1 General

1.1 Scope of work

1.1.1 The Contractor is held responsible to be familiar with the provisions contained herein and with other Sections of this Specification as applicable to the completion of the installation.

1.1.2 Work covered by this Section shall consist of furnishing labor, equipment, supplies, materials, and testing unless otherwise specified, and in performing the following operations recognized as necessary for the installation, termination, and labeling of grounding and bonding infrastructure as described on the Drawings and/or required by these specifications.

1.2 Intent of the drawings and specifications

1.2.1 These Specifications, together with the Drawings accompanying them, are intended to depict the installation requirements necessary to support this Project.

1.2.2 Contractor shall furnish materials shown and/or called for on the Drawings but not mentioned in the Specifications, or vice versa, that are necessary for the installation and support of the described work, whether or not specifically called for in both.

1.2.3 Contractor shall provide incidental equipment and materials required for the completion of systems included in this contract whether or not specified or shown on the Drawings.

1.3 Communication

1.3.1 It is Purdue’s expectation that the A/E of Record will work jointly with Purdue’s Telecommunication representatives to address specific technical issues and Owner requirements.

1.3.2 All questions, deviations, comments concerning guideline(s) interpretation, content, and/or use must be submitted in writing to the Project Manager for approval.

1.3.3 No deviations from these guidelines shall be incorporated into the project without written approval from the Project Manager and Purdue Telecommunications representative.

2 Products

2.1 Grounding Busbars

2.1.1 PBBPBB located in the BDF shall be approximately 20”x4”x1/4” ground busbar comprised of 1/4” and 3/8” stud holes with busbar insulators.

2.1.2 SBBSBB shall be approximately 12”x2”x1/4” ground busbar comprised of 1/4” and 3/8” stud holes with busbar insulators.

2.2 Grounding Connections

2.2.1 Grounding conductor terminations (lugs) shall consist of (2) two-hole long barrel lugs minimum #6AWG with 1/4” hardware and shall be compression type with window lug with a minimum of (2) crimps. Termination Lug shall match the size of the conductor that is being terminated on the busbar. Crimp according to manufacturer’s recommendation (minimum of 2 crimps).

2.2.2 Grounding conductor terminations (HTAP) shall be compression type with a minimum of (2) crimps. Crimp according to manufacturer’s recommendation.

2.2.3 Screws used in bonding of the cable tray shall be thread-forming 12-24x1/2” (M6 x 12mm) thread-forming screw.

2.3 Bonding Conductors

2.3.1 Cable Tray Bonding Conductor shall be stranded green #6 AWG insulated bonding jumper (12” max) with appropriate two-hole lugs, or manufactured two-holed copper grounding strap.

2.3.2 TBC shall be green insulated copper bonding conductor, size as required by NEC. At a minimum, the TBC shall be the same size as the TBB.

2.3.3 Telecommunications Bonding Backbone (TBB)

2.3.3.1 Green insulated copper conductor, minimum size of #6 AWG. TBB shall be sized at 2 kcmil per linear foot of conductor length up to a maximum size of 3/0 AWG.

2.3.3.2 Insulation shall meet the fire ratings of its pathway or be installed in a separate conduit.

2.3.3.3 “L” brackets of proportional size and quantity to fasten over cable tray for routing of the bonding conductors for equipment frame grounding.
### 2.3.4 TBB Sizing Table

<table>
<thead>
<tr>
<th>Length (ft)</th>
<th>Size (AWG)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 13</td>
<td>6</td>
</tr>
<tr>
<td>14-20</td>
<td>4</td>
</tr>
<tr>
<td>21-26</td>
<td>3</td>
</tr>
<tr>
<td>27-33</td>
<td>2</td>
</tr>
<tr>
<td>34-41</td>
<td>1</td>
</tr>
<tr>
<td>42-52</td>
<td>1/0</td>
</tr>
<tr>
<td>53-66</td>
<td>2/0</td>
</tr>
<tr>
<td>&gt; 66</td>
<td>3/0</td>
</tr>
</tbody>
</table>

### 2.4 Grounding Rods

**2.4.1** A copper clad ground rod with clamp, minimum of 5/8" in diameter and 10' in length manufactured in accordance with the American National Standards Institute (ANSI), Underwriter’s Laboratories (UL) 467 specification, and the National Electric Code (NEC).

### 2.5 CBN (Common Bonding Network)

**2.5.1** Green insulated copper bonding conductor, sized to be the same size as the TBB.

### 3 Execution

**3.1 Installation of the PBB**

**3.1.1** Install the PBB on the plywood 28” AFF near the outside plant entrance conduits in the “BDF”.

**3.1.2** PBB shall be installed so that the TBC for telecommunications is as short as possible and maintains a horizontal or downward path to the building’s grounding electrode system.

**3.2 Installation of the TBC for Telecommunications**

**3.2.1** TBC shall be installed in continuous PVC conduit. Install in EMT conduit only if the path passes through a plenum area. EMT conduit must be bonded to the TBC at both ends of the conduit.

**3.2.2** TBC shall maintain a horizontal or downward path from the PBB to the building’s grounding electrode system. No bend shall form an included angle of more than 90 degrees or have a radius of less than 6”.

**3.3 Installation of the SBB**

**3.3.1** Install the SBB on the plywood 28” AFF. Location to be confirmed with ITIS personnel.

**3.3.2** SBB shall be installed so that the bonding conductor connecting the SBB to the TBB is as short as possible and maintains a horizontal or downward path to the TBB.

**3.3.3** Install a stranded bonding conductor (same size as the TBB) from the SBB to the TBB. This wire shall be terminated on the SBB end with two-holed compression type lug and terminated on the TBB end with the HTAP kit.

**3.4 Installation of the TBB**

**3.4.1** Install Green insulated copper grounding conductor (refer to 2.3.4 for conductor size) from the PBB to the furthest telecommunications room.

**3.4.2** Conductors shall be installed in continuous 3/4” PVC conduit until it enters a telecommunications room. Where the TBB pathway passes through a plenum area, the installation of EMT conduit is required and must be bonded on each end to the TBB.

**3.4.3** Paint all conduit fittings, junction boxes and covers “GREEN”.

**3.4.4** Each TBB shall be continuous to the furthest IDF.

**3.4.5** The end of the TBB shall be terminated on the SBB of the furthest telecommunications room.

**3.4.6** TBB shall maintain a horizontal or downward path to the PBB. No bend shall form an included angle of more than 90 degrees or have a radius of less than 6”.

**3.5 Grounding of Cable Tray**

**3.5.1** Each bonding point of the cable tray shall be sanded down to bare metal to ensure continuity between the bonding conductor and the cable tray.

**3.5.2** Install Green #6 AWG bonding jumper (12” max) with two-hole lugs at each cable tray joint or install manufactured braided copper grounding jumper.

**3.5.3** Install Green #6 AWG grounding conductor with two-hole lugs from side of cable tray down to PBB or SBB. Maintain a horizontal or downward path from the cable tray to the PBB or SBB. Drill and install thread-forming screw on side of cable tray, making sure that bolt does not extend into wire management part of tray.

**3.5.4** At locations where the cable tray passes through a space where the tray no longer maintains its grounding continuity, install a Green #6 AWG grounding conductor with two-hole lugs from side of cable tray to the next section.
3.6 Grounding of Equipment Frame

3.6.1 Each equipment frame shall be bonded to the PBB or SBB using either the CBN (Common Bonding Network) conductor or a #6 AWG conductor directly to the PBB or SBB. Maintain a horizontal or downward path of the bonding conductor from the CBN (Common Bonding Network) conductor or the individual #6 AWG to the frame. No bend shall form an included angle of more than 90 degrees or have a radius of less than 6”.

3.6.1.1 Where only one equipment frame is located within a room, install a #6 AWG bonding conductor from the frame to the PBB or SBB terminated with two-hole lugs.

3.6.1.2 Where multiple equipment frames are located within a room, install a Common Bonding Conductor (same size as the TBB) from the PBB or SBB to the cable tray above the equipment frames. Route the bonding conductor horizontally on the “L” brackets of the cable tray. Install (1) #6 AWG green bonding conductor from each equipment frame to the CBN (Common Bonding Network) conductor above the equipment frames. Attach the #6 AWG cable to the equipment frame grounding strip using two-hole compression lugs. Attach opposite end of #6 AWG to the bonding conductor above the equipment frames using HTAP kit.

3.6.2 Install “L” brackets on cable tray for routing of the bonding conductors for equipment frame grounding. Install “L” bracket every 12”. Fasten CBN (Common Bonding Network) conductor on each “L” bracket using Velcro® or Panduit Tak-Ty® hook & loop ties.

3.7 Installation of Bonding Conductors

3.7.1 Shall be routed so to minimize bends and length.

3.7.2 Shall be a minimum of #6 AWG.

3.7.3 Bonding Conductors shall maintain a horizontal or downward path to the PBB or SBB. No bend shall form an included angle of more than 90 degrees or have a radius of less than 6”.

3.7.4 Use HTAP kit to bond the TBB to the PBB or SBB.

3.8 Grounding of Direct Buried Cables

3.8.1 The distance between ground locations shall not exceed 1000ft.

3.8.2 Grounding shall be performed at every other pedestal if no transformer is present.

3.8.3 If direct buried cable passes within 50ft of a power station or sub-station, PVC (schedule 40) or double sheathed cables should be utilized to increase dielectric strength of the cable.

3.8.4 Whether mounting a pedestal housing on a pedestal stake or at the base of a pole, a ground must be established.

3.8.5 In a MGN system, the telecommunications cable shield shall be bonded to the MGN at the beginning and end of the exposure and each 2000 ft within the exposure.