

**City of Florence** 

Lane County, Oregon

# CONTRACT DOCUMENTS

**VOLUME 2** – Technical Specifications

FOR THE CONSTRUCTION OF

# 9<sup>th</sup> Street Waterline & Roadway Improvements





Prepared By:

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# DIVISION 1 – GENERAL REQUIREMENTS TABLE OF CONTENTS

SECTION NO.	TITLE
SECTION 01010	SUMMARY OF THE WORK
SECTION 01025	MEASUREMENT AND PAYMENT
SECTION 01028	CHANGE ORDER PROCEDURE
SECTION 01040	COORDINATION
SECTION 01046	PROTECTION OF EXISTING IMPROVEMENTS
SECTION 01050	FIELD ENGINEERING
SECTION 01060	REGULATORY REQUIREMENTS
SECTION 01100	REFERENCE STANDARDS
SECTION 01300	SUBMITTALS
SECTION 01310	CONSTRUCTION PROGRESS SCHEDULES
SECTION 01400	QUALITY CONTROL
SECTION 01500	TEMPORARY FACILITIES AND CONTROLS
SECTION 01570	TRAFFIC REGULATION
SECTION 01610	STORAGE AND PROTECTION
SECTION 01700	CONTRACT CLOSEOUT
SECTION 01740	WARRANTIES
SECTION 01780	PROJECT RECORD DRAWINGS

## SECTION 01010 - SUMMARY OF THE WORK

#### PART 1 GENERAL

#### 1.01 WORK SUMMARY

- A. The Contractor shall furnish all labor, equipment, and materials necessary to complete all work in accordance with the Contract Documents.
- B. The work shall be performed within the City limits of the City of Florence, Lane County, Oregon. The City of Florence is located approximately 60 miles west of Eugene, Oregon and approximately 22 miles north of Reedsport and is located along the Oregon Coast.
- C. A brief description of the summary of the work to be completed is described below:

#### 9<sup>th</sup> Street Waterline & Roadway Improvements – Base Bid

Furnishing all labor, equipment and materials as required for the 9<sup>th</sup> Street Waterline Improvements Project consisting of the construction of approximately 3,200 lineal feet of new 16" C-900 PVC water main, the abandonment of existing 8 inch water main, installation of new fire hydrants, air release valves, and service connections. This project also requires the construction of along with roadway section improvements, including new AC surfacing, ADA-compliant curb ramp returns, and landscape restoration, all as required for a complete installation.

D. Work shall not begin until Engineer has issued the *Notice to Proceed* to the Contractor(s). All subsurface work must be complete prior to paving.

#### 1.02 WORK PROGRESS

- A. It is the intent of these Contract Documents that the Work proceed in a systematic manner so that a minimum of inconvenience to the public results in the progression of the work. Suitable equipment will be required to properly execute the work with the least amount of disruption to services and access through the work area. Contractor shall contain operations to within the designated public properties, rights-of-way and within any construction easements obtained for this project.
- B. Order and schedule delivery of materials in ample time to avoid delays in construction. If any item is found to be unavailable, notify the Engineer immediately to permit the Engineer's selection of suitable substitute. Timely delivery of all materials and equipment is Contractor's responsibility. No extensions in Contract Time will be allowed due to delays caused by late delivery of items. Availability of items should be determined during bidding.
- C. The Contractor shall protect the work and materials from damage due to the nature of the work, the elements, carelessness of others, or from any other cause until the completion and final acceptance of the work. All loss or damage arising out of the nature of the work to be done under these Contract Documents, or from any unseen obstruction or defects which may be encountered in the execution of the work, or from the action of the elements, shall be sustained by the Contractor.
- D. The Contractor shall remove completely all materials designated for removal, to the extent specified and/or indicated in the drawings. For such materials, removal, hauling, disposal (including providing disposal location), and applicable precautions are entirely the Contractor's responsibility. Allow no excess accumulation of non-reusable material at

job site(s).

- E. Contractor is responsible for the protection of all existing improvements that are to remain in place. This includes, but is not necessarily limited to: existing utilities, roads, driveways, drainage ditches, culverts, fencing, shrubbery, and all landscaping structures and vegetation. Temporary enclosures, walls, covers, or other protection shall be provided and maintained by the Contractor as required. Contractor shall cooperate with the owners of such improvements, and shall restore and/or replace all damaged items as directed, without any additional expense to the Owner or payments to the Contractor.
  - 1. The location and depth shown on the drawings for the existing underground utilities are approximate only and are based on as-built drawings, valve locations and other information.
- F. Road demolition and resurfacing must be conducted in a manner which provides businesses and residences continued access to entries and driveways to the greatest extent practical. Contractor shall coordinate with residents and business's notifying them in advance of any driveway access or lane closure.

## SECTION 01025 - MEASUREMENT AND PAYMENT

## PART 1 GENERAL

#### 1.01 GENERAL

- A. Wherever in these Specifications an article, device or piece of equipment is referred to in the singular, such reference shall include as many such items as are shown on the Drawings or are required to complete the installation.
- B. Miscellaneous items required in the project that do not have a corresponding Section in the Bid Form are to be considered incidental costs to the project. Compensation for such items and/or work shall be incorporated into other related bid items or total costs. No separate measurement and payment will occur for such incidental costs.
- C. Monthly progress payments and final payment will be made in accordance with the Contract, the General Conditions, and the Supplementary General Conditions. A portion of all progress payments will be withheld as "retainage" in accordance with the General and Supplementary General Conditions.
- D. Additional detail on measurement and payment may be found in other Sections detailing specific items.

## 1.02 UNIT PRICES

A. Payment will be made on a unit price basis according to the prices provided by the Contractor in the accepted Bid Form. Payment will be made for the actual quantity of individual items (units) incorporated and installed in the project.

#### 1.03 LUMP SUMS

- A. Payments on lump sum bid items will be made based on the percentage of work complete at the end of the particular payment period.
- B. Percentage of work complete will be recorded and submitted by the Contractor and estimated by the Engineer based on inspection. Payment will be based on the Contractor's approved schedule of values.

#### 1.04 PROGRESS PAYMENTS

- A. Monthly progress payments will be made as set forth in the Agreement, in accordance with the General Conditions and Supplementary General Conditions.
- B. At the stated day of the month, submit a monthly payment request in accordance with the General Conditions and Supplementary General Conditions. Base request on actual quantities installed and completed, and/or approved schedule of values with percent complete of each item. Show payment requested for each item, and total payment requested.
- C. Engineer will review payment requests and compare with inspection records to verify quantities and completed items. Engineer will recommend payment amounts for Owner approval and payment.

## SECTION 01028 – CHANGE ORDER PROCEDURE

## PART 1 GENERAL

#### 1.01 SUMMARY

- A. Make such changes in the Work, in the Contract Sum, in the Contract Time of Completion, or any combination thereof, as described by Change Orders signed by the Owner, Engineer, and the Contractor.
- B. See also applicable sections of the General Conditions and applicable portions of the Supplementary General Conditions.

#### 1.02 PROCESSING CHANGE ORDERS

- A. Change Orders will be numbered in sequence and dated. The Change Order will describe the changes and will be signed by the Owner, Engineer and the Contractor. Request for estimates for possible changes are not to be considered Change Orders or direction to proceed with the proposed changes.
- B. Change Orders will be prepared by the Engineer.
- C. Contractor may request that the Owner consider a Change Order by sending a written Change Order Request to both Owner and Engineer.

## SECTION 01040 - COORDINATION

## PART 1 GENERAL

#### 1.01 SUMMARY

- A. Restrict work to within public rights-of-way and easements obtained for this project.
- B. The Contractor(s) shall coordinate his work with the following:
  - 1. City of Florence Public Works Department
  - 2. Century Link Telephone & Charter Communications or other affected communications
  - 3. Central Lincoln People's Utility District
  - 4. Other affected utilities and agencies
  - 5. Private Property Owners and general public
- C. Restrict work to within public rights-of-ways. Staging and/ or storage of materials or equipment may be conducted on private property. Prior to start of construction and placement of stored materials Contractor must provide to Engineer evidence of:
  - 1. Written consent from affected property owner allowing Contractor utilize and place stored materials.
  - 2. Approval for use of site for stored materials by Owner and Engineer.
- D. Permit and maintain access for the Owner and/or residents to any adjacent facilities that are not part of work included within the project.
- E. Coordinate with Owner to determine the locations of underground piping, vaults, valves and other items that could be damaged during construction.
- F. Coordination between projects and Contractors for timing of construction, paving etc.
- G. Restoration and cleanup work shall be completed with each phase of the construction project. Parking lots and properties shall be maintained and kept clean and clear of excess excavation, debris, dirt and other materials.

## SECTION 01046 - PROTECTION OF EXISTING IMPROVEMENTS

## PART 1 GENERAL

- 1.01 GENERAL
  - A. Where Contractor's operations are near utility systems, structures, or are adjacent to other property, no work shall be started until Contractor has made all arrangements necessary for protection thereof have been made. Contractor shall exercise all possible precautions to prevent damage to existing structures, improvements, and underground utilities, which are to remain.
  - B. Approximate locations of known underground utilities are shown on the Plans. Exact location or extent of such utilities is not guaranteed, and utilities may exist which are not shown on the Plans. Contractor shall call for utility locates prior to any digging. Contractor shall also pothole as required ahead of the work to verify the location and depths of affected utilities. No additional compensation will be given for such work or for utilities being different than shown on the plans.
    - 1. All trench excavations and structure excavations within two (2) feet of any existing underground utility shall be performed by hand methods in accordance with state laws.
  - C. The Contractor shall be solely and directly responsible to the owners and operators of such properties and services for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage which may result from the carrying out of the work to be done under this Contract.
  - D. Restoration of Existing Improvements. Except as shown on the Plans or as provided elsewhere in these specifications, the Contractor shall, at their own expense, repair and/or replace all utilities, services, landscaping, structures, substructures and other improvements damaged by the operations associated with this project, as directed. These repairs and replacements shall all be suitable and proper for intended use and in every respect acceptable to the Owner, Engineer and appropriate governing body or owner of such improvement. At minimum, restoration will be required to match the existing adjacent structure/improvement in thickness, finish, quality, quantity, and aesthetics.
  - E. In the event of interruption of domestic water, electric, telephone, sewer, or other utility services, the Contractor shall promptly notify the proper authority and the Owner. The Contractor shall cooperate with the proper authority in restoration of service as promptly as possible and shall bear all costs of repair.
  - F. The Contractor shall pothole existing waterlines or other utilities ahead of his work so that potential conflicts can be minimized or that minor relocation of the new waterline routes can be made. Potholing is defined as exploratory excavation of existing waterlines or other utilities to verify their depth and location.

## 1.02 INTERFERING STRUCTURES, IMPROVEMENTS AND LANDSCAPING

A. It shall be entirely the responsibility of the Contractor to locate and protect all existing structures, landscaping, and other improvements in advance of the work. Neither the Owner, Engineer, nor any of their officers or agents shall be responsible to the Contractor for damages as a result of any structures or improvements being located differently than indicated in the drawings, nor which exist and are not indicated on the drawings.

- B. If interfering power poles, telephone poles, guy wires, or anchors are encountered, the Contractor shall notify the affected utility and the Engineer at least seven (7) days in advance of construction to permit arrangements for protection or relocation of the structure. However, failure of utility to respond shall create no obligation on Owner, and Contractor shall protect all utilities against damage, or shall stand all costs involved thereof.
- C. Landscaping, Tree and Plant Protection. Provide adequate protection of existing landscaping against damage from construction operations, including all structures and vegetation. Protect roots, trunk and foliage of existing and new shrubs and trees from all damage including that possible from compaction and dust. Contractor shall be entirely responsible to remove and replace all property which is damaged by work related to the project. Contractor shall bear all costs associated with replacement of existing landscaping, and shall cooperate with the owner of such improvements, the Owner, and the Engineer in all protection and restoration/replacement that is required. In specific circumstances, Contractor may make special arrangements with property owners for removal of landscaping without replacement. Copies of written agreements for all such arrangements shall be furnished to the Engineer.
- When construction operations will affect the property of a private citizen (such as driveways, landscaping, etc.), even when such improvements are in the road right-of-way, the Contractor shall notify the owner of such property and the Owner, at least seven (7) days in advance of any affecting Work, so that any desired preparations can be made.

## 1.03 ROADS AND ACCESS

- A. All work shall be conducted to minimize damage to existing roadways, easements and parking lots, including limiting wheel loads to acceptable levels. At all times keep roadways, shoulders, and ditches free from excess materials and debris.
- B. Spillage of soil, dust, rock, mud, etc. on all roads used by the Contractor (and any working for Contractor) during construction, shall be prevented as much as possible. If spillage cannot be prevented, an hourly patrol shall be provided by the Contractor to police and sweep clean all spillage. At the conclusion of each workday, such traveled areas shall be left completely clean and free from all extraneous materials. Contractor is entirely responsible to prevent such spills and follow all related laws and regulations. If spillage of hazardous material occurs, Contractor shall immediately notify the proper authorities and remove the spill in the proper manner. Owner will not be liable for any additional costs due to spillage of any kind.
- C. All damaged gravel, concrete and/or asphaltic concrete surfaces shall be repaired as required to conditions acceptable to the governing body and Engineer. No cleated or crawl-type equipment shall be operated on paved surfaces, except to cross a road when adequate protection of the surface is provided.
- D. During construction the Contractor shall take necessary measures to avoid and abate excessive dust. Sprinkling of roadways and sites may be necessary and shall be conducted carefully to avoid over wetting while keeping dust to a minimum.
- E. Contractor is responsible for constructing, maintaining, and removing any additional access that Contractor deems necessary for the Work. Contractor must notify Owner and Engineer, and must obtain written consent from the governing body, prior to construction of additional access not shown on the drawings. All applicable regulations shall be followed in such access construction, including obtaining any required permits.

## SECTION 01050 - FIELD ENGINEERING

## PART 1 GENERAL

#### 1.01 SUMMARY

A. Construction stakeout – The Engineer will provide assistance to the Contractor in the form of line and grade control for the following:

#### 9<sup>th</sup> Street Waterline & Roadway Improvements

Specific placement of stakeout and controls is not anticipated for this project. The Engineer and Owner will assist the Contractor in marking and identifying the limits of construction prior to the start of construction.

- B. The Contractor shall be solely responsible for laying out the work.
- C. It shall be the responsibility of the Contractor to maintain and preserve the construction stakeout as provided. The Contractor will not be allowed time extensions or damages caused by the loss of control stakes. If control is lost and/or disturbed and in the judgment of the Engineer requires replacement, such replacement will be at the expense of the Contractor.
- D. It is expected that minor revisions of the stakeout along the individual projects may be required during the course of construction. These revisions and relocations shall be made only as directed by the Engineer. The Contractor shall not be entitled to any additional compensation for minor revisions or relocations.

## SECTION 01060 - REGULATORY REQUIREMENTS

## PART 1 GENERAL

#### 1.01 SUMMARY

- A. The Contractor shall at all times observe and comply with all federal and state laws and lawful regulations issued and local laws, ordinances and regulations which in any manner affect the activities of the Contractor under this contract and further shall observe and comply with all orders or decrees as exist as present and those which may be enacted later by bodies or tribunals having any jurisdiction or authority over such activities of the Contractor.
- B. The contractor shall be responsible and liable for all accidents, damage or injury to any person or property resulting from any activity, duty and obligation of the Contractor under this Contract for which the Contractor may be legally liable. The contractor shall hold blameless and harmless and shall indemnify the Owner and its officers, employees and against the any and all claims, demands, loss injury, damage, actions and cost of actions whatsoever which they or any may sustain by reason of any act, omission or neglect of the Contractor or employees, agents, representatives or assignees of the Contractor in connection with the activities, duties and obligations of the Contractor under this Contract.
- C. All water system materials and construction undertaken on this project shall meet the requirements of the Oregon State Department of Human Services, Drinking Water Program, as outlined in OAR 333-061.

## SECTION 01100 - REFERENCE STANDARDS

## PART 1 GENERAL

#### 1.01 GENERAL

A. Abbreviations and Acronyms. Whenever the following abbreviations are used in these specifications or in the drawings, the following definitions apply. Unless otherwise designated, all reference to the following standards, specifications and methods shall imply the latest adopted revision in effect at the time of bid opening. Such standard, except as modified herein, shall have full force and effect as though printed in the specifications.

American Society for
ency
Federal and State)
Water Program
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1
ederal and State)
PWA
ociety for Protective

B. The abbreviation of "N.I.C." if shown on the plans or specifications represents work that is "Not in Contract". This work may be completed at a later date by Owner or others and for which the Contractor will not be responsible for unless otherwise directed to do so.

## **SECTION 01300 - SUBMITTALS**

#### PART 1 GENERAL

#### 1.01 GENERAL

A. This section outlines in general the items the Contractor must prepare or assemble during the progress of the work, including technical submittals, O&M data, record drawings, and substitution requests. Submittals are required for each piece of equipment or material even when the item being proposed for use is the same as specified.

#### 1.02 RELATED SECTIONS

- A. General Conditions Article 6.05, Substitutes and "Or-Equals"
- B. Supplementary Conditions SC-6.05
- C. General Conditions Article 6.17, Shop Drawings and Samples
- D. Supplementary Conditions SC-6.17
- E. Section 01310 Construction Progress Schedules
- F. Section 01700 Closeout Submittals
- G. Section 01740 Warranties
- H. Section 01780 Record Drawings
- I. Various sections requiring submittals for equipment and materials

#### 1.03 TECHNICAL PRE-BID SUBMITTALS

- A. Some of the major equipment items may require approval prior to bid, even when a specific manufacturer and model is specified and contractor plans to use the specified item. For items requiring pre-bid submittals, a complete submittal package must be received by the Engineer no later than 14 days prior to bid opening. Only items that have been approved in writing by the Engineer will be used in the project, and substitution requests for these items will not be considered. Engineer will either approve or reject such items at least 5 days prior to bid date. Items in the specifications that require pre-bid submittals are noted as such and listed below for convenience:
  - 1. N/A

#### 1.04 SUBSTITUTION REQUESTS

- A. Where the specifications state "or-equal", "or approved equal", or similar statement, the Engineer alone will determine if the proposed substitute item is allowed.
- B. Requests for substitution for items specified by manufacturer or manufacturer's model number as specified throughout the Contract Documents shall be in writing and be accompanied with sufficient information to allow the Engineer to identify the nature and scope of the request. Information to be provided shall include.
  - 1. Reason the substitution request is being made.
  - 2. All submittal information required for the specified item or equipment, including all deviations from the specified requirements necessitated by the proposed substitution.
  - 3. Reproducible contract drawings, marked up to illustrate the alterations to all structural, architectural, mechanical and electrical systems required to accommodate the proposed substitution.

- 4. If the substitution requires any mechanical, electrical or structural changes, the Contractor will be responsible for costs in evaluating a requested substitution. The cost for such an evaluation will be determined on a case-by-case basis, after receipt of written request. The Engineer will notify the Contractor in writing of said cost. If the Contractor wishes to proceed, he shall advise the Engineer in writing and submit additional information as may be requested. Final approval of a substitution must be made by both the Engineer and Owner.
- 5. No additional costs of any kind will be incurred by the Owner or Engineer by approval or rejection of any substitution request.

## 1.05 SUBMITTALS

- A. Technical submittals
  - Technical submittals covered by these specifications include manufacturer's information, shop drawings, test procedures, test results, samples, request for substitutions and miscellaneous work related submittals. Submittals shall also include, but not be limited to, all mechanical, electrical and electronic equipment and systems, materials, reinforcing steel, fabricated items, piping and conduit details, and lead time required for delivery to job site.
  - 2. Contractor's Responsibilities
    - a. The Contractor shall furnish all drawings, specifications, descriptive data, certifications, dimensional drawings, samples, tests, methods, schedules and manufacturers installation and other instructions as required by the contract documents, or the Engineer, to demonstrate fully that the materials and equipment to be furnished and the methods of work comply with the provisions and intent of the contract documents.
    - b. The Contractor shall be responsible for the accuracy and completeness of the information contained in each submittal and shall assure that the material, equipment or method of work shall be as described in the submittal. The Contractor shall verify that all features of all products conform to the specified requirements.
    - c. The Contractor shall ensure that there is no conflict with other submittals and notify the Engineer in each case where his submittal may affect the work as shown on the Plans.
    - d. The Contractor shall coordinate submittals among his subcontractors and suppliers.
    - e. Submittals shall coordinate with the work so that work will not be delayed. Coordinate and schedule different categories of submittals, so that one will not be delayed for lack of coordination with another. No extension of time will be allowed because of failure to properly schedule submittals.
    - f. The Contractor shall not proceed with work related to a submittal until the submittal process is complete.
    - g. The Contractor shall certify on each submittal document that he has reviewed the submittal, verified final conditions and complied with the contract documents. The Contractor may authorize in writing a material or

equipment supplier to deal directly with the Engineer. This interaction shall be limited to contract interpretations to clarify and expedite the work.

h. Charges will be documented and the Contractor will be charged for review of multiple non-conforming submittals for any one (1) item in excess of two (2) times.

## 1.06 RECORD DRAWINGS

A. During the course of construction, Contractor shall maintain a marked-up set of the project drawings. See Section 01780.

## 1.07 ENGINEER'S REVIEW

- A. Review shall not extend to means, methods techniques, sequences or procedures of construction, or to verify quantities, dimensions, weights or gages, or to fabrication processes, except when specifically indicated or required by the contract documents, or to safety precautions or programs.
- B. The Contractor shall submit four (4) copies of all submittal material to Engineer. Two (2) copies will be returned upon final approval. If the submittal is rejected all four (4) copies will be returned.
- C. Unless otherwise specified, within 14 calendar days after receipt of submittal, the Engineer will return the marked-up copies. The Contractor shall take appropriate action if the submittal needs to be resubmitted. If specified submittal material is to be used for O&M data, all corrections shall be made and new clean copies shall be submitted with the O&M data.
- D. Review of contract documents, method of work or information regarding materials or equipment the Contractor proposes to provide, shall not relieve the Contractor of his responsibilities for errors therein and shall not be regarded as an assumption of risks or liability by the Engineer or Owner. The Contractor shall have no claim under the Contract on account of failure or partial failure of the method of work, material or equipment so reviewed.

## SECTION 01310 - CONSTRUCTION PROGRESS SCHEDULES

## PART 1 GENERAL

#### 1.01 SUMMARY

- A. Provide a progress schedule indicating the times for starting and completing the various stages of work, including any Milestones.
- B. As work progresses, Contractor shall prepare and submit updated progress schedules as necessary.

#### 1.02 SUBMITTALS

- A. Within 10 days after the date of the Agreement (Contract), submit a proposed Construction Schedule to the Owner and Engineer for approval.
- 1.03 PROGRESS OF THE WORK
  - A. The Contractor shall execute work with such progress as necessary to prevent delay to the overall completion of the project and with such forces, materials and equipment to assure completion in the time established by the Contract.
  - B. The Contractor may find it necessary to work overtime, double shifts, weekends and/or holidays if such a schedule is required to complete the project within the time allowed.

# SECTION 01400 - QUALITY CONTROL

#### PART 1 GENERAL

#### 1.01 GENERAL

- A. Work shall conform to these specifications and the standards of quality contained herein.
- B. Only new items of recent manufacturer and quality specified, free from defects, will be permitted on the Work, unless items are specifically noted as existing to be reutilized. Remove rejected items immediately from the Work and replace with items of quality specified. Failure to remove rejected materials and equipment shall not relieve the Contractor from responsibility for quality and character of items used, nor from any other obligation imposed by the Contract.
- C. No work defective in construction or quality, or deficient in any requirement of the drawings and specifications will be acceptable in consequence of the Owner's or the Engineer's failure to discover or to point out defects or deficiencies during construction; nor will the presence of Resident Project Representatives on the work relieve the Contractor from responsibility for securing the quality and progress of work as required by the Contract. Defective work revealed within the time required by guarantees shall be replaced by the Contractor by work conforming to the intent of the Contract. No payment, whether partial or final, shall be construed as an acceptance of defective work or improper materials.

## SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 GENERAL

#### 1.01 GENERAL

- A. This section includes mobilization, temporary utilities, temporary construction, safety requirements, temporary environmental controls, and other temporary controls.
- B. Submittals
  - 1. Traffic control plan (see Section 01570).
  - 2. Staging area plan and notification of any obstructions encountered during mobilization.
  - 3. Plans for disposal of waste materials and excavated material not required for fill, including permits as required.
- C. Permits. Contractor shall secure and pay for all permits and fees required pertaining to temporary facilities and all other work.
- D. Mobilization shall include de-mobilization and consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to and from the project site; for the establishment of offices, buildings and other facilities necessary for work on the project; for premiums on bond and insurance for the project, and for other work and operations which the Contractor must perform or costs he must incur before beginning work on the project and after completion of the project.
- E. Access of Government Officials. Authorized representatives of the Federal, State and Local Governments shall at all times have safe access to the Work, whenever in preparation or in progress, and Contractor shall provide proper facilities for such access and inspections.

## PART 2 PRODUCTS

- 2.01 MATERIALS
  - A. Contractor shall provide all materials necessary for all work under this Section.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. During all construction operations, the Contractor shall construct and maintain such facilities as may be required to provide access by all property owners to their property. No person shall be cut off from access to their place of business or residence, unless the Contractor has made special arrangements with the affected persons and has notified Engineer and Owner. All temporary facilities shall be removed by the Contractor upon completion of the Work.
  - B. Temporary Utilities
    - 1. Electric Power and Telephone

- a. Electrical power. Power requirements should be confirmed by the Contractor for any special power needs. Arrangements for power shall be the responsibility of the Contractor.
- b. Phone service shall be the responsibility of the Contractor.
- 2. Sanitary Facilities
  - a. The Contractor shall provide chemical toilets of suitable types and maintain them in a sanitary condition at all times, conforming to code requirements and acceptable to the health authorities. They shall be of watertight construction so that no contamination of the area can result from their use. Arrangements shall be made for frequent emptying of the toilets. Upon completion of the work, toilets shall be removed and the area restored to its original condition.
  - b. Portable toilet facilities shall be located only at locations approved by the Owner.
- 3. Water
  - a. Water is available for normal flushing and washing operations through Owner approved connections to the existing system.
- C. Safety Requirements
  - 1. Proper traffic control shall be provided in accordance with Section 01570.
  - 2. Access for Police, Fire, and School Bus Service
    - a. Notify the fire department, police department and, when applicable, the School District before closing any street or portion thereof, and no closing shall be made without the Engineer's approval. Notify said departments when the streets are again passable for emergency vehicles. Do not block off emergency vehicle access to any area, such as consecutive arterial crossings or dead-end streets, in excess of 300 linear feet, unless the Contractor obtains special written permission from the chief of the fire department. Conduct operations so as to cause the least interference with any fire station access and at no time prevent such access.
    - b. The Contractor shall furnish a list of emergency telephone numbers to both the Engineer and the Owner so that contact may be made easily at all times in cases of emergencies.
  - 3. Fire Prevention. Contractor shall perform all work in a fire-safe manner. Contractor shall supply and maintain on site all fire-fighting equipment, supplies, and capable personnel for extinguishing incipient fires as required by all Federal, State and local laws and regulations. Each piece of internal combustion enginedriven equipment shall be equipped with a fire extinguisher in accordance with the appropriate recommendation of the National Fire Protection Association (NFPA). All engines shall be equipped with functional spark arrestors and sound suppression devices.

- D. Temporary Environmental Controls
  - 1. The Contractor shall maintain affected areas from his construction free from environmental pollution that would be in violation of federal, state or local regulations.
  - 2. Air Pollution Control
    - a. Minimize air pollution likely to occur from construction operations by wetting down bare soils to control dust and requiring proper combustion emission control devices on construction vehicles.
    - b. Give unpaved streets, roads, and detours or haul roads in the construction area a dust preventative treatment or periodically water to prevent dust. Strictly adhere to applicable environmental regulations for dust prevention.
  - 3. Water Pollution Control and Erosion Control
    - a. Discharge from dewatering, or flushing operations shall not directly impact existing water courses.
    - b. Turbidity shall not exceed 10 percent above natural stream turbidities as a result of the project. The turbidity standard may be exceeded for a limited duration, provided all practicable erosion control measures have been implemented, including, but not limited to:
      - 1. Use of filter bags, sediment fences, silt curtains, leave strips or berms, placing mulch and hay bale silt fences, or other measures sufficient to prevent offsite movement of soil.
      - 2. Use of an impervious material to cover stockpiles when unattended or during a rain event.
      - 3. Graveled construction accesses to prevent movement of material offsite via construction vehicles.
      - 4. Sediment traps or catch basins to settle out solids prior to water entering ditches or waterways.
      - 5. Spreading mulch on exposed embankments greater than 3 feet in height.
      - 6. Place hay bale silt fence at any locations where soil erosion potential is evident and as directed by the Engineer.
      - 7. Constructing sediment basins where surface runoff is causing soil erosion or as directed by the Engineer.
    - c. Erosion control measures shall be maintained as necessary to ensure their continued effectiveness.
    - d. Petroleum products, chemicals, or other deleterious materials shall not be allowed to enter the water.

#### PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

A. Mobilization, Bonding, and Insurance - Payment for this item shall be on a lump sum basis at the amount stated on the Bid Form and shall include all activities related to mobilization and demobilization on the project, preparatory work, insurance and bonding

costs, project closeout, building permits (as required) and other agency fees and other facilities and equipment necessary for work on the project.

B. Construction Facilities and Temporary Controls - Payment for work in this item shall be on a lump sum basis at the amount stated on the Bid Form and shall include all temporary construction facilities, traffic control, project offices, miscellaneous equipment, costs related to scheduling, coordination, submittals, and all other Division 1 activities within the scope of work not designated with individual payment items shall be included within this item.

## SECTION 01570 – TRAFFIC REGULATION

## PART 1 GENERAL

#### 1.01 GENERAL

- A. This section includes traffic control related safety requirements as may be required for the project.
- B. Contractor shall comply with all rules and regulations of County, State, City, and Federal authorities regarding the closing, detouring, and loading of all public streets or highways.
- C. No road (public or private) shall be closed or detoured by the Contractor to the public, except by express written permission of the Engineer and entity governing such roadways. Traffic must be kept open on all roads and streets where no detour is possible. The Contractor shall, at all times, conduct the work so as to assure the least possible obstruction to traffic and normal commercial pursuits. The convenience of the general public and residents, safety, and the protection of property is of prime importance and shall be provided for by the Contractor in an adequate and satisfactory manner.
- D. Submittals
  - 1. If road closures, lane closures, or detours are required, Contractor shall prepare, and submit for approval a Traffic Control Plan to the appropriate governing body of such road.
  - 2. If road closures, lane closures, or detours are required, Contractor shall notify Owner a minimum of 48-hours prior to the road closure

## PART 2 PRODUCTS

## 2.01 MATERIALS

- A. Contractor shall furnish all flaggers, barricades, lead cars, warning signs, lights, signals, etc. as required to comply with regulations and provide safety.
- B. All signs, lights, flags and other warning and safety devices shall meet the current ODOT safety manual affecting the location of construction, or to applicable City/County standards.
- C. Barricades shall conform to the Standard Specifications for Highway Construction of the State Highway Department affecting the location of construction, or to City or County Standards where applicable.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. Contractor shall, at their own 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 danger lights, signals, and flaggers 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.

- B. Failure of the Engineer to notify the Contractor to maintain barricades, barriers, lights, flares, danger signals, or watchmen, shall not relieve the Contractor from this responsibility. All barricades and obstructions shall be protected at night by signal lights which shall be suitably distributed and kept burning from sunset to sunrise. Barricades shall be of substantial construction and shall be suitably painted to increase their visibility at night.
- C. Whenever the Contractor's operations create a hazardous condition, Contractor shall furnish flagmen and guards as necessary, or as directed, to give adequate warning to the public of any dangerous conditions to be encountered. Contractor shall furnish, erect, and maintain approved fences, barricades, lights, signs, and any other devices that may be necessary to prevent accidents and to avoid damage and injury to the public. Flaggers and guards, while on duty and assigned to give warning to the public, shall be equipped with approved red wearing apparel and a red flag which shall be kept clean and in good repair.
- D. Contractor shall provide access to private properties at all times, except during urgent stages of construction when it is impractical to carry on the construction and maintain traffic simultaneously. Coordinate all construction activities with the affected property owners.
- E. Contractor shall patrol the traffic-control area and reset all disturbed signs and trafficcontrol devices immediately, and will remove or cover all non-applicable signs during periods not needed.
- F. At the end of each day, the Contractor shall leave work in such condition that it can be traveled without damage to the work and without danger to the public.
- G. If, in the opinion of the Engineer or other governing traffic authority, traffic control is lacking or otherwise unsafe or deficient, the Engineer may require that all work be halted until the traffic control measures can be improved to an acceptable level.

# PART 4 SPECIAL PROVISIONS

## 4.01 MEASUREMENT AND PAYMENT

A. Payment for this item shall be included within the lump sum price for Construction Facilities and Temporary Controls, unless a line item lump sum bid is shown in the Bid Form specifically for this item. It shall include all activities related to traffic and safety control on the project, preparatory work for work on the project.

## SECTION 01610 - STORAGE AND PROTECTION

## PART 1 GENERAL

#### 1.01 SUMMARY

A. Protect products scheduled for use in the Work by means as described in this Section and as recommended by the manufacturer.

#### 1.02 MANUFACTURER'S RECOMMENDATIONS

A. Except as otherwise approved by the Owner, determine and comply with manufacturers' instructions on product handling, storage and protection.

#### 1.03 PACKAGING

- A. Deliver products to the job site in their manufacturer's original container, with the labels intact and legible.
- B. Maintain packaged materials with seals unbroken and labels intact until time of use.
- C. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements at no additional cost to the Owner.
- D. The Owner may reject as non-complying such material and products that do not bear identification satisfactory to the Owner as to the manufacturer, grade, quality and other pertinent information.

#### 1.04 STORAGE

- A. Store materials on-site in coordination with the Owner to provide suitable site access and clearance.
- B. Do not store unnecessary materials that will not be incorporated into the work.

#### 1.05 PROTECTION

- A. Protect stored materials from moisture and temperature, and unauthorized handling.
- B. Provide protection for finished surfaces.
- C. Maintain finished surfaces clean, unmarred and suitably protected until accepted by the Owner.
- D. Provide proper protection for all workers.

#### 1.06 REPAIRS AND REPLACEMENTS

- A. In event of damage, promptly make replacements and repairs to the approval of the Owner and at no additional cost to the Owner.
- B. Additional time required to secure replacements and to make repairs will not be considered by the Owner to justify an extension of the Contract Time of Completion.
- C. Repair all scratches and damage to painted surfaces promptly with proper color and material.

## SECTION 01700 – CONTRACT CLOSEOUT

## PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. Section includes procedures and requirements for finalizing and closing out the Project(s).
- B. Final clean-ups and restorations shall be done prior to requesting final inspections.

## PART 2 PRODUCTS – NOT USED

#### PART 3 WORKMANSHIP

## 3.01 RESTORATION AND CLEAN-UP

- A. Upon completion of any portion of the work, promptly remove temporary facilities generated by that portion of the work, including surplus materials, equipment and machinery unless directed otherwise by the Engineer or the Owner. All construction work by the Contractor shall be clean and free of rubbish, dirt, overspray, and extraneous materials to the satisfaction of the Engineer before acceptance of the work.
- B. Street/Road Cleanup. All roadways affected during construction shall be cleaned and restored. All ditches and culverts shall be cleaned and re-graded for proper drainage. Culverts broken or damaged by construction activities shall be restored to their original condition and location. Immediately following construction, remove all dirt, mud, rock, gravel, and other foreign material at the completion of the day or as otherwise required by the Engineer.
- C. Site Restoration and Cleanup. Restore or replace any ground covering (e.g., bark chips, cinders, gravel, river rock, etc.) to the original condition or better. Replace topsoiled areas, rake and grade to conform to their original contours. Replace any damaged landscaping or plantings to prior conditions in manner acceptable to Owner. Reseed grass areas as approved. Seed and protect any disturbed slopes.

#### PART 4 SPECIAL PROVISIONS

## 4.01 MEASUREMENT AND PAYMENT

A. Payment for this item shall be on a lump sum basis at the amount stated on the Bid Form for Mobilization and shall include all activities related to project closeout.
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#### SECTION 01740 - WARRANTIES

#### PART 1 GENERAL

#### 1.01 INSTALLED MATERIALS WARRANTIES

- A. Installed Materials Warranties. Prior to 75% completion and payment for work under this Contract, the Contractor shall furnish the Owner through the Engineer, all warranty and/or guarantee forms normally furnished by the manufacturer of equipment. Warranty form shall include the specific equipment installed, the duration of the warranty, details of the warranty, and the installer's name, address and phone number. Installation date will be filled in by the Owner and will coincide with date of substantial completion of the work under this contract. All such warranties shall name the Owner as the warranted party.
  - a. Attention is directed to various other sections of the Contract Documents where specific material or installation warranties may be required for items specified.

#### 1.02 CERTIFICATIONS

- A. Contractor to prepare on Contractor's letterhead with project title and number clearly identified. Submit to Engineer with application for Final Payment.
  - 1. A written certification that Contractor has fully completed the Work in strict compliance with the Contract Documents, and requesting final inspections.
  - 2. Written certification that all subcontractors and suppliers who have furnished work or materials as part of this project have been paid in full.
  - 3. Written certification that Contractor will replace all materials and workmanship that prove defective within one-year after the date of Final Acceptance. Date Engineer signs Final Payment Certificate is date of Final Acceptance and starts the Contractor's one-year guarantee period.
  - 4. Submission of a signed State or Federal approved Wage Certification Form certifying that Contractor has paid not less than the Prevailing Wage Rate as required by law, and that Contractor has timely submitted the required payroll certificates to the appropriate state or federal wage division.
- B. One-Year Warranty Inspection. On the 11<sup>th</sup> month following final project completion and acceptance, Contractor shall be available to be present during the on-site warranty inspection by Owner. Any defects identified in materials or workmanship shall be corrected within 30 days by the Contractor at his own expense.

### PART 2 PRODUCTS – NOT USED

- PART 3 EXECUTION NOT USED
- PART 4 SPECIAL PROVISIONS
- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for this item shall be on a lump sum basis at the amount stated on the Bid Form for Mobilization, Bonds and Insurance and shall include all activities related to Contractor Certifications and Warranties.

#### END OF SECTION

#### Civil West Engineering Services, Inc.

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### SECTION 01780 - PROJECT RECORD DRAWINGS

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This section outlines in general the Contractor requirements for preparing and maintaining and record drawings of the project.
- B. Contractor shall provide access to the Record Drawings to the Engineer and Owner throughout construction and shall finalize and submit complete record drawings upon completion of the work.
- C. Accurate Record Drawings or "As-Builts" are considered extremely important and it shall be entirely the Contractor's responsibility to maintain a complete and accurate record of all details of the project as he constructs and installs equipment and materials.
- D. Contractor shall perform final "as constructed" measurements to document and verify the horizontal alignment and vertical elevation of all installed storm drain and sanitary sewer pipe and manholes. This work shall be conducted by or under the supervision of a registered Professional Land Surveyor, or Professional Engineer, licensed in the State of Oregon. All data obtained from this survey shall be incorporated into the project "As-Built" drawings, and delivered to the engineer for approval.
- E. Engineer or Owner may stop work if it is determined that Contractor is not properly recording details in record drawings and require correction and accurate documentation of all previous work before additional work proceeds.
- F. Engineer must accept and approve the drawings prior to recommending final payment.

### 1.02 RELATED SECTIONS

A. General Conditions – Article 7, Section 7.11, Record Documents

#### 1.03 SUBMITTALS

- A. Submit two complete sets of initial marked-up Record Drawings immediately upon completion of construction work and post-construction survey. Engineer will review for completeness and either approve or return one set with comments and corrections.
- B. If initial submittal requires corrections, submit one complete set of corrected marked-up Record Drawings to Engineer with or before request for final payment.

#### PART 2 PRODUCTS

- 2.01 RECORD DRAWINGS
  - A. Maintain one set of black-line prints of the Contract Drawings. Mark-up drawings using erasable red-colored pencil. Use additional colors as necessary to clearly document changes from original drawings for different categories of work at the same location.
  - B. Use clear original or copy of project drawings for mark-up. Use shop drawings for markup when they are more capable of showing actual physical conditions completely and accurately.

C. All deviations or differences from the original drawings, including dimensional, location, layout, material, and other details shall be noted clearly. Any additional information discovered during construction shall also be noted including location and depth of buried utilities and structures not shown in the original drawings.

### 2.02 FORMAT

- A. Organize Record Drawings into manageable sets using plans and shop drawings as applicable. Keep sets bound and protected.
- B. Keep on-site during construction and clearly identify as "Record Drawing" on cover.

### PART 3 EXECUTION

- 3.01 RECORDING AND MAINTENANCE
  - A. Record data as soon as possible after obtaining it. Do not wait until the end of the job or a portion of the job to record data.
  - B. Give particular attention to information concealed that would be difficult to identify or measure and record later. Record and check the markup before enclosing concealed installations.
  - C. Require the individual who installed or constructed the portion of the work, or otherwise obtained the record data, to prepare that portion of the marked-up record print.
  - D. Incorporate changes and additional information previously marked on Record Drawings, erase, redraw, and add details and notations where applicable.
  - E. Refer instances of uncertainty to Engineer for resolution.

### PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

A. Payment for Record or "As-Built" drawings, including post-construction survey work shall be included within the lump sum price for Construction Facilities and Temporary Controls, for the amount stated on the Bid Form. Maintaining up-to-date "as constructed" notes on the project drawings shall be considered incidental to the work. No additional compensation will be made for this item.

### END OF SECTION

# DIVISION 2- SITE WORK TABLE OF CONTENTS

SECTION NO.	TITLE
SECTION 02230	CLEARING & GRUBBING
SECTION 02240	CONTROL OF WATER
SECTION 02250	DEMOLITION & SITE PREPARATION
SECTION 02270	SLOPE PROTECTION
SECTION 02310	ROADWAY EXCAVATION
SECTION 02315	TRENCH EXCAVATION, BEDDING, AND BACKFILL
SECTION 02321	COMPACTION TESTING
SECTION 02370	EROSION CONTROL
SECTION 02510	WATER DISTRIBUTION PIPING
SECTION 02511	LOCATOR WIRE AND WARNING TAPE
SECTION 02515	WATERLINE APPURTENANCES
SECTION 02530	SANITARY SEWER SERVICES & ADJUSTMENT
SECTION 02630	STORM DRAIN PIPING
SECTION 02235	MANHOLES
SECTION 02720	AGGREGATE BASE/ GRAVEL SHOULDER
SECTION 02735	PAVING FABRIC
SECTION 02740	HOT MIX ASPHALT CONCRETE PAVEMENT
SECTION 02760	PAVEMENT MARKINGS
SECTION 02770	CURBS & GUTTERS
SECTION 02772	CATCH BASINS
SECTION 02775	SIDEWALKS, DRIVEWAY APPROACHES, & ADA RAMPS
SECTION 02900	LANDSCAPE RESTORATION & CLEANUP

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### SECTION 02230 – CLEARING & GRUBBING

#### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. The work to be performed under this section shall include all labor, equipment, and materials necessary for the removal of vegetation and organic matter including, trees, logs, stumps, roots, shrubs, brush, grass and other organic materials as specified herein and as necessary to complete the proposed improvements. This work shall also include the preservation and protection from injury or defacement of all vegetation and objects designated to remain, hauling and disposal of all resulting materials, backfilling of all voids resulting from clearing and grubbing operations, and grading of areas along the project alignment which are not included elsewhere in grading.
- B. Clearing and grubbing work shall be performed in strict compliance with all City, County, State and Federal laws and requirements pertaining to clearing, disposal, erosion control, and other related operations.
- C. Extra care shall be taken when construction occurs on private property. For areas within easements the Contractor shall coordinate with the Owner and private property owners prior to removal or trimming of any vegetation.

### PART 2 PRODUCTS – NOT USED

#### PART 3 EXECUTION

- 3.01 CLEARING
  - A. Clearing shall consist of the felling, trimming or cutting of trees, stumps, shrubs, brush and branches, and the clearing of downed timber, vines, grass and other vegetation to the limits specified herein, with the exception of items designated either on the Plans or within these Specifications to remain. The ground surface shall be cleared completely of all growth and organic matter as specified.
  - B. Merchantable timber, shrubs and other vegetation of value occurring within areas designated for clearing or resulting from the clearing work shall become the property of the Contractor unless otherwise specified.
  - C. Trees of which less than one-half (1/2) of the lower portion of the trunk is within the area to be cleared may be left in place unless they are so situated that they interfere with other work to be completed under this contract, in which case they shall be removed.
  - D. Trimming
    - 1. Tree branches hanging within the zone extending from the ground surface to 13feet above the finished roadway grade, or 9-feet above other areas, shall be cut off to the boles in a workmanlike manner in conformance with tree surgeon practice, as directed.
    - 2. The Contractor shall remove additional tree branches as directed by the Engineer in such a manner that the tree presents a balanced appearance.
    - 3. Scars resulting from trimming of branches shall be treated with an approved tree sealant.

### E. Clearing Limits

1. Clearing shall be performed within designated rights-of-way or easements as shown on the plans or as directed by Engineer.

#### 3.02 GRUBBING

- A. Grubbing shall consist of the removal of all embedded wood and other organic matter. Materials to be removed include stumps, trunks, buried logs, roots one-inch (1") in diameter and larger and other objectionable material.
- B. Grubbing Limits
  - 1. Grubbing shall be performed within all clearing area limits, as specified above, to a depth of six-inches (6") below the ground surface, or subgrade, whichever is deeper.
  - At all trenches and other excavations, grubbing shall be conducted to six-inches (6") outside the exposed sides of the excavation. All stumps shall be completely removed to firm undisturbed soils.

### 3.03 DISPOSAL

- A. All materials and debris resulting from clearing and grubbing operations shall become property of the Contractor at the place of origin and shall be hauled away and disposed of by the Contractor.
- B. Materials resulting from clearing and grubbing operations shall not be disposed of on lands owned or controlled by the Owner except by written permission. If so permitted, the Contractor shall place materials only at locations and in such manner as directed by the Owner.
- C. The Contractor shall obtain written permission from the owner of any property upon which clearing and grubbing materials are to be disposed. Copies of the agreement between the property owner and the Contractor shall be furnished to the Owner and Engineer.
- D. No burning of materials shall be allowed at the project site unless approved by the Owner in writing. No excess accumulation of materials shall be allowed at the project site.

#### 3.04 PRESERVATION OF EXISTING VEGETATION

- A. The Contractor shall protect from injury all trees, shrubs, vines, plants, grasses and other vegetation outside of areas to be cleared and grubbed, or which are designated by the Engineer to be preserved. Operations which may damage such vegetation to remain shall be conducted in areas where damage will not result.
- B. All items designated to remain which are damaged by the Contractor's operations shall be restored or replaced by the Contractor to as nearly as possible original condition and location at no cost to the Owner.

#### 3.05 COMPLIANCE WITH LAWS AND REGULATIONS

A. The clearing and grubbing work shall be performed in strict compliance with all City, County, State and Federal laws and requirements pertaining to clearing, hauling, disposal, erosion control, and related operations.

#### 3.06 BACKFILLING AND GRADING

- A. Stump holes and other excavations which result from clearing and grubbing operations shall be backfilled with suitable material and compacted in accordance with Section 02315.
- B. Holes in areas to be excavated or trenched at a later time may be temporarily backfilled or covered as approved to provide for public safety until completion of final backfill.
- C. Areas subject to Clearing and Grubbing shall be smoothed and reshaped to blend to surrounding grades.

### PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Clearing & Grubbing shall be included within the Lump Sum price for Demolition & Site Preparation for the amount stated on the Bid Form. Payment shall include compensation for the removal and disposal of all cleared debris and materials and labor required to complete the work described herein.

### END OF SECTION

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### SECTION 02240 - CONTROL OF WATER

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This section covers the control of surface water runoff, dewatering of pipeline trenches and structural excavations, and other elements required for control of water as dictated by the site conditions during construction.
- B. The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor assumes all liability for operation of the dewatering system and shall man the system during its operation. The dewatering system and discharge shall meet the requirements of all codes and regulatory agencies having jurisdiction of the system operation.
- C. Contractor shall inspect the construction site and consult with the City and applicable regulatory agencies to determine the best applicable method of dewatering, discharge filtration, and available options for receiving bodies. Contractor shall be responsible for all applicable permits.
- D. Submittals
  - 1. Prior to performing any excavation, the Contractor shall submit a dewatering plan to the Engineer for review. The submittal shall include method of installation, method and location of discharge, method of discharge filtration, and general details of the proposed dewatering system.

#### 1.02 MATERIALS

- A. Materials and equipment required for control of water shall be furnished and maintained as required to perform the construction.
- B. Piping/Hose
  - 1. Contractor shall provide discharge piping constructed of rigid pipe with positive restrained joints.
  - 2. Provide water tight pipe system.

#### 1.03 WORKMANSHIP

- A. The necessary machinery, appliances and equipment shall be furnished, installed, operated and maintained to keep excavations free from water during construction, and to dispose of the water so as not to cause injury to public or private property or to cause a nuisance, inconvenience or a menace to the public. Sufficient pumping equipment and machinery in good working condition shall be provided for all emergencies including power outage, and sufficient workmen shall be available at all times for the operation of the pumping equipment. The dewatering systems shall not be shut down between shifts, on holidays or weekends, or during work stoppages without written permission from the Engineer.
- B. The control of surface runoff and groundwater shall be such that softening of the bottom of excavations, or formation of "quick" conditions or "boils" during excavation, shall be prevented. Dewatering systems shall be designed and operated so as to prevent removal of the natural soils. Natural or compacted soils softened by saturation with

groundwater or standing surface water shall be removed and replaced as instructed by the Engineer at no additional expense to the Owner.

- C. During construction of structures, installation of pipelines, placing of structure and trench backfill and the placing and setting of concrete, excavations shall be kept free of water. Surface runoff shall be controlled so as to prevent entry or collection of water in excavations. The static water level shall be drawn a minimum of one (1) foot below the bottom of the excavation, so as to maintain the undisturbed state of the foundation soils and allow the placement of 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 the extent that would damage or endanger adjacent structures or property.
- D. Open and cased sumps shall not be used as primary dewatering for excavations deeper than three (3) feet below the static water table. Location of open or cased sumps shall be outside of trench excavation or limits of structural excavation.
- E. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures and pipelines.
- F. Provisions shall be made to take care of surplus water, mud, silt or other runoff pumped from excavations and trenches or resulting from slicking or other operations. Siltation of completed or partially completed structures and pipelines by surface water or by disposal of water from dewatering operations shall be cleaned up at the Contractor's expense.
- G. The Contractor shall be responsible for any damages to existing on- and off-site facilities and work in-place resulting from mechanical or electrical failure of the dewatering system.
- H. The Contractor shall comply with all applicable local, State, and Federal laws and regulations pertaining to erosion control and discharge of water off-site.
- I. Necessary filtering media, bags, or other methods shall be used to ensure that turbidity limits in the receiving bodies are not exceeded during dewatering activities.

### 1.04 PAYMENT

A. Payment for all Control of Water and other work in this section shall be considered incidental to the work. No separate or additional payment will be made.

# END OF SECTION

### SECTION 02250 - DEMOLITION & SITE PREPARATION

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This work in this section includes the furnishing of all labor, equipment, materials, incidentals, and performing all work required for the removal and disposal of concrete, miscellaneous structures, water piping as designated for removal, debris, buildings, fences and other items or improvements of manmade origin, in accordance with the Plans and these Specifications.
- B. The owner's water distribution system is compromised of steel pipe, asbestos cement pipe, cast iron piping and polyvinyl chloride and other materials. The majority of the existing water mains consist of piping without any toning wire or locator tape.
- C. The removal work described herein does not include the removal or disposal of items or improvements designated to remain.
- D. The area in which removal work, under these Specifications, is to be performed shall be confined to the minimum dimensions, within the public right-of-way or easements, which will permit proper construction of the proposed improvements, or as otherwise indicated.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Trench Excavation and Backfill shall comply with Section 02315.
- B. End caps, plugs and blind flanges and other Waterline Appurtenances shall comply with Section 02515.
- C. Asphalt concrete pavements shall comply with Section 02740
- D. Landscape restoration and reseeding shall be as specified in Section 02900.
- E. Concrete for Curbs, Walks and Driveway Approaches shall be Class 4000-3/4 (4000 psi, <sup>3</sup>/<sub>4</sub>" max. aggregate) per OSS 02000.
  - 1. Expansion joint filler shall be ½-inch thick preformed asphalt fiberboard conforming to ASTM D994.

### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Pavements, Curbs, Walks and Driveways
  - 1. Remove and dispose of designated existing AC pavements, curbs and gutters, concrete sidewalks, access ramps, driveway approaches, portions of storm drain piping, trees, shrubs, soil not being replaced, catch basins, and other miscellaneous structures being replaced or eliminated, as required, and according to the Drawings and these Specifications.

- 2. Pavements and/or structures designated to remain but damaged as a result of the Contractor's operations shall be sawcut and removed and replaced or restored at the sole expense of the Contractor.
  - a. Finishing shall produce a smooth finish matching surrounding finish or a non-slip broom finish as applicable unless otherwise specified in Section 3300.
  - b. Sidewalks shall be 4-inches thick and shall match existing sidewalks at limits of replacement.
  - c. Driveway approaches shall be 6-inches thick for residential and shall match existing sidewalks at limits of placement.
  - d. Driveway approaches shall be 8-inches thick for commercial and shall match existing sidewalks at limits of placement.
  - e. Concrete shall be deposited in forms without segregation and tamped spaded or mechanically vibrated for thorough consolidation.
  - f. Provide expansion joints around poles, fire hydrants, limits of driveways and other fixtures that protrude through or against the structures and at points of curvature. Scored joints shall be required at 5-foot centers.
- 3. Roadway Construction Dig Out Area Contractor shall dig out existing pavements located within the designated dig out areas as shown in the Drawings to the depth of firm aggregate base materials or subgrade soils. Exposed subgrade soils or base materials shall be shaped and graded as necessary to result in a finished surface which conforms to the cross section and profile indicated on the plans. If unstable subgrade areas are observed, materials shall be over-excavated to firm undisturbed ground as directed by the Engineer.
- 4. Cold Plane Pavement Removal This work shall entail the grinding, removal, and disposal of the top portion of the existing AC pavement to the limits as shown on the Plans as grind out repair areas and/or as transitional grind areas.
  - a. Transitional Butt Grind Areas the Contractor shall butt grind out a transitional area to provide a smooth transition from existing asphalt pavements to new asphalt pavement. Starting at a minimum depth of 2-inches to a final depth of 0-inches, exact length and area of transitional butt grinds shall be determined in the field.
  - b. Grind out repair areas The Contractor shall grind out repair areas, to limits as shown on the plans to a depth of 2-inches per lift unless directed otherwise by Engineer.
  - c. Upon completion of grind of repair areas, remaining surfaces shall be inspected for integrity. Additional grinding may be required.
  - d. Provide warning signs as required where abrupt edges or sloped dropoffs at the edge of the existing or new surfaces exist until placement of final asphalt pavement overlay is completed. There shall be no longitudinal edges or drop offs within the travel lane at the end of the day.
- 5. Saw Cuts

- a. Saw cuts of the existing pavements are shown, if required, and shall be sequenced to correspond to the various stages of construction.
- b. Depth of the saw cut shall extend the full depth of the item being removed such as AC pavement, concrete sidewalks, or curbs and gutters being removed.
- c. The Contractor shall be responsible for protecting and maintaining the saw cut edges during the course of construction. The Contractor shall anticipate performing additional saw cuts along existing pavement edges or at other locations where vehicular or construction equipment will have an impact on these edges. No additional compensation will be made to the Contractor for these additional saw cuts.
- B. Valve Boxes Removal & Replacement Center valve boxes and set plumb over the operating nut of the valve. Set valve boxes so they do not transmit shock or stress to the valve. Set valve box covers flush with the surface of the finished pavement or such other level as may be directed. Adjust the extensions to the proper length as required for proper installation. Backfill shall be as specified for the connecting pipeline. Correct any misalignment of valve boxes without additional expense to the Owner.
- C. Valve Box Adjustment The Contractor shall adjust the existing valve cans and cleanouts which are to remain, to the new finish grades.
- D. Removal and Disposal of Asbestos-Containing Pipe
  - 1. Removal of Asbestos-Containing Pipe
    - a. When existing pipe containing asbestos (i.e. Transite or A.C. Pipe) is exposed, cut or removed, all requirements of the EPA, Oregon DEQ, and OR-OSHA shall be followed. Specific guidelines pertaining to the handling and removal of asbestos-containing materials are given in OAR 340, Division 248 and OAR 437, Division 3, Construction. The Contractor is required to be familiar with these and all other requirements related to the removal, handling and disposal of asbestos-containing material, and shall comply with all such laws and regulations.
    - b. All asbestos-containing pipe that is not removed or otherwise disturbed shall be left or abandoned in place. The location of all such pipe shall be documented by the Contractor on the As-Built plans.
  - 2. Disposal of Asbestos-Containing Pipe
    - All asbestos-containing pipe that is removed from the ground or otherwise disturbed must be handled, enclosed, encapsulated, and removed in accordance with the provisions of **29 CFR 1926.1101** in OAR 437, Division 3, Construction.
    - b. The asbestos-containing pipe must be adequately wetted to prevent the release of asbestos fibers during cutting and handling. Asbestos-containing materials must be disposed of in leak-tight 6-mil thick plastic bags, plastic-lined cardboard containers or plastic lined metal containers, in accordance with the above requirements.

- c. The sealed containers of asbestos-containing pipe shall be hauled to an approved asbestos landfill and disposed of according to DEQ regulations and the landfill requirements.
- d. The Contractor shall take special precautions to protect the integrity of the asbestos-containing pipe and prevent the release of asbestos during the handling, loading and transportation of the pipe.
- E. Valves and valve covers, fittings, and other pipe appurtenances designated for removal shall be removed in their entirety to the limits shown on the Plans, or as required to permit proper construction of the proposed improvements. Remaining ends of pipes shall be suitably capped or plugged in a watertight manner. Provide a minimum of two (2) feet of concrete slurry filling inside of pipe for full diameter.
- F. Culverts removed during the construction and which, in the opinion of the Engineer, are reusable shall be salvaged and relaid following placement of the new waterline. Placement of bedding and backfill around reused culverts shall be in conformance with the requirements of Section 02315.
- G. All items and materials designated to remain shall be protected against damage as required. Damage to items or materials not intended for removal shall be repaired promptly by the Contractor to the satisfaction of the affected property owner. If the Engineer determines it necessary, repairs shall consist of complete replacement of the affected items or materials. All such repairs and replacements shall be made by the Contractor without compensation.
- H. Existing fences requiring removal for the construction of the planned improvements shall be replaced to near original condition and location or installed as shown on the plans and as specified. Any fences designated to remain but damaged during construction shall be replaced to near original condition at the expense of the Contractor.
  - 1. Salvage all major components from barbed wire/woven wire fences being removed and reuse with the exception of the existing posts, fence clips and wire tie-downs. Barbed wire that is rusted and in poor condition shall be replaced between the nearest posts (wooden). Components not specifically identified for re-use shall be furnished and installed by the Contractor for replacement of fence to original or better condition
  - 2. Chain Link Fence
    - a. Salvage all major components being removed and reuse with the exception of existing post, fence clips and tension wire. Components not specified for reuse shall be furnished and installed by the Contractor for replacement of fence to original condition.
    - b. Installation shall be by experienced fence erectors and shall be placed at location of existing fence unless fence is being relocated. All fencing shall be true to line, tight and straight.
    - c. The Contractor shall take care in dismantling and reconnecting the existing fence to new chain link fence at the corner locations. Any portions of the existing fencing that has become damaged during this operation shall be replaced by the Contractor.
    - d. Fence corner posts shall be set in concrete. No strain shall be placed on the corner posts until concrete has set for at least seven (7) days.

- I. Existing service lines shall be removed as required for new service line construction. Contractor shall maintain existing service lines intact until the new service lines are to be connected to the existing meters. Remove existing angle meter valve and provide new angle meter as specified in Section 02515.
- J. Waterline / Service Line Abandonment
  - 1. The Contractor shall install repair clamps on existing waterlines where shown on the Plans or as specified.
  - 2. All materials, except those determined by the Engineer or Owner to be reusable, shall become property of the Contractor at the place of origin and shall be disposed of by the Contractor in conformance with all laws, regulations and rules legally imposed on such activities.
  - 3. Waterline air release stations shall be abandoned as detailed in the contract drawing.
- K. Contractor shall remove and relocate, where shown on the plans or as required all existing signs, sign posts, reflectors, guard posts and mailboxes that are affected by the placement of the new waterlines. Final locations shall be coordinated with the Engineer or Owner.
- L. Disposal of Materials
  - 1. Salvaged valves, fittings, hydrants and other such fixtures or fittings removed and determined by the Engineer to be reusable, shall be delivered to Owner as directed.
  - 2. All materials, except those determined by the Engineer or Owner to be reusable, shall become property of the Contractor at the place of origin and shall be disposed of by the Contractor in conformance with all laws, regulations and rules legally imposed on such activities.
    - a. Contractor shall make every effort to salvage or recycle construction demolition items and debris as is feasible.
  - 3. Materials shall not be disposed of on City owned or City controlled lands except by written permission of the City, and if so permitted, the materials shall be placed only at such locations and in such manner as the City may direct. Materials may be disposed of on private properties only with written permission of the property owner(s) involved, and with copies of the agreement furnished to the City and Engineer.
- M. Excavations resulting from the removal of structures and/or obstructions shall be backfilled and compacted in accordance with the requirements of Section 02315. Backfill materials shall consist of the type and class designated on the Plans and specified in Section 02315.
- L. All existing ditches damaged by the Contractor by his operations and incidental ditching shall be re-constructed as required as to maintain existing drainages and ditches. The Contractor shall maintain channel width and side slopes of existing conditions.

### PART 4 SPECIAL PROVISIONS

# 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Demolition & Site Preparation shall be made on a lump portions basis for the amount stated on the Bid Form. Payment shall include the removal and/or abandonment of all designated portions of waterlines and appurtenances including fire hydrants, and air release stations as required for the proposed improvements and for the abandonment of or connection to existing waterlines, existing valves and valve covers and those portions of existing waterlines as designated for abandonment. Payment shall also include compensation for the removal of any storm drain piping, catch basins, manholes, and other structures designated for full removal. Contractor shall sequence his work in such a way that no disruption of any existing service or system occurs unless said disruption is approved by the Owner and Engineer.
- B. Payment for Cold Plane / Grind Pavement Removal shall be made on a unit price basis per square yard for the amount stated on the Bid Form for "Cold Plane / Grind Pavement Removal". Payment shall include compensation for all equipment and work necessary to remove, haul, and dispose of existing pavements and cold patch material which are removed by this method, as shown on the Plans or as otherwise directed by the Engineer.
- C. Measurement and Payment for Roadway Section Removal & Replacement shall be made on a unit price basis per square yard for the amount stated on the Bid Form for Roadway Section Removal & Replacement. Payment shall include compensation for all equipment and work necessary to remove, haul, and dispose of existing pavements, concretes and base materials as needed for the placement of new geo-fabric liner, aggregate base material, as required and as specified and shown on the Plans or as otherwise directed by the Engineer. Payment of this item shall also include compensation for the installation of new geo-fabric liner and aggregate base material in preparation for the new AC base courses as required and as specified in the Drawings. Placement of AC pavement shall NOT be included in this item.
- D. Payment for sawcutting as called for in the Drawings, and as necessary for construction of the roadway improvements described herein shall be considered incidental to the work.. Measurement and Payment shall include compensation for all labor, equipment and materials necessary to perform sawcutting of any material, and of any depth. The Contractor shall be responsible for protecting and maintaining the sawcut edges during the course of construction. No compensation will be made to the Contractor for any additional sawcuts as may be required to repair damaged edges.
- E. Payment for end plugs for the abandonment of existing waterlines shall be included in the lump sum price for Demolition & Site Preparation for the amount as stated on the Bid Form.
- F. Payment for abandonment of existing waterline shall be included within the lump sum for the amount stated on the Bid Form for Demolition and Site Preparation.
- G. Payment for the removal, replacement and relocation of existing signs, sign posts, reflectors, guard posts, mailboxes and newspaper boxes shall be included within the lump sum basis for the amount stated on the Bid Form for Demolition and Site Preparation.
- H. Payment for removal and disposal of excavated material from the trench as required for the removal of existing waterlines and appurtenances and backfill shall be included within the lump sum basis for the amount stated on the Bid Form for Demolition and Site Preparation.

- I. Measurement and payment for excavation and disposal of backfill and other preparation of trenches shall be included in the lineal foot cost for Trench Excavation, Bedding and Backfill.
- J. Measurement and payment for AC pavement replacement shall be as specified in Section 02740.
- K. Measurement and payment for concrete replacement shall be as specified in Section 03300.
- L. No additional compensation will be allowed to the Contractor for the handling, removal or disposal of any asbestos-containing pipe encountered during construction, or for any other items required for the demolition and site preparation for a complete installation of this work.

### **END OF SECTION**

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### SECTION 02270 - SLOPE PROTECTION

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This section includes all work necessary for furnishing, placing, and finishing slope protection facilities to the lines, grades, thicknesses and cross sections shown on the Plans or where indicated.
- B. The slope protection methods utilized in this project will include a combination of geosynthetic fabrics overlaid by riprap.

### 1.02 REFERENCES

A. OSS – Oregon Standard Specifications for Construction, 2008 Edition.

#### 1.03 SUBMITTALS

- A. Contractor shall furnish sample of proposed material for visual inspection by Engineer prior to importing to site. This shall include samples of the geosynthetic and the riprap materials to ensure they meet the intentions of the project and these specifications.
- B. Certification of manufacturer's test results as described in OSS, 2008 Edition, Section 02320(c).

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Rock (riprap)
  - 1. Rock shall be angular in shape. The thickness of a single rock shall not be less than one-third its length. Rounded rock will not be acceptable.
  - 2. Rock shall meet the gradation and testing requirements specified in OSS, 2008 Ed., Section 00390.b.
  - 3. Rock shall be free from overburden, spoil, shale and organic material. Nondurable rock, shale, or rock with shale seams will not be acceptable.
- B. Geosynthetics
  - 1. The geosynthetic fabric shall be composed of long chain, synthetic polymeric filaments or yarns formed into a stable network that retains its relative structure during handling, placement, and design service life.
  - 2. At least 95%, by weight, of the long chain polymers shall be polyolefin or polyester.
  - 3. Fabric shall be free of any chemical treatment or coating which might significantly reduce permeability.
  - 4. Fabric shall have the selvage finished so the outer fibers are prevented from pulling away from the fabric or unraveling.

5. The geosynthetic fabric shall meet the property values described in OSS, Ed. 2008, Section 02320.20.

### PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. Sequencing and Scheduling Notify Owner and Engineer 48-hours prior to placement of fabric and riprap to ensure that inspection and oversight can be arranged to confirm methods and quality control.
  - B. Excavate keyway at base of slope to lock slope protection system in and prevent it from sliding or sloughing on slope.
  - C. If required, a field stitching machine will be utilizing to join panels or rolls of fabric together. Machine shall provide a lock-type stitch as recommended by the geosynthetic manufacturer.
  - D. Protect the fabric from damage and deterioration. Prevent chemicals, water, mud, wet concrete, epoxy, and other materials from coming in contact with the fabric.
  - E. Store all geosynthetics in a dry place and off the ground at all times according to ASTM D4873. Cover all geosynthetics with a dark protective covering when received.
  - F. The geosynthetic will be rejected for use if the Engineer determines it has defects or deterioration or if it has been damaged.
  - G. Surface Preparation:
    - 1. Prepare the surface to receive the geotextile fabric by grading it to a smooth condition, free of obstructions, depressions and debris unless otherwise directed. Do not drag the geotextile on the ground to position or damage it in anyway.
    - 2. Loosely place the fabric without wrinkles so placement of the overlying material will not tear the geotextile. Lap or sew the fabric at the ends and sides of adjoining sheets as specified.
    - 3. On slopes, place the geosynthetic with the machine direction oriented up-down the slope. Lap the upper sheets over the lower sheets. When placed on a slope greater than 6V:1H, securely anchor the laps to the ground surface with pins or stakes as necessary to prevent the slippage and tearing of the fabric.
    - 4. Start placement of the riprap fill material at the toe and proceed upward to the top of the slope.
    - 5. Include a minimum overlap of 24-inches from one panel to another.
  - H. Rock (riprap) Installation
    - 1. Contractor shall take care to not puncture, tear, rip, or otherwise damage the fabric when installing riprap.
    - 2. If necessary, the contractor shall utilize an aggregate cushion over the fabric to protect it from the installation of riprap. If used, place according to OSS, Ed. 2008, Section 00350.41 (a-4).

- 3. Drop heights
  - a. For rocks greater than 200 pounds, the drop height shall be zero. Large rocks shall be carefully placed by hand or through the use of heavy equipment with a thumb and bucket to carefully grasp and place materials.
  - b. If an aggregate cushion is used, the drop height for large rocks (greater than 200 pounds) can be 3 feet.
  - c. For rocks less than 200 pounds, the drop height is 3 feet with or without an aggregate cushion.
- 4. Rock shall be placed to the depths, heights, and extents indicated on the plans.
- 5. Rock shall completely cover the geotextile fabric to provide the slope protection and protect the fabric from UV rays. The Contractor shall place rock until the Engineer confirms the area is adequately protected according the plans, details, and these specifications.

### PART 4 SPECIAL PROVISIONS

### 4.01 MEASUREMENT AND PAYMENT

A. Measurement and payment for riprap shall be included as a portion of the lump sum item for 9<sup>th</sup> Street at Ivy Storm Improvements as stated on the bid form. No separate or additional payment will be made for rock riprap.

### END OF SECTION

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#### SECTION 02310 - ROADWAY EXCAVATION

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This work consists of furnishing all labor, materials, incidentals and equipment, as well as performing all work required for Roadway Excavation.
- B. Excavation must be in accordance with ORS 757.541 to 757.571 and all other applicable laws and regulations.
- C. Adhere to rules and recommendations of the Oregon Department of Environmental Quality *Erosion and Sediment Control Manual*, most recent edition.
- D. Excavation of any material encountered regardless of nature, character or condition to the limits shown on the plans. All excavation is unclassified and boulders and solid rock are included as common excavation.

#### 1.02 REFERENCES

- A. Oregon Standard Specifications for Construction (OSS) Latest version of the Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction.
- B. Oregon Department of Environmental Quality (DEQ) *Erosion and Sediment Control Manual,* most recent edition.

#### 1.03 DEFINITIONS

- A. Excavation excavation consists of the removal of all material at site to the limits shown on the Plans or as directed. Excavation shall be classified as either common excavation or rock excavation as specified in Section 02315.
- B. Subgrade Subgrade is defined as the bottom of the excavated area on which the aggregate sub-base is to lay which provides support for the new roadway surface.
- C. Subgrade Foundation Stabilization Subgrade stabilization is defined as removing unsuitable material from the bottom of an excavation as directed by the Engineer, and furnishing, placing and compacting specified material to provide firm foundation and support.
- D. Aggregate base Aggregate base is defined as furnishing, placing and compaction of specified aggregate base for the entire excavated area for the new roadway from the top of the approved subgrade to the bottom of the HMAC surface.

#### PART 2 PRODUCTS

- 2.01 MATERIALS
  - A. 1½"-0 aggregate bases shall meet the requirements as specified in Section 02720 Aggregate Base. This material shall be used as the aggregate sub-base and to provide subgrade stabilization, where required.

- B. 1"-0 or ¾"-0 aggregate bases shall meet the requirements as specified in Section 02720 Aggregate Base. This material shall be used as the aggregate leveling base and base material beneath structures.
- C. Geo-Fabrics shall meet the requirements as specified in Section 02720 Aggregate Base. This material shall be used as the aggregate leveling base and base material beneath structures.

### PART 3 EXECUTION

### 3.01 GENERAL

- A. Remove, haul, and dispose of all formations and materials, natural or man-made, irrespective of nature or conditions encountered, within lines and grades shown on the Plans or defined herein, and as necessary for completion of the proposed improvements. The method of excavation shall be as determined by the Contractor, and as required for special protection of existing improvements. Special care shall be taken to avoid over excavation below the planned subgrade elevation. Store and protect materials suitable for use as fill where applicable. Clearing and Grubbing and Removal of Structures and Obstructions to be completed prior to excavation.
- B. When the precise location of subsurface structures and/or utilities is unknown, locate such items by hand excavation prior to utilizing mechanical excavation equipment. Use hand excavation when mechanical equipment might damage existing improvements which are to remain undisturbed. See Division 1 for other requirements.
- C. Adjustment to the roadway subsurface lines and grades as shown may be required based on the existing subsurface condition.
- D. Adjustment to the cut slopes for roadway excavation may be required based on soil conditions encountered. Special care shall be taken to avoid damage to existing facilities, trees, and root balls at top of cut, steepen cuts as required to protect trees at top of cut.
- E. Shoring and Bracing
  - 1. Sheet and brace excavation as necessary to prevent caving and to protect adjacent structures, property, workers and the public.
  - 2. All sheeting, shoring and bracing shall conform to safety requirements of OSHA and other Federal, State and local agencies.
- F. Dewatering
  - 1. Furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during digging and initial backfilling. Dispose of water in such a manner as to prevent damage to public or private property, or nuisance, or menace to the public.
  - 2. At all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage. Have available, at all times, competent workers for operation of the equipment.
  - Control surface runoff to prevent entry or collection of water within excavations. All excavations shall be kept free of water during placement of backfill and/or concrete placement.

4. Comply with all laws regarding storm water runoff, protection of natural resources, and other applicable laws and regulations.

### 3.02 EXCAVATION

- A. Once the existing topsoil, AC pavements and other materials designated for removal have been stripped away and removed. Excavate to the lines and grades shown on the project Plans, allowing for forms, shoring, working space and the required thickness of specified backfill. The bottom of the excavation shall not be more than 0.10 feet below or above the lines and grades as shown or required. Unless otherwise specified or shown on the Plans, excavations shall extend a sufficient distance from walls and footing to allow for placing and removal of forms and for inspections, except where concrete is specified to be placed directly against specified surfaces.
- B. Final excavation beneath the roadway shall be completed using an excavator equipped with a smooth-edged bucket to minimize subgrade disturbance. Loose or disturbed material shall be removed prior to placement of aggregate base material. A smooth excavation may not be practical due to the presence of rock fragments. Well embedded, protruding rock fragments may be left in the bottom of the excavation. All suitable excavation from the roadway and utility construction may be used as embankment fill beneath the new roadway or for filling low lying areas adjacent to the roadway.
- C. Trench as required, during initial excavation if possible, for placement of subsurface piping.

### 3.03 OVER EXCAVATION / SUBGRADE STABILIZATION

A. Over excavation and foundation stabilization shall be required where soil is encountered extending below the planned subgrade elevation beneath the roadway or where soft or unsuitable soil is encountered beneath utility trenches. The Engineer will determine if over excavation is required.

### 3.04 DISPOSAL OF EXCESS MATERIALS

A. Excavated materials not suitable or required for backfill shall be hauled away and disposed of on approved sites arranged by the Contractor. No site shall be used for disposal of materials without written approval of the property owner. All costs associated with the hauling and disposal of materials shall be borne by the Contractor. The Contractor shall be entitled to any proceeds received from the sale of excess materials.

#### 3.05 AGGREGATE BASE MATERIAL

- A. Placement of aggregate base materials shall be as specified in Section 02720 Aggregate Base.
- B. Where soil is encountered at the subgrade elevation for the roadway improvements, provide a Separation Geotextile beneath the Aggregate Base and native subgrade. The Separation Geotextile shall be placed smooth and without wrinkles or folds in the direction of filling with a minimum 2-foot overlaps between adjacent rolls. The Separation Geotextile shall be placed in such a manner as not to separate the required overlap. The Separation Geotextile may be deleted where siltstone or other stable material is encountered at the subgrade elevation.
- C. See Section 02321 for compaction testing requirements during backfilling operations.

### 3.06 INSPECTION

A. Contractor shall notify Engineer not less than 48 hours prior to required inspections. Required geotechnical inspections shall not be waived and work shall not proceed until inspection has been completed and the Contractor has been authorized to proceed by the Engineer.

### PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Measurement and Payment for Roadway Excavation shall be considered incidental to the work no separate payment will be made for Roadway Excavation and shall include all excavation, grading, placement of existing excavated materials, over-excavation where shown for placement of fill material, cleanup, compaction, testing and disposal of excess excavated materials from the project site.
- B. Payment for Aggregate Bases shall be made in accordance to Section 02720.
- C. Payment for Asphalt Concrete pavement shall be made in accordance with Section 02740.
- D. Payment for Foundation Stabilization and Dewatering shall be made in accordance with Section 02315.

### END OF SECTION

### SECTION 02315 - TRENCH EXCAVATION, BEDDING, & BACKFILL

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This work consists of furnishing all labor, materials, incidentals and equipment, as well as performing all work required for excavation, foundation stabilization, pipe bedding, pipe zone material, trench backfill, compaction, final grading, hauling and disposal of material resulting from the construction of utility piping, and all related appurtenances. Included also is the locating and protecting of existing utilities and other improvements (see Division 1), shoring, and bracing, excepting only such work as is covered and included under other sections of this Division, or other Divisions of these Contract Documents.
- B. Excavation must be in accordance with ORS 757.541 to 757.571 and all other applicable laws and regulations.

#### 1.02 REFERENCES

A. All work shall conform to the latest version of the Oregon Standard Specifications (OSS), except as specified herein and shown on the Plans.

#### 1.03 DEFINITIONS

- A. Trench Excavation Trench excavation consists of the removal of all material encountered in the trench to the limits shown on the Plans or as directed. Trench excavation shall be classified as either common excavation or rock excavation.
  - 1. Common excavation is defined as the removal of all material as required to complete the planned improvements, regardless of type, nature or condition of materials encountered, except that which is designated as rock excavation.
  - 2. Rock excavation is defined as the removal of boulders composed of igneous, sedimentary or metamorphic stone material which have a least dimension of 36-inches or more, or a displacement of one cubic yard or more; or the removal of solid ledge rock which, in the opinion of the Engineer, requires for its removal drilling and blasting, wedging, sledging, barring or breaking with power operated tools.
    - a. No soft or disintegrated rock; hard-pan or cemented gravel that can be removed with a hand pick or power operated excavator or shovel; no loose, shaken, or previously blasted rock or broken stone in rock fillings or elsewhere; and no rock outside of the minimum limits of measurement allowed, which may fall into the excavation, will be measured or allowed.
    - b. When solid rock layers have an overburden of non-rock material (common material) which cannot practically be stripped and handled separately, and/or when solid rock is interspersed with non-rock material, the entire mass will be classified as solid rock if the actual solid rock fraction exceeds 85% of the entire volume.
- B. Trench Foundation Trench foundation is defined as the bottom of the trench on which the pipe bedding is to lay and which provides support for the pipe.

- C. Foundation Stabilization Foundation stabilization is defined as the furnishing, placing and compacting of specified materials for any unsuitable material removed from the bottom of an excavation, as directed by the Engineer, to provide a firm trench foundation.
- D. Rip-Rap Slope Protection Rip-rap slope protection is defined as the furnishing and placement of the specified material as an embankment or channel slope protection on exposed sloes or channels for slope protection and erosion control applications.
- E. Pipe Bedding Pipe bedding is defined as the furnishing, placing and compacting of specified materials on the trench foundation so as to uniformly support the barrel of the pipe. The total bedding depth shall be as shown on the Contract Drawings.
- F. Pipe Zone Pipe zone is defined as the furnishing, placing and compacting of specified materials for the full width of the trench and extending from the top of the bedding to a level above the top outside surface of the barrel of the pipe as shown on the Contract Drawings.
- G. Trench Backfill Trench backfill is defined as the furnishing, placing and compacting of material in the trench extending from the top of the pipe zone to the bottom of pavement base, ground surface or surface material. Plans generally show locations for each type of backfill class.
- H. Drain Rock Drain rock is defined as the furnishing, placing and compacting of specified free draining material for the full width of the drain trench (perforated pipe drains) and extending to a level as specified above the top outside surface of the pipe barrel.

### 1.04 SUBMITTALS

- A. Certifications, test results, source, and samples for all imported material proposed to be used in the work. Samples of materials to be used shall be submitted 2 weeks in advance of use. Samples shall consist of 0.5 cubic feet of each type of material. Samples of Class E material are not required.
- B. Samples shall be tagged with the following information:
  - 1. Pit name and location.
  - 2. Stockpile name and location, if different than the pit.
  - 3. Recent sieve analysis of the proposed material. Statement from the Contractor or supplier that the proposed material conforms to the specifications of this project.
- C. Drawings, tabular product data, and method of installation and removal of all sheeting, sheet piling, shoring, and bracing.
- D. ODOT form 734-3468 (10-2015) or approved equal must be filled out for each material used
  - 1. Testing shall show AASHTO T-99 testing or as required elsewhere in spacifications.
  - 2. Testing must have taken place no longer than 14 days prior to engineer receiving submittal.
  - 3. Testing and form must be filled out by third party organization with CEBT technician.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Trench Foundation The trench foundation shall be undisturbed native material when suitable. Where ground water or other unstable conditions exist and the native material cannot properly support the pipe, additional excavation may be required. The trench shall be stabilized with foundation stabilization material when such conditions are present in the opinion of the Engineer.
- B. Foundation Stabilization Foundation Stabilization: 1<sup>1</sup>/<sub>2</sub>"-0 or 2"-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater or is unsuitable to provide a firm foundation in the opinion of the Engineer.
- C. Rip Rap Slope Protection Material for Rip Rap Slop Protection shall be 6"-0 stone embankment material meeting the requirements of OSS 00330.16 and shall be an unweathered, hard, angular, durable free draining material, visibly well graded from course to fine.
- D. Pipe Bedding Material for pipe bedding shall be clean, hard, sound, durable, wellgraded, <sup>3</sup>/<sub>4</sub>"-0 crushed rock, free from organic matter. Engineer must approve material prior to use.
- E. Pipe Zone Material for pipe zone shall be the same material used for bedding.
- F. Trench Backfill

Trench backfill shall be Class B as shown on the Plans or specified herein. Class B backfill shall be required for all trenches located under paved surfaces and where shown on the Plans. Class B backfill shall be brought up to finish grades where it is located within gravel roads or areas to be graveled. Backfill shall not be placed in the trench in such a way as to permit free fall of the material until at least two feet of cover is provided over the top of the pipe. Backfill shall be placed and compacted in layers as specified in Table A, unless otherwise specified or shown.

- Class "A" Backfill: Native or common excavated material, free from organic or other deleterious material, free from rock larger than 3-inches, and which meets the characteristics required for the specific surface loading or other criteria of the backfill zone in the opinion of the Engineer. If stockpiled material becomes saturated or unsuitable, Class B, C or D Backfill shall be substituted. Engineer must approve material prior to use.
- 2. Class "B" Backfill: <sup>3</sup>/<sub>4</sub>"-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.
- 3. Class "C" Backfill: Clean sand with no particles larger than <sup>1</sup>/<sub>4</sub>-inch.
- 4. Class "D" Backfill: Pit run or bar run material, well graded from coarse to fine, with maximum aggregate size of 3 inches.
- 5. Class "E" Backfill (CLSM or CDF): Controlled Low-Strength Material (cement slurry) conforming to OSS Section 00442.

a. Slurry shall consist of a highly flowable lean concrete mix; mixture of Portland cement, fly ash, fine aggregates, water and admixtures as required for a mixture that results in a hardened, dense, non-settling, hand excavatable fill.

# PART 3 EXECUTION

### 3.01 GENERAL

- A. Remove, haul, and dispose of all formations and materials, natural or man-made, irrespective of nature or conditions encountered, within lines and grades shown on the Plans or defined herein, and as necessary for completion of the proposed improvements. The method of excavation shall be as determined by the Contractor, and as required for special protection of existing improvements. Special care shall be taken to avoid over excavation below subgrades. Store and protect materials suitable for use as backfill where applicable. Clearing & Grubbing and Removal of Structures and Obstructions to be completed prior to excavation.
- B. Coordinate and provide all utility locates prior to any excavation as required by local state and federal laws and regulations. When the precise location of subsurface structures and/or utilities is unknown, locate such items by hand excavation prior to utilizing mechanical excavation equipment. Use hand excavation when mechanical equipment might damage existing improvements which are to remain undisturbed. See Division 1 for other requirements.
- C. Incidental to excavation shall be the furnishing, installing and removal of all shoring, sheeting, bracing as required to support adjacent earth banks and structures, keep excavations free from water, and to provide for the safety of the public and all personnel working in excavations.

### 3.02 EXCAVATION

- A. Excavate to the lines and grades shown on the project Plans, allowing for forms, shoring, working space and gravel base. Provide a minimum clearance around pipe barrel in all directions or greater in accordance with the standard trench detail drawing.
- B. Shoring and Bracing
  - 1. Sheet and brace excavation as necessary to prevent caving and to protect adjacent structures, property, workers and the public.
  - 2. The design, planning, installation and removal of all sheeting, shoring, sheet piling, lagging and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soil below and adjacent to the excavation.
  - 3. Horizontal strutting below the barrel of a pipe and the use of pipe as support are not acceptable.
  - 4. All sheeting, shoring and bracing shall conform to safety requirements of OSHA and other Federal, State and local agencies.
- C. Dewatering
  - 1. Furnish, install and operate all necessary machinery, appliances and equipment to keep excavations free from water during digging and initial backfilling.

Dispose of water in such a manner as to prevent damage to public or private property, or nuisance or menace to the public.

- 2. At all times have on hand sufficient pumping equipment and machinery in good working condition for all ordinary emergencies, including power outage. Have available, at all times, competent workers for operation of the equipment.
- Control surface runoff to prevent entry or collection of water within excavations. All excavations shall be kept free of water during placement of backfill and/or concrete placement.
- 4. Comply with all laws regarding stormwater runoff, protection of natural resources, and other applicable laws and regulations.

### 3.03 FOUNDATION STABILIZATION

3.04 The contractor shall over excavate the trench to firm undisturbed soils or rock when, in the opinion of the Engineer, the trench foundation materials are not suitable for the support of the pipe. Foundation Stabilization materials, as specified, shall be placed and compacted in lifts not exceeding 6-inches in compacted thickness to the required grade. Each lift shall be compacted to at least 95% of the maximum dry density in accordance with ASTM D698.

### 3.05 RIP RAP SLOPE PROTECTION

A. Remove any brush, trees, stumps and other organic material from slopes and channels to be protected by rip rap and dress to a smooth surface. Remove all unsuitable material to the depth as shown or as directed and replace with approved material.

#### 3.06 DISPOSAL OF EXCESS MATERIALS

A. Excavated materials not suitable or required for backfill shall be hauled away and disposed of on approved sites arranged by the Contractor. No site shall be used for disposal of materials without written approval of the property owner. All costs associated with the hauling and disposal of materials shall be borne by the Contractor. The Contractor shall be entitled to any proceeds received from the sale of excess materials.

### 3.07 TEMPORARY STOCKPILING

- A. Place excavated materials suitable for use as backfill (and not excess material) only within construction easements, right-of-way, or approved work area. Stockpiles shall be placed in such manner as to provide the minimum inconvenience to the public.
- B. The Contractor shall obtain written permission from any property owners prior to placement of stockpiles on private property. Provide copies to the Owner and Engineer. Remove stockpiles as soon as possible and restore sites to affected property owners' satisfaction.
- C. Access to all fire hydrants, water valves and meters shall be maintained. Stockpiles shall not be permitted to block any stormwater drainage ditches, gutters, drain inlets, culverts or natural water courses.
- D. Protect stockpiled material which is to be later incorporated into the work so that excessive wetting or drying of the material does not occur. Material shall be brought to near optimum moisture content prior to placement and compaction. Depending on the moisture content of stockpiled materials, necessary processing may include aeration,

mixing and/or wetting. No additional payment will be allowed for protecting or preparing native backfill materials.

- E. If approved native materials become unsuitable (too wet or mixed with unsuitable materials) due to negligence by the Contractor, then imported granular materials may be required for backfilling at the subject location at no additional cost to the Owner.
- F. Comply with all requirements of the 1200-C Construction Stormwater Permit. Provide necessary protection for stockpiled materials so that silt-laden runoff does not occur during rain events and to prevent wind-blown dust from stockpiles.
- 3.08 PIPE ZONE AND TRENCH BACKFILL
  - A. Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to at least 95% of the maximum dry density in accordance with ASTM D698.
  - B. Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content.
  - C. Contractor shall backfill the trench above the pipe zone in successive lifts not exceeding 12-inches in loose thickness. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Each lift shall be compacted, using suitable mechanical or pneumatic equipment, to a minimum of 95% of the maximum dry density as determined by ASTM D698. If the specified compaction is not obtained, the Contractor may be required to use a modified compaction procedure and/or reduce the thickness of lifts. If approved materials meeting the specifications cannot be compacted to the required density regardless of compactive effort or method, the Engineer may reduce the required density or direct that alternate materials be used. In no case shall excavation and pipe laying operations proceed until the Contractor is able to compact the backfill to the satisfaction of the Engineer.
  - D. CLSM. When CLSM Backfill is required, backfill above pipe zone with CLSM material. If the CLSM is to be used as a temporary surfacing, backfill to top of the trench and strike off to provide a smooth surface. If CLSM is not to be used as a temporary surface, backfill to bottom of the proposed resurfacing. Use steel plates to protect the CLSM from traffic a minimum of 24 hours.
  - E. When backfilling is complete, the Contractor shall finish the surface area as specified. In paved or graveled areas the Contractor shall maintain the surface of the trench backfill level with existing adjacent grades with <sup>3</sup>/<sub>4</sub>"-0 crushed rock until pavement replacement is completed and accepted by Owner.

# PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Trench Excavation, Bedding & Backfill shall be included within a portion of the unit amount for waterline and fittings as outlined in Section 02510. A separate payment will not be made for these items.
A. Payment for Foundation Stabilization will be made on a cubic yard basis. Measurement shall be based on the in-place volume of material excavated, placed and compacted below the pipe bedding material, within the pay limits defined on the Contract Drawings, and shall be approved by the Engineer. Payment shall include all excavation, removal and disposal of existing materials excavated and placement of new foundation material.

## SECTION 02321 – COMPACTION TESTING

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. The Contractor shall retain and pay for the service of an approved, recognized independent testing laboratory to conduct laboratory tests on materials and field testing to determine the relative compaction of trench backfill, subgrades, embankments, gravel surfacing, aggregate base and asphalt concrete pavement, as indicated. The approved Testing Agency shall recommend methods of compaction to Contractor and issue final report to the Owner, through the Engineer, regarding compaction testing results and material compliance with the specifications.
- B. These specifications call for field compaction efforts to achieve a specified relative compaction for each of the indicated classes of backfill. Determination of in-place density shall be made by means of non-destructive nuclear probe method testing in accordance with ASTM D2922-01 and ASTM D3017-01 test methods.

#### 1.02 DEFINITIONS

Relative Compaction -- The ratio, expressed as a percentage, of the in-place density of the Engineered fill material to the maximum density of the same material as determined by the ASTM D698 Standard Test Method.

#### PART 2 PRODUCTS

- 2.01 APPROVED TESTING AGENCIES
  - A. Foundation Engineering; 820 N.W. Cornell Ave; Corvallis, OR 97330; (541) 757-7645
  - B. Professional Service Industries (PSI); 1040-A Shelly Street, Springfield, Oregon 97477; (541)746-9649.
  - C. Carlson Testing, Inc.; 4060 Hudson Ave. NE; Salem, Oregon 97301 (503)589-1252
  - D. Other certified private testing laboratory(s) as approved by Engineer.

#### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Field Testing for Pipeline Construction
  - 1. Testing to determine the relative compaction of materials placed and compacted by the Contractor shall be performed a short distance behind construction. Tests shall be taken on each lift of the material prior to placement of the succeeding lift to ensure proper compaction is obtained. The Testing Agency shall perform testing at such locations and elevations as to be representative of the entire material and area being compacted. The Engineer shall have authority to require testing at times and locations he deems necessary.
  - 2. A sufficient number of density tests shall be taken on the first section of subgrade and trench backfill placed by the Contractor to establish the effectiveness of the Contractor's compactive efforts. If tests indicate that the specified relative

compaction for a given material is not being achieved, the Contractor shall modify compaction methods and recompact all placed material in order to obtain the specified results.

- 3. A minimum of three (3) tests will be required at each 100' interval along the alignment. Tests locations shall be such as to provide an accurate depiction of compaction efforts vertically. It is estimated that the following number of site visits will be required:
  - a. Each compacted 18 vertical inches at every 100' interval along the alignment.
  - b. Foundation of each new structure.
  - c. Additional site visits or tests may be required to prove Contractor is meeting compaction requirements or as requested by the Owner or the Engineer.
- B. Failing Tests For areas failing to meet the specified compaction, the Contractor shall be responsible to perform all additional work necessary to achieve specified compaction at no additional cost to the Owner. Additional work may include further compactive effort, moisture treatment, other compaction methods, removal and replacement of failing materials, or other processes required to obtain the specified results.
- C. Any subsequent settlement of backfilled areas during the one-year warranty period shall be considered to be the result of insufficient compaction, and shall be promptly repaired by the Contractor at no additional cost to the Owner.
- D. The Contractor shall not be allowed any additional compensation for down time incurred as a result of compaction testing or waiting for test results.

## PART 4 SPECIAL PROVISIONS

## 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Compaction Tests shall be included within the unit prices for aggregate base rock, asphalt concrete pavement and other associated items relative to the project. The price shall include compensation for all costs associated with compaction testing, including sampling, laboratory testing, field testing, administration, and all other work required to obtain certification of backfills placed under this Contract for each type of pipe as shown in the Bid Form.
  - 1. Only Compaction Tests with results meeting the requirements of these Specifications will be accepted. All costs associated with or arising from additional work required due to failing compaction test results, including removal and replacement of material, shall be borne by the Contractor.
  - 2. Contractor must submit invoice from Testing Agency clearly identifying Project, location and date of testing, material tested, test method, test results, specified compaction, maximum dry density of material tested, and number of tests taken. Only tests directed by the Engineer and which obtain passing results will be paid for.

## SECTION 02370 - EROSION CONTROL

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This section shall include direction and requirements on erosion control for the project. The section should not, however, be considered a comprehensive directive on what erosion control measures will be required on the project. This could vary depending on weather conditions, contractor approach to the work, regulatory agency interaction and requirements, and other factors. The sections should be considered as a general guideline on erosion control issues.
- B. The Contractor shall protect adjacent properties and water resources from erosion and sediment damage throughout the life of the contract in accordance with the ECP described later in this Section.
- C. The Contractor shall comply with all local, state and federal requirements for erosion control including the National Pollutant Discharge Elimination System (NPDES) 1200C Permit if applicable to the project. The Contractor shall be responsible for obtaining said permit and abiding by the requirements of the agencies.

#### 1.02 SUBMITTALS

- A. The Contractor shall submit an erosion control plan (ECP) to the Engineer. The ECP shall incorporate any requirements outlined in the specifications and plans along with additional requirements from DEQ as communicated through the 1200-C permitting process. The ECP will include, at a minimum, the following elements:
  - 1. Narrative site description
  - 2. Site map outlining all areas of development, drainage patters, areas of planned soil disturbance, areas for storage of soils or waste, boundaries of the 100-year flood plain, ordinary high water, location of storm drain outfalls or features, etc.
  - 3. Erosion control features including BMP and procedures for prevention, runoff control, and sediment control.

#### 1.03 RELATED SECTIONS

- A. Section 02240- Control of Water
- B. Section 02260 Shoring and Bracing
- C. Section 02316 Excavation and Backfill
- D. Section 02320 Bypass Pumping
- E. Section 02315 Trench Excavation, Bedding, and Backfill
- F. Section 02900 Site Cleanup and Landscape Restoration

## PART 2 PRODUCTS

- 2.01 Erosion Control Products the following products are samples of materials and systems that could be utilized by the Contractor for Erosion control. They do not, however, represent a complete list or requirements for the project.
  - A. Plastic sheeting: minimum 6 mil thick, polyethylene plastic sheeting for slope protection, spoils pile coverage, and protection of storage and materials.
  - B. Chemical dust control: non-toxic material that will have no adverse effect on soil structure or establishment and growth of vegetation. Potential products include:
    - 1. Liquid stabilizer emulsion: a tackifier of liquid and polyvinyl polymers with emulsion resins containing not less than 55% total solids by weight. Do not use tackifiers containing polyacrylates or polyvinyl acrylics.
    - 2. Dry powder tackifier: A tackifier consisting of one or more active hydrocolloids from natural plant sources which hydrates in water and blends with other slurry materials, and upon application and drying tacks the slurry particles to the soil surface.
    - 3. Calcium chloride and water for dust control
  - C. Temporary Mulching: loose hay, straw, netting, wood cellulose, or agriculture silage.
  - D. Matting or blankets: by American Excelsior or approved equal.
  - E. Sediment Fencing: fending that includes a geotextile fabric to screen and hold sediments. Sediment fencing to be capable of supporting its own weight and sediments. Wooden or metal posts shall support the fencing with wire mesh, if required, for additional strength.
  - F. Bio-filter Bags: Prefabricated bags made from geotextile with filter inserts of biological materials or filtration media manufactured specifically for collecting sediment in drainage inlets or channels.
  - G. Straw Bales: Standard 45 to 65 pound rectangular straw bales that are wire bound or string tied.
  - H. Sand Bags
  - I. Quick growing grasses for temporary seeding.
  - J. Rip rap for slopes, culvert, storm drain inlets and outlet aprons.

#### PART 3 EXECUTION

- 3.01 PREPARATION
  - A. Contractor to review and carry out the requirements ECP and permit conditions obtained by them through the 1200-C permitting process.
  - B. Any changes to the ECP should be brought to the attention of the Engineer. A copy of the ECP and approved 1200-C permit must be submitted to Engineer before beginning and site work on the project.

## PART 4 SPECIAL PROVISIONS

## 4.01 MEASUREMENT AND PAYMENT

A. Payment for work in this section shall be included in the lump sum item as stated on the bid form for Construction Facilities & Temporary Controls. No separate payment will be made.

## SECTION 02510 - WATER DISTRIBUTION PIPING

#### PART 1 GENERAL

#### 1.01 SUMMARY

A. This work consists of furnishing all labor, materials, incidentals and equipment, and performing all work for the furnishing, installation and testing of waterlines required for the completion of the proposed improvements. Valves, hydrants and other fittings and appurtenances shall be as specified in Section 02515.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. 4" 12" Polyvinyl Chloride (C.I.O.D. PVC)
  - Rigid PVC pipe, 4-inch through 12-inch nominal diameter, shall be made from quality PVC resin compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM D1784. Pipe shall be designated for use as water supply and distribution pressure pipe, and shall conform to the outside diameters of cast iron pipe. Pipe furnished shall be Pressure Class 235 (DR 18) conforming to all requirements of AWWA C900, Polyvinyl Chloride Pressure Pipe.
  - 2. Pipe shall be furnished in 20-foot laying lengths with integral wall-thickened bell ends. The bell shall consist of an integral wall section with a bonded-in elastomeric gasket manufactured in conformance with the requirements of ASTM F477. Gaskets shall be Rieber type to resist rolling during installation. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C900 and ASTM D3139.
    - a. A non-toxic vegetable soap lubricant shall be supplied by the pipe manufacturer with pipe.
    - b. Pipe shall be as manufactured by JM Eagle, CertainTeed, North American Pipe Corp, or approved equal.
- B. 14" and larger Polyvinyl Chloride (C.I.O.D. PVC)
  - Rigid PVC pipe, 14-inch and larger nominal diameter, shall be made from quality PVC resin compounded to provide physical and mechanical properties that equal or exceed cell class 12454 as defined in ASTM D1784. Pipe shall be designated for use as water supply and distribution pressure pipe, and shall conform to the outside diameters of cast iron pipe. Pipe furnished shall be Pressure Class 235 (DR18) conforming to all requirements of AWWA C905, Polyvinyl Chloride Pressure Pipe.
  - 2. Pipe shall be furnished in 20-foot laying lengths with integral wall-thickened bell ends. The bell shall consist of an integral wall section with a bonded-in elastomeric gasket manufactured in conformance with the requirements of ASTM F477. Gaskets shall be Rieber type to resist rolling during installation. The bell section shall be designed to be at least as hydrostatically strong as the pipe wall and meet the requirements of AWWA C905 and ASTM D3139.

- a. A non-toxic vegetable soap lubricant shall be supplied by the pipe manufacturer with pipe.
- b. Pipe shall be as manufactured by JM Eagle, CertainTeed, North American Pipe Corp, or approved equal.
- C. Buried Solvent Weld PVC Pipe Buried rigid PVC pipe shall be Schedule 40 solvent weld pressure pipe, conforming to ASTM D1785. PVC material shall consist of Type I, Grade I compound, Cell classification 12454-B per ASTM D1784. Pipe shall be as manufactured by Harvel Plastics, Inc., JM Eagle, or approved equal.
- D. Exposed ½" 6" Solvent Weld PVC Pipe Exposed rigid PVC pipe, ½-inch through 6inch nominal diameter, shall be Schedule 80 solvent weld pressure pipe, conforming to ASTM D1785. PVC material shall consist of Type I, Grade I compound, Cell classification 12454-B per ASTM D1784. Pipe shall be as manufactured by Harvel Plastics, Inc., JM Eagle, or approved equal.
- E. 4" And Larger High Density Polyethylene (HDPE) Pipe
  - Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710 high density polyethylene meeting ASTM D 3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be Listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. Color material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E.
  - 2. The material shall be listed and approved for potable water in accordance with NSF/ANSI 61. The pipe shall meet the requirements of AWWA C906.
  - 3. Pipe shall be DR11, Pressure Class 200 minimum, IPS Size, and shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS) and shall be of standard pipe lengths (40 or 50 foot).
  - 4. HDPE pipe shall be DriscoPlex 4100 IPS HDPE pipe; Isco industries or approved equal.
  - 5. Pipe shall be provided with a continuous mark made of durable printing containing the following:
    - a. Name and/or trademark of pipe manufacture, nominal pipe size and dimension ratio.
    - b. The manufacturing standard reference ASTM F714 and polyethylene grade per ASTM D3350.
- F. 4" 16" Ductile Iron Pipe Ductile iron pipe shall be Class 52 minimum thickness, conforming to ANSI/AWWA C151/A21.51 under method of design outlined in ANSI/AWWA C150/A21.50. Pipe shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. External pipe coating shall be an asphaltic coating in accordance with ANSI/AWWA C151/A21.51. Use only where shown.
- G. <sup>1</sup>/<sub>2</sub>" 3" High Density Polyethylene (HDPE) Pipe as specified in Section 02515.
- H. Restrained Joint Piping Where Plans call for Restrained Joints, all joints within the designated area shall be formally restrained with mechanical restraints designed for pipe restraint. CertainTeed Certa-Lok C900/RJ or restraint harness at regular slip-on joints

rated at full pressure of pipe such as EBAA Iron Series 1900. Joints at fittings shall be restrained using MEGALUG or approved equal.

- I. All water pipe materials shall be NSF approved for use in potable water systems, and shall be UL listed and FM approved.
- J. Fusible Polyvinylchloride C900 & C905 Pipe
  - 1. Fusible polyvinylchloride pipe shall conform to AWWA C900, AWWA C905, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.
  - 2. Pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
  - 3. Pipe shall be manufactured in a standard 40' nominal length, or custom lengths as specified and shall be blue in color for potable water use.
  - 4. Pipe shall be marked as follows:
    - a. Name and/ or trademark of pipe manufacture, nominal pipe size and dimension ratio.
  - 5. Pipe shall be as manufactured by Underground Solutions, Inc.

## PART 3 EXECUTION

- 3.01 GENERAL
  - A. Materials shall not be distributed on the job faster than can be used to good advantage. Sites shall be maintained clean and safe at all times. The Contractor shall supply all necessary signing and flagging to provide for a safe working environment.
  - B. Remove from the job site material which, according to the judgment of the Engineer, is damaged beyond repair or otherwise has been rejected. Payment will not be made for damaged or rejected materials, their removal, or for repairs to such materials.
  - C. Excavate and prepare trench as specified in Section 02315. Place any required foundation stabilization and compact pipe bedding prior to laying pipe.

#### 3.02 PIPE INSTALLATION

- A. PVC pipe shall be installed and handled in accordance with the JM Eagle Blue Brute Installation Guide, the Uni-Bell Uni-PUB-09, and these specifications. The Contractor shall have on site all proper tools and equipment to properly and safely install the pipe.
- B. Properly prepare trench and trench bedding. Do not construct trench in a manner which requires bending of the pipe. Utilize fittings rather than bending pipe.
- C. Provide concrete thrust blocking at all bends, valves, tees and other fittings in accordance with the Plans, as required to prevent movement due to thrust.
- D. Prior to lowering pipe into the trench, the Engineer will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.

- E. Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipe at all times. When pipe laying is not in progress, cover the exposed end of the pipe using a watertight expanding plug, or by other approved means to prevent entry of trench water or other foreign materials into the pipe.
- F. Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the Engineer.
- G. At no time shall pipe be deflected, either in the vertical or horizontal plane, in excess of the maximum deflection recommended by the pipe manufacturer. Maximum deviation from grade shall not exceed ½-inch. No deflection is allowed at push-on joints.
- H. Where new water pipe is installed near existing or new sanitary sewer lines, all provisions of current OAR 333-61-050 (Crossings Sanitary sewers and waterlines), regarding placement of pipe near, under, or over sanitary sewer lines shall be followed.
- I. When existing water service lines are in direct conflict with the new waterline improvements and appurtenances and minor field revisions in the alignment and grade of the new improvements cannot avoid direct conflict then existing service lines shall be temporarily adjusted to allow for the proposed improvements.
- J. Existing driveway culvert pipes or other drainage structures that are removed for ease of construction shall be replaced with the same pipe size without additional cost to the Owner. Existing pipe may be reused if not damaged and approved by the Engineer.
- K. Cutting of pavement for service line placement shall be kept to a minimum; Contractor shall minimize impact to existing roadway surfaces. All 1-inch service lines shall be pushed under existing pavements. Exceptions must be approved by the Engineer.
- L. Pipe Jointing
  - 1. Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with NSF approved pipe lubricant, as recommended by the manufacturer.
  - 2. Furnish the gaskets required for the joint being assembled. Install the gasket with uniform tension around the joint groove before placing the pipe in the trench.
  - 3. Solvent weld joints shall be installed according to ASTM D2855-90.
  - 4. No deflection is allowed at pipe joints.

## 3.03 HDPE PIPE INSTALLATION

- A. Fusion
  - 1. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the

tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.

- 2. Mechanical joining will be used where the butt fusion method cannot be used. Mechanical joining will be accomplished by either using a HDPE flange adapter with a Ductile Iron back-up ring or HDPE Mechanical Joint adapter with a Ductile Iron back-up ring. Method of mechanical joining shall be as indicated on the Plans.
- 3. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.
- B. Inspection Inspect the pipe for defects before installation and fusion. Defective, damaged or unsound pipe will be rejected.

### 3.04 FILLING AND FLUSHING

- A. After installation of water piping, fill pipes slowly while venting all air. Fill with potable water at a maximum rate to maintain 2 fps or less. Take all required precautions to prevent entrapping air in the pipes. Flush all sections of pipe to remove any solids or material that may be in the pipe. If no hydrant is installed at the end of the main, provide a tap large enough to develop sufficient flow rates to achieve a velocity between 3 to 5 feet per second in the main. Control and dispose flushing water in a proper manner to avoid erosion, flooding, property damage, and discharge of chlorinated water in an unacceptable manner.
- B. All waterlines shall be flushed as specified herein as to remove any foreign material. The contractor shall provide all fittings and backflow preventions as required to perform the flushing.
- C. In addition to flushing, all waterlines six (6) inches and larger the Contractor may elect to "Pig" the waterlines as specified herein to remove any foreign mater.
  - 1. "Pigging" shall be accomplished prior to hydrostatic testing and disinfection.
  - 2. A minimum of three (3) pigs shall be flushed through the waterlines. The Contractor has the option of running all three pigs at the same time or running the pigs one at a time. Identify individual pigs if all three pigs are to be ran simultaneously.
  - 3. Pigs shall be polyurethane form as manufactured by Knapp Poly Pig, Inc. or as approved by Engineer.
  - 4. It shall be the responsibility of the Contractor to flush the pigs through the waterlines and retrieving pigs after the test. If one or more pigs fails to run the complete length of the waterline, Contractor shall be responsible for retrieving the pigs and repeating the test.
  - 5. Contractor shall provide erosion control as required to prevent damage to surrounding vegetation and existing ground.
  - 6. The Contractor shall re-pig the waterlines as required if after pigging and disinfection of the treated waterlines, the bacteriological test fails.

- 7. Contractor shall notify Engineer and Owner a minimum of 24-hours prior to pigging the waterlines. Engineer can require waterlines to be re-pigged if excessive foreign material is encountered during pigging.
- 8. The contractor shall be required to temporarily remove and replace any reducers, pipe spools and fittings as required placing and removing pigs for the flushing.

#### 3.05 PRESSURE TESTING

- A. Hydrostatic pressure testing shall be conducted after the waterline has been flushed.
- All waterlines and service lines shall be subjected to hydrostatic pressure testing.
  Testing shall be conducted by the Contractor in the presence of the Engineer or Owners representative. Engineer and Owner shall be notified at least 2 working days in advance.
- C. Testing shall not be commenced until all thrust blocking has been in place for not less than 5 days and sufficient backfill has been placed to prevent pipe movement.
- D. Furnish and operate all pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test. Provide certifications of accuracy for gauges from an approved laboratory when requested.
- E. Perform pressure testing with hydrant auxiliary gate valves open and pressure against the hydrant valve. After the pipe test is completed, test each gate valve in turn by closing it and relieving the pressure beyond. This test of the gate valve is acceptable if there is no immediate loss of pressure
- F. All visible leaks on new waterlines shall be repaired, regardless of the amount of leakage.
- G. Test Procedure Rigid Piping (PVC, D.I.)
  - 1. The test section shall be slowly filled with water and all air expelled from the pipe prior to testing. Owner will provide water for testing at a time of day when sufficient quantities of water are available for normal system operation.
  - 2. All valves isolating the test section shall be securely closed and the specified test pressure applied by means of a pump connected near the lower end of the test section.
  - 3. The test pressure shall be 150 psi and the duration shall be at least 2-hours at the test pressure. Provide additional pumping during the test period to continuously maintain pressure within 5 psi of that required (PVC and D.I. pipe only). Use a clean container of potable water to supply the pump.
  - 4. Accurately determine the quantity of water required to maintain and restore the required pressure at the end of the test by pumping through an approved positive displacement water meter.
  - 5. The allowable leakage rate for the test section shall be determined from the following formula: L =  $\underline{SD\sqrt{p}}$

#### 148,000

- a. L = allowable leakage (gph)
- b. S = length of pipe being tested
- c. D = nominal diameter of pipe (inches)
- d. p = average test pressure during test (psi)

- 6. Compare the amount of water added during the test to the allowable leakage for the test section. If the amount of water added is less than the allowable leakage, then the section shall be considered to have passed hydrostatic testing and the Contractor may proceed with disinfection. If the amount of water added to the section exceeds the allowable leakage, the Contractor shall, at his own expense, determine the source of leakage, repair or replace the defective elements, and repeat the test until the pipeline withstands the test pressure and the allowable leakage requirements have been satisfied.
- H. Test Procedure Non-Rigid Piping (HDPE)
  - 1. Conduct per ASTM F 2164. The test section shall be slowly filled with water and all air expelled from the pipe prior to testing. Owner will provide water for testing at a time of day when sufficient quantities of water are available for normal system operation. Procedure involves an initial expansion, and test phases.
  - 2. All valves isolating the test section shall be securely closed and the specified test pressure applied by means of a pump connected near the lower end of the test section.
  - 3. Apply initial pressure of 160 psi and allow to stand for 3 hours to allow for diametric expansion or pipe stretching to stabilize. Add make-up water as required to maintain the pressure for the 3-hour period.
  - 4. After this equilibrium period, apply the specified test pressure and turn the pump off.
  - 5. The test pressure shall be 150 psi and the duration shall be at least 1 hour at the test pressure. If after the 1-hour test period the pressure remains steady (within 5%), leakage is not indicated.
  - 6. If leaks are discovered, depressurize the test section before repairing leaks. Correctly made fusion joints do not leak. *Leakage at a butt fusion joint may indicate imminent catastrophic rupture. Depressurize the test section immediately if butt fusion leakage is discovered.* Leaks at fusion joints require the fusion joint to be cut out and redone.
  - 7. Depressurize test section of pipe and conclusion of testing period by utilizing a controlled release of the testing liquid. If the test is not completed due to leakage, equipment failure, or for any other reason, that section of line being tested shall be depressurized completely and allowed to relax at least eight (8) hours before pressurizing the test section of pipe.

## 3.06 DISINFECTION

- A. All potable water distribution lines installed or modified under this Contract shall be sterilized prior to connection to the existing system, in accordance with the following procedure, AWWA Standards C651 through C654, and current OAR 333-61-050 (Disinfection or Facilities).
- B. Flushing and passing hydrostatic testing must be accomplished prior to disinfection.
- C. The Contractor shall have the option of utilizing either a liquid chlorine gas-water mixture, direct fed chlorine gas, or a calcium hypochlorite and water mixture for disinfection.

- D. Disposal of chlorinated water from the pipelines shall be performed in conformance with the most recent draft or edition of *Best Management Practices for the Disposal of Chlorinated Water* by the Oregon Department of Environmental Quality. Chlorinated water used for disinfection of waterlines and service lines shall not be directly disposed of into or impair the waters of the State (i.e. lakes, creeks, streams and wetlands).
- E. The Contractor shall provide all equipment, materials, and workmanship required to complete the flushing and disinfection of waterlines and appurtenances. Engineer shall be notified 2 working days in advance of planned disinfection procedures.
- F. Disinfection Procedure
  - 1. The Contractor shall inject chlorine solution into the waterline. Solution shall have a free chlorine residual of at least 25 mg/L, but not more than 100 mg/L. All entrapped air shall be discharged from the line and all surfaces shall be wetted. Chlorinated water shall be retained in the pipe for at least 24-hours. A free residual of not less than 10 mg/L shall be found in all parts of the line after the 24-hour period has elapsed.
  - 2. After the 24-hour period, all valves in the mainline shall be operated and all hydrants flushed with a free residual of at least 10 mg/L being found. If the residual concentration within any part of the chlorinated section is found to be less than 10 mg/L, the Contractor shall flush, rechlorinate, and retest all sections until a 10 mg/L minimum residual is obtained.
  - 3. Upon obtaining the minimum 10 mg/L free residual following the 24-hour disinfection period, the Contractor shall flush the section with potable water until the chlorine residual is equivalent to the residual of the existing system water. A minimum of one sample shall then be collected from the pipe for microbiological analysis.
- G. Microbiological Sampling and Analysis
  - 1. The Contractor is responsible for collecting and submitting samples to a certified independent testing laboratory for microbiological analysis.
  - 2. The Engineer or District representative shall be present to witness the collection of the water samples for testing. Chain of custody procedures shall be utilized during the collection and transport of samples to the laboratory.
  - 3. The Contractor shall bear all costs associated with the required testing, including laboratory fees, materials required, and transportation costs. The Contractor also shall pay for all additional tests required as a result of failing to meet the bacterial limits.
  - 4. If the results of the microbiological analysis indicates that the water is free of coliform organisms, the waterline may be put into service.
  - 5. If the results of the microbiological analysis indicate that coliform organisms are present, then the waterline shall be flushed, rechlorinated, and retested until a coliform-free sample is obtained.
  - 6. A minimum of one sample from each separable structure or pipeline shall be obtained for analysis. The presence of coliform organisms shall be determined using the Colilert 24-hour test, Method MMO-Mug, or other methods approved by the Oregon State Drinking Water Program.

## 3.07 CONNECTION TO EXISTING MAINS

- A. New waterlines shall not be connected to the existing system until passing microbiological testing results have been received. A physical break shall be provided (12-inch to 24-inch portion of pipe left out) and shall remain until all tests have passed. Merely leaving a valve closed is not acceptable. After disinfection has been completed satisfactorily, the tie-in may be made. Tie-in fittings and small sections of pipe shall be disinfected as specified below.
- B. Where new waterlines connect to existing lines and the tie-in requires a portion of the new construction to be brought into service immediately upon completion of the tie-in, the new piping and appurtenances shall be disinfected by liberally spraying or brushing on 1% hypochlorite solution (i.e. 1 gallon 5.25% bleach mixed with 4 gallons potable water), waiting 10 minutes, and then thoroughly flushing. This is generally limited to cut-in fittings.
- C. Upon completion of the tie-in, the new piping and appurtenances shall be flushed.

## PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Water Distribution Piping items (i.e. waterlines and service lines) shall be made on a lineal foot basis as stated on the Bid Form for each size, type, and backfill class, with the exception of piping associated with appurtenances such as combination air valves and blow-offs. Measurement for payment quantities shall be based on horizontal length. Payment shall include compensation for: Pipe, bedding / backfill compacted and tested, tracer wire, warning tape, roadway aggregate base, 2-inch thick section of asphalt and cold patch as required to maintain trench at existing grade throughout the entire construction of this project.
  - 1. Payment for Water Distribution Piping items shall include compensation for trench excavation, equipment to make push and casing pipe (service lines), water distribution pipe, backfill and pipe zone material, compaction, toning wire, flushing, testing and disinfection.
  - 2. Payment for Water Distribution Piping items associated with water distribution piping such as tees, elbows and other fittings and appurtenances shall be as specified in Section 02515.
  - 3. Payment for Water Distribution Piping items associated with combination air valves, blow-offs, and hydrants shall be included within the unit price for these items. No separate payment will be made for water distribution items associated with combination air valves, blow-offs, and hydrants.
  - 4. When Horizontal Directional Drilling is used to install piping; Payment for Water Distribution Piping will include bore pit excavation, backfill and compaction, directional drilling, pipe, equipment to make push and casing pipe (service lines), flushing, testing and disinfection.
- B. Payment for 2-inch diameter and smaller Waterline (all backfill classes) shall include compensation for trench excavation, backfill, pipe zone, compaction, toning wire, fittings (i.e. elbows), flushing, testing and disinfection.

C. Temporary end plugs and other equipment and materials required for flushing, disinfection and testing are considered incidental and shall be included in the unit price for Waterline Distribution Piping items.

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## SECTION 02511 - LOCATOR WIRE & WARNING TAPE

#### PART 1 GENERAL

#### 1.01 SUMMARY

A. This section consists of furnishing all labor, material and equipment, and performing all work required for the burying of an insulated copper conductor wire and plastic underground warning tape in the trench with installed non-ferrous and/or nonconductive (plastic, etc.) water and sewer lines. See the Standard Detail Drawings for trench cross section.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Waterlines
  - 1. Tracer wire shall be No. 12 AWG minimum, solid copper with blue colored insulation. Insulation shall be 0.030-inch thick HDPE designed for direct bury.
  - 2. Underground warning tape shall be 6-inch wide, 4-mil-thick, APWA Standard Blue color, reading "CAUTION – WATER LINE BURIED BELOW."
- B. Sewer Lines
  - 1. Tracer wire shall be No. 12 AWG, solid copper with green colored insulation. Insulation shall be 0.030-inch thick HDPE designed for direct bury.
  - 2. Underground warning tape shall be 6-inch wide, 4-mil thick, APWA Standard Green color, reading "CAUTION BURIED SEWER LINE BELOW."
- C. Horizontal Directional Drill Installations
  - 1. Tracer wire for HDD installations shall have steel core with copper cladding and HDPE insulation. Insulation shall be 0.045-inch thick. Minimum gage is 12 AWG. Colors shall be as above. Pro-Trace HDD-CCS; Copperhead SoloShot EHS; DURAtrace DD; or approved equal.

#### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Waterlines Wire and warning tape shall be buried the entire length of the trench, placed in accordance with the Standard Detail Drawings, for all nonconductive pipelines.
  - Wire shall be brought to the surface and connected at each valve box and each water meter. Distance between tracer lead access locations shall not exceed 1,000 feet. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack.
  - 2. Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.

- B. Sewer Lines
  - 1. Wire and warning tape shall be buried the entire length of the trench, placed in accordance with the Standard Detail Drawings, for all nonconductive pipelines.
  - 2. Wire shall be brought to the surface and connected at each manhole and sewer cleanout. Distance between tracer lead access locations shall not exceed 1,000 feet. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack. Wire shall be routed outside each manhole or cleanout riser. Wire shall be exposed inside all cleanout covers and a minimum of 24" of wire provided. At manholes, pass wire into manhole between concrete grade ring and manhole lid frame and provide a minimum of 24" coiled wire.
  - 3. Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.

## PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Locator Wire & Warning Tape shall be included within the lineal footage prices for each size and backfill class of pipe to be installed. No additional compensation will be allowed.

## 1. <u>SECTION 02515 – WATERLINE APPURTENANCES</u>

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. The work in this Section consists of furnishing all labor, materials, equipment and performing all work necessary for the proper installation of pipe appurtenances indicated on the Plans and/or required for the completion of the proposed waterline improvements.
- B. Pipe appurtenances may include, but are not necessarily limited to the following:
  - 1. Fittings (bends, tees, etc.)
  - 2. Valves and Valve Boxes
  - 3. Concrete Thrust Blocking
  - 4. Service Laterals (including saddles, valves, and other related items)
  - 5. Fire Hydrant Assemblies
  - 6. Blow-off and Combination Air Valve Assemblies
  - 7. Magnetic Master Meter
- C. All water pipe fittings and appurtenances (including rubber gaskets) shall be ANSI/NSF Standard 61 (for potable water service) approved, shall be UL listed and FM approved.
- D. Appurtenance Submittals shall be as specified in Division 1 Section 01300.

### PART 2 PRODUCTS

- 2.01 MATERIALS
  - A. Ductile Iron Fittings
    - 1. Bends, tees, reducers, and all other fittings required for piping systems shall be ductile iron fittings cast with tested and traceable ASTM A536 Ductile Iron, with mechanical joint (MJ), flanged ends (FE), or plain ends (PE), unless otherwise shown in the Drawings.
    - 2. Special note shall be taken of the various end configurations (MJ, FE, PE) of fittings, valves, and other appurtenances as indicated in the Drawings for various installation connections to existing and new materials. Contractor may use full body or compact mechanical joint fittings provided the minimum pressure rating and other specifications are met.
    - 3. All fittings interiors shall be Cement-Mortar Lined and Seal Coated in accordance with ANSI/AWWA C104/A21.4-08 Standard (or latest revision, typical). External finish of all fittings shall be a bituminous coating in accordance with ANSI/AWWA C104/A21.4-08. All coated fittings shall meet the requirements of NSF-61.
    - 4. Fittings shall conform to ANSI/AWWA C110/A21.10-08 Standard (full body), or ANSI/AWWA C153/A21.53 Standard (compact). Fittings up to 24-inch shall be rated at 350 psi. Fittings over 24-inch shall be rated at 250 psi.
    - 5. Mechanical Joints and gaskets for mechanical joint fittings shall conform to ANSI/AWWA C111/A21.11-07 Standard. Furnish with **Cor-Blue** corrosion resistant, high-strength, low-alloy steel T-bolts (conforming to ANSI/AWWA C111/A21.11), which feature a baked-on ceramic filled fluorocarbon resin for additional corrosion resistance. Gasket material shall be vulcanized styrene

butadiene rubber (SBR) or ethylene propylene rubber (EPDM) in accordance with ANSI/AWWA C111/A21.11.

- 6. Flanged fittings shall be faced and drilled to standard 125-pound template per ANSI Class 125 B16.1 Standard unless ANSI Class 250 B16.1 fittings are indicated on Drawings. Flange thickness shall conform to ANSI/AWWA C115/A21.15-05. Flange Gaskets shall be 1/8-inch thick rubber per ANSI/AWWA C111/A21.11 Appendix C, Sec. C.2 with at least (3) three bulb type rings molded into both faces of the gasket. Gaskets shall be full face style with holes for bolts. Flat rubber gaskets and/or thinner are not approved. Adapter flanges are not approved. All flanged fittings shall be supplied with Cor-Blue low alloy nuts and bolts.
- 7. MJ Joint restrainers shall be used for all MJ fittings. Joint restrainers for MJ fittings shall MEGALUG by EBAA Iron or approved equal, joint restrainers shall be designed specifically for pipe material used. Use where shown on the Plans or required by conditions.
- 8. Bell Restraints shall be ductile iron conforming to ASTM A536 and shall be manufactured by EBAA iron or approved equal.
- 9. Thrust blocking as specified shall be installed at all fittings.
- B. HDPE Fittings
  - Fittings shall be PE 4710 HDPE, Cell Classification of 445574C as determined by ASTM D 3350. Butt Fusion Fittings shall have a manufacturing standard of ASTM D 3261. Electrofusion Fittings shall have a manufacturing standard of ASTM F 1055. Molded and fabricated fittings shall have the same pressure rating as the pipe and shall be tested in accordance with AWWA C 906.
  - 2. Fabricated fittings are to be manufactured using a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.
  - 3. Fittings may be fused to pipe when fitting DR is within one DR of the pipe, otherwise flanges must be used.
  - 4. Services and service taps shall be accomplished with electrofusion saddles with brass or stainless steel threaded outlet, electrofusion saddles, or sidewall fusion branch saddles. Mechanical saddles shall not be used.
  - Flanged and Mechanical Joint Adapters Flanged and Mechanical Joint Adapters shall be shall be used to connect HDPE pipe with other pipe materials. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of AWWA C 906, ASTM D 3261.
  - 6. HDPE Wall Anchor shall be fused to HDPE pipe at concrete wall anchor locations. HDPE wall anchor shall be IPS HDPE wall anchor as manufactured by Performance Pipe; ISCO Industries or approved equal.
- C. Couplings **All couplings shall be supplied with with Cor-Blue nuts and bolts** and other hardware conforming to nuts and bolts specified for flanged fittings. Contractor shall verify outside diameters (O.D.) of pipes to be connected prior to ordering couplings. Supply with standard shop coat enamel coating.

- 1. Transition, reducing, and straight couplings, 2-inch through 12-inch, shall have cast ductile iron or carbon steel body, and resilient gaskets. TPS Hymax 2000 Series; Romac 501; or approved equal.
- 2. End caps couplings, 3-inch through 12-inch, shall have cast ductile iron sleeves, end rings and end caps, and resilient gaskets. Smith-Blair 482; Romac EC501; or approved equal.
- 3. Flange coupling adapters, 3-inch through 12-inch, shall have cast iron body and end ring, and resilient flange and coupling gaskets. Smith-Blair 912; Romac FCA501; or approved equal. Use only where restraint is not required.
- 4. Flange by mechanical joint (Flg x MJ) adaptors, 3-inch through 12-inch, shall have ductile or cast iron bodies and joints conforming to applicable fitting specifications herein. Tyler; Union Foundry Co.; or other approved pipe/fittings manufacturer.
- 5. Restrained flange coupling adapters shall be MEGAFLANGE by EBAA Iron, or standard flange by MJ adapters with MEGALUG restraint gland.
- 6. Couplings, <sup>1</sup>/<sub>2</sub>-inch through 2-inch, for CTS pipe shall be compression type with rubber gaskets. Body shall be at least 3-<sup>3</sup>/<sub>4</sub>inches long and constructed of galvanized carbon steel, with ASTM A47 malleable iron nuts. Smith-Blair 522; Romac 702; or approved equal.

## D. Valves

- 1. Gate Valves
  - a. Gate valves, 2-inch through 12-inch, shall be iron body, resilient seat, non-rising stem (NRS), rubber encapsulated disc, wedge gate valves with O-ring seals. Valves shall be manufactured to open when the stem is rotated counterclockwise. Provide a 2-inch square operating nut unless otherwise specified. Valve end configurations and sizes shall be as shown on the Plans. All gate valves shall conform to AWWA C509. All valves shall be 200 psi working pressure, 400 psi test pressure.
  - b. Valve body shall have nominal 10 mil epoxy coating inside and out meeting AWWA C550 and certified to NSF 61.
  - Buried valves shall be furnished with a cast iron valve box as specified herein, and shall have operators designed for direct bury service.
     Furnish with a stem extension such that the operating nut is within 18inches of the ground surface. Furnish hand-wheel operators for all nonburied valves, including valves in vaults.
  - d. Joint materials, nuts, and bolts for mechanical and flange joints shall be as specified in Section 02515-2.01.A.
  - e. Valves shall be as manufactured by M&H style 4067; U.S. Pipe; or approved equal.
- 2. Butterfly Valves (Buried Service)
  - a. Valves 8-inch and smaller shall be gate valves, 12-inch valves shall be butterfly valves. Butterfly Valves shall be rated for buried service and

meet the requirements of the latest revision of Class 150B, AWWA C504. Valves shall have cast iron body, ASTM A126 Class B, resilient Buna-N rubber seat and cast iron disc with stainless steel contacting edge. Shaft shall be 18-8 type 304 stainless steel conforming to ASTM A276. Valve ends shall be mechanical joint or flanged joint as applicable. Furnish with standard 2-inch square operating nut when buried and lever operator where exposed.

## E. Valve Boxes

- 1. Cast iron valve boxes with PVC extensions shall be furnished and installed with all buried gate and/or butterfly valves. See standard detail drawing.
- 2. Valve box shall have a single piece top section and separate cover. Box and cover shall be manufactured from ASTM A48, Class 30 cast iron and shall be rated for H20 traffic loading. Cover shall have "W" or "WATER" formed in the casting.
- 3. Box shaft shall be 18-inches long with a 7-inch I.D. and 7<sup>1</sup>/<sub>2</sub>-inch O.D. Top flange of box shall be 12-inches in diameter. Cover shall be 7<sup>3</sup>/<sub>4</sub>-inch diameter.
- 4. A PVC extension shall be placed at the valve extending to within 6-inches of the ground surface. The cast iron valve box is placed over this PVC extension. The PVC section shall be 6-inch diameter PVC, ASTM D3034, SDR35.
- 5. Cast iron valve boxes shall be East Jordan Iron Works Catalog No. 3639Z1 18T with 3639A1 cover; Olympic Foundry, Inc. VB-910; or approved equal.
- Valve Box for Combination Air Valve Assembly (CAV) Utilize section of 18-inch diameter ADS N-12 storm drain pipe or equal of sufficient length per Detail Drawing. Lid shall be Ford Meter Box C52 Cast Iron Cover or approved equal. Provide sealant between cover and pipe to prevent dirt from entering interior.
- F. Thrust Blocks and Concrete Anchor Walls Furnish and place thrust blocks, sized as shown on the Plans. Concrete shall conform to Oregon Standard Specifications Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches. Thrust blocking shall be placed between undisturbed earth and the waterline fitting to be anchored in such a manner that the fitting is accessible for repair and nuts and bolts are not encased. 6 mil thick plastic sheeting shall be placed between fittings and poured concrete. Thrust blocks shall be neatly formed with plywood. Contractor shall install as required to prevent lateral movement and uplift.
  - 1. Concrete anchor walls shall be formed and centered midway within the walls as shown on the Plans, HDPE wall anchor shall be incorporated into concrete wall anchor.
  - 2. Reinforcing bars shall be placed as shown in the Detail drawings and Plans and shall be of deformed, billet steel conforming to ASTM A615, grade 60.
  - 3. Adequate spacing shall be provided between the concrete cutoff wall and the nearest fitting to keep all joints, bolts and nuts free of concrete.
  - 4. Concrete shall cure for a minimum of five (5) days prior to hydrostatic testing.
- G. Fire Hydrant Assemblies

- 1. Fire hydrants shall conform to AWWA C502, latest revision, and shall be a breakflange traffic model type. Hydrants shall be of dry top center stem design. Hydrants shall be UL listed and FM approved.
- 2. Main Valve shall be 5-1/4-inch and barrel shall be 6-inch diameter.
- 3. Barrel length shall be sufficient for 36 inches of pipe cover, with extensions as required, by hydrant manufacturer. Include sweep-type bottom shoe with 6-inch mechanical joint inlet. Hydrant shall be installed to finish grade, with split safety flange 2-1/2 to 3-inches above adjacent ground or as shown in the Drawings.
- 4. Hydrant 'split break-away' safety flange and stainless steel snap ring at groundline shall allow for 360-degree rotation of the standpipe for positioning purposes.
- 5. Hydrants shall have "O" ring seals, rugged main valve, positive drain valve and non-kinking chains. Hydrants shall have bronze seat ring, drain ring, nozzles operating and thrust nuts and upper valve plate.
- 6. Main valve seat ring removal and extension of the hydrant shall be accomplished without digging.
- 7. Each hydrant shall be equipped with two 2 1/2 inch nozzles and one 4-1/2 inch steamer (pumper) nozzle. Operating nut shall be ductile iron 1-1/2 inch Pentagon National Standard, counterclockwise opening.
- 8. Hydrants shall be installed according to Drawings and shall be backed by manufacturer's 5-year warranty on materials and workmanship.
- 9. Hydrants shall be Fire Hydrant Yellow. Field touch-up will be required is new hydrant is scratched or marred.
- 10. Hydrants shall be Mueller (Super Centurion).
- H. Combination Air Valves (CAV) Single housing style combination air release and air/vacuum valves, sized as indicated on the Plans, shall be installed at high points along waterlines or at the maximum spacing recommended by the valve manufacturer. Install combination air valve assemblies per Plans and Detail Drawing.
  - 1. Furnish and install combination air valves and complete assemblies, sized as shown on the Plans and/or Standard Detail Drawings. Valves shall be 2-inch with NPT connection unless otherwise shown.
  - 2. All valve materials shall have NSF 61 certification. Body shall be reinforced Nylon with EPDM rolling seal design. Float shall be foamed polypropylene.
  - 3. Valves shall be as manufactured by A.R.I., model D-040; or approved equal.
- I. Blow-Off Assembly Blow-off assemblies shall be provided at low points along the new waterline routes as shown on the Plans and Detail Drawings.
  - 1. The blow off assembly shall include but not be limited to excavation and backfill, saddle, piping, gate valve and all other items necessary for complete installation as shown on the Plans and Detail Drawings.

- J. Red brass pipe nipples shall be seamless, M.I.P. threaded, rated for 150 psi and conforming to ASTM B43-98 and ASTM B687-99. Bronze fittings shall meet the requirements of ASTM B62-02 with NPT threaded ends conforming to ANSI/ASME B16.15. Type 304 stainless steel is approved alternate material.
- K. Service Saddles (1" 2" taps on C900 PVC Pipe)
  - Saddles with 1-inch through 2-inch taps, on 4-inch through 12-inch AWWA C900 PVC pipe shall have solid 85-5-5-5 bronze body and nuts per ASTM B62, wide stainless steel band, and Buna-N rubber gasket. Supply with F.I.P. taps. Saddles must be sized properly for pipe furnished on project and have fully factory contoured clamp to provide full support around pipe without distorting pipe, and shall be leak free. Use double strap design for taps over 1-inch. Ford Meter Box Company Style 101BS (202BSD for 1.5" and 2" tap); or approved equal.
  - 2. Corporation stops used with 1-inch through 2-inch F.I.P. tap service saddles shall be ball type, constructed of 85-5-5-5 red brass and shall conform to AWWA C800 with low or no lead composition as required for NSF 61 classification. M.I.P. inlet and pack joint for CTS outlet. Ford Meter Box Company Type FB1100 Ballcorp; or approved equal. M.I.P. inlet and F.I.P. outlet for connection to fittings as required for air valve and blow-off assemblies - Ford Meter Box Company Type FB500-7 Ballcorp; or approved equal.
- L. Service Laterals
  - Service lateral piping, 1-inch through 2-inch (1-inch minimum size allowed), shall be high density polyethylene (PE 3408) pipe conforming to AWWA C901, NSF listed, ASTM 2737 SDR 9, 200 psi rating, standard CTS sizes. Pipe shall be solid blue in color or black with blue stripes. All fittings shall be standard pack joint for CTS tube. Ford Meter Box Grip Joint for CTS and Quick Joint for CTS (or equals) are also acceptable. Stainless steel internal pipe stiffeners as required at each pack joint connection.
  - 2. Meter Stops
    - a. Meter valves used with 1-inch CTS HDPE pipe laterals shall be 85-5-5-5 cast bronze per ASTM B62 conforming to AWWA C800 with low or no lead composition as required for NSF 61 classifications. Angle-style ball valves. Use only ¾-inch valves on 5/8-inch and 5/8x3/4-inch meters and 1-inch valves on 1-inch meters. Pack joint for CTS pipe inlet meter swivel nut outlet. Ford Meter Box Company BA43-3xxW; or approved equal. Contractor shall verify meter outlet size prior to ordering.
    - Meter valves used with 1½-inch and 2-inch CTS HDPE pipe laterals shall be 85-5-5-5 cast bronze per ASTM B62 conforming to AWWA C800 with low or no lead composition as required for NSF 61 classifications. Angle-style ball valves or straight ball valve where required. Use only 1½-inch valves on 1½-inch service lines and 2-inch valves on 2-inch service lines. CTS pack joint inlet by meter flange outlet. Ford Meter Box Company BFA43-xxxW and BF43-xxxW; or approved equal. Contractor shall verify meter outlet size prior to ordering.
  - 3. Couplings

- a. Utilize CTS pack joint couplings with various MIP, FIP ends as required and shown in Detail Drawings. Use straight couplings and 90 degree ell couplings as required and shown in Detail Drawings. Couplings shall be brass conforming to AWWA C800 with low or no lead composition as required for NSF 61 classifications.
- 4. Water Meters
  - a. Utilize existing water meters when reconnecting to new service laterals, except where noted or directed to provide new meters. Meters damaged by construction operations shall be replaced at Contractor's expense. New meters shall be as required by Owner.
- 5. Meter Boxes
  - a. Utilize existing meter boxes when reconnecting to existing meter and box. Use new meter box when relocating water meters and boxes, providing new service, or when otherwise shown on the plans. Boxes damaged by construction shall be replaced at Contractor's expense.
  - b. New meter boxes shall be fiber reinforced, light-weight box with inside open dimensions of approximately 12-inch by 20-inch with 12-inch height. Boxes shall be FL12 Fiberlyte with SYN12S reading lid by Oldcastle Precast (Christy).
  - c. Larger meter boxes (for 1-1/2" and 2" meters, blow-off hydrant) shall be fiber reinforced polymer body with polymer reinforced concrete ring, 10K rating, interior dimensions of approximately 17-inch by 30-inch by 12inch height. Boxes shall be WFB1730122A0C by Newbasis. Covers shall be polymer concrete, Newbasis Part # WPC1730C02A0BWM (with hinged reader lid) for meters, and Part # WPC1730A02A0B17 (solid cover) for blow-off. Cover marked with "Water".
- N. Magnetic Master Meter and Vault
  - 1. The meter shall be magnetic type (magmeter) complete with flanged metering tube. The meter shall be McCrometer Ultra Mag, Badger ModMag M-Series, or equal.
  - 2. The meter shall be equipped to forward analog signals to measure the instantaneous and total flow of the City's system.
  - 3. Flow range will range from 0 to 1000 gpm for 4" ductile iron pipe.
  - 4. Provide a spool sized to replace the flow meter in-line to allow flowmeter to be removed for service if necessary.
  - 5. Instrument shall be factory programmed and shall include a self-diagnostic test mode, password protected configuration parameters, and a front panel keypad used change display and parameters. The converter shall be compatible with Microsoft Windows and other software programs with built in terminal communication capabilities through an interface port.
  - 6. The converter shall provide an isolated 4-20 mA output.

- 7. Grounding ring shall be 316 stainless steel or C-22 tantalum and shall be supplied with meter tube.
- 8. Install in accordance with manufacturer's instructions at location shown on the drawings and as directed.
- 9. Maintain upstream and downstream straight pipe runs as indicated in the Plans and as directed by the manufacturer.
- 10. Install grounding rings and gaskets as required. Ground as directed by manufacturer.
- 11. Meter vault shall be a pre-cast concrete vault and shall be of solid construction with H20 rating, Old Castle 644-LA vault or equal.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. Fitting Installation Install fittings at the location shown or as directed by the Engineer. Comply with AWWA C600. Handle, clean, lubricate and install fittings as specified in the appropriate sections for laying pipe. Where a cut in the pipe is necessary for inserting fittings or closure pieces, cut the pipe mechanically without damaging it or its lining and leave a smooth end at right angles to the centerline of the pipe. Dress and bevel the cut end of the pipe to remove sharp edges and projections which may damage the gasket. Repair all damaged lining and coating to the satisfaction of the Engineer. On the pipelines, securely anchor all tees, plugs and elbows as shown or directed to prevent movement due to thrust. Achieve anchorage only by use of approved thrust blocking or approved joint restraint. Maximum deflection at mechanical joints shall be 3 degrees.
  - B. Valves Set valves in the same manner as specified in Section 02510 for pipe. Clean the face of flanges thoroughly before assembling the flanged joint. Insert the gasket and tighten the nuts uniformly around the flange. Align pipe carefully on both sides of the valve before final tightening of the flanges to avoid stressing the valve body. After installation, operate the valve from full open to full closed to ensure proper operation of the valve. Correct any malfunction in the operation of the valve. Test valve joints with adjacent pipeline. Repair any leaks as observed around the valve. Backfill around valves as specified in Section 02510 for pipe.
  - C. Valve Boxes Center valve boxes and set plumb over the operating nut of the valve. Set valve boxes so they do not transmit shock or stress to the valve. Set valve box covers flush with the surface of the finished pavement or such other level as may be directed. Adjust the extensions to the proper length as required for proper installation. Backfill shall be as specified for the connecting pipeline. Correct any misalignment of valve boxes without additional expense to the Owner.
  - D. Concrete Thrust Blocking and Anchor Walls
    - 1. Provide thrust blocking, as shown or directed by the Engineer, using concrete as specified. Place the concrete blocking between undisturbed earth and the fitting to be anchored. The bearing surface shall be sized and located to adequately withstand the applied thrust force. Do not encase pipe joints or fittings with concrete. See the Plans for thrust block configurations.

- 2. Install concrete anchor walls to secure HDPE pipe in place and allow for connection to new or existing waterlines other than HDPE pipe. Secure flex restraint or wall anchor to HDPE pipe following manufactures recommendations.
- 3. Thrust blocks and anchor walls shall not be backfilled for a minimum of 12 hours unless approved by Engineer. Contractor shall provide suitable steel plating and pinning as required to cover the thrust blocks and anchor walls until backfill material may be placed.
- E. Service Laterals Replace existing lateral piping with new specified material of the same pipe diameter, unless otherwise directed.
  - 1. Within asphalt or other paved surfaces open-cut trenching will not be permitted. Laterals shall be bored, pushed or other method preferred by the Contractor that does not require open trenching. Submit lateral installation method for approval prior to commencing.
    - a. Service laterals shall be installed with a 2-inch schedule 40 PVC casing pipe from main tap to meter box. Laterals larger than 1-inch shall have a 3-inch schedule 40 PVC casing.
    - b. Service lines pushed or placed under roadways shall consist of a continuous length of pipe. No splicing, coupling and fusing of the service line underneath the roadway will be allowed unless prior approval has been given by Engineer.
    - c. All corporation stops and all other lines being tapped shall use service saddles. Corporation stops shall be tapped at a 45-degree angle to the main and orientated in such a way as to provide adequate room for future operation and maintenance.
  - 2. Within gravel or other unpaved surfaces, laterals shall be installed in open-cut trenches, or other method preferred by the Contractor and approved by the Owner and Engineer.
  - 3. New laterals shall be installed to replace all existing service laterals along the alignment of new mainlines constructed under this Contract.
  - 4. Existing service laterals shall be removed from meter box to a point 5-foot from meter box, or greater if required for proper installation of new service lateral. All materials to be abandoned which are exposed during construction shall be removed from the site and disposed of by the contractor. Existing service laterals shall be capped watertight at cut end.
  - 5. New service laterals shall be "stubbed-out" to any parcels located along new waterline alignments which do not currently have individual water service. See Plans for new service lateral locations. Contractor shall supply new service connection, line and stub to new meter box, City shall supply new water meter to property.
- F. Fire Hydrant Assemblies
  - 1. Construction and installation of the hydrants shall conform to applicable provisions of AWWA C600, except where otherwise specified.

- 2. Hydrants shall be located as shown or as directed to provide complete accessibility. Improperly located hydrants shall be disconnected and reset at the Contractors expense.
- 3. Hydrant shall be placed on precast concrete base block set on firm, level subbase to assure uniform support. Provide concrete thrust blocking against firm undisturbed native soil.
- 4. Hydrants shall be carefully placed as to prevent the base blocking from breaking. After hydrant is in place and pipeline connection has been made, place temporary blocks to maintain the hydrant in a plumb position during subsequent work. New hydrants shall be set plumb and solid for acceptable installation.
- 5. Provide a minimum of 4-cubic feet of drain rock around base of the hydrant. Extend drain rock at least 6 inches above hydrant drain hole.
- 6. Flush hydrant thoroughly following installation to remove any foreign matter.
- 7. Provide bollards to protect hydrants where shown on the plans or as directed by the Engineer. Install in accordance with detail drawings and provide two coats of epoxy coatings on post to match fire hydrants.
- G. Combination Air Release Valves
  - 1. Install in accordance with detail drawings at locations as shown on the Plans and to manufactures recommendations.
  - 2. Air Release Valves shall be located at high points of the system where there is a change from an upward slope to a downward slope. It is essential that a positive grade be maintained between mainline and air valve. Contractor shall field verify and coordinate location with Engineer.
- H. Blow Off Assembly
  - 1. Install in accordance with detail drawings at locations as shown on the Plans and to manufactures recommendations. All connections to pipes shall have service saddles; service saddles shall be located on the bottom of the pipe.

## PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Measurement and payment for installation of waterline will be made on a unit price basis for each size and type installed, for the corresponding unit price stated on the Bid Form. No separate or additional payment will be made for related materials (tracer wire, warning tape, etc) required for a complete installation as detailed in the contract documents or supplies. Payment for waterline shall include compensation for thrust and resistance blocking, joint restraints, and connection to existing and new waterlines.
  - B. Measurement and payment for fittings, including but not limited to Tees, Elbows, End Caps, Couplings, Adapters, Sleeves and Blind Flanges will be made on a unit price basis for each size and type of fitting installed, for the corresponding unit price stated on the Bid Form. No separate or additional payment will be made for nuts, bolts, washers and other fitting related hardware or supplies. Payment for fittings shall include compensation for thrust and resistance blocking, joint restraints, and connection to existing and new waterlines.

- C. Measurement and payment for Valves will be made on a unit price basis for each size and type of valve specified and installed, for the unit price stated on the Bid Form. Payment for valves will include valve box, restraint glands, and installation complete. No separate or additional payment will be made for nuts, bolts, washers, valve boxes, stem extensions, concrete blocking or other valve related hardware or supplies.
- D. Measurement and payment for Combination Air Valve Assemblies will be made on a unit price basis for each assembly installed, as stated on the Bid Form. The unit price per each shall include compensation for excavation and backfill, saddle, piping, fittings, ball valve, combination air valve, vault and cover, and all other items necessary for a complete installation as shown in the Plans and specified herein.
- E. Measurement and payment for Blow-off Hydrant Assemblies shall be made on a unit price basis for each size of blow-off assembly installed, as stated on the Bid Form. The unit price shall include compensation for excavation and backfill, saddle, piping fittings, gate valve, valve box, blow-off hydrant and all other items as required for a complete installation as shown on the plans and as specified herein.
- F. Measurement and payment for 1-inch or smaller Water Service Reconnections will be made on a unit price basis for each size and type installed, as stated on the Bid Form. The unit price shall include compensation for the service saddle, corporation stop and angle meter valve, as well as for service lateral piping for each size and type of lateral. The unit price shall also include compensation for all associated trench excavation, horizontal directional drilling, pipe bedding, pipe, pipe fittings, backfill, removal and capping of specified portion of existing service lateral, connection to corporation and meter stop valves at each end of the new lateral, and all other work required for a complete installation and service reconnection. [Saddles required for combination air valve and blow-off assemblies are included in bid items for those assemblies, and are not paid separately under this item.]
- G. Measurement and payment for 1-inch or smaller New Water Service & Connection shall be made on a unit price basis for each service, as stated on the Bid Form. Payment for new services shall include compensation for placement of meter box, compensation for the service saddle, corporation stop and angle meter valve, as well as for service lateral piping for each size and type of lateral. The unit price shall also include compensation for all associated trench excavation, horizontal directional drilling, pipe bedding, pipe, pipe fittings, backfill, connection to corporation and meter stop valves at each end of the new lateral, and all other work required for a complete installation as shown in the plans and specified herein.
- H. Measurement and payment for 2-inch waterline appurtenances and fittings shall be included within the unit price basis as stated on the Bid Form for 2-inch waterlines (all classes) unless otherwise stated on the Bid Form.
- I. Payment for 2-inch Service Reconnection and new 2-inch Service Connections shall be made on a unit price basis as stated on the Bid Form. Payment shall include, but not be limited to, excavation, valves, valve boxes, saddle, sleeves, backfill, concrete thrust blocking, disposal and removal of piping material and necessary fittings and connections all as required for a complete connection to existing and new waterlines.
- J. Measurement and payment for Fire Hydrant Assemblies will be made on a unit price basis for each type of hydrant specified and installed, at the price stated on the Bid Form. Payment for Fire Hydrant Assemblies shall include compensation for new hydrant and gate valve, all excavation, pipe bedding, pipe, drain rock, thrust blocking, pad, backfill, and all other items as shown on the Standard Detail Drawings and specified herein.

Payment shall constitute full compensation for all work specified herein and not specifically paid for under other pay items.

### SECTION 02530 - SANITARY SEWER SERVICES & ADJUSTMENTS

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. The work in this Section specifies gravity sewer pipe materials for service laterals, including fittings and anchors, as well as pipe materials for pressure sewer service laterals. This section also covers the adjustment of existing sanitary sewer services where conflicts occur with the storm drain or waterline improvements.
- B. Existing sanitary sewer service laterals may not be specifically indicated on the drawings but do existing along the proposed pipeline routes. The known sanitary sewer manholes and cleanouts are indicated and the Contractor shall proceed with caution when excavating to prevent damage to existing sanitary sewer service laterals.

#### 1.02 RELATED DOCUMENTS AND SECTIONS

 A. Oregon Standard Specifications (OSS) – The <u>2015</u> Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction Section 00490 – Work on Existing Sewers and Structures.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Gravity Sewer Service (nominal sizes 4-inches through 6-inches)
  - 1. All pipe, fittings, and appurtenances shall be new and unused, and shall meet the requirements of ASTM D3034 (SDR35) polyvinyl chloride (PVC) sewer pipe.
  - 2. Joints for PVC pipe shall be rubber gasketed type conforming to ASTM D3212 gaskets and shall be elastometric type conforming to ASTM F477.
  - 3. Pipe shall be furnished in standard lengths with sufficient shorter lengths as required for all connections and fittings.
  - 4. PVC pipe shall be as manufactured by Certainteed, Johns-Manville or approved equal.
  - 5. New service lateral connection to existing gravity sewers shall utilize one of the following clamp on style saddles:
    - a. Molded PVC saddle with elastomeric seal to sewer main, gasket branch, and stainless steel straps; conform to ASTM D3034; GPK or approved equal.
    - b. Cast ductile iron saddle with virgin SBR gasket and adjustable 3 <sup>1</sup>/<sub>2</sub>" wide stainless steel strap; Romac style "CB" or approved equal.
- B. Pressure Sewer Service
  - 1. All pipe, fittings, and appurtenances installed as part of the Pressure Sewer Service Assembly shall be new and unused.

- 2. Pressure sewer service pipe shall be high density polyethylene (HDPE) DR 17 or approved equal. HDPE pipe shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS) and shall be of standard pipe lengths.
- C. Sewer line Crossing
  - 1. Concrete slurry shall conform to the applicable portions of Section 02320.
  - 2. Ductile Iron Pipe
    - a. Pipe shall be minimum of Class 50 conforming to the ANSI/AWWA C150/A21.5 and ANSI/AWWA C151/A21.51.
    - b. Cement Mortar lining shall conform to ANSI/AAW C104/A21.4.
    - c. Joints shall be push-on rubber gasket type conforming to ANSI A21.11/AWWA C11. U.S. Pipe "Tyton Joint" or approved equal.
  - 3. Wire fabric shall be 6-inch (w1.4 x w1.4) welded steel mesh conforming to ASTM A185.
- D. Transition couplings at pipe connection to existing pipes shall be flexible rubber type with stainless steel bands, Fernco or approved equal.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. All pipe and fittings shall be installed in accordance with manufacturer's recommendations.
  - C. Excavate underneath joints so that the coupling/joint does not act as a point of support for the pie and that pipe can be uniformly supported.
  - D. Inspect pipe and fittings prior to installation. Damaged or defective materials will not be used.
  - E. Pipe zone or bedding material shall be as specified in Section 02320.
  - F. Sanitary Service Adjustment
    - 1. When existing 4-inch or 6-inch sewer services are in "direct conflict" with the new storm drain and minor field revisions in the alignment or grade of the new storm drain improvements cannot avoid a "direct conflict" then the sewer service lateral shall be adjusted to allow for the proposed improvements. The Engineer shall make this determination.
    - 2. "Direct Conflict" is defined as where the existing sewer service will physically be in conflict with the new proposed storm drain.
    - 3. The contractor shall excavate a sufficient length of the existing service as required to allow for adjustment and replacement of the service lateral to maintain a minimum 2% positive grade in the service lateral. The Engineer shall determine the limits of replacement.

- 4. Prior to disrupting sewer service to the existing user, the Contractor shall provide a minimum of 1-hour written notice to the affected user prior to the lateral being cut. The lateral adjustment shall be completed within 4-hours or temporary service shall be provided during the duration to maintain existing service.
- G. Size of new sewer pipe shall match the inside nominal dimension of the existing pipe. Provide transition couplings at limits of replacement.
- H. Provide temporary piping and pumping as required to maintain flows during sewer line replacement.

## PART 4 SPECIAL PROVISIONS

### 4.01 MEASUREMENT AND PAYMENT

A. Sanitary Service Adjustment shall be considered incidental to the work, regardless of size or length of new service line required, up to 20-feet in length. Payment shall include all demolition, excavation, backfill, removal and disposal of existing service lateral, new service lateral piping and appurtenances and connection to existing service laterals and sanitary sewer piping. No other payment will be made for this item.

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### SECTION 02630 - STORM DRAIN PIPING & FITTINGS

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This item shall include furnishing and installing of the storm drain piping and fittings as required for the replacement of the existing storm drain piping all as identified on the Plans.
- B. The Contractor shall provide manufacturer's certifications, including test results for all piping, fittings and appurtenances supplied. All submittals shall be in conformance with the requirements of Section 01300.
- C. All work shall conform to the latest version of the Oregon Standard Specifications (OSS) Part 00400, except as specified herein and shown on the Plans.

#### PART 2 PRODUCTS

### 2.01 MATERIALS

- A. All pipe, fittings and appurtenances shall be new and unused.
- B. PVC Pipe and fittings for storm drain piping shall conform to Class 12454-B, as defined in ASTM D1784. Pipe and fittings shall meet the requirements of ASTM D-3034 for 4" 15" pipe SDR 35 and ASTM F679 for 18" 36" pipe PS46. Elastomeric gaskets with push on joints shall conform to ASTM F477. Or as specified on the plans.
  - 1. All fittings and accessories shall be as manufactured and furnished by the pipe supplier or an approved equal and shall have bell and spigot configurations compatible with that of the pipe. Fittings and accessories shall have the same requirements as the pipe.
- C. Reinforced Concrete Storm Piping shall be ASTM C76 with a D-Load equal to that of the existing piping material.
- D. HDPE Storm Drain Pipe 12" through 48" diameter
  - Black PE materials used for the manufacture of polyethylene pipe and fittings shall be PE 4710 high density polyethylene meeting ASTM D 3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be Listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. Color material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E.
  - 2. Pipe shall be DR11, Pressure Class 200 minimum, IPS Size, and shall be manufactured to the requirements of ASTM F714 and AWWA C906-99 (IPS) and shall be of standard pipe lengths (40 or 50 foot).
  - 3. HDPE pipe shall be DriscoPlex 4100 IPS HDPE pipe; ISCO industries or approved equal.
- 4. Pipe shall be provided with a continuous mark made of durable printing containing the following:
  - a. Name and/or trademark of pipe manufacture, nominal pipe size and dimension ratio.
  - b. The manufacturing standard reference ASTM F714 and polyethylene grade per ASTM D3350.
- E. Concrete shall conform to Oregon Standard Specifications Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1<sup>1</sup>/<sub>2</sub>-inches. Slump shall be between 2 and 4 inches.
- F. Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.

## PART 3 EXECUTION

- 3.01 PIPE INSTALLATION
  - A. All pipe and fittings shall be installed in accordance with the manufacturer's recommendations and APWA standards.
  - B. Remove from job site material, which in the judgment of the Engineer is damaged, not as specified, or otherwise rejected. Payment will not be made for damaged or rejected materials, their removal, or for repairs to such materials.
  - C. Preparation of Trench Excavate and prepare trench for pipe laying to the lines and grades as specified and shown on the Plans. Place any required foundation stabilization and compact pipe bedding prior to laying pipe. Stabilize trench as required and comply with OSHA safety provisions.
  - D. Place and compact pipe bedding material before placing pipe in the trench. When applicable, dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material to prevent future bellies.
  - E. Install to lines and grades shown on the Plans. Maximum deviation shall not exceed 0.05 feet vertically.
  - F. Prior to lowering pipe into the trench, the Engineer or City representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.
  - G. Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipes at all times.
  - H. Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the Engineer. Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with approved pipe lubricant, as recommended by the manufacturer.

- I. Care must be taken to ensure the pipe is not moved and the side support fill is not disturbed when moving sheeting or trench boxes.
- J. Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content
- K. Provide proper Backfill Class material as required. Backfill the trench above the pipe zone in successive lifts. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Modify the compaction as necessary to protect the pipe. Compact each lift to not less than 95% of the maximum dry density.

### PART 4 SPECIAL PROVISIONS

### 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Storm Drain Piping shall be made for the amount as stated on the Bid Form for each size, type and backfill class. Measurement and Payment for this item shall be based on the horizontal length and observation of complete installation.
- B. Payment for 42" Reinforced Concrete Storm Drain Piping as described in 9<sup>th</sup> Street at Ivy Storm Improvements detail shall be included in the lump sum price as stated on the bid form. No separate or additional payment will be made.
- C. Payment for fittings and appurtenances, including but not limited to Tees, Elbows, Couplings, Adapters and Sleeves shall be included within the lineal foot cost for Storm Drain Piping. No separate or additional payment will be made for nuts, bolts, washers and other fitting related hardware or supplies. Payment for fittings shall include compensation for connection to existing storm drain lines.

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### SECTION 02535 - MANHOLES & APPURTENANCES

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. This Section covers manholes, frames, covers, adapters, and other manhole appurtenances not specifically paid for in other sections, used in the gravity storm sewer conveyance system. See Standard Detail Drawings.
- B. This Section covers manhole(s), frames, covers, adapters and other manhole appurtenances not specifically paid for in other sections.
- C. All manholes, frames and covers supplied under this contract shall be from the same manufacturer.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Manholes
  - 1. Manhole riser sections shall be pre-cast reinforced concrete with a minimum wall thickness of 5 inches, conforming to ASTM C 478. Concrete used in forming the sections shall have a minimum compressive strength of 4000 psi at 28 days. Reinforcing steel shall be Grade 60.
  - 2. New manholes shall have precast reinforced concrete bases with shelves, channels and slopes as specified. Precast bases shall have same wall thickness and reinforcement as riser sections.
  - 3. Joints between manhole sections as well as base sections shall be tongue and groove with an o-ring gasket or approved equal conforming to ASTM C-443. Preformed gaskets shall be Ram-Nek, Kent-Seal No. 2, or approved equal.
  - 4. Manholes shall have yard permeability tests passing ASTM C497-03 prior to delivery. Manhole steps shall be plastic with ½" grade 60 steel reinforcing bars encapsulated with injection molded copolymer polypropylene with serrated surfaces.
- B. Frames and Covers
  - 1. All frames and covers shall be heavy duty, gray cast iron designed for H20 traffic loading. Metal used in the castings shall conform to ASTM A48 Class 30. All castings shall be manufactured true to pattern, uniform in quality, free from blowholes, shrinkage, distortion or other defects. Component parts shall fit together in a satisfactory manner and shall have continuously machined bearing surfaces to prevent rocking and rattling. Castings shall be smooth and well cleaned by shotblasting at the factory.
  - 2. Frames and covers shall have skid resistant surface of raised knobs or indentations. Cover shall have the letter "S" cast into it. Non-watertight lids shall have two vent holes.
    - a. Storm drain covers shall have the letter "S" or word "Storm" cast into it.

- 3. Frames and covers shall be manufactured in accordance with the dimensions shown in the Standard Detail Drawings; Olympic Foundry, or approved equal.
- C. Manhole Connections
  - Connections to precast manhole sections shall be accurately core-drilled and shall utilize a properly sized flexible rubber boot providing a watertight seal. Adapter shall be factory tested for watertightness up to 10.8 psi. Kor-N-Seal as manufactured by NPC, Inc. or approved equal.
  - 2. Connections to cast-in-place concrete shall be made with a rubber waterstop grouting ring. Ring shall clamp to pipe with stainless steel clamp and have waterstop ribs. Waterstop Grouting Ring by Press-Seal Gasket Corp., or approved equal.
  - 3. Connections to plastic manholes shall be made using appropriately sized flexible couplings and connecting to preformed pipe stub-outs, provided that stub-outs are not damaged.
- D. Grout
  - 1. Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes

## PART 3 EXECUTION

## 3.01 MANHOLE INSTALLATION

- A. Prepare native soil and place and compact the crushed rock base to 95% maximum dry density as shown in the Standard Detail Drawings. Backfill material around manholes shall be as specified for trenches in Section 02320.
- B. Concrete base shall be carefully placed on the prepared bedding so as to be fully and uniformly supported at true grade and alignment.
- C. Pipe penetrations shall be core drilled to the appropriate size for each pipe entering or exiting the manhole. Jackhammering will not be allowed. Install appropriately sized KOR-N-SEAL boot on each pipe and apply non-shrink grout to remainder of wall penetration to provide positive seal. Non-shrink grout shall be as specified.
- D. Install transition couplings, per Section 02530, within 2 feet of the outside wall of manholes on all pipes; or, a pipe bell shall be located a minimum of 1 foot to a maximum of 2 feet from the outside wall of manholes.
- E. All flow channels within precast bases shall be constructed of non-shrink grout with a minimum depth of three-fourths (<sup>3</sup>/<sub>4</sub>) the contributing pipe diameter. Inverts shall be true to line and grade with flow lines having a minimum drop of 0.1 feet from inlet to outlet (0.2 feet for 90 degree flow direction changes) or as shown on the Contract Drawings. Sides of channels shall be troweled smooth to prevent solids deposition. Ledges or benches shall be sloped towards channel to drain. Provide fine broom finish on ledges.

- F. Clean tongue and grooves of base and wall sections, prime and apply joint sealer prior to setting in place. Ensure that joint has fully seated. Use approved flexible joint sealant and same manufacturer's primer. The height of the lowest wall section shall be at least three (3) times the inside diameter of the largest sewer pipe entering the manhole and in no case less than 2-feet. Wall sections shall be plumb vertical.
- G. Use eccentric cone top section for manholes greater than 6-feet deep. Use extension rings in accordance with the standard detail.
- H. Frame and covers shall be installed so that the cover is exposed and flush with the existing surface. In no case will pavement be raised or lowered to meet the grade of installed manhole frames and covers. Where manholes are installed in sloping areas, the grade of the slope shall intersect the top rim of the cover on the uphill side. Manhole frame shall be sealed to the concrete manhole section with a bed of non-shrink grout on either side of bead of flexible joint sealant. In addition, the frame and cover shall be grouted to the outside of the concrete manhole section.
- I. Manhole installations with tilted or otherwise defective bases, wall sections which are not plumb, covers which do not match existing grade properly, or are otherwise not in specification compliance shall be removed by the Contractor and replaced until acceptable.

## 3.02 BENCH AND CHANNEL EXISTING MANHOLE

- A. Modify or reconstruct manhole bases as required by hand forming channels with nonshrink grout to provide smooth flow surfaces from all inlets to the outlet. Non-shrink grout shall be as specified.
- B. All flow channels shall be constructed with a minimum depth of three-fourths (¾) the contributing pipe diameter. Inverts shall be true to line and grade with flow lines having a minimum drop of 0.2 feet from inlet to outlet.
- C. Shape flow channels to conform to connecting pipe surfaces. Ledges or benches shall be sloped towards channel to drain.
- D. Remove all rough sections or sharp edges that might obstruct flow or cause snags.
- E. Form base channels in conformance with the standard detail drawings.

#### 3.03 NEW MANHOLES ON EXISTING STORM SEWER MAINS

- A. New manholes constructed along existing sewer mains shall, where feasible, utilize precast manhole bases as defined in Paragraph 2.01 A. Existing sewer mains shall be neatly cut or snapped approximately 12 to 18 inches outside the limits of the new manhole base. Pipe stubs, properly cut to length, shall be placed in properly sized cored penetrations and joined to existing sewer mains using appropriate transition couplings as defined in Section 02530.
- B. In situations where it is not feasible or practical to cut in new pre-cast manhole bases on existing sewer mains, cast-in-place bases will be allowed. Contractor shall notify Engineer of conditions warranting cast-in-place bases.

## PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Standard Manholes installed at all depths shall be made on a unit price basis per each, at the price stated on the Bid Form. Payment will include all materials and labor required for complete installation, including excavation and backfill around manholes, all precast components, grouting and shaping of base channels, pipe adapters, manhole penetration seals, Kor-N-Seal or equal, testing, and all else related to this item not paid under other sections.
- B. Payment for the Removal & Replace Exist. Frame & Cover w/ New MH Frame & Cover set to Finished Grade shall be made on a unit price basis per each, at the price stated on the Bid Form and shall include either the salvaging of existing material to the City or the removal and disposal of all manhole frame and cover materials as indicated on the plans. The installation of new heavy duty H-20 loading manhole frame and covers label to match the utility which they are associated with is included in this item. Frame and covers shall be install using method described in the plans. This item shall include all work required for a complete and in place installation of new manhole frame and covers.
- C. Payment for Channeling, Benching and Modification of new manhole bases will be incidental to the cost per each manhole as stated on the bid form. No separate payment will be made and will include all materials, labor and equipment required for complete modification of the manhole base including all penetration coring, cleaning, preparation for cementitious grout all as required for a complete manhole base installation.
- C. Connection of existing piping to new manholes shall be considered incidental to the work. No additional payment will be allowed.

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### SECTION 02720 - AGGREGATE BASE

#### PART 1 GENERAL

#### 1.01 SUMMARY

A. This section includes all work necessary for furnishing, placing, and compacting aggregate base on the prepared surface to the thicknesses and cross sections shown on the Plans or where indicated.

#### 1.02 REFERENCES

- A. ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
- B. OSS Oregon Standard Specifications for Construction, 2015 Edition.

#### 1.03 SUBMITTALS

A. Contractor shall furnish sample of proposed material for visual inspection by Engineer prior to importing to site.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Aggregate leveling course and shoulder rock shall be 1" 0 or  $\frac{3}{4}" 0$  (19.0mm 0) angular crushed rock conforming to OSS Section 00640.
- B. Aggregate sub-base shall be  $1\frac{1}{2}$ " 0 (37.5mm 0) angular crushed rock. Use clean, hard, durable aggregates, reasonably well-graded from the maximum size to dust.
- C. Aggregate leveling course and sub-base shall conform to OSS Section 00640 or shall be obtained from a source pre-approved by the Owner.
- D. Foundation Stabilization Foundation Stabilization: 1½"-0 or 2"-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater or is unsuitable to provide a firm foundation in the opinion of the Engineer.

#### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Remove, haul, and dispose of all formations and materials, natural or man-made, irrespective of nature or conditions encountered, within lines and grades shown on the Plans or defined herein, and as necessary for completion of the proposed improvements. The method of excavation shall be as determined by the Contractor, and as required for special protection of existing improvements. Special care shall be taken to avoid overexcavation below subgrades. Store and protect materials suitable for use as backfill where applicable. Clearing & Grubbing and Removal of Structures and Obstructions to be completed prior to excavation.
- B. Coordinate and provide all utility locates prior to any excavation as required by local state and federal laws and regulations. When the precise location of subsurface structures and/or utilities is unknown, locate such items by hand excavation prior to utilizing

mechanical excavation equipment. Use hand excavation when mechanical equipment might damage existing improvements which are to remain undisturbed. See Division 1 for other requirements.

#### 3.02 WORKMANSHIP

- A. Sequencing and Scheduling Notify Engineer 48-hours prior to placement of aggregate base to permit inspection.
- B. Excavate to proper sub-grade elevations as shown on the Plans or as necessary to provide required thickness of aggregate base.
- C. Preparation of sub-grade Provide a firm sub-grade surface on which aggregate base is to be placed. Scarify sub-grade surface to provide bonding for aggregate base.
  - 1. Sub-grade Overexcavation & Replacement Remove and dispose of any unstable or unsuitable materials as directed by the Engineer. Replace any excavated materials with successive lifts of aggregate sub-base or other materials as directed by the Engineer. Grade and compact, as required, to provide a smooth surface that conforms to the surrounding grades.
  - 2. Place geo-fabric separation liner over areas where over excavation is required to provide a bridge over soft native bearing soils. Liner shall be placed smooth and without wrinkles or folds in the direction of filling with a minimum 2 foot overlap between adjacent rolls.
  - 3. Sub-grade Compaction compact exposed sub-grade.
- D. Mixing Mix to provide a homogeneous mixture of unsegregated and uniformly dispersed materials. Add water or aerate, as necessary, during mixing to achieve optimum moisture content ±2% during placement.
- E. Placement
  - 1. When, in the judgment of the Engineer, the weather is such that satisfactory results cannot be achieved, operations shall be suspended. Owner shall not be liable for damages or claims of any kind or description due to the suspension of operations by the Engineer.
  - 2. Aggregate base materials shall be deposited on the sub-grade at a uniform quantity per linear foot so that the Contractor will not resort to spotting, picking up, or otherwise shifting material. Segregation of aggregates shall be avoided and material so spread shall be free of pockets of coarse or fine materials.
  - 3. Place aggregate base materials such that when compacted and finish graded it will conform to the grades and sections shown on the Plans. Aggregate base materials shall be placed in maximum lifts of 6-inches, or as approved by the Engineer. Place each layer in spreads as wide as practical and to the full width of the course before a succeeding layer is placed.
- F. Compacting and Shaping
  - 1. Aggregate base materials shall be compacted by self-propelled, smooth drum, static or vibratory rollers capable of achieving the specified compaction.

- 2. Shape and maintain the surface of each layer of aggregate base during compaction operations such the surface of each layer is parallel to the established grade and cross section for the finished surface within 0.05 foot.
- 3. Aggregate base materials shall be compacted to 95% maximum dry density as determined by the ASTM D698 test method.
- G. Comply with Section 02321, Compaction Testing.

## 3.03 FOUNDATION STABILIZATION

A. The contractor shall overexcavate the trench to firm undisturbed soils or rock when, in the opinion of the Engineer, the trench foundation materials are not suitable for the support of the pipe. Foundation Stabilization materials, as specified, shall be placed and compacted in lifts not exceeding 6-inches in compacted thickness to the required grade. Each lift shall be compacted to at least 95% of the maximum dry density in accordance with ASTM D698.

### 3.04 DISPOSAL OF EXCESS MATERIALS

A. Excavated materials not suitable or required for backfill shall be hauled away and disposed of on approved sites arranged by the Contractor. No site shall be used for disposal of materials without written approval of the property owner. All costs associated with the hauling and disposal of materials shall be borne by the Contractor. The Contractor shall be entitled to any proceeds received from the sale of excess materials.

### 3.05 TEMPORARY STOCKPILING

- A. Place excavated materials suitable for use as backfill (and not excess material) only within construction easements, right-of-way, or approved work area. Stockpiles shall be placed in such manner as to provide the minimum inconvenience to the public.
- B. The Contractor shall obtain written permission from any property owners prior to placement of stockpiles on private property. Provide copies to the Owner and Engineer. Remove stockpiles as soon as possible and restore sites to affected property owners' satisfaction.
- C. Access to all fire hydrants, water valves and meters shall be maintained. Stockpiles shall not be permitted to block any stormwater drainage ditches, gutters, drain inlets, culverts or natural water courses.
- D. Protect stockpiled material which is to be later incorporated into the work so that excessive wetting or drying of the material does not occur. Material shall be brought to near optimum moisture content prior to placement and compaction. Depending on the moisture content of stockpiled materials, necessary processing may include aeration, mixing and/or wetting. No additional payment will be allowed for protecting or preparing native backfill materials.
- E. If approved native materials become unsuitable (too wet or mixed with unsuitable materials) due to negligence by the Contractor, then imported granular materials may be required for backfilling at the subject location at no additional cost to the Owner.
- F. Comply with all requirements of the 1200-C Construction Stormwater Permit. Provide necessary protection for stockpiled materials so that silt-laden runoff does not occur during rain events and to prevent wind-blown dust from stockpiles.

## PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Measurement and payment for aggregate base as may be required for Roadway Section Removal and Replacement work shall be considered incidental to the work and shall be included within the unit price as stated on the Bid Form for waterline of size and type as installed. Replacement shall be 4" of Asphalt on 8" agg. base minimum. No separate payment will be made for this item.
- B. Payment for Foundation Stabilization will be made on a cubic yard basis. Measurement shall be based on the in-place volume of material excavated, placed and compacted below the pipe bedding material, within the pay limits defined on the Contract Drawings, and shall be approved by the Engineer. Payment shall include all excavation, removal and disposal of existing materials excavated and placement of new foundation material.

### SECTION 02735 - PAVING FABRIC

#### PART 1 GENERAL

### 1.01 SUMMARY

A. This section covers the work necessary to furnish and install paving fabric to act as a stress relieving membrane within the pavement structure between the existing asphalt pavements and new HMAC overlay.

#### 1.02 RELATED SECTIONS

A. Section 02740 – Asphalt Concrete Pavement

#### 1.03 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO) "Standard Specification for Geotextile Specification for Highway Applications" Designation M 288-05.
- B. American Society for Testing and Materials (ASTM):
  - D 276 Method for Identification of Fibers in Textiles (Melting Point).
  - D 3786 Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics .
  - D 4354 Practice for Sampling of Geosynthetics for Testing.
  - D 4355 Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
  - D 4439 Terminology for Geotextiles.
  - D 4533 Test Method for Index Trapezoid Tearing Strength of Geotextiles.
  - D 4632 Test Method for Grab Breaking Load and Elongation of Geotextiles.
  - D 4759 Practice for Determining the Specification Conformance of Geosynthetics.
  - D 4833 Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
  - D 4873 Guide for Identification, Storage, and Handling of Geotextiles.
  - D 5199 Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes.
  - D 5261 Test Method for Measuring Mass per Unit Area of Geotextiles.
- C. Geosynthetic Accreditation Institute Laboratory Accreditation Program (GAI-LAP).

#### 1.04 DEFINITIONS

- A. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.
- B. Maximum Average Roll Value (MaxARV): Property value calculated as typical plus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will be below the value reported.
- C. Typical Roll Value: Property value calculated from average or mean obtained from test data.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Geotextile labeling, shipment and storage shall follow ASTM D 4873.

- B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.
- C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.
- D. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.
- E. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of geotextile material must be discarded before installation.
- F. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 degrees C (160 degrees F) and any other environmental condition that might damage the geotextile.

### 1.06 QUALITY ASSURANCE

- A. Geotextiles shall be subject to sampling and testing to verify conformance with this specification. Sampling for testing shall be in accordance with ASTM D 4354.
- B. Acceptance shall be in accordance with ASTM D 4759 based on testing of either conformance samples obtained using Procedure A of ASTM D 4354, or based on manufacturer's certifications and testing of quality control samples obtained using Procedure B of ASTM D 4354.

## PART 2 PRODUCTS

## 2.01 MATERIALS

- A. Paving Fabric:
  - 1. Polypropylene, staple fiber, needle-punched nonwoven geotextile, calendared on one side.
  - 2. Resistant to ultraviolet degradation.
  - 3. Minimum Average Roll Values (MARV):

Property	Test Method	Units	Property Requirement
Grab Tensile Strength	ASTM D 4632	N	400
		(lbs)	(90)
Grab Elongation	ASTM D 4632	percent	50
Mullen Burst	ASTM D 3786	kPa	1240
		(psi)	(180)
Mass Per Unit Area	ASTM D 5261	g/sm	122
		(oz/sy)	(3.6)
Asphalt Retention	ASTM D6140	L/sq m	0.9
		(gal/sq yd)	(0.20)
Melting Point	ASTM D 276	Degrees C	160
		(Degrees F)	(320)
UV Resistance	ASTM D 4355	percent	70 at 150 hrs

- 4. Paving fabric shall be Petromat 4599 as manufactured by Propex, Inc.; or approved equal.
- B. Tack Coat:
  - 1. The sealant material used to impregnate and seal the geotextile, as well as bond it to both the base pavement and overlay, shall be a paving grade asphalt recommended by the geotextile manufacturer and approved by the Engineer.
  - 2. Over milled asphalt surfaces uncut asphalt cements are the preferred sealants; cationic and anionic emulsions may be used in overlays and with prior approval from Engineer. Cutbacks and emulsions, which contain solvents, shall not be used.
  - 3. Tack coat asphalt cement shall be as defined in Section 02740 unless otherwise modified herein.
- C. Equipment:
  - 1. The asphalt distributor shall be capable of spraying the asphalt sealant at the prescribed uniform application rate. No streaking, skipping, or dripping will be permitted. The distributor shall also be equipped with a hand spray having a single nozzle and positive shut-off valve.
  - 2. Mechanical or manual lay down equipment shall be capable of laying the geotextile smoothly.
  - 3. The following miscellaneous equipment shall be provided: stiff bristle brooms or squeegees to smooth the geotextile; scissors or blades to cut the geotextile; brushes for applying asphalt sealant to geotextile overlaps.
  - 4. Pneumatic rollers shall be used to ensure proper adherence of the paving fabric to the prepared surface.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Existing flexible or rigid pavements scheduled for milling and overlay shall be thoroughly cleaned of all dirt, gravel, loose pavement fragments, weeds, rubbish, and any other debris or deleterious substances prior to application of tack coat asphalt or emulsion so that no damage to the geotextile fabric occurs.
- B. Washed concrete sand may be spread over asphalt-saturated paving fabric to facilitate movement of equipment during construction or to prevent tearing or delamination. Hotmix broadcast in front of construction vehicle tires may also serve this purpose. If sand is applied, excess quantities shall be removed from the paving fabric prior to placing the surface course. Sand is not usually required. However, ambient temperatures are occasionally sufficiently high to cause bleed-through of the asphalt sealant resulting in undesirable paving fabric adhesion to construction vehicle tires.
- C. Neither the asphalt sealant nor the paving fabric shall be placed when weather conditions, in the opinion of the Engineer, are not suitable. Air and pavement temperatures shall be sufficient to allow the asphalt sealant to hold the paving fabric in place. For asphalt cements, air temperature shall be 50°F and rising. For asphalt emulsions, air temperature shall be 60°F and rising.
- D. The surface on which the paving fabric is to be placed shall be reasonably free of dirt, water, vegetation, or other debris. Cracks exceeding 3 mm (1/8 in) in width shall be filled with suitable crack filler. Potholes shall be properly repaired as directed by the Engineer. Fillers shall be allowed to cure prior to paving fabric placement.

E. If milling has penetrated areas below the existing asphalt surface, these areas shall be restored utilizing a dense grade HMAC leveling course as well as any milled surfaces with deeper grooves and near vertical or sharp faces, faulted joints.

### 3.02 INSTALLATION OF TACK COAT

- A. The specified rate of asphalt sealant application must be sufficient to satisfy the asphalt retention properties of the paving fabric and bond the paving fabric and overlay to the old pavement.
- B. When emulsions are used, the application rate must be increased to offset water content of the emulsion.
- C. Application of the sealant shall be by distributor spray bar, with hand spraying kept to a minimum. Temperature of the asphalt sealant shall be sufficiently high to permit uniform spray pattern. For asphalt cements the minimum temperature shall be 300°F. To avoid damage to the paving fabric, however, the distributor tank temperatures shall not exceed 320°F.
- D. A spray pattern for asphalt emulsion is improved by heating. Temperatures between 130°F and 160°F are desirable. A temperature of 160°F shall not be exceeded since higher temperatures may break emulsion.
- E. The target width of asphalt sealant application shall be the paving fabric width plus 150 mm (6 inches). The asphalt sealant shall not be applied any farther in advance of paving fabric placement than the distance the Contractor can maintain free of traffic.
- F. Asphalt spills shall be cleaned from the road surface to avoid flushing and paving fabric movement.
- G. When asphalt emulsions are used, the emulsion shall be cured prior to placing the paving fabric and final wearing surface. Essentially no moisture should remain in the emulsion when paving fabric is placed.

#### 3.03 INSTALLATION OF PAVING FABRIC

- A. The paving fabric shall be placed onto the asphalt sealant (calendared or smooth side up) with minimal wrinkling prior to the time the asphalt has cooled and lost tackiness. As directed by the Engineer, wrinkles or folds in excess of 25 mm (1 in) shall be slit and laid flat.
- B. Pneumatic rolling will be required to maximize paving fabric contact with the pavement surface.
- C. Overlap of paving fabric joints shall be sufficient to ensure full closure of the joint but should not exceed 150 mm. Transverse joints shall be lapped in the direction of paving to prevent edge pickup by the paver. A second application of asphalt sealant to the paving fabric overlaps will be required if in the judgement of the Engineer additional asphalt sealant is needed to ensure proper bonding of the double paving fabric layer.
- D. Removal and replacement of paving fabric that is damaged will be the responsibility of the Contractor. No additional compensation will be allowed.

### 3.04 PROTECTION

- A. Traffic will not be allowed on the paving fabric except emergency and construction vehicles as necessary.
- B. Placement of the hot-mix overlay should closely follow paving fabric laydown. The temperature of the mix shall not exceed 320°F. In the event asphalt bleeds through the paving fabric causing construction problems before the overlay is placed, the affected areas shall be blotted by spreading sand. To avoid movement of, or damage to the seal-coat saturated paving fabric, turning of the paver and other vehicles shall be gradual and kept to a minimum.
- C. Prior to placing a seal coat (or thin overlay such as an open-graded friction course), lightly sand the paving fabric at a spread rate of 0.65 to kg per m2 (0.15 to 0.20 lb/ft2), and pneumatically roll the paving fabric tightly into the sealant.

## PART 4 SPECIAL PROVISIONS

### 4.01 MEASUREMENT AND PAYMENT

A. Payment for Paving Fabric will be made on a unit price basis per square yard at the price stated on the Bid Form. Payment shall include all materials, labor and equipment required to complete all work associated with placement of asphalt tack coat and paving fabric prior to placement of asphalt concrete overlay.

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### SECTION 02740 - HOT MIX ASPHALT CONCRETE PAVEMENT

#### PART 1 GENERAL

### 1.01 SUMMARY

A. This section includes furnishing all materials, labor and equipment necessary to construct asphalt concrete pavement to the lines, grades and cross sections shown or established, including one or more courses and overlays. Work shall be performed in conformance with any applicable State, County or City Standards.

### PART 2 PRODUCTS

#### 2.01 DEFINITIONS

- A. Hot Mixed Asphalt Concrete (HMAC) Asphalt concrete is a hot mix of asphaltic cement; well graded, high quality aggregate; mineral filler and additives, as required; plant mixed into a uniformly coated mass, hot laid in on a prepared foundation, and compacted to a specified density.
- B. Oregon Standard Specifications (OSS) The 2008 Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction.

### 2.02 MATERIALS

- A. Unless otherwise specified herein, types, grades, quality and proportions of materials shall conform to specified and/or applicable sections of the current Oregon Standard Specifications.
- B. HMAC shall be <u>Level 3 HMAC, ½-inch Dense Graded Mix</u> in accordance with OSS Section 00745.
- C. Asphalt Tack Coat shall consist of CSS-1 or CSS-1h emulsified asphalt (EA) tack coat conforming to OSS 00730.
- D. Base Aggregate shall be as specified in Section 02720 of these specifications.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. Unless otherwise specified herein, HMAC shall be mixed, processed, hauled, laid, compacted, and finished in accordance with OSS Section 00745.
  - B. Notify the Engineer at least 48-hours prior to placement of base aggregate and asphalt concrete pavement to permit inspection.
  - C. When, in the judgment of the Engineer, the weather is such that satisfactory results cannot be achieved asphalt concrete paving operations shall be suspended. Owner shall not be liable for damages or claims of any kind or description due to the suspension of operations by the Engineer. HMAC shall not be placed when the ambient temperature is below 35° F.
  - D. Adhere to all applicable State and/or OSHA regulations pertaining to road closure, traffic control, and other related safety precautions.

- E. To provide for the convenience and safety of the traveling public, pavement replacement shall be performed immediately following the completion of backfilling operations. In the event that pavement replacement cannot be performed as such, the Contractor shall maintain the trench backfill on a daily basis, as directed, until pavement replacement has been completed.
- F. Subgrade and aggregate base shall be prepared, compacted and finished in accordance with Section 02720.
- G. Pavement Sawcutting
  - 1. Utility trenches in existing pavement areas shall be sawcut immediately prior to repaving. Sawcuts shall be made a minimum of 6-inches outside the limits of the trench, or to the outer extents of pavement damaged as a result of the Contractor's operations, whichever is greater.
- H. Tack Coat Asphalt
  - 1. Contact surfaces of manholes, catch basins, gutters and existing pavements shall be treated with a layer of tack coat asphalt. Do not place on wet surfaces.
  - 2. Joints between existing and new AC pavement shall be filled with tack coat asphalt.
  - 3. Apply tack coat asphalt with a pressure distributor capable of uniformly applying the emulsified asphalt at even heat on variable surface widths up to 16-feet, at readily determined and controlled rates from 0.05 to 0.20 gallons per square yard, and with uniform pressure. Pressure distributor shall include a tachometer, pressure gages, accurate volume measuring devices and a thermometer for measuring temperature of tank contents. Pressure distributor shall be equipped with a positive power asphalt pump and full circulation spray bars adjustable both laterally and vertically. Set bar height for triple lap coverage.
  - 4. Minimum surface temperature at the time of placement of tack coat asphalt shall not be less than 50° F.
  - 5. Tack coat shall only be applied to clean dry surfaces. All loose material should be removed by sweeping, flushing with water or other approved methods.

Surface	Application Rate (gallons / yd <sup>2</sup> )		
Surface	Undiluted	Diluted 1:1 with Water	
New HMAC	0.05 - 0.07	0.10 – 0.13	
Oxidized HMAC	0.07 – 0.10	0.13 – 0.20	
Milled HMAC	0.10 – 0.13	0.20+	

6. Apply tack coat asphalt at the following rates for the indicated surfaces.

- 7. Tack coat asphalt shall be at a temperature between 140° F and 185° F as recommended by the manufacturer at the time of application.
- 8. Do not place HMAC on the tack coat until the asphalt separates from the water, but before it loses its tackiness.
- I. Asphalt Concrete Pavement

- 1. HMAC shall be a minimum of 250° F at the time of placement.
- 2. Storage of HMAC shall comply with Oregon Standard Specifications for Construction (OSSC) 00745.45.
- 3. Control of line and grade shall be manual.
- 4. HMAC shall be covered during hauling if rain or cold air temperatures are encountered any time between loading and placement. HMAC will be rejected if any of the following is observed: mix falls below minimum specified temperature; slumping or separating; solidifying or crusting; absorbing moisture. Rejected loads shall be disposed of at the Contractor's expense.
- 5. Deposit HMAC from the hauling vehicles so segregation is prevented. Depositing of HMAC shall comply with Oregon Standard Specifications for Construction (OSSC) 00745.48.
- 6. Placement
  - a. HMAC should be placed using a self-contained, self-propelled paver supported on tracks or wheels that do not contact the mix being placed.
  - b. When leveling irregular surfaces and raising low areas, do not exceed 2inches actual compacted thickness on any one lift.
  - c. Place the mix in the number of lifts and courses, and to the compacted thickness for each lift and course as shown on the Plans. Limit the minimum lift thickness to twice the maximum aggregate size in the mix.
- 7. The compacted depth of new asphalt concrete pavement on public streets shall be 2-inches, minimum. Asphalt concrete paving for utility trench patches shall be 4-inches, minimum sat in two (2) 2-inch lifts, or shall match the existing paving, whichever is greater. Asphalt concrete overlays on public streets shall have a minimum thickness of 2-inches. On non-public roads or driveways, match existing thickness, with a minimum thickness of 2-inches. Asphalt concrete pavement in excess of 2-inches thick shall be constructed in multiple lifts of approximately equal thickness. The maximum compacted thickness of any individual lift shall not exceed 2-inches unless approved otherwise.
- 8. Pavement shall be placed, shaped, compacted and finished to the grades and cross sections shown on the Plans or established. Taper new overlays at limits to match existing asphalt pavement.
- 9. HMAC shall be compacted using self-propelled steel wheeled static rollers, vibratory rollers, or pneumatic tired rollers capable of achieving the minimum compaction specified. If vibratory rollers are used, they should be specifically designed for compaction of HMAC, have adjustable amplitude and frequency, and be capable of at least 2000 vibrations per minute. Finish rolling should be performed by a static roller or a vibratory roller in the static mode.
- 10. Asphalt concrete pavement shall be compacted to a minimum of 92% relative compaction with the theoretical maximum density determined by AASHTO T-209. Testing shall be performed at random locations using a nuclear gauge operated in the back-scatter mode. At least one density test shall be performed every 1000 lineal feet on each spread or a minimum of one test each day of production.

J. No traffic shall come in contact with any newly paved surface until surface has cooled and set sufficiently to prevent marking. The Contractor is responsible for traffic control.

## K. Warranty

- 1. Contractor shall maintain all asphalt concrete paved areas and shall furnish all required materials and workmanship at no additional cost to the Owner for a period of one year following the Owner's acceptance of the complete project.
- 2. If any newly paved asphalt concrete surfaces settles, cracks, breaks, or becomes otherwise defective within the warranty period as described herein, then the deficiencies or damages in surfacing shall be immediately repaired by the Contractor upon request and in a manner approved by the Engineer.
- 3. All costs incurred in the repair of deficiencies or damages shall be borne by the Contractor, with no additional compensation allowed.

### PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Measurement and payment for the excavation, disposal, backfill, and other preparation of trenches is included within the lineal foot cost for Trench Excavation, Bedding & Backfill.
- B. Utility Trenches Class "B", "C" backfill or CLSM backfill shall be brought to the surface and used as Aggregate Base with a 2-inch thick cold patch cap. No separate measurement and payment will be made for Aggregate Base.
- C. Sawcutting The cost for sawcutting existing pavement adjacent to new utility trenches and shall be considered incidental to the work. No additional compensation will be allowed for this item.
- D. Asphalt Concrete Pavement
  - 1. Measurement and payment for Asphalt Pavement (2-inches thick) shall be made on a unit price basis per square yard (sy) for the amount stated on the Bid Form. Payment shall include compensation for all work necessary to prepare and construct the asphalt concrete pavement. There will be no separate measurement of bituminous cements or additives contained in the mixture or used otherwise in the work. Payment will be made only for material incorporated into the specified limits.
  - 2. Measurement and payment for Cold Plane / Grind Pavement Removal (2-inches thick) shall be made on a unit price basis per square yard (sy) for the amount stated on the Bid Form. Payment shall include compensation for all work necessary to prepare and remove the asphalt concrete pavement. There will be no separate payment made. Payment will be made only in-place and constructed to the satisfaction of the Engineer.
  - 3. Measurement and payment for Roadway section replacement (4" of Asphalt on 8" of Agg. Base) shall be incidental to utility trench installation. See section 02315 and 02510. Payment shall include compensation for all work necessary to prepare and construct the asphalt concrete pavement section including required aggregate base material compacted to 95% M.P. and the installation of asphalt pavement in two (2) 2" thick sections compacted to between 92% and 96% S.P. This item includes all work for a complete installation which is not included in any

other items. There will be no separate measurement / payment for bituminous cements or additives contained in the mixture or used otherwise in the work. Payment will be made only in-place and constructed to the satisfaction of the Engineer.

### SECTION 02760 – PAVEMENT MARKINGS

#### PART 1 GENERAL

#### 1.01 SUMMARY

A. This Section includes all materials and workmanship for durable permanent pavement striping and pavement markings.

#### 1.02 DEFINITIONS

- A. Oregon Standard Specifications (OSS) The joint Oregon Department of Transportation/APWA Oregon Chapter Standard Specifications for Construction.
- B. ODOT Qualified Products List (QPL) The Qualified Products List published every six months by the Oregon Department of Transportation, Construction Section.

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. All markings shall be retroreflective thermoplastic.
- B. 4" Striping White and yellow, solid and skip lines shall be 15 mils thickness retroreflective thermoplastic for each marking application.
- C. Thermoplastic shall be reflectorized in type and shall be specifically made for application upon asphaltic concrete surfaces and shall comply with related sections of the ODOT Standard Specifications for Construction.
- D. Crosswalks, stop bars, directional arrows and bike markings shall be Thermoplastic and white in color. Thermoplastic pavement markings shall be Type B (preformed fused thermoplastic film) as specified in Section 00867 of the ODOT Standard Specifications for Construction.

### PART 3 EXECUTION

- 3.01 DURABLE PAVEMENT STRIPING APPLICATION
  - A. Apply striping to the lines and locations shown on the Plans or as directed.
  - B. Lay out a continuous guideline for each line and receive approval from the Engineer prior to striping.
  - C. Place permanent striping prior to traffic being allowed on the pavement. If scheduling does not allow placement of permanent striping prior to allowing traffic on the roadway, install and maintain flexible pavement markers until permanent striping is completed.
  - D. Apply striping material only when the surface is sufficiently dry, clean and free of contaminants such as surface oils. Some striping materials require the asphalt to cure for several weeks prior to placement.
  - E. Place striping parallel and true to line. Place skip stripes so that they are in cycle with existing striping on at least one end of the project. Allowable tolerances for application are as follows:

- 1. Side to Side  $-\frac{1}{2}$  inch on tangents; 1 inch on curves.
- 2. Length of Skips 10 feet +/- 2 inches.
- End to End on Skips 30 feet +/- 2 inches. Place skips on cycle to a tolerance of 2 inches. A tolerance of 12 inches will be allowed on the first skip of a run, but it shall be on cycle in one skip.
- 4. Double Lines Parallel, with a gap tolerance of +/- 3/8 inch.

### 3.02 FINISHING AND CLEANUP

- A. Protect applied markings from traffic until sufficiently dry to prevent damage or tracking by normal traffic movements. At a minimum, place cones or tubular markers next to all pavement markings, and place barricades at all areas where cross traffic is anticipated.
- B. Remove or repair all unacceptable work and dispose of at the Contractor's expense. Repair or replace unacceptable work immediately if it causes a safety problem. The removed material becomes the property of the Contractor. If additional traffic control is required for removal of unacceptable material, provide it as directed and at no additional cost to the Owner.
- C. Do not open up any work area to traffic that is not adequately striped and suitable for safe driving.

## PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Roadway Striping shall be made on a unit price basis per lineal foot as stated on the Bid Form. Payment will include all materials, labor and equipment required for layout and application of thermoplastic pavement fog lines, bike lane and centerline striping as described herein and as shown on the plans. No separate payment will be allowed.
  - B. Payment for white thermoplastic striping for crosswalks and stop bars shall be made on a unit price basis per lineal foot for the amount stated on the Bid Form. Payment shall include all materials, labor and equipment as required for the layout and installation of the thermoplastic striping as shown on the Plans and Details and as described herein. No separate payment will be made.
  - C. Payment for other pavement markings (not striping), such as directional arrows, bike lane symbols, lettering, arrows etc, shall be made on a unit price basis for the amount stated on the Bid Form. Payment shall include compensation for all materials, labor and equipment necessary for the layout and installation of the thermoplastic roadway markings as shown in the Drawings. No separate payment will be made.

### SECTION 02770 - CURBS & GUTTERS

#### PART 1 GENERAL

### 1.01 SUMMARY

A. The work in this section includes the furnishing of all labor, materials, equipment and performing all work for the placement of new curbs and gutters as shown on the Plans and as required for roadway improvements.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Concrete shall be as specified in Section 03300.
- B. Expansion and joint filler shall be <sup>1</sup>/<sub>2</sub>-inch thick preformed asphalt fiberboard conforming to ASTM D994.
- C. Poured joint sealer for expansion joints shall be polyurethane-base, non-sag elastomeric sealant, and gray in color. Sika Corporation "Sikaflex-1A" or approved equal.

### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. The dimensions of the curbs and gutters shall conform to the details shown within the Construction Plans.
- B. Curbs and gutters shall be placed on compacted aggregate base of <sup>3</sup>/<sub>4</sub>"-0 materials; aggregate base shall be in a moist condition. A minimum of 4-inches of compacted aggregate shall be used.
- C. Forms shall have sufficient strength to resist the pressure of the concrete and to prevent leakage. Forms shall extend for the full depth of concrete and shall be adequately braced. Forms shall be cleaned and coated with an appropriate release agent before concrete is placed against them. Face forms shall be removed as soon as possible to permit finishing of face. Front and back forms shall be removed, after concrete has set, without damage to the concrete.
- D. Concrete shall be deposited into the forms without segregation and then tamped and spaded for complete consolidation. Mechanical vibration may also be used.
- E. Joints shall be placed at appropriate intervals for the section replaced. Maximum spacing of isolation joints shall be 50 feet, contraction joints shall be 10 feet all other control joints shall be 15-feet and shall match same spacing as concrete sidewalk.

### PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

A. Measurement and Payment for new typical standard Curb and Gutters shall be on a lineal foot basis for the amount as stated on the Bid Form, measurement shall be taken at the face of the curb at flow line. Payment shall include compensation for installation of aggregate base material, placement of concrete, backfilling, expansion joints, finishing and curing, testing as required for complete placement.

### SECTION 02772 - CATCH BASINS

#### PART 1 GENERAL

### 1.01 SUMMARY

- A. This section includes the furnishing and installation of catch basins. Catch basins shall conform to the type specified and as shown on the Plans and shall include frames and grates.
- B. Catch basins shall be precast unless specified otherwise or as approved by the Engineer. Catch basins shall conform to the sizes, dimensions and locations as shown on the Plans.
- C. Minor revisions in the new catch basins may be required to allow for adjustment of new storm drain pipe grades. The Contractor shall field verify pipe penetrations and dimensions (height) required and shall not be entitled to any additional compensation for revising precast catch basins to allow for minor filed revisions.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Catch Basins
  - 1. Type 3
    - a. Catch Basin shall be precast to the sizes shown within the details of these Plans.
    - b. Type 3 catch basin shall be per City of Florence standard detail drawing F-305A.
    - c. Frame and grate shall conform to the City of Florence standard detail drawing F-305B. Grate shall be dipped in hot asphalt prior to placement.
- B. Curb Inlets
  - 1. Curb Inlets shall be per City of Florence Standard Detail Drawing F-304.
    - a. Curb Inlets shall be precast to the sizes shown within the details of these Plans.
- C. Area Drain
  - 1. Reinforced Concrete Pipe (RCP)
    - a. Pipe and fittings shall conform to the requirements of ASTM C76 or ASTM C655.
    - b. Frame and grate shall be Olympic Foundry Model No. MH9G or approved equal.
    - c. Concrete for base shall conform with Section 03300-2.
- D. Grout shall be non-shrink as specified in Section 03600.

- E. Aggregate base material shall conform to Section 02720.
- F. Cast-in-place concrete shall conform to Section 03300.

### PART 3 EXECUTION

#### 3.01 GENERAL

- A. Catch Basins and Curb Inlets shall be pre-cast reinforced concrete with a minimum wall thickness of 6 inches, conforming to ASTM C478. Concrete used in forming the structure shall have a minimum compressive strength of 4000 psi at 28 days.
- B. Connecting pipe shall be placed the full thickness of wall and flush with inner face. Place pipe at the required grade and alignment. Connect pipe to each catch basin and area drain with grout as required for watertight joints.
- C. Precast catch basins and area drains shall be installed per manufacturer's recommendations.
- D. Aggregate base material shall be compacted to at least 95 percent of maximum density as determined by AASHTO T-180. Unless otherwise shown, depth of base material shall be a minimum of 6-inches.

### PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for each type of Catch Basin and Curb Inlet shall be on a unit price basis for each as stated on the Bid Form. Payment shall include precast catch basin/curb inlet, top, frame and grate(s), cast-in-place concrete, reinforcing steel, aggregate base, excavation and backfill and all other related work for a complete installation and connection of storm drain piping.

### SECTION 02775 - SIDEWALKS, DRIVEWAY APPROACHES AND SIDEWALK RAMPS

#### PART 1 GENERAL

### 1.01 SUMMARY

A. The work in this section includes the furnishing of all labor, materials, equipment and performing all work for the placement of new sidewalks, driveway approaches, valley gutters and sidewalk access ramps using Portland cement concrete.

#### 1.02 RELATED SECTIONS

- A. Section 02770 Curbs and Gutters
- B. Section 03300 Cast in Place Concrete

#### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Concrete shall be as specified in Section 03300.
- B. Expansion and joint filler shall be ½-inch thick preformed asphalt fiberboard conforming to ASTM D994.
- C. Poured joint sealer for expansion joints shall be polyurethane-base, non-sag elastomeric sealant, and gray in color. Sika Corporation "Sikaflex-1A" or approved equal.
- D. Handicap accessible ramp grades shall meet ADA Standards. Optional Calculation Tables for Point Elevations available in the Plan Details.
- E. If required or indicated on the plans, reinforcing steel shall be as specified in Section 03200.
- F. Aggregate base shall be as specified in Section 02720. If no specific size or grade is noted, furnish either 1"-0 or <sup>3</sup>/<sub>4</sub>"-0 as directed by the Engineer a minimum of four (4) inches thick.
- G. Truncated Domes (Sidewalk Ramps) with detectable warning surfaces for sidewalk ramps shall be supplied by Armor-Tile, Detectable Warnings systems or other approved equal.

#### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Properly prepare bedding and foundations using appropriate materials and workmanship, depths, widths, and cross sections shown on the plans and details or as directed.
- B. Bring areas on which structures are to be constructed to established line, and make firm, dry and free of all unsuitable or deleterious materials before placing concrete. Existing concrete surfaces shall be clean and moist at the time of placing new concrete.
- C. Forms shall have sufficient strength to resist the pressure of the concrete and to prevent leakage. Forms shall extend for the full depth of concrete and shall be adequately braced. Forms shall be cleaned and coated with an appropriate release agent before

concrete is placed against them. Face forms shall be removed as soon as possible to permit finishing of face. Front and back forms shall be removed, after concrete has set, without damage to the concrete.

- D. Concrete shall be deposited into the forms without segregation and then tamped and spaded for complete consolidation. Mechanical vibration may also be used.
  - Sidewalks shall be 4-inches thick Portland cement concrete placed on a minimum of four (4) inches of compacted <sup>3</sup>/<sub>4</sub>"-0 aggregate base material and shall match existing sidewalks at limits of replacement.
  - 2. Handicap accessible ramps grades shall meet ADA Standards.
  - 3. Scored joints shall be required at 5-foot centers.
  - 4. Protect and keep moist during curing.
- E. Joints shall be placed at appropriate intervals for the section replaced. Joints shall be the preformed filler type and shall be not less than ½ inch wide and placed flush or no more than 1/8 inch below the concrete surface.
- F. Construct suitable connections between new and existing concrete where existing driveways, walks, and other structures are cut back to permit the new construction or where the new construction abuts existing concrete. Unless shown or directed otherwise, furnish and place minimum ½ inch think preformed expansion joint filler between new and existing concrete.
  - 1. Between walks, monolithic curbs and sidewalks, and surfacing, provide expansion joints.
  - 2. Transversely in walks opposite expansion joints in adjoining curbs and elsewhere so the distance between joints does not exceed 45 feet.
  - 3. Transversely in walks at a distance of 16 feet to 8 feet from the ends of walks which abut curbs.
  - 4. Around poles, fire hydrants, posts, boxes, and other fixtures which protrude through or against the structures.
- G. Surface Finishing
  - 1. Remove forms, if any, from structures after the concrete has taken its initial set and while the concrete is still green.
  - 2. Repair minor defects with mortar containing one part Portland cement and two parts sand. Do not plaster exposed surfaces.
  - 3. The top and face of the sidewalk shall be true and straight, free from humps, sags, or other irregularities. The surface shall not vary more than ¼ inch from the edge of a 12-foot-long straightedge laid on the top or face of the structure, except in curves. Contractor shall furnish the straightedge and operate it for testing, if needed.
  - 4. Finish concrete surfaces to smooth and uniform texture by troweling, floating, and cross brooming. Lightly groove or mark surfaces into squares or other

shapes to match markings on similar or existing surfaces in the vicinity, as directed.

5. On all sidewalk ramps and accessible route islands, install truncated domes as shown. Place according to the manufacturer's recommendations.

### 3.02 Curing

- 1. Cure and protect concrete after placing and finishing.
- 2. Keep the concrete free from contact, strain, and public traffic for at least seven calendar days, or longer, as directed.
- 3. Do not apply curing compounds to the designated truncated dome areas of sidewalk ramps and accessible routes.

## PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

- A. Payment for Standard 4,000 PSI Concrete Sidewalk with 4" Aggregate Base shall be on a square foot basis for the amount as stated on the Bid Form for each type. Measurement shall be from back of curb for total lineal footage with cross-sections from back of curb to back of walk at each width change for the total square footage of the sidewalk. Sidewalk along the back of pedestrian ramps or driveway aprons shall be paid for under those items. Payment shall include compensation for all labor and materials necessary for the excavation, preparation and placement of aggregate base materials pertaining to sidewalks, all necessary formwork, backfilling, placement of concrete, expansion joints, finishing, curing, testing and all else required for complete construction of new sidewalks.
- B. Payment for Standard 4,000 PSI 6"/8" thick Driveway with 8" Aggregate Base shall be on a square foot basis for the amount as stated on the Bid Form for each type. Measurement shall be from lip of gutter to back of sidewalk for the width of the driveway apron. Payment shall include compensation for all labor and materials necessary for the excavation, preparation and placement of aggregate base materials pertaining to driveways, all necessary formwork, backfilling, placement of concrete, expansion joints, finishing, curing, testing and all else required for complete placement of new driveways.
- C. Payment for 6" thick 4,000 PSI ADA compliant Pedestrian Ramp with 6" Aggregate Base shall be made on a unit price basis per each for the amount stated on the Bid Form. Measurement shall be by each observed to be to the satisfaction of the Engineer. Payment shall include compensation for all labor and materials necessary for the excavation, preparation of aggregate base materials pertaining to ADA ramps as shown on the project drawing and shall include adjacent reinforced and unreinforced concrete flat work, all necessary formwork, backfilling, placement of concrete, expansion joints, Truncated Domes, finishing, curing, testing and all else required for a complete placement of new ADA ramps.
  - 1. Truncated Domes shall be considered incidental to the work associated with the installation of ADA ramps. No additional compensation shall be made for the labor and materials required for the placement of truncated domes.
  - 2. Adjacent unreinforced/reinforced concrete flat (valley gutters) work shall be considered incidental to the work associated with the installation of ADA ramps.

No additional compensation shall be made for the labor and materials required for the placement of concrete flat work.

- 3. Concrete header curbs be considered incidental to the work associated with the installation of ADA ramps. No additional compensation shall be made for the labor and materials required for the placement of concrete header curbs.
- D. Measurement and Payment for Valley Gutters & other concretes located within the traveled way shall be included in the unit cost for ADA Pedestrian Ramps as stated on the Bid Form, regardless of thickness. Payment shall include compensation for all labor and materials necessary for the preparation and placement of aggregate base materials pertaining to valley gutters, all necessary formwork, reinforcement, backfilling, placement of concrete, expansion joints, finishing, curing and all else required for complete construction of new valley gutters.

### SECTION 02900 – LANDSCAPE RESTORATION & CLEANUP

#### PART 1 GENERAL

### 1.01 SUMMARY

- A. This section covers the work necessary to reseed, restore and cleanup the site(s). Work shall include the removal of all construction equipment, rubbish, construction debris, and unused materials of any kind resulting from the project activities.
- B. Site cleanup shall include the cleanup of all pavement surfaces, whether new or existing within the limits of the project and shall include the replacement of any disturbed pavement markings.

#### PART 2 PRODUCTS

- 2.01 RESEEDING MATERIALS
  - A. Grass seed shall be from blue tag stock and from the latest crop available. Deliver each variety in standard containers labeled in accordance with Oregon State laws and U.S. Department of Agriculture rules and regulations under the Federal Seed Act. Provide with label showing seed variety, percentage of purity, germination, maximum weed content, date of test within nine months of date of delivery, and as set forth in the General Seed Certification Standard by the Oregon State University Certification Board. Mold or other evidence of container having been wet or otherwise damaged will be cause for rejection of each lot of seed. Grass seed may be delivered to the project as a mixture provided each variety of grass seed in the mixture is identified and labeled as specified.
  - B. Where imported topsoil is required, provide natural, fertile, friable topsoil, representative of local productive soil, and 90% free of clay lumps or other foreign matter larger than 2-inches in diameter, not frozen or muddy, with pH 5.0 to 7.0, and not less than 3% humus as determined by loss of ignition of moisture-free samples dried at 100° C. Gravel portion (particles larger than 2 mm) shall not exceed 15% of total volume. Topsoil shall be free of quack grass, horsetail and other noxious vegetation and seed. Should such regenerative material be present in the soil, all resultant growth, both surface and root, shall be removed by the Contractor within 1-year of acceptance of the work at no expense to the Owner.
  - C. Provide a lime compound of ground dolomitic limestone not less than 85% total carbonates and magnesium, ground so that 50% passes a number 100 sieve and 90% passes a number 20 sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the number 100 sieve.
  - D. Furnish fertilizer in moisture-proof bags marked with weight and the manufacturer's certified analysis of the contents showing the percentage for each ingredient. Furnish fertilizer in a dry condition free from lumps and caking, in granular or palletized form, of standard commercial grade conforming to all State and Federal regulations and to the standards of the Association of Official Agricultural Chemists.
  - E. Provide all other materials required to accomplish the work specified.

## PART 3 EXECUTION

- 3.01 WORKMANSHIP
  - A. Surface Dressing
    - 1. Slopes, sidewalk areas, planting areas, easements and roadways shall be smoothed and dressed to the required cross section and grade by means of a grading machine insofar as it is possible to do without damaging the work or existing improvements, trees and shrubs. Supplement machine dressing by hand work as directed.
    - 2. Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. Grade all areas true to line and grade as shown or as approved. Where the existing planting is below sidewalk and curb, fill and dress the area to the walk regardless of limits shown. Wherever fill material is required in the planting area, make finished surface high enough to allow for final settlement.
  - B. Remove and dispose of all excavated or construction materials, equipment, and rubbish of all kinds resulting from the work. Where brush and trees beyond the limits of the project have been disturbed or damaged, remove and dispose of or restore same, as directed, at no expense to the Owner.
  - C. Clean all drainage facilities such as inlets, catch basins, culverts and open ditches of all excess material or debris resulting from the work, to the satisfaction of the Owner.
  - D. Clean all pavement surfaces, whether new or existing within the limits of the project. Clean existing improvements such as curbs, gutters, walls, sidewalks, castings for manholes, monuments, water gates, lamp poles, vaults, signs, and other similar installations as approved. Flush the roadway with a pressure type flusher as approved. Hand sweep or flush all sidewalks as directed.
  - E. Restoring Planted Areas
    - 1. Hand rake and drag all formerly grassed and/or planted areas leaving disturbed areas free from rocks, gravel, clay, or any other foreign material and ready, in all respects, for seeding. The finished surface shall conform to the original surface, be free draining and free from holes, rough spots, or other surface features detrimental to a seeded area.
    - 2. Plant grass seed only at times when local weather and other conditions are favorable to the preparation of the soil and to the germination and growth of grass. Sow grassed areas evenly with a mechanical spreader at a rate of one pound per 300 square feet, roll with packer to cover seed, and water with fine spray. Method of seeding may be varied as approved, however, responsibility to establish a smooth, uniformly grassed area will not be waived.

## PART 4 SPECIAL PROVISIONS

#### 4.01 MEASUREMENT AND PAYMENT

A. Payment for Landscape Restoration will be made on a lump sum basis as stated on the Bid Form, and shall include topsoil, seed, bark, mulch, landscape shrubs/trees, gravel shoulder, site cleanup and all other materials and work required to complete the work to replace landscaping adjacent to the work to a level which is equal to that prior to construction in the opinion of the Engineer.
# DIVISION 3- CONCRETE TABLE OF CONTENTS

SECTION NO.	TITLE
SECTION 03110	CONCRETE FORMWORK
SECTION 03200	CONCRETE REINFORCEMENT
SECTION 03300	CAST IN PLACE CONCRETE
SECTION 03600	GROUT

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### SECTION 03110 - CONCRETE FORMWORK AND ACCESSORIES

### PART 1 GENERAL

### 1.01 WORK INCLUDED

- A. Concrete formwork required for all project structural concrete.
- B. Formwork design, placement, proper securing and support, and removal.
- C. Coordination for various wall and slab penetration locations and sizes including sleeve positioning for casting in place.

### 1.02 RELATED SECTIONS

- A. Section 03300 Cast-In-Place Concrete
- B. Section 03200 Concrete Reinforcement

### 1.03 REFERENCES

- A. American Concrete Institute (ACI) 318-11, Chapter 6 Formwork, Embedded Pipes, and Construction Joints.
- B. ACI 347R-04 Guide to Formwork for Concrete
- C. ACI Special Publication, SP-4(7<sup>th</sup>) Formwork for Concrete

### 1.04 QUALITY ASSURANCE

- A. The formwork shall be designed for the loads, lateral pressure, and allowable stresses outlined in "Recommended Practice for Concrete Formwork", ACI 347 and for design considerations, wind loads, allowable stresses and other applicable requirements of the local building code. The design and construction of the formwork shall be the responsibility of the CONTRACTOR. Form design shall be certified by a Registered Structural Engineer.
- B. Forms shall be constructed by laborers experienced in concrete formwork erection. Formwork shall be constructed such that the hardened surfaces shall conform to the tolerance limits of ACI 347.
- C. Formwork shall be true in every respect to produce hardened concrete to the required shape, size, grade, and alignment as indicated on the Construction Drawings, and of sufficient strength, bracing, and rigidity to maintain their position and shape under the loads and operations incidental to placing and curing the concrete, as well as other forces resulting from the movement of the forms. The forms shall be mortar-tight at the time concrete is placed in them and shall be so constructed that the surfaces of the finished concrete will be reasonably free from ridges, fins, offsets, or similar defects. Adequate and suitable means for removing the forms without injury to the surfaces or edges of the finished concrete shall be provided.
- D. Resulting work which is not in conformance with applicable contract specifications shall be promptly removed and replaced.

### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect form materials from damage that may affect finish appearance or form stability.
- B. Keep forms clean and free from deleterious materials. Protect form coating to prevent contamination.
- C. Protect form ties from rusting.

### PART 2 PRODUCTS

- 2.01 FORM MATERIALS
  - A. Plywood Forms will be grade marked B-B Plyform, Exterior Class 1 and 2 and HDO Medium Density Overlaid Plywood Concrete Form, B-Matte Formquard or equal, conforming to the requirements of U.S. Products Standard PS-1.
  - B. Metal Forms will use smooth metal plate free from surface irregularities.

#### 2.02 ACCESSORIES

- A. Form Ties
  - 1. Shall be factory fabricated form ties, snap-off type of adequate design to prevent form deflection and concrete spalling upon removal. The permanently embedded portion shall terminate not less than <sup>3</sup>/<sub>4</sub>-inch from the face of finished concrete. The permanently embedded portion shall have a waterseal washer located at the approximate center of walls.
  - 2. Breakback Distance: Ties will be placed so that the set back in the concrete is such that the portion of the tie remaining after snap-off and removal of exterior portions is at least 1 inches back from the concrete surface.
  - 3. Do not use wire ties and wood spacers
- D. Form Release Agents
  - 1. Form coating will be non-grain-raising and non-staining resin or polymer type that will not leave residual matter on the surface of the concrete or adversely affect bonding to concrete of paint, plaster, mortar, protective coatings, waterproofing or other applied materials. Coatings containing mineral oils, paraffin, and other non-drying ingredients are not permitted. For concrete surfaces contacting potable stored water, the coatings and form release agents shall be completely non-toxic and approved by the EPA for the intended use.
- E. Form Joint Caulking
  - 1. Manufacturer and Brand: Sonneborn Sonolac, Dap Acrylic Latex, or approved
- E. Chamfer Strips clear white pine or similar with planed surface against concrete.

### PART 3 EXECUTION

### 3.01 PREPARATION

A. Ensure that reinforcing steel is properly placed according to the spacing and tolerances required, and that proper inspection has been conducted.

- B. Ensure waterstops are installed as required when placed prior to formwork.
- C. Review plans for wall and slab penetrations and imbedded items.
- D. Remove debris and foreign matter from formwork. Clean form contact surfaces. Replace with new material when necessary or when directed.
- E. Remove loose rust and foreign matter from reusable hardware prior to installation into Formwork.
- F. Re-use Forms only when contact surfaces equal original use and forms have been adequately cleaned.

### 3.02 INSTALLATION

- A. Comply with ACI 318 and ACI 347. Fabricate with facing materials that produce the specified tolerance requirements of ACI SP-4, produce true surfaces and lines, sharp corners, and surfaces free of offsets, bulges, ridges, etc.
- B. Carefully conform to the shapes, lines and dimensions of the drawings. Ensure that edges are chamfered where shown. Form any Surface Indentations shown on the Drawings.
- C. Arrange to provide concrete cold joints as indicated on the drawings. Unless otherwise directed, make contraction, expansion, and construction joints only where shown. Continue reinforcing steel across construction joints which are not indicated to be free moving.
- D. At forms for exposed concrete, fill form panel joints with Form Joint Caulking Compound, and strike compound flush with panel on face adjacent to exposed Concrete, or cover joints with thin, smooth, plastic, pressure-sensitive tape.
- E. At forms for exposed concrete, seal Form Ties against leakage with Form Joint Caulking Compound.
- F. Make form joints tight to prevent leakage. Minimize the number of form joints used.
- G. Ensure that formwork is properly supported, tied, and braced to prevent deflection and maintain shape (see allowable tolerances for formwork).
  - 1. Provide bracing as required to meet load requirements.
  - 2. Protect against undermining or settlement when placed on ground.
  - 3. Anchor as required to prevent upward or lateral Formwork movement during Concrete placement.
  - 4. Locate ties equidistant and symmetrical. Align vertically and horizontally.
- H. Provide Access Openings as required for cleaning and inspection of Forms and Embedded Items prior to placing Concrete. Locate where not exposed to view.
- I. Anchor Bolts: Set with templates to assure accurate bolt positioning

- J. During Concrete placement, in areas where Formwork develops weakness, settlement, or distortion, stop concrete placement, remove placed concrete, and remove or strengthen Formwork.
- K. Reposition to true alignment prior to, during, and after Concrete placement, if necessary.

### 3.03 ALLOWABLE TOLERANCES FOR FORMWORK

- A. Variation from Plumb: 1/4 inch in 10 feet maximum
- B. Variation of Building Lines: 1/4 inch in any Bay or 20 feet maximum
- C. Variation in Cross-Sectional Dimensions: Minus 1/8 inch; plus 1/4 inch
- D. Variation in Surface Tolerance: 1/8 inch in any 10 feet measured with 10-foot straightedge.
- E. Maximum Deflection of Form facing between Supports: 0.00025 x Span
- F. Wall Locations: Accurately size and locate within 1/8 inch.

### 3.04 FORM TREATMENT

- A. All forms shall be adequately treated with form release agent to prevent concrete damage during form removal.
- B. Prior to each use: Apply form coating to contact surfaces in accordance with Manufacturer's instructions. Conduct surface preparation in accordance with manufacturer's instructions prior to coating forms.
- C. When treating previously set forms, carefully prevent coatings from covering reinforcing steel, waterstops, imbedded items, or existing concrete.
- D. Prevent coatings from collecting in puddles.

### 3.05 FORM REMOVAL

- A. Leave forms and shoring in place until concrete has attained sufficient strength to safely support own weight and imposed loads.
- B. Remove forms at time and in manner to insure safety of structure, and without concrete surface damage.
- C. At exposed concrete, form removal time shall be uniform to avoid color differences.
- D. Remove top forms from any sloping concrete surfaces as soon as concrete is selfsupporting. Repair and finish, if necessary, and cure immediately.

### 3.06 CLEANING AND REPAIRING

- A. Including Work of other Trades, clean, repair, and touch-up, or replace when directed, products which have been soiled, discolored, or damaged by Work of this Section.
- B. Remove debris from Project Site upon Work completion, or sooner if directed.

### PART 4 SPECIAL PROVISIONS

### 4.01 MEASUREMENT AND PAYMENT

A. Payment for Concrete Formwork & Accessories shall be included within a portion of the unit amount for Bid Form items as outlined in section 03300 Cast-In-Place Concrete or other concrete related section requiring formwork. No separate payment will be made for these items.

### END OF SECTION

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### SECTION 03200 - CONCRETE REINFORCEMENT

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section includes reinforcement for concrete including deformed steel bars, welded-wirefabric, and fiber reinforcement.
- B. Supply, detail shop drawings, and place reinforcement.
- C. Provide reinforcing to the sizes and dimensions shown on the drawings and according to approved shop drawings for rebar placement.

### 1.02 RELATED SECTIONS

- A. Section 03110 Concrete Formwork and Accessories
- B. Section 03300 Cast-In-Place Concrete

### 1.03 REFERENCES

- A. American Standards for Testing and Materials (ASTM), latest edition
  - 1. ASTM A 615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
  - 2. ASTM A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
  - 3. ASTM A 82 Specification for Steel Wire, Plain, for Concrete Reinforcement
- B. American Concrete Institute (ACI), latest edition
  - 1. ACI 315-99 Details and Detailing of Concrete Reinforcement
  - 2. ACI 318 Building Code Requirements for Reinforced Concrete
  - 3. ACI 408R Bond and Development of Straight Reinforcing Bars in Tension
  - 4. ACI 439.3R-07 Types of Mechanical Splices for Reinforcing Bars
- C. Oregon Structural Specialty Code (OSSC) Adopted Oregon code, 2010 edition or latest revision.
- D. Concrete Reinforcing Steel Institute (CRSI)
  - 1. CRSI Manual of Standard Practice, 1997
  - 2. CRSI Reinforcing Bar Detailing, 1999
  - 3. CRSI 63 Recommended Practice for Placing Reinforcing Bars
  - 4. CRSI 65 Recommended Practice for Placing Bar Supports

#### 1.04 SUBMITTALS

A. Certified Mill Test Reports for steel.

- B. Detail and placement drawings. Submit in accordance with Section 01300 at least 14 days prior to reinforcement fabrication.
  - Reinforcing steel shall be detailed in accordance with the "ACI Detailing Manual" SP-66 (04), ACI Committee 315; CRSI; and in conformance with the project drawings.
  - 2. Shop drawings shall include sufficient plan, section, and elevation drawings of all beams, walls, slabs, footings, columns, and other shapes to clearly show all reinforcement details, spacing, and sizes.
  - 3. Bends, splices, hooks, ties and all other details shall be shown. Drawings shall indicate any fieldwork required.
  - 4. Shop drawings shall show steel specifications and conformances.
- C. Samples of all proposed bar supports with a written description of where each support is proposed to be used.

### 1.05 QUALITY ASSURANCE

- A. Coordinate with other Trades affecting or affected by Work of this Section.
- Bends, hooks, laps, splices, cover, and other details shall conform to OSSC Section 1907; and ACI 318, except where more stringent requirements are shown in the drawings or specified herein.
- C. Perform reinforcement work in accordance with CRSI Documents 63 and 65.
- D. Conduct field measurements as necessary prior to fabrication. Conform to the approved detail and placement drawings.
- E. All materials shall be new, unused, specifically manufactured for the intended purpose.
- F. Any welding shall be conducted by persons with Welder Certification in accordance with AWS D1.4.
- 1.06 DELIVERY, STORAGE AND HANDLING
  - A. Materials shall be delivered properly bundled and labeled to show grade, size and location. Deformed bars shall be marked with the letter "S" per ASTM A615. Deliver with suitable hauling and handling equipment.
  - B. Properly store to protect from moisture. Cover steel with waterproof covering and store so that materials are not against unprotected earth.
  - C. Handle material carefully to protect from cuts, nicks, kinks, deformation, and other damage. Ensure worker safety.

### PART 2 PRODUCTS

- 2.01 REINFORCEMENT MATERIALS
  - A. Reinforcing Bars for Concrete

- 1. All structural reinforcement shall be deformed bars.
- 2. Deformed billet steel; ASTM A 615, Grade 60

### 2.02 ACCESSORIES

- A. Provide all Accessories necessary for proper Reinforcement placement, spacing, support, and fastening. Bricks, broken CMU, spalls, rocks or similar materials shall not be used for support of reinforcing steel.
- B. Tie Wire: 16-gauge minimum, black annealed steel; acceptable patented system.
- C. Bar Supports, Bolsters, Chairs and Spacers
  - 1. Sized and shaped for strength and support of reinforcement during installation and placement of concrete. Use only approved materials.
  - 2. High density concrete dobies. Compressive strength equal or greater than concrete to be placed. No plastic or low cement content dobies accepted.
  - 3. Chairs: Stainless steel. With plastic tips when used at surfaces that will be exposed to view.
  - 4. Spacers: Plastic wheel type. Preco Barspan Wheels, or approved equal.
  - 5. Plastic Shims may be used to support plastic spacers.

### PART 3 EXECUTION

### 3.01 PREPARATION

- A. Verify that surfaces to receive Reinforcement are accurately sized and located, square, plumb, rigid, secure, and otherwise accurately prepared.
- B. Prior to starting Work, notify General Contractor about defects requiring correction.
- C. Reinforcement shall be free from mud, oil or other nonmetallic coatings that decrease bond.
- D. Remove surface rust and mill scale with wire brush. Heavily rusted bars shall not be used.
- E. Do not start Work until conditions are satisfactory.

### 3.02 PLACEMENT

- A. Perform reinforcement work in accordance with CRSI Documents 63 and 65, and fabricate in compliance with ACI 315.
- B. Conform to approved placement and detail drawings and specified tolerances herein.
- C. Reinforcement shall be accurately placed and adequately supported before concrete is placed, and shall be secured against displacement within the tolerances of this section.
- D. All reinforcement shall be bent cold unless otherwise permitted by the Engineer.

- E. Reinforcement partially embedded in concrete shall not be field bent unless approved by the Engineer.
- F. Do not weld splices, crossing bars, or other locations.
- G. Splices: Provide bars in full lengths to preclude the need for splices as much as possible. Locate any allowed splices not indicated on the drawings at points of minimum stress. Development length and splices shall conform to ACI 318. At wire mesh, lap one full mesh plus 2-inches. Splices of adjacent bars shall be staggered. Use greater splice lengths where shown in the drawings.
- H. Spacing: Comply with OSSC Section 1907.6, contract drawings, and approved shop drawings.
- I. Protective Concrete Cover: Comply with OSSC Section 1907.7 minimums. Provide greater cover where shown in the drawings.
- J. Bars in slabs shall be supported on well-cured concrete blocks or approved chairs.
- K. Tolerances:
  - 1. Concrete Cover: Plus or minus <sup>1</sup>/<sub>4</sub> inch.
  - 2. Spacing Between Bars: <sup>1</sup>/<sub>4</sub> inch.
- L. Bar relocation to avoid interference with other reinforcement, conduits or embedded items: 1 bar diameter, unless otherwise approved by Engineer.
- M. Reinforcement around openings: Unless otherwise shown on the drawings, place at least double the area of steel removed by the opening around the opening and extend on each side sufficiently to develop bond in each bar. At square or rectangular openings, place at least one diagonal bar at each corner.

### 3.03 PROTECTION

- A. Protect other Work against damage and discoloration caused by Work of this Section.
- B. Protect placed reinforcement from subsequent movement and inclement weather until concrete is placed.

### 3.04 FIELD QUALITY CONTROL

A. The Engineer or Owner representative shall be notified when reinforcing steel is ready for inspection. Inspection must occur before any concrete is placed.

### PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Concrete Reinforcement shall be included as a portion of the unit price for any items requiring concrete reinforcement. Payment shall include all labor, materials as required to complete the work described herein. No separate payment for Concrete Reinforcement will be made.

### END OF SECTION

### 03300 CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section includes work required to supply, place, finish and cure cast-in-place concrete, including mix design, certifications, and submittals and testing.
- B. Installation of inserts, sleeves, anchor bolts, grounding cable and other items embedded in concrete, but furnished under other sections.
- C. Rinsing out of transit mix trucks, washing or wetting of concrete, site cleanup, or other activity related to water at the site shall be in conformance with all EPA requirements for the prevention of water runoff to storm water sewers or creeks.

#### 1.02 RELATED SECTIONS

- A. Section 03110 Concrete Formwork and Accessories
- B. Section 03200 Concrete Reinforcement
- C. Section 02800 Grouting

### 1.03 REFERENCES

- A. American Standards for Testing and Materials (ASTM), latest editions
  - 1. ASTM C31 Standard Specification for Making and Curing Concrete Test Specimens in the Field
  - 2. ASTM C33 Specification for Concrete Aggregate
  - 3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  - 4. ASTM C94 Standard Specification for Ready-Mixed Concrete
  - 5. ASTM C143 Standard Test Method for Slump of Hydraulic Cement Concrete
  - 6. ASTM C150 Standard Specification for Portland Cement
  - 7. ASTM C231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
  - 8. ASTM C260 Standard Specification for Air Entrained Admixtures for Concrete
  - 9. ASTM C309 Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete
  - 10. ASTM C494 Standard Specification for Chemical Admixtures for Concrete
  - 11. ASTM C618 Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- B. American Concrete Institute (ACI), latest editions

- 1. ACI 301 Standard Specification for Structural Concrete in Buildings
- 2. ACI 304R Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
- 3. ACI 305R Recommended Practice for Hot Weather Concreting
- 4. ACI 306R Recommended Practice for Cold Weather Concreting
- 5. ACI 309R Guide for Consolidation of Concrete
- 6. ACI 318 Building Code Requirements for Reinforced Concrete
- 7. ACI SP-15 Field Reference Manual (have copy on-site)
- C. Oregon Structural Specialty Code (OSSC) 2010 Edition or latest revision.
- 1.04 SUBMITTALS
  - A. Mix design submittals and certificates of compliance shall be furnished at least 30 days prior to any anticipated concrete placement. All submittals must be approved by the Engineer prior to placement of any concrete.
  - B. Contractor is responsible to obtain design of the concrete mix that shall conform to ASTM C94 and the requirements of this section. Mix design shall be prepared by a professional testing laboratory or concrete mix design professional.
  - C. Submit properties of each mix design for each class of concrete including:
    - 1. Average compressive strength of proposed mixture
    - 2. Documentation of strength test results of similar concrete mixtures in accordance with ACI 318
    - 3. Slump
    - 4. Air Content
    - 5. Density
    - 6. Water/Cement ratio
    - 7. Maximum aggregate size
    - 8. Cementitious materials and type
    - 9. Admixtures
  - D. Certificates of compliance for aggregate, cement, and admixtures signed by the concrete supplier certifying that materials meet or exceed these specifications.
  - E. Concrete placement schedule showing construction joint locations and type, and placement sequence.
  - F. Product data for proposed curing compounds, admixtures, hardeners, sealers, etc. to be used.

### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Conform to ACI 305R in hot weather.
- C. Conform to ACI 306R in cold weather.
- D. Installer Qualifications: Concrete work shall be finished by persons with at least 5 years experience with work of similar scope and quality.
- E. No chloride containing admixtures shall be used.
- F. On-Site water addition to concrete will not be permitted.
- G. Conduct field-testing as specified.
- H. Admixtures shall be added in strict conformance with the manufacturer's instructions.
- I. Manufacturer Qualifications: Concrete supplied from concrete plants with current certification under the NRMCA Certification of Ready Mixed Concrete Production Facilities. Individual with responsibility for concrete mixtures certified as an NRMCA Concrete Technologist Level 2.
- 1.06 DELIVERY
  - A. Concrete shall be scheduled and delivered in a timely manner in accordance with ASTM C94 and ACI 304R. Ensure that forms and reinforcement are complete and ready to accept concrete prior to scheduling delivery.
  - B. When installing a continuous pour section, ensure that trucks arrive and concrete is placed with no greater than 45 minutes elapsing between lifts.

### PART 2 PRODUCTS

- 2.01 CEMENTITIOUS MATERIALS
  - A. Hydraulic Cement per ASTM C150
  - B. Fly Ash: ASTM C618, up to 15% by volume of cement content

### 2.02 WATER

A. Water used for mixing shall be clean and potable.

### 2.03 AGGREGATE

- A. Aggregates shall be natural materials conforming to ASTM C33 as modified herein.
- B. Aggregates shall be nonreactive as defined in ASTM C33 and tested per ASTM C289.
- C. Aggregate shall contain no soil, friable particles, organic matter, or other deleterious materials. Aggregate shall be washed prior to use in the concrete mix.
- D. Aggregates shall contain no chert, limestone, or shale.

- E. Coarse Aggregate:
  - 1. Use coarse aggregate from only one source for exposed concrete in a single structure.
  - 2. Coarse aggregate shall be smooth, rounded and uniform. No more than 15% shall be elongated (max. dimension 5 times min. dimension).
  - 3. Coarse aggregate shall be durable, sound and hard.
  - 4. Maximum Size: 3/4-inch, but not more than one-fifth of narrow dimension between sides of Formwork, one-fourth depth of slab, nor three fourths of narrowest distance between Reinforcing Steel.
- F. Fine Aggregate:
  - 1. Use fine aggregate from only one source for exposed concrete in a single structure.
  - 2. Fine aggregate shall not exceed 40% by weight of combined aggregate total, except when coarse aggregate maximum size is ½-inch or less.
  - 3. Fine aggregate shall be durable, sound, clean and hard.
  - 4. Sand Equivalent of 75 minimum per ASTM D2419.
- G. Combined (Coarse and Fine) Gradation per ASTM C136:

US Standard Sieve	% Passing by Weight
1½-inch	100
1-inch	90-100
3/8-inch	45-75
No. 4	33-50
No. 8	28-44
No. 16	23-38
No. 30	10-22
No. 200	0-2

### 2.04 CHEMICAL ADMIXTURES

- A. General:
  - 1. When two or more admixtures are used, they shall be certified by the manufacturer(s) to be compatible.
  - 2. Chlorides are not permitted in any form.
  - 3. Air Entraining and Water Reducer admixtures are required.
  - 4. All admixtures shall be added at the batch plant, unless otherwise specified.
- B. Midrange Water Reducer:
  - 1. Shall conform to ASTM C494, Type A and F.
  - 2. Master Builders, Inc. "PolyHeed" Series; or approved equal.

- C. High-Range Water Reducer (Superplasticizer):
  - 1. Shall conform to ASTM C494, Type F or G; and ASTM C1017, Type I or II.
  - 2. Master Builders, Inc. "Rheobuild"; or approved equal.
- D. Air-Entraining Admixture:
  - 1. Shall conform to ASTM C260.
  - 2. Master Builders, Inc. "MicroAir", "MB-AE 90"; or approved equal.

### 2.05 FIBERS

A. Fibrous Concrete Reinforcement: ASTM C1116. Shall be "Fibermesh MD" added at a minimum of 1.5 pounds per cubic yard. Use where specified or shown on the drawings.

### 2.06 BONDING AGENT

- A. Required where new concrete is poured against existing concrete, and on embedded items with less than 1<sup>1</sup>/<sub>2</sub>-inches of cover.
- B. 100% solids, two component epoxy bonding compound meeting ASTM C881, Type II, Grade 2, Class B or C materials except as modified herein.
- C. Properties:
  - 1. Bond Strength @ 14 days (ASTM C882) 1800 psi minimum
  - 2. Tensile Strength @ 7 days (ASTM D638) 4400 psi minimum
  - 3. Tensile Elongation @ 7 days (ASTM D638) 1.49% maximum
- D. Master Builders, Inc. "Concresive Liquid PL"; or approved equal.
- 2.07 CURING COMPOUNDS AND SEALERS
  - A. Evaporation Reducer: Spray applied monomolecular film that reduces the rate of surface moisture evaporation, minimizes plastic shrinkage, and does not effect the cement hydration process. Master Builders, Inc. "Confilm"; WR Meadows "Sealtight Evapre"; or approved equal.
  - B. Exterior Use Liquid Membrane-Forming Curing Compound: Shall conform to ASTM C309, Type I, Class B and ASTM C1315, Type 1, Class A. WR Meadows "CS-309-25"; or approved equal.
  - C. Interior Use Liquid Membrane-Forming Curing Compound: Water-base acrylic curing and sealing compound conforming to ASTM C309, Type I, Class B and ASTM C1315, Type 1, Class A. WR Meadows "Vocomp-25-1315"; or approved equal.
  - D. Concrete Sealer: Non-yellowing, acrylic co-polymer solution meeting ASTM C309, Type 1, Class B and ASTM C1315, Type 1, Class A. WR Meadows "TIAH 1315"; or approved equal.

### 2.08 CONCRETE HARDENERS

A. Liquid concrete densifier and hardener, chemical resistant, colorless, with 100% active chemicals. WR Meadows "Liqui-Hard"; or approved equal.

### 2.09 VAPOR BARRIER

A. ASTM D2103 – Polyethylene Film and Sheeting, 6 mils thickness.

### 2.10 HIGH-PERFORMANCE CONCRETE MIX

- A. Use: All water-holding structures and adjoining structures, equipment pads, footings, support walls, retaining walls, and others not designated for standard concrete. May be used in place of standard concrete except for interior slabs where a smooth trowel finish is required.
- B. Mix Design Requirements:
  - 1. Cement: Portland Cement, Type II, ASTM C150.
  - 2. Water / Cementitious Materials Ratio: 0.35-0.40 by weight
  - 3. Strength: 4500 psi minimum, ASTM C39
  - 4. Slump before plasticizer: 1.5 to 3-inches, ASTM C143
  - 5. Air Content: 5.5-7% by volume, ASTM C231
  - 6. Water Reducer: High-Range
  - 7. Maximum slump at time of placement: 8-inches (with rheoplastic admixture)

### 2.11 STANDARD CONCRETE MIX

- A. Use: Sidewalks and walkways, curbs and gutters, reinforced concrete parking areas and other miscellaneous structures
- B. Mix Design Requirements:
  - 1. Cement: Portland Cement, Type I or II, ASTM C150
  - 2. Water / Cementitious Materials Ratio: 0.45-0.50 by weight
  - 3. Strength: 3500 psi minimum, ASTM C39
  - 4. Air Content: 2.5-5% by volume, ASTM C231
  - 5. Water Reducer: Mid or High-Range
  - 6. Maximum slump at time of placement: 5-inches or less

### PART 3 EXECUTION

- 3.01 PREPARATION
  - A. Examine all reinforcement, formwork, waterstops, premolded joint fillers, and other embedded items to ensure they are accurately placed, properly secured and cleaned.
  - B. Ensure that inspection of reinforcement is complete and installation approved.

- C. Ensure concrete mix design and test certifications have been submitted and approved.
- D. Ensure that all required materials and equipment are on-site and operable.
- E. Ensure that subgrade and base rock are properly placed and compacted. Place vapor barrier and leveling sand at slab-on-grade locations. Sprinkle subgrades and other porous surfaces with water to reduce adsorption.
- F. Apply form release agent to formwork.
- G. Apply bonding agent where required.
- H. Notify General Contractor of work requiring correction. Do not start work until conditions are satisfactory.
- I. Review for various locations to receive different types of concrete mixes.
- J. Notify Engineer at least 48 hours in advance of concrete placement.

# 3.02 CONCRETE PLACEMENT

- A. Comply with ACI 304, ASTM C94, ACI 305R and 306R, and OSSC Section 1905 as required.
- B. Convey and place by methods with will prevent material separation, segregation, and loss. Mix for at least 10 minutes and at least 3 minutes immediately prior to discharging at the job site.
- C. Concrete shall be delivered to site and placed within formwork within 1½ hours after the introduction of water to the mixture.
- D. Deposit concrete continuously or in layers so that no concrete will be placed on concrete that has hardened sufficiently to cause the formation of seams or other planes of weakness. Where seams are unavoidable, provide construction joints as directed.
- E. Do not convey pneumatically placed concrete through aluminum pipe.
- F. Do not retemper concrete, or add water on-site for other reasons.
- G. Use trunks or tremies when pouring walls to ensure concrete does not drop or fall more than 4 feet. Place in layers not exceeding 2 feet in depth.
- H. Screed all slabs to true levels or slopes, true within ¼ inch per 10 feet. Evenly slope to any drain at 3/16 inch per foot, unless otherwise shown on Drawings.
- I. When mean temperature exceeds, or is expected to exceed 80°F during placement and finishing operations, steps shall be taken in accordance with ACI 305R to reduce concrete temperature and water evaporation. Slabs will be fog sprayed from the completion of screeding until curing is begun (except during troweling). Submit detailed hot weather concreting procedure to Engineer for approval at least 2 days prior to planned placement.
- J. When mean temperature falls below, or is expected to fall below 40°F, comply with ACI 306R. Concrete shall be protected from freezing by means acceptable to the Engineer. Submit detailed cold weather concreting procedure to Engineer for approval at least 2 days prior to planned placement.

### 3.03 CONSOLIDATION

- A. Employ mechanical, high frequency vibrators to consolidate concrete around reinforcement, into corners and angles of formwork, and to exclude rock pockets, air bubbles and honeycomb.
- B. Have sufficient number of vibrators and tampers on-site. Minimum of 1 device per each 20 c.y. placed per hour.
- C. Vibration shall be in accordance with ACI 309. Vibrator frequency shall be between 8000 and 12000 rpm.
- D. Hold Vibrator in one spot no longer than 15 seconds; keep in constant motion, insert and withdraw at points approximately 18 inches o.c.
- E. Maintain vibrator in vertical position when penetrating concrete walls. At slabs, hold vibrator perpendicular to the surface at all times.
- F. Vibrate each successive lift. Extend vibrator into previous lift to avoid seams.
- G. Transporting concrete with vibrator is not permitted.
- H. Maintain spare vibrators at jobsite during concrete placement.
- I. Supplement vibration by forking and spading along surfaces of forms and between reinforcing whenever flow is restricted.

#### 3.04 CONTROL JOINTS

- A. Form to true, straight lines, with adjacent slab sections flush at Joints. Make panels as close to square as possible.
- B. Conform to ACI 302 and the Project Drawings. If not shown, submit control joint layout plan to Engineer for approval.
- C. Joints shall be formed by tooling into fresh concrete. The joint shall be perpendicular to the concrete surface and ¼ of the thickness of the slab. Zip strips not allowed.
- D. Fill joint as directed with proper joint sealants.
- E. Extend Reinforcement through Joints, unless otherwise shown on Drawings.
- F. If necessary, and approved by Engineer, joint may be saw cut as soon as concrete has sufficiently hardened to prevent dislodging of aggregates. Saw continuous slots perpendicular to surface and ¼ of slab thickness. Must be complete within 12 hours of concrete placement.

### 3.05 CONCRETE FIELD TESTING

- A. Samples for concrete tests shall be taken in accordance with ASTM C172.
- B. If total quantity of a class of concrete for the project is less than 50 cubic yards, strength tests are not required when evidence of satisfactory strength is submitted to and approved by Engineer.

- C. Samples for compressive strength tests of each class of concrete shall be taken not less than once per day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5000 feet squared of surface area of walls or slabs. If the total volume of concrete for each class is such that less than 5 tests are required, then samples shall be made from at least 5 random batches or each batch if less than 5 batches is required.
- D. Acceptance of concrete shall be based on strength test results of standard cured cylinders in accordance with ASTM C 31 and tested at 28 days in accordance with ASTM C 39. Strength test results are the average of two specimens.
- E. When strength cylinders are made, tests of slump per ASTM C143, air content per ASTM C94, temperature per ASTM C1064 and density per ASTM C138shall be made and recorded with the strength test results.
- F. Strength of each concrete class shall be deemed satisfactory when both of the following criteria are met:
  - 1. The average of three consecutive compressive-strength tests equals or exceeds specified compressive strength
  - 2. Any individual compressive-strength test result does not fall below specified compressive strength by more than 500 psi.
- G. When compressive strength tests indicate low strength, follow procedure in ACI 318 chapter 5.6.4 Investigation of low-strength test results.

### 3.06 FINISHES

- A. Rough Form Finish
  - 1. Finish resulting after form removal with fins or projections exceeding <sup>1</sup>/<sub>4</sub>-inch removed, and with tie holes and defective areas repaired and patched.
  - 2. Location: Formed concrete surfaces not exposed to view in the finished structure.
- B. Standard Smooth Finish
  - 1. As-cast surface with all fins and projections completely removed and smoothed, and with all tie holes and defective areas repaired and patched for a uniform, smooth appearance.
  - 2. At unformed surfaces, such as tops of walls, strike-off smooth and finish with a texture matching adjacent surfaces.
  - 3. Location: Formed surfaces exposed to view in the finished structure.
- C. Float Finish
  - 1. After placing slabs, do not work the surface until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently to permit the operation of a power-driven float, or by hand-floating if area is small or inaccessible to power units.
  - 2. Check the level of the surface plane to a tolerance not exceeding ¼-inch in 10 feet when tested with a 10-foot straightedge placed on the surface in not less than two different angles from a reference point. Cut down high spots and fill low spots. Uniformly slope surfaces to drain where shown on the drawings.

- 3. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture. Do not overfinish.
- 4. Location: Monolithic slab surfaces that are to receive a trowel finish and other finishes.
- D. Trowel Finish
  - 1. After floating, begin the first trowel finish operation using a power driven trowel. Consolidate the concrete surface by the final hand troweling operation, free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8-inch in 10 feet when tested with a 10-foot straightedge.
  - 2. Do not absorb wet spots with neat cement or cement-sand mixture, and do not use chemical dryers.
  - 3. Location: Monolithic slab surfaces exposed to view, or to be covered with resilient floor covering, or to receive liquid hardener treatment.
- E. Nonslip Broom Finish
  - 1. After concrete has received floating finish specified above, provide light brushing with fiber-bristle broom perpendicular to traffic flow.
  - 2. Location: Exterior walks and other horizontal walking surfaces.

### 3.07 CONCRETE SURFACE REPAIRS

- A. After removal of forms, repair and patch defective areas with specified repair mortar.
- B. In honeycomb and rock pocket areas, saw cut area and remove material down to solid concrete. Saw cut edges perpendicular to the concrete surface. Thoroughly clean out loose material, saturate area with water to a saturated surface dry condition and brush-coat the area to be patched with a slurry coat of structural repair mortar. Place additional mortar to patch the area before the slurry coat has dried. Smooth and blend to surrounding surface. Do not feather edges.

### 3.08 CONCRETE CURING AND PROTECTION

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Protect concrete from rapid moisture loss before and during finishing operations with a fog spray or evaporation reducer. Apply evaporation reducer in accordance with manufacturer's instructions after screening and bull floating, but before power floating and troweling.
- B. Curing shall begin as soon as the finishing operation has been completed and the surface will not be damaged by the curing method. Curing shall be maintained for not less than 7 days.
- C. Curing Methods: Perform curing of concrete by curing compound, by moist curing, by moisture-retaining cover curing, or combinations thereof, as specified herein.
  - 1. Moist Curing. Use one of the following methods:
    - a. Keep concrete surface continuously wet by covering with water
    - b. Use continuous water-fog spray

- c. Cover concrete with absorptive cover (burlap cloth, 9 oz./s.y.), thoroughly saturate with water, and keep continuously wet. Completely cover all concrete and lap edges 4-inches. Place moisture retaining cover (polyethylene film) over absorptive cover.
- 2. Moisture-Retaining Cover. Cover all surfaces completely with polyethylene sheets, lap edges at least 3-inches, and seal with waterproof tape. Immediately repair any holes or tears with sheet material and tape.
- 3. Curing Compound. Use specified compound and apply in accordance with manufacturer's instructions. Apply within 1 hour of final finishing operations or form removal. Maintain continuity of coating and protect from damage during curing period. If finish materials are to be applied later, follow manufacturer's instructions for compound removal.
- D. Exterior Structural Concrete: Cure for 7 days with moist cure or moisture-retaining cover. After 7 day period, apply specified or approved sealing compound to surfaces that will be exposed in the finished structure.
- E. Interior Slabs to be Covered (with resilient flooring): Cure for 7 days with moist cure or moisture-retaining cover. Or; cure for 7 days using specified or approved interior curing/sealing compound. Ensure compound compatibility with adhesives.
- F. Interior Slabs Exposed and Other Exposed Interior Concrete: At interior slab locations that will remain uncovered, interior curbs, equipment pads, etc., cure for 7 days with moist cure or moisture-retaining cover. After 7days, or as recommended by the manufacturer, apply liquid chemical hardener. Follow manufacturer's instruction for hardener application. Apply at least two coatings unless otherwise recommended by the manufacturer and approved. Protect adjoining work from overspray and remove all excess hardener from surface of floor slab.
- G. Protect all surfaces from damage until curing is complete and sealers and hardeners have dried.

### 3.09 CORRECTION AND REMOVAL OF DEFECTIVE WORK

- A. Remove and replace any concrete which shows excessive cracks or severe damage. Remove and replace slabs which do not drain properly, or are improperly finished, and other defective concrete as directed.
- B. Remove and replace work with improper cover over steel, concrete containing wood, cloth or other foreign matter.
- C. Fill and repair all voids, rock pockets, and other defects as directed. Voids larger than <sup>3</sup>/<sub>4</sub>- inch shall be considered excessive and such work shall be removed and replaced.
- D. Remove and replace any concrete that has been improperly cured or finished.
- E. Should concrete fail to meet the minimum specified 28 day strength as determined by tests on both the regular and spare cylinders, the concrete will be deemed defective and shall be removed and replaced. Contractor shall bear the entire cost of such testing, removal, redesign, and replacing of defective concrete.
- F. Concrete which has improper water/cement ratios, and/or improper air contents shall be removed and replaced as directed.

G. Contractor shall bear all costs for removal and replacement of defective work.

# PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for Cast-In-Place Concrete shall be included within the unit price for each item which requires cast in place concrete for the amount as stated on the Bid Form. No separate payment shall be made for cast in place concrete.

# **END OF SECTION**

### SECTION 03600 GROUT

### PART 1 GENERAL

### 1.01 SUMMARY

- A. Section includes various types of grout as may be required for the project as shown on the Drawings and as required.
- B. Work includes supply, preparation, mixing, application, finishing and curing of grout.
- 1.02 RELATED SECTIONS
  - A. Section 03200 Concrete Reinforcement
  - B. Section 03300 Cast-In-Place Concrete

### 1.03 REFERENCES

- A. ASTM C1107 Standards Specification for Packaged Hydraulic-Cement Grout (Nonshrink)
- B. ASTM C109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars – Modified
- C. ASTM C1090 Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic Cement Grout
- D. ASTM C939 Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
- E. ASTM C827 Test Method for Early Volume Change of Cementitious Mixtures

### 1.04 SUBMITTALS

- A. Submit list of each type of grout proposed for each location to be grouted. Include manufacturer's specifications, use recommendations, surface preparation and application instructions, and protection of adjacent surfaces.
- B. Submit three copies of submittal package. Grout shall be approved prior to use.

### 1.05 QUALITY ASSURANCE

- A. Grout Manufacturer shall be consulted when questions arise during selection of a particular grout for application. Grout used shall be as recommended by the manufacturer for each type of application.
- B. Grout shall be mixed, placed and cured in strict conformance to the manufacturer's instructions. Surfaces to be grouted shall be carefully prepared according to the manufacturer's instructions. Improper surface preparation and curing are the most common causes of grout failure and problems.

### 1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver materials in manufacturer's sealed containers with contents clearly labeled.

B. Store materials in a dry area at a temperature between 40 and 100°F.

# PART 2 PRODUCTS

- 2.01 STANDARD NON-SHRINK GROUT
  - A. Non-metallic, non-bleeding, cement based non-shrink grout meeting ASTM C1107, Grades B or C. Pumpable and pourable with positive expansion per ASTM C827.
  - B. Compressive Strength at Flowable Consistency per ASTM C109: 2500 psi at 1 day, 5000 psi at 3 days, and 8000 psi at 28 days (minimums).
  - C. Use: Grouting around pipe and conduit penetrations in concrete slabs, and other locations where non-shrink grout is called for and other specified grouts are not required.
  - D. Manufacturers: Dayton Superior Corp. "1107 Advantage Grout"; ThoRoc "621 Construction Grout; EUCO "NS Grout"; or approved equal.

### 2.02 DRY PACK GROUT

- A. Cement based, non-shrink, noncorrosive, non-metallic, high density, high strength grout for dry pack applications. Meets COE CRD-C-621.
- B. Compressive Strength per ASTM C109: 3000 psi at 1 day, 6500 psi at 7 days, and 8000 psi at 28 days (minimums) at damp pack consistency.
- C. Use: Pipe penetration patches in precast concrete, overhead applications and other areas where poured or pumped grout use is not practical.
- D. Manufacturers: Dayton Superior Corp. "Sure-Grip Grout Dri-Pak"; W.R. Meadows "Pac-It"; EUCO "Dry Pack Grout"; or approved equal.

### 2.03 ACCESSORIES

- A. Aggregate: Washed pea gravel, maximum 3/8-inch size.
- B. Water: Clean potable water.
- C. Curing Compound: Water based, acrylic as recommended by grout manufacturer.

### PART 3 EXECUTION

### 3.01 MIXING

- A. Mix materials in accordance with the manufacturer's instructions.
- B. Where grout depth will exceed 2-inches, add aggregate at a maximum rate of 25 pounds per 55 pound bag.
- C. Do not retemper mix.
- 3.02 PREPARATION

- A. Carefully prepare all surfaces to be grouted in accordance with the manufacturer's recommendations and as specified. Concrete must be cured for 28 days before placing grout.
- B. Clean surfaces to remove loose and foreign material by waterblasting, mechanical abrasion, or sandblasting. Surface shall be free of dirt, oil, curing compounds and laitance.
- C. Remove unsound concrete by chipping or grinding. Grind or sandblast steel surfaces to remove all rust, mill scale and paint.
- D. Install forms to contain liquid grout. Seal joints and corners.

### 3.03 INSTALLATION - CEMENTITIOUS GROUTS

- A. Follow manufacturer's instructions.
- B. Just prior to grouting, thoroughly saturate concrete surfaces for 24 hours; remove excess water.
- C. Place grout continuously by most practical means. Work from one side to avoid entrapped air.
- D. Grout may be rodded or tamped, but do not vibrate.
- E. Apply curing compounds to exposed grout in accordance with manufacturer's instructions or cure with wet burlap for 3 days. Curing shall commence immediately after placement.

### PART 4 SPECIAL PROVISIONS

- 4.01 MEASUREMENT AND PAYMENT
  - A. Payment for grout shall be considered incidental to bid items requiring grouting and associated costs shall be included within the cost basis as stated on the Bid Form. No separate measurement or additional payment will be made for these quantities and/or items.

### END OF SECTION