SECTION 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the requirements for the Communications Grounding and Bonding.

B. Project Overview

1. Design Consultant to provide project overview here.

C. Related Sections:

1. Div 01
2. Section 270000 Communications
3. Section 270528 Interior Pathways for Communications Systems
4. Section 270543 Exterior Pathway for Communications Systems
5. Section 270553 Identification for Communications Systems
6. Section 271100 Communications Equipment Room Fittings
7. Section 271300 Communications Backbone Cabling
8. Section 271500 Communications Horizontal Cabling
9. Section 272100 Data Communication Network Equipment

1.2 REFERENCES

A. Refer to section 270000

1.3 DEFINITIONS AND ABBREVIATIONS

A. Section 270000

B. PBB – Primary Bonding Busbar for Communications systems: The dedicated extension of the building grounding electrode system for the telecommunications infrastructure. The central attachment point for the TBB's and equipment typically located in the MDF, also known as the Main Cross-connect (MC).

C. SBB – Secondary Bonding Busbar: The grounding connection point for telecommunications systems and equipment in the area typically served by a Telecommunications Room other than the MDF.

D. TBB - Telecommunications Bonding Backbone: A bonding conductor that interconnects the PBB to the SBBs.

E. TBC – Telecommunications Bonding Conductor that bonds the PBB to the electrical power ground.

F. BBC – Backbone Bonding Conductor : A conductor that interconnects Telecommunications Bonding Backbone.

G. Exothermic Weld: A method of permanently bonding two metals together by controlled heat reaction resulting in a molecular bond.

1.4 SYSTEM DESCRIPTION

A. General

1. All conductor wire, busbars and conduit shall be UL listed.

2. The communications grounding/bonding system shall be independent from all power grounding except for the connection to the building's electrical service main grounding electrode system.

3. Power grounding and/or bonding shall not be allowed to interfere or provide any back feed or be a conductor to the separate communications ground system source or to any communications bonded materials or equipment.

B. PBB and TBC

1. The main ground source feed for the PBB located in the MC (MDF) shall be an independent feed from the building's electrical service main grounding electrode system, known as the Telecommunications Bonding Conductor (TBC).

2. The TBC shall be a stranded copper ground wire from the building ground system to the PBB in the MC (MDF) sized at a minimum #4/0 unless otherwise sized by the Electrical Engineer of Record.

3. The TBC connections shall be low emission exothermic welds at the connecting ends.

C. Telecommunication Bonding Backbone (TBB) and SBB

1. The Telecommunication Bonding Backbone (TBB) originates at the PBB and shall be extended from the PBB within the MC (MDF) throughout the building along the same route as the telecommunications backbone pathways, to the SBB in each TR (IDF).

2. The minimum TBB conductor size between busbars shall be a stranded copper ground wire one (1) AWG size smaller than the TBC.

D. Backbone Bonding Conductor (BBC)

1. Whenever two or more TBBs are used in a multistory building, the TBBs shall be bonded together with a BBC (by low emission exothermic welds) at the top floor and at a minimum of every third floor in between with a copper conductor equal to the gauge of the TBB.

E. TEBC and RBC

1. All cabinets and racks shall be connected by the Telecommunications Equipment Bonding Conductor (TEBC). The TEBC is a stranded copper #4 conductor from the PBB/SBB extending along each row of racks within the room. Bond each rack with a Rack Bonding Conductor (RBC). The RBC is a stranded copper #6 conductor connected to the vertical rack bonding terminal. All connections shall be irreversible crimp connections. Route conductor so as to minimize the quantity of sweeping bends.

1.5 SUBMITTALS

A. Refer to sections 270000

1.6 DELIVERY, STORAGE, AND HANDLING

A. Refer to sections 270000

1.7 PROJECT/SITE CONDITIONS

A. Refer to section 270000

1.8 WARRANTY

A. Refer to section 270000

1.9 MAINTENANCE AND SUPPORT

A. Refer to section 270000

PART 2 PRODUCTS

2.1 TELECOMMUNICATIONS BUSBARS

A. Material: Copper, 1/4" thick (aluminum not permitted).

B. Pre-drilled

1. Hole spacing per ANSI Joint Standard J-STD-607 (latest revision).

2. Hole pattern shall accommodate two-hole lugs.

C. Busbars shall be listed by a nationally recognized testing laboratory.

D. Primary Bonding Busbar (PBB)

1. **Panduit #GB4B0624TPI-1** ground busbar with busbar insulators, standoff brackets, stainless steel bolts with Torx T-45 head, 20"x4" minimum.

E. Secondary Bonding Busbar (SBB)

1. **Panduit #GB4B0612TPI-1** ground busbar with busbar insulators, standoff brackets, stainless steel bolts with Torx T-45 head, 12"x4" minimum.

2.2 GROUNDING JOINTS/SPLICES

A. Grounding conductor joints/splices shall be mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor equal to Burndy "QPX", OZ/Gedney "XTP" or "PMX" or Penn-Union "VX" or copper compression type with two (2) indents equal to Burndy, T&B or Blackburn.

B. Grounding conductor terminations (lugs) shall be single barrel, mechanical screw type, copper alloy with machined contact surfaces equal to OZ type "SL", T&B, or Burndy or copper compression type with two (2) indents equal to Burndy, T&B or Blackburn.

2.3 BONDING CONDUCTORS

A. Material: Stranded copper (aluminum not permitted).

B. Equipment Frame Bonding Conductor; Panduit #TRGK672 Telecommunications Rack Grounding Kit.

C. Bonding Conductor (BC): Green insulated copper bonding conductor, size as required by NEC.

D. The BC shall be, as a minimum, the same size as the TBB.

E. Telecommunications Bonding Backbone (TBB): Green insulated copper conductor, minimum size of No. 6 AWG.

F. The TBB shall be sized as indicated on drawings. Where not indicated size at 2 kcmil per linear foot of conductor length up to a maximum size of 3/0 AWG. Insulation shall meet fire ratings of its pathway.

Table 1	
Sizing of the TBB	
TBB length (ft)	TBB Size (AWG)
Less than 13	6
14-20	4

21-26	3
27-33	2
34-41	1
42-52	1/0
53-66	2/0
Greater than 66	3/0

G. Exothermic Connector Manufacturers:

1. Erico Products (Cadweld)
2. Burndy Corporation (Therm-O-Weld)
3. OZ Gedney
4. COH approved equal

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide the required elements and associated hardware necessary to provide a complete Telecommunications Grounding Infrastructure as specified.

C. PBB

1. Locate the PBB at 7' AFF fastened to the plywood backboard near the outside plant entrance conduits in the "MDF".
2. TMGB shall be installed so that the BC for telecommunications is as short and straight as possible.
3. Conductor shall be installed in continuous 1 conduit.

D. SBB

1. Locate the SBB at 7' AFF fastened to the plywood backboard near the copper riser termination in each "IDF".
2. SBB shall be installed so that the TBB for telecommunications is as short and straight as possible.

E. TBB

1. Install non insulated copper grounding conductor in 1" conduit from PBB to each SBB.

F. Bonding Conductor Joints/Splices

1. Install mechanical type, copper alloy, with a minimum of two bolts and a separate section for each conductor or copper compression type with two (2) indents.
2. Install manufactured insulating cover or heavy tape insulation over joints/splices.

G. Equipment Cabinets and Racks

1. The busbar shall be installed at the base and back of each cabinet/rack for floor fed cabinets/racks.
2. The busbar shall be installed at the top and back of each cabinet/rack for top fed cabinets/racks.

3. Each cabinet and rack shall be provided with a minimum # 6 AWG ground wire.
4. Do not loop from cabinet/rack to cabinet/rack.
5. Each cabinet or rack bay against the wall shall be bottom/side ground fed from the wall.
    a. Wall ground feeds/raceways to racks shall not be exposed on the walls.
    b. Exception: Some cabinet or rack bays will require the ground to be fed from the ceiling raceway.
6. All ground raceways within each cabinet/rack or cabinet base and adjacent-ganged cabinet base shall be an insulated metallic flex type raceway and shall not interfere with equipment mounting frames or equipment mounting brackets.

H. Cable Runway, Cable Raceway and Support System Grounding

1. The Contractor shall provide communications cable tray and cable runway systems with a communications dedicated ground from the PBB/SBB.
2. All cable tray needs to be electrically continuous per NEC 250.96.
    a. Metal raceways, wire-mesh cable trays, cable armor, cable sheath, enclosures, frames, fittings, and other metal non-current-carrying parts that are to serve as an alternate grounding path, with or without the use of supplementary equipment grounding conductors, shall be effectively bonded where necessary to ensure electrical continuity and the capacity to conduct safely any fault current plausibly to be imposed on them.
    b. Any nonconductive paint, enamel, or similar coating shall be removed at the threads, contact points, and contact surfaces.
    c. Grounding or bonding conductors shall be connected by fittings designed for that purpose to ensure adequate bonding.
3. The Contractor shall provide and install a #6 AWG ground wire to bond one end of each cable tray/runway system to the PBB/SBB.
4. For electrically non-continuous conduits that contain only grounding conductor, the Contractor shall bond the conduit and conductor together at both ends to ground to the nearest PBB/SBB with grounding bushings or ground clamps.

I. Shielded Backbone Cabling

1. The Contractor shall terminate and bond the shield to the nearest PBB or SBB at both ends, following manufacturer’s guidelines.

J. Grounding of Equipment Frame

1. Install manufactured insulating cover or heavy tape insulation over joints/splices.
2. Bonding connections should be made by using:
    a. Double crimp connectors only for all horizontal runs (cabinets trays etc.). Use listed hardware that has been laboratory tested. For double crimp connectors use 2-hole type connector.
    b. Exothermic welding (per NEC) within the ground electrode system, for parts of a grounding system that are subject to corrosion or that must carry high currents reliably, or for locations that require minimum maintenance. Exothermic weld to be used on the Telecommunications Bonding Backbone (TBB) conductor for all connections.

3.2 QUALITY CONTROL

A. Inspect grounding and bonding system connections and conductors for proper installation and tightness.

3.3 LABELING

A. All grounding and bonding components shall be labeled with unique printed IDs.

B. Refer to section 270553

3.4 CLEANING

A. Refer to section 270000

3.5 ACCEPTANCE

A. Refer to Section 270000.

END OF SECTION 270526