The Contractor shall assume all liability for providing all necessary means to safely convey storm water past the work area.

7. The Contractor shall protect water resources, wetlands, and other natural resources.

8. Bypass pumping systems may be required to be operated 24 hours per day.

9. The Contractor shall provide all pipeline plugs, pumps of adequate size to handle peak flow, alarm systems to indicate pump failure and temporary discharge piping to ensure that the total flow of the main can be safely diverted around the section requiring work.

10. The Contractor shall have adequate standby equipment available and ready for immediate operation and use in the event of an emergency or breakdown. One standby pump for each size pump utilized shall be installed at the mainline flow bypassing locations, ready for use in the event of primary pump failure.

11. Bypass pumping system shall be capable of bypassing the flow around the work area and of releasing any amount of flow up to full available flow into the work area as necessary for satisfactory performances of work.

12. 1The Contractor shall make all arrangements for bypass pumping during the time when the main is shut down for any reason and for each segment of the work.

B. Design Requirements

1. The bypass pumping system shall have sufficient capacity from each section of line where work will be performed.

C. Field Quality Assurances

1. The contractor shall perform leakage and pressure tests on all bypass pumping discharge lines prior to actual operation.

2. Inspect bypass pumping system every two hours to ensure that the system is working correctly.

3. Provide maintenance services to ensure that the temporary pumping system is properly operating.

4. Provide spare parts for pumps and piping on site.

5. Provide adequate housing equipment for each pump and accessories on site.

6. Provide alarm systems on all pumps to indicate pump failures.

D. Bypass Installation

1. Contractor shall be responsible for locating any existing utilities in the area the Contractor selects to locate the bypass pipeline. Contractor shall assume all costs associated with relocating utilities and obtaining approvals from respective owner of utility.

2. Minimize disturbances to existing utilities. Engineer shall approve all pipeline locations prior to installation.

3. At all times provide access to private property driveways crossed by the temporary pipeline.

4. Provide all thrust restraint, excavation, pipe, backfill, and surface restoration required to install and remove temporary piping after completion of work.

5. During bypassing operations, Contractor shall protect the pumping equipment, main, all storm water lines, and new work from damage inflicted by the Contractor's operation or failure of the bypass pumping system.

6. Contractor construct temporary bypass pumping system as may be required to provide for the performance of work.

7. All plugging of storm water shall incorporate primary and temporary plugging devices. When installed plugging is no longer required, remove plugging in a manner that permits storm water flow to slowly return to normal without surge.

8. Contractor shall prevent surcharging of upstream and downstream storm water manholes.

9. Perform all work in accordance with OSHA requirements.

10. Contractor shall obtain written permission and release for placement and removal of bypassing facilities on private property.

E. Vactor or Pumper Trucking Operations

1. Contractor may utilize vactor or pumper trucks for removing storm water from the system

2. Contractor shall provide additional traffic control required to maintain truck transportation to and from discharge points.

3. Provide trucks in sufficient number, size, and capacity to pump (vacuum), store, transport, and discharge without causing surcharging of the upstream storm drain lines.

4. Contractor shall provide for sufficient travel time from each manhole to each discharge point when utilizing vactor or pumper trucks.

5. Contractor shall transport storm water to discharge points in accordance with all state, county, and federal regulations.

END OF SECTION

SECTION 02220
STRUCTURE EXCAVATION

1. GENERAL

A. This section specifies excavations required for constructing and placing manholes.

2. MATERIALS - NOT USED

3. WORKMANSHIP

A. The bottom of the excavation shall not be more than 0.10 feet below or above the lines and grades shown or required. Unless otherwise specified, excavations shall extend a sufficient distance from walls and footings to allow for placing and removal of forms and for inspection, except where concrete is specified to be placed directly against specified surfaces.

B. The Contractor shall utilize whatever methods and equipment necessary to excavate to the limits designated by the Plans and Specifications and authorized by the Engineer, except that no equipment or method may be utilized which because of its action deteriorates the subgrade making additional excavation necessary beyond the limits originally authorized.

C. Excavated or surplus materials shall not be stockpiled to a depth greater than 5 feet above finished grade within 25 feet of any excavation, structure or top of existing slope.

D. All excavated subgrades shall be approved by the Engineer for stabilization prior to the structure placement.

E. Structure backfill shall be as specified in Section 02300.

F. Manhole safety boxes shall be provided in accordance with OSHA Health and Safety Standards for Excavation, 29 CFR Part 1926 as required by conditions.

END OF SECTION

SECTION 02221
TRENCH EXCAVATION

1. GENERAL

A. This section shall include the excavation of trenches for the storm drain lines, manholes, and other underground pipelines to the lines and grades shown on the Plans.

B. Trench excavation is not permitted in the within 25 feet of the center line of the nearest railroad track. See Plans for more detail.

C. The work covered under this item consists of furnishing all labor, equipment, supplies and materials and in performing all operations in connection with the following:

1. Excavation of any material encountered regardless of nature, character or condition, to the limits shown on the Plans. Excavation will be classified as either common or rock.

2. Over-excavation of wet or unsuitable materials.

3. Hauling and disposal of unsuitable or excess excavated materials on sites arranged by the Contractor.

4. Furnishing and installing safety devices, barricades and procedures.

5. Placement and compaction of any required embankment and backfilling of all trenches and pits.

6. Verifying, locating and protecting existing facilities. Repair or replacement of facilities damaged by Contractor's operation.

7. Coordination with utility companies, the affected agencies, private property owners and the public.

8. Hauling, filling, grading, subgrade preparation compacting in final locations, wet and dry, and all operations pertaining thereto for site grading for waterlines, waterline appurtenances and roads.

9. All other incidental earthwork as indicated on the Plans, as specified and as required to complete the work ready for final use. Cleanup work.

D. Definitions

1. Common Excavation: All excavation that is not classified as rock excavation.

2. Rock Excavation: The removal and disposal of rock that requires systematic drilling and blasting; or use of mechanical rock breaking equipment, i.e. where ripping or loosening with excavation equipment (Dozer D-8 with single ripper, Caterpillar 225 with rock ripper/rock hammer or larger) is required.

E. Significant rock excavation is not anticipated.

2. MATERIALS - NOT USED

3. WORKMANSHIP

A. Trench excavation shall include the excavation of all material encountered, regardless of type, classification or consistency.

B. The length of open trench shall be kept to a minimum. The minimum trench width in the pipe zone must provide a clear working space of 6-inches on each side of pipe for pipes 4-inches in diameter and larger. No limitation on trench width for pipes smaller than 4-inches in diameter.

C. Excavated material shall be placed in such a manner it does not interfere with or create a hazard to personnel or vehicular traffic.

D. Where excavated native materials are used for backfill, the Contractor shall segregate and protect from weather the excavated material best suited for backfill. The Contractor shall plan their operations such that the best available material may be used on any portion of the work.

E. The length of open trench shall be kept to a minimum. Maximum length of open trench shall not exceed 300 feet at any one time and no trench shall be left in an open condition overnight.

F. The trench width must provide a clear working space of 6-inches on each side of pipe, unless otherwise shown on the Plans or detail drawings. It is the intent of these specifications that the trench width at the surface be kept to a minimum necessary to install the pipe in a safe manner.

G. Excess or unsuitable material shall be removed and disposed of off-site at upland locations obtained by the Contractor.

H. Any roots encountered over 2-inches shall be cut with saw perpendicular to trench.

END OF SECTION

SECTION 02222
FOUNDATION STABILIZATION, PIPE ZONE, AND BACKFILL

1. GENERAL

A. Foundation stabilization is defined as the granular material used to stabilize the bottom of the pipe trench below the pipe zone, when in the opinion of the Engineer, the trench bottom is excessively soft and/or unstable such that it cannot support the pipe.

B. Pipe zone is defined as the granular material to be used in the trench area extending a specified distance below the pipe (bedding) to a specified distance above the pipe, for the full width of the trench.

C. Backfill is defined as the granular material to be used in the trench between the top of the pipe zone and the bottom of the surfacing material or ground surface.

D. Submittals

1. Reports and test results that demonstrate the materials comply with the specifications for the foundation stabilization, pipe zone and backfill. Samples shall be submitted 14 days in advance of material use to allow verification by the Engineer for compliance with the specifications.

2. Samples shall be tagged with the following information:

a. Pit name and location.

b. Stockpile name and location, if different than the pit.

c. Recent sieve analysis of the proposed material. Statement from the Contractor or supplier that the proposed material conforms to the specifications of this project.

E. Testing of Backfill

1. The Contractor shall arrange and pay all costs for a certified inspection and testing laboratory acceptable to the Engineer to take samples, perform moisture content, gradation, compaction and density tests during placement of the trench backfill. A minimum of two (2) tests will be required to be taken for each 200 lineal feet of trench backfill as specified.

2. Tests shall be collected at locations and intervals selected by the Engineer to verify the compaction procedures are attaining the specified density.

3. In the event tests fail or the compaction methods or effort are not maintained, then additional testing shall be required at the expense of the Contractor.

4. The Contractor shall authorize and require the testing laboratory to submit all test results directly to the Engineer.

5. The Contractor shall cooperate by providing labor and equipment when necessary to prepare testing areas and shall bear all costs associated with such efforts.

6. Areas of failing tests shall be re-compacted and retested at the Contractor's sole expense. The Contractor shall make necessary adjustments in methods, materials or moisture content to achieve the correct backfill density as specified.

2. MATERIALS

A. Foundation stabilization shall be 3"-0 crushed rock unweathered, hard, durable, free draining material, visibly well graded from coarse to fine with the maximum size of three (3) inches. Authority to place foundation stabilization material shall only be issued by the Engineer.

B. Pipe zone shall be 1"-0 imported crushed rock conforming to the requirements of Section 02222-2.C.2. All rocks larger than 1-1/2" shall be removed from material used as pipe zone fill. Class C Backfill may be substituted for 1"-0 imported crushed rock only if no groundwater is present and outside of ODOT Right-of-Way.

C. Backfill

1. Class B Backfill

a. Class B backfill shall be imported 1"- 0" crushed rock conforming to Section 00641 and 02630 of the 2024 Oregon Standard Specifications for Construction.

2. Class E Backfill

a. Class E Backfill shall be a controlled density fill (CDF) comprised of a mixture of cement, fly ash, aggregates, water and admixtures proportioned to provide a non-segregating, self-consolidating, free-flowing and excavatable material which will result in a hardened, dense, non-settling fill.

b. Mix Ratio

1. The weights shown below are only an estimate of the amount to be used per cubic yard of CDF. The actual amounts may vary from those shown if approved by the Engineer. The Contractor may submit additional data to be approved by the Engineer.

2. Design Parameters and Proportions Per Cubic Yard

Design Parameter	**Proportions per Cubic Yard**
Maximum Compressive Strength	100 – 250 psi
Maximum Mixing Water	30 – 50 gals
Cement	30 – 50 lbs
Fly Ash	200 – 350 lbs
Dry Aggregate	2700 – 3200 lbs

c. Type II Portland Cement conforming to ASTM C150 shall be used.

d. Fly ash shall be Class F conforming to ASTM C618 or Class N, natural pozzolan. Fly ash supplied during the life of the project shall have been formed at the same single source.

e. Dry aggregate shall be fine aggregates conforming to the requirements of ASTM C33. Tests for size and grading of fine aggregates shall be in accordance with ASTM C136.

3. WORKMANSHIP

A. Foundation Stabilization

1. The Contractor shall increase the depth of excavation below the pipe zone area or below the roadway subgrade and replace with foundation stabilization material only where, in the opinion of the Engineer, it is necessary to stabilize the trench bottom or roadway subgrade.

2. Compact in layers not exceeding eight inches in depth.

B. Pipe Zone

1. The Contractor shall increase the depth of excavation below the bottom of the pipe to allow for placement of the pipe zone material. Refer to Drawings for depth of excavation below based on various diameter pipes.

2. Place within full trench width below and above the outside top of the pipe. Refer to Plans for minimum trench width and depth of the new pipe.

3. Place in maximum six (6) inch lifts and compact by hand methods, ensuring the material fills all voids beneath the pipe.

4. Initial lift for pipe bedding shall be placed, compacted and graded prior to pipe installation.

5. Placement shall comply with the table at the end of the section in regards to layer depth and compaction requirements. See details on Plans for typical section.

C. Trench Backfill

1. Trench backfill shall be Class B or E as shown on the Plans or specified herein. Compaction and layer depth shall comply with Section 02222-3.

2. Class B backfill shall be required for all trenches located under paved and graveled surfaces and where shown on the Plans. Class B backfill shall be brought up to finish grades where it is located within gravel roads or areas to be graveled. Where it is located under paved areas, Class B backfill shall be brought up to the finish grade also to provide temporary surfacing for vehicular traffic until it can be paved. The Contractor shall remove and dispose of this excess gravel once the pavement is ready to be placed at no additional cost to the Owner.

3. Backfill shall not be placed in the trench in such a way as to permit free fall of the material until at least two (2) feet of cover is provided over the top of the pipe.

4. Backfill shall be placed and compacted in layers as specified in the table below.

D. Cleanup

1. Surplus and unsuitable excavated materials, abandoned pipe, broken pavement, and rubbish, shall be removed from the construction site in a timely manner.

   a. Rubbish and unsuitable excavated materials shall be loaded directly to waste; no stockpiling will be permitted. Surplus material may be stockpiled offsite at the designated staging area. Disposal of waste materials shall conform to all laws, regulations and ordinances and be disposed of at a site obtained by the Contractor.

2. Side ditches that have been affected by the Contractor's operations shall be cleared, drained through points so affected, and if the area affected is extensive the entire drain ditch shall be re-formed.

3. Following placing of pipe, backfilling and testing, roadways, roadway shoulders and unpaved streets shall be finished to a uniform cross-section. Areas adjacent to the trench that are disturbed as the result of construction under this Contract shall be restored to their original condition.

E. Fills shall be placed in horizontal layers and compacted with power-operated tampers, rollers or vibratory equipment. Material type, maximum layer depth, relative compaction and general application are specified in the table below, unless otherwise specified or shown.

Fill and Backfill Classification		
Material Type and General Application	**Max. Uncompacted Layer Depth, Inches**	**Min. Relative Modified Proctor-Dry Density (ASTM D1557/AASHTO T-180)**
Foundation Stabilization	12	N/A
Pipe Zone / Bedding	6	90
Class B - Trench Backfill	12	95
Class E - Trench Backfill	N/A	N/A

END OF SECTION

SECTION 02270
SLOPE PROTECTION

1. GENERAL

A. This section specifies materials and placement of rip rap for bank stabilization at the stormwater pipe daylight into the existing drainage ditch as shown on the Plans. Rip rap shall be furnished and constructed in accordance with these specifications and conforming to the lines, grades and locations as shown on the Plans and as specified. Rock shall conform to Section 00390 of the 2024 Oregon Standard Specifications for Construction.

2. MATERIALS

A. General Requirements

1. Rock for loose rip rap shall be angular in shape. The thickness of a single rock shall not be less than one-third its length. Rounded rock will not be accepted.

2. Rock shall be free from overburden, soil, shale and organic material. Non-durable rock, shale, or rock with shale seams is not acceptable.

3. Rock shall conform to the following test requirements.

   a. Apparent Specific Gravity (AASHTO T 85): 2.50 min.

   b. Percent Absorption (AASHTO T 85): 6.0 max.

   c. Degradation (ODOT TM 208A)

      1. Passing No. 20 Sieve: 35.0% max.

      2. Sediment Height: 8.0" max.

   d. Soundness (AASHTO T 104)

      1. Average Loss of 2-1/2" - 1-1/2" and,

      2. 1-1/2" - 3/4" fraction after 5 alternations: 16.0% max.

B. Gradation Requirements

1. Grade loose rip rap by class and size of rock according to the following table.

Weight of Rock (Pounds)	**Percent (by Weight)**
Class 50	
50-30	20.0
30-15	30.0
15-2	40.0
2-0	10.0-0

2. The material shall be uniformly graded from the smallest to the maximum size specified.

3. Determination of the acceptability of the rip rap material gradation will be through visual review by the Engineer.

3. WORKMANSHIP

A. Rip rap shall be placed on the bank as shown in the Plans or directed by the Engineer. Placement shall be at least 12 inches thick.

B. Preparation

1. Remove brush, trees, stumps and other organic material from slopes to be protected by rip rap and slope protection. Dress slopes to a smooth surface to the shape shown on the Plans. Construct key at bottom of slope to provide base for the rip rap placement.

C. Carefully place rip rap. Do not open the bucket until it has been lowered to the slope on which the material is being placed.

D. Place to its full course thickness in one operation. Do not use methods that cause segregation of rip rap or displace the underlying material.

E. The face of the rip rap placement shall be uniform, free from humps or depressions and with no excessively large cavities below. Arrange individual stones by hand methods or mechanical equipment to provide a smooth finished surface.

F. Maintain the rip rap placement until accepted. Replace any material displaced by any cause at no additional cost to the Owner.

END OF SECTION

SECTION 02300
AGGREGATE BASE

1. GENERAL

A. This item shall include furnishing all materials, labor and equipment required for the construction of the new aggregate base under the manholes, and as shown on the Plans and specified herein.

2. MATERIALS

A. Aggregate base shall be 1”-0 crushed rock as indicated on the plans.

1. Aggregate base shall conform to the requirements of Section 02630 of the 2024 Oregon Standard Specifications for Construction.

B. Contractor shall furnish current confirmation from an independent testing laboratory that the material complies with the applicable specification for durability, sand equivalent and gradation. Verification of compliance must be furnished prior to placement of any material.

C. Compaction Testing

1. The Contractor shall arrange and pay all costs for a certified inspection and testing laboratory acceptable to the Engineer to take samples, perform moisture content, gradation, compaction, and density tests during placement of backfill, embankment and gravel surfacing. A minimum of three (3) tests will be required to be taken for every 40 tons of aggregate base placed.

2. Based on these tests, the Contractor shall make necessary adjustments in methods, materials or moisture content to achieve the correct backfill density as specified. Tests shall be collected at locations and intervals selected by the Engineer to verify the compaction procedures are attaining the specified density.

3. In the event tests fail or the compaction methods or effort are not maintained, then additional testing shall be required at the expense of the Contractor.

4. The Contractor shall authorize and require the testing laboratory to submit all test results directly to the Engineer.

5. The Contractor shall cooperate by providing labor and equipment when necessary to prepare testing areas and shall bear all costs associated with such efforts.

3. WORKMANSHIP

A. Notify Engineer a minimum of 48 hours prior to placement of aggregate base.

B. Preparation of Subgrade

1. Ensure that all surfaces and materials on which base aggregate is to be placed are firm and have been prepared as specified.

2. Subgrade under the manholes shall be excavated or filled with suitable material to the required lines and grades as shown on the Plans.

    a. Provide 8-inch minimum depth of 1" – 0 aggregate base beneath all manholes

C. Grade Control

1. Establish and maintain the required lines and grades during construction operations. Check subgrade for conformity to design grades and sections as shown on the Plans immediately before placing base.

D. Placement

1. Aggregate base shall be placed in such a manner and to such depth that when compacted it will conform to the grades and sections shown on the Plans. Aggregate base shall be placed and compacted in maximum 6-inch lifts unless the Contractor provides mechanical compaction equipment approved by the Engineer for deeper lifts. In general, each layer shall be placed in spreads as wide as practicable and to the full width of the course and compacted before a succeeding layer is placed. Segregation shall be avoided.

E. Compaction

1. Aggregate base shall be compacted to achieve 95% density when tested in accordance with ASTM D1557/AASHTO T-180. Add water as required.

F. Tolerance of finished surface shall be 0.05 foot.

END OF SECTION

SECTION 02310
BORING, TUNNELING, AND JACKING

1. GENERAL

A. This section specifies boring, tunneling and jacking which are required to accomplish THE steel casing installation under the railroad. This includes all materials, labor and services necessary.

B. All tunneling, boring and jacking operations shall conform to the latest revision of Chapter 24, Safety Code for Mining, Tunneling and Quarrying of the Oregon Safety Code for Places of Employment as published by the Oregon Industrial Accident Commission.

2. MATERIALS

A. Casing Pipe

1. Steel pipe shall have a specified minimum yield strength, SMYS, of at least 35,000 psi (241 Mpa).

2. All casing pipe joints will be welded in accordance with AISC Specifications, Section 1-7-2. All joint welds will be full penetration.

B. Where not specifically noted on the Plans or otherwise specified, casing pipe shall be installed in accordance with the following schedule and conform to the detailed specifications for each type of casing pipe.

1. Casing Schedule

a. Carrier Pipe: 18” Storm Drain Line

b. Casing Pipe: 30” Diameter

c. Joint Type: Welded

d. Minimum Wall Thickness: 0.469” Wall Thickness

C. Carrier Pipe

1. The carrier pipe and associated appurtenances shall be as specified in Section 02725-2.

D. Casing End Seals

1. Casing end seals for the Highway Crossing shall be 1/8-inch thick compounded synthetic rubber with stainless steel bands and clamp. Calpico Model C or approved equal.

E. Carrier Pipe Insulators

1. Carrier pipe insulators shall consist of eight (8) inch wide stainless steel band, minimum 14 gauge, with PVC insulating liner and two (2) inch high skids.

Flange bolts, nuts and washers shall be stainless steel. Calpico Model 8SS or approved equal.

2. Carrier pipe insulators shall be installed and spaced in accordance with manufacturers recommendations.

F. Backfill shall comply with Section 02222-2.

3. WORKMANSHIP

A. General

1. The Contractor (at their option and responsibility) may construct the pipeline pushes by one of the following methods at the location shown on the Plans:

a. Jacked casing pipe with carrier pipe installed on skids.

b. Bored casing pipe with carrier pipes installed in skids.

2. Direct jacking of the carrier pipe will not be permitted.

B. Casing Installation and Tolerances

1. Casing pipe shall be installed at location as shown on the Plans. Maximum vertical deviation shall not exceed three (3) inches. Maximum deviation in horizontal alignment shall not exceed eight (8) inches.

2. Casing placement shall clear the existing waterlines, telephone lines and cable TV by a minimum of six (6) inches vertically. Minimum cover shall be as shown on the plans.

3. Unattended bore pits shall be protected by a minimum six foot high fence or, shall be backfilled or steel plated and pinned.

C. Backfill placement and type shall comply with Section 02222-2 and Section 02222-3, and as shown on Plans.

END OF SECTION

SECTION 02605
MANHOLES

1. GENERAL

A. This section specifies the new manholes.

B. Submittals shall be provided for frames and covers being supplied for manholes. Submittals shall provide model number, dimensions and material type.

C. Manholes shall be precast concrete conforming to the sizes, dimensions and locations shown on the Plans, and as specified herein.

D. All manholes are to be installed per current APWA standards and DEQ guidelines.

E. All precast structures shall submit buoyancy calculations showing adequate safety factor (1.25) against floating of structure(s). Assume groundwater is present to the finished surface elevation.

2. MATERIALS

A. Frames and Covers

1. Storm Drain Manholes

a. Standard Frame and Cover

1. Frame and cover shall be made of new material, tough, close-grained gray cast iron conforming to ASTM A-48, Class 30, and shall be smooth and clean, free of blisters, blowholes, and all defects. Cover and frame to be machined to a true bearing all around.

2. Cover shall be marked according to the detail drawings.

3. Frames and covers shall be standard or suburban, depending on the manhole location and as approved by Engineer. Suburban style manhole frames shall not be installed in PCC streets.

4. Riser grade rings shall be designed to withstand AASHTO H-20 loadings.

B. Precast Manholes

1. Precast Walls

a. Precast wall sections shall be minimum inside diameter as shown on the Plans, minimum 5-inch wall thickness, reinforced concrete pipe in accordance with ASTM C478. Before precast manhole sections of any size are delivered to the job site, the sections shall meet the permeability test requirements of ASTM C-14.

2. Manhole cones shall be standard eccentric type and have same wall thickness and reinforcement as manhole section.

3. Precast Bases

   a. Precast base sections or manhole bases shall be used. Precast manhole bases shall be reviewed and approved by the Engineer prior to installation. Where precast bases are not channelized, the contractor shall construct smooth channels to connect the flow from inlet pipe(s) to outlet pipe.

4. Tops shall be a highway rated precast section; minimum 10-inches thick.

5. Top and bottom of all manhole sections and cones shall be parallel. Walls shall be fabricated as keylock type suitable for placement of gasket material.

6. Precast manhole extension rings shall have an inside diameter of 24-inches, shall be no more than six (6) inches in height, and shall have a minimum wall thickness of five (5) inches.

   a. Extension rings shall be used for final height adjustment. Installation shall be plumb.

   b. Extension rings shall be limited to a maximum height adjustment of 12-inches.

   c. Rings shall be grouted in place and made watertight with a high-strength, non-shrink grout as specified in Section 03600. Unused grout shall be discarded after 20 minutes and shall not be used. Rings shall not be brought to grade with lumber.

C. Gaskets

1. Sections shall be installed with either preformed rubber gaskets or plastic gaskets. Rubber gaskets shall conform to ASTM C-443. Plastic gaskets shall be Kent-seal No. 2 or Ram Neck, or approved equal, and shall meet all requirements of ASTM C-990.

D. Foundation stabilization and backfill material shall be as specified in Section 02222. If, in the opinion of the Engineer, unstable subgrade material exists that will not support the manhole or other structure, the contractor shall excavate below grade and backfill with foundation-stabilization material approved by the Engineer.

E. Backfill and base shall be 1”-0 imported crushed gravel (Class B) conforming to the requirements of Section 02300-2.

F. Grout shall be non-shrink as specified in Section 03600.

G. Connections

1. Flexible pipe-to-manhole connectors shall be rubber conforming to ASTM C923 with Type 304 stainless steel band and tightener. Connector shall be KOR-N-SEAL as manufactured by NPC, Inc., or approved equal.

2. Additional pipe needed for connections to new manholes shall be of the same type of material as the storm drain line as specified in Section 02725.

3. The diameter of the pipe shall be the same as the existing pipe unless otherwise shown on the plans.

H. Cast-in-Place Manholes will not be allowed.

3. WORKMANSHIP

A. Manholes

1. Excavations for manholes shall comply with Sections 02050 and 02220. Provide shoring, bracing, and dewatering as specified in Sections 02140 and 02150.

2. Place and compact the aggregate base to at least 95% of maximum density as determined by AASHTO T-180 prior to placement of new manhole.

3. Construct manholes in locations designated on the Plans.

4. Frames and Covers

a. Finish grade elevations for manhole covers shall match existing or as noted on plans or specified below; covers of new manholes located in paved roadways shall be flush with the surrounding area finish grade. Extension rings shall be used as required to match finish grade. Provide watertight gasket material between rings.

b. Secure cover to frame per manufacturer's recommendations.

c. Frames and covers removed from existing manholes that are to be replaced by new manholes shall be removed intact and salvaged to Owner.

5. Manhole bases shall be hand troweled with grout to provide flow channels with a smooth surface.

a. Shape flow channels to conform to connecting pipe radius.

b. Remove all rough sections or sharp edges that might obstruct flow or cause snags.

6. Manholes shall be watertight. Install gaskets between sections in accordance with manufacturer's recommendations. Use lubricant/primer furnished by gasket manufacturer.

7. Mortar and trowel interior and exterior surfaces smooth.

8. Pipe Connections

a. All rigid pipes entering or leaving the manhole shall be provided with flexible joints within 12-inches of the manhole structure and shall be placed on firmly compacted bedding. Special care shall be taken to see

that the openings through which pipes enter the structure are completely watertight. All flexible pipe shall be connected to manholes according to the manufacturers' recommendations.

9. Flexible Joints

   a. Where the last joint of the line laid up to the manhole is more than 12-inches from the manhole base, a 6-inch concrete encasement shall be constructed around the entire pipe, from the manhole base to within 1 foot of the pipe joint, at the discretion of the Engineer. The pipe encasement shall be constructed integrally with the manhole base. Pipes laid out of the manhole shall be shortened to ensure that the first flexible joint is no more than 12-inches from the manhole base.

   b. Manhole pipe connections shall be made using core drilling equipment. Revisions to design will not constitute a variance to core drill requirement and may, require manufacture and installations of new manhole matching design revisions.

   c. Jackhammering or sawcutting manhole walls shall not be permitted.

10. Manhole Testing

   a. All new sewer manholes shall be vacuum tested or hydrostatically tested.

   b. All adjacent surface restoration will be completed before conducting a sanitary manhole acceptance test, including finished paving and final adjustment to grade. Any test conducted beforehand shall be considered informal, and will not count for acceptance.

   c. Notify the Engineer a minimum of 24 hours before conducting the acceptance test.

   d. Vacuum tests will be conducted in accordance with the latest applicable standards, such as established procedures based on ASTM C924 and as follows:

      1. Vacuum tests shall be performed by drawing ten (10) inches Hg of vacuum on the manhole.

      2. Time shall be measured for the vacuum to drop to nine (9) inches of mercury.

      3. Manholes that provide a minimum test time of 60 seconds before the vacuum drawn on the manhole drops below nine (9) inches of Hg shall pass the vacuum test.

      4. Manholes that fail the vacuum test shall be repaired and retested until satisfactory test results are achieved.

   e. Hydrostatic tests shall consist of plugging all inlets and outlets and filling the manhole with water to the top of the manhole. Allowable leakage shall not exceed 0.2 gallons per hour per foot of head above the invert.

The test shall last for a minimum of two (2) hours. A manhole may be filled 24 hours prior to time of testing to permit normal absorption into the manhole walls.

f. If manhole test fails, Contractor shall repair and retest each manhole until it passes at no additional cost to the Owner.

g. The Contractor shall provide and pay all costs for water used in testing.

END OF SECTION

SECTION 02725
STORM DRAIN PIPE

1. GENERAL

A. This item shall include furnishing and installing all storm drain pipe as shown on the Plans and specified herein.

B. Storm drain pipe shall be polyvinyl chloride pipe (PVC).

C. The Contractor shall provide manufacturer's certifications, including test results for all piping, fittings and appurtenances supplied. All submittals shall be in conformance with the requirements of Section 01300.

2. MATERIALS

A. All pipe, fittings, and appurtenances shall be new and unused.

B. 18-Inch Diameter Polyvinyl (PVC) Pipe

1. PVC pipe with 18-inches nominal inside diameter shall meet the requirements of ASTM F 679, SDR 35, T-1 wall thickness.

2. Pipe shall be furnished with an integral bell gasketed joint. Joint shall conform to ASTM D-3212 with rubber rings conforming to ASTM F-477.

3. Pipe shall be green in color. Pipe shall be manufactured in a standard 14’ to 20’ nominal lengths.

4. Pipe shall be as manufactured by J-M Manufacturing Company; Pacific Western Extruded Plastics Company or approved equal.

C. Appurtenances

1. Transition Fittings: When joining different types of pipes, the contractor shall use approved ridged fittings. Flexible fittings such as Fernco, Caulder, or approved equal; flexible fittings may require additional support under the coupling. Bell type couplings are considered flexible.

2. Flexible connectors for connecting to manholes shall be as specified in Section 02605.

3. Concrete Anchor Walls

a. The Contractor shall pour anchor walls against undisturbed earth, remove all water from the excavation, and construct suitable forms to create shapes that will provide full bearing surfaces against undisturbed earth.

b. Concrete anchor walls shall be used only when approved by the Engineer.

c. The Contractor shall install the concrete anchor wall per the detail drawings.

4. Toning wire shall be No. 14 AWG, solid copper with green colored insulation.

D. All trench backfill shall be Class B or as specified in Section 02222-2.

3. WORKMANSHIP

A. All pipe and fittings shall be installed in accordance with the manufacturer's recommendations and APWA standards. Refer to the Plans for types of storm drain pipe that are required for each specific storm drain placement.

B. Install to lines and grades shown on the Plans. Maximum deviation shall not exceed 0.05 feet vertically.

C. Pipe zone (bedding) material shall be placed and compacted in the trench before installing pipe. Pipe zone material shall be shaped such that pipe will be uniformly supported over its full length.

D. Excavate underneath joints so that the coupling/joint does not act as a point support for the pipe and so that the pipe is uniformly supported.

E. Inspect pipe prior to installation. Damaged or defective materials will not be used.

F. Transition couplings shall be installed where connecting new storm drain pipe to existing pipes or different types of pipes. The Contractor shall seal the coupling with concrete for watertight fit where required by the Engineer.

G. Television Inspection

1. All new storm lines, including perforated storm drain lines shall have Television Inspection.

2. Any deficiencies noted during the television inspection, including point of leakage, cracked pipe, deviations from grade, rolled gaskets or separated joints, shall be corrected.

3. Television inspection shall be repeated until no deficiencies are noted.

4. All costs for additional television inspection and repair of deficiencies shall be borne by the Contractor.

5. See Section 02740 for additional information.

END OF SECTION

SECTION 02740
STORM DRAIN LINE TELEVISION INSPECTION

1. GENERAL

A. Requirements Comprise

1. Contractor shall show adequate prior experience in the examination and inspection of storm drain lines and shall utilize quality monitoring, recording, and field equipment designed and constructed specifically for storm drain inspection.

2. Flow Control: Contractor shall control upstream flow.

3. Television inspections are required for the storm drain improvements at the following intervals for each specific type of improvement.

a. New Storm drain Line Construction – all new storm drain lines shall have television inspection for the following periods:

1. After completion of new storm drain lines and lateral connections.

2. During the one-year warranty period at a date approved by the Engineer.

B. Description

1. Contractor shall provide a TV camera, monitor, and video recording (Digital format) for storm drain inspection. The TV camera must be specifically designed for storm drain inspection - small, rugged, self-propelled, and waterproof. The camera shall have pan and tilt capability and be capable of viewing directly into laterals that connect to the main line. The camera must have its own light source suitable to provide a clear picture of the entire periphery of the pipe. Camera and monitoring equipment shall provide a color picture.

2. The Contractor shall provide a TV monitor that shall be capable of producing a high resolution picture. The picture shall be adequate for continual monitoring during the television investigation. Contractor shall be able to adjust the monitor contrast, brightness, and other factors as necessary to provide a clear picture. The adequacy of the picture shall be determined by the Engineer on the initial run. Future runs shall provide quality at least as good as or better than the initial run as determined by the Engineer. Quality less than the initial run will require the pipe sections to be re-inspected at no additional cost to Owner.

2. MATERIALS

A. Use quality monitoring, recording, and field equipment designed and constructed specifically for storm drain inspection.

B. Provide written records that show the location of the subject inspection.

C. Provide copies of the pre-construction videos prior to starting rehabilitation or replacement of storm drain lines.

D. Provide storm drain plugs that do not damage pipe.

3. WORKMANSHIP

A. Television Inspection

1. Television Inspection of the storm drain lines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by visual inspection. The interior of the storm drain shall be carefully inspected to determine the location of conditions which may prevent proper installation of inversion lining. Contractor shall furnish television inspection, video, and suitable log to the Engineer per Section 02740-1.

2. All storm drain lines shall be free of debris and the walls of the pipe shall be clean enough to clearly see the joints and lateral connections.

3. The inspection shall be done one manhole or catch basin section at a time.

4. The camera shall move through the line in either direction under its own power and at a moderate rate. In no case will the camera travel at a speed greater than 30 feet per minute. The camera shall be stopped when necessary to permit proper assessment and documentation of the storm drain line condition and defects. Mechanisms that move the camera through the storm drain line shall not obstruct the camera view or interfere with proper documentation of the storm drain conditions.

5. The Contractor shall use radios or telephone communication to assure suitable communication between crewmembers and the camera operator/video monitor Operator.

6. If, during the inspection operation, the television camera will not pass through the entire section from manhole to manhole or catch basin, the Contractor shall set up equipment so that the inspection can be performed from the opposite direction/manhole. If, again, the camera fails to pass through the entire manhole section, the inspection shall be considered complete and no additional work will be required on this pipe section.

7. If the television camera encounters broken pipe and there is risk that continued inspection could cause damage to the television camera equipment, the Contractor may elect to discontinue the inspection for that pipe section.

8. Measured distance shall be determined by means of a footage meter attached to the television camera. The measurement meter shall be “zeroed” at the center of the start manhole. The measurement meter shall be configured such that the pipe distance is shown on the monitor and in the recorded video. Contractor shall also measure the above ground distance from center of manhole to center of manhole for the pipe section being inspected using a steel field tape. Such distance shall be recorded in the log using the manhole designations shown on the drawings. The variation between metered distance and measured distance shall not exceed

one (1) percent of measured distance or the pipe section shall be re-inspected until metered distance matches measured distance.

9. Written television inspection logs shall be prepared at the same time the television inspection is being performed.

   a. The inspection log shall contain the following information: Contractor's crew chief's name, date, general weather conditions and observations, manhole designations at start and end of inspection run, direction of flow, type of pipe, type of joints (if it can be determined), joint spacing, manhole conditions, measured section length (by steel tape), pipe size, approximate depth of pipe at each manhole and direction of inspection (camera movement). Oral logging of the above information onto the video with an audio voice-over shall not be acceptable in lieu of the written log.

   b. Pipe and system defects shall be located by footage. If the Contractor proposes codes or shorthand designations for describing defects, such codes shall be reviewed and accepted by the Engineer prior to recording. Defects described shall include cracked pipe, open pipe, open cracks, broken pipe, crushed pipe, collapsed pipe, circumferential defects, longitudinal defects, erosion, corrosion, dips or sags, misalignment, offset joint, separated joint, infiltration joint, and defective or poorly formed lateral joint or connection.

   c. Each lateral connected to the storm drain line shall be located by footage. The camera shall stop and view directly into each lateral and pan around the entire lateral connection. Any infiltration sources in the laterals or excessive flow from the laterals or connections shall be noted in the log. Any defects shall be noted in the log.

   d. Television inspection shall start and end at the inside face of each manhole with particular attention given to the first (and last) two (2) feet of recording to identify any pipe shear condition at the manhole connection.

10. Video Recordings

   a. Video recordings shall contain only complete pipe sections between manholes and/or catch basins. Partial sections will not be included. The video shall be supplied to the Engineer. Each video shall be clearly identified using indelible ink and a log provided with identification related to the manhole sections, designated by manhole number that the video contains. Videos of initial conditions shall be provided to Engineer prior to starting construction.

11. Contractor shall be solely responsible for the safety of their crew. Adherence to OSHA regulations is the responsibility of the Contractor. The Engineer may recommend to the Owner that the Contractor stop the work and cancel the Contract if appropriate safety regulations are not complied with by the Contractor.

12. Storm Drain Flow Control

a. When storm drain line depth of flow at the upstream manhole of the manhole section being worked is above the maximum allowable for television inspection, the flow shall be reduced to the level shown below by plugging or blocking of the flow or by pumping and bypassing of the flow as necessary.

b. Depth of flow shall not exceed that shown below for the respective pipe sizes as measured in the downstream manhole when performing television inspection.

Pipe Size	**Depth of Flow**
6" - 10" Pipe	20% of pipe diameter
12" - 24" Pipe	25% of pipe diameter

c. Plugging or Blocking

1. A storm drain line plug shall be inserted into the line upstream of the section being worked. The plug shall be so designed that all or any portion of the sewage can be released. During TV inspection, flow shall be reduced to within the limits specified above. After the work has been completed, flow shall be restored to normal.

d. Pumping and Bypassing

1. When pumping and bypassing is required, the Contractor shall supply the pumps, conduits and other equipment to divert the flow around the manhole section in which work is to be performed. The bypass system shall be of sufficient capacity to handle existing flow plus additional flow that may occur during a rainstorm. The Contractor will be responsible for furnishing the necessary labor and supervision to set up and operate the pumping and bypassing system.

e. Flow Control Precautions

1. When flow in a storm drain line is plugged, blocked or bypassed; sufficient precautions must be taken to protect the storm drain lines from damage that might result from storm drain surcharging. Further, precautions must be taken to ensure the storm drain flow control operations do not cause flooding or damage to public or private property being served by the storm drain involved.

END OF SECTION

SECTION 02900
LANDSCAPING

1. GENERAL

A. This section specifies placement of topsoil and revegetation by grass cover of all areas disturbed during construction.

2. MATERIALS

A. Fertilizer

1. Furnish fertilizer in moisture-proof bags marked with weight and the manufacturer's certified analysis of the contents showing the percentage for each ingredient. Furnish fertilizer in a dry condition free from lumps and caking, in granular or pelletized form, of standard commercial grade conforming to all State and Federal regulations and to the standard so the Association of Official Agricultural Chemists. Fertilize may be furnished in bulk form if an approved transfer hopper is provided.

2. Fertilizer shall be Inorganic 22-16-8 and shall be applied at the minimum rate of 500 pounds per surface acre. Inorganic 22-16-8 shall include 22 percent nitrogen, 16 percent available phosphoric acid, 8 percent soluble potash and include minimum 2 percent sulfur. The fertilizer shall contain not less than 50 percent cold-water insoluble nitrogen derived by incorporating a minimum of 800 lbs. of urea formaldehyde per ton of fertilizer. The fertilizer shall have a minimum Activity Index (AI) of 50 as determined by the Association of Official Chemists analytical methods.

B. Seed

1. Provide tested grass seed from blue tag stock and from the latest crop available. Deliver each variety in standard containers labeled in accordance with Oregon state laws and U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Provide with label showing seed variety, percentage of purity, germination, maximum weed content, date of test within 9 months of date of delivery, and as set forth in the General Seed Certification Standard by the Oregon State University Certification Board. Mold or evidence of container having been wet or otherwise damaged will be cause for the rejection of each lot of seed.

2. Grass seed may be delivered to the project as a mixture provided each variety of grass seed in the mixture is identified and labeled as specified.

3. Seed, as a mixture, shall be applied at the following minimum rates for use in wet and moist zones and dry zones as shown in the following tables.

a. Wet and Moist Area Seed Mix

1. Pro Time 840 Native Wetland Mix. Application rate: 87 lbs/acre (minimum)

Wet and Moist Area Seed Mix		
Scientific Name	**Common Name**	**% Mixture**
Elymus glaucus	Blue Wildrye	47
Hordeum brachyantherum	Meadow Barley	40
Deschampsia caespitosa	Tufted Hairgrass	10
Glyceria occidentalis	Western Mannagrass	2
Beckmannia syzigachne	American Sloughgrass	1

b. Dry Area Seed Mix

1. Pro Time 400 Native Grass Mix. Application rate: 30 lbs/acre (minimum)

Dry Area Seed Mix		
Scientific Name	**Common Name**	**% Mixture**
Elymus glaucus	Blue Wildrye	60
Hordeum brachyantherum	Meadow Barley	30
Bromus carinatus	Native California Brome	10

C. Topsoil

1. Topsoil shall consist of a natural friable surface soil without admixtures of undesirable subsoil, refuse, or foreign materials. It shall be shredded and reasonably free from roots, hard clay, coarse gravel, stone larger than one inch (1") in any diameter, noxious weeds, tall grass, brush, sticks, stubble, or other litter, and shall have indicated by a healthy growth of crops, grasses, trees, or other vegetation that it is free-draining and non-toxic. Topsoil to contain no more than 10% stones.

2. Topsoil shall conform to the following requirements.

a. Organic Material: Not less than 40% nor more than 60% by volume (15-20% by weight).

b. Silt: Not less than 20% by volume (50-60% by weight).

c. Sand: Not less than 20% nor more than 30% by volume (20-30% by weight).

3. The Contractor shall notify the Engineer of the location from which they propose to furnish topsoil at least 10 days prior to delivery of topsoil to the Project from that location. The Engineer will review and approve of the topsoil prior to delivery to the project site by the Contractor.

D. Bark Mulch (If Required)

1. Bark mulch shall be a commercial type using Redwood Bark as a basis. Redwood bark mulch shall be free of non-bark debris, harmful bacteria, disease spores, pests and substances toxic to plant growth. Maximum size shall be 2". Contractor shall provide 5-gallon sample prior to delivery for approval by the Engineer.

2. Bark mulch shall be Redwood Bark as manufactured by Rexius Company or as approved from local sources.

3. WORKMANSHIP

A. Topsoil shall be evenly spread on the designated areas or as specified herein to a depth of four inches after settlement and compaction unless a different depth is called for. Spreading shall not be done when the ground is excessively wet, frozen, or otherwise in a condition detrimental to the Work. Roadway surfaces, including curbs and sidewalks shall be kept clean during hauling and spreading operations.

1. After spreading has been completed, large clods, stones larger than one inch (1") in any diameter, roots, stumps, and other litter shall be raked up and removed.

a. Street Construction Areas

1. If the existing topsoil that is stockpiled from the stripped slopes and street construction areas as specified in Section 02100 is insufficient to provide the specified minimum four (4) inch depth, then additional topsoil shall be provided.

B. Seeding

1. Seeding shall not commence until the slopes and areas to be seeded have been completed to final grades.

2. Notify Engineer to observe soil preparation 48 hours prior to hydraulic seeding.

3. The surface soil on all areas to be seeded shall be in a condition favorable for the germination and growth of grass seed. A minimum of one-fourth the surface soil shall be in a loose condition.

4. All areas to be seeded shall be made substantially clean and free of weeds sticks, debris and other matter detrimental or toxic to the growth of grass.

5. Scope of Seeding

a. All constructed/disturbed slopes, areas and embankments which are not graveled or paved.

b. All disturbed trenches and slopes where grass cover existed prior to construction.

6. Seed and fertilizer shall be placed by the hand methods.

7. Contractor shall provide mulching materials over the seed to prevent the seed from blowing or getting wash away. Mulching materials may be dried peat moss that is uniformly placed to cover the seed after it is placed. The peat moss shall be wetted immediately after the seed is placed to help hold it in place.

C. Maintenance

1. All seeded areas shall be maintained by watering, weeding and cultivating as necessary to keep the cuttings in a healthy growing condition.

2. Maintenance period shall begin immediately after planting is complete and approved by the Engineer, and shall continue for 60 days for seeded areas.

3. Provide equipment and means for proper application of water.

4. At the end of the maintenance period, all grass material shall be in a healthy growing condition.

D. Guarantee

1. Seeded Areas

a. If at the end of the 60-day maintenance period, a satisfactory growth of grass has not been produced, the Contractor shall renovate the grass or reseed unsatisfactory portions thereof, or, if after September 30, during the next planting season, April to October. If a satisfactory growth develops by August 1 of the following year, it will be accepted. If it is not accepted, a complete replanting will be required.

b. A satisfactory growth is defined as:

1. No bare spots larger than three (3) square feet.

2. Not more than ten (10) percent of total area with bare spots larger than one (1) square foot.

END OF SECTION

SECTION 03000
DIVISION 3 - CONCRETE

SECTION	TITLE
03200	REINFORCING STEEL
03300	CAST-IN-PLACE CONCRETE
03600	GROUT

SECTION 03200
REINFORCING STEEL

1. GENERAL

A. Scope

1. The work included under this section consists of furnishing all material, supplies, equipment, tools, transportation, and facilities, and performing all labor and services necessary for, required in connection with or properly incidental to furnishing and installing all reinforcing bars, ties, spacing devices, inserts, and all other material required to complete installation, as described in this section of the specifications, shown on the accompanying drawings, or reasonably implied therefrom.

2. Work Included

a. Fabricating and installing all reinforcing steel for cast in place concrete.

b. Fabricating and installing all reinforcing steel for shotcrete.

c. Fabrication of reinforcing steel dowels to be embedded in existing concrete and existing masonry.

B. The following is a list of Reference Standards referred to in this portion of the specifications.

Reference	Title
ASTM A82	Specification for Cold-Drawn Steel Wire for Concrete Reinforcement
ASTM A185	Specification for Welded Steel Wire Fabric for Concrete Reinforcement
ASTM A615	Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM A706	Specification for Low Alloy Steel Deformed Bars for Concrete Reinforcement

C. Codes and Standards

1. Comply with all applicable Federal, State and Local Code and Safety Regulations. In addition, comply with the latest edition of the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified.

Reference	Title
A.C.I. 315	Details and Detailing of Concrete Reinforcement
A.C.I. 318	Building Code Requirements of Reinforced Concrete
A.W.S. D1.4	Structural Welding Code- Reinforcing Steel

D. Mill Certificates

1. The Contractor shall provide Mill Certificates for reinforcing steel in accordance with the requirements of this specification section. When Mill Certificates cannot be provided, laboratory test reports shall be provided.

E. Submittals

1. Submittals shall be made to the Engineer in accordance with the requirements of Section 01300 of these specifications.

2. Construction, fabrication, or ordering of materials shall not begin until Contractor has received submittals reviewed by the Engineer governing all aspects of the intended work.

3. Shop Drawings shall be submitted that show diagrammatic elevations of all walls, footings, columns, beams, slabs, etc., at a scale sufficiently large to show clearly the positions and erection marks of reinforcing bars, their dowels, and splices. Shop drawings shall also show details for congested areas and connections. Shop Drawings used in field must be reviewed copies.

4. Manufacturer's catalog sheets including instructions for use and description of application shall be provided on mechanical anchorage devices for butt splices.

F. Store reinforcement during fabrication and at site to avoid excessive rusting or coating with grease, oil, dirt, or other objectionable materials.

G. Coordinate work with all trades so as not to interfere with the work of other trades. Bring interferences between trades to Engineer's attention and resolve before any concrete is placed.

2. MATERIALS

A. Bars for all reinforcing steel to be welded shall conform to the requirements of ASTM A 706, Grade 60 including Supplement S1.

B. Bars for reinforcement not noted above shall be deformed, intermediate grade steel conforming with the requirements of ASTM A 615, Grade 60 including Supplement S1.

C. All wire for concrete reinforcement shall conform with "Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement," ASTM A 82.

D. All wire fabric mesh shall conform with "Specifications for Wire Fabric for Concrete Reinforcement," ASTM A 185. Wire fabric shall be 6-inch x 6-inch (W1.4 x W1.4) unless otherwise noted.

E. Welding electrodes shall be per Table 5-1 of AWS D1.4.

F. Mechanical anchorage devices shall develop 125 percent of the minimum yield strength of the bars spliced.

G. All other materials, not specifically described by these specifications but required for complete and proper placement of reinforcement shall be new, first quality of their respective kinds, and subject to the approval of the Engineer.

H. Fabrication

1. Bends for reinforcing steel shall be made in accordance with ACI 318 latest edition. Bend all bars cold.

2. Bars shall not be cut by gas torch.

3. WORKMANSHIP

A. Prior to all work of the section, carefully inspect the installed work of other trades and verify that all work is sufficiently complete to permit the start of work under this section and that the completed work of this section will be in complete accordance with the original design and the reviewed shop drawings. In the event of discrepancy, immediately notify the Engineer in writing.

B. In the event conduits, pipes, inserts, sleeves, or any other items interfere with placing the reinforcement as indicated on the drawings or approved shop drawings, or as otherwise required, immediately notify the Engineer and obtain approval on procedure before placement of reinforcement is started.

C. Do not field bend reinforcing steel in a manner that will injure material, cause the bars to be bent on too tight a radius, or that is not indicated as allowed on drawings or permitted by Engineer. Do not straighten bent or kinked bars for use on project without permission of Engineer. Replace bars with kinks or bends not shown on the drawings.

D. All reinforcement shall be placed in strict conformity with the requirements of the engineering drawings, both as to location, position and spacing of members. It shall be supported and secured against displacement by the use of adequate and proper wire supporting and spacing devices, tie wires, etc. so that it will remain in its proper position in the finished structure.

E. Preserve clear space between parallel bars of not less than 1 1/2 times the nominal diameter of round bars and in no case let the clear distance be less than 1 1/2 inches nor less than 1-1/3 times the maximum size of aggregate for concrete. Bars placed in shotcrete shall have a minimum clearance between bars of 2 1/2" for No. 5 and smaller and 6 bar diameters for bars larger than No. 5.

F. Lap splices shall be contact lap splices in accordance with ACI 318 unless noted otherwise on the Contract Drawings. Bars shall be wired together at laps. Wherever possible, stagger splices in adjacent bars. Make all splices in wire fabric at least 1 1/2 meshes wide or 12", whichever is greater. When splicing in areas to receive shotcrete, lap splices shall be non contact with at least 2" clearance between bars.

G. Butt splices shall be accomplished by mechanical anchorage devices.

H. Bars shall not be cut by gas torch.

I. Take all means necessary to ensure that steel reinforcement, at the time concrete is placed around it, is completely free from rust, dirt, loose mill scale, oil, paint and all coatings which will destroy or reduce the bond between steel and concrete.

J. The Contractor shall notify the Engineer at least 24 hours in advance of when the inspections are required.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE

1. GENERAL

A. This section specifies cast-in-place concrete which consists of furnishing all material, mixing and transporting equipment, and performing all labor for the proportioning, mixing, transporting, placing, consolidating, finishing and curing of concrete.

B. Concrete work shall conform to APWA Standards and the requirements of ACI 301.

C. Sampling, Testing, and Inspection

1. All materials and work shall be subject to inspection at the batch plant, and at the road improvement site. Material or workmanship not complying fully with the drawings, and/or specifications will be rejected.

2. If the Engineer, through oversight or otherwise, has accepted material or work which is defective or contrary to specifications, this material or work, regardless of state of completion, may be rejected.

3. The Contractor shall cooperate with and notify Engineer at least 24 hours in advance of inspection required and shall provide samples and facilities for inspection without extra charge.

D. Submittals

1. General Requirements

a. Submittals shall be made to Engineer in accordance with the requirements of Section 01300 of these specifications.

b. Construction and fabrications or mixing of materials shall not begin until contractor has received submittals reviewed by Engineer governing all aspects of the intended work.

2. Mix Designs

a. Mix designs shall be submitted for each class of concrete on the job and shall show names and brands of all materials, proportions, slump, strength, gradation of coarse and fine aggregates, and location to be used on job.

3. Laboratory Test Reports

a. Laboratory test reports shall show the name of testing agency, date of testing, types of tests performed and shall be signed by a principal of the testing agency who is a registered Civil Engineer in the State of Oregon. Laboratory tests shall not be older than eight (8) months and shall certify that the tested materials meet the specified standards.

b. Laboratory test reports for concrete mix designs shall clearly identify each material or mix number of each mix tested to verify the correlation between the tested mix designs and the proposed mix designs.

2. MATERIALS

A. Type I Portland Cement conforming with ASTM C150 shall be used.

B. Aggregates

1. Fine and coarse aggregates shall conform to ASTM C33. Aggregates shall be hard, dense and durable sand, gravel or crushed rock free from organic matter and other deleterious substances.

2. Maximum coarse aggregate size shall be 1 ½-inch. Fine aggregate shall be between 35 and 45 percent of the total aggregate. Maximum percent by weight of both fine and coarse aggregate passing the No. 200 sieve shall be 2 percent.

3. Minimum sand equivalent per ASTM D2419 is 75.

C. Curing compound shall be of the white liquid membrane forming type and conform to ASTM C309. Master Builders, Masterseal; W.R. Grace and Co., Horn Clearseal; or equal.

D. Air-entraining admixtures for concrete shall conform to ASTM C260. All concrete shall contain between 3 percent to 6 percent entrained air.

E. Water for washing aggregate, for mixing, and for curing shall be free from oil and deleterious amounts of acids, alkalies, and organic materials. Water used for curing shall not contain an amount of impurities sufficient to discolor the concrete.

F. Forms

1. Forms shall conform in construction to ACI 347 and shall be of wood, metal, or other suitable material that is straight and free from warp.

2. Forms shall have sufficient strength to resist the pressure of concrete without excessive deflection.

G. All concrete shall be provided in accordance with the following:

1. Class A (Miscellaneous structures)

a. Minimum 28-day compressive strength (ASTM C39): 3,000 psi.

b. Minimum cement content: 5.5 sacks per cubic yard.

c. Minimum water content: 6 gallons per sack.

d. Maximum slump (ASTM C143): 4 inches.

e. Entrained air volume: 3 percent to 6 percent of the concrete.

3. WORKMANSHIP

A. Subgrade Preparation

1. All concrete shall be placed on the prepared subgrade base, depth as specified. Material and compaction shall be as specified in Section 02300.

2. Concrete shall not be placed until the Engineer has approved the prepared subgrade.

3. Subgrade shall be moist prior to concrete placement.

B. Alignment

1. Align vertically and horizontally with a 3-inch tolerance.

C. Concrete Placement

1. Concrete shall be manufactured and delivered in accordance with ASTM C94; Standard Specification for Ready-Mixed Concrete.

2. Formwork

a. Formwork shall conform to ACI 347. All forms shall be sealed and watertight.

b. The design and construction of all formwork shall be the responsibility of the Contractor and shall comply with all local, state and federal regulations.

c. Front and back forms shall extend to full depth of concrete being placed.

d. Forms shall be cleaned and coated with approved release agent prior to concrete placement.

e. Concrete shall be deposited in forms without segregation. Mechanically vibrate for thorough consolidation.

3. Ready-Mixed Concrete hauled in truck mixers or truck agitators shall be deposited in place within 90 minutes from the time the water is added to the mix. Retempering concrete by adding water shall be allowed up to 45 minutes from original charging, as long as the maximum slump is not exceeded. Concrete that is unsuitable for placement as delivered shall be rejected.

4. Reinforcement and concrete cover - comply with applicable ACI 318 requirements. Provide 2 1/2-inches clear to outside faces to be in contact with liquid and 3-inches clear to outside faces to be in contact with soil.

D. Finishing

1. General

a. Unformed surfaces which will not be exposed in the completed work shall be brought to the required finished elevations and left true and regular.

b. Screeds

1. Sufficient screeds, unaffected by form deflections under concrete loads, shall be installed to insure an even concrete surface, true to grade and elevation, without unacceptable local depressions of any sort.

2. Screeds shall be set to the required levels before any concrete may be placed.

c. Type S-1 (required for all finish concrete surfaces)

1. An integral finish obtained by trowelling with a steel trowel after the surface has been floated to compact and seal the surface evenly and allowed to stand until all water-sheen has disappeared.

2. Prior to floating, any excess surface water shall be removed and no mortar shall be used for leveling.

3. Final trowelling shall be done after the concrete has hardened sufficiently to prevent drawing moisture and fine materials to the surface and when the concrete is sufficiently hard that no mortar accumulates on the trowel.

4. Cement or mixture of cement and sand, shall not be spread on surfaces to absorb excess water or to stiffen the concrete.

5. Trowelling shall produce a dense, smooth, impervious surface free from defects, blemishes, and trowel marks.

6. Complete the finish by brooming with a steel or hard-bristled broom. In driveway approaches, note that the top portion of the curb will have grooves placed in it per the detail drawings.

E. Repair of Surface Defects

1. Surface defects such as tie holes, minor honey combing or otherwise defective concrete shall be repaired in accordance with ACI 301, Chapter 9.

2. Minor honey combing or otherwise defective areas shall be cut out to solid concrete to a depth of at least 1-inch. The edges of the cut shall be perpendicular to the surface of the concrete.

3. Patches on exposed surfaces shall be finished to match the adjoining surfaces after they have set. Patches shall be cured as specified for concrete. Patches on exposed aggregate finish will not be allowed. Contractor shall remove and replace damaged section between control joints by sawcutting.

F. Curing

1. Concrete shall be cured by protecting it against loss of moisture, rapid temperature change, and mechanical injury for at least three (3) days after placement. After all free water has disappeared from the surface, a liquid membrane-forming compound shall be uniformly sprayed on all exposed surfaces.

2. When concrete has been placed in cold weather and the temperature may drop below 35 degrees F., straw, hay, insulated curing blankets, or other suitable material shall be provided along the line of work. Concrete injured by frost action shall be removed and replaced at the Contractor's expense.

G. Removal of Forms and Supports

1. Do not remove formwork until concrete has hardened and attained sufficient strength to permit safe removal and adequate support of loads.

2. Remove forms carefully to avoid damaging corners and edges of exposed concrete.

3. Forms shall not be removed until concrete strength reaches 85 percent of the specified strength or unless otherwise approved by the Engineer.

H. Protection

1. Contractor shall protect new concrete from rain.

2. Concrete shall be protected from temperatures lower than 35 degrees.

3. Concrete shall be protected from vandalism. Any concrete damaged by vandalism shall be repaired / replaced at the direction of the Engineer at no additional cost to the Owner.

I. Joints

1. Control (or contraction) joints, expansion joints, and all longitudinal joints shall be as shown on the Plans and specified in Sections 02525-3 and 02527-3.

2. Control joints shall be formed by one of the following methods: sawed, hand formed, formed by premolded filler or full-depth construction joints. Joint depth shall be equal to one-third the slab thickness. Hand-formed joints shall have a maximum edge radius of c-inch. Sawing of joints shall begin as soon as the concrete has hardened sufficiently to permit sawing without excessive raveling. All joints shall be continuous across the slab unless otherwise shown on the Plans.

3. Expansion joints shall consist of vertical expansion joint filler placed in a butt type joint for the full depth of the concrete. The expansion joint filler shall be continuous. Damaged or repaired joint filler shall not be used.

J. Backfilling

1. After concrete has achieved required strength, backfill with suitable materials, unless concrete has been placed against existing structures or original ground.

2. Comply with Section 02222-3.

END OF SECTION

SECTION 03600
GROUT

1. GENERAL

A. This section specifies grout for uses relating to supports and repairs of cracks and holes, and other miscellaneous grouting required.

2. MATERIALS

A. Cement shall be Type II Portland Cement conforming to ASTM C150.

B. Sand shall be hard, dense, durable particles regularly graded from coarse to fine and shall conform to ASTM C33.

C. Epoxy grout shall be Sika Corporation or equal.

D. Non-shrink grout shall be Sika Top 122 Plus as manufactured by Sika Corporation; Master Builders Embeco 636 or equal.

E. Cement grout shall consist of one part cement 2 parts sand and sufficient water to make a stiff workable mix.

F. Water reducing retarder shall be ASTM C494 Type D, and shall be Master Builders Pozzolith 300-R or equal.

G. Manufacturer's data shall be provided for the following:

1. Epoxy grout

2. Non-shrink grout

3. Retardants.

3. WORKMANSHIP

A. General applications for the different types of grout are as follows:

1. Cement grout-filling non-bearing portions of manhole bottoms and built-up surfaces.

2. Non-shrink grout-used for sealing pipe penetrations, holes, abandoned pipe openings, under frames and lift rings, bearing surfaces of pipe, machinery and equipment bases, lift holes, bearing plates, setting anchor bolts and grouting reinforcing steel holes.

3. Epoxy grout-used for repairing cracks by pressure grouting and repairing structural concrete.

B. Grout shall be placed in accordance with manufacturer's recommendations or as specified herein.

C. Surfaces shall be cleaned prior to grout placement and roughened by brushing or other methods to allow adhesion of the grout.

END OF SECTION