CITY OF MANZANITA
Public Works Department
P.O. Box 129, Manzanita,OR 97130-0129
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ci.manzanita.or.us

CITY OF MANZANITA

MANZANITA CLASSIC STREET CONNECTION

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

June 2025

Work under this contract is funded through Business Oregon and Local Funds

City Of Manzanita
Attention: Leila Aman
City Manager
Po Box 129
167 S. 5th
Manzanita, OR 97130
503-812-2514

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CONTRACT DOCUMENTS

Request for Proposals

The City of Manzanita is seeking proposals from qualified and experienced General Contractors (GCs) for construction services for the construction of a waterline expansion, storm water system, retaining wall, pedestrian pathway, paving and traffic calming measures along Classic Street. The project is referred to as the "***Manzanita Classic Street Connection***" by the City. The City's objective is to enter into a Construction Agreement with a qualified GC that will provide these services for the Manzanita Classic Street Project in conformance with ORS 279C.335(2) and **Resolution 25-03**. This alternative method of solicitation related to the RFP process is being used for this project. A description of the Proposal requirements is available at the City of Manzanita website (https://ci.manzanita.or.us/).

Proposals for the **Manzanita Classic Street Connection Project** need to be submitted and delivered by 2:00 PM on **June 20, 2025** in pdf format via email to Leila Aman, laman@ci.manzanita.or.us.

Electronic submissions are preferred, however, hard copies can be mailed or personally delivered to:

The City of Manzanita
Attn: Leila Aman
167 S 5th Street
Manzanita, OR 97130

Phone and facsimile proposals will not be accepted. There will be no formal opening of proposals.

Solicitation process, disclosure requirements, and proposal selection process can be found in **Resolution 25-03**.

The City will evaluate proposals and will provide an evaluation and recommendation for Council award based on the schedule as outlined in the RFP.

In general, the project will be constructed within an urban area with limited right of way and the requirement to maintain traffic through the work area. Landscaping will provide aesthetics as well as slope stability either side of Classic, including a vegetative strip between the Classic Street and the sidewalk. There will be traffic calming measures on Classic Street, including speedbumps, pavement markings, signage and reconstruction of the northeast corner at Laneda to make it ADA compliant for a north south crossing. These elements may be value engineered out if costs exceed available City funds. The elements of work include, but are not limited to:

1. Installation of water main and appurtenances.
2. Installation of storm drainage including storm pipe, manholes and catch basins.
3. Construction of curbs.
4. Construction of retaining walls.
5. Installation of guardrail.
6. Roadway reconstruction and paving.
7. Landscaping.

The project is funded by Business Oregon and the City of Manzanita. State prevailing wages (BOLI) will be required.

IMPORTANT: RFP plus Bidding Documents can be viewed in person by appointment at the City of Manzanita City Hall, at 167 S. 5th Street, Manzanita, OR 97130; schedule appointment by cityhall@ci.manzanita.or.us. Please contact Kyle Ayers, PE, City Engineer, North Coast Civil Design, LLC at 503.440-1088 or kyle@nccivil.com if you have any Bid/Construction related questions. Leila Aman is the sole point of contact for all questions, concerns, and protests related to this RFP. She may be reached by email at laman@ci.manzanita.or.us.

All proposals shall comply with the provisions of ORS 279C.800-870 [workers on public works to be paid not less than prevailing rate of wage for projects over $50,000.00]. Contractors submitting bids are required to be registered with the Construction Contractor's Board.

A mandatory pre-bid conference will be held **via Zoom on Thursday June 12, 2025 at 10:00 am.** Meeting link will be sent out to all plan holders the week of the meeting.

Bid security in the amount of not less than 10% of the bid must accompany each bid in accordance with the Instructions to Bidders. The RFP must be completed and submitted, all addenda acknowledged, and a copy of the bid bond sent in the submittal package. If a copy of the bid bond is uploaded, the original must be provided to the City after the RFP is due but before the end of business on **June 27, 2025**. The Owner reserves the right to waive any bid irregularities or informalities.

No proposer may withdraw or modify the proposer's submission after the hour set for the opening thereof, until after the lapse of 30 days from the submission deadline.

By Order of the **City of Manzanita**

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BID BOND

We, _____, as "Principal,"
(Name of Principal)

and _____, an _____ Corporation,
(Name of Surety)

authorized to transact Surety business in Oregon, as "Surety," hereby jointly and severally bind ourselves, our respective heirs, executors, administrators, successors and assigns to pay unto the City of Manzanita ("Obligee") the sum of ($_____)

_____ dollars.

WHEREAS, the condition of the obligation of this bond is that Principal has submitted its bid to an agency of the Obligee in response to Obligee's project identified as:

MANZANITA CLASSIC STREET CONNECTION which bid is made a part of this bond by reference, and Principal is required to furnish bid security in an amount equal to ten (10%) percent of the total amount of the bid pursuant to ORS 279C.365 (5) and the procurement document.

NOW, THEREFORE, if the bid submitted by Principal is accepted, and if a contract pursuant to the bid is awarded to Principal, and if Principal enters into and executes such contract within the time specified in the procurement document and executes and delivers to Obligee its good and sufficient performance and payment bonds required by Obligee within the time fixed by Obligee, then this obligation shall be void; otherwise, it shall remain in force and effect.

IN WITNESS WHEREOF, we have caused this instrument to be executed and sealed by our duly authorized legal representatives this _____ day of _____, 2025.

PRINCIPAL: _____ **SURETY:** _____

By _____
Signature

_____
Official Capacity

Attest: _____
Corporation Secretary

BY ATTORNEY-IN-FACT:

_____
Name

_____
Signature

_____
Address

_____
City State Zip

_____ _____
Phone Fax

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FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

(OAR 137-049-0360)

Bids which are submitted by Bid Closing, but for which a required disclosure submittal has not been made by the specified Disclosure Deadline, are not responsive and shall not be considered for Contract award

AGENCY SUPPLIED INFORMATION:

PROJECT NAME: ***MANZANITA CLASSIC STREET CONNECTION***

CLOSING:	**Date: June 20, 2025**	**Time: 2:00 PM**
REQUIRED DISCLOSURE DEADLINE:	**Date: June 20, 2025**	**Time: 4:00 PM**

Deliver Form To (Agency):	City of Manzanita
Designated Recipient (Person):	Leila Aman
Email:	laman@ci.manzanita.or.us
Agency's Address:	167 S 5th Street, Manzanita, OR 97130

The contracting agency will insert "N/A" above if the contract value is not anticipated to exceed $100,000. Otherwise this form must be submitted either with the bid or within two (2) working hours after the advertised bid closing date and time; but no later than the DISCLOSURE DEADLINE stated above.

Unless otherwise stated in the solicitation, this document shall not be submitted by facsimile. It is the Responsibility of bidders to submit this disclosure form and any additional sheets, with the bid number and project Name clearly marked, at the location indicated by the specified disclosure deadline. See "Instructions to Bidders".

List below the Name, Category of Work add Dollar Value for each first-tier subcontractor that would be furnishing labor, or labor and material, for which disclosure is required. Enter the word "NONE" if there are no first-tier subcontractors subject to disclosure. ATTACH ADDITIONAL SHEETS IF NECESSARY.

BIDDER DISCLOSURE:

	SUBCONTRACTOR NAME	CATEGORY OF WORK	DOLLAR VALUE
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____

The above-listed first-tier subcontractor(s) are providing labor, or labor and material, with a Dollar Value equal to or greater than:

a) 5% of the total Contract Price, but at least $15,000. [If the Dollar Value is less than $15,000 do not list the subcontractor above.]
   or
b) $350,000 regardless of the percentage of the total Contract Price.

Form Submitted By (Bidder Name): _____

Contact Name: _____ Phone #: _____

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END OF CONTRACT DOCUMENTS

TECHNICAL SPECIFICATIONS

DIVISION ONE – GENERAL REQUIREMENTS

SECTION 101 – SUMMARY OF WORK

101.1 THE PROJECT:

In general, the elements of work include, but are not limited to:

1. Installation of water main and appurtenances.
2. Installation of storm drainage including storm pipe, manholes and catch basins.
3. Construction of concrete curbs.
4. Construction of retaining walls.
5. Installation of guardrail.
6. Roadway reconstruction, paving, traffic control revisions and other work.

These specifications, in conjunction with applicable provisions or other parts of the contract documents and the plans shall govern the character and quality of equipment, material, construction procedures and workmanship for work under this contract. References within these Specifications also include the Oregon Standard Specifications for Construction. In the event of a conflict or where there appears to be a conflict in Specifications or the Construction Plans, the most stringent shall apply. In the event that these Specifications are silent, the most current edition of the Oregon Standard Specifications for Construction shall be used.

101.2 WORK SEQUENCE:

The Contractor shall schedule work to maintain the public's continuous access to those properties having driveways and main access routes within the limits of the project. The Contractor shall include in the contract sum sufficient funds as may be required for delays and interruptions of work caused by the public's continuous use and access to those businesses and properties abutting and adjacent to the limits of the project. No additional payment to the Contractor will be allowed on account of the Contractor's failure to anticipate such costs.

101.2.01 Public Access - The Contractor shall schedule work on this project such that it be excavated and constructed in an orderly manner according to the following sequencing requirements.

- All removed concrete sidewalks shall be available for use by the public with crushed rock sidewalk leveling course as a temporary sidewalk surface not later than 3:00 p.m. of each workday preceding each weekend throughout the duration of the project.
- All existing concrete sidewalk areas shall be available for continuous public access every weekend and holiday throughout the duration of the project with either:
    a) the existing concrete surface,
    b) the temporary crushed rock surface, or
    c) the new concrete surface.
- The Contractor shall coordinate the placement of new concrete valley gutters in order to minimize the inconvenience to the public in gaining access to adjoining properties. During concrete placing operations, provide temporary wooden bridges/planking over fresh concrete for all properties where the primary pedestrian access is located, or where the concrete construction otherwise restricts access to the full width of abutting properties. In general, the Contractor shall stagger the construction of fresh concrete valley gutters in order to not deny complete access to abutting properties. Planking shall remain in place for a minimum of 7 days unless high early strength concrete is placed.

101.2.02 Driveway Access - The Contractor shall coordinate with each property owner and provide a minimum 1 week notice prior to disruption of existing driveway and construction of new driveway. The Contractor shall schedule all concrete valley gutter and driveway work in order to provide the abutting property owner and driveway users with the maximum amount of access over existing and new driveways, in accordance with the following requirements:

- Temporary crushed rock ramps to provide vehicular access over the driveway shall be provided by the Contractor as needed.

- Once the existing driveway is removed in front of anyone abutting property within the project limits, the Contractor shall place, fine-grade and compact the crushed rock driveway leveling course within 1

calendar day after the removal of such driveway. Temporary crushed rock ramps to provide vehicular access over the driveway shall be provided by the Contractor as needed. The contractor shall allow for a minimum of 3 days curing time of new concrete prior to installation of temporary vehicular bridge including the use of protective fabric, clean sand, crushed rock and steel plates in order to protect new concrete.

- The Contractor shall notify, in writing, each affected business, property owner or resident at least 7 Calendar Days before beginning excavation, removal or reconstruction of the driveway or access.

101.2.03 Removal of Asphalt Pavement - Remove all existing asphalt pavement surfaces designated to be removed as necessary to construct new utilities, concrete gutter, sidewalk, and roadway. The Contractor shall schedule all pavement demolition work in order to provide the public with the maximum amount of access along existing pavement surfaces and/or new base rock surfaces in accordance with the following requirements:

- Remove only as much pavement as needed to construct all underground trenching operations. Leave all other asphalt pavement areas in place during trenching for underground utilities, specifically at existing driveways and delivery areas.
- Finally, remove pavement as indicated on the plan or as directed by the engineer and prepare subgrade for base rock.
- The maximum length of time that any one block within the project limits is without an asphalt or base rock surface shall not exceed 15 calendar days. This maximum time period of 15 calendar days shall begin with the removal of the remaining asphalt pavement within any one block and shall end with the complete installation of new base rock within that same block, including compaction of the new base rock. Temporary crushed rock ramps to provide vehicular access over the new concrete valley gutters and driveways shall be provided by the Contractor as needed.

101.2.04 Traffic Control - The Contractor shall develop and submit a Traffic Control Plan (TCP) for review and approval as specified in Section 130.4. The traffic control plan shall detail key intersections within the project zone in accordance with Section 157 of these specifications. The Contractor shall include signage along side streets as necessary to inform traffic of the Manzanita Classic Street and Necarney City Road route closures and proper rerouting. The Contractor shall furnish and place traffic control barricades and signs according to the MUTCD and ODOT specifications in order to allow the public reasonable access to those businesses and residences within the project's limits. The Contractor shall use cones, delineators, detour signs and barricades to keep vehicular and pedestrian traffic out of the immediate construction zone of the Contractor. All signs and barricades must be approved by the City of Manzanita and the Engineer prior to ordering.

101.2.05 General sequence of work - The Contractor shall begin work on the project within 10 days from the date the Notice to Proceed is issued.

101.2.06 Contractor's construction equipment - All construction equipment shall be so parked so as not to disrupt normal two-way traffic along side streets and so as not to block any vehicular or pedestrian access to adjoining properties. Any damage to the existing roadway, utilities, drainage system or shoulders shall be repaired to the City's satisfaction at the Contractor's expense.

Steel tracked equipment shall not be used on paved surfaces that are not to be replaced. If steel tracked equipment cannot avoid moving across these asphalt surfaces, protection measures shall be used such as steel plates, plywood or other means to protect the remaining surface. Any surface damaged by steel tracked equipment shall be repaired or replaced to the satisfaction of the Owner at the Contractor's expense.

101.2.07 Removal of existing water mains within project limits - The Contractor is responsible for cutting, capping and installing temporary valving as necessary to make clean, straight connections to the existing water system with as few fittings as possible or as directed by the Engineer. The Contractor shall demolish the existing water mains within the work area as necessary to create the necessary room for the proposed utilities. The Contractor shall develop and submit a Water Sequencing Plan (WSP) for review and approval as specified in Section 130.6.

101.2.08 Interference between existing utilities and new utilities - Conflicts exist between existing franchise utilities and proposed utilities and road improvements. The Contractor shall make all necessary provisions to perform necessary relocations as specified in the plans to allow for the new construction of the water and storm system.

101.2.09 Project Dewatering – Groundwater is not expected to be encountered on the project. The Contractor is responsible for designing and installing a dewatering system if necessary as described in Section 222.

101.3 OWNER'S RIGHTS UPON THE PREMISES:

The Owner, on behalf of both the public and the City of Manzanita, reserves the right to enter upon the premises, to use same, or to use parts of the work before substantial or final completion of the work, it being understood that such use by the Owner and the public in no way relieves the Contractor from full responsibility for the entire work until final completion of the contract.

END OF SECTION 101

SECTION 104 – COORDINATION

104.1 PROJECT COORDINATION:

ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center. (Note: The telephone number for the Oregon Utility Notification Center is (503) 232-1987.)

The work of this project involves underground and overhead utilities, and public rights-of-way. The Contractor shall coordinate all work with the following agencies prior to beginning the project.

104.1.01 - City Street Right-of-Way, Storm Drainage System and Water System; City of Manzanita Public Works Department, Rick Rempfer, Public Works Director, **(503) 368-5347.**

104.1.02 - Sanitary Sewer System; Nehalem Bay Wastewater Agency (NBWA); Bruce Halverson, (**503) 368-5125.**

104.1.03 - CATV; Charter Communications, Justin Hall, **(541) 921-1859.**

104.1.04 - Telephone Facilities; RTI Nehalem Telecom, Bill Dillard, **(503) 368-5116**.

104.1.05 - Electric Facilities; Tillamook People's Utility District (TPUD), Engineering Dept., James Aman, **(503) 842-2535**.

104.2 CUTTING AND PATCHING:

104.2.01 Notification - The Contractor shall notify the Engineer at least 3 days prior to any cutting which affects:

a. the structural integrity of any completed or existing work, or
b. the weatherproof integrity of any weather-exposed or moisture-resistant work.

104.2.02 Preparation - Prior to any cutting, the Contractor shall provide and maintain adequate temporary support and protection necessary to assure the structural and weatherproof integrity of the affected work. The Contractor shall protect from damage all portions of the exposed work and other portions of the project.

104.2.03 Existing Conditions - After uncovering work, the Contractor shall inspect the existing conditions and report to the Engineer any unsatisfactory or questionable conditions to the Engineer. The Contractor shall not proceed with further work until the Engineer provides further instructions.

104.3 MEASUREMENT AND PAYMENT:

Before ordering any materials or doing any work, the Contractor shall verify all measurements on the project and shall be responsible for the correctness of the same. No additional payment to the Contractor will be allowed on account of difference between actual dimensions and measurements indicated on the plans.

END OF SECTION 104

SECTION 106 – REGULATORY REQUIREMENTS

106.1 PERMITS AND FEES:

The Contractor shall procure all construction permits, performance bonds and licenses required by all approving agencies. The work of this project falls under the jurisdiction of the City of Manzanita and Tillamook County. The Contractor shall conform to all jurisdiction requirements of the governing agencies when working within the public right-of-way. The following permits will be a part of the project:

- NPDES 1200-C Storm Water Permit
- Right of way permits for Tillamook County
- Any traffic control permitting and reviews.

Work hours are to be between 7am and 7pm, Monday through Friday. Any deviation from this schedule must be requested by the Contractor in writing and receive approval from the City.

The City shall provide copies of all temporary construction easements and access easements for the project.

END OF SECTION 106

SECTION 121 – PROJECT MEETINGS

121.1 PRECONSTRUCTION CONFERENCE:

Immediately after signing the Agreement and prior to the start of any work, the Contractor, the Engineer and the Owner shall meet together to review procedures for ensuring the smooth progress of the work and to discuss any other items requiring clarification. Before the project construction activities start a kick off – Preconstruction meeting will be required with the Contractor, Subcontractors, Owner, Engineer, Utilities, and Biz Oregon. All required forms required by Biz Oregon will need to be completed to be given to the Biz Oregon representative at this meeting if not sooner.

121.2 WEEKLY PROGRESS MEETINGS:

Periodic project meetings between the Contractor and the Engineer shall be scheduled by the Engineer throughout the construction process on a weekly basis to discuss coordination and scheduling of construction activities. In general, such meetings shall be held each Monday morning on the project site. The Contractor shall inform the Engineer of the project schedule and construction activities planned for the coming week and shall provide a verbal update to the Engineer on the project schedule for the actual work completed through the end of each week.

Residents adjacent to the project will be allowed to be present at these weekly meeting in order to be informed about road closures, access to their properties and proposed work for the week.

END OF SECTION 121

SECTION 131 – SUBMITTALS

131.1 GENERAL:

The Contractor shall be required to submit the following submittals.

1) Construction Schedule
2) Shop Drawings, Product Data, and Samples
3) Traffic Control Plan & Sequencing Plan
4) Demolition Plan
5) Trenchless installation Plan
6) Water Shut-Down & Sequencing Plan
7) Water disinfection plan
8) Record Drawings at completion of project
9) Dewatering Plan (if needed)

10) Aggregate, Asphalt Mix & Concrete Mix Design, including grout
11) TV Inspection on electronic media at completion of project (storm installation)

131.2 CONSTRUCTION SCHEDULE:

131.2.01 Project Schedule - The anticipated construction schedule is set forth in the Instructions to Bidders prior to commencing work on the project, the Contractor shall submit to the Engineer for review, a complete construction schedule detailing the order in which the work will proceed together with an estimated time schedule. An updated project schedule shall be submitted on a monthly basis along with every monthly progress payment request. If Contractor's submitted schedule and the prosecution of work vary by 2 weeks or more, Contractor shall re-submit a new schedule, and a work plan to complete project on time.

131.2.03 July 4th Site Conditions The Contractor shall make all side streets, Necarney City Road, Classic Street from Laneda to Dorcas, intersection at Laneda, Dorcas and Necarney accessible, free of materials and equipment no later than the end of the work day on July 2, 2025 in preparation for the City of Manzanita 4th of July Parade. The Contractor shall take all necessary costs, preparations and such delays into account when planning for work during these specified times. Calendar days for holidays will be included in the overall contract completion timing.

131.2.03 Memorial Day and Labor Day weekend Site Conditions – The contract site shall be clear of equipment and materials no later than the Thursday prior to these holiday weekends. Calendar days for holidays will be included in the overall contract completion timing.

131.3 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES:

131.3.01 Identification - Shop drawings, product data, and samples shall be dated and contain: Name of project; description or names of equipment, materials and items; identification of locations at which the equipment, materials or items are to be installed.

131.3.02 Transmittals - Submission of shop drawings, product data, and samples shall be accompanied electronically by use of Projectsight software.

131.3.03 Quantity - Unless otherwise specified, the number of shop drawings, product data, and samples which the Contractor shall submit and, if necessary, resubmit shall be the number of copies that the Contractor requires to be retained plus two copies which will be retained by the Engineer.

131.4 TRAFFIC CONTROL PLAN & SEQUENCING PLAN:

131.4.01 Traffic Control Plan (TCP) Guidelines:

1. TCP shall be drawn on 24" x 36". Base Map is available from the Engineer upon request.
2. TCP must use legible lettering and clear, contrasting, symbols for viewing or printing.
3. Include name and telephone number of the 24-hour contact person representing the Contractor.
4. Show all nearby streets with street names to assure proper orientation.
5. Show existing sidewalks, driveways and intersections in the construction work zone including areas affected by taper transition.
6. Show location and dimensions of the construction work zone.
7. Show staging area and materials storage area, as appropriate.
8. Indicate location of construction signs, barricades, and delineators.
9. Use a legend to define all signs and symbols and designate them with MUTCD nomenclature.
10. Show existing and proposed temporary parking restriction zones and signs, as needed, within the work area.
11. Road closures will require approval from the City of Manzanita Director of Public Works, Police, Fire Department and Emergency Services.
12. Signs and barricades will be required to direct pedestrians and bicyclists through or around the construction work zone and shall be shown on the TCP.
13. Indicate on the plan the duration of the construction work and subsequent traffic control (include type of work and estimated start date, as appropriate).

131.5 DEMOLITION PLAN:

130.5.01 Demolition Plan - Contractor shall detail the different stages of the demolition plan, located within the Construction Drawings. Details of these stages may be incorporated into the Construction Schedule.

131.6 WATER SHUT-DOWN & SEQUENCING PLAN:

131.6.01 - A Water Sequencing Plan (WSP) shall be submitted by the Contractor and approved by the City and Engineer prior to the installation of any water main or appurtenances. At a minimum, the WSP shall address the following information:

1. WSP shall be drawn on 24" x 36".
2. Indicate on the plan the duration of the construction work and subsequent disruptions and tie-ins (include type of work and estimated start date, as appropriate).
3. Contractor shall sequence construction to allow for continuous water service to all residences throughout the project area, except as required for mandatory shut-downs. Due to the lack of water valves on the existing system within the project region, breaks, shut-downs and tie-ins will impact large portions of the City's residence.
4. Conflicts exist between the existing water main and new water main throughout the project, particularly at intersections. The Contractor shall install temporary thrust blocking and temporary valving as necessary to allow the demo of conflicting water pipes.
5. Contractor shall phase construction to limit the amount of mandatory shut-downs when tying the new water mains into the existing system. This may require the Contractor to construct, test and disinfect the new water main in sections, utilizing temporary tie-ins.
6. New water mains and appurtenances - construction should begin in the proximity of existing mains to facilitate future installation of the testing corporation stop assembly (i.e. jumper) and tie-in.
7. Connection to any existing waterline is not allowed until Contractor is ready to test new water mains prior to placing them in service. Contractor shall be responsible for all labor and equipment required for pressure testing flushing, chlorination, dechlorination, erosion prevention, and repair of any damage caused by any and all water main flushing prior to issuance of tentative acceptance by the city or engineer.
8. Initial flush - initial flushing of new water main(s), including all hydrants and dead-end water main(s), may commence after jumper has been installed and connection to the existing water main is complete. City personnel may verify that initial flushing is properly performed and all air and debris have been removed from the new water main. All water mains shall be initially flushed at a minimum rate of 2.5 feet per second (fps) and for the duration necessary to provide a minimum of 2 complete water turn-overs within the new water main(s).
9. Removal of the jumper and final flush – Once City or Engineer approval has been granted, the Contractor may remove the jumper and perform needed flushing on the new water main to remove any remaining air and debris. City personnel may flush existing water mains as necessary and verify that Contractor's flushing of the new water main(s) is adequate.
10. Disinfection plan – provide a plan including timing for testing and line disinfection

131.7 DEWATERING PLAN (if required):

131.7.01 Dewatering Plan - Contractor shall submit a dewatering plan meeting the requirements of Section 222 of these technical specifications as required by the Engineer.

131.8 RECORD DRAWINGS AT COMPLETION OF PROJECT:

131.8.01 Record Drawings - Contractor shall submit Record Drawings to the Engineer or City upon completion of construction. Record Drawings shall be submitted in both paper and digital (PDF) form. Any associated warranty information, manuals, cut sheets, etc. pertinent to the construction shall also be submitted.

131.9 MEASUREMENT AND PAYMENT

There shall be no separate measurement and payment for project submittals. The cost for this work shall be included in other bid items.

END OF SECTION 131

SECTION 132 – WEB BASED CONSTRUCTION MANAGEMENT

SECTION 132.1
The use of a web-based construction management (WBCM) system is a requirement of this contract.

132.2 WEB based construction management
ProjectSight, go to www.projectsight.trimble.com

132.3 PROJECTSIGHT™
A. The Owner and Contractor shall utilize an Owner-provided web-based construction management system, ProjectSight™, for electronic submittal of all data and documents throughout the duration of the Contract. The Owner furnished WBCM will be made available to all Contractors' Project personnel, subcontractor personnel, suppliers, consultants, and the Designer of Record. The joint use of this system is to facilitate electronic exchange of information, automation of key processes, and overall management of the Contract. The WBCM shall be the primary means of Project information submission and management. When required by the Owners representative, paper documents will also be provided. In the event of discrepancy between the electronic version and paper documents the paper documents will govern.

User Access Limitations:
The Owner's Representative will control the Contractor's access to the WBCM by allowing access and assigning user profiles to accepted Contractor personnel. User profiles will define levels of access into the system, determine assigned function-based authorizations (determines what can be seen), and user privileges (determines what they can do). Subcontractors and suppliers will be given access to the WBCM through the Contractor. Entry of information exchanged and transferred between the Contractor and its subcontractors and suppliers on the WBCM shall be the responsibility of the Contractor.

Joint Ownership of Data: Data entered in a collaborative mode (entered with the intent to share as determined by permissions and workflows within the WBCM) by the Owner's Representative and the Contractor will be jointly owned.

Automated System Notification and Audit Log Tracking: Review comments made (or lack thereof) by the Owner on Contractor submitted documentation shall not relieve the Contractor from compliance with requirements of the Contract Documents. The Contractor is responsible for managing, tracking, and documenting the Work to comply with the requirements of the Contract Documents. Owner's acceptance via automated system notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the Contractor's submitted information.

Submittals: See Section 01 33 00, Submittal Procedures.

Computer Requirements: The Contractor shall use computer hardware and software that meets the requirements of the Owner furnished WBCM as recommended by the WBCM supplier to access and utilize the WBCM. As recommendations are modified by the WBCM supplier, the Contractor will upgrade their system(s) to meet the recommendations or better. Upgrading of the Contractor's computer systems will not be justification for a cost or time modification to the Contract.

Contractor Responsibility: The Contractor shall be responsible for the validity of their information placed in the WBCM and for the abilities of their personnel. Accepted users shall be knowledgeable in the use of computers, including but not limited to Internet browsers, email programs, CAD drawing applications, and Portable Document Format (PDF) document distribution program. The Contractor shall utilize the existing forms in the WBCM to the maximum extent possible. If a form does not exist in the WBCM, the Contractor must include a form of their own or provided by the Owner's Representative as an attachment to a submittal. PDF documents will be created through electronic conversion rather than optically scanned whenever possible. The Contractor is responsible for the training of their personnel in the use of the WBCM (outside what is provided by the Owner) and the other programs indicated above as needed.

User Access Administration: Provide a list of Contractor's key WBCM personnel for the Owner's Representative acceptance. Contractor is responsible for adding and removing users from the system. The Owner's Representative reserves the right to perform a security check on all potential users. The Contractor will be allowed to add additional personnel and subcontractors to the WBCM.

Connectivity Problems: The WBCM is a web-based environment and therefore subject to the inherent speed and connectivity problems of the Internet. The Contractor is responsible for its own connectivity to the Internet. The WBCM response time is dependent on the Contractor's equipment, including processor speed, Internet access speed, etc., and current traffic on the Internet. The Owner will not be liable for any delays associated from the usage of the WBCM including, but not limited to slow response time, downtime periods, connectivity problems, or loss of information. The Contractor will ensure that connectivity to the WBCM (whether at the home office or jobsite) is adequate. The minimum bandwidth requirements for using the system is 128 kb/s. It is recommended a faster connection be used when uploading pictures and files into the system. Under no circumstances shall the usage, of the WBCM be grounds for a time extension or cost adjustment to the Contract.

Training:

The Project Owner has arranged for the following training to be provided to the Contractor:
Up to two WBCM training sessions will be offered for Contractor and Subcontractor personnel to be coordinated at a time arranged by Contractor with Owner's Representative within 21 days of Notice to Proceed. Contractor participation in training is strongly encouraged and shall be considered incidental to the Work.

132.4 Measurement and Payment
There shall be no separate measurement and payment for this item; costs shall be included in other bid items.

END OF SECTION 132

SECTION 151 – TEMPORARY FACILITIES AND CONTROLS

151.1 TEMPORARY ELECTRICITY:

The Contractor will provide and pay all charges for a source of power. The Contractor shall provide his own extension cords, temporary lighting lamps and wiring for his work. Heavy or special power sources required for welders, etc., shall be provided by the Contractor by the use of generators or making his own arrangements with the Power Company and pay all costs for same.

151.2 TEMPORARY WATER:

151.2.01 Temporary Water for Construction Use - The Owner will designate fire hydrants within or near the project as a source of water for construction use. The Contractor shall operate such hydrants in an approved manner. The Contractor shall provide valves, hoses, extensions, and nozzles as required. Water usage shall be metered with hydrant flow meter as provided by the City with approved backflow device. The contractor shall schedule obtaining and coordinating water access with the city.

151.3 TEMPORARY SANITARY FACILITIES:

151.3.01 Temporary Facilities for Workmen - The Contractor shall furnish, install, and maintain adequate sanitary facilities for the workmen. All such facilities shall comply with governing health regulations.

151.5 MEASUREMENT AND PAYMENT:

All temporary facilities and construction will be included in the single lump sum item at the contract price for "Mobilization". Payment shall constitute full compensation for supplying all labor, equipment and materials, constructing, installing, maintaining and removing all temporary facilities and construction specified herein.

END OF SECTION 151

SECTION 160 – MATERIALS AND EQUIPMENT

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

160.1 TRANSPORTATION AND HANDLING:

The Contractor shall arrange for all product and material deliveries in accordance with the project schedule to avoid any unnecessary delays. Products and materials shall be delivered undamaged, in the manufacturer's original packaging, and with legible identifying labels intact. Immediately upon delivery, the Contractor shall inspect all products for compliance with the contract documents.

160.2 STORAGE AND PROTECTION:

The Contractor shall store all products according to manufacturer's instructions. Before and after installation, the Contractor shall protect all products from damage and discoloration.

160.3 PRODUCT SUBSTITUTIONS AND OPTIONS:

160.3.01 Substitutions – No substitutions will be allowed on the proposed water system. Other substitutions will be considered, however, only substitutions approved by the Engineer shall be incorporated in the work. Each request for product substitution shall be made to the Engineer in writing and shall include:

a. The identification of the specified product.
b. The identification of the proposed substitution complete with manufacturer's literature and other information necessary for evaluation.
c. All changes required in other work as a result of the proposed substitution.
d. All cost increases as a result of the proposed substitution.
e. Contractor shall provide a purchase order for the Engineer to evaluate proposed substitutions and/or subsequent approval by the City.

The Engineer shall be the sole judge of the acceptability of each proposed substitution.

160.3.02 Contractor's Options:

160.3.02A - For products specified by general standards, such as ASTM, etc., the Contractor shall select any product meeting the specified standard.

160.3.02B - For products specified by naming several manufacturers, the Contractor shall select any product manufactured by a specified manufacturer meeting the specifications.

160.3.02C - For products specified by "or approved equal", the Contractor shall submit requests for substitution as specified above.

160.3.03 Inappropriate Products and Methods - If the Contractor believes that any specified product, method, or system is inappropriate for use he shall so notify the Engineer before performing the work in question. Start of work shall constitute acceptance on the part of the Contractor that the specified products, methods, and systems are appropriate for the specified use.

END OF SECTION 160

SECTION 180– CONTRACT CLOSEOUT

180.1 FINAL INSPECTION:

When all on-site paving and related work is completed, including site cleanup, the Contractor shall notify the Engineer in writing that the project is ready for final inspection. The Engineer will make an inspection within 15 calendar days of receiving notification. The Engineer will notify the Contractor, in writing, within 10 calendar days thereafter. If all construction work required by the contract is found complete and satisfactory, this inspection will constitute the final inspection.

If any work is found incomplete or unsatisfactory, the Engineer will give written instructions as to what shall be done to satisfactorily complete the work. After complying with the Engineer's instructions, the Contractor shall follow the above procedures of notification, requesting a final inspection.

The Engineer will issue a notice to the Contractor when all the following work is satisfactorily completed:

a. All work required under the contract;
b. All Change Order work;
c. The final trimming and cleanup work; and,
d. All required certifications, bills, forms, and other documents are received from the Contractor.

180.2 PROJECT SITE CLEAN-UP

Prior to the release of the retained funds, the project site shall be cleared of any debris, trash, construction materials, or any other materials left on the site as a result of paving and striping construction of the project. As the work progresses and immediately after completion of the work, the Contractor shall clean up and remove all refuse and unused materials of any kind resulting from the work. If the Contractor fails to commence the cleanup within 24 hours after directed by the Engineer, the Engineer may have the work performed by others. The cost shall be borne by the Contractor and may be deducted from payments due or to become due to the Contractor. After work is completed and before final acceptance of the work, all areas affected by the work shall be neatly finished and all equipment, temporary structures, rubbish and waste shall be removed from the work area.

END OF SECTION 180

END OF DIVISION ONE

DIVISION TWO – SITEWORK

SECTION 201 – MOBILIZATION

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

201.1 DESCRIPTION:

Mobilization shall consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site; for the establishment of offices, buildings and other facilities necessary for work on the project for traffic control; for premiums on bond and insurance for the project, and for other work and operations which the Contractor must perform or costs he must include before beginning work on the project.

201.2 MATERIALS:

The Contractor shall provide all materials required to accomplish the work as specified.

201.3 CONSTRUCTION:

201.3.01 General - The Contractor shall set up construction facilities in a neat and orderly manner within designated or approved work areas.

201.4 MEASUREMENT AND PAYMENT:

201.4.01 Lump Sum Basis - Payment for the performance of the mobilization work as above specified will be made at the contract lump sum amount for the item "Mobilization". The amounts to be allowed for "Mobilization" in the progress payment to be made under the contract will be made as follows:

1. When 5% of the total contract amount, as modified by Change Order, is earned from other bid items, not including advances on materials, 50% of the amount bid for mobilization, or 5% of the total original contract amount, whichever is the least, less normal retainage, will be paid.
2. When 10% of the total contract amount, as modified by Change Order, is earned from other bid items, not including advances on materials, 100% of the amount bid for mobilization, or 10% of the total original contract amount, whichever is the least, less normal retainage, will be paid.
3. Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10% of the total original contract amount will be paid.

The above schedule of progress payments for mobilization shall not limit or preclude progress payments otherwise provided by the contract.

END OF SECTION 201

SECTION 202 – TEMPORARY PROTECTION AND DIRECTION OF TRAFFIC

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

202.1 DESCRIPTION:

This work consists of furnishing, installing, moving, operating, and maintaining signs, barricades, and other traffic control devices throughout the area affected by the project.

202.2 MATERIALS:

All materials used in temporary installations under this Section shall be in conformance with ODOT Specifications and the latest MUTCD.

202.3 CONSTRUCTION:

202.3.01 General - Protective and directional devices shall be provided by the Contractor as required, in addition to the specific signs and barricades shown on the Traffic Control Plan. The devices and their placement shall conform to the requirements of the ODOT specifications and the latest MUTCD.

202.3.02 Contractor's Plan and Schedule - Prior to beginning the work, the Contractor shall submit a proposed Traffic Control Plan for protective and directional measures in compliance and approved by the Engineer. During the performance of the work, the Contractor shall submit any proposed revisions to the plan for the Engineer's approval.

No work shall be started on any stage of construction until the Contractor’s Traffic Control Plan has been approved and all approved traffic control devices are in place. Reviewing of the TCP will include city, county and consulting engineering staff.

During construction, the Contractor shall determine if any protective and directional devices are required in addition to those in place and shall immediately notify the Engineer. The Contractor shall immediately make any changes approved or directed by the Engineer but shall not place or remove devices without prior approval from the Engineer.

202.3.03 Maintenance - The Contractor shall maintain all traffic devices in proper position, clean, and legible at all times. Vegetative growth or other materials shall be trimmed or removed to permit clear vision of the devices. Lights, beacons, and flashers shall be kept clean, visible and operable. The effectiveness of the installations shall be verified at frequent intervals, both in daylight and dark, by actual travel and inspection by the Contractor. Devices damaged or destroyed by any means shall be repaired, replaced, or restored by the Contractor.

The Contractor shall have a person on the job during working hours and on call at all other times, who will maintain all directional and warning devices in proper position and condition. The name and phone number for that person shall be on file with the Engineer and local law enforcement agencies.

202.3.04 BARRICADES, WARNING SIGNS, AND FLAGGERS:

Per the approved TCP, the Contractor shall at his expense and without further or other order provide, erect and maintain at all times during the progress or temporary suspension of the work suitable barricades, fences, signs, or other adequate warnings or protection, and shall provide, keep and maintain such equipment and labor as may be necessary or as may be ordered by the Engineer to insure the safety of the public as well as those engaged in connection with the work. All barricades and obstructions shall be protected at night by signal lights which shall be suitably distributed across the roadway and which shall be kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be suitably painted to increase their visibility at night. Failure of the Engineer to notify the Contractor to maintain traffic control devices, or flagger shall not relieve the Contractor from this responsibility. Barricades, Signs and Temporary Devices used under these provisions remain the property of the Contractor and shall be moved, removed, or made inoperative as occasion dictates during the life of the contract.

In conjunction with the required general traffic control work, the Contractor shall furnish and maintain the temporary signs and Type III barricades as detailed on the Traffic Control Plan.

If flagmen are necessary for the purpose of protection and safety to traffic, such flagmen shall be furnished at the Contractor's expense. The signs to be furnished and used by the Contractor in directing, controlling and safeguarding traffic shall conform to the standard sign designs in use by the ODOT and the latest release of the MUTCD.

Inappropriate temporary or existing signs shall be covered or turned to preclude visibility to traffic. Flags shall be removed or rolled and completely covered with an opaque, black, nonreflective sheath.

Upon completion of the work, the devices shall be removed from the project and evidence of their existence obliterated.

202.3.05 Flaggers shall have satisfactorily completed approved training courses.

202.3.06 Lane Closures - The Contractor shall obtain the Engineer's approval of proposed methods and timing of lane closures.

202.3.07 Obstruction of Traffic - The Contractor shall conduct work to assure the least possible obstruction to traffic. Work which would restrict or interrupt traffic movement shall not be performed on opposite sides of the traveled way at the same time. See also Section 101.2 Construction Sequencing.

202.3.08 TRAFFIC ON LOCAL STREETS:
The Contractor shall allow minimum one-way traffic along within the project limits to residences and businesses having accesses within the project limits. The Intersections may be temporarily closed to through traffic in accordance with Section 157 of these specifications. The Contractor shall furnish and place traffic control barricades and signs in order to allow the public access to commercial properties and residences within the project limits. The barricades shall be placed at each end of the project, including all side streets. The Contractor shall use additional cones, delineators and barricades to keep vehicular and pedestrian traffic out of the immediate construction zone of the Contractor.

202.3.09 PEDESTRIAN ACCESS:
The Contractor shall so conduct his operations as to cause the least possible obstruction and inconvenience to the public and the Owners and occupants of abutting properties and their visitors. The Contractor shall maintain convenient pedestrian access at all times along all walking paths abutting the project.

202.4 MEASUREMENT AND PAYMENT:

202.4.01 General - Measurement and payment for Temporary Protection and Direction of Traffic will include, but not necessarily be limited to, the following work items:

a. Furnishing and installing tubular markers, flashers, and other traffic control devices not covered by other pay items;
b. Maintaining, moving and removing all devices;
c. Placing, maintaining, and removing temporary sign covers;
d. Providing for and furnishing electrical energy;
e. Cleaning up and removing devices destroyed or damaged by public traffic;
f. Furnishing, placing, maintaining, and removing temporary crushed rock ramps at driveways and crosswalks for temporary access over concrete curbs and concrete crosswalks;
g. Maintaining all directional and warning devices; and
h. Furnishing all other labor, materials, and equipment necessary to perform the temporary protection and direction of traffic.
i. Use of flagging personnel on the project including all equipment.

202.4.02 Payment - Temporary protection and direction of traffic will be paid on a lump sum basis for all required work. The Contractor shall include in the contract Bid sum, sufficient funds as may be required for supplying all labor, equipment and materials necessary for the proper regulation of traffic.

END OF SECTION 202

SECTION 205 – DEMOLITION

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

205.1 DESCRIPTION:

This item includes all work necessary for the demolition, removal and disposal of all pavement, curbs, driveways, sidewalks, trees and brush, inlets, manholes, storm pipe, water pipe, and abandoned pipelines within the designated limits and to preserve from injury or damage such objects and structures as are designated to remain in place.

This item also includes the disposal of unsuitable and excess excavated material within the designated limits.

205.2 MATERIAL:

205.2.01 No disposal site - will be provided by the Owner. The Contractor shall dispose of all excess material not required elsewhere on the project, make arrangements for disposal and bear all cost related thereto. All details for the use of such site shall be the responsibility of the Contractor. Written permission to place material on private property shall be obtained by the Contractor from the property owner or other responsible party prior to placing the material thereon, and evidence of such permission shall be furnished the Engineer. The permit shall be in writing and shall be so phrased as to absolve the Owner from any and all responsibility in connection with the placing of material on said property.

205.2.03 Disposal of Removed Materials - The Contractor shall dispose of all removed pipelines, materials, unsuitable and excess material not required offsite.

205.3 CONSTRUCTION:

205.3.01 Public streets - used by the Contractor between the project site and all disposal sites shall be kept free and clear of any and all debris resulting from the Contractor's demolition activity.

205.3.02 Asphalt surfaces - designated to remain, and which will abut new asphalt surfaces shall be sawcut to a neat and straight edge. The Contractor shall pre-cut all existing pavement before commencing excavation. All saw cuts shall be made with a concrete saw. Where the Contractor fails to protect the cut edges during trenching and backfilling, the Contractor shall be required, at the Contractor’s expense, to re-cut the edges prior to repairing the pavement.

205.3.03 Water Pipeline Demolition - The Contractor is responsible for cutting, capping and installing temporary valving at beginning, end and each side road of the project as necessary to make a clean tie-in to the existing water main. This will allow the Contractor to demolish the existing water mains in order to create the necessary room for the proposed water main. The Contractor shall be responsible for protecting any temporary water services throughout construction and assisting the City if modifications need to be made during construction in order to provide continuous water service to residents.

205.3.04 Storm Structures and Pipe Demolition - The Contractor is responsible for cutting and protecting existing pipes or structures to remain at beginning and end of the storm sewer as necessary to make a clean connection to the existing storm sewer. This will allow the Contractor to demolish the existing storm sewer in order to create the necessary room for the proposed storm sewer. The Contractor shall be responsible for protecting any storm runoff throughout construction.

205.3.05 Clearing and Grubbing - The Contractor is responsible for trimming, cutting, and stump removal, all trees and brush within the construction limits unless called out to remain on the plans. The Contractor shall be responsible for protecting any adjacent vegetation and trees called out on the plans to stay.

205.3.06 Salvage and Reinstall Hydrant – The Contractor is responsible for removing/salvaging and storing the existing hydrant and assembly valve in a manner that protects and leaves the Hydrant and valve in proper working order and reinstalled in the new location designated on the plans. Improper removal, handling, and/or storage will result in the Hydrant assembly being replaced at the contractor’s expense.

205.3.07 Salvage Existing Signs - The Contractor is responsible for removing/salvaging the existing Sign and post in a manner that protects and leaves the sign in proper working order. The City will reinstall all signs in the new location designated on the plans. Improper removal, handling, and storage will result in the sign and post being replaced at the contractor's expense. If the post cannot be salvaged notify the engineer before removal to be documented and replacement.

205.4 MEASUREMENT AND PAYMENT:

205.4.01 Measurement and payment for all demolition activities will be made according to the following items:

205.4.01A Removal of Pavement, AC/PCC will be as shown in the plans and as measured and paid for on a square yard basis of the gross surface area of pavement designated in the plans and actually removed under the bid item "Removal of Pavement, AC/PCC." Additional pavement demolition due to contractor damage will be paid by the contractor.

205.4.01B Concrete Demolition of concrete walks and curbs will be measured and paid for on the bid basis, on a square yard basis of the surface area of sidewalk designated and actually removed under the bid item "Removal of Walk". "Removal of Curbs" will be measured and paid for on a lineal foot of the length of curb actually removed Additional curb and gutter removal due to contractor damage will be paid by the contractor.

205.4.01C Sawed asphalt will be measured on a linear foot basis for the lengths designated and sawed and paid for under the bid item of "Asphalt Pavement Sawcutting". Additional pavement sawcutting due to contractor damage will be paid by the contractor.

205.4.01D Pipeline and Structure Demolition - There will be separate payment for water pipeline, storm pipeline or storm structure demolition. The cost of pipe demolition "Remove or Plug-Fill and Abandon Existing Pipe (Water)" and "Removal of Pipe (Storm Sewer)" will be by the lineal foot measured along the pipeline removed. The cost of "Removal of Structures (Storm Sewer)" is to be by lump sum and include but not limited to the structure, rings, and casting. All water main fittings are incidental to "Remove or Plug-Fill and Abandon Existing Pipe (Water)".

205.4.01E Clearing and Grubbing will be measured and paid for on an acre basis of the gross area surface cleared and grubbed as shown in the plans.

205.4.01F Salvage and Reinstall Hydrant will be measured and paid for by each Hydrant assembly called out and shall include the hydrant and gate valve, any 6" ductile iron pipe used will be paid separately.

205.4.01G Salvage Existing Signs will be paid by lump sum. Work will include removal of sign and post and delivery to the City.

205.4.02 Payment will be made at the appropriate contract price and shall constitute full compensation for all demolition work, backfilling with approved material, loading, hauling, reinstallation, disposal and disposal site activities.

END OF SECTION 205

SECTION 206 – COLD PLANE PAVEMENT REMOVAL

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

206.1 Description:

206.2.1 Scope - This Work consists of removing existing Pavement to prepare a foundation for placing new Surfacing.

206.2 Equipment

206.2.1 Equipment - Provide self-propelled planing machines or grinders:

- Capable of removing Pavement material.
- Capable of accurately establishing profile grades within a tolerance of 0.02 foot by reference from either the existing Pavement or from independent grade control.
- With a positive means for controlling cross-slope elevations.
- With a totally enclosed cutting drum with replaceable cutting teeth.
- With an effective means of removing loosened material from the surface and preventing dust from escaping into the air.
- Capable of providing a true cross-slope grade that will allow placement of overlay Pavement to a uniform thickness.

206.3 Construction

206.3.1 Pavement Removal:

206.3.1A General - Remove the existing Pavement to the depth, width, grade and Cross Section shown or as directed. The use of a heating device to soften the Pavement is not allowed. All edges shall be vertical without tapered edges.

206.3.1B Depth 1 inch to 2 inches - If the depth of the existing Pavement to be removed is 2 inches or less, but more than 1 inch and the section will be under traffic. Schedule the Work so the full width and length of travel lanes of the pavement can be removed during the same shift. Remove the Shoulder area within 24 hours.

206.3.1C Depth over 2 inches - If the depth of the existing Pavement to be removed is over 2 inches and the section will be under traffic, schedule the Work so the full width and length of the travel lanes and Shoulders can be removed, leaving no longitudinal or transverse drop-offs, during the same shift.

206.3.1D Pavement Removal Alternative - If unable to complete the Pavement removal according to 206.3.1(B) and (C), then within the same Day construct a wedge of asphalt concrete, at a Slope of 1V:10H or flatter along each exposed longitudinal drop-off, and 1V:50H or flatter along each exposed transverse drop-off. Place wedges completely across the milled area at intersections, points of beginning and ending of the milling operation, and around manholes, valve boxes and other Structures. Longitudinal drop-offs of 1 inch or less do not require a wedge. Maintain wedges as long as the area remains under traffic or until Pavement is replaced. Remove and dispose of wedges before placing new Pavement.

206.3.1E Warning Signs - Provide warning signs as required where abrupt or sloped drop-offs occur at the edge of the existing or new surface according to Section 202.

206.3.2 Surface Tolerance - Test with a 12-foot straightedge furnished and operated by the Contractor, as directed. The variation of the top of the ridges from the testing edge of the straightedge, between any two ridge contact points, shall not exceed 1/4 inch.

206.3.3 Disposal of Materials - Dispose of all materials according to 205.

206.3.4 Maintenance Under Traffic - If the cold planed Pavement surface will be exposed to traffic, sweep and clean prior to allowing traffic to use the Roadway.

206.4 Measurement

206.4.1 Measurement - The quantities of cold plane Pavement removal will be measured on the square yard basis, in place. When the depth of Pavement to be removed is variable, the depth as shown is an estimate and is approximate only. No guarantee is made that the actual depth will be the same as the estimated depth.

206.5 Payment

206.5.1 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per square yard, for the item "2" Cold Plane Pavement Removal". Payment will be payment in full for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified. No separate or additional payment will be made for temporary wedges constructed, maintained, and removed under 00620.40(d), or for replacement of cutting teeth.

END OF SECTION 206

SECTION 220 – EARTHWORK

220.1 DESCRIPTION:

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

This item includes all work necessary for general excavating, borrow excavation and grading all roadways, driveway areas, parking areas planting areas, cuts, embankments, slopes, fills, roadway ditches, lot grading and all other earth-moving work required in the construction of the project including disposal of all surplus material.

All excavation covered in this item shall be unclassified excavation regardless of the type, nature or condition of the materials encountered. The Contractor shall assume full responsibility to estimate the kind and extent of the various materials to be encountered in order to accomplish the work.

220.2 MATERIALS:

220.2.01 Disposal of Unsuitable and Excess Material - The Contractor shall dispose of all unsuitable and excess material not required elsewhere on the project.

220.2.02
Borrow Excavation shall be approved material provided and obtained from authorized sources lying outside of, separated from and independent of the Roadway Cross Sections. Sufficient material is not available within the project limits. Contractor shall provide material similar to the site materials as approved by the Engineer. Material shall be imported select structural fill with a maximum particle size of 4” and less than 5% passing the #200 sieve. There shall be no vegetative matter in the borrow.

220.3 CONSTRUCTION:

220.3.01 Embankments and fills shall be placed in approximately horizontal layers of a maximum of 8 inches in thickness, each layer being separately and thoroughly compacted.

220.3.02 Excavation and grading shall be to the lines and grades as shown on the plans and as staked by the Engineer. The Contractor shall trim all roadbeds, parking areas ditches and other excavations and embankments to the established lines and grades. All surfaces shall be left in a neat and well-finished condition prior to the time the project is completed and accepted. Immediately prior to completion of the earthwork, the Contractor shall clean the entire roadway right-of-way area of debris and foreign matter of all kinds and dispose of as directed.

220.3.03 Roadway subgrade shall be excavated and shaped to line, grade, and cross-section as shown on the plans and as staked by the Engineer. The Contractor shall remove all soft or otherwise unsuitable material as directed and replace with suitable material from the excavation.

220.3.04 Compaction - See Section 223. The proximity to adjacent homes will require minimal vibration construction techniques.

220.4 MEASUREMENT AND PAYMENT:

220.4.01 – General Excavation will be measured by the cubic yard basis for all general excavation of materials within the designated limits and paid for under the bid item for General Excavation, including loading of all materials into trucks and transportation to the point of embankment. Borrow Excavation Measurement and Payment will be at the contract price per ton and shall constitute full compensation for all work specified herein.

END OF SECTION 220

SECTION 221 – TRENCH EXCAVATION, BEDDING AND BACKFILL

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

221.1 DESCRIPTION:

This item includes all work necessary for trench excavation, trench foundation, pipe bedding, pipe zone, trench backfill, and surface removal and replacement.

221.1.01 Trench excavation is defined as the removal of all material encountered in the trench to the depths as shown or as directed. Trench excavation shall be classified as unclassified excavation.

221.1.02 Trench foundation is defined as the bottom of the trench on which the pipe bedding is to lay and is responsible for the support of the pipe.

221.1.03 Pipe bedding is defined as the furnishing and placing of specified materials on the trench foundation so as to uniformly support the barrel of the pipe. The total bedding depth shall extend from a point 6 inches below the barrel of the pipe to the horizontal centerline of the pipe.

221.1.04 The initial backfill is defined as the full width of the trench from the top of the bedding to a point 12 inches above the top outside surface of the barrel of the pipe.

221.1.05 Trench backfill is defined as the furnishing, placing and compacting of material in the trench between the top of the initial backfill material and the bottom of the pavement base rock, ground surface, or surface material as directed.

221.2 MATERIAL:

221.2.01 The trench foundation shall be undisturbed native material in all areas except where in the opinion of the Engineer, the native material is such that it cannot support the pipe. In those conditions, excavation shall be included to additional depths as required by the Engineer and backfilled with select trench foundation material which shall be 1½ inch-minus crushed rock.

221.2.02 Pipe bedding material

221.2.02A Native Pipe Bedding - free of humus, organic matter, vegetative matter, frozen material, clods, sticks and debris and containing no stone having a dimension greater than 1½ inches. The materials shall predominate in the fine sizes and in place, shall present no isolated points or areas or larger stones which would cause fracture or denting of the structure or subject it to undue stress. When, in the opinion of the Engineer, the native material is unsuitable for pipe bedding, an Extra Work order will be issued and select pipe bedding material shall be used which shall be clean pea gravel or crushed rock with a maximum size of ¾ inch, uniformly graded from coarse to fine. All pipe bedding materials shall be subject to the Engineer's approval.

221.2.02B Select Pipe Bedding material shall be crushed rock with a maximum size of ¾ inch, uniformly graded from coarse to fine.

221.2.03 The initial backfill material shall consist of native sand, free of humus, organic matter, vegetative matter, frozen material, clods, sticks and debris and containing no stone having a dimension greater than 1½ inches. The materials shall predominate in the fine sizes and in place, shall present no isolated points or areas or larger stones which would cause fracture or denting of the structure or subject it to undue stress. When, in the opinion of the Engineer, the native material is unsuitable for initial backfill, an Extra Work order will be issued and select initial backfill material shall be used which shall be select pipe bedding material, as described above. All initial backfill materials shall be subject to the Engineer's approval.

221.2.04 Trench backfill shall be native sand, free of humus, organic matter, vegetative matter, frozen material, clods, sticks and debris and containing no stone having a dimension greater than 1½ inches which, in the opinion of the Engineer, meets the desired characteristic required for the specific surface loading or other criteria of the backfill zone. When, in the opinion of the Engineer, the native material is unsuitable for trench backfill, an extra work order will be issued and select trench backfill material shall be used which shall be pit-run or river-run rock, maximum aggregate size ¾ inches, with sufficient fine material to act as binder but no excess earth.

221.3 CONSTRUCTION:

221.3.01 Trench Excavation:

221.3.01A General - All trench excavation and backfill shall conform to any and all specifications of any controlling regulatory agency under which the work is being performed. Pipelines shall be constructed in continuous open trench except that, in special locations, short tunnels or the cut and tunnel method of excavation may be used under specific instructions of the Engineer. The Engineer may require the use of tunnels to pass obstructions or to minimize traffic interference.

221.3.01B Potholing and Subsurface Investigation – In advance of the trenching operations for waterline and storm construction, the Contractor shall pothole and explore the subsurface conditions, including types of materials and types of fittings of the existing mains and the locations of other utilities, at all locations noted on the plan General and Construction Notes. In general, potholing will occur at locations as directed by the Engineer, such as at all connections to existing mains and at utility crossings. The Contractor shall note all pertinent materials and locations of utilities at each pothole. If subsurface conditions differ from that as shown on the plans, the Contractor shall immediately notify the Engineer. The Contractor shall record all potholes on the as-built plans including location, date, time, depth dug and crossing elevations of found existing utilities.

221.3.01C Open Trench Limit - The length of open trench excavated shall always be kept to a minimum. The Engineer shall be the sole judge of the amount of open trench allowed based upon work conditions of the area. In normal cases, the open trench length shall not exceed 100 feet. Related trench construction such as crushed rock surface restoration, concrete restoration, etc. shall normally be completed within 300 feet of the open trench limit unless otherwise instructed by the Engineer.

221.3.01D Trench Width - It is the intent of these specifications that the trench width at the surface of the ground be kept to a minimum necessary to install the pipe in a safe manner. In all cases, trenches must be of sufficient width to allow for shoring and permit proper joining of the pipe and backfilling of material along the sides of the pipe. The minimum trench width, in the pipe zone shall be the outside diameter of the pipe plus 12 inches. No maximum width of trench at the top of the pipe will be specified herein. When required by design, it will be shown on the plans. If the maximum width shown is exceeded by the Contractor without written authorization, the Contractor will be required, at no expense to the Owner, to provide pipe of a higher strength designation, a higher class of bedding, or both, as approved. Excavation for manholes and other structures shall be wide enough to provide a minimum 12 inches between the structure surface and the sides of the excavation. The Contractor shall confine the top width of the trench to right of ways or easements. Special written agreements to extend the width may be made with the affected property Owner, provided such agreement is first approved by the Engineer. The Contractor shall take all necessary precautions to avoid damage to properties, structures and utilities adjacent to the trench.

221.3.01E Grade - The Contractor shall excavate the trench to the lines and grades as shown or established by the Engineer, with proper allowance for pipe thickness, pipe bedding and foundation stabilization as required. The subgrade upon which the bedding is to be placed shall be firm, undisturbed

and true to grade. If the trench is over-excavated, the Contractor shall restore to grade with material of the type specified for select bedding material at no expense to the Owner and place the material over the full width of the trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe bedding.

221.3.01F Disposal of Excess Material - The Contractor shall dispose of all excess material not required elsewhere on the project, make arrangements for disposal and bear all cost related thereto, in accordance with Section 205.

221.3.01G Shoring - Unless otherwise provided in the special provisions, 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. The method of shoring shall be according to the Contractor's design. The Contractor may elect to use a combination of shoring and overbreak, tunneling, boring, sliding trench shields or other methods of accomplishing the work, provided the method conforms to all applicable local, state and federal safety codes. Removal of any cribbing and sheeting from the trench shall be accomplished in such a manner as to fulfill the above requirements. Damages resulting from improper cribbing or from failure to crib shall be the sole responsibility of the Contractor. Cribbing will not be a pay item and the cost thereof shall be included in the unit contract price for “Install Water Main”, or “Install Storm Drainage Pipe” as applicable. That portion of cribbing or sheeting extending below the crown elevation of flexible pipe shall be left in place unless satisfactory means of reconsolidating bedding or side support, disturbed by cribbing or sheeting removal, can be demonstrated. If a moveable box is used in lieu of cribbing or sheeting and the bottom cannot be kept above the crown elevation of flexible pipe, the bedding or side support shall be carefully reconsolidated behind the movable box prior to placing backfill. The use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench bracing will not be permitted.

221.3.01H Location of Excavated Material - Excavated material shall be placed at locations and in such a manner that it does not interfere with the function of existing drainage facilities.

221.3.02 Trench water – The Contractor shall provide and maintain ample means and devices with which to promptly remove and dispose of all water entering the trench excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe and until the backfill at the pipe zone has been completed. The Contractor shall dispose of the water in a suitable manner without damage to adjacent property. Groundwater shall be controlled such that softening of the bottom of excavations or formation of "quick" conditions or "boils" during excavation shall be prevented. Removal of trench water within the trench can be performed with conventional trash pumps set in the trench and shall be considered as incidental to, and all costs included in, the various contract pay items in the proposal.

221.3.03 Trench Foundation - When, in the judgment of the Engineer, the existing material in the bottom of the trench is unsuitable for supporting the pipe, the Contractor shall excavate below the pipe, as directed by the Engineer. No pipe or structure shall be placed on wet, frozen or muddy subgrade. The Contractor shall backfill the trench to subgrade of the pipe bedding, with select trench foundation material over the full width of the trench and compact in layers not exceeding 6 inches deep to the required grade. Where the native trench material is sand, no trench foundation materials will be authorized by the Engineer on account of water entering the trench excavation. In such case, the Contractor shall stabilize the native sand trench foundation with adequately designed dewatering systems in accordance with Subsection 221.3.02.

221.3.04 Pipe Bedding consists of leveling the bottom of the trench or the top of the foundation material and placing bedding material to the horizontal centerline of the pipe. Bedding material shall be as specified here in before and placed in at least two lifts. Place the first lift to provide the minimum 6 inch depth of bedding material as shown on the plan before the pipe is installed. The Contractor shall spread the bedding smoothly to proper grade so that the pipe is uniformly supported along the barrel and excavate bell holes at each joint to permit proper assembly and inspection of the entire joint. Bedding under the pipe shall provide a firm, unyielding support along the entire pipe length. The Contractor shall place subsequent lifts of not more than 6 inches in thickness up to the horizontal centerline of the pipe, bring lifts up together on both sides of the pipe and carefully work under the pipe haunches by slicing with a shovel, tamping or other approved procedure. Particular attention must be given to the area from the flow line to the horizontal centerline of the pipe or top of bedding to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone. Pipe bedding shall be placed the full width of the trench.

221.3.05 Initial Backfill - The Contractor shall place the specified initial backfill material carefully around the pipe in 6 inch layers and thoroughly hand tamp with approved tamping sticks supplemented by "Walking In" and from movement either horizontally or vertically during placement and compaction of initial backfill material. Mechanical compactors shall not be utilized in placement of the initial backfill material.

221.3.06 Trench Backfill - The Engineer will sample excavated material to determine the suitability of the native sand for backfill use. If the native sand backfill is found to be compactable and within the tolerance range of the moisture content, the Contractor will be allowed to use it for trench backfill. The Contractor shall take reasonable precautions to prevent excavated material from becoming saturated beyond the critical moisture limits and replace any saturated native material with other approved native material at no expense to the Owner. When, in the opinion of the Engineer, the excavated material is unsuitable for trench backfill by reason of pre-existing moisture content or other undesirable physical characteristics, the Contractor shall use suitable excess excavated material at the direction of the Engineer. Over optimum moisture levels shall not be cause for designating the material as unsuitable. The Contractor shall backfill the trench above the pipe zone to the final surface grade, or subgrade, as shown on the plans, in lifts not to exceed 12-inch loose depth. The Contractor shall compact each lift to a minimum of 95% of the maximum density as determined by AASHTO T99, Method D. Any subsequent settlement of the trench during the warranty period shall be considered to be the result of improper compaction and shall be promptly corrected. The Contractor shall compact and rake the soil to match the ground surface elevation adjacent to the trench and maintain the surface of the backfilled trench level with the existing grade until the entire project is accepted by the Owner.

221.4 MEASUREMENT AND PAYMENT:

221.4.01 Trench excavation will not be a pay item and the cost thereof shall be included in the contract unit price for the appropriate pipe installation, as applicable.

221.4.02 Select Pipe Bedding, Initial Backfill, and Trench Backfill will not be a pay item and the cost thereof shall be included in the contract unit price for the appropriate pipe installation, for the particular depth of installation.

221.4.03 Native sand Pipe Bedding, Initial Backfill, and Trench Backfill will not be a pay item and the cost thereof shall be included in the contract unit price for the appropriate pipe installation, for the particular depth of installation.

221.4.04 Potholing – There will be no separate payment for potholing. The cost of potholing and associated restoration is to be included in one or more of the unit prices.

221.4.05 CDF Backfill Material will be measured and on a cubic yard in-place basis for locations shown on plans or deemed necessary by the Engineer. Measurement will be made of the gross surface area and depth of CDF actually installed, based on truck tickets.

END OF SECTION 221

SECTION 221A – TRENCHLESS PIPE INSTALLATION

221A.1 DESCRIPTION:

This section specifies horizontal directional drilling and installation of product pipe for water main installation, furnishing all labor, materials, equipment, and incidentals and all other related work necessary for horizontal directional drilling and installation of product pipe, complete.

221A.2 REFERENCES

The following is a list of standards which may be referenced in this section:
American Petroleum Institute (API):
13A - Specification for Drilling Fluid Materials.
RP 13B-1 - Standard Procedure for Field Testing Water-Based Drilling Fluids.
American Water Works Association (AWWA): C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4 in. (100 mm) Through 63 in. (1,575 mm), for Water Distribution and Transmission.
ASTM International (ASTM):

D2447, Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
D2513, Standard Specification for Polyethylene (PE) as Pressure Pipe, Tubing, and Fittings.
D3035, Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
D3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.
F714, Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
Occupational Safety and Health Administration (OSHA):
Code of Federal Regulations; Title 29 - Labor; Chapter XVII Occupational Safety and Health Administration; Department of Labor (Parts 1900-1999), "Revised Excavation Standards" (29 CFR 1926.650 Subpart P).
Code of Federal Regulations; Title 29, Labor; Chapter XX -Occupational Safety and Health Administration; Department of Labor (Parts 2200-2499).

221A.3 DEFINITIONS

Horizontal Directional Drilling: A trenchless, steerable installation method of using a multi-axis drilling machine to bore a small diameter pilot hole. The pilot hole is bored by either controlled fluid jetting or fluid assisted mechanical cutting or combinations thereof. The pilot hole is reamed, as necessary, to a final diameter that accommodates the product pipe and/or casing. The product pipe and/or casing is pulled back into the reamed hole by the drilling machine. The installed product pipe is cleaned and prepared for testing and operation.

IDFR: Inadvertent release of drilling fluid to ground surface, water ways, or utilities as a result of drilling fluid pressure in excess of that pressure required to fracture or permeate the ground, which generally occurs at the weakest soil condition and cover combination. Also referred to as hydrofracture.
Spill: Release of drilling fluid to ground surface from entry or exit pits from mixing, handling or hauling equipment.

Conductor casing: A steel pipe with diameter slightly larger than the reamer diameter, driven into the ground at the entry pit, and sometimes also at the exit pit, to help manage drilling fluids to prevent spills and IDFRs, stabilize the ground near the entry, and to assist with entry alignment control.

Obstruction: Objects located wholly or partially within the cross-sectional area excavated by the tunneling machine that prevent or impede the forward movement of the casing after all diligent efforts to advance past the object by the Contractor have failed.

221A.4 SUBMITTALS

Informational Submittals:

Daily Drilling Logs: Contractor will be responsible for maintaining drilling logs that provide drill bit location at least every 30 feet along the drill path or after each drill pipe joint, whichever is more frequent. Record observations of drilling conditions and periodic field tests. In addition, daily logs shall be submitted that record at a minimum the following twice per shift and at every noticeable change in materials throughout each pilot drill pass, pre-ream pass, and pipe installation pass:

- Drilling fluid batch quantities and mix proportions.
- Drilling fluid flow rate, both fresh and recirculated fluids.
- Drilling fluid viscosity, sand content, and density measurements.
- Spoil material quantities.
- Description of spoil material and drilling conditions.

Daily logs shall be submitted that record at a minimum the following on a per-joint basis for the appropriate HDD stage:

- Locator/tracking system data, including: Position, roll, and tilt angles, and depth. (Pilot Drilling)
- Drilling fluid pressure, including maximum and average values. (Pilot Drilling and Pre-Ream)
- Drill thrust. (Pilot Drilling and Pre-Ream)
- Head torque and rate of rotation. (Pilot Drilling and Pre-Ream)
- Drill pullback force, including maximum and average values. (Pullback)
- Any damage to the product pipe. (Pullback)

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Record Information: Upon completion of the installation, the Record Drawing Submittal package shall contain the following components:

Tool Information: A description of the tools actually used on the installation if they differ from what was contained in the approved submittal.

Field Operators' Records: Provide the tool operators' records including predrilling field calibration, raw data record (head position, fluid data) and the location of any anomalies or IDFRs.

Record Drawings: Including interpretation analysis of raw data, actual plan and profile shown on the same drawing sheet as the original installation plan. Provide drawing plotted at a scale no smaller than 1 inch equals 20 feet horizontal and vertical. The Contractor will provide field survey at the ends of each installation and provide the datum for establishing location of the installations.

Action Submittals:

The following Informational Submittals shall be submitted to the Engineer within 60 calendar days after the date of Notice to Proceed (NTP):

221A.5 Qualifications: HDD Contractor Personnel Qualifications Statement,

Detailed schedule of work including work and staging area preparation, preconstruction survey, pipe delivery; pipe string fusion and documentation; drill mobilization and setup; conductor casing installation (if applicable), pilot hole drilling/boring and reaming; hydrostatic testing prior to pullback, ballasting setup, pipeline pullback, disposal of excess drilling fluids and drill/bore cuttings; hydrostatic testing after pullback, final pipe inspection and testing; record drawing preparation; demobilization and restoration, and post-construction survey.

Working plans showing the general arrangement of the Contractor's work areas, storage areas, staging and pipe stringing areas, including maintenance of traffic and site access during pipe jointing, and laydown areas showing locations of drill entry and exit points, mud mixing equipment, drilling equipment, and pollution prevention measures among other features. The working plans shall show the layout profile and supports for any pits, trenches, conductor casings, or other excavations required to drill and install the pipe.

Manufacturer's Product Data: HDD drill rig and associated equipment. Include manufacturer name and drill rig model, torque and pullback capacity.

Detailed working plans shall be submitted for pipe installation, including a plan/profile along the pipe drill path plotted at a scale no smaller than 1 inch equals 20 feet horizontal and vertical. Provide entry and exit locations and angles, conductor casing size and depth as applicable, bending radii, lengths and depths, and clearance from existing easements, rights of way, and structures. The layouts of the pipes shown on Drawings represent the required pipe size and minimum depths and are based on the entry and exit points shown on Drawings. The Contractor may vary, within the limits of the workspaces, the entry and exit angles and profile layout as long as the minimum depths shown are maintained, and the product pipe is extended to acceptable points for connection to the existing pipes. All such variances shall be submitted to Engineer for approval prior to start of drilling.

Design Calculations:

If the Contractor elects to shift the entry or exit point more than 50 feet, or increase or decrease entry or exit angles by more than 3 degrees from the design, or reduce a bending radius by more than 50 feet, submit detailed calculations supporting the redesign. The calculations shall consist of the following:

Predicted and allowable pulling loads and bending stress, and the minimum allowable bending radius. Provide an estimate of the pulling loads and bending stress at characteristic points along the drill path where the curvature of the drill path changes.

Graphical representation of evaluation of IDFR risks, showing maximum allowable and minimum required pressures at all critical locations along the bore alignment for pilot drilling and for pullback.

The Contractor shall be responsible for proper design of the directional bore.

The calculations shall be conducted by or under the direct supervision of a Professional Engineer licensed in the State of Oregon, who shall stamp and seal the calculations.

Description of drill rod and pilot drill tooling.

Description of how pilot hole drill will be steered and how position and inclination of bore head will be monitored. Include the type, operating range, and degree of accuracy of the tracking equipment. Surface (walkover) locating systems are acceptable.

Describe how drill fluid viscosity, density, and downhole pressure will be monitored and the frequency of drilling fluid testing.

Reaming Head Descriptions, Cutters and Size: Describe reaming procedures, number of passes, direction of reaming passes, reaming tooling, and method of monitoring drill fluid viscosity, density, and pressure to prevent IDFR and excess ground movements during reaming.

Composition of drilling fluids and additives: Planned density and viscosity ranges. Drilling fluids shall be nonhazardous materials which comply with local, state, and federal laws and regulations. Contractor's plan for safe disposal offsite of all drilling fluids and cuttings in accordance with state, federal, and local laws and regulations.

Drilling fluids management plan: Identify the source of fresh water for mixing drilling mud. Submit a method of slurry containment, including sketches and systems of fluid seal at entry pit conductor casing if used. Include a method of cuttings removal and recycling drilling fluid during hole boring and reaming. Describe the method of drilling fluid containment on site. Describe the method of transporting drilling fluids and spoils offsite, including anticipated total volume. Identify the approved disposal site for drilling mud and spoils. Estimate the anticipated daily volume to be held overnight.

Product pipe assembly plan including equipment and procedures for fabricating, handling, transporting, and storing pipe segments, welding/fusing, lay down, pull guides, and rollers.

Contingency plan for the following potential situations:

- Loss of drilling fluid circulation.
- Hydrofracture (IDFR) spill cleanup method with plans for standby equipment and cleanup materials.
- Obstruction encountered during drilling or reaming.
- Broken drill pipe.
- Drill pipe separates from downhole equipment.
- Collapsed or buckled product pipe.
- HDD fails to advance or fails to respond to steering actions.
- Failure to maintain grade and when alignment deviations are more than allowable limits.
- Installation (pull back) forces reach 80 percent of the maximum allowable forces including manufacturer's recommended allowable factor of safety (at least 2.0).
- Abandonment Contingency Plan to handle the possibility that the HDD crossing cannot be completed.

221A.6 QUALITY ASSURANCE

Perform all work in conformance with authorities having jurisdiction.

All pertinent information shall be displayed on the HDD instrumentation in the control cabin for observation and documentation by the Owner or Engineer.

Contractor Experience Requirements: Provide key personnel with at least 10 years' experience in directional drilling and associated pipe installation, including at least two projects involving HDPE pipe at least as large as 12 inches in diameter, and including at least one project involving compound curves, and including at least one project involving elevation difference of at least 30 feet. Key personnel include:

221A.6.1 Project Manager/Superintendent:

Minimum 7 years of experience in the last 10 years from the submittal of Offeror's SOQ as HDD Project Manager/Superintendent, including the planning and supervision of similar equipment and methods that will be used for this Project.

Minimum two (2) projects in the last 10 years from the submittal of Offeror's SOQ involving pilot hole drilling, reaming, and pullback along a drill path at minimum involving elevation difference of at least 30 feet.

221A.6.2 HDD Drill Rig Operator:

Minimum 5 years of experience in the last 10 years from the submittal of Offeror's SOQ as HDD Drill Rig Operator, including successful completion of HDD and pipeline installation using the same type of HDD equipment and tracking system(s) that will be used for this Project.

Minimum one (1) project in the last 10 years from the submittal of Offeror's SOQ involving pilot hole drilling, reaming, and pullback along a drill path at minimum involving compound curve.

221A.6.3 HDD Steering and Tracking Specialist:

Minimum 5 years of experience in the last 10 years from the submittal of Offeror's SOQ as HDD Tracking Specialist, including successful tracking of HDD using the same type of tracking system(s) that will be used for this Project.

Minimum five projects in the last 10 years from the submittal of Offeror's SOQ involving successful accurate tracking and support of pilot hole drilling.

Minimum one (1) project in the last 3 years from deadline date of Offeror's SOQ involving successful accurate tracking and support of pilot hole drilling involving a drill path with compound curve.

221A.6.4 HDPE Pipe Fusion Specialist:

Current training certificate from pipe fusion equipment manufacturer.

Minimum 5 years of experience in the last 10 years from the submittal of Offeror's SOQ as HDD Pipe Fusion Specialist.

Minimum five (5) projects in the last 5 years from the submittal of Offeror's SOQ involving successful performance of pipe fusion in pipe diameters similar to those of this Project. Successful pipe fusion includes identifying and monitoring each joint made using a data logger provided with the fusion machine, and providing a complete report on each fusion that is used in the project.

HDD Contractor Personnel Qualifications Statement: Submit qualifications statement which shall include, but not limited to the following:

The name of the on-the-job Project Manager/Superintendent(s) qualified and proposed to perform the horizontal directional drilling work.

The name of the on-the-job HDD Drill Rig Operator(s) qualified and proposed to perform the horizontal directional drilling work.

The name of the on-the-job HDD Tracking Specialist(s) qualified and proposed to perform the position monitoring for the horizontal directional drilling work.

The name of the on-the-job HDPE Pipe Fusion Specialist(s) qualified and proposed to perform the HDPE pipe fusion for the horizontal directional drilling work.

221A.6.5 Drill Path Location System:

Contractor shall provide a plan for accurately locating the drill path during drilling operations at least 60 calendar days prior to any horizontal directional drilling. The measurement frequency and accuracy of the proposed guidance system as stated by the manufacturer of the system shall be provided to Engineer.

The Contractor shall be responsible for selecting steering and guidance tools capable of achieving design line and grade tolerances while taking into account the potential for signal loss and potential interferences.

Down-Hole Fluid Monitoring System: Contractor shall accurately measure the borehole fluid pressure at the leading end of the pilot hole's Bottom Hole Assembly (BHA) during drilling operations. The measurement frequency, measuring point, and accuracy of the proposed measuring system as stated by the manufacturer of the system shall be followed.

For each pipe material, use only pipe from a single manufacturer.

221A.6.7 Delivery, storage, and handling

The Contractor shall handle the pipe during loading, transportation, and unloading so as to prevent injury to or abrasion of pipe. Pipe shall not be dropped from vehicles, nor allowed to roll down skids or slopes without proper restraining ropes. Suitable pads, strips, skids or blocks shall be used for each pipe during transportation and while awaiting installation.

The Contractor shall not use and shall remove from construction site, pipe with physical damage such as cuts, gashes, nicks or abrasions which may have occurred during shipping, storage, or handling, which are deeper than 10 percent of wall thickness.

Pipe and fittings shall be handled by wide belly band slings as recommended by the pipe manufacturer to avoid damage to the pipe. Bare chains shall not be used in contact with pipe.

The pipe shall be stored at the storage area designated on Drawings or other areas that might be approved by Engineer. Stored pipe shall be protected by the Contractor.

221A.6.8 Site conditions

It is the Contractor's responsibility to review the Drawings, Specifications, and existing site conditions prior to the start of work.

Inspect the locations where horizontal directional drilling operations will be conducted and the pipe is to be assembled and installed, verify the conditions under which the work will be performed, and provide all necessary details, whether shown or not, for the orderly prosecution of the work.

221A.7 SEQUENCING AND SCHEDULING

In conformance with the requirements of Contract Documents.

Coordinate sequence and schedule with Owner for road closures necessary to complete the work.

221A.8 Safety

Contractor shall familiarize themselves with, and shall at all times conform to, all applicable health and safety regulations, including all OSHA standards.

Around the perimeter of all open trenches and HDD pits, Contractor shall install a 6 feet high chain link safety fence during nonworking hours.

221A.9 PRODUCTS

221A.9.1 HDD equipment

The HDD equipment shall be sized properly to complete the installation of the proposed alignment with due considerations of the ground conditions, downhole tools, drilling fluid additives, drilling technologies, size of final product pipe, and length of bore. HDD equipment shall be sized with a pullback capacity not exceeding the pipe tensile strength for this project. The Contractor shall be able to retrieve their equipment without leaving the drill rod in the hole.

The drill rig system pullback capacity shall be of at least 40,000 pounds.

The HDD equipment shall maintain a minimum pumping capacity to provide sufficient quantity of drilling fluids exceeding the targeted flow volume for all phases of the operation.

HDD machine safety requirements will include a common grounding system to prevent electrical shock in the event of a high voltage underground cable strike.

A swivel shall be used to connect the pull section to the drill steel to minimize torsional stress imposed on the pulled pipe. The pull section shall be supported as it proceeds during the pull back so that it moves freely and the pipe and any coating are not damaged.

Provide and use equipment capable of providing down-hole real-time measurement of borehole fluid pressure during pilot drilling and reaming.

221A.9.2 HDPE PIPE

As specified in Section 261, Water Pipe and Fittings.

221A.9.3 CONDUCTOR CASING PIPE

Welded pipe, new smooth-wall, carbon steel, ASTM 139 Grade B.

Permalok Pipe, new smooth-wall, carbon steel, ASTM A515 Grade 60 or ASTM 572, Grade 42 with watertight T7 joints.

221A.9.4Grout

Abandoned boreholes and abandoned product pipes shall be completely grouted with a pumpable, flowable mixture of sand-cement grout conforming to the following requirements and approved by Engineer:

Grout shall consist of a mixture of water and portland cement, with mineral fillers or admixtures as necessary to achieve a nonshrink, nonbleed, flowable grout. The grout shall have a minimum 28-day compressive strength of 50 psi.

Sand for grout shall be clean natural silica sand, graded such that 100 percent of the material passes the No. 20 sieve and not more than 20 percent passes the No. 200 sieve.

Bentonite shall comprise less than 10 percent of grout mixture by volume.

221A.10 EXECUTION

221A.10.1 GENERAL

Do not commence directional drilling until all required submittals have been approved by Engineer.

Do not begin drilling until all pipe and special items for drilling have been delivered to the work site.

During performance of work, Contractor shall keep a reasonable degree of order by housekeeping at all work sites. The jobsite is to be free of trash and unsightly debris for the duration of the work.

During performance of work, Contractor shall minimize disturbance of the natural environment (vegetation, trees, ground) to that only strictly necessary to complete the pipeline work.

Provide fresh water, free of hazardous or toxic substances, for drilling and grouting purposes.

Engineer and Owner shall be provided safe access at all times to observe HDD operations and instrumentation.

221A.10.2 Existing utilities

The Contractor shall request utility locates in compliance with Oregon law and common ground alliance best practices.

Contractor shall be responsible for any damage to piping or utilities shown on Drawings and/or field located prior to construction.

Should utilities that are not shown or incorrectly shown be encountered during the work, consult piping or utility owner immediately for instructions. Contractor shall cooperate with Engineer and utility companies in keeping respective services and facilities in operation.

Use of Explosives: Do not bring explosives onto site or use in the Work. Use of explosive materials is strictly prohibited.

221A.10.3 PREPARATIONS

Locate positions of entry and exit pits, establish elevation and horizontal datum for bore head control, and lay out pipe assembly area. Entry and exit locations shall be surveyed by experienced survey personnel licensed in the State of Oregon prior to the start of directional drilling.

Locate any other features that need to be precisely located as required for the Contractor’s use.

The survey results shall be plotted on a Drawing with a scale no smaller than that used for the Enlarged Plan and Profile Drawings in the Contract Document, and submitted to Engineer for approval.

Any Contractor proposed changes to the alignment or profile shall be clearly shown.

Lay out and assemble pipe in manner that complies with permit requirements and does not obstruct adjacent roads, and will allow reasonably prompt access to utility maintenance personnel.

221A.10.4 DRILLING PILOT HOLE

Install conductor casing at the launch site as shown on Drawings and drill pilot hole from entrance point to exit point following vertical and horizontal alignment shown on Drawings. Contractor is responsible for selection and proper use of the steering tools and guidance system based on the known conditions at the site. Loss of control due to interference from known structures and utilities will be corrected at no cost.

Contractor will implement any measures necessary to overcome interference and complete bores to design alignment. Contractor is alerted to the presence of overhead power lines.

The steering tool/guidance system shall have orientation sensors to monitor and record azimuth or bearing and pitch.

As pilot hole is advanced, plot actual horizontal and vertical alignment of pilot hole at intervals not exceeding the length of one drill rod.

Provide Engineer with position or inclination of pilot bore upon request and at the completion of the installation.

The Contractor assumes all liability for loss or damage to all down-hole equipment.

Alignment Requirements:

- Pilot hole exit point shall be within 10 feet horizontally of exit point location shown unless such tolerance places product pipe outside of ROW or easement in which case ROW/Easements take priority.
- The pilot hole shall be installed along the design drill path with the designated design radius of curvature shown on the Drawings and the entire path shall be within plus or minus 6 feet radial distance of the design drill path. Where a utility exists, pilot hole shall be closer to the horizontal alignment shown, as necessary to avoid damaging existing utilities and/or to satisfy permit or utility owner's requirements.
- The Contractor will not receive compensation for longer or deeper pipeline profile or other deviation from the Drawings.
- Alignment shall have no intermediate high points that might trap air in pipe after installation.
- Radius of curvature of completed pilot hole, as measured along any three drill pipes, shall be greater than that which after pipe installation will result in pipe wall stresses greater than 50 percent of yield stress.
- Should the directional drill pipeline alignment differ from the Drawings such that additional pipe and/or different fittings are necessary to join the excavated pipe, the Contractor is responsible for notifying Engineer of the changes immediately, so additional pipe and/or different fittings can be designed by Engineer (at their option) on a timely basis without delaying the construction.

Acceptance: If pilot hole alignment fails to conform to specified requirements, drill new pilot hole with alignment meeting specified requirements.

- If the hole is lost or damaged during the performance of the Work and subsurface conditions are materially consistent with those shown on the Geotechnical Data Report, the loss and damage shall be borne by the Contractor.
- If the hole is not carried to the contract length or to within exit point tolerance, the Contractor shall withdraw partially or fully and drill a modified or new crossing. The requirement to drill a substitute crossing shall be recurring until the hole is acceptable and at no additional cost.
- The Owner reserves the right to hire an independent inspector to verify the location of the installed pipeline and to recover the cost of the inspection from Contractor if inspection reveals the pipeline to be out of specification.
- If before the completion of the crossing, the Contractor encounters any condition or unknown obstruction, which, in the Contractor's professional judgment and with the written acceptance from Engineer makes continuation of the drill abnormally difficult or hazardous, or which precludes further drilling using normal procedures, the Contractor may elect to discontinue drilling, retract and redrill to avoid the obstacle, or drill in a substitute location agreeable to Engineer and Owner.

Contractor shall use good practices to maintain circulation and desirable properties of drilling fluid.

Monitor and control drilling fluid viscosity, density and pressure to prevent IDFRs. Utilize down-hole pressure sensor to monitor drilling fluids at the leading end of the pilot hole's BHA during drilling.

221A.10.5 REAMING PILOT HOLE, AND PULLING PIPE

Prereaming operations shall be conducted at the discretion of the Contractor. All provisions of this Specification relating to simultaneous reaming and pullback operations shall also pertain to prereaming operations.

Obtain Engineer's approval to proceed after submitting pilot bore as-built and before enlarging pilot hole and pulling pipe into position.

Prior to pulling pipe or casing, enlarge pilot hole ahead of pipe to diameter sufficient for pulling pipe into position and complete additional passes as necessary. The pilot hole shall be reamed to a diameter, which is, at minimum, 50 percent greater or 12 inches larger than the pipe OD (whichever is smaller) using the appropriate tools.

The Contractor shall not attempt to ream at a rate greater than the drilling equipment and mud system are designed to safely handle.

Monitor and control drill fluid viscosity, density and pressure to prevent IDFRs. Ream and swab as required for proper hole diameter prior to pipe pull.

The product pipe shall be filled with water prior to pullback to mitigate the risk of the pipe collapsing in the borehole, as well as to reduce pullback forces due to buoyancy. Once filled the pipe shall remain full during pullback and at all times thereafter.

Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole. Except for drilling rod removal, pullback shall not cease, until the pipe is completely pulled into its permanent position.

While pulling pipe, monitor pulling force and handle pipe in manner that does not overstress pipe. Limit radius of curvature along length of pipe string during installation to minimum radius of 100 feet. A swivel shall be used to connect the pipe pull section to the reaming assembly to minimize torsional stress imposed on the section. If pipe buckles or is otherwise damaged, remove damaged section and replace it with new pipe.

Protect exterior of the pipe from damage. The pull section shall be supported as it proceeds during pull back so that it moves freely and the pipe is not damaged. In no case shall the pipe be dragged across pavement, gravel, or other abrasive surfaces.

After pullback, the pipe may take several hours to recover from axial strain. When pulled from the reamed bore hole, the pull-nose shall be pulled out a distance longer than the total length of the pull to avoid having the pull-nose retract back below the bore hole exit level due to stretch recovery and thermal contraction to equilibrium temperature. No connections shall be made until the stretch recovery and thermal contraction cycles are complete.

Pull pipe so that minimum of 10 feet of pipe is exposed at both ends of bore following recovery.

Open ends of the installed pipeline string shall be effectively closed or plugged with metal or plastic cover during nonworking hours, or as otherwise required to prevent water or soil from entering the pipeline.

The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the borehole. The pipe shall be guided into the borehole to avoid deformation of, or damage to, the pipe. Under no circumstances shall unsupported pipe be dragged over an asphalt or concrete surface; above ground rollers or other similar devices shall be used to support the pipe while it is being moved across such surfaces. The rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.

During pullback operations, the Contractor shall monitor roller operation and use sidebooms if required to assist movement of the pipe.

Engineer shall be notified immediately if pullback pressures exceed 80 percent of the maximum allowable value.

221A.10.6 Drilling fluids

All drilling fluids, muds, or chemical additives used by Contractor shall be composed and used in compliance with applicable, local, state, and Federal environmental regulations. Oil-based drilling fluids or fluids containing additives that can contaminate the soil or groundwater are not acceptable.
Sample and test drilling fluid Marsh viscosity, sand content, and mud density, during pilot bore and reaming operations to verify conformance with design per API 13A and API RP 13B-1. During pilot boring and pullback, Contractor shall sample drilling fluids and measure Marsh viscosity and mud density at least twice per working shift. Record results on daily drilling logs. Other appropriate mud design parameters shall be tested if evidence of significant variation exists, or if drilling contingency actions are required.

Contractor shall accurately and continuously measure and monitor the drilling fluid pressure, flow rate of recirculation fluids, and flow rate of added fresh fluids. Contractor shall calibrate or field verify estimated pump

and drill system fluid head loss by recording observed drilling fluid pressure upon exit of pilot bore while continuing to temporarily pump planned mud at planned maximum pump rate; or by other reasonable means.

Inadvertent Returns (IDFR): Contractor shall be responsible for avoiding any impact to existing utilities, structures, facilities, waterways and wetlands in the Project area during the drilling operation. If the drilling fluid starts leaking to the surface (other than at the entry and exit points), or if fluid loss results in surface movement, Contractor shall cease drilling until fluid loss volumes can be brought under control to minimize any inadvertent returns in the Project area. In such event, Engineer shall be notified immediately. The Contractor shall clean up any locations where drilling fluid surfaces. Contractor shall pay particular attention to the potential of inadvertent returns washing out along existing utility crossings, and shall have preventive measures in place to prevent these occurrences from happening. Contractor shall be fully responsible for all damages caused by the pipeline installation operations.

Recirculation: Contractor shall be responsible for securing a way of constructing the pipeline with the recirculating fluids. Contractor shall be responsible for similarly removing the temporary recirculation line if used. Contractor shall provide solids control and fluids cleaning equipment of a configuration and capacity that will process surface returns and produce drilling fluid suitable for reuse.

Disposal of drilling fluids and drill cuttings is the responsibility of the Contractor. Excess drilling fluids and drill cuttings shall be disposed of in approved offsite locations in accordance with local, state, and federal laws and regulations. No additives which would prevent offsite/nonhazardous disposal of drilling mud will be allowed.

221A.10.7 CLEANING PIPE ENDS

After pulling pipe, clean exposed ends for installation of fittings.

221A.10.8 HANDLING AND DISPOSAL OF DRILLING MUD AND CUTTINGS

Make adequate provisions for handling and containing muddy water, drilling mud, and cuttings during drilling operations. Do not discharge these contaminants into waterways.

Construct mud pits at entry and exit points and other supplemental measures in a manner that completely contains mud and prevents its escape.

When onsite provisions for storing muddy water, drilling mud, or cuttings onsite are exceeded, haul contaminants away to suitable legal disposal Site.

Contractor shall have tools and equipment onsite and shall ensure crew members are experienced in use of same to contain and cleanup any spills. Follow the provisions of the approved Hydrofracture Contingency Plan.

Dispose of all excess drilling fluid and cuttings at licensed landfills or otherwise approved disposal sites. Excess drilling fluid and cuttings will be contained on site at all times, and outside of the mud pits and entry and exit points, material will not be stored in contact with the ground prior to removal from the Site.

221A.10.9 Joining pipe sections

Pipes shall be joined to one another by means of thermal butt fusion in accordance with the requirements of Section 33 05 01.10, High-Density Polyethylene (HDPE) Pressure Pipe and Fittings.

221A.10.10 Operations Within Pipe Staging Area

Conduct operations in a manner that minimizes disturbance to public or private properties bordering the staging area or where construction easements have been obtained.

Areas where drilling fluids are in use shall be isolated by appropriate silt fences and hay bales.

At the completion of construction, all areas will be restored to original conditions. This will include, but not be limited to, the restoration of all damaged or disturbed gravel surfaces, grassed areas or lawns, repair of fences and gates, replacement of trees or plantings damages.

221A.10.11 PRESSURE AND LEAKAGE TESTING

Refer to 261.4 Water Pipe and Fittings, Testing.

The HDPE pipe specified for use in the HDD installation shall be hydrostatically tested in the following manner:

The Contractor shall provide all bracing, worker protection, materials and equipment to safely complete the testing of the fused and strung out pipe.

Test the HDPE pipe following completion of fusing and stringout operations prior to attachment to the drill rig for pull back. This test will be completed while the pipe is above grade.

Contractor shall fuse blind flanges on to each end of the pipe lengths to be tested.

The blind flanges shall have the appropriate piping attached to fill/drain the pipe being tested with water and to allow air release as filling is occurring.
Fill/drain lines and air release lines shall have a shutoff valve attached.
All attached piping shall be capable of withstanding the test pressure identified below.
Pressure test the pipe in accordance with Section 261.4 Water Pipe and Fittings, Testing.

Following successful completion of the above grade pressure test:

Drain and dispose of test water in a manner that meets all local, state and federal requirements.
Note: Contractor shall be responsible for draining the test water in a manner/flow rate that does not create a vacuum in the new line.

Remove the blind flanges following the successful completion of testing and draining of the new pipe.

Once the tested pipe is drained, and the bore hole has been prepared, pull the new pipe into position.

Note: It is required that the pipe be ballasted with water during pull back. (See Article Prereaming, Reaming Pilot Hole and Pulling Pipe.

After pulling pipe into position but before attachment of adjacent sections of pipe, pressure test pipe again as specified above. At the end of the in-ground pressure test, leave the pipe full of water and make connections required at both ends of the HDD.

A final test of the completed pipeline (which includes the cut and cover reaches adjacent to the HDD reach plus the HDD installed reach) will be completed before connecting the new system existing system.

Refer to Section 261, Water Pipe and Fittings, for required test pressures.

If the HDD operations should encounter an object or condition that impedes the forward progress of the pilot bore, reaming pass, or pipe pullback, the Contractor shall notify Engineer immediately.

The Contractor shall submit a plan to correct the condition, and remove, clear, or otherwise make it possible for the tunneling machine pilot, reamer, carrier pipe, and casing pipe to advance past any and all objects or obstructions that impede forward progress of the tunneling machine, pilot, reamer, carrier pipe and casing. Upon written notification of Engineer, the Contractor shall immediately proceed with removal of the object or obstruction by means of an obstruction removal shaft or by other approved methods, as submitted by the Contractor. An obstruction removal shaft shall consist of a small excavation for the purpose of removing the obstruction.

Boreholes, installed and/or partially installed that fail to meet the requirements of these Specifications shall be abandoned and backfilled with grout as specified herein.

Where the abandonment is the result of the Contractor's failure to drill/bore the borehole to within the required tolerances, or failure to maintain the borehole open for insertion of the product pipe, or failure to install the product pipe properly without damage, collapse, parting the joints, or the installed product pipe fails to meet the requirements specified in this Section, the Contractor shall, at Contractor's own expense, abandon the borehole or product pipe or both, backfill the borehole or product pipe or both with grout as specified herein, and drill/bore a new borehole along an alignment approved by Engineer and install a new product pipe.

Abandoned boreholes and product pipes shall be completely grouted with a sand-cement grout.

Grout shall be injected into the borehole and product pipe to be abandoned through drill rods or pipes extending to the end of the borehole or product pipe. Grout shall be injected at a pressure sufficient to overcome the hydrostatic pressure of the drilling fluid, but at a pressure less than required to cause heave or damage to the overlying or adjacent structures. Grout shall be injected until the borehole or product pipe is flushed of all drilling fluid and the return flow at the collar of the boring or product pipe shows undiluted grout or until less than 1.0 cubic foot of grout can be pumped at the maximum allowable pressure within 10 minutes. The boring or product pipe shall then be plugged to maintain the grout in the boring or product pipe until the grout has set. Additional grout shall be injected as necessary to fill any voids left as a result of shrinkage or bleeding of the grout.

END OF SECTION 221A

SECTION 222 – DEWATERING SYSTEM

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

222.1 DESCRIPTION:
This section provides specifications for dewatering systems and appurtenances if required during construction.

The Contractor shall be responsible for payment of any regulatory agency fees associated with its proposed dewatering system.

222.1.01 Quality Control - Before dewatering commences, the Contractor shall submit to the Engineer, plans setting forth the details of the proposed dewatering system. The dewatering system plans shall be in sufficient detail to indicate sizes of pumps, piping, appurtenances, and the ultimate disposal point for water.

The Contractor shall select the particular method of dewatering to be employed.

222.1.02 Submittals - The following shall be submitted in accordance with Section 131.

222.2 METHOD:

222.2.01 General - The Contractor shall furnish, install, operate, maintain and remove all machinery, appliances, and equipment to maintain all excavations free from water during construction, and shall dewater and dispose of the water so as not to cause injury to public or private property, or to cause a nuisance or menace to the public.

The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent, which would cause damage or endanger adjacent structures or utilities. In addition, the system shall be fully filtered and protected against intake of any sand, which may otherwise cause subsurface voids, caving, and damage to adjacent structures.

The static water level shall be drawn down at least 2 feet below the bottom of the excavation in order to maintain the undisturbed state of the foundation soils and to facilitate the placement of fill or backfill compacted to the required density as specified in accordance to Section 221.3.03.

222.3 EXECUTION:

222.3.01 Installation - The Contractor shall install all equipment necessary for dewatering. He shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have

available, at all times, competent worker for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to ensure efficient dewatering and maintenance of dewatering operations during power failure.

222.3.02 Performance - 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 to prevent erosion of, and intake of, any soils. Care shall be taken to prevent disturbance, by the method of dewatering, of pipe bedding already in place in the trench. The Contractor is fully responsible for maintaining the integrity of previously placed pipe and bedding during dewatering and the release of groundwater.

During excavation, construction of structures, installation of pipelines, placement of the structure and trench backfill, and the placing and setting of concrete, excavations shall be kept free of water. The Contractor shall control surface runoff to prevent entry or collection of water in excavations or any adjacent erosion. The static water level shall be drawn down in the vicinity of the excavation to maintain the undisturbed state of the foundation soils and allow the placement of any fill or backfill to the required density. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to an extent that would damage or endanger adjacent structures, utilities or property.

All dewatering systems shall be equipped with adequate filtering systems to prevent intake of any soils or soil grains from the ground in and around the excavations.

222.3.03 Discharge Points - Discharge of ground and surface runoff water shall be in accordance with the Contractor's dewatering plan. The Contractor may discharge groundwater to the existing system as long as the rate does not exceed the system's capacity. If, in the opinion of the Engineer or City, the storm system being used for discharge is being overwhelmed, the Contractor shall utilize portable tanks to transport waters to an approved alternate location for discharging. Prior to any discharge, the Contractor shall take all necessary precautions to avoid discharge of oil, grease, and excessive suspended solids.

222.3.04 Release of Groundwater - 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 any structures, pipelines, and sewers.

222.3.05 Damages - The Contractor shall be responsible for and shall repair without cost to the Owner for any damage to existing facilities or utilities, work in place, or other Contractors' equipment, and the excavation, including damage to the bottom due to the heave and including removal of material and pumping out of the excavated area, that may result from the Contactor's dewatering operations, including any damages that may result from any mechanical or electrical failure of the dewatering system.

222.4 MEASUREMENT AND PAYMENT:

222.4.01 Dewatering – Payment (if required) will be made lump sum amount as a negotiated change order and shall constitute full compensation for all dewatering required throughout the full duration of the project.

END OF SECTION 222

SECTION 223 – SUBGRADE

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

223.1 DESCRIPTION:

This work consists of the preparation of the subgrade. Subgrade is defined as the area of new or existing roads, streets, alleys, driveways, sidewalks, or other public place upon which additional materials are to be placed as a part of work covered in other Sections or by future work. All subgrade on this project is classified as untreated subgrade.

223.1.01 Untreated Subgrade - The top 1 foot of material placed in embankments or removed from cuts in the normal grading of the roadbed and which is brought to true line and grade, shaped and compacted to provide a foundation for the pavement structure constitutes untreated subgrade.

223.2 MATERIALS:

223.2.01 Soil - The native ground on all streets of this project is native sand.

223.3 CONSTRUCTION:

223.3.01 Preparation - Prior to starting subgrade work, including backfill, all underground work contemplated in the area of the subgrade shall be completed. This requirement includes work by the Contractor, by the Owner, or by others. The Contractor shall drain all depressions or ruts which contain water.

223.3.02 Untreated Subgrade - The Contractor shall remove unsuitable material as directed and replace with approved material. The subgrade shall be excavated and shaped to line, grade, and cross section and then scarified and compacted to the specified density. Compaction shall extend to a line 1 foot beyond the edge of the paving curbs or forms and to a depth of 12 inches below final subgrade.

223.3.03 Moisture Content – Moisture Content at the time of compacting the subgrade materials shall be prepared to within -4% to +2% of optimum moisture content. Material which does not contain sufficient moisture to obtain proper compaction shall be wetted and thoroughly mixed as directed. Subgrade areas which too wet to be compacted to specified density, but which in the judgment of the Engineer otherwise meet the requirements, shall be scarified and aerated to provide -4% to +2% of optimum moisture content. The upper 12 inches of the subgrade shall be scarified and dried by manipulation, aeration, drainage, or other means before being compacted. The Engineer may authorize the removal of excessively wet material and/or the use of additional stabilizing of material as extra work.

223.3.04 Tolerances - The Contractor shall rework areas found to be deficient in thickness by more than 0.04 foot, except that fresh stabilizing material shall be added in an amount equal to one half of the original amount. The Contractor shall accomplish all reworking at no expense to the Owner.

The finished surface of untreated subgrade shall not vary more than 0.04 foot from established grade and cross section at any point. The Finished surface, when tested with a 10 foot straightedge, shall not vary from the testing edge by more than 0.04 foot at any point.

223.3.05 Compaction equipment for roadway subgrade shall be standard steel wheeled rollers or vibratory rollers capable of meeting the specified density requirement.

223.3.06 Compaction equipment for curb, gutter, and sidewalk subgrade shall be mechanical vibrators or impact tampers. All compaction equipment shall provide compaction of demonstrated equivalency to that of a standard steel wheeled or vibratory roller. **The proximity to adjacent homes will require minimal vibration construction techniques**.

223.3.07 Compaction - The required density of untreated subgrade materials within the roadway section shall be not less than 95% of maximum density as determined by AASHTO T180 (modified Proctor).

If the specified compaction is not obtained, the Contractor shall notify the Engineer. The Contractor may be required to use a modified compaction procedure or apply additional compaction effort. If approved materials meeting the specifications can be compacted to the required density regardless of compaction effort or method, the Engineer may reduce the required density or direct that alternate materials be used. In no case shall finishing and compaction of the subgrade proceed until the Contractor is able to compact the material to the satisfaction of the Engineer.

223.4 MEASUREMENT AND PAYMENT:

223.4.01 Untreated subgrade will be considered incidental work. Subgrade preparation will not be a separate bid item. All work required to be accomplished under this section shall be included in the pay item for Aggregate Base Course.

223.4.02 Incidental Work - When not listed in the Bid schedule, draining water from the subgrade; smoothing the subgrade in preparation for staking; blading, shaping, compacting and wetting the subgrade, including roadbed, excavating, transporting and placing onsite materials, road grade staking, to final line, grade and cross section, and other anticipated items will be considered incidental work.

223.4.03 Compaction Testing – Compaction testing will be performed periodically by the Owner's compaction testing agency. Tests will be performed upon completion of the Contractor's final compaction efforts. The Owner will provide initial compaction tests for the Contractor. All compaction tests which fail to meet specifications and require additional testing shall be provided and paid for by the Contractor, at no additional cost to the Owner.

END OF SECTION 223

SECTION 224 – AGGREGATE BASES

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

224.1 DESCRIPTION:

This item includes all work necessary to furnish, place and compact one or more courses of aggregate base, sub-base, or leveling courses on a prepared subgrade within the designated limits. This item also includes crushed rock surfacing used for shoulder work and driveways.

224.2 MATERIALS:

224.2.01 Base Course Aggregate shall be of the designated size 1 inch-0 (25 mm-0) and shall meet the requirements of Oregon Standard Specifications subsection 02630.10. At the option of the Contractor, leveling course aggregate as specified in Section 224.2.02 herein may be substituted for the base course aggregate

224.2.02 Leveling course aggregate, sidewalk rock, driveway rock and shoulder rock shall be of the designated size ¾ inch-0 (19 mm-0) and shall meet the requirements of Oregon Standard Specifications subsection 02630.10.

224.2.03 Acceptance will be based on periodic samples of the material stockpiles and in place prior to compaction. The testing agency will take proctor samples of Contractor's aggregate source (three samples maximum). If the aggregate does not meet the specified requirements, it will be rejected and shall be removed from the project site at the sole expense of the Contractor. Additional proctor samples for new aggregate sources will be paid for by the Contractor. Similarly, if the aggregate changes in size, appearance or consistency throughout the duration of the project, additional proctor samples for the aggregate will be taken by the testing agency and paid for by the Contractor.

224.3 CONSTRUCTION:

224.3.01 Preparation of Foundation - All surfaces on which a base is to be constructed shall be firm at the time aggregate is placed thereon. No materials shall be placed on a soft, muddy, or frozen subgrade.

224.3.02 Placing - The Contractor shall haul, and deposit the material so as to provide a homogeneous mixture of unsegregated and uniformly dispersed materials as placed in position for compacting. The Contractor shall spread and strike off the material to the designated line, grade and transverse slope with surface texture of uniform appearance without segregation or fracture of material.

224.3.03 Compaction equipment for roadway aggregate bases shall be standard steel wheeled rollers or vibratory rollers capable of meeting the specified density requirement. See also Section 223.

224.3.04 Compaction equipment for gutter aggregate bases shall be mechanical vibrators or impact tampers. All compaction equipment shall provide compaction of demonstrated equivalency to that of a standard steel wheeled or vibratory roller.

224.3.05 Roadway Base Rock Density Requirements - The Contractor shall begin compaction of each layer of roadway base rock as soon as practicable after the material is spread and continue until a density of not less than 95% of the maximum density has been achieved. Maximum density will be determined by AASHTO T180.

224.3.06 Road Base Widening - The existing road shoulders shall be excavated to a depth of 12-18 inches below the new asphalt grade, in order to allow for a minimum of 6.5-12.5 inches of new compacted base course and 1.5 inches leveling course below the new asphalt

224.3.07 Thickness of Base Course on Street Shoulders - If the existing base is found to be less than 3 inches in depth after excavating to a depth of 3 inches below the existing asphalt grade, new base material shall be installed to a depth of 6 inches below the existing asphalt grade.

224.3.08 Surface Finish - The roadway base rock aggregate base surface shall be within 0.1 foot of the required grade, and when tested with a 10 foot straightedge shall not vary from the testing edge by more than 0.08 foot at any point.

224.4 MEASUREMENT AND PAYMENT:

224.4.01 Roadway Base Course Rock Aggregate will be measured and paid for on a neat line cubic yard basis as shown in the roadway design sections and limits as authorized by the Engineer.

224.4.02 Leveling Course Rock, Shoulder Rock and Driveway Aggregate will be measured and paid for on a neat line cubic yard basis as shown to the design sections and limits as authorized by the Engineer.

224.4.04 Payment will be at the unit contract price for the various types of rock and shall constitute full compensation for supplying, placing, grading, compacting and maintaining the aggregate bases and shoulder rock aggregate.

END OF SECTION 224

SECTION 227 – EROSION CONTROL

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

227.1 DESCRIPTION:

The Contractor shall construct temporary erosion control structures as shown on the plans and specified herein. The Contractor shall maintain these structures throughout the course of construction as set forth in these specifications.

227.2 SUBMITTALS:

The Contractor shall submit manufacturer's data on the silt fence system and bio-bag materials to the Engineer prior to ordering materials.

227.3 MATERIAL:

227.3.01 Silt fence system shall be the "Envirofence" silt fence system manufactured by Mirafi, Inc., or equal. The height of a silt fence shall not exceed 36 inches (higher fences may impound volumes of water sufficient to cause failure of the structure).

227.3.02 Bio bags shall be 8” inches in diameter, 30 inches long and constructed with ½ inch mesh fiber filled with clean wood chips.

227.3.03 Hold down stakes shall be 24 inch long steel rods (1/2 inch diameter), or rebars (#4). Precast concrete blocks, 8” x 8” x 16”, shall be used in lieu of stakes on hard surfaces such as asphalt pavement and concrete valley gutters.

227.04 CONSTRUCTION:

227.4.01 - All erosion control products and materials will be installed in accordance with the manufacturer's recommendations and as shown on the plans.

227.4.02 - All erosion control measures shall be left in place until all slope stabilization and/or reseeding efforts are completed and vegetation has taken root, or as directed by the Engineer.

227.4.03 Bio Bag protection for catch basin inlets - Bags shall be placed lengthwise in a single row in a half circle around the catch basin with the ends of adjacent bags pressed together. Each bag shall be securely anchored to the ground and held in place by at least two concrete blocks.

227.4.04 Silt Fences - The filter fabric shall be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. Where joints are necessary, filter cloth shall be spliced together only at a support post, with a minimum 6 inch overlap, and securely sealed. Posts shall be spaced a maximum of 10 feet apart at the barrier location and driven securely into the ground (minimum of 24 inches). A trench shall be excavated approximately 6" (wide) x 6" (deep) along the line of posts and upslope from the barrier. The trench shall be backfilled and the soil compacted over the filter fabric. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently seeded and stabilized.

227.4.05 Maintenance of Bio Bags - Bio bags barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall by the Contractor. Close attention shall be paid to the repair of damaged bags, end runs and undercutting beneath bags. Necessary repairs to barriers or replacement of bags shall be accomplished promptly by the Contractor. Sediment deposits should be removed after each rainfall. They must be removed when the level of deposition reaches approximately half the height of the barrier. Any sediment deposits remaining in place after the bio bag barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

227.4.06 Maintenance of Silt Fences - Silt fences and filter barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall by the Contractor. Any required repairs shall be made immediately by the Contractor. Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and the barrier still be necessary, the fabric shall be replaced promptly. Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximately one-quarter the height of the barrier.

227.4.07 Removal of Erosion Control Structures - Any material remaining in place after the fence or barrier is no longer required shall be graded to conform to the finished grade and/or reseeded.

227.05 MEASUREMENT AND PAYMENT:

227.5.01 - Payment for the work as above specified will be made at the contract lump sum amount for the item “Erosion and Sedimentation Control”. This work shall constitute full compensation for the purchase, installation, maintenance, removal and disposal of all erosion and sedimentation control activities.

END OF SECTION 227

SECTION 250 – ASPHALT CONCRETE PAVEMENT

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

250.1 DESCRIPTION:

This item includes all work necessary for the construction of hot mix asphalt concrete pavements upon prepared foundations, base surfaces or overlay installations. The Contractor shall provide submittal information to the Engineer for approval on all materials, methods, equipment and HMAC mix design. Such submittal information shall be submitted a minimum of three (3) weeks prior to construction. Unless otherwise specified, the Contractor shall submit the number of copies that are described elsewhere in the contract.

250.2 MATERIALS:

All materials shall meet the requirements of the ODOT Standard Specifications, 2024 or most current edition, unless specifically noted herein.

250.2.01A Asphalt Cement, Additives and Aggregate treatment shall meet the requirements of Section 00744, Hot Mixed Asphalt Concrete (HMAC), ODOT Standard Specifications, 2024 or most current edition, and the requirements of ODOT, Standard Specifications for Asphalt Materials, 2024 or most current edition. Use a current approved ODOT mix design. The mix JMF should be no older than 9 months.

250.2.01B 2018 Asphalt Cement and Additives – Asphalt Cement and Additives - Furnish the following asphalt cement and additives:

(a) Asphalt Cement - Provide asphalt cement conforming to the requirement of ODOT's publication "Standard Specifications for Asphalt Materials". Copies of the publication are available from ODOT's website. The applicable Specifications are those contained in the current publication on the date the Project is advertised. Use the grade of asphalt that is specified.
(b) Asphalt Cement Additives - Use standard recognized asphalt cement additive products that are approved with the mix design Do not use silicones as an additive. Add the following asphalt cement additives when required by the JMF:

- Anti-stripping asphalt cement additives to prevent stripping or separation of asphalt coatings from Aggregates to satisfy the TSR specified in 00744.13.

- Asphalt cement admixtures used to aid in the mixing or use of asphalt mixes.

250.2.02 Mineral filler shall conform to the requirements of AASHTO M17. Collector dust may be used as mineral filler, in whole or in part, provided the dust or the resultant mineral filler mixture conforms to the above requirements.

250.2.03 Level 2 HMAC (class) of Concrete and Proportions of Materials – The asphalt concrete mixture shall be of the level (class) as shown on the plans (Level 2 if not shown elsewhere) and shall conform to the requirements of ODOT, Standard Specifications for Asphalt Materials, 2024 or most current edition. The mix design shall be developed by the Contractor and shall meet Section 00744, Hot Mixed Asphalt Concrete (HMAC), ODOT Standard Specifications, 2024 or most current edition.

250.2.04 Tack coat asphalt shall be emulsified asphalt and meet the requirements of Section 00730, ODOT Standard Specifications, 2024 or most current edition.

250.3 CONSTRUCTION:

250.3.01 Foundation Preparation - All bases and foundations shall be constructed to the condition prescribed under the applicable specification. Broken or ragged edges of existing Portland cement concrete or bituminous surfaces underlying or abutting the new pavement shall be trimmed back in a straight line to firm material. Contact surfaces of structures in the paving area shall be treated with an asphalt tack coat prior to placing the asphalt concrete. Underlying surfaces of Portland cement concrete (if discovered) and designated areas of asphalt-deficient, fine-cracked or spalled bituminous material shall be treated with an asphalt tack coat prior to placing the asphalt concrete.

250.3.02 Preparation and Acceptance of add item – In general, aggregate base materials will be constructed, graded and compacted by the Contractor in accordance with Section 223. Following the completion of the aggregate base on the project, those streets shall be available for use by the public for local vehicular traffic to abutting properties, with traffic operations on the aggregate base course. The paving subcontractor for this project shall inspect the aggregate base immediately prior to paving operations and make recommendations to the Engineer for foundation preparation work to prepare the aggregate base for the paving work. Such foundation preparation work will not be considered as additional work but will be included in the normal foundation preparation work described above in this section.

250.3.03 Existing Pavement Surfaces – Existing pavement surfaces shall be cleaned of all loose material, dirt and dust by brooming, by flushing with water or by other approved methods. All vegetation on existing asphalt surfaces shall be removed in a manner acceptable to the Engineer.

250.3.04 Weather Limitations Asphalt concrete mixtures shall be placed on dry prepared surfaces when the air temperature in the shade and the surface temperature is 55°F (15°C) and warmer. However, the Engineer may permit the Contractor to begin paving work if the temperature is 50°F or above and rising, and in the judgment of the Engineer will be 55°F in a reasonable period of time. Placing any mixture during rain or other adverse weather conditions will not be permitted, except that mix in transit at the time these adverse conditions occur may be laid if the following conditions are met:

a. Mix is at proper temperature when delivered to the site.
b. Mix is covered during transit.
c. Mix is placed on a foundation free of standing or flowing water.

250.3.05 Tack coat asphalt shall be applied to existing bituminous and Portland cement concrete surfaces prior to placing asphalt concrete per ODOT Standard Specifications. A tack coat is not required before placing ACP on Aggregate bases. Apply the Emulsified Asphalt with a pressure distributor conforming to ODOT Standard Specification, 00730.22, unless otherwise allowed. Apply the Emulsified Asphalt to the prepared surface at a rate between 0.05 and 0.20 gallons per square yard as directed and with the Emulsified Asphalt temperature between 140°F and 185°F as recommended by the manufacturer. Application rates for tack coat diluted according to ODOT Standard Specification 00730.11 will be increased as necessary to provide the same amount of residual asphalt as the application rates specified above.

It shall be applied only so far in advance of the asphalt concrete paving operations as is necessary in order to provide a tacky surface upon which to place the asphalt concrete.

Do not place hot mixed asphalt concrete Pavement or Emulsified Asphalt Concrete Pavement on the tack coat until the Emulsified Asphalt separates from the water (breaks), but before it loses its tackiness.

250.3.06 Hot Mix Asphalt Concrete Pavers – The HMAC paving operations shall meet the requirements of Section 00744 of ODOT Standard Specifications, 2024 or most current edition.

250.3.07 Placing – Asphalt concrete shall be at a temperature of between 285°F and 300°F at the time it is placed. (If the submitted Job Mix Formula, temperature-viscosity curve of the asphalt cement supports a lower temperature, it will be allowed by the Engineer.) Asphalt Concrete shall be placed in panels of such width as to hold to a practical minimum the number of longitudinal joints required. The longitudinal joints in any panel shall offset those joints in underneath panels by not less than 6 inches. Special care shall be taken at longitudinal joints to provide the required bond and density. The placing of asphalt concrete shall be a continuous operation as nearly as practicable. If the capacity of the paving machine exceeds the capacity of the hauling vehicles, the paving machine shall be operated at a reduced uniform speed so as to maintain a continuous operation.

250.3.08 Paving shall be applied in a minimum of two lifts. The first lift shall be a leveling course, followed by a cover course or wearing course.

250.3.09 Compaction and Rolling – Longitudinal joints shall be rolled directly behind the paving machine. The first panel shall have vertical edges, and the abutting panel shall be tightly crowded against its edge. Material from the second panel shall be pushed over the surface of the first panel so as to develop an overlap of from 3 inches to 6 inches. Breakdown rolling shall immediately follow the rolling of the longitudinal joints and edges. Rollers shall be operated as close to the paving machine as necessary to obtain adequate density without causing undue displacement. The breakdown roller shall be operated with the drive roll or wheels nearest the paving machine. Exceptions may be made when working on steep slopes or super-elevated curves. Roller wheels shall be kept moist with only enough water to avoid picking up the material. Rollers shall move at a uniform speed not to exceed 3 mph for steel wheeled rollers. Rollers shall be in good condition and capable of being reversed without backlash. The line of rolling shall not be suddenly changed nor the direction of rolling suddenly reversed. Any pronounced change in direction of the roller shall be made on stable material. If rolling causes displacement of the material, the affected areas shall be loosened and restored to the original grade with loose material before being re-rolled. Heavy equipment, including rollers, shall not be permitted to stand on finished surface before it has thoroughly cooled or set. The finished surface shall be true to line and grade, free of irregularities and roller wheel tracks.

Breakdown and intermediate compaction shall be completed before the HMAC temperature drops below 180°F, unless otherwise directed. Steel-wheeled rollers shall have a gross static weight of at least 8 tons. Vibratory rollers shall be equipped with amplitude and frequency controls capable of at least 2000 vibrations

per minute, shall be specifically designed to compact HMAC and shall have a gross static weight of at least 8 tons. Finish rolling shall be performed with additional coverages until all roller marks are eliminated. If steel-wheeled rollers are used for finish rolling, they shall have a gross static weight of at least 6 tons.

250.4 MEASUREMENT AND PAYMENT:

250.4.01 Measurement – of asphalt concrete pavement will be by weighing the mixed materials on a certified scale. The weight of asphalt concrete shall include the asphalt cement in the mixture. Certified plant mix temperatures at loading and weight slips shall be supplied to the Engineer at the point of delivery. Tickets shall be collected at the site, either by the inspector, engineer or contractor and provided to the engineer when requested. No payment shall be made without tickets.

250.4.02 Payment will be at the contract price per ton for each category of the material placed and compacted to the designated depths and limits and/or furnished at the plant site and will be limited to not more than 105% of the calculated tonnage within the designated limits. Payment shall constitute full compensation for all work specified herein, either for furnishing the pavement materials only or for furnishing and installing the pavement materials as listed in the Bid schedule.

250.4.03 HMAC Level 2 Payment will be measured and paid for on a per ton basis to the limits as shown on the construction drawings at a nominal compacted depth specified by ODOT.

250.4.04 Tack Coat – No separate payment will be made for the asphalt tack coat, the cost of which is to be included in one or more of the other unit prices.

250.4.05 Asphalt Cement Price Adjustment – An asphalt cement escalation/de-escalation clause will be in effect during the life of this contract. The price adjustment will use the Monthly Asphalt Cement Material Price (MACMP) established by the Oregon Department of Transportation (ODOT) on the first of each month. The price adjustment will use the MACMP for the month the contract was awarded as the Base Asphalt Cement Material Price "Base." The price adjustment will be determined by multiplying the Adjustment Factor, as established below, by six (6) percent and adding to the unit price for asphalt concrete pavement and pavement patching. The Monthly Asphalt Cement Adjustment Factor will be determined each month of the contract as follows:

- If the MACMP is within +/- 10% of the "Base", then there will be no adjustment.
- If the MACMP is more than 110% of the base, then:
  - Adjustment Factor = (MACMP) – (1.10 x "Base")
- If the MACMP is less than 90% of the base, then:
  - Adjustment Factor = (MACMP) – (.90 x "Base")

The "Base" price established for this contract is the MACMP for the contract date as established by ODOT. The contractor shall supply the base price information with their initial submittals.

END OF SECTION 250

SECTION 251 – MISCELLANEOUS ASPHALT CONCRETE STRUCTURES

251.1 Description:

251.1.1 Scope - This Work consists of furnishing and placing asphalt concrete speed bumps. This Work does not include asphalt concrete construction on Traffic Lanes, auxiliary lanes, Shoulders, Median areas, tapers, widenings, parking areas, exit and entrance ramps, Patching and Leveling on similar areas.

251.2 Materials:

251.2.01 Asphalt Tack Coat - Furnish asphalt tack coat Material meeting the requirements of Section 00730.

251.2.02 Asphalt Concrete Pavement for Speed Bumps - furnish Level 2, 1/2 inch ACP according to Sections 250, as applicable. When conditions justify, the mixture may be varied, if approved. Acceptance will be based on testing the Engineer deems appropriate.

251.2.03 Traffic Delineators – Traffic delineators shall be as provided by Zicla – 3" high bike delineators; 2.5' – 3' in length. Delineators shall be bolt down installation.

251.3 Construction

251.3.01 Foundation Preparation - Bring areas on which Structures are to be constructed to established grade, and make firm, dry and free of deleterious material. Tack contact areas where asphalt concrete is to come in contact with previously placed asphalt concrete or clean the area with compressed air.

251.3.02 Placing Asphalt Concrete - Place asphalt concrete according to 250, as applicable, except place asphalt concrete Structures of uniform width and length unless otherwise directed.

251.3.03 The Engineer may allow small or special pavers, spreader boxes, or blade graders for placing asphalt concrete. Where allowed, the Engineer may allow mixture to be placed by hand methods.

251.3.04 Construct all Structures within the following lines and grades:

- 0.08 foot of true line
- 0.04 foot of established surface grade, Cross Section and Slope
- 0.04 foot of specified thickness

251.3.05 Compacting Asphalt Concrete - Compact asphalt concrete according to the following or as directed:

- Compaction to a specified density will not be required, regardless of thickness. Perform breakdown and intermediate rolling until the entire surface has been compacted with at least four Coverages by the rollers. Perform additional Coverages, as directed, to obtain finish rolling of the ACP.
- Along curbs and walls, on walks, irregular areas, and other areas not practically accessible to rollers conforming to 250, compact the mixture with small, self-propelled rollers, mechanical tampers, hot hand tampers, or hand rollers. On depressed areas a trench roller may be used, or cleated compression strips may be used under the roller to transmit compression to the depressed area.

251.3.06 Pavement Smoothness - Finish asphalt concrete to a uniform texture.

251.3.07 Coordinate with fire department for tire width requirements for speed bumps. Provide a break at the roadway centerline and at width per fire department truck requirements. Provide edge of road break as shown in the Sheet 501 detail.

251.3.08 Sizing of the speed bumps shall be in accordance with the Detail shown on Sheet 501

251.3.09 No thermoplast directional arrows will be required.

251.3.10 Bike lane delineators shall be installed in accordance with manufacturer's recommendations but shall be no further apart than 10' spacing and increased to 4' spacing within 50 feet of the start of the intersection.

251.4 Measurement

251.4.01 Measurement - Will be per each as place in site. The quantities of structures will be measured according to the actual count of each road location where the Structure is constructed.

251.5 Payment

251.5.01 Payment – shall be based on a per each basis and paid under the bid item called out as "Speed Bumps". Payment will be payment in full for coordination with the fire department, furnishing and placing all Materials, including asphalt concrete and asphalt tack coat, and for furnishing all Equipment, labor, delineator signs on either side of the road, and Incidentals necessary to complete the respective Structures in place as specified. Payment shall be based on a per each basis and paid under the bid item called out as "Traffic Delineators". Payment will be payment in full for coordination, furnishing and all materials, equipment, labor, and incidentals necessary to complete the respective Structures in place as specified.

END OF SECTION 250

SECTION 252 – CONCRETE ADA RAMPS, CURBS AND GUTTERS

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

252.1 DESCRIPTION:

This item includes all work necessary for the construction of concrete sidewalk, ADA ramps, valley gutters, straight curb and mountable concrete curb and gutter. Hereinafter, all such curbs, gutters and mountable curb and gutter are referred to as “curbs”.

252.2 MATERIALS:

252.2.01 Concrete shall conform to the requirements of ASTM C94 and of Section 330. Compressive field strength of Portland cement concrete shall be not less than 3,300 psi at 28 days (Class 3300).

252.2.02 Preformed expansion joint fillers for concrete shall conform to the requirements of AASHTO M153 or AASHTO M213 except that those furnished under AASHTO M213 shall be tested in conformance to ASTM D1751. Fillers conforming to AASHTO M213, except the binder if other than bituminous material, may also be used provided that they otherwise meet this specification and provided further that they have been demonstrated to be rot and vermin proof for a period of at least 5 years.

252.2.03 Curing materials shall be liquid membrane-forming compounds for curing concrete conforming to the requirements of AASHTO M148.

252.2.04 Construction Fabric. Geotextile materials (if required) shall be as described in Section 257

252.3 CONSTRUCTION:

252.3.01 Aggregate Foundation and Bedding - All bases upon which new concrete curbs and ADA Ramps are to be constructed shall be firm and free of all extraneous matter. Foundation courses and beddings shall be constructed in conformance with the applicable requirements of Section 224 and the standard detail. The Contractor shall thoroughly dampen surfaces upon which new concrete is to be placed prior to placement of the concrete.

252.3.02 Line and Grade - The top and face of finished curb shall be true and straight and the top surface of concrete shall be of uniform width, free from humps, sags, honeycombs, or other irregularities. When a straightedge 10 feet long is laid on the top or face of the curb the surface shall not vary more than 0.02 foot from the edge of a 10 foot straightedge, except at grade changes or vertical curves. The Contractor shall construct all curb within 0.02 foot of true line, within 0.02 foot of established surface grade, cross section and slope, and within 0.02 foot of specified thickness. The Contractor shall construct all ADA ramps within ODOT requirements and as specified on the plan sheets.

252.3.03 Placing - Concrete curbs may be placed either by mechanical extrusion methods or between suitable forms, as the Contractor may elect. Concrete ADA ramps shall be place between suitable forms placed to provide proper slopes needed.

252.3.03A Extrusion Method - If concrete is to be placed by mechanical extrusion methods, the slump shall be between one and two inches. Concrete shall be fed into the extruding machine at a uniform rate and the machine shall be operated under sufficient restraint to forward motion to produce a well compacted mass of concrete. Maximum size of aggregate shall be 1/2 inch.

252.3.03B Forms - If forms are used, the concrete slump shall be between 2 inches to 4 inches. Maximum size of aggregate shall be 3/4 inch. Placing of concrete shall conform to the requirements of Subsection 330.3.01. Forms shall be removed from formed structures after the concrete has taken its initial set and while the concrete is still green.

252.3.04 Concrete Finishing - Minor defects shall be repaired with mortar containing one part Portland cement and two parts sand. Plastering will not be permitted on exposed surfaces. Honeycombed and other structurally defective concrete shall be removed and replaced at no expense to the Owner. While the concrete is still green, the exposed surfaces shall be finished as required to provide a uniform texture and smooth surface.

252.3.05 Transverse expansion joints shall be constructed opposite abutting expansion joints, at each point of tangency, and at connections to existing curbs, driveways and walks. Additional transverse expansion joints shall be provided at other evenly spaced locations as required to confine the expansion joint spacing to a maximum of 15 feet or as shown on the plans. The width of joints and thickness of filler shall match those of the joints in abutting concrete; elsewhere the filler thickness shall be not less than 1/2 inch. Each expansion joint shall be at right angles to the alignment, vertical to the top surface, and shall provide complete separation of the concrete. The joint in the old concrete which abuts the new concrete shall be made with a saw cut as required in Section 205.

252.3.06 Curing - After the concrete has been placed and finished, it shall be cured by application of a white pigmented liquid membrane-forming compound applied uniformly to the damp concrete by pressure spray methods, or by keeping the concrete protected and moist, by approved methods, for at least 72 hours. The concrete shall be protected from contact, strain, and vehicular traffic for at least 7 days.

252.4 MEASUREMENT AND PAYMENT:

252.4.01 Curbs will be measured on a linear foot basis along the face or centerline of the curb, for each type of specified curb, including pedestrian and driveway ramps, catch basins aprons, inlets and other structures. Payment will be made at the contract price per linear foot and shall constitute full compensation for each different curb style in place including excavation and haul, aggregate, expansion materials, concrete, forming, finishing, jointing, curing, protection, and temporary ramping.

252.4.02 ADA Ramps will be paid under the bid item “Extra for Pedestrian Landings-ADA Ramps” and will be measured on a per each basis at each corner of the intersection as called out on the plan. Payment will be made at the contract price per each and shall constitute full compensation for excavation and haul, aggregate, construction fabric, concrete, rebar, forming, finishing, detectable domes, jointing, curing, protection, and temporary ramping.

END OF SECTION 252

SECTION 257 – CONSTRUCTION FABRIC

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

257.1 DESCRIPTION:

This item includes all materials and work necessary for the placement of construction fabric required on a prepared subgrade at the locations shown on the plans.

257.2 MATERIALS:

257.2.01 Construction fabric shall be ground stabilization fabric woven from monofilaments of isotactic polypropylene, Mirafi 500X, or approved equal. Fabric shall have the following properties:

Weight.....4 oz./sq.yd
Thickness.....25 mils
Grab Strength.....200 lbs.
Rapid Tear Strength.....25 lbs.
Burst Strength.....325 psi

257.3 CONSTRUCTION:

257.3.01 No standing water shall be present at the excavated subgrade when fabric is placed. Roll fabric onto the subgrade, keeping it as taut and free of wrinkles as possible using 8” min. fabric stakes. Overlap joints a minimum of 24 inches between sections of fabric.

257.3.02 Aggregate base and fill should be placed on the fabric without any construction equipment operating on the uncovered fabric.

257.3.03 Proofroll the base prior to placement of the fabric; proofroll the base material or fill to tension the fabric and identify soft spots in the subgrade. If a soft spot is encountered, mound base rock into the subgrade at the soft area.

257.3.04 Construct base per specification Section 224 and contract drawings.

257.4 MEASUREMENT AND PAYMENT:

257.4.01 Construction fabric will be measured and paid for by a negotiated change order if required. Payment will be at the unit price and shall constitute full compensation for supplying and placing the fabric.

END OF SECTION 257

SECTION 258 – PAVEMENT MARKINGS

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

258.1 DESCRIPTION:

This item includes all work necessary for furnishing, preparing, and installing all forms of striping and pavement markings.

258.2 MATERIALS:

258.2.01 Preformed thermoplastic pavement markings shall be PREMARK PLUS as supplied by Flint Trading Co., (Thomasville, North Carolina, tel. 336-475-6600, www.flinttrading.com) or approved equal. The pavement markings shall contain factory applied surface beads, 30% glass beads by weight, for high retro-reflectivity. The thermoplastic material shall conform to AASHTO designation M249-79 (98), with the exception of the relevant differences due to the material being supplied in a preformed state.

258.2.01A Graded Glass Beads - The material shall contain a minimum of thirty percent (30%) intermixed graded glass beads by weight. The intermixed beads shall be clear and transparent. Not more than twenty percent (20%) consists of irregular fused spheroids, or silica. The index of refraction shall not be less than 1.50. The material shall have factory applied coated surface beads in addition to the intermixed beads at a rate of 1 lb. (± 10%) per 11 sq. ft. These factory applied coated surface beads shall have the following specifications:

1) Minimum 80% rounds
2) Minimum refractive index of 1.5
3) Minimum SiO_2 Content of 70%;
4) Maximum iron content of 0.1%;

Size Gradation	% Retained
1400 mm (14 U.S. mesh)	0-3%
1180 mm (16 U.S. mesh)	2-10%
1000 mm (18 U.S. mesh)	10-30%
850 mm (20 U.S. mesh)	30-60%
600 mm (30 U.S. mesh)	50-80%
500 mm (35 U.S. mesh)	60-85%
355 mm (45 U.S. mesh)	95-100%
250 mm (60 U.S. mesh)	98-100%

258.2.01B Pigments - White: Sufficient titanium dioxide pigment shall be used to ensure a color similar to Federal Highway White, Color No. 17886, as per federal Standard 595. Yellow: Sufficient yellow pigment shall be used to ensure a color similar to Federal Highway Yellow, Color No. 13655, as per Federal Standard 595. The yellow pigment shall be of an organic nature only and contain no lead chromate.

258.2.01C Heating Indicators - The top surface of the material (same side as the factory applied surface beads) shall have regularly spaced indents. These indents shall act as a visual cue during application that the material has reached a molten state so satisfactory adhesion and proper bead embedment has been achieved and a post-application visual cue that the installation procedures have been followed.

258.2.01D Skid Resistance - The surface, with properly applied and embedded surface beads, shall provide a minimum resistance value of 45 BPN when tested according to ASTM E-303.

258.2.01E Thickness - The material shall be supplied at a minimum thickness of 125 mils (3.15 mm).

258.2.01F Versatility - As an option, turn arrows and combination arrows may come without surface applied glass beads, thus facilitating the use of those arrows as either left or right indicators, thereby reducing inventory requirements.

258.2.01G Environmental Resistance - The material shall be resistant to deterioration due to exposure to sunlight, water, salt or adverse weather conditions and impervious to oil and gasoline.

258.2.01H Retroreflectivity - The material, when applied in accordance with manufacturer's guidelines, shall demonstrate a uniform level of sufficient nighttime retroreflection when tested in accordance to ASTM E1710-97. The applied material shall have an initial minimum intensity reading of 500 $mcd \cdot m^{-2} \cdot lx^{-1}$ for white and 300 $mcd \cdot m^{-2} \cdot lx^{-1}$ for yellow as measured with an LTL-2000 or LTL-X Retroreflectometer.

258.3 CONSTRUCTION:

258.3.01 General - Contractor shall install pavement marking in accordance with applicable requirements of Oregon Standard Specifications Subsection 0850.

258.3.01A Prepare and Prime Pavement - Remove contaminants from new AC surfaces that may adversely affect the installation of the pavement markings by sandblasting, shot-blasting, or sweeping. Air blast the pavement with a high-pressure system to remove extraneous or loose material. Apply materials to new asphalt concrete that is sufficiently cured according to the manufacturer's recommendations. After the pavement surface is clean and dry, apply primer as recommended by the manufacturer to the area receiving the pavement markings. Apply the primer in a continuous, solid film according to the recommendations of the primer manufacturer and the pavement markings manufacturer.

258.3.01B Protection – Protect all applied marking from traffic until sufficiently cured so as not to be damaged or tracked by traffic movements.

258.3.02 Thermoplastic Pavement Markings, General - The Engineer will be responsible for preliminary spotting of the lines and markings to be installed and approval of the Engineer must be obtained before thermoplastic pavement marking may begin. The area to be marked shall be dry, clean and free of loose particles. The Contractor shall ensure that no moisture is present on the surface.

258.3.03 Preformed Thermoplastic Pavement Markings shall be applied on asphalt using the propane torch method recommended by the manufacturer or using a method approved equal by the Engineer. The material shall be able to be applied at ambient and road temperatures down to 32ºF without any preheating of the pavement to a specific temperature. The material shall be able to be applied without the use of a thermometer. The pavement shall be clean, dry and free of debris. The material supplier shall enclose application instructions with each box/package of the thermoplastic pavement markings.

258.4 MEASUREMENT AND PAYMENT:

258.4.01 Stop Bars – The quantities of stop bars will be measured and paid for a lineal foot basis for the quantity ordered and actually installed. Stop bar width shall be 12". Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

258.4.01 Center Line and Fog line – The quantities of center line and fog line will be measured and paid for a lineal foot basis for the quantity ordered and actually installed. Center line quantities will be lineal foot for both 4" stripes. Gaps between stripes will not be measured. Striping width shall be 4". Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

258.4.01 Crosswalk Stripes (6'x2') – The quantities of crosswalk stripes will be measured and paid for an each basis for the individual crosswalk box at the quantity ordered and actually installed. Payment will be payment in full for furnishing and placing all materials, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

END OF SECTION 258

SECTION 261 – WATER PIPE AND FITTINGS

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

261.1 DESCRIPTION:

This item includes all work necessary for the installation of water pipe and fittings as shown on the plans for use in water distribution systems.

261.2 MATERIALS:

261.2.01 General - Materials and strength specifications shall be as hereinafter specified for the particular kind of pipe and fittings as shown on the plans. No pipe and fittings that are not hereinafter specified will be allowed on the project. All water system materials shall be NSF approved for use in domestic water supply systems.

261.2.02 Water Main Pipe:

261.2.02A Polyvinyl Chloride (PVC) pipe shall conform to the requirements of AWWA C900/C905. Pipe shall have integral bell and spigot joints conforming to the requirements of ASTM D3139. The pressure class shall be Class 305, DR14. Ductile iron fittings shall be used with PVC pipe.

261.2.02B High Density Polyethylene Pipe (HDPE). Pipe shall be DR 14, IPS diameter

261.2.03 Water main pipe fittings shall be of a class and rating at least equal to the adjacent pipe unless specified otherwise. Joint materials shall be compatible with the adjacent pipe. All fittings shall be cast or ductile iron. Mechanical joint and push-on joint type coupling shall conform to ANSI A21.10 and A21.11 (AWWA C153), cement lined and seal coated according to ANSI A21.4 (AWWA C104). Other types of joints shall conform to FS WWP-421 b, Type II for push-on joints. Flanged couplings shall be drilled and faced in accordance with ANSI B-16.1 or B-16.2. Rubber gasket type shall be U.S. Pipe, Tyton or approved equal. Cast iron fittings for use with FS Type II and Type III cast iron water pipe shall conform to the same specifications except that joints shall be mechanical type and include cast iron glands, plain rubber gaskets and T-head cast iron bolts and nuts per ANSI A21.11 or an approved compression type with rubber gasket.

261.2.04 Valves:

261.2.04A Gate valves, three inches and larger in diameter, up to 10 inches in diameter, shall conform to the requirements of AWWA C500 as to composition and quality of material and workmanship and shall be NSF approved. Valves shall be iron body, bronze mounted, resilient wedge type, with triple O-ring seals, non-rising stem, and 2-inch square operating nut. Gate valves shall be Clow, Dresser M and H, or Mueller. Valve ends shall be mechanical joint, flanged joint, or push-on joint, or a combination of the foregoing as called for in the plans.

261.2.04B Gate Valves - Two inches and smaller in diameter shall be NRS with operating hand wheel, screw ended, and have a rated working pressure not less than 150 p.s.i. The valves shall conform to the requirements of FS WWB 54B, Class A, Type 1.

261.2.05 Valve Boxes –Cast iron valve boxes shall be furnished with all valves 3 inches and larger, "Vancouver" style, Olympic Foundry Model 910, with notches to indicate water main alignment. Extensions shall be used as required for varying installation conditions and shall be a single piece of PVC sewer pipe, ASTM D-3034. Valve box covers shall be marked "W". All valve boxes shall be equipped with a valve box base Model VC212 by 3DC or approved equal.

261.2.06 Flanged coupling adapters shall be by Uniflange Corp., Series 900-C, or approved equal.

261.2.07 Pipe Restraint fittings shall be “GripRing” by Romac Industries, Inc. or approved equal.

261.2.08 Water Service Assemblies:

261.2.08A Tubing shall be Crosslinked Polyethylene (PEXa) “REHAU-MUNICIPEX” water service tubing conforming to ASTM F876 and NSF/ANSI Standard 14 and 61 (NSF-pw-g), minimum 200 p.s.i. Pipe shall be certified to AWWA C 904 Cross-linked Polyethylene (PEX) Pressure Pipe and certified to standards ASTM F876, CSA B137.5, NSF 14, NSF 61 and PPI TR-4, by approved testing agencies, with a standard materials designation code of 3306. Pipe shall have the minimum markings: PEXa 3306, CSA B137.5, ASTM F876, F2023 and F2080, NSF-pw.

All compression joints shall use stainless steel insert stiffeners.

261.2.08B Service saddles shall be nylon coated, ductile iron saddles with single stainless steel strap, Romac Style 101NS.

261.2.08C Corporation stops for waterlines with service saddles or tees shall be type Mueller type B2502810N with AWWA IPT inlet and CTS Mueller 110 Conductive Compression Connection for water service tubing outlet.

261.2.08D Angle meter stops shall be Mueller type P24258N, CTS 110 x Meter Swivel Nut, for PE water service tubing inlet on services up to 2 inches.

61.2.08E Meter boxes - New meter boxes will be furnished by the City and installed to finished grade by the Contractor.

261.2.08F Water meters will be supplied and installed by the City.

261.2.08G Water service fittings on the customer side of the meter will be supplied and installed by the City.

261.2.08H Casing shall be Schedule 40 PVC, pushed under the existing pavement and shoulders of Sunset Lane, sized to allow for the tubing to be installed inside of the PVC casing.

261.2.09 Fire hydrants shall: Be suitable for general waterworks service, Have dry barrel, post type with compression main valve closing with the inlet pressure, Have a Replaceable Stem Coupling and a replaceable Traffic Flange at the ground line to prevent or minimize traffic damage, Comply with AWWA Standard C502, Be UL listed and FM approved, and Be Certified to ANSI/NSF 61/372.

Each hydrant shall be equipped with two 2 1/2 inch hose nozzles and one 4 1/2 inch threaded pumper nozzle. Main valve shall be 5 1/2 inch compression type with a 6 inch inlet and counter clockwise opening. Hydrants shall be furnished with factory lubricate, 0-ring sealed bonnet, safety flange construction, allowing for 360° rotation of nozzle section on stem. Hydrant assemblies shall include main line tees and connecting pieces with integrally cast joint restraint, Tyler mechanical joint swivel fittings, or approved equal. Hydrants shall be Mueller Super Centurion 250 Fire Hydrants. Hydrant shall be Shop Coated with high performance 2-part Epoxy.

261.2.10 Tracer wire shall be #12 solid copper wire with blue colored insulation.

261.2.11 Thrust blocks shall be constructed of Portland cement concrete conforming to the requirements of ASTM C94. Compressive field strength shall be not less than 2,000 p.s.i. at 28 days. Maximum size of aggregate shall be 1½ inches.

261.2.12 Air Release Valves shall be A.R.I. Model S-50 or approved equal.

261.3 CONSTRUCTION:

261.3.01 Alignment and Grade - All pipe shall be laid to the required lines and grades. Fittings and valves shall be at the required locations with joints centered, spigots home, and valve and hydrant stems plumb.

Temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers, or other obstructions encountered in the process of the work shall be furnished by the Contractor at no expense to the Owner. Where the grade or alignment of the pipe is obstructed by existing utility structures such as conduits, ducts, pipes, branch connections, the obstructions shall be permanently supported, relocated, removed or reconstructed by the Contractor in full cooperation with the Owners of such utility structures, or the new water pipe shall be laid to an alignment and/or grade to miss the obstruction. No deviation shall be made from the required line or grade except with the written consent of the Engineer.

261.3.02 Depth of Trench - Water mains shall have a minimum cover of 30" from finish grade to top of pipe. Water service lines shall have a minimum cover of 24 inches below finish grade. The Contractor shall increase the depth of cover on all new water mains as needed with additional trench depth and vertical bends in order to avoid conflicts with the existing water main and with the new storm drainage pipes.

261.3.03 Curvature - PVC pipe may be laid on horizontal and vertical curves so long as the radius is no less than the following values:

10" pipe - 500 ft. radius (4-1/2" offset per 20' length)
8" pipe - 400 ft. radius (6" offset per 20' length)
6" pipe - 300 ft. radius (8" offset per 20' length)
4" pipe - 200 ft. radius (12" offset per 20' length)

Where the design alignment and grade call for greater curvature, appropriate angle fittings shall be used. Water service tubing may be laid on horizontal and vertical curves with a minimum radius of 1 foot.

HDPE pipe shall be placed on curve radius based on manufacturer recommendations for the pipe selected.

261.3.04 Pipe Distribution and Handling - The Contractor shall not distribute material on the job faster than it can be used to good advantage. The Contractor shall unload pipe only by approved means. Pipe will not be unloaded by dropping to the ground. The Contractor shall inspect all pipe and fittings prior to lowering into trench to insure no cracked, broken, or otherwise defective materials are used. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep it clean during laying and joining. The Contractor shall use approved implements, tools, and facilities for the safe and proper protection of the work. The Contractor shall lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. The Contractor shall remove all damaged pipe from the job site. Pipe shall not be dropped or dumped into trenches.

261.3.05 Installation - Trench excavation, bedding and backfill shall be in accordance with Section 221.

261.3.05A Push-on Joints - After a section of pipe has been lowered into the prepared trench, wipe clean the gasket and gasket seat inside the bell with a cloth. Place the gasket in the bell with the large round side of the gasket first. Apply a thin film of lubricant to the inside surface of the gasket. Using a cloth, wipe clean the plain end of the next pipe and insert into the bell just far enough to make contact with the gasket. Force "home" the plain end into the bell end by the use of a bar, fork tool or jack assembly. Align pipe for position and tamp into place.

261.3.05B Mechanical Joints - Before laying all pipe, valves, or fittings, remove all lumps, blisters, and excess coal-tar coating from the bell ends. Wire brush and wipe clean the inside of the bell and the outside of the spigot to remove all loose rust and foreign material just prior to assembly. Swab the cleaned surfaces with soapy water just prior to slipping the gasket over the spigot end. Accurately center the spigot end in the bell before inserting the gasket. After the gasket is in place, assembly the gland and bell end with bolts by alternately tightening the bolts around the bell end maintaining approximately equal tension until the final tension is reached. Install followers for all MJ installations.

261.3.06 Pipe Restraint - The Contractor shall provide restrained joints at all tees, caps, plugs, and bends for the lengths shown on the plans adjoining such fittings. Joint restraint shall be mechanical joint with retainer glands, or push-on with approved locking gasket, U.S. Pipe Tyt-Lok, or approved equal. All joint restraint method shall be submitted to the Engineer for review prior to such use.

261.3.07 Pipe cutting shall be accomplished using proper pipe cutting tools designed specifically for that purpose. Cuts shall be made in accordance with the pipe manufacturer's recommendations.

261.3.08 Tracer wire shall be installed adjacent to PVC pipe and wrapped around service tubing in continuous lengths. Joints or splices in tracer wire shall be waterproof with all connections made with heat shrink connection kits 3M or approved equal. Ends of wire shall be accessible in all valve boxes and meter boxes.

261.3.09 Fire hydrants shall be installed as shown on the plans and in accordance with the hydrant manufacturer's recommendations. Install hydrant with proper depth of bury or use extension for height adjustment such that hydrant traffic flange shall be located above grade as shown on the plans. Hydrants shall be set true and plumb. Hydrants shall be repainted to the satisfaction of the Engineer should the paint be scratched, chipped, faded or discolored.

261.3.10 New Water Services – The Contractor shall furnish and install new water services either to the existing meter box location or to the new meter box location, as shown on the plans and as staked by the Engineer. All water services shall be installed with service saddle, corporation stop, water serviced tubing and angle meter prior to all testing and disinfection. Connections between the new main and the new water services shall be made with approved type fittings. All connections shall be inspected by the inspector prior to covering with backfill.

261.3.11 Reconnecting Existing Water Services – The Contractor shall furnish and install all water services either to the existing meter box location or to the new meter box location, as shown on the plans and staked by the Engineer. All water services shall be installed with service saddle, corporation stop, water serviced tubing and angle meter prior to all testing and disinfection. Connections between the new main and the new water services shall be made with approved type fittings. All connections shall be inspected by the inspector prior to covering with backfill.

Following successful testing and disinfection of all mains and services in each section of the project, the City Water Department Staff will disconnect, replace, and reconnect existing water services between the customer and the new water service angle meter stop.

261.3.12 Water Service Interruptions – The Contractor shall coordinate all service interruptions of the occupants of the affected properties with the City Water Department Staff. Service interruptions shall be for as short a time period as possible and the Contractor shall be responsible for arranging for alternative service of the affected property as required.

261.3.13 Valve Boxes – Install valve boxes with PVC pipe as extensions. The Contractor shall compact all backfill materials and surface restoration layers around all valve boxes with mechanical vibrators or impact tampers. Adjust final grade of all valve boxes to be maximum 1/8-inch above asphalt finish grade, minimum flush with finish grade. Valve boxes set into depressions of finish grade will not be acceptable. Valve boxes shall be installed within diamond shape concrete collars as shown on the construction plans. The Contractor shall remove and reset any valve boxes that are set into depressions of asphalt finish grade.

261.4 TESTING:

261.4.01 General - A pressure test and a leakage test shall be made by the Contractor of every section of water main after the completion of the final trench backfill. All connections to existing mains shall be left uncovered for a period of 4 hours after normal operating pressure is applied, after which time the inspector shall inspect all such connections and joints, and any leaks which appear shall be repaired.

261.4.02 Pressure Test:

261.4.02A Pre-test - After each valved section of pipe has been laid and partially backfilled, the Contractor shall perform a hydrostatic pressure test as outlined below. The maximum length for testing shall be confined to each block of the project (the project is divided into four blocks). The results shall be given to the Engineer prior to complete backfill of the pipe. If the test indicates materials or workmanship that does not meet design requirements, defective material and/or workmanship shall be corrected and the test re-run until specifications are fulfilled.

261.4.02B Pressure Test of Completed Waterline - All mains, hydrants and fittings shall be subjected to a pressure test in the presence of the inspector after all pre-testing has been completed. All water services shall be installed with service saddle, corporation stop, water serviced tubing and angle meter prior to all testing and disinfection. A separate test shall be made on each section of the project whenever any section of the work is installed in such a manner as to permit its segregation as a unit. The maximum

length for testing shall be confined to each block of the project (the project is divided into four blocks). Each section of pipe shall be completely filled with water and care shall be taken to insure that all air is expelled from the pipe line. The specified test pressure shall be applied by means of a pump connected to the main through a corporation stop and service tubing. The test pressure, measured at the point of lowest elevation, shall be 150% of the working pressure at that point. The test pressure shall be held for two hours during which time, all exposed pipe, fittings, valves and couplings will be carefully examined for leaks. The portion of main being tested shall be considered "acceptable" for the purposes of this test if the pressure does not decrease more than 5 p.s.i. in 1 hour. All leaks shall be repaired. The test shall be repeated until satisfactory.

261.4.03 Leakage Test - A leakage test shall be conducted after the pressure test has been satisfactorily completed and shall consist of an examination of all exposed joints for leakage as well as overall leakage test of the completed section of pipe. The pressure to be maintained during the test shall be the same as for the pressure test and shall be measured at the low point of the system. The same procedure for filling the line and expelling air shall be used as for the pressure test. The duration of each leakage test shall be 1 hour. Any joint found where accumulated leakage of the joint exceeds the rate of leakage specified by the manufacturer of the pipe shall be rejected. The overall permissible leakage for the section of pipe tested shall not be greater than the number of gallons per hour as determined by the formula in which:

$L = \frac{SD\sqrt{P}}{133{,}200}$	L=	Allowable leakage, in gallons per hour
	S=	Total length of pipe tested, in feet
	D=	Nominal diameter of the pipe, in inches
	P=	Average test pressure during the leakage test, in pounds per square inch (gauge)

Should any test of a section of pipe line disclose joint leakage greater than that permitted, the Contractor shall, at no expense to the Owner, locate and repair the defective joints until the leakage is within the permitted allowance.

261.4.04 Testing of Service Lines - Corporation stops, service lines, and angle meter stops shall be installed prior to the above described tests. Water service reconnections shall be tested up to the angle meter stop. Reconnected portions of water services beyond the last valve will be accomplished by the City Water Department Staff, and shall be approved by the inspector prior to covering, and any leaks which appear beyond the last valve will be repaired by the Owner. Any leaks which appear in front of the last valve shall be repaired by the Contractor. Water service connections for future use shall be tested up to the last valve.

261.4.05 Disinfection and Flushing - Upon completion of the testing, water mains shall be disinfected in accordance with AWWA C651 and the latest Oregon State Health Division regulations. After disinfection, the chlorinated water shall be flushed from the water main until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The chlorinated water shall be disposed of in a manner approved by the Oregon State Health Division and the Oregon State DEQ. The chlorinated water shall be discharged into the sanitary sewer system only after the written permission of the sewer system Owner is obtained by the Contractor. At the option of the Contractor, and if the chlorinated water is not discharged into the sanitary sewer system, the Contractor shall neutralize the chlorinated water with a chemical neutralizing agent prior to discharging the chlorinated water.

261.5 MEASUREMENT AND PAYMENT:

261.5.01 Water Main Pipe - Measurement for pipe will be made on a linear foot basis for the various classes, types, and size of pipe listed and installed. No reduction in length will be made for valves and fittings. Where pipe is laid on a continuous slope greater than 10% for a distance greater than 100 feet, measurement will be made upon the average slope distance between 100 foot stations. Payment will be at the contract price per linear foot and shall constitute full compensation for the pipe in place, including excavation, bedding, mechanical restraints, thrust blocking, anchorage, backfill, testing and disinfection.

261.5.02 Valves - Measurement and payment for water main valves will be made at the contract price for the various size of each valve installed. Payment will be made at the contract price and shall constitute full

compensation for the valve in place including valves, mechanical restraint, thrust blocking, valve boxes, concrete, reinforcement and lids as specified in the Bid schedule or as shown on the construction drawings. Hydrant valves will be paid for as a part of the fire hydrant assembly contract price. Valves included in the separate item marked "Connections" are not included for payment in this item.

261.5.03 Fire Hydrant Assemblies –Measurement and payment for fire hydrant assemblies will be made at the contract price for each hydrant installed. Payment will be made at the contract price and shall constitute full compensation for the entire hydrant assembly in place, including hydrant valve, valve box and lid, , anchorage, restraints, blocks, tracer wire, gravel and painting.

261.5.04 Water Service Pipe and Assemblies - Measurement and payment for water service pipe and water service assemblies will be made on a per each basis at the contract price for each water service assembly installed. Water service fittings include the service saddle, water service pipe, corporation stop, angle meter stop, tracer wire and City provided meter box. Payment will be at the contract price per each water service assembly and shall constitute full compensation for the water service pipe and assembly in place including testing, disinfection, excavation, bedding, backfill, connections and fittings to existing water services.

261.5.05 Water Main Fittings and Bends- Measurement and payment for water main fittings and bends will be made at the contract price for each fitting installed. Payment will be made at the contract price and shall constitute full compensation for the fitting in place, including thrust blocks or other mechanical joint restraint. Water service fittings including service saddle, corporation stop, angle meter stop and meter box and are not included in this payment item. Where individual fittings are not shown on the Bid schedule, those fittings will be considered incidental to the water main pipe construction and no separate payment will be made for incidental fittings. Fittings included in the separate item marked "Connections" are not included for payment in this item.

261.5.06 Connections - Measurement and payment for water main connections will be made at the contract price for the entire connection installed along with any temporary thrust blocking, valving or connections needed to maintain water service and as delineated in the WSP, Demolition and Utility Plans of the contract drawings. Payment will be made at the contract price and shall constitute full compensation for the complete connection in place.

261.5.07 Air Release Assemblies - Measurement and payment for air release assemblies will be made at the contract price for each assembly installed. Payment will be made at the contract unit price and shall constitute full compensation for the entire assembly in place including service saddle, meter box, corporation stop, service tubing, angle meter stop, air release valve, drain pipe and necessary support.

END OF SECTION 261

SECTION 265 – PVC CATCH BASINS

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

265.1 DESCRIPTION:

This item includes all work necessary for the installation of PVC catch basins. Concrete catch basins shall be as shown on the plans.

265.2 MATERIALS:

265.2.01 PVC Catch Basins:

265.2.01A PVC Catch Basins shall be pre-fabricated basins, 18" diameter, manufactured by Nyloplast America Inc., or approved equal. Height of a basin shall be as shown on the plans.

265.2.01B Lids shall be standard cast iron lids supplied by the same company as the basins, designed for the basin size used. Catch basins and grates shall have an H-20 traffic rating and shall be set in concrete as recommended by the manufacturer. Catch basins shall be furnished with bicycle safe slotted grates.

265.2.01C Pipe Connections shall be fabricated in the catch basin at the factory. Any pipe adapters used shall be manufactured by the same company for the specific catch basin and pipe to be used. All connections shall be gasketed and specified as “water-tight”.

265.2.01D Future Pipe Stubs shall be furnished and installed as specified on the construction plans.

265.2.01E Concrete shall be as specified in Section 330.

265.3 CONSTRUCTION:

265.3.01 Excavation and backfill shall be in accordance with applicable portions of Section 266.

265.3.02 Pipe connections at catch basins shall be made according to manufacturer’s recommendations. Special care shall be taken by the Contractor to see that the pipe connections at catch basins are completely watertight. All pipes entering or leaving the catch basin shall be placed on firmly compacted bedding material. Concrete catch basins shall have all connections cored and booted.

265.3.03 Catch Basins shall be installed according to the plans. The units shall be placed on a prepared bedding of 8 inches compacted thickness of 3/4 inch-minus crushed rock. Catch basins shall be installed using conventional flexible pipe backfill materials and procedures. The backfill material shall be 3/4 inch-minus crushed rock. Construct an 8” to 10” thick ring of concrete under the frame, grate and hood of the catch basin as recommended by details provided by the manufacturer.

265.3.03 Catch basins, grates, frames and covers shall be installed level and plumb, at the elevation shown on the plans, in accordance with the manufacturer’s recommendation. The catch basin body shall be cut at the time of final grade so as to maintain a one piece, leak proof structure. No brick, stone or concrete block shall be used to set the frame, grate and hood to the final grade.

265.4 MEASUREMENT AND PAYMENT:

265.4.01 PVC Catch Basins – Measurement and payment for PVC basins “Nyloplast Catch Basin” will be made at the contract price for each type of PVC catch basin installed. Payment will be made at the contract price and shall constitute full compensation for the basin in place, including lid, concrete apron, excavation, bedding, fittings, pipe connections and backfill. All existing storm pipe and structure demo or capping shall be incidental to the project.

265.4.02 Concrete Catch Basins – Measurement and payment for Concrete catch basins shall be a standard ODOT basin “Type 1 Catch Basins” will be made at the contract price for each type of Concrete catch basin installed. Payment will be made at the contract price and shall constitute full compensation for the basin in place, including lid, concrete apron, excavation, bedding, fittings, booted pipe connections and backfill. All existing storm pipe and structure demo or capping shall be incidental to the project.

END OF SECTION 265

SECTION 266 – STORM DRAINAGE PIPE AND FITTINGS

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

266.1 DESCRIPTION:

This item includes all work necessary for the construction of surface and subsurface storm drainage piping and facilities including storm drainage piping and culverts.

266.2 MATERIALS:

266.2.01 General - Storm drainage pipe and fittings shall be as hereinafter specified for the particular kind of pipe and fittings required, as designated on the plans. Joints for all fittings shall be the same as the joints used on the pipe. No pipe and fittings that are not hereinafter specified will be allowed on the project, and no substitution of approved pipe materials will be allowed other than the pipe materials shown on the plans.

266.2.02 Storm Drainage Pipe:

266.2.02A Corrugated High Density Polyethylene Smooth Interior (HDPE) pipe and fittings shall be ADS SaniTite HP pipe for use in gravity flow sanitary sewer applications. Dual wall pipe shall conform to the requirements of ASTM F2736. Pipe shall be joined with a gasketed integral bell & spigot joint meeting the requirements of ASTM F2736 and ASTM F2764, for the respective diameters. Pipe shall be watertight according to the requirements of ASTM D3212, with the addition of a 15psi pressure requirement. Spigot shall have two gaskets meeting the requirements of ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gaskets are free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly. Pipe shall have a reinforced bell with a polymer composite band installed by the manufacturer.

266.2.02C Joint Materials, Couplings and Fittings shall conform to ASTM F2736, ASTM F2764, and AASHTO M330, for the respective diameters. Bell & spigot connections shall utilize a welded or integral bell and spigot with gaskets meeting ASTM F477. Fittings and connections shall provide a watertight connection according to the requirements of ASTM D3212.

266.2.03 Drain rock for shall be railroad ballast rock which shall consist of uniformly graded 2 inches to 3 inches, rough edged aggregate. At the option of the Contractor, rounded river rock, washed to remove all fines, with a maximum size of 3 inches, may be substituted for railroad ballast rock as drain rock.

266.2.04 Pipe bedding material, select pipe bedding material, initial backfill material, and trench backfill material shall be as specified in Section 221.

266.2.05 Tracer wire and locate warning tape. Tracer wire shall be #12 solid copper wire with HDPE coating, continuous with no splices installed on the top or the storm pipe. Tracer wire shall be continuity tested as described in Section 261 Water.

Locate warning tape shall be installed at least 12” above the pipeline. It shall be 2” minimum width, green and marked Storm water.

266.3 CONSTRUCTION:

266.3.01 Trench excavation, bedding and backfill for storm drainage piping shall be as specified in Subsection 221.1.

266.3.02 Pipe bedding consists of leveling the bottom of the trench and placing bedding material to the depth as specified on the plans. Bedding material shall be as specified hereinbefore. The Contractor shall spread the bedding smoothly to proper grade so that the pipe is uniformly supported along the barrel. Bedding under the pipe shall provide a firm, unyielding support along the entire pipe length. The Contractor shall place subsequent lifts of not more than 6 inches in thickness up to the required depth, bring lifts up together on both sides of the pipe and carefully work under the pipe haunches by slicing with a shovel, tamping or other approved procedure. Particular attention must be given to the area from the flow line to the horizontal centerline of the pipe or top of bedding to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone. Pipe bedding shall be placed the full width of the trench.

266.3.03 Initial Backfill - The Contractor shall place the specified initial backfill material carefully around the pipe in 6 inch layers and thoroughly hand tamp with approved tamping sticks supplemented by "Walking In" and slicing with a shovel. The Contractor shall prevent pipe from movement either horizontally or vertically during placement and compaction of pipe zone material. Mechanical compactors shall not be utilized in placement of the material. The material shall be placed to a depth of 12 inches above the top of the pipe.

266.3.04 Trench backfill shall be as specified in Subsection 221.3.06.

266.3.05 HDPE and CPE Joint Construction - Joints shall be made with an integral built-in bell and factory installed gasket that requires no extra couplers, grout or other sealants to install. Installation shall be in accordance with ASTM Recommended Practice D2321, or as directed by the Engineer.

266.3.06 Line and Grade - Survey line and grade control hubs shall be installed on an offset line at intervals not greater than 100 feet when the Contractor uses a laser beam for pipe alignment, and at intervals not

greater than 40 feet for other methods of pipe alignment. The Engineer will furnish the Contractor with the elevation of the corresponding storm invert elevations. Variance from established line and grade shall not be greater than ½ inch for line and ¼ inch for grade, provided that such variation does not result in a level or reverse sloping invert. The Contractor shall establish line and grade for pipe by the use of lasers or by transferring the cut from the offset hubs to the trench at whatever intervals necessary to maintain the line and grade. The method of transferring the cut from the offset hubs to the trench shall be subject to the approval of the Engineer. A transfer method not approved by the Engineer shall not be used. The Contractor shall constantly check both line and grade for each length of pipe laid and in the event they do not meet the limits described, the work shall be immediately stopped, the Engineer notified, and the cause remedied before proceeding with the work. When using laser alignment the Contractor shall check beam alignment at 100 foot intervals.

266.3.07 Pipe Distribution and Handling - The Contractor shall not distribute material on the job faster than it can be used to good advantage. The Contractor shall unload pipe only by approved means. Pipe will not be unloaded by dropping to the ground. The Contractor shall inspect all pipe and fittings prior to lowering into trench to insure no cracked, broken, or otherwise defective materials are used. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep it clean during laying and joining. The Contractor shall use approved implements, tools, and facilities for the safe and proper protection of the work. The Contractor shall lower pipe into the trench in such a manner as to avoid any physical damage to the pipe. The Contractor shall remove all damaged pipe from the job site. Pipe shall not be dropped or dumped into trenches.

266.3.08 Laying Pipe on Curves - The Contractor shall lay pipe on horizontal or vertical curves only when approved and at the direction of the Engineer.

266.3.09 Installation of Service Tees and Wyes - Fittings shall be placed where indicated on the plans or as staked by the Engineer, or as required by existing services. The Contractor shall provide ends of all inactive service laterals and fittings with approved watertight plugs, caps, or stopper, suitably braced to prevent blow off during internal hydrostatic or air testing. Such plugs or caps shall be removable and their removal shall provide a socket suitable for making a flexible joint lateral connection or extension. If any fitting is placed when the Engineer is not present, the Contractor shall place a stake and see that it is maintained to mark the location of such fitting until the Engineer has recorded the location of the fitting.

266.3.10 Pipe Placing and Laying - Trench excavation, bedding and backfill shall be in accordance with Section 221.

266.3.10A HDPE pipe shall be laid upgrade with spigot ends in the direction of flow. After a section of pipe has been lowered into the prepared trench, the end of the pipe to be joined will be cleaned as will the inside of the joint and the rubber ring, immediately before joining the pipe. The joint will be assembled in accordance with the recommendations of the manufacturer of the type of joint used. All special tools and appurtenances required for the jointing assembly will be provided by the Contractor. The trench bottom shall form a continuous and uniform bearing and support for the pipe at every point between joints. Sufficient pressure will be applied in making the joint to assure that the joint is "home", as defined in the standard installation instructions provided by the pipe manufacturer. Sufficient bedding material will be placed to secure the pipe from movement before the next joint is installed to assure proper pipe alignment and joint make-up. After the joint has been made, the pipe will be checked for alignment and grade. When in correct alignment and grade, the pipe shall be supported by placing the specified initial backfill material as described in Section 221.

When the pipe is laid within a movable trench shield, all necessary precautions will be taken to prevent pipe joints from pulling apart when the shield is moved ahead. The Contractor shall take the necessary precautions required to prevent excavated or other foreign material from getting into the pipe during the laying operation. At all times, when laying operations are not in progress, at the close of the day's work, or whenever the workers are absent from the job, the open end of the last laid Section of pipe will be closed and blocked to prevent entry of foreign material or creep of the gasketed joints.

The Contractor shall plug or close off pipes which are stubbed off for manhole construction or for connection by others, with temporary plugs. The Contractor shall take all precautions necessary to prevent the uplift or floating of the line prior to the completion of the backfilling operation. When cutting and/or machining of the pipe is necessary, the Contractor shall use only the tools and methods recommended by the pipe manufacturer. The Contractor shall join the pipe in conformance with the

manufacturer's recommendations. Joints or pipe will not be deflected more than recommended by the manufacturer.

266.4 TESTING:

266.4.01 Cleaning Prior to Test - Prior to the internal pressure testing and inspection of the system by the Engineer, the Contractor shall flush and clean all parts of the system. The Contractor shall remove all accumulated construction debris, rocks, gravel, sand, silt and other foreign material from the system at or near the closest downstream manhole. If necessary, the Contractor shall use mechanical rodding or bucketing equipment or balling. Upon the Engineer's inspection of the system, if any foreign matter is still present, the Sections and portions of the system shall be reflushed and cleaned as required.

266.4.02 Television Inspection of Storm Sewers - Upon completion of all storm sewer construction, testing and repairs, the Contractor shall conduct a color TV acceptance inspection of all installed lines 8 inches to 72 inches. Unless otherwise directed, the Contractor shall conduct a subsequent warranty TV inspection of all installed lines. Warranty TV inspections shall be in color and shall be conducted during the warranty period in a season of high ground water conditions as defined by the Engineer. The acceptance inspection and the warranty inspection shall be conducted by an approved technical service which is equipped to make audio-visual tape recordings of the televised inspections.

The audio-visual recordings shall be compatible with the Owner's playback equipment. The Contractor shall ensure that recording equipment is functioning properly and that a clear and usable record is made of all possible defects. The equipment used for recording shall be equipped with a footage meter which records a visual record on the tape. A voice accounting of suspected deficiencies shall be made on the sound track.

A written report shall be made at the time of each television inspection. This report shall be made on a form approved by the Engineer. The video record and the written report of the acceptance inspection and the warranty inspection shall be submitted to the Engineer and will become the property of the Owner.

The audio and visual reports of the acceptance inspection and the warranty inspection shall include identification of individual groundwater infiltration sources such as laterals, and construction defects.

The installation shall meet the requirements for sanitary sewer pipe installations, with vertical sags no greater than ½".

If the TV inspection shows or appears to show ovaling of the pipe as determined by the engineer or inspector the contractor shall mandrel the line using a 10% mandrel to verify pipe integrity.

266.5 MEASUREMENT AND PAYMENT:

266.5.01 Storm drainage pipe will be measured on a linear foot basis for the various sizes and types of pipe installed as shown on the plans. Measurement will be the pipe length along the centerline from end to end of each pipe. Payment will be made at the contract price per linear foot for the various sizes of pipe, bends and fittings installed and shall constitute full compensation for all work and materials specified herein, including trenching, pipe laying, backfill, flushing and cleaning, tracer wire and testing, warning tape, TV inspection and reports and all other specification requirements. All existing storm structure or pipe and structure demo or capping is incidental to the project.

266.5.02 Storm Drainage Connections - Measurement and payment for storm pipe connections will be made at the contract price for the entire connection installed along with any temporary connections and pumping needed to maintain storm flow as delineated on the contract drawings. Payment will be made at the contract price and shall constitute full compensation for the complete connection in place, including all materials, piping, tees, fittings required to make a water-tight connection to the existing storm system services. All existing storm structure or pipe and structure demo or capping is incidental to the project.

END OF SECTION 266

SECTION 269 – STORM DRAINAGE MANHOLES

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

269.1 DESCRIPTION:

This item includes all work necessary for the construction of storm drainage – infiltration manholes, reconstruction of storm drain manholes and storm drainage vaults.

269.1.01 Related Technical Specifications - The Oregon Standard Specifications, current edition, is incorporated into this specification by reference. It shall be understood that in any matter addressed by both the text of this technical specification and the referenced specification, be it in construction method, material, or quality control, the more stringent specification is intended and shall be enforced.

269.2 MATERIALS:

269.2.01 Cast-in-Place Storm Drainage Manholes:

269.2.01A Aggregates shall be of the designated size 3/4 inch-0 and shall meet the requirements of Oregon Standard Specifications Subsection 2630.

269.2.01B Portland Cement and Portland Cement Concrete (PCC) shall conform to the requirements of ASTM C94. Compressive field strength shall be not less than 3,000 p.s.i. at 28 days. Maximum size of aggregate shall be 3/4 inch. Slump shall be between 2 inches to 4 inches.

269.2.01C Metal Reinforcement shall conform to the requirements of ASTM A 615, Grade 60, deformed bars.

269.2.01D Forms - Exterior surfaces shall be formed with steel or plywood. Other surfaces shall be formed with matched boards, plywood, or other approved material. Trench walls, rock, or earth will not be acceptable form material.

269.2.02 Metal Castings:

269.2.02A General - Manhole covers shall be designed so they may be secured to the frames. Matching surfaces of covers and frames shall be flat to prevent any movement of covers within frames. Covers and frames shall be interchangeable.

269.2.02B Cast Iron Materials shall conform to the requirements of ASTM A 48. Class 30B. The foundry shall certify as to the tensile and transverse properties and Brinell Hardness. The Owner reserves the right to require a rough transverse bar, size of bar 1.2" (diameter) x 20" (long), and/or a tensile bar as per ASTM A 48 for each 20 castings or heat when less than 20 castings are made.

269.2.02C Storm Drainage Manhole Frames and Covers shall be of heavy duty design with minimum weight of 295 pounds. Frames and covers shall be machine finished or ground on seating surfaces to assure a non-rocking fit in any position and interchangeability. Covers shall be marked with "STORM" in minimum 2 inch raised or indented letters, and shall have 1 or 2 vent holes only. Frames shall provide for a minimum 23 inch diameter clear opening.

269.2.02D Clean out frames and covers shall have a minimum weight of 80 pounds.

269.2.03 Cap Screws and Washers for watertight manhole covers shall be stainless steel with 60,000 p.s.i. minimum tensile strength conforming to the requirements of ASTM A453.

269.2.04 Precast Concrete Storm Drainage Manholes:

269.2.04A Precast Concrete Manhole Sections and appurtenances shall conform to the requirements of ASTM C478. Minimum wall thickness shall be 4 inches. Cones shall have the same wall thickness and reinforcement as riser sections. Cones shall be eccentric. Joints shall be tongue-and-groove or keylock type. Prior to delivery of precast manhole sections to the job site, yard permeability tests may be required

at the point of manufacture. The precast sections to be tested will be selected at random from the stockpiled material which is to be supplied to the project. All test specimens will be mat tested, and shall meet the permeability test requirements of ASTM C 14. Precast manhole sections shall consist of circular sections in standard nominal inside diameters of 42, 48, 54, 60, 72, 84, or 96 inches. Heights of sections shall be multiples of 12 inches. Heights of manhole sections 72 inches through 96 inches in diameter shall be as required to fit site conditions. Other sections shall be 24 inch riser and flattop sections.

269.2.04B Precast Concrete Manhole Bases may be used provided all the details of construction are approved prior to construction. Inlet and outlet pipe holes shall be core-drilled at the plant location or in the field. Conical-type flexible neoprene boots shall be installed in the factory core-drilled hole to create a water-tight connection between manhole and storm pipe, Kor-N-Seal or approved equal. Kor-N-Seal Pipe Adapter shall be used to create a water-tight seal with the boot.

269.2.05 Storm Drainage Manhole Joint Materials:

269.2.05A Mortar shall conform to the requirements of ASTM C387, or be proportioned 1 part Portland cement to 2 parts clean, well-graded sand that will pass a 1/8 inch screen. Admixtures may be used not exceeding the following percentages of weight of cement: hydrated lime, 10%; diatomaceous earth or other inert materials, 5%. Consistency of mortar shall be such that it will readily adhere to the precast concrete if using the standard tongue-and-groove type joint. If the keylock type joint is used, the consistency shall be such that excess mortar will be forced out of the groove and support is not provided for the next precast manhole section to be placed. Mortar mixed for longer than 30 minutes shall not be used.

269.2.05B Non-Shrink Grout shall be Sika 212, Euco N-S, Five-Star, or approved equal non-metallic cementitious commercial grout exhibiting zero shrinkage per ASTM C-827 and CRD-C-621. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used. Non-shrink grouts shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout being used. Water shall not be used as a substitute for the commercial bonding agent.

269.2.05C Preformed Plastic Gaskets shall be used in addition to mortaring all joints. Preformed plastic gaskets shall meet all the requirements of federal specification SS-S-00210.

269.2.05D Rubber Gaskets shall conform to ASTM C 443.

269.2.06 Cleanouts shall be constructed with pipe and fittings conforming to the applicable portions of Sections 266 and shall be of the same material as the pipe in the section of storm main to which the cleanout is constructed. Rubber-gasketed water-tight mechanical plugs shall be furnished at each cleanout.

269.3 CONSTRUCTION:

269.3.01 General:

269.3.01A - Manhole and outfall excavation and foundation stabilization shall be in accordance with applicable portions of Section 221. Manholes and outfalls shall be installed on a prepared surface base of crushed rock as shown on the plans. All backfill around manholes and outfalls shall be 3/4" - 0" crushed rock. All manholes shall be 48” in diameter.

269.3.01B Pipe connections at manholes shall be constructed with watertight connections. Special care shall be taken by the Contractor to see that the pipe connections at manholes are completely watertight. Manholes shall be placed on firmly compacted bedding material.

269.3.02 Bases shall be placed on a prepared bedding of 8 inches compacted thickness of ¾ inch-minus crushed rock.

269.3.02A Cast-in-place Bases shall be constructed according to the plans. The concrete shall be consolidated by mechanical vibration, hand spading, rodding, or tamping. The concrete shall be screeded off such that the manhole riser section has a level uniform bearing for the full circumference.

269.3.02B Precast Bases shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment, making sure that all entering pipes can be inserted on proper grade. HDPE pipe connections to manholes shall be booted

No channels shall be constructed in the base of storm drainage manholes. Storm drainage manhole bases shall function as sediment traps. Inverts on storm drainage manholes shall use the unfinished precast manhole base as a catchment basin with no channel.

269.3.03 Precast Concrete Manhole Risers - All lift holes shall be thoroughly wetted, then completely filled with mortar, and smoothed and pointed both inside and out to ensure watertightness. Preformed plastic or rubber gaskets shall be used on all sanitary manholes. Mortar shall be used on 24 inch extension rings above the cones. All mortar joints between precast elements shall be thoroughly wetted, then completely filled mortar. On proposed street grades, a minimum of one 24 inch precast riser will be required between the cone and the manhole cover frame. Watertight seals between the precast concrete manhole section(s) and the precast bases and eccentric cones shall be effected by placing a preformed plastic or rubber gasket between the precast sections, then filling the remaining voids in the joint seam, both inside and outside, with mortar.

269.3.04 Manhole, Grates, Frames and Covers shall be installed in such a manner as to prevent infiltration of surface or ground water between the frame and the concrete of the manhole section. All mortared manhole necks and all riser ring joints made with mortar shall be constructed using an approved commercial concrete bonding agent applied to all cured concrete surfaces being mortared. No joints, necks, or frames on manholes shall be mortared without an approved bonding agent. Rim elevations shall be adjusted with approved precast concrete grade rings and final asphalt paving graded rings.

269.3.05 Storm drain manhole re-construction – shall follow the specifications outlined in this section, 269.3, Construction. A submittal is required for manhole reconstruction, see TS, Section 130.

269.3.06 Backfill – drain rock backfill in the perforated section shall be to the limits shown in the plans.

269.4 MEASUREMENT AND PAYMENT:

269.4.01 Storm Drainage Manholes - Measurement and payment for manholes “Infiltration Basin Structure” will be made on a per each basis. Payment will be at the contract price per each manhole for each type and size and shall constitute full compensation for all work and materials necessary to construct all water-tight manholes. All existing storm structure or pipe and structure demo or capping is incidental to the project.

269.4.02 48 inch Storm Sewer Manholes - Measurement and payment for manholes “48" Storm Sewer Manhole (all depths)” will be made on a per each basis for each type and all depths. Payment will be at the contract price per each manhole for each type and size and shall constitute full compensation for all work and materials necessary to construct all water-tight manholes. All existing storm structure or pipe and structure demo or capping is incidental to the project.

END OF SECTION 269

SECTION 275 – MINOR ADJUSTMENT OF EXISTING MANHOLES, CLEANOUTS, CATCH BASINS AND WATER VALVES

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

275.1 DESCRIPTION:

This item includes all work necessary for the adjustment of existing sewer structures and storm drain manholes and catch basins to new finish grades with the use of cast iron paving riser rings and resetting of frames, lids and rims.

275.2 MATERIALS:

275.2.01 Concrete shall conform to the requirements of ASTM C94. Compressive field strength shall be not less than 3,000 p.s.i. at 28 days. Maximum size of aggregate shall be 3/4 inch. Slump shall be between 2 inches to 4 inches.

275.2.02 Mortar shall conform to the requirements of ASTM C387, or be proportioned 1 part Portland cement to 2 parts clean, well graded sand which will pass a 3/8 inch screen. Admixtures may be used not exceeding the following percentages of weight of cement: a) hydrated lime, 10%; b) diatomaceous earth or other inert materials, 5%. Consistency of mortar shall be such that it will readily adhere to the precast concrete. Mortar mixed longer than 30 minutes shall not be used.

275.2.03 Non-Shrink grout shall be Sika 212, Euco N-S, Five-Star, or approved equal non-metallic cementitious commercial grout exhibiting zero shrinkage per ASTM C-827 and CRD-C-621. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Unused grout shall be discarded after 20 minutes and shall not be used. Non-shrink grouts shall be placed or packed only with the use of an approved commercial concrete bonding agent applied to all cured concrete surfaces being grouted. The bonding agent shall be compatible with the brand of grout being used. Water shall not be used as a substitute for the commercial bonding agent.

275.2.04 Precast Concrete Grade Rings shall conform to the requirements of ASTM C478.

275.2.05 Cast Iron Paving Grade Rings shall be supplied by Advantage Precast, Inc., Keizer, OR. or approved equal.

275.2.06 Cast Iron Manhole Paving Grade Rings shall conform to the requirements of H20 Load Ratings. All sewer paving riser rings will be furnished by NBWA and installed by the Contractor.

275.2.07 Precast Concrete Water Valve Boxes shall conform to the requirements of H20 Load Rating. All precast concrete water valve boxes as required for this project shall already be in place or will be furnished by the Owner and installed by the Contractor.

275.2.08 Crushed Rock shall be of the designated size 3/4 inch-0 and shall meet the requirements of Oregon Standard Specifications Subsection 2630.

275.2.09 Formwork shall conform to the requirements of Section 310.

275.3 CONSTRUCTION:

275.3.01 Manhole Frame Adjustment - Manholes shall be raised or lowered by removing the existing frames, grates or covers and adjusting the height as necessary to correspond to grade. Manholes may be raised or lowered by any of the following or combination of methods when no particular method is specified.

275.3.01A Manhole necks are defined as that upper portion of a manhole having vertical walls and a uniform diameter or dimensions sufficient to receive and support the metal frame. The manhole neck may be extended by the use of precast extension rings and mortar or by reconstructing the neck except that the total distance from the top of the metal frame at its new adjusted grade to the bottom of the neck shall not exceed 24 inches.

275.3.01B Manhole cones may be cut down and rebuilt provided the batter or slope of the cone does not exceed 6 inches horizontal per 12 inches vertical.

275.3.01C Manhole barrels of precast concrete shall be extended in kind with like Precast concrete materials.

275.3.01D Existing frames shall be reset in fresh mortar and brought to proper grade following manhole adjustment.

275.3.02 Manhole Ring Addition - Existing frames may be extended with cast iron paving rings where the existing slope across the manhole matches the finish grade slope.

275.3.03 Water Valve Box Adjustment – Precast concrete water valve boxes shall be raised by digging out the existing valve box and raising it to match the finish grade. The Contractor shall add and compact with mechanical compaction equipment such additional crushed rock as may be needed to fill the void resulting from lifting the valve box.

275.3.04 Pipe Connections to Existing Manholes shall be core-drilled and constructed such that connections are watertight and will provide smooth flow into and through the manhole. Existing pipe stubouts may be used for new pipe connections provided that the existing pipe stubout is not damaged and is in proper alignment with the new pipe. Connections to existing pipe stubouts shall be made with approved flexible couplings. When existing pipe stubouts are damaged or not in proper alignment with the new pipe, the existing stubout shall be removed and the new pipe installed in the manhole base as described in Subsection 270.3.01B. Where there are no existing pipe stubouts, the Contractor shall construct openings in the existing manhole base or barrel as required and shall construct connections that are watertight and will provide a smooth flow into and through the manhole, in accordance with Subsection 270.3.01B. The Contractor shall provide all diversion equipment and facilities and perform all work necessary to maintain flow in existing lines and manholes during work on any manhole.

275.3.05 Storm Drain Catch Basin - Existing concrete catch basins shall be modified by removing existing frame and grate and reinstalling new frame and grate as specified in Subsection 267.2.02 to match the finish grade.

275.4 MEASUREMENT AND PAYMENT:

275.4.01 Sanitary Sewer Manhole Adjustments will be measured on a per each basis for each sanitary sewer manhole “Minor Adjustment Of Manholes” adjusted with paving rings or if necessary adjustment of the manhole cone. Payment will be at the contract price per each under the bid item “Minor Adjustment of Manholes” and shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary or incidental to the installation of the paving rings or cone adjustment. The paving riser rings will be supplied by the Nehalem Bay Wastewater Agency.

275.4.02 Water Valve Box Adjustments There will be no separate measurement and payment for the adjustment of water valve boxes. The cost of removal and disposal is to be included in one or more of the unit prices.

275.4.03 Storm Drain Catch Basin adjustment will be measured on a per each basis for each catch basin frame and grate removed and replaced with new frame and grate to new finished grade as specified in the design drawings. Payment will be at the contract price per each for “Minor Adjustment of Manholes” and shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary or incidental to the modifying of the existing catch basin and installation and adjustment of the new frame and grate creating a water-tight connection.

275.4.04 New Pipe Connections to Existing Structures Measurement and payment for storm manhole or catch basin connections will be made on a per each basis under the bid item “Connections to Existing Strom Sewer.” Construction shall include all materials, equipment, and labor required to clean, prepare, and seal the manhole, including water-tight connection, temporary bypass pumping, materials, rechanneling and testing the manhole.

275.4.06 Storm Manhole Adjustments will be measured on a per each basis for each storm manhole “Minor Adjustment Of Manholes” adjusted with paving rings or if necessary adjustment of the manhole cone. Payment will be at the contract price per each under the bid item “Minor Adjustment of Manholes” and shall constitute full compensation for furnishing all labor, materials, tools and equipment necessary or incidental to the installation of the paving rings or cone adjustment. The paving riser rings will be supplied by the City Public Works Department.

END OF SECTION 275

SECTION 292 – HYDROSEEDING

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

292.1 GENERAL

292.1.01 Description: This item includes all work necessary to complete hydroseeding operations as shown on the plans and as specified herein. Hydroseeding shall include temporary seeding, permanent seeding, seed, mulch, fertilizer, tackifier, and water to provide complete and uniform coverage of designated areas.

292.1.02 Submittals: Contractor shall provide the following submittals for review and approval:

1. Qualification Data: Provide documentation demonstrating experience in hydroseeding projects of similar scope and complexity.
2. Grass Seed Mixtures: Submit grower's certified analysis and vendor's proof of order for each seed mix specified.
3. Fertilizers: Submit manufacturer's certified analysis.
4. Mulch: Submit samples and vendor's certified analysis for hydroseeding mulch.
5. Tackifier: Submit product data sheets and manufacturer's specifications.

292.1.03 Quality Assurance:

1. Installer's Field Supervision: Maintain an experienced full-time supervisor on-site when work is in progress.
1. Seed Quality: Comply with applicable state and federal seed regulations. Seeds must be labeled in accordance with U.S. Department of Agriculture rules and regulations.
2. Material Inspection: The Owner's Representative retains the right to inspect all materials at the site before application. Materials found to be defective or non-compliant shall be removed and replaced at the Contractor's expense.

292.1.04 Delivery, Storage, and Handling:

3. Deliver hydroseeding materials in original, unopened containers bearing manufacturer's labels.
4. Store seed, mulch, and fertilizer in a dry, covered location to prevent contamination.
5. Protect materials from exposure to weather, excess moisture, and damage.

292.1.05 Project Conditions:

1. Hydroseeding shall not be performed during high winds or heavy rainfall that may cause erosion or washout.
2. Hydroseeding shall be conducted only when the soil moisture content is suitable for seed germination and establishment.
3. The Contractor shall observe and report any unsuitable conditions affecting seeding performance before proceeding.

292.1.06 Warranty:

1. The Contractor shall guarantee the establishment of a uniform stand of grass for a period of one growing season or one year from final acceptance, whichever is longer.
2. Areas found to have poor germination, bare spots larger than 9 square inches, or unhealthy growth shall be reseeded at the Contractor's expense.

292.2 MATERIALS

292.2.01 Topsoil: A 2" deep layer of topsoil shall be placed in all areas designated for seeding/hydromulching and shall consist of existing native topsoil material excavated from the surrounding vicinity or imported topsoil consisting of fertile, loamy, natural surface soil consisting of sands, silts, clays and organic matter in combination and free from substances toxic to plant growth, noxious weeds, roots, refuse, sticks and lumps. Sticks and roots shall be removed from the topsoil. All material shall be approved by the engineer prior to placement and fine grading.

292.2.02 Seed Mixes:

1. Seed shall be fresh, certified, and conform to the specifications outlined in the contract documents.
2. Seed mixture and application rates shall be as follows:

SPECIES	COMMON NAME	SEEDING RATE
Festuca rubra	Red Fescue	1.15 lbs./acre
Elymus glaucus	Wild Rye	4.22 lbs./acre
Bromus carinatus	California Brome	4.75 lbs./acre
Agrostis exarate	Spike Grass	0.10 lbs./acre
Glyceria occidentalis	Mannagrass	1.20 lbs./acre

Overall Seeding Rate = 11.42 lbs./acre

292.2.03 Fertilizer:

1. Fertilizer shall be a balanced mix suitable for seed establishment.
2. Fertilizer shall have a minimum analysis of 18-16-16 for hydroseeding applications.
3. Application rate: 1 lb. of nitrogen per 1,000 square feet.

292.2.04 Mulch:

1. Hydroseeding mulch shall be composed of wood fiber or cellulose fiber, free from weeds and contaminants.
2. Mulch shall be applied at a rate of 2,000 to 2,500 lbs. per acre, depending on site conditions.

292.2.05 Tackifier:

1. Tackifier shall be a biodegradable bonding agent to hold seed and mulch in place.
2. Tackifier shall be mixed and applied per manufacturer's recommendations.

292.3 EXECUTION

292.3.01 Site Preparation:

1. Verify that the area to be hydroseeded has been properly graded, cleared of debris, and prepared for seeding.
2. Ensure soil conditions are appropriate for seed germination and growth.

292.3.02 Application:

1. Apply hydroseeding mixture using a hydraulic seeding machine capable of distributing a uniform slurry of seed, mulch, fertilizer, tackifier, and water.
2. Apply mixture in a manner that ensures complete and even coverage.
3. Hydroseeding shall not be performed in excessive wind or rain conditions.
4. Temporary Seed shall be installed within 7 days of embankment or excavated slope finishing.

292.3.03 Maintenance:

1. The Contractor shall be responsible for maintaining hydroseeded areas until final acceptance.
2. Maintenance shall include watering, erosion control, and protection from traffic and trespassing.
3. Hydroseeded areas shall be watered as necessary to promote germination and growth.

292.3.04 Final Acceptance:

1. The Owner's Representative will inspect hydroseeded areas upon completion.
2. Any areas failing to establish uniform growth shall be reseeded at no additional cost to the Owner.
3. Final acceptance will be granted upon successful establishment of a uniform and healthy stand of grass.

292.3.05 Measurement and Payment

1. Hydroseeding shall be paid per square yard complete and in place including, seed, fertilizer, mulch, tack, installation for both bid items "Temporary Seed" and "Permanent seed".
2. "Topsoil" shall be paid for imported materials installed as directed by the Engineer and measured by the cubic yard measured at 2" in depth.

END OF SECTION 292

SECTION 293 – PLANTING

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

293.1 GENERAL:

293.1.01 Description: This item includes all work necessary to complete the tree, shrub and groundcover plantings as shown on the Landscape Planting Plans and Details.

293.1.02 Submittals: Contractor shall provide the following submittals for review and approval:

c) Qualification Data: for qualified landscape installer to execute the planting and preparation. Include a list of similar projects completed demonstrating installer's capabilities and experience. Include project names, addresses and year completed along with names and addresses of owner's contact person.
d) Warranty: Sample of warranty.
e) Material Test Reports: for existing native surface topsoil and imported or manufactured topsoil.
f) Product Data: for each type of product including quantities, sizes and sources for plant materials.

293.1.03 Quality Assurance:

a) Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
b) Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
c) Plant Material Observation: Owner's Representative may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Owner's Representative retains right to observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and to reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

293.1.04 Delivery, Storage and Handling:

a) Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
b) Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
c) Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
d) Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
e) Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
f) Handle planting stock by root ball.
g) Do not remove container-grown stock from containers before time of planting.
h) Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

293.1.05 Project Conditions:

a) Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work
b) Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.
   Spring Planting: March 1 – May 15.
   Fall Planting: September 1 – November 15
c) Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply

products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

293.1.06 Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period as agreed upon with the owner.

293.2 MATERIALS:

293.2.01 Topsoil: the existing native topsoil material excavated from the surrounding vicinity or imported topsoil consisting of fertile, loamy, natural surface soil consisting of sands, silts, clays and organic matter in combination and free from substances toxic to plant growth, noxious weeds, roots, refuse, sticks and lumps. Sticks and roots shall be removed from the topsoil. All material shall be approved by the engineer prior to placement and fine grading. Depth shall be 2" maximum.

293.2.02 Planting Soil: shall be existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

293.2.03 Plant Material: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

a) Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
b) Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
c) Labeling: Label each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant as shown on Drawings.

293.2.04 Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

4. Size: 5-gram, 10-gram, and/or 21-gram tablets.
5. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

293.2.05 Bark Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs. It shall be commercially produced, medium-coarse, dark brown bark mulch. Bark shall be ground Fir or Hemlock bark, uniform color, free of weeds, seed, sawdust and splinters and shall not contain resin, tannin or other compounds detrimental to plant life. All material shall pass a 1-inch mesh screen.

293.2.06 Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens /m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

6. Organic Matter Content: 50 to 60 percent of dry weight.
7. Source Material: Recycled plant waste. Yard and garden waste, wood waste, agricultural crop residues, pre-consumer vegetable food waste or biosolids-based composts (when approved).

293.2.07 Pesticides shall be registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

8. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
9. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

293.2.08 Mycorrhizal: Mycorrhizal Fungi: Provide “MycoApply Endo Plus” granular mycorrhizal inoculum. Available from: Mycorrhizal Applications, Inc., Grants Pass, OR (541) 476-3985, or equal.

293.2.09 Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

293.3 EXECUTION:

293.3.01 Planting Methodology: The planting of Trees, Shrubs, and Groundcovers shall be conducted using a pocket planting approach rather than preparing entire planting beds. The quantities of planting soil and amendments shall be based on the specific needs of each plant to ensure proper installation and establishment.

293.3.02 Examination: Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

10. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
11. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
12. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
13. Uniformly moisten excessively dry soil that is not workable and which is too dusty.
14. Proceed with installation only after unsatisfactory conditions have been corrected.
15. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner’s Representative and replace with new planting soil.

293.3.03 Preparation:

p) Verify finish grades are properly achieved and soil preparation has been completed in accordance with the specifications; start of Work denotes acceptance by the Contractor and Contractor assumes responsibility for final results.
q) Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
r) Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
s) Lay out plants at locations shown on Drawings or otherwise directed by Owner’s Representative. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
t) Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
u) If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
v) Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

293.3.04 Herbicide Application: Spray herbicide as required to eradicate noxious weed growth._Apply herbicide over all areas of weed or grass growth within landscaped area to eradicate weed growth. Apply in single application at manufacturer’s maximum recommended rate, as follows:

a) Apply after soil preparation has been completed and approved by Owner’s Representative.
b) Observe manufacturer’s recommended period prior to working and planting in treated areas.

293.3.05 Excavation for Trees and Shrubs: Excavate planting holes, with vertical sides and with bottom of excavation slightly raised at center to provide proper drainage. Loosen hard subsoil in bottom of excavation. Planting hole needs to be 3 times width of root spread and 1 ½ times depth of root ball.

a) If non-percolating soils are encountered, fill excavations for trees and shrubs with water and allow to percolate out before planting. If plant holes do not drain: Auger drill holes 36 inches deep by 8 inches wide and fill with drainage backfill. Cover top with filter fabric. Notify Owner’s Representative to observe prior to planting.
b) If conditions detrimental to plant growth are encountered, such as rubble fill, or obstructions, notify Owner’s Representative and resolve before planting.

c) Scarify bottom and sides of hole with shovel to eliminate "glazed" surfaces.
d) Set plants on native soil where possible.

293.3.06 Placing: Set top of root ball slightly higher than finish grade; deep planting not permitted. If hole for trees is too deep, fill hole with native soil only where applicable or prepared soil to correct levels.

a) Set plants plumb and faced for best appearance.
b) Remove wire baskets, burlap, fasteners from rootball completely if rootball will not be damaged. If damage is suspected, notify Owner's Representative for concurrence and remove tops and sides of baskets minimum. Use bolt cutters on wire if necessary to remove wire baskets. Bending back not acceptable. Remove all burlap and twine from planting pit.
c) Remove metal cans or plastic containers completely from rootball.
d) Neatly cut off broken, girdling, or frayed roots and any root growth growing in a circular manner conforming to its container.

293.3.07 Backfilling - General

a) Before mixing, clean topsoil of extraneous materials and other materials harmful or toxic to plant growth.
b) Planting backfill soil mix shall be as follows: 1/4 compost material, 1/4 amended topsoil and 1/2 soil excavated from planting pit.
c) Backfill half of plant pit around rootball with backfill soil mix, carefully tamp soil around rootballs.
d) Provide slow-release fertilizer tablets during backfill at the following rates: Locate plant tablets 1 inch from roots and at mid-depth. Space evenly around the plant.
   1-gallon shrub = 1 tablet
   2-gallon shrub = 2 tablet
   3-gallon shrub = 2 tablet
   5-gallon shrub or tree = 3 tablets
e) Add 3 ounces mycorrhizal inoculum per caliper-inch to backfill around trees. Add 3 tablespoons mycorrhizal inoculum per gallon planting size. Add 1 teaspoon mycorrhizal inoculum per ground cover plant.
f) Complete backfilling, firming to surface grade.
g) Form watering basin from site topsoil as shown on Drawings.
h) Thoroughly hand water each plant and entire bed immediately after planting. Adjust rootball and soil as required if settlement of soil occurs.
i) Remove plant tags and ribbons.

293.3.08 Planting Trees and Shrubs

a) Set roots or rootball on layer of compacted planting soil backfill mix or native suitable topsoil from planting pit, plumb and in center of pit or trench with top of rootball at 1 inch above elevation of adjacent finished grade.
b) Place additional planting soil backfill mix around base and sides of ball and eliminate voids and air pockets. When backfill is approximately 2/3 complete, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing final layer of backfill. Cut burlap from top of rootball and roll back to sides of planting hole; form watering basin; stake and guy immediately after planting.
c) After planting, apply top-dress fertilizer at the following rates:
   0-1-foot-tall shrub = 0.4 oz.
   1-2-foot-tall shrub = 0.8 oz.
   2-4-foot-tall shrub or tree = 1.75 oz.
   4-8-foot-tall shrub or tree = 4 oz.
   8+ feet = 4 oz. plus proportional amount per foot.

293.3.09 Planting Groundcover: Space plants as shown or scheduled on Drawings. Dig holes 3 times the width and 1-1/2 times the depth of the rootball. Plant with planting soil backfill mix. Work soil around roots to eliminate air pockets. Water thoroughly after planting.

293.3.10 Planting Area Mulch: Place mulch 3 inches deep in all planting beds. Rake smooth. Mulch shall be pulled away from crowns of shrubs, perennials and groundcover plants. Mulch shall be flush with adjacent curbs and paving. Taper mulch thickness from full 3 inches' depth to 1-inch depth over a 12-inch horizontal run at paving edges so mulch will be flush with adjacent curbs and paving.

293.3.11 Plant Maintenance: Begin plant maintenance immediately after planting and continue until Final Acceptance. Maintain plants for an additional 90 days minimum after written notice of Substantial Completion of the Project and until Final Acceptance (whichever is later). If plants are not installed before the dormant period, November 15th to March 1st, maintain for a period of 90 days after the dormant period or until Final Acceptance, whichever is later.

4. Inspect plants at least once a week and perform maintenance promptly.
5. Maintain trees, shrubs and ground covers by watering, pruning, spraying, cultivating, and weeding as required for healthy growth.
6. Water when soil moisture is below optimum level for best plant growth.
7. Remove and replace impaired or dead plants promptly during specified planting season.
8. Tighten and repair stake and guy supports and reset trees and shrubs to proper grades or vertical position as required.
9. Eradicate all weeds, grass, and other undesired vegetation growth from planting areas. Remove dead weeds and dispose legally off-site. Remove all perennial weeds completely, including all underground parts.
10. Restore all soil settlement to original grade.
11. Fertilize trees, shrubs and ground cover once at the end of the Maintenance Period. Work the fertilizer thoroughly into the top 2 inches of soil.
12. In March, within the first growing season, fertilize all planting areas with 1 application of each of the maintenance fertilizers, at the rate of 7 pounds per 1,000 square feet of soil surface.

293.3.12 Clean-up and Protection

13. During landscape work, keep pavements clean and work area in an orderly condition.
14. Sweep and wash paved surfaces to remove soil and soil stains.
15. Clean all mud and debris from catch basins, which is caused by Work of this Section.
16. Remove plant containers, trimmings, clippings, and all extraneous debris unearthed or resulting from any operations specified herein, from Project Site and dispose in a lawful manner.
17. Protect landscape work and materials from damage.
18. Maintain protection during installation and Maintenance Period.
19. Treat, repair or replace damaged Work as directed by Owner's Representative, at no additional cost to the Owner.

293.3.13 Acceptance

20. Substantial Completion:
    Notify the Owner's Representative in writing of the completion of planting. Within 10 days after notification of completion of Work, the Owner's Representative will inspect the Work in the presence of the Contractor and the Owner, and prepare a Notice of Substantial Completion, along with a list of items that require completion and correction (i.e., Punch List). Notice of Substantial Completion constitutes the commencement of the Maintenance Period.
21. Final Acceptance:
    The final inspection of all planting will be made by the Owner, Owner's Representative in the presence of the Contractor, following completion and correction of all items on the Punch List, and prior to the expiration of the Maintenance Period. Before Final Acceptance will be granted, the site must be in the condition stipulated all correction items on the Punch List completed to the satisfaction of the Owner and Owner's Representative. If Final Acceptance is not granted at the end of the Maintenance Period, continue maintaining plantings until Final Acceptance is granted, at no additional cost to the Owner.

293.3.14 Disposal

22. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

293.3.15 Measurement and Payment

293.3.15A - All temporary facilities and construction will be paid for as a single lump sum item at the contract price for "Landscaping". Payment shall constitute full compensation for supplying all labor, equipment and materials, constructing, installing, maintaining and removing all temporary facilities and construction specified herein.

293.3.15B – "Compost Erosion Blanket" will be paid per square yard complete and in place. Payment shall constitute full compensation for supplying all labor, equipment and materials, constructing, installing, maintaining and removing all temporary facilities and construction specified herein.

293.3.15C - Topsoil (Seeding Area) will be paid per cubic yard borrowed, hauled and in place. Payment shall constitute full compensation for supplying all labor, equipment and materials, constructing, installing, maintaining and construction specified herein. Depth shall be at 2” maximum. Existing topsoil on site shall not be included in this pay item.

END OF SECTION 293

END OF DIVISION TWO

DIVISION THREE – STRUCTURES

Work shall be constructed generally in conformance with the current edition of the Oregon Standard Specifications for Construction - Section 00596B and as modified below.

SECTION 301 – PREFABRICATED MODULAR RETAINING WALLS DESCRIPTION

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

301.10 Scope - This Work consists of furnishing and constructing prefabricated modular gravity retaining walls as shown and specified.

301.11 Proprietary Prefabricated Modular Walls - These Special Provisions list the types and locations of preapproved proprietary prefabricated modular Proprietary Retaining Wall Systems to be constructed.

301.12 Cost Reduction Proposals - According to ODOT 00140.70, cost reduction proposals will be considered for Proprietary Retaining Wall Systems that are preapproved by the Agency before Advertisement of the Project.

301.13 Definitions:

Alternate Gabion Basket Joint Fasteners – **Not approved for this project**

Appurtenances - Traffic barriers, guardrail, fences, non-standard coping, drainage Structures, sign supports, lighting supports, sound barriers, foundations, and utilities that are not part of the Retaining Wall System but are connected to, resting on, or passing through the Retaining Wall System.
Batter - The Slope of the wall facing from vertical that is expressed as degrees, or as a ratio of the horizontal change in inches for each 12 inches of vertical change. A vertical face has a zero Batter.

Bin Wall - A prefabricated modular gravity Retaining Wall System type composed of metal or precast concrete modules backfilled with Granular Material.

Crib Wall - A prefabricated modular gravity Retaining Wall System type composed of interlocking longitudinal and transverse beams made of precast reinforced concrete and backfilled with Granular Material.

Drains – hydrostatic wall penetration drains shall be installed at low points of the walls.

Dry Cast Concrete Block Gravity Wall - A prefabricated modular gravity Retaining Wall System type composed of dry cast concrete blocks without Soil reinforcements.

Gabion Gravity Wall - A prefabricated modular gravity Retaining Wall System type composed of assembled wire baskets that are connected together and filled with specified Rock. **This system is not allowed for this project.**

Manufacturer - The fabricator having exclusive production rights for a Proprietary Retaining Wall System.

Nonproprietary Retaining Wall System - A Retaining Wall System that is not patented or trademarked and its details are shown.

Piecemark - An alpha-numeric marking that identifies a specific type of retaining wall component. All components with the same Piecemark are considered identical. Piecemarks shown on the Working Drawings identify placement of the component.

Preapproved Proprietary Retaining Wall System - A wall system that is listed in Appendix 15-D of the Oregon State Geotechnical Design Manual.

Preapproved Proprietary Retaining Wall System Options - Acceptable preapproved proprietary retaining walls listed when Proprietary Retaining Wall Systems are required.

Preapproved Proprietary Retaining Wall System Alternates - Acceptable preapproved proprietary retaining walls listed when Nonproprietary Retaining Wall Systems are shown.

Prefabricated Modular Retaining Wall System - A basic gravity Retaining Wall System type composed of solid or hollow prefabricated concrete or steel modules. Hollow modules are typically backfilled with Granular Material. Prefabricated modular retaining walls include metal and precast concrete bin, precast concrete crib, gabion, dry cast concrete block, and wet cast concrete block gravity retaining walls.

Proprietary Retaining Wall System - A Retaining Wall System that is protected by trademark, patent, or copyright and is produced or distributed by a Manufacturer having exclusive rights.

Retained Backfill - Unreinforced backfill within a distance of H/2 behind the back of the wall, where H is the total height of the wall excluding the leveling pad or footing.

Retaining Wall System - An engineered system of structural and geotechnical components that restrains a mass of earth. The terms "Retaining Wall System", "retaining Structure", and "retaining wall" are used interchangeably.

Wet Cast Concrete Block Gravity Wall - A gravity Retaining Wall System type composed of wet cast concrete blocks without Soil reinforcements.

301.14 Proprietary Retaining Walls - Submit the following at least 30 Calendar Days before beginning construction of proprietary retaining walls:

- Complete stamped Working Drawings and design calculations prepared by the Manufacturer, according to ODOT 00150.35.
- Manufacturer's field construction manual, according to ODOT 00150.37.
- Manufacturer's field representative's name and qualifications.

Field verify existing ground elevations and bottom of wall elevations before preparing and submitting Working Drawings.
Obtain the Engineer's written approval before beginning construction of the wall system.

(a) **Working Drawings** - Working Drawings shall meet the requirements of the Project documents and the AASHTO LRFD Bridge Design Specifications, as modified by the ODOT GDM, and shall be consistent with the preapproved Retaining Wall System. Include the following items in the Working Drawings, as applicable:

(1) **General Notes** - Information for design and construction of the retaining wall.

(2) Plan View:
- Construction centerline and related horizontal curve data.
- Centerline station and offset to the wall control line or face of wall including the beginning and end points of the retaining wall.
- Location, type and size of all Appurtenances.
- Location of Right-of-Way and easement boundaries, staged construction, designated Wetlands, and all other Highway Structures, features, or facilities or other construction constraints.

(3) Elevation View:
- Wall vertical curve data and wall elevations at a sufficient number of points along the top of wall that defines the top of wall alignment.
- Field verified elevations of original and final ground lines and foundation bearing elevation along face of the wall.
- Vertical dimensions of steps along the wall base (foundation bearing elevation).
- Centerline stations and elevations at the beginning and end of the wall. • Horizontal offsets. • Changes in the top of wall Slope.
- Layout of prefabricated modular units.
- Architectural treatment.

(4) Typical Sections:
- Typical sections at intervals of 50 feet or less along the wall.
- Wall construction limits.

- Original and final ground lines across Typical Sections, including Roadways, Highway Structures, and other facilities.
- Construction centerline stationing at each Typical Section.

(5) Structural and Geometric Details:
- Leveling pad details, showing depths and limits of proposed excavation beyond the Neat Lines of the wall.
- Prefabricate modular unit details.
- Final front face Batter.
- Reinforcing bar bend details.
- Surface and subsurface drainage details for the wall.
- Prefabricated modular unit construction details at Utility and drainage facilities, overhead sign support footings, guardrails, traffic barriers, piles, shafts, or other Structures.
- Maximum inclinations of wall backslope and foreslope.
- Elevation, Slope, and width of wall bench in front of wall.
- Locations of anticipated shoring.

(6) Appurtenances:
- Wall appurtenance details needed to construct the wall.
- Wall appurtenance details that are required but not fully detailed on the Plans.

(7) Wall Construction Methods and Construction Sequence:
- Wall construction methods.
- Construction sequence.
- Locations of all shoring.

(8) Materials and Quantity Summary List - All items of each wall.

(b) **Design Calculations** - Design calculations shall meet the requirements of the Project documents and AASHTO LRFD Bridge Design Specifications, as modified by the ODOT GDM, and shall be consistent with the preapproved Retaining Wall System.

Include the following items in the design calculations, as applicable:

(1) Design Limits:
- Structural and geotechnical design input parameters and design assumptions.
- Wall design loads, load combinations, load factors, and resistance factors for each limit state.

(2) Methodology:
- Design steps with a detailed design narrative explaining the design and demonstrating how the design meets all applicable design requirements.
- Explanation of all symbols and variables used in the calculations.
- A set of hand calculations verifying typical computer generated output.

(3) External Stability Calculations - Calculations showing that the Retaining Wall System meets external stability requirements, including overturning, sliding, and bearing capacity.

(4) Internal Stability Calculations:
- Calculations showing that the retaining wall meets internal stability requirements at each level of the wall.
- Calculations showing adequate structural resistance of prefabricated modular units.

(5) Compound Stability - Calculations showing that the retaining wall meets compound stability requirements.

(6) Appurtenance**s**:
- Design calculations for wall Appurtenances that are required but not fully detailed on the Plans.
- Calculations for all appurtenance load effects on the wall.
- Retaining wall design parameters will be listed in the Special Provisions.

(c) Manufacturer's Field Construction Manual - The Manufacturer shall prepare a field construction manual that includes detailed instructions for constructing the retaining wall.

301.15 Nonproprietary Retaining Wall Submittals - Submit complete unstamped Working Drawings according to ODOT 00150.35 at least 30 Calendar Days before beginning construction of nonproprietary retaining walls. Field verify existing ground elevations and bottom of wall elevations before preparing and submitting Working Drawings. Obtain the Engineer's written approval before beginning construction of the wall system.

Materials

301.20 General:

(a) **Proprietary Retaining Wall Systems** - Provide all Proprietary Retaining Wall System components from the same wall Manufacturer. If there are conflicts between the Manufacturer's requirements and the Agency's requirements, the Agency's requirements prevail.

(b) **Nonproprietary Retaining Wall Systems** - Provide Materials according to the applicable material Specifications.

(c) **Quality Control** - Provide quality control according to ODOT Section 00165.

301.21 Backfill:

(a) **Gravel Leveling Pads Backfill** - Furnish dense graded 1" - 0 or the 3/4" - 0 Aggregate base Material for leveling pads meeting the requirements of 02630.10.

(b) **Modular Block Core and Drainage Backfill** - Furnish 3/4" - No. 4 PCC Aggregate Material meeting the requirements of 02690.20(a) through (e).

(c) **Retaining Wall Granular Backfill** - Furnish dense graded 1" - 0 or 3/4" - 0 Aggregate base Material meeting the requirements of ODOT 02630.10 and the following:

(1) Material Passing No. 200 Sieve - The amount of material passing the No. 200 sieve shall not exceed 15 percent by weight. Test according to AASHTO T 11.
(2) Plasticity Index - The plasticity index of the material passing the No. 40 sieve shall not exceed 6. Test according to AASHTO T 90.

(d) **Pipe Drain Backfill** - Furnish granular drain backfill Material for drainage pipes meeting the requirements of ODOT 00430.11.

301.22 Concrete:

(a) **Cast-in-Place Concrete for Leveling Pads** - Furnish Commercial Grade Concrete for leveling pads meeting the requirements of Section 00440.

(b) **Precast Concrete Bin Units** - Furnish precast concrete bin units with the following properties:
(1) Portland Cement Concrete - Class 4000 - 3/4 structural concrete meeting the requirements of Section 00540.
(2) Casting - Place concrete in each bin unit without interruption and consolidate with an approved vibrator. Use a release agent throughout the casting operation.
(3) Supporting and Curing - Maintain full support, cure the units, and do not strip or remove the forms from the units until the concrete has obtained a minimum compressive strength of at least 1,000 psi.
(4) Finish - Finish the bin unit front face with a general surface finish according to ODOT 00540.53(a).
(5) Tolerances - Manufacture units within the following tolerances:
a. Unit Dimensions - Within ± 1/2 inch between diagonals. Within ± 3/16 inch for all other unit dimensions.
b. Unit Face - Smooth formed surfaces within ± 3/32 inch when measured with a 3-foot straightedge. Textured-finished surfaces within ± 3/16 inch when measured with a 3-foot straightedge.
(6) Acceptance of Bin Unit Concrete Strength - Acceptance will be according to ODOT 00540.17, except acceptance of concrete strength will be determined based on production sublots. A production sublot will

consist of either 10 units or a single Day's production, whichever is less. Cast one set of cylinders for each production sublot. The concrete strength of a production sublot will be represented by a single compressive strength test on a cylinder.

(7) Marking - On the rear face of each unit scribe the date of manufacture, the production sublot number, and the Piecemark.

(8) Handling, Storing, and Shipping - Do not allow chipping, discoloration, cracks, fractures and connecting device damage during handling, storing, and shipping. Support stored units on firm blocking.

(9) Rejection - Units not meeting the requirements of this Subsection will be rejected.

(c) **Dry Cast Concrete Blocks** - Furnish dry cast concrete blocks with the following properties:

(1) **Aggregate, Strength, Freeze-Thaw Durability, Unit Weight, and Water Absorption**:

- Aggregate meeting the requirements of ASTM C33.
- Blocks meeting the requirements of ASTM C1372.
- The average of three coupons or cores have a minimum compressive strength of 4,000 psi as tested according to ASTM C140.
- Individual coupons or cores have a minimum compressive strength of 3,500 psi as tested according to ASTM C140.
- A minimum oven-dry unit weight of 125 pcf as tested according to ASTM C140.
- Test, no longer than 18 months before delivery, freeze-thaw durability of five test specimens made with the same materials, concrete mix design, manufacturing process, and curing method that will be used on the Project. At least four of the five test specimens shall have a weight loss of not more than 1 percent of the block's initial weight after 150 freeze-thaw cycles as tested according to ASTM C1262.
- A maximum water absorption of 1 percent above the water absorption of the sublot of blocks that were produced and passed the freeze-thaw test. For the water absorption testing, do not use the same blocks used for the freeze-thaw test.

(2) **Portland Cement** - Portland cement meeting the requirements of ODOT 02010.10.

(3) **Blended Hydraulic Cement** - Blended hydraulic cement meeting the requirements of ODOT 02010.20.

(4) **Tolerances** - Manufacture within the following geometric tolerances:

- Molded length and width dimensions within ± 1/8 inch of the block Manufacturer's nominal length and width dimensions.
- Molded height dimension within ± 1/16 inch of the block Manufacturer's nominal height dimension.
- Rear height does not exceed the front height.
- Top and bottom face groove dimensions within the tolerances specified by the Manufacturer.

(5) **Color** - Consistent natural color of dry cast concrete.

(6) **Finish** - Split-face units that when viewed from a distance of 10 feet under diffused light, chips, cracks, and other imperfections are not detectable.

(7) **Acceptance of Blocks** - Acceptance will be determined on tolerances, visual inspection, compressive strength, water absorption, freeze-thaw durability, and unit weight. Acceptance of compressive strength, water absorption, and unit weight will be based on production sublots. The maximum number of blocks per production sublot is 2,000 blocks. Test blocks at the frequency of one set for each production sublot. Acceptance of freeze-thaw durability will be based on the freeze-thaw testing requirements of ODOT 00596B.12(c)(1).

(8) **Marking** - Indicate the date of manufacture and the production sublot number on each sublot of dry cast concrete blocks.

(9) **Handling, Storage, and Shipping** - Do not allow chipping, discoloration, cracks, or fractures during handling, storing and shipping.

(10) **Rejection** - Blocks not meeting the requirements of this Subsection will be rejected.

(d) **Wet Cast Concrete Blocks** - Furnish wet cast concrete blocks with the following properties:

(1) **Concrete** - Commercial Grade Concrete meeting the requirements of Section 00440.

(2) **Marking** - The rear face of each block is scribed with the date of manufacture, the production sublot number, and the Piecemark.

(3) **Color** - Consistent natural color of wet cast concrete.

(4) **Finish** - Smooth-face blocks that, when viewed from a distance of 10 feet under diffused light, chips, cracks, and other imperfections are not detectable.

(5) **Tolerances** - Molded length and width dimensions within 1/4 inch of the Manufacturer's dimensions. Molded height dimension within 1/8 inch of the Manufacturer's dimension.

(6) **Handling, Storing, and Shipping** - Do not allow chipping, discoloration, cracks, or fractures during handling, storing, and shipping.

(7) **Acceptance of Blocks** - Acceptance will be determined by tolerances, visual inspection, and concrete strength. Concrete strength will be based on production sublots. A production sublot is 20 blocks or a single Day's production, whichever is less. The production sublot will be represented by a single compressive strength sample of one set of cylinders.

(8) **Rejection** - Blocks not meeting the requirements of this Subsection, or that exhibit any of the following defects will be rejected:
- Honeycombed or open texture concrete.
- Extreme color variation on front face of block.

(e) **Precast Concrete Crib Walls** - Furnish precast concrete Crib Walls with the following properties:

(1) **Portland Cement Concrete** - Furnish Class 4000 - 3/4 structural concrete meeting the requirements of ODOT Section 00540.

(2) **Color** - Consistent natural color of wet cast concrete.

(3) **Finish** - Smooth Crib Wall members that, when viewed from a distance of 10 feet under diffused light, chips, cracks, **and** other imperfections are not detectable.

(4) **Tolerances** - Manufactured within ± 1/8 inch of the Manufacturer's nominal dimensions.

(5) **Handling, Storing, and Shipping** - Do not allow chipping, discoloration, cracks, or fractures during handling, storing, and shipping.

(6) **Acceptance of Concrete Strength** - Acceptance of concrete strength will be determined based on production sublots. A production sublot will consist of either 100 Crib Wall members or a single Day's production, whichever is less. Cast one set of cylinders for each production sublot. The concrete strength of a production sublot will be represented by a single compressive strength test on a cylinder.

(7) **Rejection** - Crib units not meeting the requirements of this Subsection will be rejected.

301.23 Steel:

(a) **Steel Reinforcement for Concrete** - Furnish steel reinforcement for concrete meeting the requirements of ODOT Section 00530.

(b) **Metal Bin Gravity Walls** - Furnish metal Bin Walls meeting the requirements of ODOT Section 02350.

300.24 Geosynthetics:

(a) **Geotextile Filter Layer for Subsurface Drainage Systems** - Furnish Type 1 drainage geotextile according to Section 02320.

(b) **Geotextile Filter Layer Between Backfill and Other Prefabricated Modular Walls** - Furnish Type 1 or Type 2 drainage geotextile according to Section 02320.

(c) **Modular Block Drainage Fill Geotextile Filter** - Furnish Type 1 drainage geotextile according to ODOT Section 02320.

Labor

301.30 Quality Control Personnel - Provide technicians with CAgT and CDT certifications.

301.31 Manufacturer's Field Representative Qualifications and Duties - Provide a Manufacturer's field representative meeting the following minimum qualifications:

- Is a licensed professional engineer in the State of Oregon.
- Has been trained and certified by the manufacture in the construction, installation, and inspection of the selected Proprietary Retaining Wall System.

The times that the Manufacturer's field representative is required to be present or available and the duties of the Manufacturer's field representative are:

(a) **Preconstruction Conference** - Meet with the Engineer and all Contractor supervisory personnel and Subcontractors involved in construction of the proprietary retaining wall at the preconstruction conference to discuss methods of accomplishing all phases of Work required to construct the proprietary retaining wall.

(b) **Initial Wall Construction** - Be present at the retaining wall construction site and provide technical assistance to the Contractor and Engineer during all wall construction activities from the beginning of wall construction until at least 10 percent of the total wall length is successfully installed and backfilled to a height of at least 10 feet, or the actual wall height, whichever is less.

Submit daily field observation reports no later than noon of the next Calendar Day. Include the following information in the daily field observation reports:

- Date of observation.
- Description of all Work observed and whether or not the Work was acceptable.
- Documentation of all communications with the Contractor and Engineer.
- Name and signature.

(c) **Remaining Wall Construction** - Be available by phone or in person as needed throughout the remaining construction of the proprietary retaining wall to provide technical assistance to the Contractor and Engineer.

(d) **Final Field Observations** - Conduct a final field observation of the completed retaining wall construction with the **Engineer** and Contractor. Submit a final field observation report that includes the following information 1 Calendar Day after the final field observation:

- Date of observation.
- Documentation of all retaining wall deficiencies.
- Recommendation to accept or reject the retaining wall construction.

Provide a stamped final report to the Engineer no later than 10 Calendar Days after the final field observation of the retaining wall. Include the following information in the final report:

- Preconstruction meeting minutes.
- All daily field observation reports.
- Transcripts of all communications with the Contractor and the Engineer during the remaining wall construction phase.
- Final field observation report.

Construction

301.40 General:

(a) **Proprietary Retaining Walls** - Construct proprietary retaining walls according to Agency requirements, Manufacturer's Working Drawings, and the Manufacturer's field construction manual. If the Manufacturer's Working Drawings or the Manufacturer's field construction manual conflict with Agency requirements, Agency requirements shall take precedence. Follow instructions and recommendations of the representative if approved by the Engineer.

(b) Nonproprietary Retaining Walls - Construct nonproprietary retaining walls as shown.

301.41 Excavation and Foundation Preparation - Perform excavation and prepare and backfill wall foundations according to ODOT Section 00510 and the following:

- Grade the foundation level for a width equal to the width of the wall base plus 1.0 foot on each side. Do not reinforce backfill for over-excavated foundations without prior approval.
- Place backfill Material in nearly horizontal layers not more than 8 inches thick. Compact the entire surface of each layer with at least three Coverages, using Equipment made specifically for compaction. Routing hauling and grading Equipment over the surface is not acceptable for compaction.
- Do not construct backfill when the backfill, the foundation, or the embankment on which it would be placed is frozen, or unstable.

301.42 Leveling Pads:

(a) **Cast-in-Place Leveling Pads** - Construct cast-in-place leveling pads with:

- Unreinforced concrete.
- A width of at least the block front face to block back face plus 12 inches (6 inches on each side of the facing units).
- A thickness of 6 inches ± 1/4 inch.
- A location tolerance of ± 1 inch of the design location.
- A top pad tolerance of ± 1/8 inch of the design elevation.
- Cure cast-in-place leveling pads at least 12 hours before placing the wall units.

(b) **Gravel Leveling Pads** - Construct gravel leveling pads with:

- A width of at least the width of the wall facing plus 12 inches (6 inches on each side of the facing units).
- A thickness of at least 6 inches.
- A location tolerance of ± 1 inch of the design location.
- A top pad tolerance of ± 1/8 inch of the design elevation.
- Compact gravel leveling pads in 3 to 4 inch Lifts using a minimum of three Passes of a walk behind vibratory plate compactor with a gross static weight of not less than 125 pounds and a total compaction static plus dynamic force of not less than 2,000 pounds.

301.43 Subsurface Drainage - Install subsurface drainage before constructing walls.

301.44 Erecting Walls:

(a) **Dry Cast Concrete Block Walls**:

(1) **Placement** - Begin placing the first course of blocks on top of and in full contact with the lowest foundation level of the leveling pad. Level and align all blocks. Lay blocks as close together as possible and parallel to the straight or curved line of the wall face. Place blocks in vertical or battered positions as shown. Level each course block-to-block and front-to-back. Set each block on the blocks below without rocking. Correct high areas by grinding or shimming with approved shims. Do not use shims within 1 inch of the front face. Do not exceed a shim stack thickness of 1/16 inch. Stack all blocks in a running bond pattern with each block spanning the joint below.

Place retaining wall granular backfill with each course of blocks. When shown, place modular block core backfill and drainage fill backfill, and install drainage fill geotextile and shear pins with each course of blocks. Remove all backfill that is on top of the blocks before installing the next course of blocks or Soil reinforcements. Attach the top row of dry cast concrete blocks or cap blocks to the underlying blocks with an adhesive from the QPL. Clean the finished exposed wall face of all foreign material deposits.

(2) **Tolerances**:

- First course of wall blocks located within ± 1/4 inch of the design horizontal alignment.
- Final out of plane concavity or convexity of the front face within ± 3/4 inch in 10 feet.
- Final deviation from the design Batter within ± 1 1/4 inch for each 10 feet of wall height.
- Outward leaning Batter is zero.
- Each course of blocks within ± 1/16 inch of level when checked with a 4-foot straightedge level.
- Out of plane offset between consecutive rows within 3/4 inch of the planned offset.
- Finished top of wall elevation within ± 1 inch of the design elevation.

(b) **Wet Cast Concrete Block Walls**:

1. **Placement** - Begin placing the first course of blocks on top of and in full contact with the lowest foundation level of the leveling pad. Level and align all blocks. Lay blocks as close together as possible and parallel to the straight or curved line of the wall face. Place blocks in vertical or battered positions as shown. Level and set each block on the blocks below without rocking. Correct high areas by grinding or shimming with approved shims. Do not use shims within 1 inch of the front face. Do not exceed a shim stack thickness of 1/8 inch. Stack all blocks in a running bond pattern with each block spanning the joint below.

   Place retaining wall granular backfill with each course of blocks. When shown, place modular block core backfill and drainage fill backfill, and install drainage fill geotextile and shear pins with each course of blocks. Remove all backfill that is on top of the blocks before installing the next course of blocks or Soil reinforcements. Clean the finished exposed wall face of all foreign material deposits.

2. **Tolerances**:

- First course of wall blocks located within ± 1/4 inch of the design horizontal alignment.
- Final out of plane concavity or convexity of the front face within ± 3/4 inch in 10 feet.
- Final deviation from the design Batter within ± 1 1/4 inch for each 10 feet of wall height.
- Outward leaning Batter is zero.
- Each course of blocks within ± 1/8 inch of level when checked with a 4-foot straightedge level.
- Front-to-back tilting within ± 1/4 inch of the design Batter when measured with a straightedge level long enough to span the entire front-to-back distance of the block.
- Out of plane offset between consecutive rows within ± 3/4 inch from the planned offset.
- Finished top of wall elevation within ± 1 inch of design elevation.

(c) **Metal Bin and Precast Concrete Bin Walls:**

(1) **Placement** - Begin placing the first course of Bin Wall units on top of and in full contact with the prepared leveling pad surface. Concurrently with the assembly of the bins, place retaining wall granular backfill within and around the bins of the assembled wall to the limits shown. Maintain the outside backfill approximately level with the inside backfill.

(2) **Tolerances:**

- First course of units within ± 1/4 inch of the design horizontal alignment.
- Final out of plane concavity or convexity within ± 1 1/4 inches in 10 feet.
- Final deviation from the design Batter within ± 1 inch for each 10 feet of wall height.
- Outward leaning Batter is zero.
- Out of plane offset between consecutive rows within ± 1 inch from the planned offset.

(d) **Precast Concrete Crib Walls:**

(1) **Placement -** Begin placing the first course of Crib Wall units on top of and in full contact with the prepared leveling pad surface. Concurrently with the assembly of the cribs, place retaining wall granular backfill within and around the cribs of the assembled wall to the limits shown.

Maintain the outside backfill approximately level with the inside backfill. Fill depressions of stringers and spacers and compact without displacing them from line and Batter.

(2) **Tolerances**:

- First course of units within ± 1/4 inch of the design horizontal alignment.
- Final out of plane concavity or convexity within ± 1 1/4 inches in 10 feet.
- Final deviation from the design Batter within ± 1 inch for each 10 feet of wall height.
- Outward leaning Batter is zero.
- Out of plane offset between consecutive rows within ± 1 inch from the planned offset.

301.47 Backfill Placement:

a. General - Do not misalign wall units or damage wall components when placing backfill Material. Remove and replace all misaligned or damaged wall materials at no additional cost to the Agency.
b. Compaction - Meet the following requirements:

(1) **Equipment** - Provide the following compaction Equipment:

a. **Backfill In and Within 3 Feet Behind Wall Units** - Walk behind vibratory roller compactor with a single smooth drum, vibratory plate compactor, or rammer/tamper plate compactor; each with a gross static weight of not more than 1,000 pounds and a total compaction static plus dynamic force of not more than 5,000 pounds.
b. **Backfill More Than 3 Feet Behind Wall Units** - Vibratory roller compactor with a single smooth drum, vibratory plate compactor, or rammer/tamper plate compactor.

(2) **Maximum Density and Optimum Moisture Content** - Determine maximum density and optimum moisture content of the retaining wall granular backfill material according to AASHTO T 99 Standard Proctor Method A, with coarse particle correction according to ODOT TM 223.

(3) **Moisture Content** - Prepare backfill material to within minus 4 percent to plus 2 percent of optimum moisture content at the time of compacting. Add water to material that does not contain sufficient moisture and thoroughly mix. Remove excess moisture by manipulation, aeration, drainage, or other means before compacting.

(4) **Density**:

a. **Backfill In and Within 3 Feet Behind Wall Units** - Compact to 95 percent of maximum density using the required number of Passes determined according to 00596B.47(b)(5)(a).

b**. Backfill More Than 3 Feet Behind Wall Units** - Compact to 95 percent of maximum density determined according to 00596B.47(b)(5)(b).

(5) **Testing Methods and Frequency**:

a. **Test Pad Method** - Before placing the wall backfill, determine the number of Passes necessary to achieve the specified density by constructing a test pad that is at least 5 feet wide, 15 feet long, and 3 feet in final depth. Construct test pad fill in layers no more than 8 inches thick using the same Equipment and methods that will be used to compact the wall.

b**. Nuclear Gauge Method** - Test in-place field density according to AASHTO T 310. Test at the frequency required in the ODOT Manual of Field Test Procedures.

c. **Frequency.** Perform at least one density test according to AASHTO T 310 on each test pad layer. Construct and test a new test pad when changes in material occur or different Equipment is used during the construction of the wall backfill, except a new test pad is not required for modular block drainage backfill**.**

(6) **Deflection Requirement** - Conduct at least one deflection test, witnessed by the Engineer on each compacted layer of backfill according to ODOT TM 158. If the tested layer exhibits yielding, deflection, reaction, or pumping, rework the area to provide acceptable test results before placing the next layer.

Maintenance

301.60 Protecting Work - Protect and repair Work as follows:

- Do not allow runoff from adjacent areas to enter the wall construction site during construction operations.
- At the end of each Day's operation, direct potential runoff away from the wall by sloping the last Lift of backfill away from the wall.
- Rework and repair all damaged Subgrade areas to the depth where undamaged Work is encountered.

Measurement

301.80 Measurement - The quantities of Work performed under this Section will be measured according to the following:

No measurement of quantities will be made for retaining walls. Estimated quantities of retaining walls are shown on the contract plans. Measurement shall be by the lineal foot of installed wall as submitted by the Contractor and as approved by the Engineer.

Excavation below elevations shown will be measured according to ODOT 00510.80(b).

Payment

301.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item Unit of Measurement “Retaining Wall” ..... Lineal Foot

Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified.

Excavation below elevations shown will be paid for according to ODOT 00510.90(c). No separate or additional payment will be made for: Manufacturer's representative excavation, shoring, leveling pads, and specified backfill wall drainage and filter systems.

END OF SECTION 301

SECTION 304 – FENCES DESCRIPTION

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

304.1 Scope - This Work consists of constructing:

- Fences, gates, and gateways of barbed wire, woven wire fabric, chain link fabric, or combinations, to the lines and grades shown or directed.
- Protective fences, on and off Structure as shown or directed.

304.1.1 All dimensions shown on the Plans are horizontal and vertical measurement. Actual quantities required for the installation may be greater depending on the Slope of the terrain.

304.2 Definitions:

304.2.A Fences - Fence, gates, gateways, and appurtenances, regardless of kinds and types.

304.2.B Gates - Swinging units to provide an opening in the fence line.

304.2.B.1 Single Gate - A unit of 16 feet or less.

304.2.B.2 Double Gate - Two single gate units used together.

304.2.C Gateway - Supported fence wire or fabric stretched between gate posts and fastened by bars, wire hinges and locking devices.

304.2.D Panel - That portion of fence between adjacent posts.

304.2.E Run - As used in this specification, run is defined as follows:

- Fences, gates, and gateways - The length of fence between end posts, intermediate end posts, corner posts, and gate posts.
- Bridge protective fence - A section of fence150 feet or less in length.

304.3 Materials

304.3.1 Materials - Furnish Materials meeting the following requirements:
Chain Link Fabric 03010.30
Commercial Grade Concrete.....00440
Fence Gates.....03010.60
Fence Grounding ..... 03010.50(e) and (f)
Fence Posts, Braces, and Appurtenances 02110.30, 03010.50
Guardrail Elements.....02820.10
Pickets.....03010.31
Protective Fence Materials, On and Off Structures 03010.75

304.4 Construction

304.4.1 General - Construct the several kinds and types of fences including the assembly and erection of all component parts and materials complete in place at the locations shown or directed. Confine activities and operations to the area immediately adjacent to the Right-of-Way line and within the highway Right-of-Way. Arrange for permits required from adjacent property owners to perform the Work.

304.4.1.A Schedule the installation of fencing or provide temporary fencing or other adequate means to prevent livestock from entering the Project Right-of-Way, easements and/or adjoining properties according to 00170.92.

304.4.1.B Lines, Grades, and Preparation Work - Unless otherwise directed, set fences so the fence fabric and wires are on Right-of-Way lines or Agency property lines, with posts set on Agency property. If directed, center concrete footings and fence posts 1 foot from the Right-of-Way or property line on Agency property.

304.4.1.C Clear, grub and prepare the fence line area. Remove all shrubs, brush, snags, downed timber, float Rock, and other obstacles, including trees up to 6 inches in diameter which interfere with fence construction. If directed, preserve trees and geographic features on fence lines by varying the fence alignment to miss them.

304.4.1.D Fill or excavate ground surface irregularities which interfere with maintaining specified clearance above ground surface of the bottom wire of the fence. Limit the width as necessary to provide a clear way for the fence.

304.4.1.E Excavate for concrete footings to reasonably Neat Lines, but not less than the specified dimensions in Soil, or not less than 18 inches deep in Rock. Prevent disturbance of original ground at the sides and bottom of the excavation.

304.4.1.F Clear and grade gate openings to permit the gate to swing in a horizontal plane according to 01050.48.

304.4.1.G Dispose of materials removed under these provisions, including excess excavation, in a satisfactory manner.

304.4.2 Optional Posts - Use steel or wood posts in barbed, or barbed and woven wire fence construction according to one of the following options, and once an option has been selected, use that option throughout the Project:

Steel posts entirely in all types of fence.

304.4.3 Installing Posts and Braces:

304.4.3.A General - Set all metal end posts, intermediate end posts, corner posts, gate posts, and chain link fence posts in concrete footings. Set all other posts firmly in the ground or in concrete footings as the Contractor elects.

304.4.3.A.1 Set posts to the depths shown. Reasonable variation in depths will be allowed and posts may be appropriately shortened or left slightly high, as approved by the Engineer, to:

- Avoid unnecessary penetration or excavation in Rock or other unusually firm material.
- Obtain desired grades along the fence.

304.4.3.A.2 Set all posts vertical, except on curved alignment set posts slightly off vertical, as directed, to offset the pull of the fence fabric and wires.

304.4.3.A.3 For bridge protective fence only, set all metal end posts, intermediate end posts, and chain link fence posts as shown.

(1) Driven Posts - Posts which are set by driving shall be free of damage when set. Remove and replace any driven posts which are split, twisted or bent, or have a badly misshapen tops.

(2) Dug Holes - Where Rock is encountered, set the posts to depths of not less than 18 inches and backfill with fine Granular Material. Do not exceed the post height shown by more than 3 inches. When posts are set in dug holes, backfill in 6 inch layers with each layer separately and thoroughly tamped and compacted.

(3) Concrete Footings - Dimensions of footings shall not be less than shown and shall fill the excavated areas. Place the concrete with contact against firm Soil at the sides and bottom and tamp around the posts and brace ends after the posts and braces have been brought to and firmly held in proper position. Strike off, slope or crown and smooth the surface of the concrete at the ground level to shed water. Allow to cure for at least 5 Calendar Days before subjecting the posts and braces to strain.

304.4.3.B End Posts - Set end posts:

- At the beginning and end of new fence construction that is not terminating at gate posts.
- At the end of the intersecting line of existing fences just outside the line of the new fence.

304.4.3.C Intermediate End Posts - Set intermediate end posts in the line of the new fence:

- At each summit and at each valley in the grade of the fence where the algebraic difference in the grades of adjoining panels of fence exceeds 30 percent.
- At other points located along the new fence line to break the fence construction into approximately equal runs not exceeding the applicable lengths of runs shown.

304.4.3.D Corner Posts - Set corner posts as follows:

Chain Link Fences - At angle points in fence alignment where the alignment of adjoining panels of fence changes direction by 20 degrees or more.

304.4.3.E Line Posts - Set line posts along the line of fence, between end, intermediate end, corner, and gate posts, and at the spacings shown. Line posts may be set at spacings not exceeding 25 percent greater than specified or at closer spacings if approved. Set a line post in the new fence line at a point in alignment with each intersecting fence line approximately 1 foot from the end post of the intersecting fence line. It is intended that the actual number of line posts will average to the number required for normal spacing.

304.4.3.F Braces - Construct braces before placing of fence fabric and wires on the posts.

304.4.3.F.1 Metal Braces - Provide corner posts and intermediate end posts with two braces, one each direction from the post in the main fence lines. Provide end posts and gate posts with one brace in the line of the fence as shown. Attach metal braces to the metal end, intermediate end, corner and gate posts and set in concrete footings.

304.4.4 Chain Link Fence:

(a) Concrete Footings - Construct concrete footings according to 304.4.3

(b) Chain Link Fence Rails and Tension Wires - Place longitudinal rails and longitudinal tension wires along the line of chain link fence, except at gates.

(1) Tension Wire - Attach tension wire to end, gate and corner posts by bands and clamps. Either thread the top tension wire through line post loop caps or hold in open slots in a manner to limit vertical movement. Tie or attach the bottom tension wire to the bottom of line posts by ties or clamps in a manner that prevents vertical movement. Provide tension wires with one turnbuckle or one ratchet take-up in each run of fence.

(c) Chain Link Fence Fabric and Wire - Assemble and install chain link fence fabric and wire according to the following:

(1) Splicing Fabric - Use spiral pickets of specified chain link fabric material for fabric splices. Use wrap or telephone type splices for tension wire and barbed wire with each end wrapped around the other wire for not less than six complete turns.
(2) Fastening Fabric - Fasten fabric to end, gate and corner posts and to gate frames as shown. Attach fabric to line posts with wire ties at top and bottom and at intermediate spacings not exceeding 18 inches. Fasten fabric to top and bottom rails and to longitudinal tension wires with metal bands or tie wires spaced as shown, but in no case greater than 24 inches apart.

For wall mounted fence only, assemble and install chain link fence fabric and wire according to paragraphs (1), (2), and (3) of this Subsection. Provide anchorage, plate and calculations for review by the Engineer.

304.5 Measurement

304.5.1 Measurement - The quantities of fences, protective fences, gates, and associated items performed under this Section will be measured according to the following:

304.5.1.A Chain Link Fence - Chain link fence will be measured on a length basis. Measurement will be from center to center of posts, measured along the line and grade of each separate continuous run of fence as constructed, exclusive of gates.

304.6 Payment

304.6.1 Payment - The accepted quantities of fences and associated items performed under this Section will be paid for according to the following:

304.6.2 Chain Link Fence - Chain link fence will be paid for at the Contract unit price, per lineal foot, for the following items: “4 Foot Chain Link Fence”. Payment will be payment in full for furnishing and placing all Materials, and for furnishing all Equipment, labor, and Incidentals necessary to complete the Work as specified. Payment for Materials, Equipment, and labor involved in constructing panels of fence additional to normal fence construction at waterways and at ground surface depressions.

END OF SECTION 304

SECTION 305 – METAL GUARDRAIL

The following information shall supplement existing Oregon Department of Transportation Standard Specifications for Construction. These provisions shall take precedence over any conflicting specifications.

305.00 Scope - This Work consists of constructing metal guardrail to the lines and grades shown or established and includes the assembly and erection of all components, parts and Materials complete at the locations shown or directed. Metal guardrail and metal Median barrier will be referred to in this Section as "guardrail". The types of guardrail will be shown. Work shall be performed in accordance with these special provisions and Section 00810 of the current release of the Oregon Department of Transportation Standard Specifications.

305.11 Posts - Posts, except as specified for use on Bridges or otherwise shown or directed, may be of steel or wood, as the Contractor elects. Once a type has been selected, use it throughout the continuous run of guardrail except in the transitions and terminals.

305.13 Guardrail Anchors - Furnish steel guardrail anchors according to Section 02820 and as called out in the plans. No guardrail anchor cable assembly per Project for testing according to AASHTO M 30 will be required.

Construction

305.40 Timing and Coordination of Work - Time and coordinate construction of guardrail to hold disturbance of Bases, Surfacings and Pavements to a minimum. Place all metal Median barrier Materials in continuous runs. Do not leave posts installed for guardrail exposed to traffic for more than 24 hours before installing the rail members, rail end pieces and anchors and tightening all bolts, except replacement rail shall be installed according to 00310.40(a).

305.42 Installation of Posts and Anchors - Place posts and anchors as shown. If directed, install 8 foot guardrail posts. Drive posts in place. If posts are driven through the Bases, Surfacings, Pavement or other utilities repair all damage as directed. Remove and replace posts, anchors or other components damaged during installation with sound components. Firmly set all posts at proper line, grade and spacing within a tolerance of 1/2 inch. Rigidly attach anchors, terminals and connections to other Structures as shown.
Anchor posts shall be Type 5 installations.

300.43 Erection of Rails and Other Components - Normally, all fabrication of metal beam rail members and other components shall be done in the shop or by the manufacturer. Limit field cutting, drilling and other field fabrication to the minimum and perform in a manner that will not impair the appearance or structural quality of the material. Burning new holes in metal beam rail members is not allowed.

Restore to specified condition, surface finishes and protections that are damaged before or during erection.
Repair the cut ends of galvanized bolts, rail elements and back-up plates, and any holes drilled or punched after galvanizing according to ASTM A780. Minimum zinc content for Method A2 is 94 percent on the dry film.
Toe nail blocks to post with two 16d, galvanized, flat head nails to prevent rotation.
Draw tight all bolts. Bolts shall be of sufficient length to extend slightly beyond the nuts

Measurement

305.80 Measurement - The quantities of guardrail items constructed under this Section will be determined as follows:

- Length - Measurement will be on the length basis, measured as follows:
- Length Method - Measurement will be from center to center of end posts, or as otherwise shown, along the line and grade of each run of each type.

Payment

305.90 Payment - The accepted quantities of Work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	**Unit of Measurement**
(a) Guardrail, Type 2A	Foot
(b) Guardrail End Pieces,	Each

END OF SECTION 305

END OF DIVISION THREE

END OF TECHNICAL SPECIFICATIONS DOCUMENTS