SECTION 337900 - SITE GROUNDING

This Section includes grounding grids, loops, and other Site-related grounding components for extensive grounding of buildings and facilities.

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

Rod electrodes.

Active electrodes.

Exothermic connections.

Mechanical connectors.

Wire.

Grounding well components.

* + - * 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 033000 - Cast-in-Place Concrete: Product and execution requirements for concrete used in concrete wells.

* + - 1. REFERENCE STANDARDS

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

* + - * 1. The Institute of Electrical and Electronics Engineers, Inc.:

IEEE 80 - IEEE Guide for Safety in AC Substation Grounding.

IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

* + - * 1. International Electrical Testing Association:

NETA ATS - Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems.

* + - 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 data for grounding electrodes and connectors.
        5. Shop Drawings: Indicate layout and installation details of grounding components.
        6. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

Include separate paragraphs for additional certifications.

* + - * 1. Test and Evaluation Reports: Indicate overall resistance-to-ground.
        2. Manufacturer Instructions: Submit detailed instructions on installation requirements, including storage and handling procedures.
        3. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.
        4. Qualifications Statement:

Coordinate following subparagraph with requirements specified in QUALIFICATIONS Article.

Submit qualifications for manufacturer.

* + - 1. CLOSEOUT SUBMITTALS
         1. Project Record Documents: Record actual locations of electrodes and connections.
      2. QUALITY ASSURANCE

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

* + - * 1. Comply with IEEE 142.
        2. Substation Grounding: Comply with IEEE 80.
        3. Perform Work according to all applicable standards and Utility company requirements.

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. PRODUCTS
   * + 1. DESCRIPTION
          1. Use configuration as indicated on Drawings.
       2. PERFORMANCE AND DESIGN CRITERIA
          1. Overall Resistance-to-Ground: As indicated on Drawings.
       3. ROD ELECTRODES
          1. Manufacturers:

ERICO, an Nvent Brand, (440) 248-0100, 34600 Solon Road, Solon, OH 44139.

Harger Co., (800) 842-7437, 301 Ziegler Drive, Grayslake, IL, 60030.

Approved equivalent.

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

* + - * 1. Description: [**Copper**] [**Copper-clad steel**] ground rods.

Specify diameter and length below. Delete following two paragraphs if information is indicated on Drawings, or if installer elects to meet performance requirements.

* + - * 1. Diameter: [**1/2**] [**3/4**] <\_\_\_\_\_\_\_\_> inch.
        2. Length: [**5**] [**8**] [**10**] <\_\_\_\_\_\_\_\_> feet.
        3. Spacing: Spacing between ground rods shall be 2.2 times ground rod length unless otherwise specified in the drawing.
      1. ACTIVE ELECTRODES
         1. Manufacturers:

ABB Inc., (203) 563-0403, 187 Danbury Road, STE 1E, Wilton, CT 06897.

ERICO, an Nvent Brand, (440) 248-0100, 34600 Solon Road, Solon, OH 44139.

Approved equivalent.

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

* + - * 1. Description: Metallic-salt-filled copper tube electrode.
        2. Shape: [**Straight**] [**L-shaped**] [**As indicated on Drawings**].
        3. Length: [8] [10] [12] [20] <\_\_\_\_\_\_\_\_> feet.
        4. Connectors: [**U-bolt pressure plates**] [**Suitable for exothermic welded connections**].
      1. EXOTHERMIC CONNECTIONS
         1. Manufacturers:

Burndy LLC., (800) 346-4175, 47 E Industrial Park Dr, Manchester, NH 03109.

ERICO, an Nvent Brand, (440) 248-0100, 34600 Solon Road, Solon, OH 44139.

Galvan Electrical, (704) 455-5102, P.O. Box 369, Harrisburg, NC 28075.

Harger Co., (800) 842-7437, 301 Ziegler Drive, Grayslake, IL 60030.

ILSCO Corp., (800) 776-9775, 4730 Madison Road, Cincinnati, OH, 45227.

NSI Industries, (800) 321-5847, 9730 Northcross Center Court, Huntersville, NC 28078.

Approved equivalent.

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

* + - * 1. Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.
      1. MECHANICAL CONNECTORS
         1. Manufacturers:

Burndy LLC., (800) 346-4175, 47 E Industrial Park Dr, Manchester, NH 03109.

ERICO, an Nvent Brand, (440) 248-0100, 34600 Solon Road, Solon, OH 44139.

Galvan Electrical, (704) 455-5102, P.O. Box 369, Harrisburg, NC 28075.

Harger Co., (800) 842-7437, 301 Ziegler Drive, Grayslake, IL 60030.

ILSCO Corp., (800) 776-9775, 4730 Madison Road, Cincinnati, OH, 45227.

NSI Industries, (800) 321-5847, 9730 Northcross Center Court, Huntersville, NC 28078.

Approved equivalent.

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

* + - * 1. Description: Bronze connectors, suitable for grounding and bonding applications, and in configurations required for particular installation.
      1. WIRE
         1. Material: Stranded copper.

Indicate sizes to meet physical strength requirements. Increasing conductor size does not appreciably increase performance of grounding system.

* + - * 1. Minimum Size of Horizontal Electrodes: [4/0] [2/0] [2] <\_\_\_\_\_\_\_\_> AWG.
        2. Minimum Size of Connections to Electrodes: [2/0] [2] <\_\_\_\_\_\_\_\_> AWG.
        3. Minimum Size of Bonding to Other Objects: [2/0] [2] <\_\_\_\_\_\_\_\_> AWG.
        4. Mechanical Connectors: Bronze.
        5. Grounding Boxes: Bronze.
      1. GROUNDING WELL COMPONENTS

Delete following paragraph if grounding wells are constructed of cast-in-place concrete.

* + - * 1. Well Pipe:

Description: [**Clay tile**] [**Concrete**] pipe with belled end.

Size:8 inches in diameter by 24 inches long

* + - * 1. Well Cover: Cast iron, with legend GROUND embossed on cover.
        2. Treatment Well Liner:

Description: [**Clay tile**] [**Concrete**], perforated pipe.

Diameter: 8 inches.

* + - 1. ACCESSORIES
         1. Treatment Chemicals:

Magnesium sulfate (Epsom salts) [**, or**] <**\_\_\_\_\_\_\_\_**>.

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

Suitable ion-producing, non-corrosive, and non-toxic chemicals.

1. EXECUTION
   * + 1. EXAMINATION
          1. Verify that final backfill and final compaction have been completed before driving rod electrodes.
          2. Verify that trenching has been completed before installing horizontal electrodes.
       2. PREPARATION
          1. Remove exposed and abandoned grounding components by cutting conductors flush with grade and pavement, and then patching surfaces.
          2. Existing Installations:

Provide access to existing grounding electrodes, connections, and other installations remaining active and requiring access.

Modify installation or install wells [**as indicated on Drawings**].

* + - * 1. Extend existing Site grounding installations using materials and methods [**compatible with existing installations, or**] as specified.
        2. Clean and repair existing remaining grounding connections.
      1. INSTALLATION

Include description of how rod electrodes are to be installed if vertical position is not appropriate.

* + - * 1. Install rod electrodes [**in vertical position with bottom at least 5 feet below frost line**] [**in vertical position with bottom at least <\_\_\_\_\_\_\_\_> feet below frost line**] [**as indicated on Drawings**] <**\_\_\_\_\_\_\_\_**>.
        2. Install interconnecting wire [**2 feet below finished grade level**] [**<\_\_\_\_\_\_\_\_> feet below finished grade level**] [**below frost line**] [**as indicated on Drawings**].
        3. Install grounding wells [**and grounding boxes**] [**as indicated on Drawings**] [**at each electrode**] [**at every second electrode**] [**at every <\_\_\_\_\_\_\_\_> electrode**].

Consider using following paragraph to specify cast-in-place concrete well.

* + - * 1. Construct concrete well as specified in Section 033000 - Cast-in-Place Concrete.

Edit following paragraph to indicate locations where treatment is required. Also, select acceptable treatment chemicals.

* + - * 1. Chemical Treatment:

Provide chemical treatment [**as indicated on Drawings**] [**at each vertical electrode location**] <**\_\_\_\_\_\_\_\_**>.

Saturate treatment chemicals with water following chemical application.

Trenching:

Dig circular trench, centered on electrode.

Make trench 12 inches deep with 18-inch inside diameter.

Uniformly distribute 50 lb of treatment material into trench and cover with topsoil.

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

Fill each electrode well to 12 inches below grade with treatment material.

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

Locate four uniformly spaced treatment wells along 48-inch radius from each electrode requiring treatment, and fill each well to 12 inches below grade with treatment material.

Consider using following paragraph if treatment wells are specified in preceding paragraph.

* + - * 1. Treatment Wells:

Specify depth of at least one-half of electrode depth.

Lining: Install to depth [**of [5] <\_\_\_\_\_\_\_\_> feet**][**as indicated on Drawings**].

Well Pipe and Cover: Installed flush with finished grade.

* + - 1. FIELD QUALITY CONTROL

NETA ATS refers to specific ANSI standards, and includes procedures and acceptable values for acceptance testing electrical equipment according to those standards.

Caution: Section 4 of NETA ATS stipulates a division of responsibility that may conflict with Conditions of the Contract or General Requirements.

* + - * 1. Inspect and test according to NETA ATS[**, except Section 4**].
        2. Perform inspections and tests as listed in NETA ATS, Section 7.13.
        3. Take final grounding system measurements [**three**] [**or**] [**four**] days after chemical treatment.
      1. DEMONSTRATION
         1. Demonstrate location of each accessible grounding connection and each chemical treatment well. Coordinate with Director’s Representative.

END OF SECTION 337900