

Exhibit 1

DC-NET CABLING STANDARDS

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Introduction

This document frameworks the Structured Cabling Standards, Specifications and Guidelines that are applicable to the environment of DC-Net. The Structured Cable Plant is a fundamental part of DC-Nets mission. The Standards in this document provide consistent guidelines to assure that all Structured Cable Systems (SCS) in new or existing buildings shall meet the needs of DC-Net.

**This Document is written in accordance with the Construction Specifications Institute (CSI) MasterFormat Division 27.

Chapter 1.) 270000 GENERAL COMMUNICATIONS PROVISIONS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following:
 - Scope of Work
 - 1) Intent of Drawings
 - 2) Definitions
 - 3) General Standards of Materials
 - 4) Products and Substitutions
 - 5) Applicable Codes
 - 6) Guarantees and Certificates

1.2 SCOPE OF WORK

- A. The scope of work included under Division 27 of the specifications shall include complete systems as shown in the Contract Documents and specified herein. Any work reasonably inferable or essential to result in a complete

installation or the intended operation and performance of the systems, shall be included in the Bid except where there is a specific reference to exclusion and incorporation in other references.

1.3 INTENT OF DRAWINGS

- A. Provide complete and functional systems for the project. The systems shall conform to the details stated in the specifications and shown on the drawings. Items or work not shown or specified, but required for complete systems, shall be provided and conform to accepted trade practices. The drawings and specifications are presented to define specific system requirements and serve to expand on the primary contract requirements of providing complete systems. The drawings are diagrammatic and indicate the general arrangement and routing of the systems included in this contractors work.
- B. Do not scale the drawings. Because of the scale of the drawings, it is not possible to indicate offsets, fittings, valves, or related items which may be required to provide complete operating systems. Check and verify dimensions and existing conditions at the site. Install systems in such a manner that interferences between pipes, conduit, ducts, equipment, architectural and structural features are avoided.
- C. These documents may not explicitly disclose final details required for a complete system installation; however, contractors shall possess the expertise to include the necessary actions of complete operating systems.
- D. BICSI Certification of Workers
 - 1) The contractor will employ a minimum of one Registered Communications Distribution Designer (RCDD) certified and in good standing with BICSI. This RCDD must be a direct full time employee of the contractor and the contractor will continue a minimum of one RCDD throughout the duration of the project. An RCDD shall remain assigned to the project from start to finish and be available to provide guidance to the installation team.
 - 2) The cable manufacturer must be able to extend a NetClear 25-year Static, Dynamic and Applications Warranty to the end user once the Telecommunications Contractor fulfills all requirements under the Cable Manufacturer's warranty program. At least 30 percent of the copper installation and termination crew must be certified by BICSI with a Technician level of training or better.

1.4 DEFINITIONS

- A. Specific terminology, as used herein, shall have the following meanings:
- 1) "Finished Space" shall mean space other than mechanical rooms, electrical rooms, furred spaces, pipe chases, and unheated spaces immediately below roof, space above ceilings, unexcavated spaces, crawl spaces, tunnels, and interstitial spaces.
 - 2) "Conditioned" shall mean spaces directly provided with heating and cooling.
 - 3) "Unconditioned" shall mean spaces without heating or cooling including ceiling plenums.
 - 4) "Indoors" shall mean located inside the exterior walls and roof of the building.
 - 5) "Outdoors" shall mean outside the exterior walls and roof of the building.

1.5 GENERAL STANDARDS OF MATERIALS

- A. Equipment and materials, unless otherwise noted, shall be new and of first quality, produced by manufacturers who have been regularly engaged in the manufacture of these products for a period of not less than five years.
- B. Equipment of one type shall be the products of one manufacturer; similar items of the same classification shall be identical, including equipment, assemblies, parts and components.
- C. Materials furnished shall be determined safe by a nationally recognized testing organization, such as Underwriters' Laboratories, Inc., or Factory Mutual Engineering Corporation, and materials shall be labeled, certified or listed by such organizations. Where third party certification is required for packaged equipment, the equipment shall bear the appropriate certification label.
- D. With respect to custom made equipment or related installations which are constructed specially for this project, the manufacturer shall certify the safety of same on the basis of test data. The Owner shall be furnished copies of such certificates.

1.6 PRODUCTS AND SUBSTITUTIONS

- A. Where a specific manufacturer's product is identified, the Contract Amount shall be based on that product only. Any substitutions from the specified product shall be offered as a Substitution Request. Substitutions shall not be permitted after the bidding phase without a Substitution Request Form included with the bid.
- B. Where several manufacturers' products are specified, the Contract Amount shall be based upon the specified products only. Any substitutions from the specified products shall be offered as a Substitution Request. Substitutions shall not be permitted after the bidding phase without a Substitution Request Form included with the bid.
- C. Where only one manufacturer's product is specified, the associated systems have been designed on the basis of that product. Where several manufacturers' products are specified, the associated systems have been designed on the basis of the first-named manufacturer's product. When products other than those used as the basis of design are provided, the contractor shall pay additional costs related to submissions review, redesign, and system and/or structure modifications required by the use of that product.
- D. It is the intent of these specifications that the service organizations follow the above substitution procedures.

1.7 APPLICABLE CODES

- A. Materials furnished and work installed shall comply with applicable codes, with the requirements of the local utility companies, and with the requirements of governmental departments or authorities having jurisdiction.

1.8 GUARANTEES AND CERTIFICATES

- A. Defective equipment, materials or workmanship, including damage to the work provided under other divisions of this contract resulting from same, shall be replaced or repaired at no extra cost to the Owner for the duration of the stipulated guarantee periods.
 - 1) Unless specifically indicated otherwise, the duration of the guarantee period shall be one (1) year following the date of Substantial Completion. Temporary operation of the equipment for temporary conditioning, testing, etc., prior to occupancy will not be considered part of the warranty period.

TABLE 1 FIRESTOPPING STANDARDS

Standard	Title	Ratings Established	Hose Stream Required	Pressure	What It Evaluates
ASTM E119 or UL 263	<i>Standard Test Methods for Fire Tests of Building Construction and Materials</i>	Assembly Ratings	Floors - No Walls - Yes	Neutral	Floors, walls, beams, and other structural elements
ASTM E814 or UL 1479	<i>Standard Test Methods for Fire Tests of Through-Penetration Firestop</i>	F and T ratings; L and W ratings only for UL 1479	Yes	2.5 Pa (0.01 in WC)	Through-penetration firestop systems
ASTM E1966 or UL 2079	<i>Standard Test Methods for Fire-Resistive Joint Systems</i>	Assembly ratings; L ratings only for UL 2079	Floors - No Walls - Yes	2.5 Pa (0.01 in WC)	Expansion and control joints, with or without movement
ASTM E2307	<i>Standard Test Methods for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus</i>	F and T ratings	No	2.5 Pa (0.01 in WC)	Curtain wall safing gaps

Pa = Pascal
WC = Water Column

TABLE 2 PIPE SIZES AND FIRE RATINGS

Pipe Size/Description	F Rating	T Rating
38 mm (1-1/2 in) solid core PVC	3 hours	2 hours
50, 75, or 100 mm (2,3, or 4 in) solid core PVC	2 hours	2 hours
50, 75, or 100 mm (2,3, or 4 in) cellular core PVC		
38-100 mm (1 - 1/2 - 4 in) CPVC		
38-100 mm (1 - 1/2 - 4 in) PB		
38-100 mm (1 - 1/2 - 4 in) RNC		

CPVC = Chlorinated Polyvinyl Chloride
PB = Polybutene
PVC = Polyvinyl Chloride
RNC = Rgid Nonmetallic Conduit

Chapter 2.) 270500 COMMON WORK for COMMUNICATIONS

SECTION 270526 - Grounding and Bonding for Communications Systems

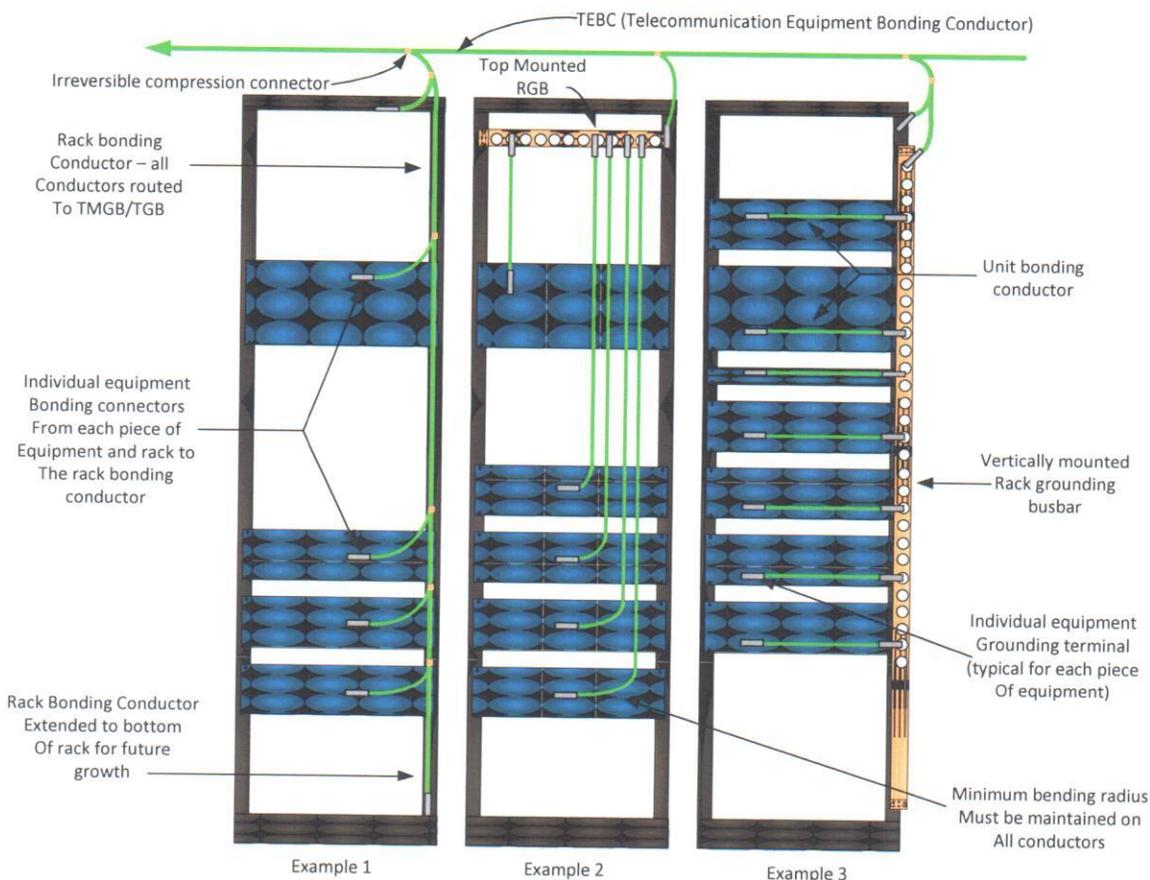
PART 1-GENERAL

1.1 SUMMARY

- A. The Telecommunications Contractor is to provide all materials and labor for the installation of the grounding and bonding system for the Communications Infrastructure. This includes requirements for providing a permanent grounding and bonding infrastructure for all communications circuits, raceways, ladder rack and cable tray.
- B. Only approved connections shall be used and positioned in accessible locations. The grounding conductor shall be connected to the grounding electrode via exothermic weld, listed lugs, listed pressure connectors, listed clamps or other approved listed alternatives.

Following are some examples of the approved ways of Grounding and Bonding DC-Net equipment racks.

FIGURE 1.1



1.2 REFERENCES

A. General:

- 1) National Electrical Code (NEC)
- 2) National Electrical Safety Code (NESC)
- 3) Occupational Safety and Health Act (OSHA)

B. Communications:

- 1) TIA/EIA – 568: *Commercial Building Telecommunications Cabling Standard*
- 2) TIA/EIA – 569: *Commercial Building Standard for Telecommunications Pathways*
- 3) TIA/EIA – 606: *The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings*
- 4) TIA/EIA – 607: *Commercial Building Grounding and Bonding Requirements for Telecommunications*
- 5) ISO/IEC IS 11801: *Generic Cabling for Customer Premises*
- 6) BICSI TCIM: *BICSI Telecommunications Cabling Installation Manual*
- 7) BICSI TDMM: *BICSI Telecommunications Distribution Methods Manual*

8) BICSI CO-OSP: *BICSI Customer-Owned Outside Plant Design Manual*

1.3 DEFINITIONS

- A. “**TMGB**” shall mean *Telecommunications Main Grounding Busbar*. There is typically one TMGB per building, located in the main telecommunications room. This busbar is directly bonded to the electrical service ground.
- B. “**TGB**” shall mean *Telecommunications Grounding Busbar*. There is typically one TGB per telecommunications room. The TGB is connected both to the TMGB and to the buildings structural steel or other permanent metallic systems.
- C. “**TBB**” shall mean *Telecommunications Bonding Backbone*. The TBB is a conductor used to connect TMGBs to TGBs.

1.4 SYSTEM DESCRIPTION

- A. Furnish and Install all materials, devices and required accessories to provide a complete, permanent Grounding and Bonding infrastructure for communications circuits, raceways, ladder racks and cable trays as specified in the Contract Documents. The Grounding and Bonding system shall support an ANSI/TIA/EIA and ISO/IEC compliant Structured Cabling System (SCS).
- B. This work shall include materials, equipment and apparatus not explicitly mentioned herein or noted in the Construction Documents but which is necessary to make a complete working ANSI/TIA/EIA and ISO/IEC compliant Grounding and Bonding system.

1.5 CONTRACTOR WARRANTY:

- A. Provide a Contractor-endorsed warranty against defects in materials and workmanship.
 - 1) Provide labor aspect to the fulfillment of this warranty at no cost to the Owner.
 - 2) The Contractor Warranty period shall initiate upon Owner acceptance of the work.

PART 2-PRODUCTS

2.1 GENERAL:

- A. Materials shall consist of busbars, supports, bonding conductors and other incidentals and accessories as required.

2.2 MATERIALS

- A. Grounding/Bonding:

- 1) Telecommunications Main Grounding Busbar (TMGB):
 - a) Large (20" x 4" x 1/4"), Pre-drilled: CPI 10622-020, or equivalent
 - b) Small (10" x 4" x 1/4"), Pre-drilled: CPI 10622-010, or equivalent
 - 2) Telecommunications Grounding Busbar (TGB):
 - a) Large (20" x 4" x 1/4"), Pre-drilled: CPI 10622-020, or equivalent
 - b) Small (10" x 4" x 1/4"), Pre-drilled: CPI 10622-010, or equivalent
 - 3) Telecommunications Bonding Backbone: #6 AWG insulated (green) copper conductor.
 - 4) Grounding Conductor: #6 AWG insulated (green) copper conductor.
- B. Firestopping Material: Must conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted testing agencies per ASTM E814 or UL 1479 fire test in a configuration that is representative of actual field conditions.
- C. Labels: As recommended in ANSI/TIA/EIA 606. Permanent, permanently fastened, and created by hand-carried label maker or a software-based label making system. Handwritten labels are not tolerable.
- 1) Hand-Carried label maker:
 - a) Brady: ID Pro Plus (or approved equivalent).
 - 2) Labels:
 - a) Brady: Bradymaker Wire Marking Labels WML-511-292 (or approved equivalent).

PART 3-EXECUTION

3.1 GENERAL

FIGURE 3.1

Small System Example

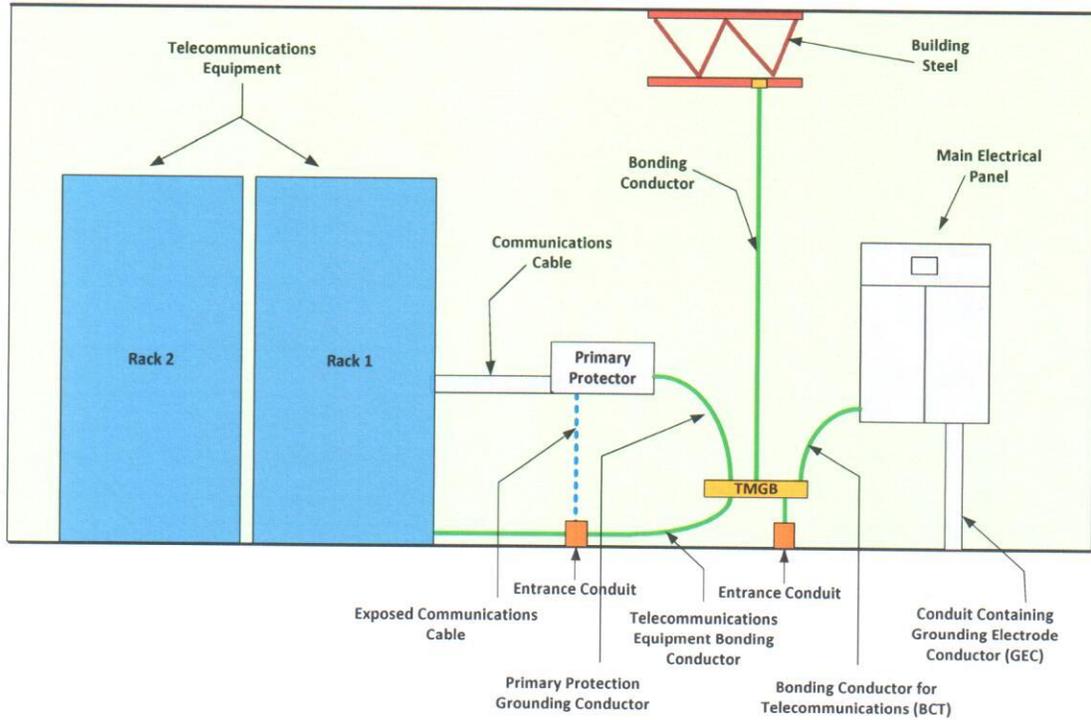
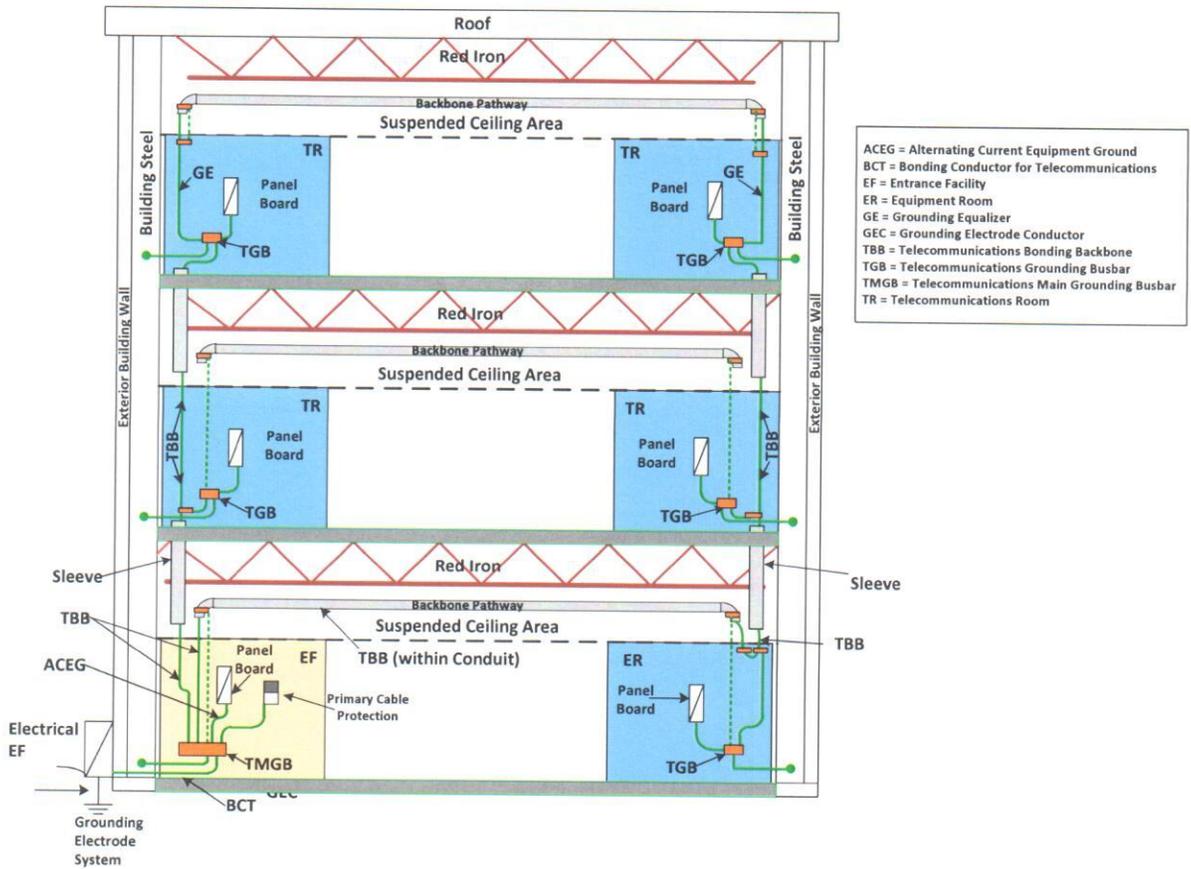


FIGURE 3.2

Large System Example



- A. The Telecommunications Contractor is exclusively liable for the welfare of the public and workers in accordance with all applicable rules, regulations, building codes and ordinances.
- B. All work shall comply with applicable safety rules and regulations including OSHA. All work shall comply with requirements of the National Electrical Safety Code (NESC) and the NEC. The exception is where local codes and/or regulations are more stringent, in which case the local codes and/or regulations shall govern.
- C. All work shall comply with the standards, references and codes listed in **PART 1-1.2 REFERENCES** above. Where questions arise concerning standards, references, or codes apply, the more stringent shall prevail.
- D. Replace and/or repair to original condition (or better) any existing structures, materials, equipment, etc. inadvertently demolished or damaged by the

Telecommunications Contractor during the course of installation at no additional cost to the Owner.

- E. Install the grounding and bonding system in a manner certifying that communications circuits, when installed, are capable of fully complying with ANSI/TIA/EIA and other references listed in **PART 1-1.2 REFERENCES**, above.

3.2 INSTALLATION

- A. The Grounding and Bonding infrastructure system shall not utilize the building plumbing system, unless required to do so by the NEC.
 - 1) The Telecommunication Contractor shall coordinate the installation of the grounding and bonding system with the electrical power distributions grounding infrastructure.
- B. Grounding/Bonding:
 - 1) TMGB: Provide a minimum of one TMGB per Entrance Room for each building and as shown on Contract Documents. Install TMGB(s) and directly bond TMGB(s) to electrical service ground and to related TBB(s).
 - 2) TGB: Provide a minimum of one TGB per Telecommunications Room (TR) and as shown on the Contract Documents and as required by standards, references and codes listed above in **PART 1-1.2 REFERENCES**. Directly bond each TGB to its related TBB and to the nearest building structural steel or other permanent metallic system.
 - 3) TBB: Provide TBB(s) as shown on the Contract Documents and as required to bond all non-current carrying metal telecommunications equipment and materials to the nearest TGB. Use TBB(s) to connect the TMGB to each of the TGB(s). The Contractor shall route along the shortest and straightest path possible with minimum bends. All bends shall be sweeping. TBB(s) shall be continuous (without splices).
 - a) Ensure that all bonding breaks through paint to bare metallic surface of all painted metallic hardware.
- C. Firestopping:
 - 1) The Telecommunications Contractor shall maintain the fire rating of all penetrated fire barriers. Fire stop and seal all penetrations made during the SCS installation.

- a) Provide firestopping material for through and membrane penetrations of fire-rated barriers.
- b) Install firestops in strict accordance with manufacturers detailed installation procedure.
- c) Install firestops in accordance with fire resistance requirements, manufacturer's recommendations, local fire and building authorities, and applicable codes and standards referenced in **PART 1-1.2 REFERENCES**. Apply sealing material in a manner acceptable to the local fire and building authorities.
- d) Firestopping material that is used to seal open penetrations through which cable passes shall be re-usable/re-enterable.

D. Labels:

- 1) Label TMGB(s) with "**TMGB**"
- 2) Label TGB(s) with "**TGB**"
- 3) Label TBB(s) with "**WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!**"

SECTION 270529- Hangers and Supports for Communications Systems

PART 1- GENERAL

1.1 SUMMARY

- A. Support structures are necessary to allow installation of Telecommunications cable, connecting hardware, and associated apparatus. These structures comprise components such as equipment racks, cabinets, distribution rings, hangers, J Hooks, plywood backboard, cable trays, conduits, slots, sleeves, and their associated hardware
- B. When installing pathways the Contractor shall ensure that the route for the pathway is clear of obstructions, such as HVAC ducts, large pipes, and structural beams within the building. When fire barriers are penetrated, the contractor shall firestop all penetrations to maintain the fire rated barrier.

1.2 CABLE TRAYS

- A. Cable tray shall be wall mounted or supported by the building structure from above using threaded rods (ATR) and manufacturer specified attachments. ATR shall be installed using properly sized anchors and attachment hardware. ATR shall be selected to support the maximum load for which the cable tray is designed.
- B. Wall mounted support brackets may be used to support cable tray. Wall bracket supports shall be installed along a wall along the route of the cable tray. The number of brackets and specified spacing interval is dependent upon the rated load the cable tray must support.
 - a. Supporting attachments shall be made on a cable tray not more than 24" from the ends, and at joints between two sections.
 - b. Additional supports are required every 5ft.

SECTION 270533- Conduits and Backboxes for Communications Systems

PART 1- GENERAL

1.1 SUMMARY

- A. Provide all materials and labor for the installation of a pathway system for inside plant. This section includes requirements for horizontal and building backbone raceways, fitting, and boxes specific to cabling for voice and data.
- B. Related Sections:
 - 1) Division 26 Section – “Basic Electrical Materials and Methods”
 - 2) Division 27 Section – “Grounding and Bonding for Communications Systems”
 - 3) Division 27 Section – “Inside Plant Communications Systems”

1.2 REFERENCES

- A. General:
 - 1) National Electrical Code (NEC)
 - 2) National Electrical Safety Code (NESC)

- 3) Occupational Safety and Health Act (OSHA)

B. Communications:

- 1) ANSI/TIA/EIA – 568: *Commercial Building Telecommunications Cabling Standard*
- 2) ANSI/TIA/EIA – 569: *Commercial Building Standard for Telecommunications Pathways*
- 3) ANSI/TIA/EIA – 606: *The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings*
- 4) ANSI/TIA/EIA – 607: *Commercial Building Grounding and Bonding Requirements for Telecommunications*
- 5) ISO/IEC IS 11801: *Generic Cabling for Customer Premises*
- 6) BICSI TCIM: *BICSI Telecommunications Cabling Installation Manual*
- 7) BICSI TDMM: *BICSI Telecommunications Distribution Methods Manual*
- 8) BICSI CO-OSP: *BICSI Customer-Owned Outside Plant Design Manual*

1.3 DEFINITIONS

- A. "EMT" shall mean Electrical Metallic Tubing.
- B. "RMC" shall mean Rigid Metal Conduit.
- C. "SMR" shall mean Surface Metal Raceway.
- D. "Raceway" shall mean any enclosed channel for routing wire, cable or TBB(s).
- E. "TMGB" shall mean *Telecommunications Main Grounding Busbar*. There is typically one TMGB per building, located in the main telecommunications room. This busbar is directly bonded to the electrical service ground.

- F. "TGB" shall mean *Telecommunications Grounding Busbar*. There is typically one TGB per telecommunications room. The TGB is connected both to the TMGB and to the buildings structural steel or other permanent metallic systems.
- G. "TBB" shall mean *Telecommunications Bonding Backbone*. The TBB is a conductor used to connect TMGBs to TGBs.
- H. "Pullbox" shall mean a metallic box with a detachable cover, used to enable pulling cable through conduit runs longer than 100' or where there are more than 180 degrees of bends.
- I. "Junction Box" shall mean a pullbox where a feeder conduit transitions to multiple distribution conduits.

1.4 SYSTEM DESCRIPTION

- A. Furnish, install, and place into adequate and successful operation all materials, devices, and essential accessories to deliver a complete Conduit, Raceway system as hereinafter identified and/or reflected in the Contract Documents. The Conduit, Raceway system shall support an ANSI/TIA/EIA and ISO/IEC compliant SCS.
- B. The work shall include materials, equipment and apparatus not explicitly stated herein or noted on the Contract Documents but which are required to make a complete working Conduit, Raceway system.

1.5 WARRANTY

1.6 QUALITY ASSURANCE

- A. Labeling and Listing: Provide conduits, raceways and boxes specified in this Section that are labeled and listed.
 - 1) The Terms "Listed" and "Labeled": As defined in NEC, article 100.
 - 2) Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- B. Comply with NECA's "Standard of Installation."
- C. Comply with NEC.

PART 2-PRODUCTS

2.1 GENERAL

- A. Materials shall consist of conduit, surface metal raceway, outlet boxes, fittings, enclosures; pull boxes, and other raceway incidentals and accessories as necessary for inside plant.

2.2 MATERIALS

- A. Conduit:

- 1) EMT: Shall be 1" minimum conduit size. Flexible Metal Conduit (FMC) is not acceptable.

- a) Conduit: Galvanized steel tubing shall meet ANSI C80.3

- b) Couplings: Steel, cast iron, or malleable iron compression type employing a split, corrugated ring and tightening nut, with integral bushings and locknuts.

- 2) RMC: Shall be 1" minimum conduit size.

- a) Conduit: Hot dipped galvanized steel with threaded ends meeting ANSI C80.1

- b) Couplings: Unsplit, NPT threaded steel cylinders with galvanizing equal to the conduit.

- c) Nipples: Same as conduit, up to 8" in diameter, with no running threads.

- B. Sleeves: ENT conduit, insulated throat bushings on each end.

- C. Surface Raceway: Wiremold V2400 series or equivalent – Two piece, steel, single channel surface raceway.

- D. Outlet boxes:

- 1) The outlet box shall be a minimum of 4 "(100 mm) x 4" (100 mm) x 2 ¼ "(57 mm). This size will provide accommodations for one or two 1" conduits.

- 2) If a larger conduit is specified, the outlet box size shall be increased accordingly. A maximum 1 ¼" conduit will require a 4 11/16 "(120 mm) x 4 11/16 "(120 mm) x 2 ½ "(64 mm) outlet box.

- E. Pull Strings: Plastic or nylon with a minimum test rating of 200 lb.

2.3 FIRESTOPPING

- A. Material: Must conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted testing agencies per ASTM E814 or UL 1479 fire test in a configuration that is representative of actual field conditions.

2.4 LABELING AND ADMINISTRATION

- A. Labels: As recommended in ANSI/TIA/EIA 606. Permanent (i.e. not subject to fading or erasure), permanently affixed, typed, and created by a hand-carried label marker or an approved equivalent software-based label making system. Handwritten labels are not acceptable.

- 1) Hand-carried label maker:

- a) Brady: ID Pro Plus (or approved equal).

- 2) Labels:

- a) Brady: Bradymaker Wires Marking Labels WML-511-292 (or approved equal)

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor is solely responsible for the safety of the public and workers in accordance with all applicable rules, regulations, building codes and ordinances.
- B. All work shall comply with applicable safety rules and regulations including OSHA. All work shall comply with the requirements of the National Electrical Safety Code (NESC) and the NEC except where local codes and/or regulations are more stringent, in which case the local codes and/or regulations shall govern.
- C. All work shall comply with the standards, references and codes listed in PART 1 -- REFERENCES above. Where questions arise regarding which standards, references, or codes apply, the more stringent shall prevail.

- D. All work shall comply with the requirements and recommendations of the product manufacturers. Where questions arise regarding which requirements and recommendations apply, the more stringent shall prevail.
- E. Install the raceway system in a manner ensuring that communications circuits, when installed, are able to fully comply with the ANSI/TIA/EIA and other references listed in Part 1 — References, above.
- F. Replace and/or repair to original (or better) condition any existing structures, materials, equipment, etc. inadvertently demolished or damaged by the Contractor during the course of construction at no additional cost to the Owner.
- G. Remove surplus material and debris from the job site and dispose of legally.

3.2 EXAMINATION

- A. Examine surfaces and spaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until insufficient conditions have been amended.

3.3 INSTALLATION

- A. Install raceways, boxes, enclosures, and cabinets as indicated, according to the manufacturer's written instructions. Provide a raceway for each location indicated. Do not gang raceway into wireways, pullboxes, junction boxes, etc., without explicit approval from the DC-Net Project Manager.
- B. Conduit:
 - 1) Install EMT unless other conduit is shown on the Contract Documents or is required by Code.
 - 2) Install conduit as a complete, continuous system without wires, mechanically secured and electrically connected to metal boxes, fittings and equipment. Blank-off unused openings using factory-made knockout seals.
 - 3) Run conduit in the most direct route possible, parallel to building lines. Do not route conduit through areas in which flammable material may be stored.
 - 4) Keep conduit at least 6 inches away from parallel runs of flues and steam or hot-water pipes or other heat sources operating at

temperatures above one-hundred degrees Fahrenheit. Install horizontal conduit runs above water piping.

- 5) Keep conduit away from sources of electromagnetic interference as follows:
 - a) 5 inches from fluorescent lighting.
 - b) 12 inches from conduit and cables used for electrical power distribution.
 - c) 48 inches from motors and/or transformers.
- 6) Do not exceed 295 feet total length for a given conduit run to be used for distribution cabling (from outlet box to telecommunications room), including intermediate conduits and junction boxes.
- 7) Install conduit exposed, except in finished areas or unless shown otherwise on the drawings. Do not install conduit below grade/slab unless specifically shown on the Contract Documents as being installed below grade/slab.
- 8) Install exposed conduit in lines parallel or perpendicular to building lines or structural members except where the structure is not level. Follow the surface contours as much as practical. Do not install crossovers or offsets that can be avoided by installing the conduit in a different sequence or a uniform line.
 - a) Run parallel or banded conduits together, on common supports where practical.
 - b) Make bends in parallel or banded runs from same centerline to make bends parallel.
- 9) Conduits concealed above ceilings, furred spaces, etc., which are normally inaccessible may be run at angles not parallel to the building lines.
- 10) Wherever practical, route conduit with adjacent ductwork or piping and support on common racks. Base required strength of racks, hangers, and anchors on combined weights of conduit and piping.