READ THIS FIRST

Notice to the Design Engineer, please refer to the Port of Seattle, Facilities and Infrastructure standards for reference before editing this specification.

This Project Spec Document may need additional modifications to suit your project. It is recommended that you proofread each section, paying attention to any “Notes” boxes such as this one--you should remove these “Notes” sections as you go. Also, do a search for all bracket characters “ [ ] “ as they are used to show you areas containing options or project specific details (you can use Microsoft Word’s Find feature {Ctrl-F} to jump to an open bracket “ [ “ character quickly). Again, these bracket characters should be removed.

It is important that every paragraph be numbered to allow for easy referencing. If you use the document’s built in styles and formatting your outline should be fine (turn on the formatting toolbar by going to View > Toolbars > Formatting). Most paragraphs will use the style “Numbered Material” and can be promoted (Shift) or demoted (Shift-Tab).

You should not have to manually enter extra spaces, carriage returns or outline characters such as A, B, C, or 1.01, 1.02; the formatting will do this for you. The entire document is 11 pt. Arial. If you paste items in, you may need to reapply the “Numbered Material” format.

1. GENERAL
   1. SUMMARY
      1. Description of Work: Grounding and Bonding for Communications Systems.
      2. Provide grounding connections as specified in Section 26 05 26 – Grounding.
   2. GOVERNING CODES, STANDARDS AND REFERENCES
      1. ASTM B8 (American Society for Testing and Materials) - Standard Specification for Concentric-Lay-Stranded Copper conductors, Hard, Medium-Hard, or Soft.
      2. NFPA 70 (National Fire Protection Association) - National Electrical Code.
      3. ANSI/NFPA 780 (National Fire Protection Association) - Standard for the Installation of Lightning Protection Systems.
      4. ANSI/UL 467 (Underwriter's Laboratory) - Grounding and Bonding Equipment.
   3. SUBMITTALS
      1. Refer to Section 27 05 00 – Common Work Results for Communications.
      2. Product Data: For each type of product indicated.
      3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
         1. Grounding: Indicate locations of grounding bus bars.
         2. Elevations and mounting details.
         3. System line diagram.
      4. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
      5. Source quality control reports.
      6. Field quality control reports.
      7. Maintenance data.
   4. QUALITY ASSURANCE
      1. Installer Qualifications: All installation of the Telecommunication Ground Systems shall be done by a licensed electrician.
         1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD, or Installer Level 2.
         2. Installation Supervision: Installation shall be under the direct supervision of BICSI Technician, BICSI Installer 2, who shall be present at all times when Work of this Section is performed at Project site.
         3. Field test: certified third party organization.
      2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
      3. Grounding: Comply with ANSI-J-STD-607-A.
      4. Labeling: Comply with ANSI/TIA-607-B and ANSI/NECA/BICSI-607.
   5. PROJECT CONDITIONS
      1. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weather tight, wet work in spaces is complete and dry.
   6. COORDINATION
      1. Coordinate layout and installation of communications pathways with the other trades installing equipment in the ceiling.
      2. Coordinate grounding and bonding of communications systems with the electrical installer.
      3. Coordinate the labeling scheme for the communications systems with the Owner
2. PRODUCTS
   1. GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
      1. Comply with ANSI J-STD-607-A and with requirements of Division 26 Section 26 05 26 – Grounding.
      2. Grounding Electrode System
         1. When required the Grounding Electrode System shall meet the following
            1. Active grounding system constantly replenishing moisture into the soil.
            2. Provide low resistance to ground
            3. Provide season to season stability
            4. Be maintenance-free for 30 years
            5. Contain no hazardous materials or chemicals
         2. Manufacturers:
            1. Lyncole Grounding Solutions: Lyncole XIT Grounding System
            2. Or Approved Equal.
      3. Telecommunications Main Grounding Bus Bar
         1. The TMGB must be a predrilled copper busbar with holes for use with standard- sized lugs, have minimum dimensions of 6.3 mm (0.25”) thick by 101 mm (4 in) wide, and be variable in length. It must be listed by an NRTL.
         2. Hole patterns on the busbars shall accommodate two-hole lugs per the recommendation of BICSI-607 and ANSI-J-STD-607-A standards.
         3. Insulators shall electrically isolate busbars from the wall, or other mounting surfaces, thereby controlling the current path.
         4. Provide required stainless steel hardware to fasten the two-hole ground lugs to the Busbar.
         5. Manufacturers:
            1. Chatsworth Products, Inc. (CPI),Telecommunications Main Grounding Busbar: Part Number 40153-020, 20” x 4” (510 mm x 100 mm)
            2. Or Approved Equal.
      4. Telecommunications Grounding Bus Bar
         1. The TGB must be a predrilled copper busbar with holes for use with standard- sized lugs, have a minimum dimension of 6.3 mm (0.25 in) thick by 51 mm (2 in) wide, and be variable in length. It must be listed by an NRTL.
         2. Hole patterns on the Busbars shall accommodate two-hole lugs per the recommendation of BICSI and ANSI-J-STD-607-A standards.
         3. Insulators shall electrically isolate Busbars from the wall, or other mounting surfaces, thereby controlling the current path.
         4. Provide required stainless steel hardware to fasten the two-hole ground lugs to the Busbar.
         5. Manufacturers:
            1. Chatsworth Products, Inc. (CPI),Telecommunications Grounding Busbar: Part Number 13622-012, 12” x 2” (300 mm x 50 mm)
            2. Or Approved Equal.
      5. Grounding Conductors
         1. Telecommunications grounding connectors shall have a minimum size of #6 AWG.
         2. Telecommunications Bonding Backbone shall be size 2/0 AWG.
         3. All Telecommunication grounding conductors shall be copper conductors, calculated so that no more than 40V can be present along its entire length.
      6. Bonding Accessories
         1. Two Mounting Hole Ground Terminal Block
            1. Ground terminal block shall be made of electroplated tin aluminum extrusion.
            2. Ground terminal block shall accept conductors ranging from #14 AWG through 2/0.
            3. The conductors shall be held in place by two stainless steel set screws.
            4. Ground terminal block shall have two 1/4” (6.4 mm) holes spaced on 5/8” (15.8 mm) centers to allow secure two-bolt attachment to the rack or cabinet.
            5. Ground terminal block shall be UL Listed as a wire connector.
            6. Manufacturer:

Chatsworth Products, Inc. (CPI), Two Mounting Hole Ground Terminal Block

Part Number 40167-001,

Or Approved Equal.

* + - 1. Compression Lugs
         1. Compression lugs shall be manufactured from electroplated tinned copper.
         2. Compression lugs shall have two holes spaced on 5/8” (15.8 mm) or 1” (25.4 mm) centers, as stated below, to allow secure two bolt connections to busbars.
         3. Compression lugs shall be sized to fit a specific size conductor, sizes #6 AWG to 4/0, as stated below.
         4. Compression lugs shall be UL Listed as wire connectors.
         5. Manufacturer:

Chatsworth Products, Inc. (CPI),Compression Lugs in different sizes

Or Approved Equal.

* + - 1. Antioxidant Joint Compound
         1. Oxide inhibiting joint compound for copper-to-copper, aluminum-to- aluminum or aluminum-to-copper connections.
         2. Manufacturer:

Chatsworth Products, Inc. (CPI), Antioxidant Joint Compound

Or Approved Equal.

* + - 1. C-Type, Compression Taps
         1. Compression taps shall be manufactured from copper alloy.
         2. Compression taps shall be C-shaped connectors that wrap around two conductors forming an irreversible splice around the conductors; installation requires a hydraulic crimping tool
         3. Compression taps shall be sized to fit specific size conductors, sizes #2 AWG to 4/0, as stated below.
         4. Compression taps shall be UL Listed.
         5. Manufacturer:

Chatsworth Products, Inc. (CPI), Compression Taps

Or Approved Equal.

* + - 1. Pedestal Clamp With Grounding Connector
         1. Pedestal clamp shall be made from electroplated tinned copper or bronze. Installation hardware will be stainless steel.
         2. Pedestal clamps shall be sized to fit a specific size conductor, size #6 AWG and/or 2/0, as stated below.
         3. Pedestal clamp installation hardware shall be sized to attach to round and/or square raised access floor pedestals that are 1-1/8” to 1-3/4” in diameter, as stated below.
         4. Pedestal clamp shall provide straight (in-line) or cross (intersection) support for up to two conductors.
         5. Pedestal clamp shall be UL Listed as grounding and bonding equipment.
         6. Manufacturer:

Chatsworth Products, Inc. (CPI), Pedestal Clamps.

Or Approved Equal.

* + - 1. Pipe Clamp With Grounding Connector
         1. Pipe clamp shall be made from electroplated tinned bronze. Installation hardware will be stainless steel.
         2. Pipe clamp shall be sized to fit up to two conductors ranging in size from #6 AWG to 250 MCM; conductors must be the same size.
         3. Pipe clamp installation hardware shall be sized to attach to pipes, sizes 1” to 6” (0.75” to 6.63” in diameter), as stated below.
         4. Pipe clamp shall be UL Listed as grounding and bonding equipment.
         5. Manufacturer:

Chatsworth Products, Inc. (CPI), Pipe Clamps.

Or Approved Equal.

* + - 1. Equipment Ground Jumper Kit
         1. Kit includes one 24”L insulated ground jumper with a straight two hole compression lug on one end and an L-shaped two hole compression lug on the other end, two plated installation screws, an abrasive pad and a 0.5oztube of antioxidant joint compound.
         2. Ground conductor is an insulated green/yellow stripe #6 AWG wire
         3. Lugs are made from electroplated tinned copper and have two mounting holes spaces 0.5” to 0.625” apart that accept 1/4” screws.
         4. Jumper will be made with UL Listed components.
         5. Manufacturer:

Chatsworth Products, Inc. (CPI), Ground Jumper Kit.

Or Approved Equal.

1. EXECUTION
   1. GENERAL
      1. All installation of the Telecommunication Ground Systems shall be done by a licensed electrician. This includes but not limited to:
         1. All Bus bars
         2. All bonding conductors
         3. Bonding to all non-active (non-current carrying) metal support structures, rack, runway etc. within each Telecommunication Room or Space. Coordinate this bonding with the supplier and installer of rack, runway etc.
      2. NOTE: The TMGB/TGB is to provide a single point ground reference within the room and IS NOT TO BE USED AS AN AC EQUIPMENT GROUND.
      3. The TBB should not be placed in ferrous metallic conduit. If it is necessary to place grounding and bonding conductors in conduit that exceeds 1m (3’) in length, the conductors shall be bonded to each end of the conduit using a grounding bushing or a # 6 AWG conductor, minimum.
      4. Each telecommunications grounding and bonding conductor shall be labeled. Labels shall be located on conductors as close as practicable to their point of termination in a readable position. Labels shall be nonmetallic and include the information “IF THIS CONNECTOR OR CABLE IS LOOSE OR MUST BE REMOVED, PLEASE CALL THE BUILDING TELECOMMUNICATIONS MANAGER” Refer to ANSI/TIA/EIA-606 for additional labeling requirements.
   2. INSTALLATION
      1. Outdoor grounding and bonding connections.
         1. All outdoor grounding and bonding (earthing) connections shall be accomplished using exothermic welding.
      2. Wall-Mount Bus bars
         1. Attach bus bars to the wall with appropriate hardware according to the manufacturer’s installation instructions.
         2. Conductor connections to the TMGB or TGB shall be made with two-hole bolt-on compression lugs sized to fit the busbar and the conductors.
         3. Each lug shall be attached with stainless steel hardware after preparing the bond according to manufacturer recommendations and treating the bonding surface on the busbar with antioxidant to help prevent corrosion at the bond.
         4. The wall-mount busbar shall be bonded to ground as part of the overall Telecommunications Bonding and Grounding System.
      3. Rack-Mount Bus bars and Ground Bars
         1. When a rack or cabinet supports active equipment or any type of shielded cable or cable termination device requiring a ground connection, add a rack-mount horizontal or vertical busbar or ground bar to the rack or cabinet. The rack-mount busbar or ground bar provides multiple bonding points on the rack for rack and rack-mount equipment.
         2. Attach rack-mount bus bars and ground bars to racks or cabinets according to the manufacturer’s installation instructions.
         3. Bond the rack-mount bus bar or ground bar to the room’s TMGB or TGB with appropriately sized hardware and conductor.
      4. Ground Terminal Block
         1. Every rack and cabinet shall be bonded to the TMGB or TGB.
         2. Minimum bonding connection to racks and cabinets shall be made with a rack-mount two-hole ground terminal block sized to fit the conductor and rack and installed according to manufacturer recommendations.
         3. Remove paint between rack/cabinet and terminal block, clean surface and use antioxidant between the rack and the terminal block to help prevent corrosion at the bond.
      5. Pedestal Clamp
         1. At minimum, bond every sixth raised access floor pedestal with a minimum #6 AWG conductor to the TMGB or TGB using a pedestal clamp sized to fit the pedestal and the conductor and installed according to the manufacturer’s recommendations.
         2. If pedestal clamps are used to construct a signal reference grid, bond the signal reference grid to the TMGB or TGB and bond each rack and/or cabinet to the signal reference grid using a compression tap or similar non- reversible bonding component sized to fit both conductors.
         3. Remove paint between the pedestal and pedestal clamp, clean surface and use antioxidant between the pedestal and the clamp to help prevent corrosion at the bond.
         4. Remove insulation from conductors where wires attach to the pedestal clamp.
      6. Pipe Clamp
         1. Bond metal pipes located inside the data center computer room with a minimum #6 AWG conductor to the TMGB or TGB using a pipe clamp sized to fit the pipe and the conductor and installed according to the manufacturer’s recommendations.
         2. Remove paint between the pipe and pipe clamp, clean surface and use antioxidant between the pipe and the clamp to help prevent corrosion at the bond.
         3. Remove insulation from conductors where wires attach to the pipe clamp.
      7. Equipment Ground Jumper Kit
         1. Bond equipment to a vertical rack-mount busbar or ground bar using ground jumper according to the manufacturer’s recommendations.
         2. Clean the surface and use antioxidant between the compression lugs on the jumper and the rack-mount busbar or ground bar to help prevent corrosion at the bond.
      8. Bonding conductor
         1. Where building steel is available within the room, the TMGB/TGB should be bonded to the nearest structural steel column, provided that its bonding effectiveness has been verified via two-point bonding testing. This connection would be an acceptable alternative to routing of a Bonding Conductor for Telecommunications (BCT) to the main electrical panel board.
         2. A bonding conductor can be routed between TMGB and the nearest effectively grounded AC electrical branch circuit panel board, provided a low ground impedance of the panel board has been verified with a ground impedance tester. This connection would be an acceptable alternative to routing of a BCT to the main electrical panel board.
         3. The size of any bonding conductors shall follow the recommended sizes shown on the drawings.
         4. All cabling used to bond grounds are to be tagged with labels with the point of origin and destination i.e. going to/coming from, with printed labels.
   3. IDENTIFICATION
      1. Identify system components, wiring, and cabling complying with ANSI/TIA -606-A. Comply with requirements in Division 26 Section 26 05 53 – Electrical Identification.
      2. Provide nonmetallic pre-printed labels, white background with black printing that can be permanently mounted to the busbar.
      3. The bonding conductors for telecommunications, TBB conductor, and each grounding equalizer shall be green or marked with a distinctive green color.
   4. FIRESTOPPING
      1. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 Section 07 84 00 – Firestopping.
2. MEASUREMENT AND PAYMENT
   1. GENERAL
      1. No separate measurement or payment will be made for the Work required by this section. The cost for this portion of the Work will be considered incidental to, and included in the payments made for the applicable bid items in the [Schedule of Unit Prices] [Lump Sum price bid for the Project].

End of Section

Revision History:

10/11/2018 New Section