SECTION 400539.23 - CONCRETE GRAVITY AND DRAINAGE PROCESS PIPE

Note that this section has only been edited for NYSOGS standardization and has not been technically edited. The designer shall make all technical edits specific to the project for this section.

This Section specifies pipe materials and appurtenances normally encountered with gravity process and drainage piping within a water and wastewater treatment plant.

Concrete manholes are specified in Section 330561; polyethylene and fiberglass manholes are specified in Sections 330573 and 330576, respectively. Pipe markers are specified in Section 330597.

1. GENERAL
   * + 1. SUMMARY
          1. Section Includes:

Concrete gravity process and drainage piping.

Excavation, bedding, and cover materials.

* + - * 1. Related Requirements:

List other Sections directly related to or affecting Work of this Section. Include Sections specifying information expected to be found in this Section as well as Sections required to describe complete system or assembly requirements.

Section 330130.61 - Packer Injection Grouting: Grout sealing of piping.

Section 330505.33 - Infiltration and Exfiltration Testing: Infiltration testing of gravity drainage piping.

Section 330561 - Concrete Manholes: Manholes for drainage piping.

Section 330573 - Polyethylene Manholes: Manholes for drainage piping.

Section 330576 - Fiberglass Manholes: Manholes for drainage piping.

Section 330597 - Identification and Signage for Utilities: Pipe markers.

* + - 1. DEFINITIONS

Limit list of definitions to terms unique to this Section and not provided elsewhere.

* + - * 1. Bedding: Fill placed under, beside, and directly over pipe, prior to subsequent backfill operations.
      1. REFERENCE STANDARDS

List reference standards included within text of this Section, with designations, numbers, and complete document titles.

LEED requires compliance with specific editions of referenced standards.

* + - * 1. American Association of State Highway and Transportation Officials:

AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 10-lb Rammer and a 18-in. Drop.

* + - * 1. ASTM International:

ASTM C14 - Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe.

ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

ASTM C443 - Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3).

ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3).

ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

* + - 1. COORDINATION
         1. Coordinate Work of this Section with connections to process equipment and facilities.
      2. PREINSTALLATION MEETINGS
         1. Convene minimum [**one week**] <**\_\_\_\_\_\_\_\_**> [**weeks**] prior to commencing Work of this Section.
      3. SUBMITTALS

Only request submittals needed to verify compliance with Project requirements.

* + - * 1. Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
        2. Manufacturer’s installation instructions shall be provided along with product data.
        3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
        4. Product Data: Submit manufacturer information indicating piping details, appurtenances[**, and**] <**\_\_\_\_\_\_\_\_**>.

USE PARAGRAPH BELOW WITH EPD REQUIREMENT WHEN PROJECT ESTIMATE IS $1M OR MORE.

* + - * 1. Submit an Environmental Product Declaration (EPD) from the manufacturer for concrete pipe within this specification section, if available. A statement of the contractor’s good faith effort to obtain the EPD shall be provided if not available.

Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services.*

* + - * 1. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

* + - * 1. Source Quality-Control Submittals: Indicate results of [**shop**] [**factory**] tests and inspections.
        2. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        3. Qualifications Statement:

Coordinate following Subparagraph with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer and installer.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
         1. Manufacturer's Certificate:

Certify that products meet or exceed specified sustainable design requirements.

Insert material certifications list below to suit products specified in this Section and Project sustainable design requirements. Specific certificate submittal and supporting data requirements are specified in Section 018113.

Materials Resources Certificates:

Certify source and origin for [**salvaged**] [**and**] [**reused**] products.

Certify recycled material content for recycled content products.

Certify source for regional materials and distance from Project Site.

* + - * 1. Product Cost Data:

Submit cost of products to verify compliance with Project sustainable design requirements.

Exclude cost of labor and equipment to install products.

Provide cost data for following products:

Edit list of material cost data below to suit products specified in this Section and Project sustainable design requirements. Specific cost data requirements are specified in Section 018113.

Salvaged, refurbished, and reused products.

Products with recycled material content.

Regional products.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record finished locations of pipe runs, connections, [**manholes,**] [**cleanouts,**] and invert elevations.
         2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
      2. QUALITY ASSURANCE

Include this Article to specify compliance with overall reference standards affecting products and installation included in this Section.

In following Paragraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

* + - * 1. Perform Work according to <**\_\_\_\_\_\_\_\_**> standards.

Include following Paragraph only when cost of acquiring specified standards is justified.

* + - * 1. Maintain <**\_\_\_\_\_\_\_\_**> [**copy**] [**copies**] of each standard affecting Work of this Section on Site.
      1. QUALIFICATIONS

Coordinate following Paragraphs with requirements specified in SUBMITTALS Article.

* + - * 1. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
        2. Installer: Company specializing in performing Work of this Section with minimum [**three**] <**\_\_\_\_\_\_\_\_**> years' [**documented**] experience.
      1. DELIVERY, STORAGE, AND HANDLING
         1. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
         2. Storage:

Store materials according to manufacturer instructions.

Block individual and stockpiled pipe lengths to prevent moving.

* + - * 1. Protection:

Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.

Provide additional protection according to manufacturer instructions.

* + - 1. EXISTING CONDITIONS
         1. Field Measurements:

Verify field measurements prior to fabrication.

Indicate field measurements on Shop Drawings.

1. PRODUCTS
   * + 1. CONCRETE PROCESS AND DRAINAGE PIPING

Nonreinforced concrete pipe is typically used in gravity-flow applications and where subsoil backfill will not induce loads, potentially causing pipe fracture. Pipe sizes range from 4 to 36 inches. Class 1, 2, and 3 designations refer to pipe strength.

* + - * 1. Concrete Pipe:

Comply with ASTM C14, Class [**1**] [**2**] [**3**].

Type: Nonreinforced.

Inside Nominal Diameter: <**\_\_\_\_\_\_\_\_**> inches.

End Connections: [**Bell and spigot**] [**Plain**].

Fittings:

Nonreinforced concrete.

Comply with ASTM C14.

Joints:

Rubber compression gasket.

Comply with ASTM C443.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Reinforced concrete pipe is typically used for larger diameter applications, low-pressure applications, or where subsoil pressure requires greater pipe strength than nonreinforced concrete pipe. Sizes range from 12 to 108 inches based on class and wall type.

* + - * 1. Reinforced Concrete Pipe:

Comply with ASTM C76, Class [**I**] [**II**] [**III**] [**IV**] [**V**], with Wall Type [**A**] [**B**] [**C**].

Reinforcement: [**Mesh**] [**Bar**].

Inside Nominal Diameter: <**\_\_\_\_\_\_\_\_**> inches.

End Connections: [**Bell and spigot**] <**\_\_\_\_\_\_\_\_**>.

Fittings: Reinforced concrete.

Joints:

Rubber compression gasket.

Comply with ASTM C443.

* + - 1. MANHOLES
         1. As specified in Section [**330561 - Concrete Manholes**] [**330573 - Polyethylene Manholes**] [**330576 - Fiberglass Manholes**].
      2. SUSTAINABILITY CHARACTERISTICS

Insert sustainable design characteristics in this Article to suit content of this Section and Project sustainable design requirements specified in Section 018113.

* + - * 1. Material and Resource Characteristics:

Recycled Content Materials: Furnish materials with maximum available recycled content [**including:**] [**.**]

Insert list of materials specified in this Section required to have recycled content.

<**\_\_\_\_\_\_\_\_**>.

Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project Site [**including:**] [**.**]

Insert list of materials specified in this Section required to be regional materials.

<**\_\_\_\_\_\_\_\_**>.

* + - 1. MATERIALS
         1. Bedding and Cover:

Select bedding and cover material type based on Project conditions.

Bedding: Fill Type [**A1**] [**A2**] [**A3**] [**A4**], as specified in Section [**310516 - Aggregates for Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Cover: Fill Type [**A1**] [**A2**] [**A3**] [**A4**], as specified in Section [**310516 - Aggregates for Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Soil Backfill from Above Pipe to Finish Grade:

Subsoil with no rocks more than 6 inches in diameter, frozen earth, or foreign matter.

* + - 1. MIXES
         1. Grout: As specified in Section [**330130.61 - Packer Injection Grouting**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.
      2. ACCESSORIES
         1. Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.
      3. SOURCE QUALITY CONTROL
         1. Provide shop inspection and testing of completed assembly.

Include one or both of following Paragraphs to require Director's inspection or witnessing of test at factory.

* + - * 1. Director’s Inspection:

Make completed pipe sections available for inspection at manufacturer's factory prior to packaging for shipment.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspection is allowed.

* + - * 1. Director’s Witnessing:

Allow witnessing of factory inspections and tests at manufacturer's test facility.

Notify Director’s Representative at least [**seven**] <**\_\_\_\_\_\_\_\_**> days before inspections and tests are scheduled.

Include following Paragraph if reliance on manufacturer's approved quality-control program is sufficient for Project requirements.

* + - * 1. Certificate of Compliance:

If manufacturer is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's facility conforms to Contract Documents.

Specified shop tests are not required for Work performed by approved manufacturer.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that [**trench cut**] [**excavation base**] is ready to receive Work.
          2. Verify that excavations, dimensions, and elevations are as indicated on [**Drawings**] [**layout drawings**].
       2. PREPARATION

Type of correcting materials (fine aggregate, coarse aggregate, or lean concrete) depends on type of subsoil, percolation characteristics, and compaction requirements.

* + - * 1. Correct over-excavation with [**fine aggregate**] [**coarse aggregate**] [**lean concrete**].
        2. Remove large stones or other hard materials that could damage pipe or impede consistent backfilling or compaction.
        3. Protect and support existing sewer lines, utilities, and appurtenances.
        4. Utilities:

Maintain profiles of utilities.

Coordinate with [**other utilities**] <**\_\_\_\_\_\_\_\_**> to eliminate interference.

Notify Director’s Representative if crossing conflicts occur.

* + - 1. INSTALLATION
         1. Bedding:

Place bedding material at trench bottom.

Level materials in continuous layer not exceeding [**6**] [**8**] <**\_\_\_\_\_\_\_\_**> inches.

Maintain optimum moisture content of bedding material to attain required compaction density.

* + - * 1. Piping:

Refer to geotechnical report for subsoil capability to support piping and for compaction of fill requirements.

Verify that drainage system is indicated on Drawings or will be included on Shop Drawings. Drawing details should describe location of aggregate types in relation to pipe and pipe bedding, dimensions of cut trench width, and details of connections to other Work.

Lay pipe to slope gradients as indicated on [**Drawings**] [**layout drawings**].

Maximum Variation from Indicated Slope: [**1/8**] <**\_\_\_\_\_\_\_\_**> inch )in [**10**] <**\_\_\_\_\_\_\_\_**> feet .

Install bedding at sides and over top of pipe, to minimum compacted thickness of [**12**] <**\_\_\_\_\_\_\_\_**> inches.

Pipe Markers: As specified in Section 330597 - Identification and Signage for Utilities.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Installation Standards: Install Work according to <**\_\_\_\_\_\_\_\_**> standards.

* + - * 1. Manholes: As specified in Section [**330561 - Concrete Manholes**] [**330573 - Polyethylene Manholes**] [**330576 - Fiberglass Manholes**].
      1. FIELD QUALITY CONTROL
         1. Request inspection by [**Director’s Representative**] <**\_\_\_\_\_\_\_\_**> prior to [**and immediately after**] placing bedding.
         2. Testing:

If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.

In following Subparagraph insert "State of New York Department of Transportation," "Municipality of \_\_\_\_\_\_\_\_ Department of Public Works," or other agency as appropriate.

Perform testing on concrete gravity piping system according to <**\_\_\_\_\_\_\_\_**> standards.

\*\*\*\*\*\* [OR] \*\*\*\*\*\*

Infiltration and Exfiltration Testing: As specified in Section [**330505.33 - Infiltration and Exfiltration Testing**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Compaction Testing:

Select from among test standards referenced in following Subparagraph appropriate for fill materials and Project requirements. AASHTO T 180 in following Subparagraph is similar to ASTM D1557.

Consult geotechnical report to select compaction test method appropriate to fill materials being used and to Project requirements.

Comply with [**ASTM D1557**] [**ASTM D698**] [**AASHTO T 180**] [**ASTM D6938**].

Testing Frequency: <**\_\_\_\_\_\_\_\_**>.

* + - 1. PROTECTION
         1. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION 400539.23