



Division 260526

Grounding and Bonding

DESIGN GUIDE

1 General

1.1 Introduction

- A. This section applies to:
 - 1. Grounding electrodes and conductors
 - 2. Equipment grounding conductors
 - 3. Bonding
- B. Metal hardware installed in below grade vaults has been a maintenance issue on campus due to corrosion over time. Confirm with the ELSM if anti-corrosion measures are required for below grade metal hardware during the design.

2 Materials

2.1 Rod Electrodes

- A. Material: Copper-clad steel
- B. Diameter: 3/4 inch diameter
- C. Length: 10 feet long , unless otherwise directed by the ELSM.



2.2 Ground Bars

- A. Electrical Room Ground Bars: Shall be ¼” thick by 4” high by 20” long solid copper bar with 4” insulated stand-off supports. Bar shall be factory pre-drilled to accept standard 2-hole lugs.

2.3 Connectors

- A. Connectors and clamps for grounding systems shall be compression type, irreversible.
- B. Connections to equipment shall be bolted type.

2.4 Exothermic Connections

- A. Exothermic fusion welds are not allowed for any applications.

2.5 Wire

- A. Material: Solid copper for #12 through #8 AWG. Stranded copper for #6AWG and larger.
- B. Bonding conductors at ground rods shall be #4/0 bare stranded copper.
- C. System grounding electrode conductors and bonding conductors shall be stranded single conductors, with 600 volt insulation, sized to meet NFPA 70 requirements.

3 Execution

3.1 Grounding at Transformers

- A. Transformers shall be installed on top of a vault with manhole access.
- B. Transformer service grounding shall be accomplished by installation of a #4/0 bare copper grounding grid as follows:



1. Drive one (1) 3/4 inch x10 feet copper clad steel ground rod at each of the four corners of the pad/vault, 6 inches outside the concrete pad edge to a depth such that the top of each ground rod is approximately 6 inches below finished grade.
2. Provide a #4/0 bare, stranded copper conductor connecting the corner ground rods together in a grid of rectangular pattern, approximately 6 inches outside the concrete pad edge. Provide another #4/0 bare stranded ground conductor connecting this grid to the transformer ground. Connect the conductors to the ground rods at the elevation between natural earth and gravel sub-base.
3. Bond protective posts in proximity to the transformer and provide smooth yellow plastic sleeve cover for protective post.
4. Provide grounding and bonding of vault interior. Field apply ocal spray plastic coating on all exposed metal hardware and metal supports after vault interior grounding is complete.

3.2 Grounding at Pad Mounted Switches

- A. Pad mounted switches shall be installed on top of a vault with manhole access.
- B. Pad switch and vault grounding shall be accomplished by installation of a #4/0 bare copper grounding grid as follows:
 1. Drive one (1) 3/4 inch copper clad steel ground rod at each of the four corners of the vault, 6 inches outside the concrete edge to a depth such that the top of each ground rod is approximately 6 inches below finished grade.
 2. Provide a #4/0 bare, stranded copper conductor connecting the corner ground rods together in a girdle of rectangular pattern, approximately 6 inches outside the concrete edge. Provide another #4/0 bare stranded ground conductor connecting this girdle to the ground bar in each switch compartment. Connect the conductors to the ground rods at the elevation between natural earth and gravel sub-base.
 3. Bond protective posts in proximity to the switch and provide smooth yellow plastic sleeve cover for protective post.



4. Provide grounding and bonding of vault interior. Field apply ocal spray plastic coating on all exposed metal hardware and metal supports after vault interior grounding is complete.

3.3 Grounding at Manholes

- A. Manhole grounding shall be accomplished by installation of a #4/0 bare copper grounding grid as follows:
 1. Drive one (1) 3/4 inch copper clad steel ground rod at each of the four corners of the manhole, 6 inches outside the concrete edge to a depth such that the top of each ground rod is approximately 6 inches below finished grade.
 2. Provide a #4/0 bare, stranded copper conductor connecting the corner ground rods together in a girdle of rectangular pattern, approximately 6 inches outside the concrete edge. Connect the conductors to the ground rods at the elevation between natural earth and gravel sub-base.
 3. Provide grounding and bonding of manhole interior. Field apply ocal spray plastic coating on all exposed metal hardware and metal supports after vault interior grounding is complete.

3.4 Building Grounding Electrode

- A. Provide a concrete encased grounding electrode within the building concrete foundation or provide a ground ring per NEC Article 250.

3.5 Distribution Grounding

- A. Provide grounding electrodes and grounding electrode conductors for separately-derived electrical systems, including dry-type transformers. Ground the neutral of each separately-derived electrical system. Bond the grounding electrodes for each separately-derived system to the premises grounding electrode system.
- B. Provide building grounding system as follows:
 1. Main Ground Bar (MGB) - Provide equipment ground bar at main electrical room.



2. Sub Ground Bar (SGB) - Provide equipment ground bar in each sub electrical room.
3. Provide a Bare, Stranded Copper Conductor from each SGB to the MGB. It is permitted to connect multiple floors of stacked electrical rooms in series for a single homerun from the lowest floor SGB to the MGB.
4. Provide a dedicated Bare, Stranded Copper Conductor from MGB to the following:
 - a. Building Grounding Electrode
 - b. Building Steel
 - c. Cold Water Service
 - d. Ground Rods
- C. Provide a redundant equipment grounding conductor together with each feeder run in addition to the conduit system grounding path.
- D. Provide a redundant equipment grounding conductor, in addition to the conduit system ground path and in addition to the phase and neutral conductors shown on the plans, in each branch circuit conduit which supplies receptacles, lights or fixed electrical equipment.
- E. Provide a copper equipment grounding terminal bar in panelboards, new or existing, where equipment grounding conductors terminate, bonded to a grounding bushing on the conduit feeding the panelboard.
- F. Provide separate grounding conductors at motor connections, transformer connections, and where flexible or non-metallic conduit is used.
- G. Connect the ground terminal on each receptacle to the metallic raceway system with a bonding jumper. Maintain continuity of the ground to every outlet in the system.

4 Appendix

4.1 Reserved for future.

