SECTION 334119 - UNDERSLAB DRAINAGE

This Section specifies weep tile drainage systems for slabs on subgrade or fill. This Section includes filter aggregate and filter fabric surrounding weep tile and drainage mat, but does not include trench cutting and backfill.

Drainage systems for building perimeters are specified in Section 334113.

Requirements for this Section may be dictated by geotechnical report recommendations.

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

Slab-on-grade drainage system.

* + - * 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 055000 - Metal Fabrications: Access covers and frames in [**floor slab**] <**\_\_\_\_\_\_\_\_**>, and cleanouts in weep drainage systems.

Section [**221429 - Sump Pumps**] [**221429.16 - Submersible Sump Pumps**]: Sump pumps.

Section 224000 - Plumbing Fixtures: Representative examples of plumbing fixtures and trim.

Section 310001 - Earthwork Materials: Filter aggregate or sand for backfill.

Section **310000 - Earthwork**: Excavating for Site subdrainage piping and surrounding filter aggregate.

Section 334200 - Stormwater Conveyance: Connection to [**weep drainage system**] [**sump pit**] [**collection pit**] [**<\_\_\_\_\_\_\_\_> pit**] <**\_\_\_\_\_\_\_\_**>.

List Sections specifying installation of products included in this Section and indicate specific items.

Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>: Placement of pipe sleeves in concrete [**sump pits**] [**collection pits**] [**<\_\_\_\_\_\_\_\_> pits**].

List Sections specifying products installed in this Section and indicate specific items.

Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>: Sewer pipe connection couplings for placement by this Section.

Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>: [**Waterproofing**] [**Dampproofing**] with drainage-capable protection board at vertical subgrade surfaces.

Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>: Pipe outlet at [**filter bed**] [**swale**] [**French drain pit**] [**municipal ditch**] <**\_\_\_\_\_\_\_\_**>.

Section <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>: Concrete [**sump**] [**collection**] <**\_\_\_\_\_\_\_\_**> pits.

* + - 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. Consider including publication dates for referenced standards in this Section to ensure that the correct standard is used for LEED compliance.

* + - * 1. ASTM International:

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

ASTM C412 - Standard Specification for Concrete Drain Tile.

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

ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.

* + - 1. COORDINATION

This is applicable for projects with connections to municipal sewer systems. Remove if no municipal sewer connection.

* + - * 1. Coordinate Work of this Section with connections to [**municipal sewer utility service**] <**\_\_\_\_\_\_\_\_**>, and to trenching Work.
			1. SUBMITTALS

Only request submittals 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 on pipe drainage products, pipe accessories, 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. Shop Drawings: Indicate dimensions, layout of piping, high and low points of pipe inverts, gradient of slope between corners and intersections, and <**\_\_\_\_\_\_\_\_**>.
				2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
				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.

Remove paragraph if not a LEED project.

* + - 1. SUSTAINABLE DESIGN SUBMITTALS
				1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design submittals.
				2. 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. Section 017716 - Contract Closeout: Requirements for submittals.
				2. Project Record Documents: Record actual locations of pipe runs, connections, cleanouts, and principal invert elevations.
			2. QUALITY ASSURANCE

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.
			1. DELIVERY, STORAGE, AND HANDLING
				1. Section 016500 - Materials and Equipment: Requirements for transporting, handling, storing, and protecting products.
				2. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.
				3. Store materials according to manufacturer instructions.
				4. 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. PIPING
				1. [Manufacturers](http://www.specagent.com/LookUp/?ulid=13276&mf=04&src=wd):

ADS, (800) 821-6710, 4640 Trueman Blvd., Hilliard, OH 43026.

NAPCO; Westlake Chemical Corp., (866) 598-6098, 2801 Post Oak Blvd., Ste. 600, Houston, TX 77056.

Approved equivalent.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above.

* + - * 1. Description:

Material: PVC.

Comply with ASTM D2729.

Nominal Diameter: [**4**] [**6**] <\_\_\_\_\_\_\_\_> inches.

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

Nominal Diameter: As indicated on Drawings.

Ends: Plain.

Fittings: PVC.

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

* + - * 1. Description:

Material: Concrete.

Comply with ASTM C412.

Quality: [**Standard**] [**Extra**] [**Heavy-duty extra**] [**Special**].

Nominal Diameter: [4] [6] <\_\_\_\_\_\_\_\_> inches.

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

Nominal Diameter: As indicated on Drawings.

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

Fittings:

Non-reinforced concrete.

Comply with ASTM C14.

Joints:

Rubber compression gasket.

Comply with ASTM C443.

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

If using tubing material as specified in following paragraph, note that coarse backfill materials or improper care with installation may cause tubing to collapse.

* + - * 1. Description:

Material: Corrugated plastic tubing.

Type: Flexible.

Nominal Diameter: [**3**] [**4**] <\_\_\_\_\_\_\_\_> inches.

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

Nominal Diameter: As indicated on Drawings.

End Connections: [**Coupling bands**] <**\_\_\_\_\_\_\_\_**>.

Remove if not a LEED project.

* + - 1. SUSTAINABILITY CHARACTERISTICS

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

* + - * 1. Section 018113 - LEED Documentation Requirements: Requirements for sustainable design compliance.
				2. 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. ACCESSORIES

Consider using first following optional paragraph for perforated plastic or bituminous-fiber pipe, and second following optional paragraph for unperforated pipe.

* + - * 1. Pipe Couplings: Solid [**plastic**] <**\_\_\_\_\_\_\_\_**>.

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

* + - * 1. Joint Cover: [**No. 15 asphalt-saturated roofing felt**] [**No. 30 asphalt saturated-roofing felt**] [**10-mil-thick polyethylene**] [**<\_\_\_\_\_\_\_\_>-mil-thick polyethylene**] <**\_\_\_\_\_\_\_\_**>.
				2. Filter Fabric: As specified in Section 310001 - Earthwork Materials.
1. EXECUTION
	* + 1. EXAMINATION
				1. Verify that [**trench cut**] [**excavated base**] is ready to receive Work.
				2. Verify that excavations, dimensions, and elevations are as indicated on [**Shop**] Drawings.
			2. PREPARATION

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

* + - * 1. Hand trim excavations to indicated elevations.
				2. Correct over-excavation with <**\_\_\_\_\_\_\_\_**>, as specified in Section [**310001 - Earthwork Materials**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

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

* + - * 1. Correct over-excavation with lean concrete.

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

* + - * 1. Correct over-excavation with <**\_\_\_\_\_\_\_\_**>.
				2. Remove large stones or other materials that could damage drainage piping or could impede consistent backfilling or compaction.
			1. INSTALLATION

Minimize aggregate bed thickness under pipe such that water will not collect under piping, causing it to not drain as intended. Bed thickness will also depend on flatness of trench or excavated cut as well as tolerance of cut-slope gradient. Consider using impervious fill to limit or restrict moisture movement.

* + - * 1. Install [**perforated**] [**unperforated**] pipe for subdrainage system.
				2. Place drainage piping on [**clean-cut subsoil**] [**compacted impervious fill**].

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

* + - * 1. Slope:

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

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

Consider including first following optional paragraph for plain-end pipe if joints are loosely butted. Consider including second following optional paragraph for mechanical-joint perforated pipe.

* + - * 1. Loosely butt pipe ends, and place [**12**] <**\_\_\_\_\_\_\_\_**>-inch-wide joint cover strip around pipe diameter, centered over joint.

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

* + - * 1. Place pipe with perforations facing down, and mechanically join pipe ends.
				2. Install pipe couplings.

Following paragraph refers to Section 310000 for backfilling and compaction. Edit paragraph to include specific compaction requirements if criteria in Section 310000 are not appropriate to Project requirements.

* + - * 1. Compaction:

As specified in Section [**310000 - Earthwork**] <**\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_**>.

Do not displace or damage pipe while compacting.

* + - * 1. Cover:

Install aggregate at sides, over joint [**covers**], and over top of pipe.

Install top cover to compacted thickness of [**12**] <**\_\_\_\_\_\_\_\_**> inches.

* + - * 1. Place filter fabric over leveled top surface of aggregate cover prior to subsequent backfilling operations.
				2. Place aggregate in maximum [**4**] [**6**] <**\_\_\_\_\_\_\_\_**>-inch lifts, consolidating each lift.

Consider including following paragraph if impervious fill is used to limit or restrict moisture movement.

* + - * 1. Place impervious fill over drainage pipe aggregate cover, and compact.
				2. Connect to [**stormwater conveyance system**] [**sump pits**] <**\_\_\_\_\_\_\_\_**> using unperforated pipe [**through installed sleeves**].
			1. FIELD QUALITY CONTROL
				1. Request inspection by Director’s Representative prior to [**and immediately after**] placing aggregate cover over pipe.
				2. Equipment Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and rerun tests.
			2. PROTECTION
				1. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.
			3. ATTACHMENTS

When relying on separate schedules, tables, illustrations, or forms to specify product requirements, include list of each attachment. Include identical list of attachments in Project Manual table of contents.

Consider including schedule if unusual site conditions are evident, if Drawings do not show details of stormwater conveyance system, or if different sizes and locations require description by schedule.

Insert attachments following END OF SECTION. Consider following example when developing Project schedule.

* + - * 1. Basement Floor Slab Drainage:

Location: Underside of slab.

Slope to drain at 1/4 inch per foot to sump pit.

END OF SECTION 334119