

SECTION 33 31 13
SITE SANITARY SEWAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gravity-flow, non-pressure sanitary sewerage outside the building, with the following components:
1. Cleanouts
 2. Piping

1.2 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic (SDR 35).

1.3 QUALITY ASSURANCE

- A. Reference Standards:
1. City of Vancouver Public Works Administration (City Public Works), "Sewer Design & Construction Requirements (Section 3)".
 2. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating per 2018 APWA.

1.4 SUBMITTALS

- A. Field quality-control test reports.

1.5 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.

PART 2 - PRODUCTS

2.1 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings: ASTM D 3034, SDR 35 minimum stiffness shall be 46 PSI per A STM D-2412. The joints type shall be elastomeric gasket conforming to ASTM D-3212.

2.2 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. See City Public Works standard details for cleanouts.

2.3 ECCENTRIC REDUCER

- A. Spears or approved equal. Schedule 80 PVC reducer manufactured to ASTM D 2467 for use with pipe manufactured to ASTM D 1785.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling per Division 31 Section "Trenching, Backfilling, and Compacting ". Bedding and backfill operation and compaction shall be done in accordance with 2018 APWA.

3.2 PIPING APPLICATIONS

- A. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.
 - 1. Use non-pressure-type flexible couplings where required to join gravity-flow, non-pressure sewer piping, unless otherwise indicated.
- B. Special Pipe Fittings: Use for pipe expansion and deflection. Pipe couplings and special pipe fittings with pressure ratings at least equal to piping rating may be used in applications below, if allowed by the City Public Works.
 - 1. PVC sewer pipe and fittings, gaskets, and gasketed joints.

3.3 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- D. Install gravity-flow, non-pressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
 - 2. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- E. Clear interior of piping of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.4 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, non-pressure, piping according to the following:
 - 1. Join PVC sewer piping according to ASTM D 2321 for elastomeric gasket joints.

3.5 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
 - 1. Use City Public Works detail for standard sanitary cleanout, drawing number S-3.1, when cleanout is located at the end of a pipe run.
 - 2. Use City Public Works detail for property line cleanout, drawing number S-3.0, when cleanout is located in the middle of a pipe run.
- B. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.6 CONNECTIONS

- A. Connect non-pressure, gravity-flow drainage piping to building's sanitary building drains in accordance with the City Public Works standards.
- B. Make connections to existing piping and underground manholes.
 - 1. Connect to existing 8" Sewer line as the location shown on the contract documents using an eccentric reducer per City Public Works standards.
 - 2. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
 - 3. All manhole connections to be inspected by City Engineer.

3.7 IDENTIFICATION

- A. Materials and their installation are specified in Division 31 Sections "Grading" and "Trenching, Backfilling, and Compaction." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
1. Use detectable warning tape over ferrous and nonferrous piping.
 2. All non-metallic pipe shall be installed with #14 copper tracer wire.

3.8 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Re-inspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to requirements of authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Air test gravity sanitary sewer piping in accordance with deflection tested in accordance with City Public Works standards, 2018 APWA /WSDOT.
- C. Leaks and loss in test pressure constitute defects that must be repaired, per City Public Works standards.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

- E. Hydrostatic test concrete manholes in accordance with City Public Works standards and 2018 APWA.

3.9 CLEANING

- A. Clean interior of piping of dirt and superfluous material.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

- A. When not listed in the Bid proposal, all "Sanitary Sewage" costs will be considered incidental work for which no separate payment will be made.
- B. When listed in the Bid Proposal, payment for work specified under this section to be made at the units and prices named in the Proposal, complete and satisfactory to the Owner's Representative.
- C. Payment indicated shall include complete compensation for all labor, equipment, materials and incidentals required or the completion of the work. No additional compensation to be allowed.

END OF SECTION 33 31 13

SECTION 33 41 16
SUBDRAINAGE PIPING

PART 1 - GENERAL

1.1 SUMMARY

This Section includes subdrainage systems for the following:

1. Bio-retention cell.

1.2 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.
- B. Subdrainage: Drainage systems that collect and remove subsurface or seepage water from bio-retention cells.

1.3 SUBMITTALS

- A. Product Data: For the following:
 1. Perforated-wall pipe and fittings.
 2. Geotextile filter fabric.
 3. Drain Rock

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PERFORATED-DRAIN PIPES AND FITTINGS

- A. ADS perforated Single Wall HDPE Pipe, pattern type B and Fittings or approved equal: ASTM F 667, Joins shall be made with split or snap couplings. Standard connections shall meet the requirements of the ASTM F667. Gasketed connections shall incorporate a closed-cell synthetic expanded rubber gasket meeting the requirements of ASTM D 1056 Grade 2A2. Pipe and fitting material shall be high-density polyethylene conforming with the minimum requirement of cell classifications 323410C or 333410C as defined and described in the latest version of ASTM D3350.

2.3 SOIL MATERIALS

- A. Backfill, drainage course, and satisfactory soil materials are specified on civil plans.

2.4 GEOTEXTILE FILTER FABRICS

- A. Description: Mirafi or approved equal fabric of PP or polyester fibers or combination of both. Flow rate range from 110 to 330 gpm/sq. ft. when tested according to ASTM D 4491.
 - 1. Structure Type: Nonwoven, needle-punched continuous filament or woven, monofilament or multifilament.
 - 2. Style(s): Flat and sock.

2.5 DRAIN ROCK

- A. Description: Clean ¾" - ½" Drain Rock

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling shall follow Division 31 Section "Trenching, Backfilling, and Compacting" methods and standards.
- B. Storm drainage installation within the play area shall be installed only after rough grading activities are completed, play equipment footings are installed, and the fine grading of the sub grade is completed.

3.3 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions and other requirements indicated.
 - 1. Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 12 inches, unless otherwise indicated.
 - 2. Lay perforated pipe with perforations down.
 - 4. Install drain rock and filter fabric as detailed on the drawings.

3.4 PIPE JOINT CONSTRUCTION

- A. Join PVC pipe and fittings according to ASTM D 3034 with elastomeric seal gaskets according to ASTM D 2321.

3.5 FIELD QUALITY CONTROL

- A. Testing: After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.

3.6 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

- A. When not listed in the Bid proposal, all "Subdrainage" costs will be considered incidental work for which no separate payment will be made.
- B. When listed in the Bid Proposal, payment for work specified under this section to be made at the units and prices named in the Proposal, complete and satisfactory to the Owner's Representative.
- C. Payment indicated shall include complete compensation for all labor, equipment, materials and incidentals required or the completion of the work. No additional compensation to be allowed.

END OF SECTION 33 41 16

SECTION 33 42 00
STORMWATER CONVEYANCE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes gravity-flow, non-pressure storm drainage outside the building, with the following components:
 - 1. Storm pipes and fittings
 - 2. Area drain / catch basin
 - 3. Storm cleanout
 - 4. Drywell

1.2 DEFINITIONS

- A. PVC: Polyvinyl chloride plastic.

1.3 PERFORMANCE REQUIREMENTS

- A. Gravity-Flow, Non-pressure, Drainage-Piping Pressure Rating per the Plumbing Code.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Special pipe fittings.
- B. Field quality-control test reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe, pipe fittings, and seals from dirt and damage.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

- A. Pipe: ASTM A 716, for push-on joints.

- B. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
- C. Compact Fittings: AWWA C153, for push-on joints.
- D. Gaskets: AWWA C111, rubber.

2.2 PVC PIPE AND FITTINGS

- A. PVC Sewer Pipe and Fittings: AWWA C900, Class 100, for gasketed joints and using ASTM F 477, elastomeric seals.
 - 1. Fittings NPS 4 to NPS 8 (DN 100 to DN 200): PVC pressure fittings complying with AWWA C907, for gasketed joints and using ASTM F 477, elastomeric seals.
- B. PVC Sewer Pipe and fittings, NPS 4 to NPS 8 ASTM D 3034, SDR 35, with bell-and-spigot ends for gasketed joints with ASTM F 477, elastomeric seals.

2.3 AREA DRAINS / CATCH BASINS

- A. Catch basins and area drains are Gibson Steel Basins 12" square with 6" diameter outlet, or approved equal.

2.4 CLEANOUTS

- A. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping. See City of Vancouver standard details for cleanouts.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

- D. Install gravity-flow, non-pressure drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
- E. Pipe installation shall follow 2018 APWA.
- F. All non-metallic pipe shall be installed with #14 copper tracer wire. Wrap around pipe and terminate at all structures.

3.2 PIPE JOINT CONSTRUCTION

- A. Deflect storm sewer pipes into catch basins/area drains and cleanout or manholes as required on plans. Maximum joint deflections shall not exceed 5 degrees or manufacturer's recommendations, whichever is less.

3.3 AREA DRAINS/CATCH BASINS

- A. Area drains and catch basins shall be set square with curbs and edge of paths. All drainage structures shall be adjusted so water flow will into them without ponding.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extension from sewer pipe to cleanouts at grade.
 - 1. Use City of Vancouver detail for standard sewer cleanout, drawing number S-3.1, when cleanout is located at the end of a pipe.
 - 2. Use City of Vancouver detail for property line cleanout, drawing number S-3.0, when cleanout is located in the middle of a pipe.
- B. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.5 IDENTIFICATION

- A. Use detectable warning tape over ferrous piping if required by the City of Vancouver.

3.6 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches (610 mm) of backfill is in place, and again at completion of Project.
 - 1. Submit separate reports for each system inspection.
 - 2. Defects requiring correction include the following:

- a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Re-inspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
 2. Test completed piping systems according to authorities having jurisdiction.
 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 4. Submit separate report for each test.
 5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Exception: Piping with soil tight joints unless required by authorities having jurisdiction.
 6. Before mandrel testing or final acceptance, flush and clean all storm drains, and remove all foreign material from the mainlines, manholes and catch basins.
 7. Contractor shall conduct deflection test of flexible storm sewer pipes by pulling an approved mandrel through the completed pipeline following trench compaction. The diameter of the mandrel shall be 95% of the initial pipe diameter. Test shall be conducted not more than 30 days after the trench backfilling and compaction has been completed.
- C. Leaks and loss in test pressure constitute defects that must be repaired.
- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.7 CLEANING

- A. Clean interior of piping of dirt and superfluous materials.
- B. At the end of the project, the contractor shall clean all drainage structures within the project limits.

PART 4 - MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

- A. When not listed in the Bid proposal, all "Storm Drainage" costs will be considered incidental work for which no separate payment will be made.
- B. When listed in the Bid Proposal, payment for work specified under this section to be made at the units and prices named in the Proposal, complete and satisfactory to the Owner's Representative.
- C. Payment indicated shall include complete compensation for all labor, equipment, materials and incidentals required or the completion of the work. No additional compensation to be allowed.

END OF SECTION 33 42 00