SECTION 16450

GROUNDING

# GENERAL

## DESCRIPTION

### This section includes materials, testing, and installation of electrical grounding.

## RELATED WORK SPECIFIED ELSEWHERE

### Section 16010: General Electrical Requirements.

### Section 16120: Wires and Cables.

## SUBMITTALS

### Submit shop drawings in accordance with the General Conditions.

### Submit material list for all grounding materials and equipment. Indicate size, material, and manufacturer.

### Submit test results. Indicate overall resistance to ground and resistance of each electrode.

## PERFORMANCE REQUIREMENTS

### Grounding System Resistance:

#### **Transformer Grounding Electrode:** 25 ohms.

#### **Separately Derived Sources Grounding Electrode:** 10 ohms. This includes ground rod where required for wireless equipment.

#### **Noncurrent-Carrying Metal Parts:** 25 ohms.

#### **Grounds Not Covered Above:** 25 ohms.

## MEASUREMENT AND PAYMENT

### Payment for the work in this section shall be included as part of the lump-sum bid amount stated in the Proposal.

# MATERIALS

## GROUND RODS

### Ground rods shall be copper-clad steel, 3/4 inch diameter, minimum 10 feet long, with hardened steel points.

## CONNECTIONS

### **Ground Clamps:** Clamps for connection of ground wire to ground rod shall be bronze.

### **Exothermic Connections:** Provide Cadweld or equal.

## CONDUCTORS

### **Equipment Ground:** Conductors shall be low-voltage building-wire type.

### **Bare Copper Conductors:** Annealed bare copper, conforming to ASTM B3 and B8. Size of grounding electrode conductors shall be as shown on the drawings, and shall not be smaller than #4/0 AWG.

# EXECUTION

## INSTALLATION

### Install ground rods in the presence of a DISTRICT representative.

## GROUND ELECTRODE

### Install 20 feet of bare copper ground wire 3 inches above bottom of the concrete footing for new buildings as shown in the drawings. Connect the wire to the ground bus within the main service switchboard. Protect wire with a rigid PVC conduit where wire stubs up through slab at switchboard.

### Bond the interior metallic water system to the grounding system in accordance with NEC Article 250-80 and Table 250-95.

### Bond the rebar in the building floor slab to the grounding system as shown in the drawings.

### For area where it is not practical to install ground rod, grounding electrode system shall consist of a minimum 200 feet of bare 500kcmil copper cable embedded in concrete foundation or slab.

## EQUIPMENT GROUNDING

### Connect the ground buses of lighting panels, distribution panels, and motor control centers to the ground bus within the main service switchboard with a grounding conductor.

### Ground raceways and noncurrent carrying parts of electrical equipment in accordance with NEC Article 250. Grounding through the conduit system shall be in excess of any ground conductors Ground conductors are required in all conduits.

### Circuits in nonmetallic conduit shall carry one ground conductor for equipment grounding.

### Metallic conduits which terminate without mechanical connection to an electrical equipment metal housing by means of locknut and bushings or hubs, shall be provided with grounding bushings. Bond all bushings with an equipment grounding conductor to the equipment ground bus.

## GROUND TEST WELL

### Provide a handhole and ground rod as detailed in the drawings to aid in performing ground testing and connecting additional ground rods if required by the test results. Connect ground wire from ground rod to main service switchboard ground bus as detailed in the drawings.

## CONNECTIONS

### Exothermic weld all underground connections.

## TESTS

### Before making connections to the ground electrode, measure the resistance of the electrode to ground using a ground resistance tester specifically designed for ground resistance testing. Perform testing in accordance with test instrument manufacturer’s recommendations using fall-of-potential method. Perform the test not less than two days after the most recent rainfall, and in the afternoon after any ground condensation (dew) has evaporated. If a resistance less than the performance requirements is not obtained, provide additional ground rods driven 6 inches below grade spaced 10 feet away from the ground well and connect to ground test well with No. 4 AWG bare copper wire and repeat the test. If the performance requirements are still not obtained, inform the DISTRICT for resolution.

**END OF SECTION**