

**PART 1 - GENERAL**

This section of the Telecommunications Construction Guide Specification has references, products, procedures, processes, and work descriptions/summaries that are common to many Washington State University Pullman (WSUP) campus telecommunications projects. This information is provided in specification format to serve as a guide to the Designer in producing a CSI-compliant specification that will meet the unique requirements of WSUP Telecommunications projects. However, this document is not intended to be a Master Specification. The information included in this section is not intended to be all-inclusive for any given project.

The Designer shall edit this section (adding and/or removing content where required) to meet the requirements of a given project.

Prior to publishing the specifications for bid or construction purposes, all edits shall be made using the MS Word Tracking Changes feature. **When submitting the specifications for review at each progress milestone, print the specifications showing the revision markings.**

Text in shaded boxes (such as this text) is included to aid the Designer in understanding areas of this section that may require modification for a particular circumstance. Although this text is generally written in declarative form, the Designer shall consider it guidance only. The Designer shall not assume that the content of this specification section is suitable or sufficient for any given project in its current form, and shall remain responsible for developing a thorough and complete specification that meets the requirements of the project being designed.

1.1 SUMMARY

- A. Provide all materials and labor for the installation of a cable tray system for communications infrastructure. This section includes requirements for providing a cable tray system for communications circuits. These requirements are in addition to any that may exist in Division 26 – “Cable Tray.”

1.2 SYSTEM DESCRIPTION

Review and edit the following statement(s) for applicability to this project, restricted to describing performance, design requirements and functional tolerances of a complete system.

- A. Furnish, install, and place into satisfactory and successful operation all materials, devices, and necessary appurtenances to provide a complete, permanent Cable Tray infrastructure for communications circuits as hereinafter specified and/or shown on the Contract Documents. The Cable Tray system shall support an ANSI/TIA/EIA and ISO/IEC compliant communications Structured Cabling System (SCS) as specified in Section 27 15 00 — "Communications Horizontal Cabling."
- B. The work shall include materials, equipment and apparatus not specifically mentioned herein or noted on the plans but which are necessary to make a complete working ANSI/TIA/EIA and ISO/IEC compliant Cable Tray system.

1.3 STANDARDS AND CODES

Review and edit the following list of references. Check for completeness, currency and applicability to this project. The Designer shall verify with the WSUP FSPM and/or the WSUP ITPM assigned to the project whether the latest edition and/or addenda of each required reference is appropriate and specify the edition and addenda below accordingly.

- A. The applicable portions of the following specifications, standards, codes and regulations shall be incorporated by reference into this section:
1. ASTM A123 – Specification for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
  2. ASTM A653 – Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot Dip Process, Structural (Physical) Quality.
  3. ASTM A1011 – Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low Alloy and High-Strength Low-Alloy with Improved Formability.
  4. ASTM A1008 – Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy and High-Strength Low-Alloy with Improved Formability.
  5. ASTM B633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel
  6. NEMA VE 1 – Metallic Cable Tray Systems
  7. NEMA VE 2 – Cable Tray Installation Guidelines

## PART 2 - PRODUCTS

Ensure that products listed under the PART 2 – Products paragraphs have corresponding installation instructions in PART 3 – Execution, or in another specification section if furnished but not installed under this section.

WSUP has standardized on certain manufacturers and certain products for all new Structured Cabling Systems in WSUP facilities. Products shall be specified accordingly. The Designer shall ensure that the latest part numbers are used for specified products. Any substitutions require WSUP pre-approval before specification.

If the Designer wishes to use products that deviate from WSUP standards, a Standards Variance Request shall be made, as described in the Technology Infrastructure Design Guide (TIDG). If the alternative product is approved, the Designer shall adapt this to reflect the approved changes.

The products listed throughout Part 2 - Products below are not all-inclusive for any given project. The Designer shall ensure that all required products are specified. The Designer shall also verify that the most current part number of each specified product is listed in this section.

### 2.1 GENERAL

- A. Materials shall consist of tray sections, tray fittings, connectors, supports, expansion joints, blind end plates, barrier strips, radius drops, bonding conductors and other incidentals and accessories as required. Provide all incidental and/or miscellaneous hardware not explicitly specified or shown on the Contract Documents that is required for a fully operational and warranted system.
- B. Unless specifically stated as “Or equal”, equivalent items are not acceptable. Provide items as specified.
- C. Physically verify existing site conditions prior to purchase and delivery of the materials.
- D. Except for the use of ladder rack and wire basket tray where indicated, open bottom type cable trays, where cable and wiring are exposed to view are not acceptable.
- E. Structure of trays shall be suitable to support a continuous loading of cables weighing 75 pounds per linear foot, when supported on 12 foot centers, without any deflection exceeding 1/100 of the span, with a safety factor of 1.50.

- F. Interior surfaces shall be smooth and free of offset edges, projections or misalignment. Assembly bolts for end to end connections shall have a pattern which does not cause damage to cable sheaths of jackets. All edges shall be smooth, rounded and de-burred.

## 2.2 SOLID BOTTOM CABLE TRAY

- A. Solid bottom cable tray components shall be manufactured by a single manufacturer. Components shall not be intermixed between different manufacturers.
  - 1. The cable tray manufacturer shall be the following:
    - a. PW (Legrand) or pre-approved equal
  - 2. Substitution is not acceptable unless the cable tray manufacturer has been pre-approved prior to bidding. Contractors, in order to obtain approval for cable tray manufacturer substitution, shall submit their request for substitution to the Engineer at least two weeks prior to the bid date. Approval or denial of a substitution request will be based upon the sole judgment of the Engineer.
- B. Cable tray shall be comprised of "C" channel sides and a solid, corrugated bottom.
  - 1. The cable tray product line shall be the following:
    - a. PW (Legrand): SC-1E53-0020-12 (hot-dipped galvanized steel).
    - b. PW (Legrand): SC-1E53-0020-18 (hot-dipped galvanized steel).
    - c. Aluminum tray is not permitted.
  - 2. Width: Widths shall be as shown on the Contract Documents. Where cable tray width is not shown on the Contract Documents, it shall be sized according to the amount of cable to be placed in the trays (as shown on the Contract Documents) plus an additional 100% for future expansion capability.
  - 3. Depth: Depths shall be as shown on the Contract Documents. Where cable tray fill/load depth is not shown on the Contract Documents, it shall be 4 inches.
  - 4. Fittings: Fittings shall be factory manufactured.
  - 5. Lids: Lids shall be provided where shown on the Contract Documents.
- C. Manufacturer's factory fabricated accessories and special transitions shall be provided for all changes in direction, elevation and offsets. Use manufacturer's standard fittings including bolting assemblies for all end to end connections.
  - 1. Field-fabricated transitions shall not be accepted.
- D. Cable tray shall be factory-primed and then painted onsite as indicated in the Contract Documents.

## 2.3 WIRE BASKET (MESH) TRAY

- A. Wire mesh tray components shall be manufactured by a single manufacturer. Components shall not be intermixed between different manufacturers.
  - 1. The cable tray manufacturer shall be one of the following:
    - a. B-Line
    - b. Cablofil
  - 2. Substitution is not acceptable unless the cable tray manufacturer has been pre-approved prior to bidding. Contractors, in order to obtain approval for cable tray manufacturer substitution, shall submit their request for substitution to the Engineer at least two weeks prior to the bid date. Approval or denial of a substitution request will be based upon the sole judgment of the Engineer.
- B. For a given manufacturer, all components shall be part of a single cable tray product line – components shall not be intermixed between a manufacturer's cable tray product lines.
  - 1. The cable tray product one shall be one of the following:
    - a. B-Line: Flextray Series
    - b. Cablofil, Inc.: EZ Tray CF54/xxx and CF104/xxx Series

- C. Wire mesh tray shall be constructed of welded wire mesh (high strength steel wires) with a continuous safety edge wire lip. Tray shall be complete with all supports, materials, and incidental and miscellaneous hardware required for a complete cable tray system.
  - 1. Finish: Carbon steel with electro-plated zinc galvanized finish.
  - 2. Width: Widths shall be as shown on the Contract Documents. Where cable tray width is not shown on the Contract Documents, it shall be sized according to the amount of cable to be placed in the trays (as shown on the Contract Documents) plus an additional 100% for future expansion capability.
  - 3. Depth: Depths shall be as shown on the Contract Documents. Where cable tray depth is not shown on the Contract Documents, it shall be 4 inches.
  - 4. Mesh: 2 x 4 inches.
  - 5. Fittings: Fittings shall be field fabricated from straight sections using manufacturer-approved cutting tools and in accordance with manufacturer's instructions.
- D. Wire mesh cutting tools shall be manufacturer-approved with "offset cutting blade" jaws and a minimum 24 inch handle, and able to produce clean cuts without ragged edges.

## 2.4 SUPPORTS

- A. Wall supports shall provide for open side access cable lay-in capability.
  - 1. Solid Tray shall be welded steel, unistrut cantilever brackets:
    - a. 12 inch wide tray: PW (Legrand) G-0205-13
    - b. 18 inch wide tray: PW (Legrand) G-0205-19
  - 2. Wire Basket Tray shall be formed finished steel shapes:
    - a. 12 inch wide tray: B-Line 12 L BRKT
    - b. 18 inch wide tray: B-Line 20 L BRKT
    - c. End Termination: B-Line FTA9WTK
- B. Trapeze-style hangers shall support cable tray from structure above the tray.
  - 1. All-thread
  - 2. Unistrut
- C. Center hanger-style supports are not permitted.

## 2.5 CABLING RADIUS DROP FITTINGS

- A. Solid Tray:
  - 1. PW (Legrand) G-0254-12
  - 2. PW (Legrand) G-0254-18
- B. Wire Basket Tray:
  - 1. B-Line DROP OUT

## 2.6 GROUNDING AND BONDING

- A. Continuous Grounding Conductor: 6 AWG copper conductor, bare (uninsulated), unspliced. Using the cable tray or wire mesh tray as a grounding conductor, with bolted splicing hardware and bonding jumpers is not acceptable
- B. Grounding Lugs:
  - 1. Solid Bottom Tray
    - a. PW (Legrand): 9992-A840-01 with attachment clamp 9999-1873-03
  - 2. Wire Mesh Tray
    - a. B-Line: GROUNDBOLT with Ground Support Clip GROUNDSUPT GL

- b. Cablofil: GNDCL Grounding Lug with B-Line Ground Support Clip GROUNDSUPT GL

## 2.7 FIRESTOPPING MATERIAL

- A. Firestopping material: Conform to both Flame (F) and Temperature (T) ratings as required by local building codes and as tested by nationally accepted test agencies per ASTM E814 or UL 1479 fire test in a configuration that is representative of the actual field conditions. Manufactured by:
  - 1. Specified Tech. Inc. EZ-Path, with ganging brackets.

## 2.8 LABELING AND ADMINISTRATION

- A. Labels: As recommended in ANSI/TIA/EIA 606. Permanent (i.e. not subject to fading or erasure), permanently affixed, and created by a hand-carried label maker or a computer/software-based label making system. Handwritten labels are not acceptable.
  - 1. Labels: Brady: Bradymaker Wire Marking Labels WML-511-292 (or approved equal)
  - 2. Label Clips: Cablofil, Inc. (regardless of wire mesh tray manufacturer)
  - 3. Hand-carried label maker: Brady: ID Pro Plus (or approved equal).

## PART 3 - EXECUTION

Ensure that products incorporated into the project under PART 3 paragraphs have corresponding Product information in PART 2 – Products, or in another specification Section if installed but not supplied under this Section.

The following paragraphs include installation requirements written specifically for the Products listed in Part 2 above. If other products are approved, the Designer shall ensure that appropriate Part 3 installation requirements are added/removed or modified as applicable and described in equal or greater detail to the following paragraphs.

All installation requirements shall be consistent with the manufacturer's requirements.

### 3.1 GENERAL

- A. Install the cable tray system in a manner ensuring that communications circuits, when installed, are able to fully comply with the ANSI/TIA/EIA Standards.

### 3.2 EXAMINATION

- A. Examine surfaces and spaces to receive cable tray for compliance with installation tolerances and other conditions affecting performance of cable tray installation. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Notify the Engineer/Owner of conditions that may adversely affect the installation, subsequent use, or cause the tray (or circuits to be subsequently installed in the tray) to not comply with ANSI/TIA/EIA standards.

### 3.3 INSTALLATION

- A. Provide cable tray, in the locations and widths shown on the Contract Documents and in accordance with manufacturer's requirements and industry practices (NEMA VE 2). Ensure that the cable tray equipment complies with the requirements of NEC, and applicable portions of NFPA 70B and NECA's "Standards of Installation" pertaining to general electrical installation practices.
  - 1. Cable tray shall be installed plumb, level and square with finished building surfaces.

2. Provide factory-manufactured connection hardware between each cable tray segment. Cable tray segments shall be mutually aligned. Connection hardware shall be installed according to the manufacturer's requirements.
  3. Mount tray at heights indicated on Contract Documents.
  4. Cable tray elevation changes shall be gradual, or as shown on the Contract Documents.
- B. Cable Tray Routing:
1. Route cable tray as shown on the Contract Documents. Where not shown on the Contract Documents, route cable tray in the most direct route possible, parallel to building lines.
  2. Do not route cable tray through areas in which flammable material may be stored or through wet, hazardous or corrosive areas.
- C. Vertical Transitions:
1. Vertical height transitions of cabling that exceed 24 inches shall be supported by cable tray throughout the transition.
- D. Wall Penetrations:
1. Provide wall penetrations where required and as shown on the Contract Documents. Provide roto-hammering, core drilling and saw cutting where required for installation.
  2. Provide slot/sleeves through wall, if wall is not fire-rated. Seal around slot/sleeves, closing up the penetration around the slot/sleeves.
  3. Provide fire-rated cable pathway hardware through wall if the penetration is through a fire-rated wall. Restore fire-rating of wall. Firestopping shall comply with the requirements in Section 07 27 00 – Firestopping.
- E. Cable Tray Clearance Requirements:
1. Clearance requirements for cable tray accessibility:
    - a. Maintain a clearance of 8 inches between top of cable tray and ceiling structure or other equipment or raceway.
    - b. Maintain a clearance of 8 inches between at least one side of cable tray and nearby objects.
    - c. Maintain a clearance of 6 inches between bottom of cable tray and ceiling grid or other equipment or raceway.
  2. Clearance requirements from sources of electromagnetic interference (EMI):
    - a. Maintain a clearance of 5 inches or more from fluorescent lighting.
    - b. Maintain a clearance of 12 inches or more from conduit and cables used for electrical power distribution.
    - c. Maintain a clearance of 48 inches or more from motors or transformers.
    - d. Pathways shall cross perpendicularly to electrical power cables or conduits.
  3. Maintain a clearance of at least 6 inches from parallel runs of flues and steam or hot-water pipes or other heat sources operating at temperatures above one-hundred degrees Fahrenheit.
- F. Provide cable tray supports where shown on the Contract Documents. Where not shown on the Contract Documents, provide supports according to the manufacturer's recommendations.
1. Load span criteria: Install tray supports in accordance with the load criteria of L/240, and as shown on the Contract Documents.
  2. Supports shall be attached to structural ceiling or walls with hardware or other installation and support aids specifically designed for the cable tray and designed to support the cable tray's weight and required cable weight and volume.
  3. Where cable trays run adjacent to walls, provide wall-mounted supports.
  4. Provide ceiling-hung supports only where the use of a wall-mounted support is not possible or where shown on Contract Documents. For example, provide ceiling-hung supports where cable tray is not running adjacent to a wall.
  5. Do not attach cable tray supports to ceiling support system or utility support systems.

6. Coordinate bracket installation with General Contractor for blocking and backing support. Framing shall comply with the requirements in Section 06 10 00 – Rough Carpentry.
  7. Attach cable tray to support brackets.
- G. Cable tray shall be installed free of burrs, sharp edges, or projections which may damage cable insulation or cause cuts to cable installation technicians. Cable tray shall be free of denting and other bending damage in surfaces that are intended to be straight and true.
- H. Wire mesh-type cable tray shall be cut with a manufacturer-approved cutter.
1. The choice and position of the jaws at the point where the cut is to be made shall allow shearing as close as possible to the intersection of the steel wires.
  2. Cuts shall ensure the integrity of the galvanic protective layer.
  3. Do not use saws to cut tray.
- I. Wire Mesh Tray Fittings: Provide field-fabricated fittings from straight sections of cable tray using manufacturer-approved tools and in accordance with manufacturer's instructions. Bends shall be long radius. Short radius bends and T-sections shall not be used unless specifically shown on the Contract Documents.
- J. Cable Tray Fittings: Provide factory-fabricated fittings in accordance with manufacturer's instructions. Bends shall be long radius. Short radius bends and T-sections shall not be used unless specifically shown on the Contract Documents.
1. Fittings shall be installed without gaps, such that cabling in the tray will not be visible from below or from the side.
- K. Expansion Joints: Provide cable tray sliding or offsetting expansion joints/fittings where shown on the Contract Documents and where cable tray crosses building expansion joints. Provide bonding jumper except where expansion joints are specifically approved for bonding.
- L. Thermal contraction and expansion: Install cable tray sections with gap settings between cable tray sections that are appropriate for the range of thermal expansion and contraction expected for the space during construction and also during normal occupancy and operation.
1. Conceal any gaps in solid cable tray, such that cabling in the tray will not be visible from below or from the side.
- M. Blind End Plates: Close unused openings using factory-made blind end plates.
- N. Barrier Strips: Provide barrier strips as shown on the Contract Documents
- O. Radius Drops: Provide cable tray radius drops where shown on the Contract Documents and where cable trays cross other telecommunications cable trays or ladder rack.

### 3.4 GROUNDING AND BONDING

- A. Bond metallic raceway (including cable tray) together and to the nearest TGB (as provided under Section 27 05 26 — "Grounding and Bonding for Communications Systems"). Ensure that bonding breaks through paint to bare metallic surface of painted metallic hardware.
- B. Provide a continuous grounding conductor running the length of the cable tray.
1. Bond each tray segment to the conductor using listed hardware.
  2. Cable tray bonding jumpers/splices are not permitted as a substitute for a continuous grounding conductor.
- C. Bonding conductors:

1. Bond distribution conduits and raceways to cable tray.
2. Provide bonding jumpers at expansion joints, sleeves and any other locations where electrical continuity is interrupted.
3. Provide bonding conductor between cable tray and the electrical power distribution system grounding infrastructure.

### 3.5 CLEANING AND PROTECTION

- A. On completion of installation, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and in accordance with accepted industry practice, that ensure coatings, finishes, and cabinets are without damage or deterioration at the time of Substantial Completion.
  1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
  2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

### 3.6 TESTING

- A. Test cable trays to ensure electrical continuity of bonding and grounding connections. Demonstrate compliance with maximum grounding resistance per NFPA 70B, Chapter 18.

### 3.7 LABELING AND ADMINISTRATION

- A. Provide the following label every 10 feet along the entire length of the cable tray:
  1. Label shall read "TELECOMMUNICATIONS / LOW VOLTAGE CABLING ONLY".

**END OF SECTION**