

**STORMWATER PIPING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Storm drainage piping, fittings, and accessories, connection of drainage system to existing structures.
  - 1. The Standard Specification for this section is Water Environment Services of Clackamas County Standards, and the applicable sections of the current Uniform Plumbing Code. All work shall be done in accordance with these specifications and in conformity with the lines, grades, and dimensions shown on the Drawings.
  - 2. The referenced specification for this Section is the "Oregon Standard Specifications for Construction" latest edition as prepared by the Oregon Department of Transportation and the Oregon Chapter of the American Public Works Association, and its revisions and supplements.

**1.2 RELATED SECTIONS**

- A. Section 31 23 17 – Trenching

**1.3 DEFINITIONS**

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories, and Manufacturer.
- C. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project As-Built Documents:
  - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

**1.5 REGULATORY REQUIREMENTS**

- A. Conform to applicable code for materials and installation of the Work of this section.

**1.6 PROJECT CONDITIONS**

- A. Existing Utility Systems: The existing utility systems shown are based on record drawings supplied by the Owner, and "surface" field survey. Many of the existing systems and connections points could not be field verified. Prior to constructing any of the utility systems, the contractor shall "pot-hole" all connection points and utility crossings to verify inverts, sizes, locations, and potential conflicts. Any discrepancies shall be reported to the Architect for resolution or re-design.
- B. Coordinate the Work with termination of storm sewer connection outside building, trenching, and connection to foundation drainage system.

**PART 2 PRODUCTS**

**2.1 MATERIALS - STORM SEWER PIPE AND FITTINGS**

- A. General: Materials shall meet the requirements of the Standard Specifications.
- B. Storm sewer pipe shall have flexible gasket joints. Joints on all fittings shall be the same as the joints used on the pipe. Caps or plugs shall be furnished with each fitting, outlet, or stub as required with the same type gasket and/or joint in the pipe. Refer to Drawings for type and location of storm sewer pipe.
- C. PVC Storm Pipe
  - 1. PVC ASTM D3034 pipe in accordance with Standard Specifications.

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**D. HDPE Storm Pipe**

1. HDPE ADS N-12 Dual Wall Storm Pipe with smooth interior.

**E. Fittings**

1. All fittings shall be of sufficient strength to withstand all handling and load stresses encountered. All fittings shall be of the same materials as the pipe unless otherwise approved.
2. Material joining the fittings shall be free from cracks and shall adhere tightly to each joining surface.
3. All fittings shall be capped or plugged, and gasketed with the same gasket material as the pipe joint, fitted with an approved mechanical stopper, or have an integrally cast knockout plug. The plug shall be able to withstand all test pressures without leaking, and when later removed, shall permit continuation of piping with jointing similar to joints in the installed line.

**F. Grout:**

1. Grout shall be of the non-shrinking type.

**G. Trace Wire:**

1. Magnetic detectable conductor, clear plastic covering, imprinted with "Storm Sewer Service" in large letters.

**2.2 CLEANOUT COMPONENTS**

- A. All storm cleanouts and frames shall be furnished per the details provided in the Construction Plans.

**2.3 BEDDING AND COVER MATERIALS**

- A. As specified in Section 31 20 00 2.1.D and 3.10.B.

**PART 3 EXECUTION**

**3.1 TRENCHING**

- A. See Section 31 23 17 for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

**3.2 INSTALLATION - PIPE**

- A. General: Storm mains and appurtenances shall be installed per the requirements of the Standard Specifications and manufacturer's instructions.
- B. Survey control hubs for both line and grade shall be provided by the Contractor in a manner consistent with accepted practices. The Contractor shall establish line and grade for pipe by the use of lasers or by transferring the cut from the offset stakes to the trench at whatever intervals necessary to maintain the line and grade. The Contractor shall check line and grade as necessary.
1. In the event that the limits prescribed herein are not met, the work shall be immediately stopped, the Architect notified, and the cause remedied before proceeding further with the work.
- C. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- D. Lay pipe to slope gradients noted on layout drawings.
- E. Install continuous trace wire 6 inches above top of pipe.

**3.3 INSTALLATION - CLEANOUTS**

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe end sections.
- C. Level top surface of base pad; sleeve concrete shaft sections to receive storm sewer pipe sections.

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- D. Establish elevations and pipe inverts for inlets and outlets as indicated.
- E. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

**3.4 FIELD QUALITY CONTROL**

- A. Perform field inspection and testing in accordance with Section 01 40 00.
- B. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
- C. Deflection Test: Test in accordance with Clackamas County Standards.

**3.5 LINE CLEANING**

- A. Prior to the internal testing and inspection of the system by the Agency or County, the Contractor shall flush and clean all parts of the system and remove all debris

**3.6 PROTECTION**

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

**END OF SECTION**

**STORMWATER INLETS AND MANHOLES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This section specifies requirements for storm drainage catchbasins, area drains, and atrium inlets for a gravity flow drainage system.

**1.2 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.
- B. Applicable sections of the current Oregon Plumbing Specialty Code and Water Environment Services of Clackamas County Requirements.
- C. All work shall be done in accordance with these specifications and in conformity with the plans
- D. Section 33 42 11 Stormwater Gravity Piping.

**1.3 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating structure, accessories, and Manufacturer.
- C. Shop drawings noting appropriate dimensions and elevations.
- D. Manufacturer's Installation Instructions: Indicate special procedures required to install Products specified.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- F. Project As-Built Documents:
  - 1. Record location of pipe runs, connections, catch basins, cleanouts, and invert elevations.
  - 2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Do not store plastic pipe and fittings in direct sunlight
- B. Protect pipe, pipe fittings and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.

**1.5 QUALITY ASSURANCE**

- A. Piping materials shall bear label, stamp, or other marking or specified testing agency.
- B. Comply with NSF/ANSI 14, "Plastic Piping System Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer for plastic sewer piping.

**1.6 PROJECT CONDITIONS**

- A. Interruption of Utility Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Owner no fewer than two days in advance of proposed interruption of service.

**PART 2 - PRODUCTS**

**2.1 CATCH BASIN – TRAPPED OUTLET**

- A. For use on private property.

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- B. All private catch basins shall have a trapped outlet and minimum 18 inch sump.
- C. Grate dimensions shall be 24 inch by 24 inch square.
- D. Catch basin, frame, and grate shall be H-20 heavy truck traffic rated in vehicle areas.

**2.2 Manholes**

- A. Manhole components shall conform to Clackamas County standards.
- B. All steps within structures must comply with OSHA standards for fixed metal, individual rung ladders (OAR 437), and CWS, except that there shall be no more than 24 inches between the top of the casting and the rung of the top step.
- C. All precast manhole riser sections shall conform to the requirements of ASTM C478.
- D. All poured in place concrete shall have a 28 day strength of 3000 psi, and a slump of 2 inches to 2 inches.
- E. All joints shall be sealed with preformed gaskets such as Kent-Deal #2, Ram-Neck, or an approved equal conforming to federal specifications SS-S00210.
  - 1. All pipe connections to manhole shall be water tight

**PART 3 - EXECUTION**

**3.1 EARTHWORK**

- A. Excavation, trenching, and backfilling are specified in section 31 23 17 Trenching.

**3.2 INSTALLATION**

- A. General: install structure complete with appurtenances and accessories indicated.
- B. Install public structure per Water Environment Services of Clackamas County.
- C. Install private structures per Manufacturer's recommendation and Oregon Plumbing Specialty Code.

**3.3 CONNECTIONS**

- A. Pothole prior to construction to verify location, size and depth of existing piping. Notify Engineer if location, size or depth of existing pipe is different than shown on the plans.

**3.4 FIELD QUALITY CONTROL**

- A. Inspection shall be per Water Environment Services of Clackamas County.

**3.5 CLEANING**

- A. Clean dirt and superfluous material from interior of piping prior to testing.

**3.6 TESTING AND ACCEPTANCE**

- A. Testing shall be in conformance with Water Environment Services of Clackamas County and Oregon Plumbing Specialty Code.

END OF SECTION