SECTION 036000 - GROUTING

This Section includes portland cement grout, rapid-curing epoxy grout, and nonshrink cementitious grout.

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

Portland cement grout.

Rapid-curing epoxy grout.

Nonshrink cementitious grout.

* + - * 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 031000 - Concrete Forming and Accessories: Form materials, waterstops, and accessories as required to form cast-in-place concrete and maintain structural integrity until stripping.

Section 033000 - Cast-in-Place Concrete: Cast-in-place or in-situ concrete for structural building frames, slabs on fill or grade, and other concrete components.

* + - 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 the correct standard is used for LEED compliance.

* + - * 1. American Concrete Institute:

ACI 301 - Specifications for Structural Concrete for Buildings.

ACI 318 - Building Code Requirements for Structural Concrete.

* + - * 1. ASTM International:

ASTM C33 - Standard Specification for Concrete Aggregates.

ASTM C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

ASTM C150 - Standard Specification for Portland Cement.

ASTM C191 - Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle.

ASTM C307 - Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings.

ASTM C531 - Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes.

ASTM C827 - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

* + - * 1. U. S. Army Corps of Engineers Concrete Research Division (CRD):

CRD-C621 - Non-Shrink Grout.

* + - 1. 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 regarding grout and <\_\_\_\_\_\_\_\_>.
				5. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate Paragraphs for additional certifications.

* + - * 1. Manufacturer Instructions: Submit instructions for mixing, handling, surface preparation, and placing epoxy-type and nonshrink grouts.
				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.

* + - 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 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.

Products with recycled material content.

Regional products.

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

* + - 1. 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 Paragraph 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. AMBIENT CONDITIONS
				1. Maximum Conditions: Do not perform grouting if temperatures exceed <\_\_\_\_\_\_\_\_> degrees F.
				2. Minimum Conditions: Maintain minimum temperature of <\_\_\_\_\_\_\_\_> degrees F before, during, and after grouting, until grout has set.
1. PRODUCTS
	* + 1. PORTLAND CEMENT GROUT
				1. Portland Cement: Comply with ASTM C150, Type I and II.
				2. Water:

Potable.

No impurities, suspended particles, algae, or dissolved natural salts in quantities capable of causing:

Corrosion of steel.

Volume change increasing shrinkage cracking.

Efflorescence.

Excess air entraining.

* + - * 1. Fine Aggregate:

Washed natural sand.

Gradation:

Comply with ASTM C33.

Represented by smooth granulometric curve within required limits.

Free from injurious amounts of organic impurities according to ASTM C40.

* + - * 1. Mix:

Portland cement, sand, and water.

Do not use ferrous aggregate or staining ingredients in grout mixes.

* + - 1. RAPID-CURING EPOXY GROUT
				1. Manufacturers:

ARDEX Americas.

Euclid Chemical Company.

Sika Corporation.

Approved equivalent.

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

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

Furnish materials according to <\_\_\_\_\_\_\_\_> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above. Include configuration, size, color, material composition, and other properties needed to describe product.

* + - * 1. Description:

High-strength, three-component epoxy grout formulated with thermosetting resins and inert fillers.

Rapid-curing, high adhesion, and resistant to ordinary chemicals, acids, and alkalis.

* + - * 1. Performance and Design Criteria:

Compressive Strength:

12,000 psi at seven days.

Comply with ASTM C579.

Minimum Tensile Strength:

2,000 psi.

Comply with ASTM C307.

Coefficient of Expansion:

30x10-6 inch per degree F.

Comply with ASTM C531.

Shrinkage:

None.

Comply with ASTM C827.

* + - 1. NONSHRINK CEMENTITIOUS GROUT
				1. Manufacturers:

ARDEX Americas.

Euclid Chemical Company.

Sika Corporation.

Approved equivalent.

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

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

Furnish materials according to <\_\_\_\_\_\_\_\_> standards.

Insert descriptive specifications below to identify Project requirements and to eliminate conflicts with products specified above. Include configuration, size, color, material composition, and other properties needed to describe product.

* + - * 1. Description:

Pre-mixed and ready-for-use formulation requiring only addition of water.

Nonshrink, non-corrosive, nonmetallic, non-gas forming, and no chlorides.

* + - * 1. Performance and Design Criteria:

Certified to maintain initial placement volume or expand after set, and to meet following minimum properties when tested according to CRD-C621 for Type D nonshrink grout:

Setting Time:

Initial: Approximately two hours.

Final: Approximately three hours.

Comply with ASTM C191.

Maximum Expansion: 0.10 to 0.40 percent.

Compressive Strength:

One-Day: 4,000 psi.

Seven-Day: 7,000 psi.

28-Day: 10,000 to 10,800 psi.

Comply with CRD-C621.

* + - 1. FORMWORK
				1. As specified in Section 031000 - Concrete Forming and Accessories.
			2. 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. EXECUTION
	* + 1. EXAMINATION
				1. Verify areas to receive grout.
			2. PREPARATION
				1. Remove defective concrete, laitance, dirt, oil, grease, and other foreign material from concrete surfaces by brushing, hammering, chipping, or other similar means until sound and clean concrete surface is achieved.
				2. Roughen concrete lightly, but not to interfere with placement of grout.
				3. Remove foreign materials from metal surfaces in contact with grout.
				4. Align, level, and maintain final positioning of components to be grouted.
				5. Saturate concrete surfaces with clean water, and then remove excess water.
			3. INSTALLATION
				1. Formwork:

Construct leakproof forms anchored and shored to withstand grout pressures.

Install formwork with clearances to permit proper placement of grout.

As specified in Section 031000 - Concrete Forming and Accessories.

* + - * 1. Mixing:

Portland Cement Grout:

Use proportions of two parts sand and one part cement, measured by volume.

Prepare grout with water to obtain consistency to permit placing and packing.

Mix water and grout in two steps:

Premix using approximately 2/3 of water.

After partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing two to three minutes.

Mix only quantities of grout capable of being placed within 30 minutes after mixing.

Do not add additional water after grout has been mixed.

Minimum Compressive Strength: **[2,400]** <\_\_\_\_\_\_\_\_> psi in 48 hours and **[7,000]** <\_\_\_\_\_\_\_\_> psi in 28 days.

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

Rapid-Curing Epoxy Grout:

Mix and prepare according to manufacturer instructions.

Minimum Compressive Strength: **[2,400]** <\_\_\_\_\_\_\_\_> psi in 48 hours and **[7,000]** <\_\_\_\_\_\_\_\_> psi in 28 days.

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

Nonshrink Cementitious Grout:

Mix and prepare according to manufacturer instructions.

Minimum Compressive Strength: **[2,400]** <\_\_\_\_\_\_\_\_> psi in 48 hours and **[7,000]** <\_\_\_\_\_\_\_\_> psi in 28 days.

Mix grout components in proximity to Work area and transport mixture quickly and in manner not permitting segregation of materials.

* + - * 1. Placing of Grout:

Place grout material quickly and continuously.

Do not use pneumatic-pressure or dry-packing methods.

Apply grout from one side only to avoid entrapping air.

Do not vibrate placed grout mixture or permit placement if area is being vibrated by nearby equipment.

Thoroughly compact final installation and eliminate air pockets.

Do not remove leveling shims for at least 48 hours after grout has been placed.

* + - * 1. Curing:

Prevent rapid loss of water from grout during first 48 hours by use of approved membrane curing compound or by using wet burlap method.

Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.

After grout has attained its initial set, keep damp for minimum three days.

* + - 1. FIELD QUALITY CONTROL
				1. **[Inspection and]** Testing:

Comply with ACI **[301] [318]** and as specified in Section <\_\_\_\_\_\_-\_\_\_\_\_\_\_\_\_\_\_\_>.

Submit proposed mix design **[of each class of grout]** to Director’s Representative for review prior to commencement of Work.

Tests of grout components may be performed to ensure compliance with specified requirements.

END OF SECTION 036000