SPECIFICATION NO. IT-CISD-LAN-322-02

Consolidated Edison Company of New York
4 Irving Place, New York, New York 10003

Information Technology
Communications Infrastructure & Site Design

DESCRIPTION

LAN Infrastructure at

R900 – Spring Valley Operations Center

Building Expansion

LOCATION

390 Route 59 West
Spring Valley, NY 10977

Prepared By: Ronald Devito Date: 04/07/2025

Systems Specialist

Reviewed By: Paul Nardelli Date: 04/09/2025
Systems Specialist

Approved By: Michael J. Ribarich Date: 05/22/2025
Systems Manager

Table of Contents

1.0 Project overview 3
2.0 Project Requirements 3
2.1 General 3
2.2 Installation 3
2.3 Deliverables 4
3.0 Scope of Work 4
3.1 Removal of Existing Infrastructure 4
3.2 IT Rooms 5
3.3 Copper Structured Cabling 5
3.4 Fiber Structured Cabling 7
3.5 Grounding, Bonding, and Isolation 8
3.6 Racking and Stacking 9
3.7 Work Area Equipment 9
3.8 Femtocell 10
4.0 Reference Standards 10
4.1 IT-CISD-CPR-STD-Cat-6-and6A Copper Cable Standard 10
4.2 IT-CISD-FIB-STD - Fiber Cable Standard 10
4.3 IT-CISD-TGB-STD – Grounding and Bonding Standard 10
4.4 IT-CISD-RRL-GDL Cable Runway and Rack Layout Guideline 10
4.5 IT-CISD Conduit Installation Standard Requirements 10
5.0 Attachments 11
5.1 Attachment 01 - CAT-6 6A Cable Pathways and Drop Locations 11
5.2 Attachment 02 – Access Point Deployment 11
5.3 Attachment 03 - Comm and LAN Room Layouts 11
5.4 Attachment 04 - Comm Room and LAN Room Rack Elevations 11
5.5 Attachment 05 - Fiber Ties and Backbone Connections 11
5.6 Attachment 06 - Fiber Tray Layout and Labeling 11
5.7 Attachment 07 - Master ABF Cable Schedule 11
5.8 Attachment 08 - ABF Riser Documentation 11
5.9 Attachment 09 - Femtocell Documentation 11

1.0 PROJECT OVERVIEW

Con Edison/Orange and Rockland Utilities (CECONY/ORU) is adding a three-story 48,000-square foot addition to Spring Valley Operations Center. A LAN infrastructure is required to support this effort. This document details the components and services that the cable installation contractor (Contractor) must supply and perform.

2.0 PROJECT REQUIREMENTS

2.1 General

2.1.1 All work shall be performed according to the requirements in this specification, including all drawings, reference standard specifications, and attachments.

2.1.2 The Contractor shall, before bidding, visit and examine the worksite and the latest construction drawings to become familiar with the site arrangement and existing conditions and difficulties, which may affect the execution of the work scope covered by this specification. Non-familiarity of existing site conditions and proposed construction will not be an acceptable basis for any later claims of additional costs.

2.1.3 Drawings within this specification are for reference only. The Contractor shall perform inspections as required to verify the accuracy of dimensions and details on all drawings and clarify any requirements included in this specification before submitting a bid proposal. There shall be no claims for extra costs incurred by the Contractor due to the underestimating of material and/or labor required because of field conditions, which could have been identified through inspection and measurements.

2.1.4 Any claim submitted by the Contractor that is related to difficulties encountered during construction because of the Contractor's failure to verify site conditions and clarify specification requirements will not be honored by Con Edison.

2.2 Installation

2.2.1 Con Edison qualified Contractors:

1) Powercom – Contact Hal Kern 914-632-2600, halkern@powercomsystems.com.
2) Telenetics – Contact Bob Vogel 516-779-2640, telenet@rcn.com.
3) Coranet – Contact Paul Giddens, 212-635-2770, PGiddens@coranet.com

2.2.2 The Category 6 cable installation described in this document shall require component and cable manufacturer certification issued by Siemon Company as their 25-year System 6^{SM} certification.

2.2.3 The Category 6A cable installation described in this document shall require component and cable manufacturer certification issued by Siemon Company as their 25-year UltraMAX™6A certification.

2.2.4 All copper cable described in this document shall be installed in accordance with the latest revision of the Con Edison IT-CISD-CPR-STD-Cat-6-and6A Copper Cable Standard and attachments within this document.

2.2.5 All The air blown fiber installation described in this document shall be installed and tested such that it meets all requirements for the Sumitomo extended warranty.

2.2.6 All fiber cable described in this document shall be installed in accordance with the latest revision of the Con Edison IT-CISD-FIB-STD - Fiber Cable Standard and attachments within this document.

2.2.7 All telecommunications grounding and bonding described in this in this document shall be installed in accordance with the latest revision of the Con Edison IT-CISD-TGB-STD – Standard Specification for Installation of LAN Telecommunications Grounding and Bonding and attachments within this document.

2.2.8 All cable runways and racks described in this document shall be installed in accordance with the latest revision of the Con Edison IT-CISD-RRL-GDL-03 Cable Runway and Rack Layout Design and Construction Guideline and attachments within this document.

2.2.9 All conduit cable pathways described in this document shall be installed in accordance with the latest revision of the Con Edison IT-CISD Conduit Installation Standard Requirements and attachments within this document. STI EZ—Path 44 Series pathways shall be installed where conduit is not specified.

2.3 Deliverables

2.3.1 Proof of submittal for Siemon Company certification/warranty documentation in electronic format.

2.3.2 Proof of submittal for Sumitomo certification/warranty documentation in electronic format.

2.3.3 As-built drawings in native electronic format for all attachments in Section 5 if final installation differs from this specification.

2.3.4 Pictures of ground resistance tester displays for all for all bonding conductor and ground bar Ohm measurements.

3.0 SCOPE OF WORK

The Contractor shall provide all equipment, labor, supervision, and material to do the work described in this section. Unless stated differently in this section, the contractor shall follow installation practices within the reference standards stated in Section 4 and attachments in Section 5.

3.1 Removal of Existing Infrastructure

3.1.1 Not applicable.

3.2 IT Rooms

3.2.1 The Contractor shall supply and install three two-post (3) 19” racks and one (1) four-post 19” rack in the 1st floor Comm Room.

3.2.2 The Contractor shall coordinate the installation of a Mid Atlantic 44U Wide Rack Enclosure, model# DRK19-44-36LRD supplied and installed by the Security contractor in the 1st Floor Comm room.

3.2.3 The Contractor shall coordinate the installation of a Moreng Telecom Products, Issue P Network Power Bay 7 Foot 23 Inch Wide 2 Post Blue Rack – Part # R084231R-3 supplied and installed by the CCTN contractor in the 1st Floor Comm room.

3.2.4 The Contractor shall supply and install one (1) two-post and one (1) four-post 19” rack in the 2nd and 3rd floor LAN Rooms.

3.2.5 The Contractor shall secure racks to the floor using ½” anchors, washers, lock washers and nuts. Excess threading that thread past the nut shall be cut flush with the nut after nut has been tightened to manufacturer’s specification.

3.2.6 The Contractor shall supply and install 10” wide, 7’ tall, double sided black vertical wire-managers CPI parts 30096-703.

3.2.7 The Contractor shall supply and install a cable runway system in the Comm Room and each LAN Room. The cable runway shall be installed at two (2) different heights.

3.2.8 The 12” wide power runway shall be secured to the wall perpendicular to each rack and cabinet at a height of 7’ 6”. The power runway shall be attached to the top of each rack/cabinet using a rack-to-runway mounting plate with bracket and to the wall behind the rack.

3.2.9 The combination of 12” and 24” data runway shall run parallel with the racks at the height of 8’. The data runway will be secured to the ceiling and the walls.

3.2.10 Vertical sections of 24” wide data runways are required for floor and lower wall penetrations.

3.2.11 The Contractor shall supply and install radius drops from each direction above each rack vertical cable manager and for each transition between horizontal and vertical runways.

3.2.12 The Contractor shall use CPI Adjustable Cable Runway system using part# 14300-724 and extra stringers if required to align radius drops with wire managers, part# 14302-724.

3.3 Copper Structured Cabling

3.3.1 The Contractor shall install one hundred and twenty-four (124) dual CAT-6 and thirteen (13) dual 6A drops from the 1st floor Comm room to the 1st floor work area. The Contractor shall install sixteen (16) dual CAT-6

drops for card swipe readers and one (1) dual CAT-6 drop for a duress button. The card swipe and duress button drops shall be terminated to the Corporate Security Patch Panel. Corporate Security's Contractor shall be responsible for running, terminating and testing CAT-6 drops for security cameras.

3.3.2 The Contractor shall install one hundred and forty-six (146) dual CAT-6 and thirteen (13) dual CAT-6A drops from the 2nd floor LAN room to the 2nd floor work area.

3.3.3 The Contractor shall install nine (9) dual CAT-6 drops for card swipe readers. The card swipe drops shall be terminated to the Corporate Security Patch Panel. Corporate Security's Contractor shall be responsible for running, terminating and testing CAT-6 drops for security cameras.

3.3.4 The Contractor shall install one hundred (100) dual CAT-6 and eleven (11) dual CAT-6A drops from the 3rd floor LAN room to the 2nd floor work area.

3.3.5 The Contractor shall install sixteen (16) dual CAT-6 drops for card swipe readers and seven (7) dual CAT-6 drop for duress buttons. The card swipe and duress button drops shall be terminated to the Corporate Security Patch Panel. Corporate Security's Contractor shall be responsible for running, terminating and testing CAT-6 drops for security cameras.

3.3.6 All copper cabling trunks shall be supported by SnakeTray™ affixed to threaded rods suspended from the ceiling deck. Small branch runs shall be supported by Panduit 4" J-Pro hooks affixed to threaded rods suspended from the ceiling deck.

3.3.7 The Contractor shall install two (2) CAT-6 dual drops between the floor box and behind each display in each conference room.

3.3.8 The Contractor shall use the following type and brand of CAT-6 cabling:

1) Siemon 9C6P4-E3-02-RXACat6 System 6 Plenum Cable - White
2) Siemon 9C6P4-E3-06-RXACat6 System 6 Plenum Cable – Blue

3.3.9 The Contractor shall provide a distinct color cabling for each "dual drop." The "dual drop" position shall remain constant throughout the project. The cable colors shall be as follows:

1) Cable A – Blue
2) Cable B – White

3.3.10 The Contractor shall supply, label and install one (1) CAT-6 patch cable between each LAN Room patch panel yellow port and a LAN switch port according to a schedule provided by the IT project manager.

3.3.11 The Contractor shall supply, label and install one (1) CAT-6 patch cable between each LAN Room patch panel violet port and a LAN switch port according to a schedule provided by the IT project manager.

3.3.12 The Contractor shall supply, label and install one (1) CAT-6 patch cable between each work area yellow port according to a schedule provided by the IT project manager.

3.3.13 The Contractor shall supply, label and install one (1) CAT-6 patch cable between each work area violet port according to a schedule provided by the IT project manager.

3.4 **Fiber Structured Cabling**

3.4.1 The Contractor shall supply and install two (2) new TDU (Tube Distribution Unit) (DE36IDU) in the 1st floor Comm room.

3.4.2 The Contractor shall supply and install two new TDU (DE20IDU) in the 2nd and 3rd floor LAN rooms.

3.4.3 The Contractor shall install conduits between TDUs per Attachment 03 – Conduit Schedule.

3.4.4 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 01 and the 2nd floor LAN room TDU 03, and between 2nd Floor LAN Room TDU 03 and 3rd Floor LAN Room TDU 05.

3.4.5 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 02 and the 2nd floor LAN room TDU 04, and between 2nd Floor LAN Room TDU 04 and 3rd Floor LAN Room TDU 06.

3.4.6 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 01 and Electric Control Center IDF A. Final Rack/enclosure, and fiber tray position to be determined in the field.

3.4.7 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 02 and Electric Control Center IDF B. Final Rack/enclosure, and fiber tray position to be determined in the field.

3.4.8 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 01 and Spring Valley Data Center Production Row 4. Final Rack/enclosure, and fiber tray position to be determined in the field.

3.4.9 The Contractor shall supply and install one (1) 19-tube (TC19TP2) tube cable between the 1st floor LAN room TDU 02 and Spring Valley Old Data Center. Final Rack/enclosure, and fiber tray position to be determined in the field.

3.4.10 The Contractor shall install a microduct pathway, blow, terminate and test one (1) 24-strand single mode fiber bundle (FB24SX) between the 1st floor LAN room and the 3rd floor LAN rooms, via Fiber Riser 1 (TDUs 01, 03, and 05).

3.4.11 The Contractor shall install a microduct pathway, blow, terminate and test one (1) 24-strand single mode fiber bundle (FB24SX) between the

1st floor LAN room and the 3rd floor LAN rooms, via Fiber Riser 2 (TDUs 02, 04, and 06).

3.4.12 The Contractor shall install a microduct pathway, blow, terminate and test one (1) 24-strand single mode fiber bundle (FB24SX) between the 1st floor LAN room and the 2nd floor LAN rooms, via Fiber Riser 1 (TDUs 01 and 03).

3.4.13 The Contractor shall install a microduct pathway, blow, terminate and test one (1) 24-strand single mode fiber bundle (FB24SX) between the 3rd floor LAN room and the 2nd floor LAN rooms, via Fiber Riser 2 (TDUs 04, and 06).

3.4.14 The Contractor shall install a microduct pathway, blow, terminate and test two (2) 72-strand single mode fiber bundles (FP72PVS) between the 1st Floor Comm Room and the Electric Control Center IDF A, via 1st Floor Comm Room TDU 01. The fiber bundles will terminate directly in Rack B2, Tray 5. The new fiber tray shall be installed in "RU" 20. Note this is an old rack without RU designations.

3.4.15 The Contractor shall install a microduct pathway, blow, terminate and test two (2) 72-strand single mode fiber bundles (FP72PVS) between the 1st Floor Comm Room and the Electric Control Center IDF B, via 1st Floor Comm Room TDU 02. The fiber bundles will terminate directly in Rack B1, Tray 6. The new fiber tray shall be installed in RU 28.

3.4.16 The Contractor shall install a microduct pathway, blow, terminate and test two (2) 72-strand single mode fiber bundles (FP72PVS) between the 1st Floor Comm Room and the Spring Valley Data Center Production Row 4, via 1st Floor Comm Room TDU 01. The fiber bundles will terminate directly in Cabinet 1, Tray 4. The new fiber tray shall be installed in RU 30.

3.4.17 The Contractor shall install a microduct pathway, blow, terminate and test two (2) 72-strand single mode fiber bundles (FP72PVS) between the 1st Floor Comm Room and the Spring Valley Old Data Center, via 1st Floor Comm Room TDU 02. The fiber bundles will terminate directly in Cabinet 5, Tray 4. The new fiber tray shall be installed in RU 22.

3.4.18 The Contractor shall use Sumitomo FutureFlex FOR-144-0-1 Cable Breakout Kits for Ribbon when terminating the 72-strand single mode fiber bundles for the CCTN Routes.

3.4.19 The Contractor shall install Sumitomo FutureFlex FT-9-288XFQX2U fiber trays in the new Comm Room CCTN Racks, RR #0101.02 and RR #0101.03 in RUs 40 and 41.

3.4.20 The contractor shall install Sumitomo FutureFlex FT-9-144XFQX1U fiber trays at the endpoints delineated in 3.4.14 through 3.4.17.

3.5 Grounding, Bonding, and Isolation

3.5.1 The contractor shall start off each cabinet and cabinet/rack row in each LAN rooms 1” from the adjacent wall to ensure isolation from that wall.

3.5.2 The Contractor shall isolate all racks from the floor.

3.5.3 The Contractor shall isolate all cable runways from walls, floors, and any supporting structures.

3.5.4 The Contractor shall coordinate with the General Contractor and IT project manager on the location to install the grounding conductor (GrC) and the single point ground bar (SGB) in the Communications Room and each LAN room.

3.5.5 The Contractor shall supply and install a SGB and bond to the provided GrC in the Communication Room and each LAN room.

3.5.6 The Contractor shall supply and install a master ground bar (MGB) in in the Communication Room and each LAN room and bond to the SGB.

3.5.7 The Contractor shall supply and install a floor ground bar (FGB) in each in the Communication Room and each LAN room of the and bond to the MGB.

3.5.8 The Contractor shall bond the antistatic floor to the FGB in in the Communication Room and each LAN room.

3.5.9 The Contractor shall bond each HRGB to the MGB.

The Contractor shall supply and install non-conductive Panduit J-Pro (or equivalent) J-hooks to route and isolate all bonding conductors and power cords.

3.6 Racking and Stacking

3.6.1 The Contractor shall pick up from the Con Edison CISD group on the 9th floor of 4 Irving Place NY 10003, deliver, and rack mount all Con Edison provided UPSs (Uninterruptible Power Supply) (Uninterruptible Power Supply), External Battery Packs, ATSs (Automatic Transfer Switch) and Netbotz devices.

3.6.2 The Contractor shall pick up from the Con Edison IP Build & Automation (IPB&A) group on the 4th floor of 4 Irving Place, NY 10003, deliver and rack mount all Con Edison provided Cisco switches.

3.6.3 The Contractor shall supply and install wire managers under each installed patch panel and Cisco LAN switch.

3.6.4 The Contractor shall supply and install Siemon blank panels in for all unused rack units except for units 44 and 45.

3.6.5 The Contractor shall label and install Con Edison provided power cords according to a schedule provided by the IT project manager.

3.7 Work Area Equipment

3.7.1 The Contractor shall supply and install an Oberon panel at each wireless access point location.

3.7.2 The Contractor shall pick up from the Con Edison IPB&A group on the 4th floor of 4 Irving Place, NY 10003, deliver and install wireless access points within the Oberon panels for each new wireless access point location.

3.7.3 The Contractor shall label each Oberon panel, access point and associated dual CAT-6 according to a schedule provided by the IT project manager.

3.8 Femtocell

3.8.1 The Contractor shall pick up from the Con Edison CISD group on the 9th floor of 4 Irving Place, NY 10003 and deliver three (3) Femtocells and associated GPS antennae, RF cable and grounding material.

3.8.2 The Contractor shall install one (1) Femtocell in the 1st floor Comm Room. and one (1) in the 2nd and 3rd Floor LAN Rooms.

3.8.3 The Contractor shall install four (4) internal antennae on all three floors.

3.8.4 The Contractor shall install one (1) LMR 400 RF cable from the 1st Floor Comm Room Femtocell to each of the internal antennae on the 1st floor.

3.8.5 The Contractor shall install one (1) LMR 400 RF cable from the 2nd Floor LAN Room Femtocell to each of the internal antennae on the 2nd floor.

3.8.6 The Contractor shall install one (1) LMR 400 RF cable from the 3rd Floor LAN Room Femtocell to each of the internal antennae on the 3rd floor.

3.8.7 The Contractor shall install the three (3) GPS antennae on the East center of the new building roof.

3.8.8 The Contractor shall install one (1) LMR 400 RF cable from the 1st Floor Comm Room Femtocell to one (1) of the GPS antennae.

3.8.9 The Contractor shall install one (1) LMR 400 RF cable from the 2nd Floor LAN Room Femtocell to one (1) of the GPS antennae.

3.8.10 The Contractor shall install one (1) LMR 400 RF cable from the 3rd Floor LAN Room Femtocell to one (1) of the GPS antennae.

3.8.11 The Contractor shall bond each LMR 400 RF cable at each antenna end to building steel.

3.8.12 The Contractor shall patch in each Femtocell to its associated CAT-6 drop, label each Femtocell, associated dual CAT-6 drop, LMR cable, and bonding conductors according to a schedule provided by the IT project manager.

4.0 REFERENCE STANDARDS

4.1 IT-CISD-CPR-STD-Cat-6-and6A Copper Cable Standard

4.2 IT-CISD-FIB-STD - Fiber Cable Standard

4.3 IT-CISD-TGB-STD – Grounding and Bonding Standard

4.4 IT-CISD-RRL-GDL Cable Runway and Rack Layout Guideline

4.5 IT-CISD Conduit Installation Standard Requirements

5.0 ATTACHMENTS

5.1 Attachment 01 - CAT-6 6A Cable Pathways and Drop Locations

5.2 Attachment 02 – Access Point Deployment

5.3 Attachment 03 - Comm and LAN Room Layouts

5.4 Attachment 04 - Comm Room and LAN Room Rack Elevations

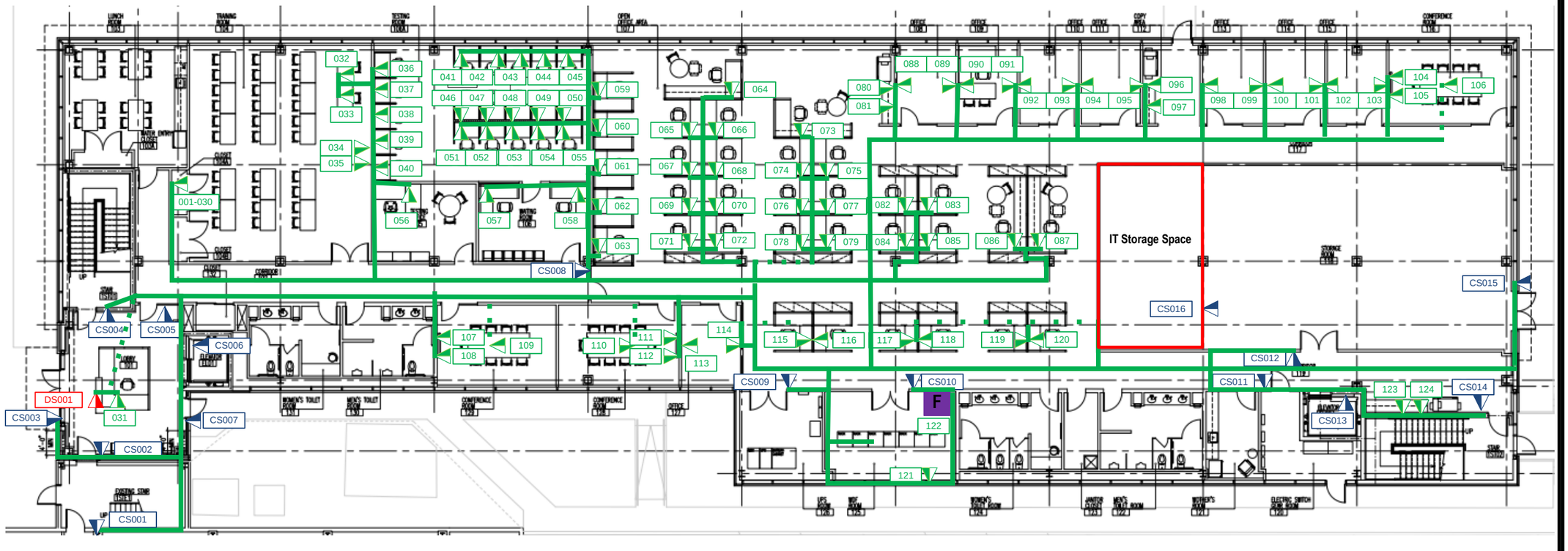
5.5 Attachment 05 - Fiber Ties and Backbone Connections

5.6 Attachment 06 - Fiber Tray Layout and Labeling

5.7 Attachment 07 - Master ABF Cable Schedule

5.8 Attachment 08 - ABF Riser Documentation

5.9 Attachment 09 - Femtocell Documentation



141 CAT-6 Duplex Drops Total

Legend

- CAT 6 Overhead Pathways
- CAT 6 1" Trenched Conduit
- 124 — CAT 6 Duplex Drop
- CS016 — CAT 6 Duplex Drop – Corporate Security Card Swipe
- DS001 — CAT 6 Duplex Drop – Corporate Security Duress Button
- F 001 — CAT 6 Duplex Drop - Femtocell

REVISION NOTES

REV:	1	DATE:	-	REVISED BY:	-
REV:	2	DATE:	-	REVISED BY:	-
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REV:	4	DATE:	-	REVISED BY:	-
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REV:	6	DATE:	-	REVISED BY:	-
REV:	7	DATE:	-	REVISED BY:	-
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REV:	9	DATE:	-	REVISED BY:	-
REV:	10	DATE:	-	REVISED BY:	-

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4 Irving Place
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DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – SVOC Building Expansion

WORK DESCRIPTION:
Attachment 01

JOB NUMBER:		DRAWN BY:	Ron Devito
SCALE:	N.T.S.	DATE:	03/12/2025
REVISION No.	REV		
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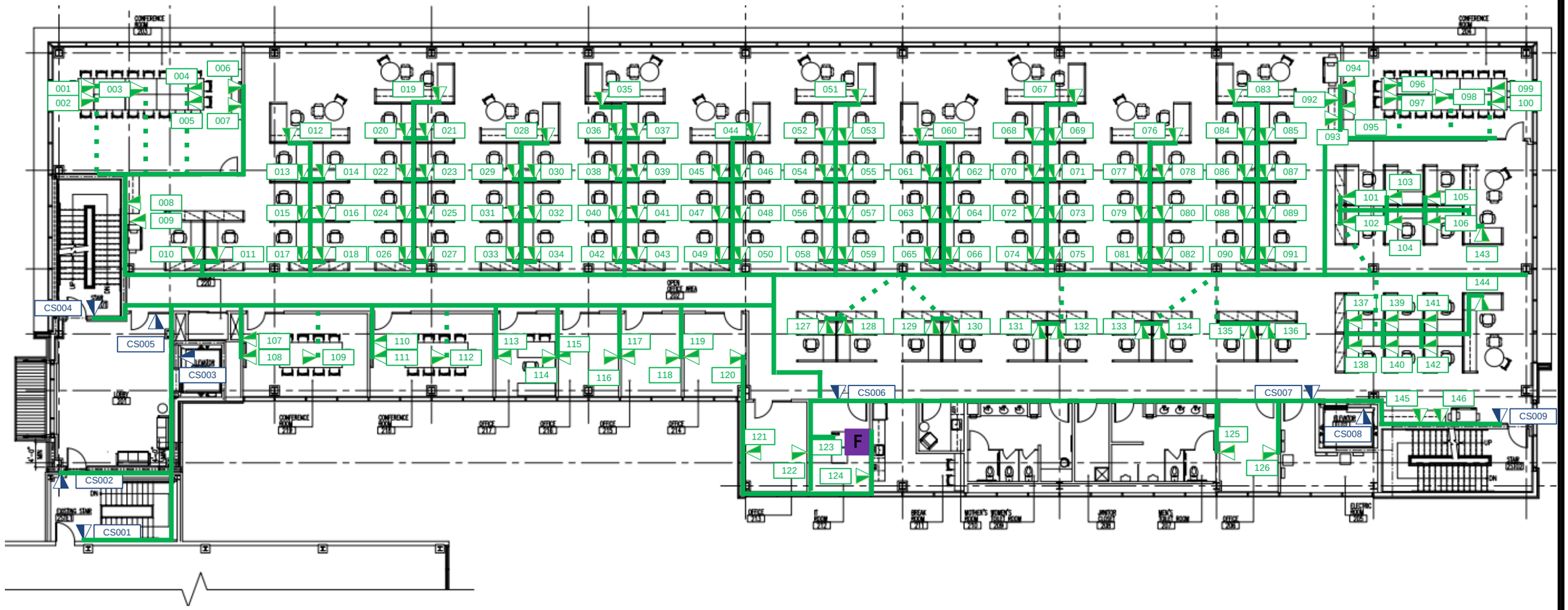
DRAWING TYPE:	-	SHEET:	1 OF 3



155 CAT-6 Duplex Drops Total

Legend

- CAT 6 Overhead Pathways
- CAT 6 1" Trenched Conduit
- 146 — CAT 6 Duplex Drop
- CS009 — CAT 6 Duplex Drop – Corporate Security Card Swipe
- F 001 — CAT 6 Duplex Drop - Femtocell

REVISION NOTES

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10	-	-

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DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER: -

PROJECT MGR. TEL No.: -

SITE LOCATION:

R900 – SVOC Building Expansion

WORK DESCRIPTION:

Attachment 01

JOB NUMBER:

DRAWN BY: Ron Devito

SCALE: N.T.S.

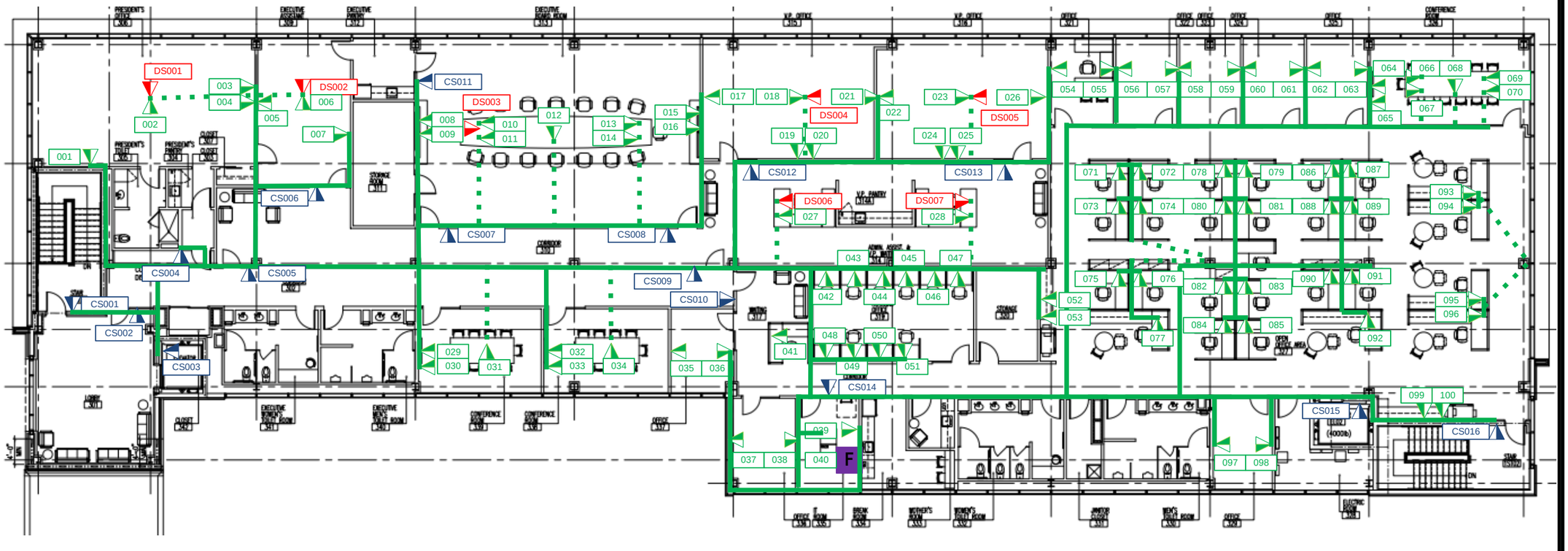
DATE: 03/12/2025

REVISION No.: REV

FILE NAME: -

DRAWING TYPE: -

SHEET: 2 OF 3



123 CAT-6 Duplex Drops Total

Legend

- CAT 6 Overhead Pathways
- CAT 6 1" Trenched Conduit
- 100 — CAT 6 Duplex Drop
- CS016 — CAT 6 Duplex Drop – Corporate Security Card Swipe
- DS007 — CAT 6 Duplex Drop – Corporate Security Duress Button
- F / 001 — CAT 6 Duplex Drop - Femtocell

REVISION NOTES

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REV:	8	DATE:	-	REVISED BY:	-
REV:	9	DATE:	-	REVISED BY:	-
REV:	10	DATE:	-	REVISED BY:	-

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DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – SVOC Building Expansion

WORK DESCRIPTION:
Attachment 01

JOB NUMBER:	DRAWN BY: Ron Devito
SCALE: N.T.S.	DATE: 03/12/2025
REVISION No. REV	
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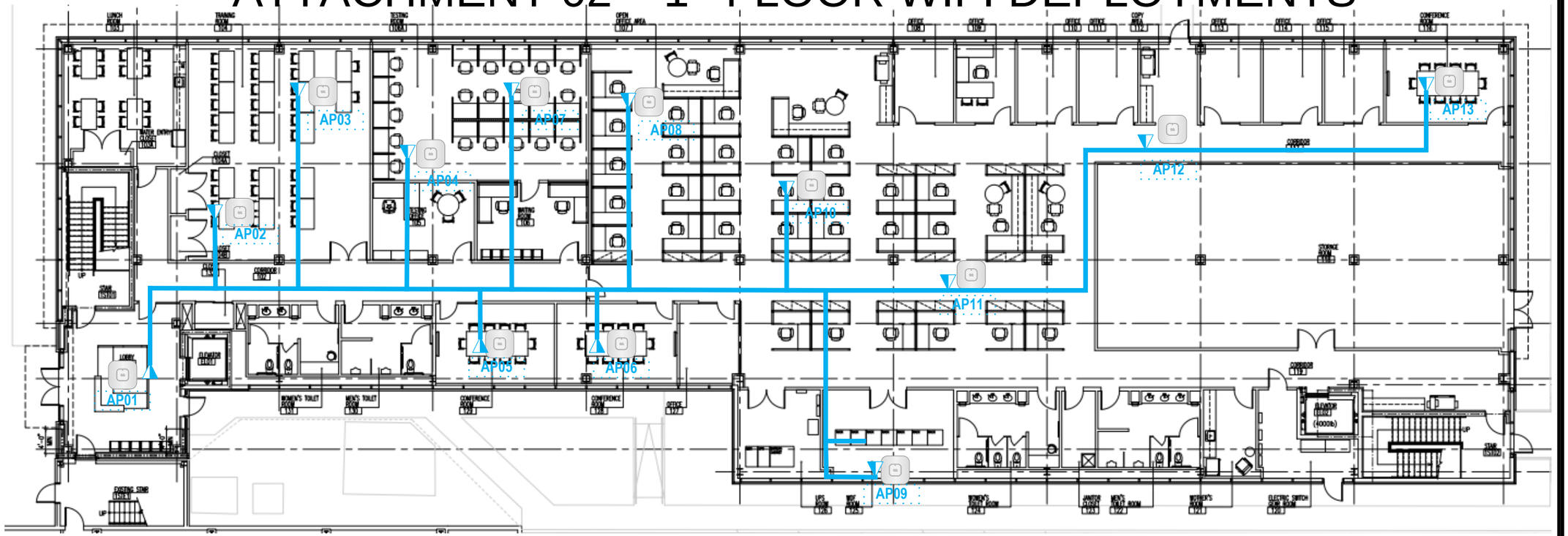
DRAWING TYPE: -	SHEET: 3 OF 3

ATTACHMENT 02 – 1st FLOOR WIFI DEPLOYMENTS



Legend

- CAT 6A Pathways
- CAT 6A Duplex Drop
- WiFi Access Point (13 Total)

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DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

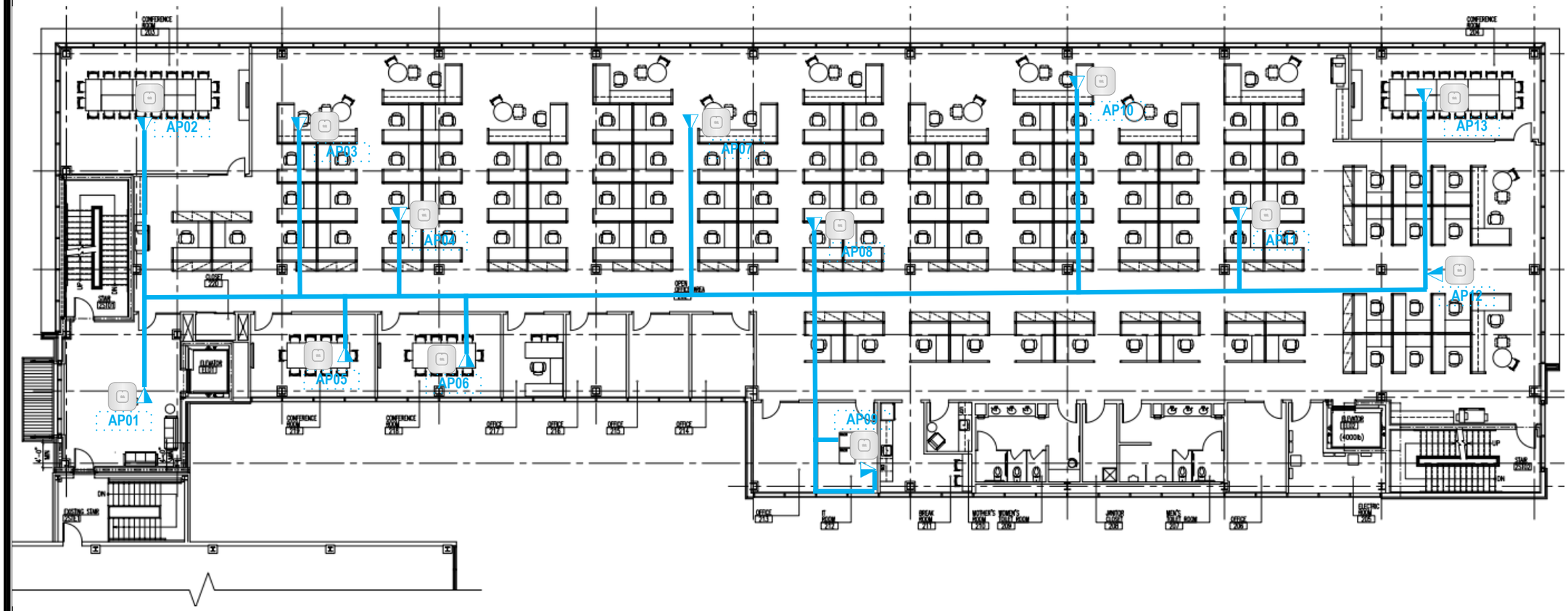
SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 1 OF 3

ATTACHMENT 02 – 2nd FLOOR WIFI DEPLOYMENTS



Legend

- CAT 6A Pathways
- CAT 6A Duplex Drop
- WiFi Access Point (13 Total)

REVISION NOTES		
REV:	DATE:	REVISED BY:
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REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

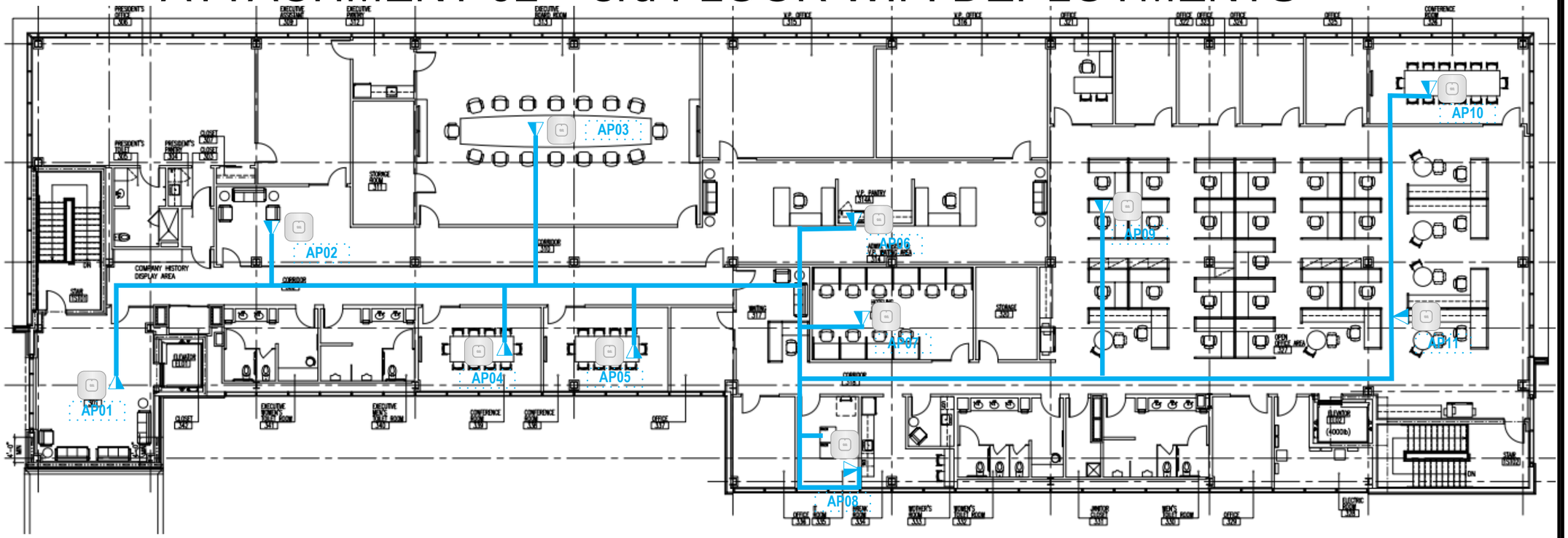
PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:		DRAWN BY: Devito, Ronald James
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 2 OF 3

ATTACHMENT 02 – 3rd FLOOR WIFI DEPLOYMENTS



Legend

- CAT 6A Pathways
- CAT 6A Duplex Drop
- WiFi Access Point (11 Total)

REVISION NOTES

REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER -

PROJECT MGR. TEL No. -

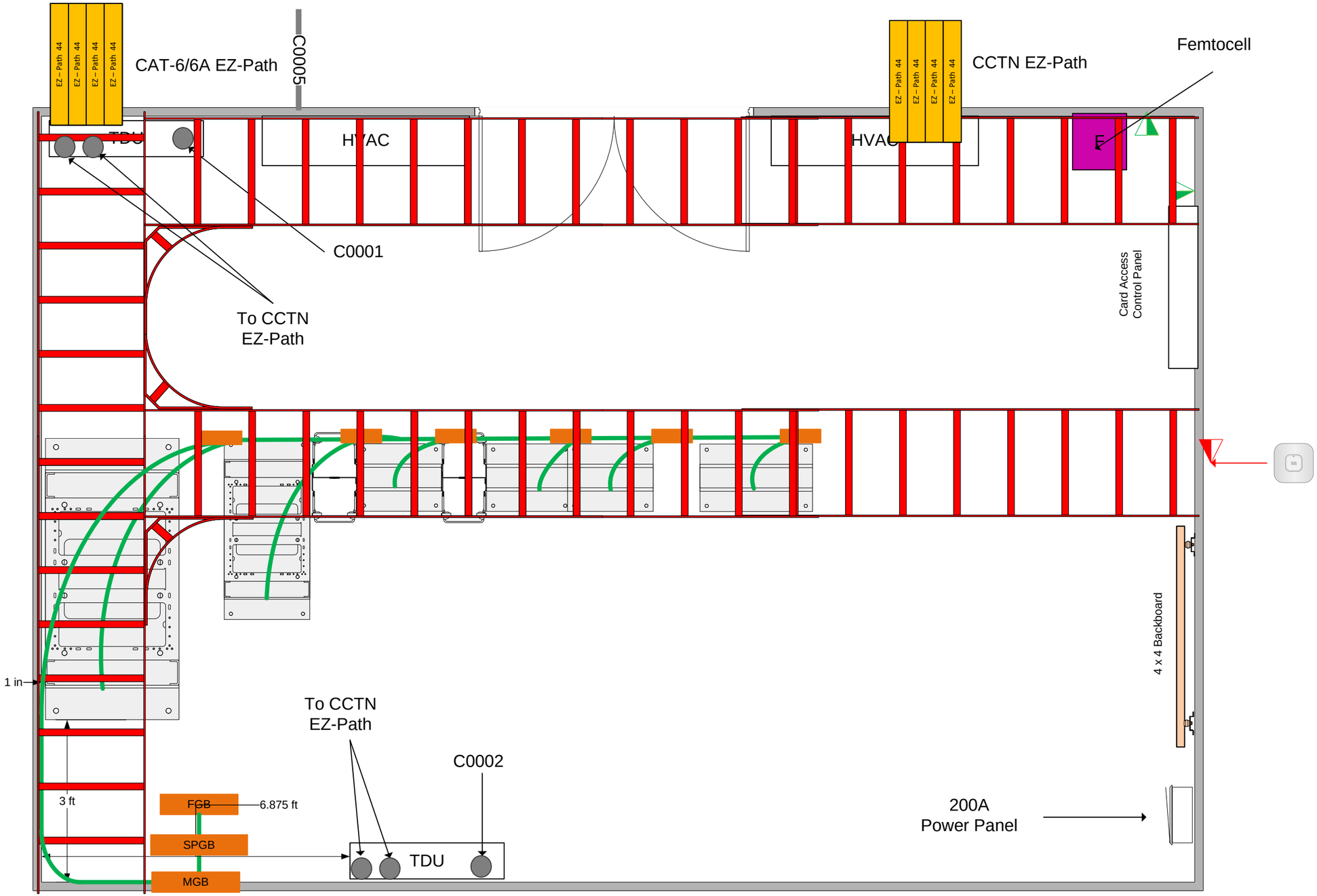
SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 3 OF 3

ATTACHMENT 03 – 1st FLOOR COMM ROOM LAYOUT



REVISION NOTES		
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REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:

conEdison
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New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

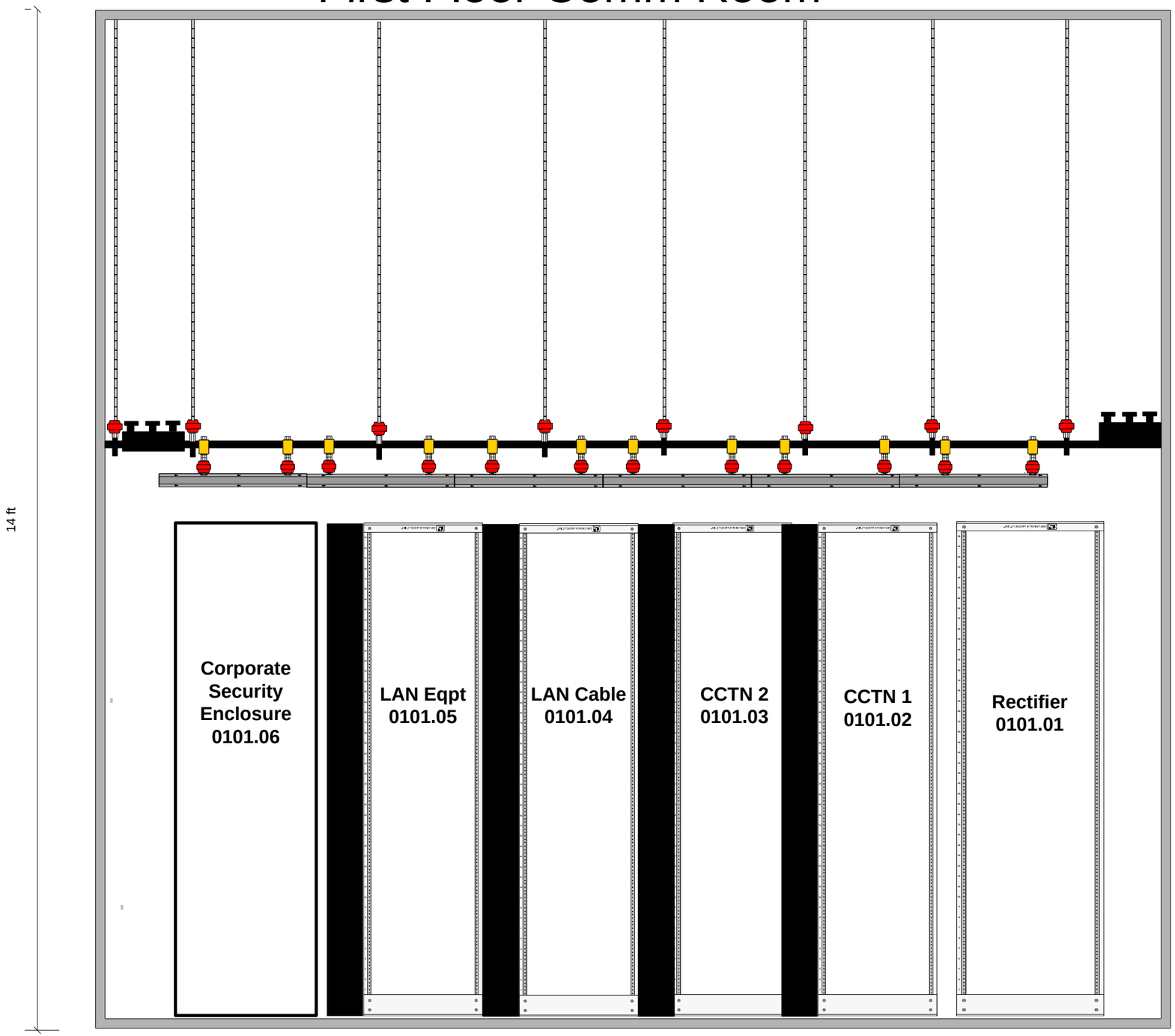
SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 1 OF 3

ATTACHMENT 03 – Equipment Power
First Floor Comm Room



REVISION NOTES		
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REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:
REV:	DATE:	REVISED BY:

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New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

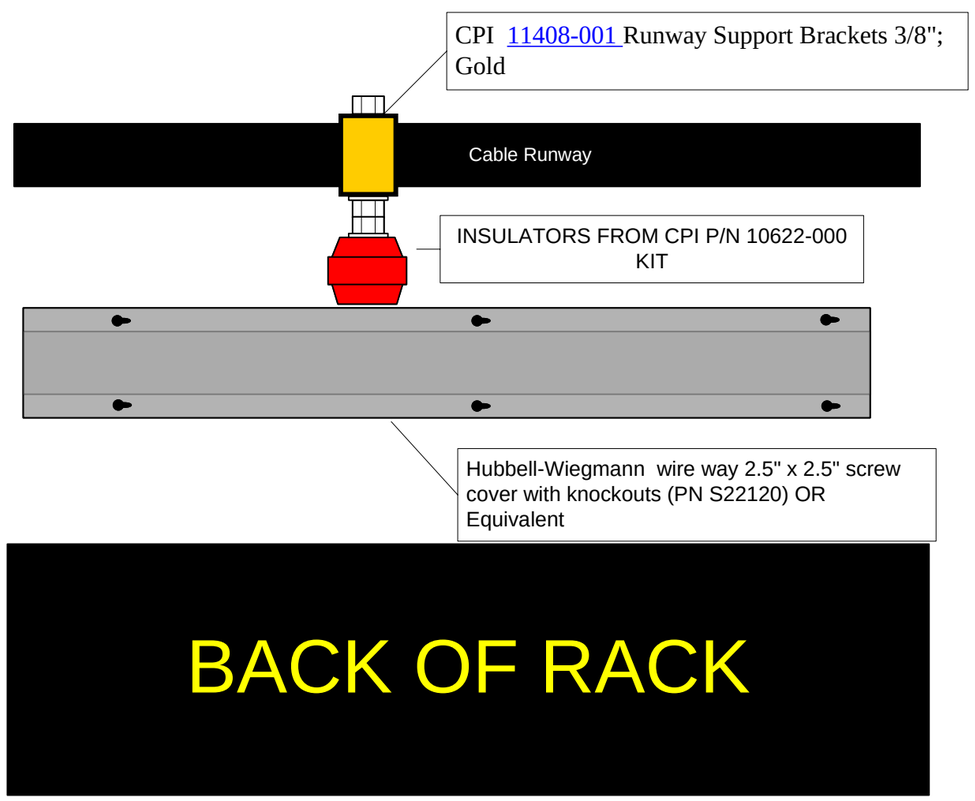
PROJECT MGR. TEL No.
-

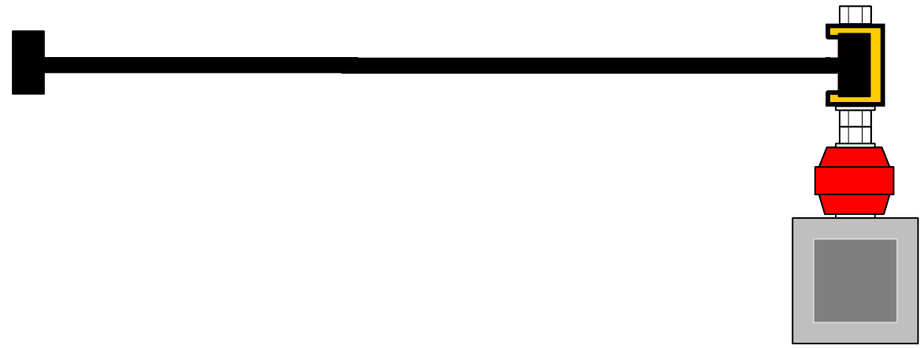
SITE LOCATION:
R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 2 OF 3

ATTACHMENT 03 – POWER RACEWAY DETAIL





(BACK)

REVISION NOTES

REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER -

PROJECT MGR. TEL No. -

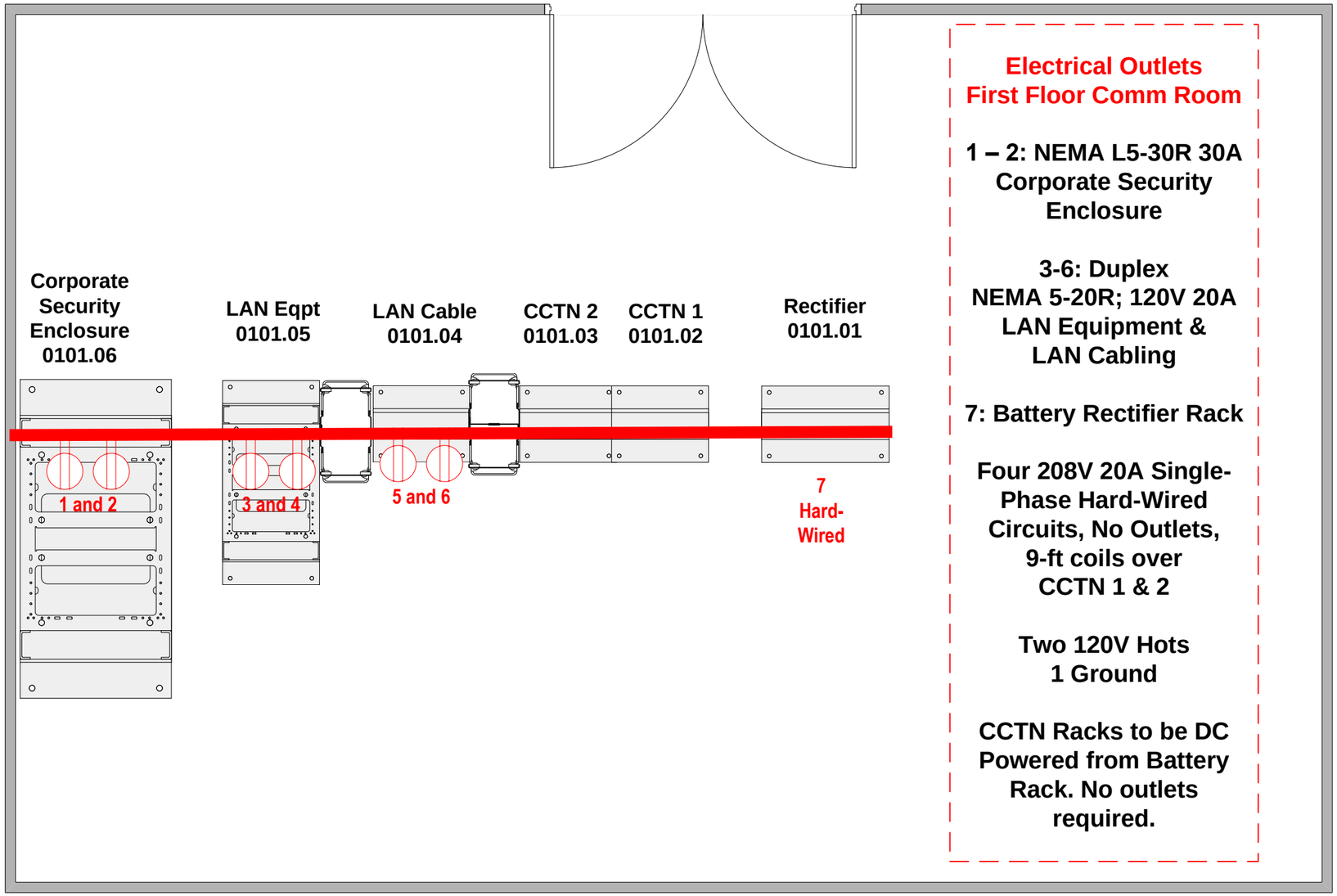
SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 3 OF 3

ATTACHMENT 03 – 1st FLOOR COMM ROOM POWER OUTLETS



Electrical Outlets
First Floor Comm Room

1 – 2: NEMA L5-30R 30A
Corporate Security Enclosure

3-6: Duplex
NEMA 5-20R; 120V 20A
LAN Equipment & LAN Cabling

7: Battery Rectifier Rack

Four 208V 20A Single-Phase Hard-Wired Circuits, No Outlets, 9-ft coils over CCTN 1 & 2

Two 120V Hots
1 Ground

CCTN Racks to be DC Powered from Battery Rack. No outlets required.

REVISION NOTES

REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

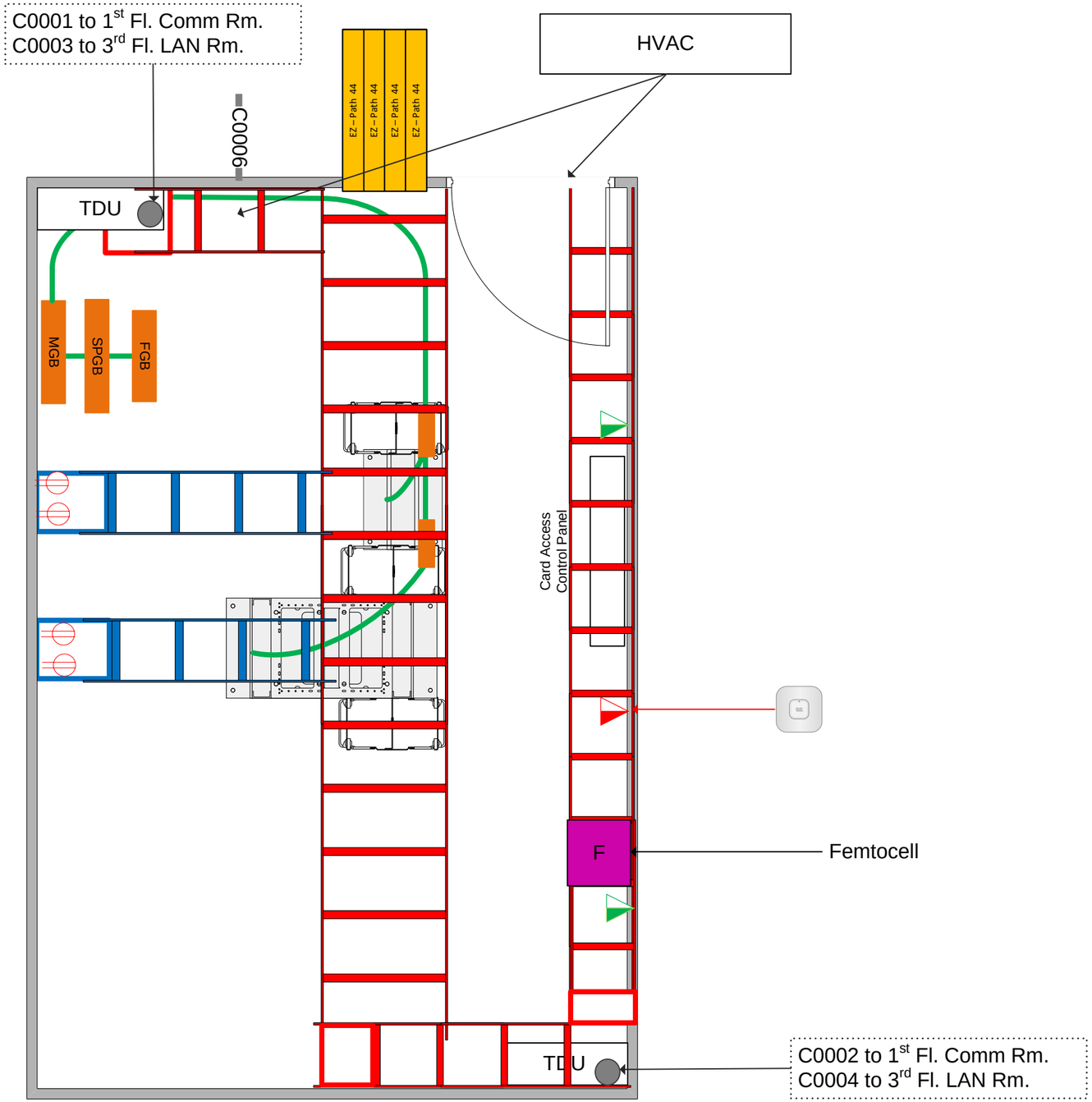
PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 05/22/2025	REVISION No. REV 2
FILE NAME:		
		SHEET: 4 OF 3

ATTACHMENT 03 – 2nd FLOOR LAN ROOM LAYOUT



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REV:	DATE:	REVISED BY:

conEdison
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New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER

-

PROJECT MGR. TEL No.

-

SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

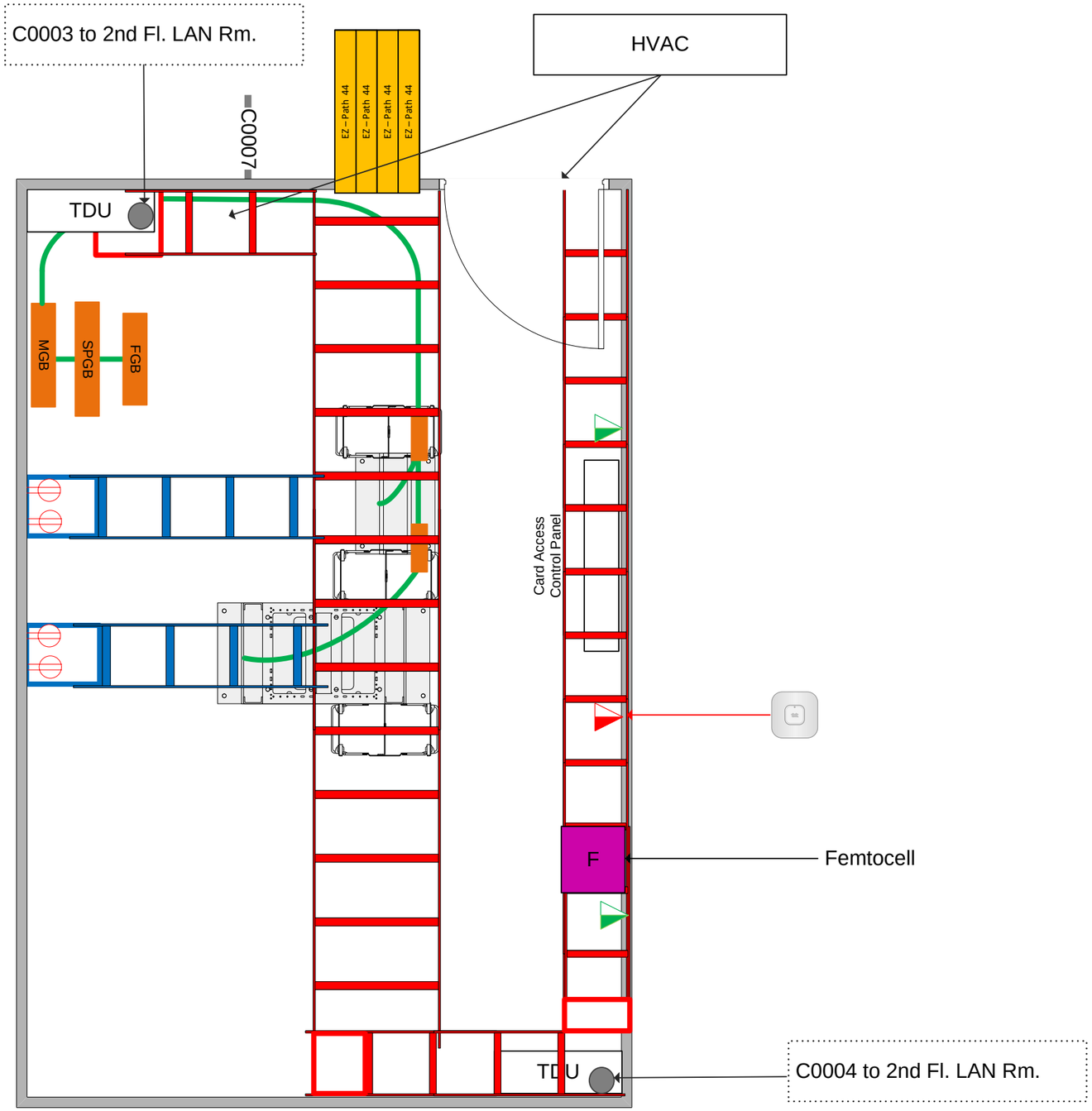
JOB NUMBER:	DRAWN BY:
	Devito, Ronald James

SCALE:	DATE:	REVISION No.
.25" = 1'	02/18/2025	REV 1

FILE NAME:

SHEET: 5 OF 3

ATTACHMENT 03 – 3rd FLOOR LAN ROOM LAYOUT



REVISION NOTES

REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

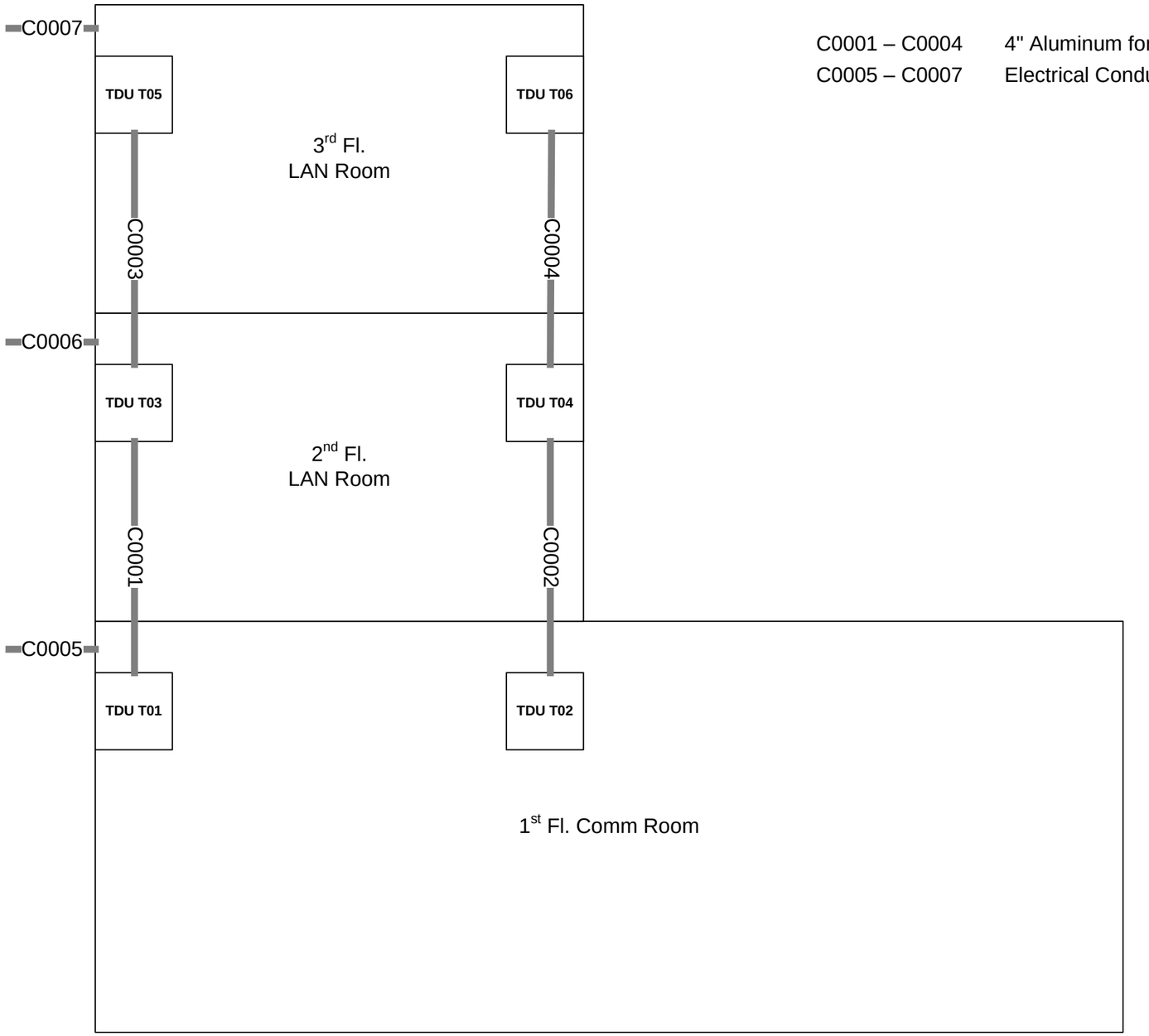
SITE LOCATION:

R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James
SCALE: .25" = 1'	DATE: 02/18/2025
REVISION No. REV 1	
FILE NAME:	
	SHEET: 6 OF 3

ATTACHMENT 03 – CONDUIT SCHEDULE



C0001 – C0004	4" Aluminum for Fiber Risers
C0005 – C0007	Electrical Conduits for Room Circuits

REVISION NOTES

REV:	DATE:	REVISED BY:

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:
IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – Spring Valley Operations Center

WORK DESCRIPTION:

JOB NUMBER:	DRAWN BY: Devito, Ronald James	
SCALE: .25" = 1'	DATE: 02/18/2025	REVISION No. REV 1
FILE NAME:		
		SHEET: 7 OF 3

ATTACHMENT 04 - 1ST Floor Comm Room Rack Elevations

R6 - CORPORATE SECURITY 30" WIDE DVR ENCLOSURE

45		45
44		44
43		43
42		42
41		41
40		40
39		39
38		38
37		37
36		36
35		35
34		34
33		33
32		32
31		31
30		30
29		29
28		28
27		27
26		26
25		25
24		24
23		23
22		22
21		21
20		20
19		19
18		18
17		17
16		16
15		15
14		14
13		13
12		12
11		11
10		10
09		09
08		08
07		07
06		06
05		05
04		04
03		03
02		02
01		01

R6 - CORPORATE SECURITY 30" WIDE DVR ENCLOSURE

RR #0101.06

R5 - LAN EQUIPMENT RACK 4-Post 19"

45	Copper Buss Bar (rear of rack)	45
44		44
43	Schneider Electric NetBotz 250A	43
42	Schneider Electric AP4450	42
41	Siemon 1U Blank panel	41
40	Cisco 9500	40
39	CPI 30139-719 - 1U Wire Manager	39
38	Cisco C9200L-48P-4G LAN 1 Switch 1	38
37	CPI 30139-719 - 1U Wire Manager	37
36	Cisco C9200L-48P-4G LAN 1 Switch 2	36
35	CPI 30139-719 - 1U Wire Manager	35
34	Cisco C9200L-48P-4G LAN 1 Switch 3	34
33	CPI 30139-719 - 1U Wire Manager	33
32	Cisco C9200L-48P-4G LAN 2 Switch 1	32
31	CPI 30139-719 - 1U Wire Manager	31
30	Cisco C9200L-48P-4G LAN 2 Switch 2	30
29	CPI 30139-719 - 1U Wire Manager	29
28	Cisco C9200L-48P-4G LAN 2 Switch 3	28
27	CPI 30139-719 - 1U Wire Manager	27
26	Cisco C9200L-48P-4G Corp Sec	26
25	CPI 30139-719 - 1U Wire Manager	25
24	Siemon 2U Blank panel	24
23		23
22	Siemon 3U Blank panel	22
21		21
20		20
19	Siemon 3U Blank panel	19
18		18
17		17
16	Siemon 3U Blank panel	16
15		15
14		14
13	Siemon 3U Blank panel	13
12		12
11		11
10	AP7800B PDU 1	10
09	AP7800B PDU 2	09
08	APC SRT2200RMXLA	08
07		07
06	SRT72RMBP	06
05		05
04	APC SRT2200RMXLA	04
03		03
02	SRT72RMBP	02
01		01

R5 - LAN EQUIPMENT RACK 4-Post 19"

RR #0101.05

R4 - LAN CABLING RACK 2-Post 19"

45	Copper Buss Bar (rear of rack)	45
44		44
43	Fiber Tray PCH-04U	43
42		42
41		41
40		40
39	Siemon 1U Blank panel	39
38	Siemon MAX-PNL-48	38
37	Wireless AP CAT 6A Drops 1-12	37
36	CPI 30139-719 - 1U Wire Manager	36
35	Siemon MAX-PNL-48	35
34	Corp. Sec. CAT 6 Drops 1 - 17	34
33	Siemon 1U Blank panel	33
32	Siemon MAX-PNL-72	32
31	Work Area CAT 6 Drops 1-36	31
30	CPI 30139-719 - 1U Wire Manager	30
29	Siemon MAX-PNL-72	29
28	Work Area CAT 6 Drops 37-72	28
27	CPI 30139-719 - 1U Wire Manager	27
26	Siemon MAX-PNL-72	26
25	Work Area CAT 6 Drops 73-108	25
24	CPI 30139-719 - 1U Wire Manager	24
23	Siemon MAX-PNL-72	23
22	Work Area CAT 6 Drops 109-124	22
21	Siemon 1U Blank panel	21
20	Siemon 3U Blank panel	20
19		19
18		18
17	Siemon 3U Blank panel	17
16		16
15		15
14	Siemon 3U Blank panel	14
13		13
12		12
11	Siemon 3U Blank panel	11
10		10
09		09
08	Siemon 3U Blank panel	08
07		07
06		06
05	Siemon 3U Blank panel	05
04		04
03		03
02	Siemon 2U Blank panel	02
01		01

R4 - LAN CABLING RACK 2-Post 19"

RR #0101.04

R3 - CTTN Rack 2 2-Post 19"

45	Copper Buss Bar (rear of rack)	45
44		44
43	Telect Fuse Alarm Panel	43
42		42
41	Sumitomo FT-9-288XFQX2U	41
40		40
39	Reserved for Future Sumitomo FT-9-288XFQX2U	39
38		38
37	Reserved for Future Sumitomo FT-9-288XFQX2U	37
36		36
35		35
34	Cisco NCS-2006	34
33		33
32		32
31	Cisco ONS 15216	31
30		30
29		29
28	Cisco NCS2K-MF-1RU=	28
27		27
26	Nokia SAR 7705-18	26
25		25
24		24
23		23
22		22
21		21
20		20
19		19
18		18
17		17
16		16
15		15
14	ADC Di-M2GU1	14
13		13
12		12
11		11
10		10
09	NetGuardian-864G5	09
08		08
07		07
06		06
05		05
04		04
03		03
02		02
01		01

R3 - CCTN RACK 2 2-Post 19"

RR #0101.03

R2 - CCTN Rack 1 2-Post 19"

45	Copper Buss Bar (rear of rack)	45
44		44
43	Telect Fuse Alarm Panel	43
42		42
41	Sumitomo FT-9-288XFQX2U	41
40		40
39	Reserved for Future Sumitomo FT-9-288XFQX2U	39
38		38
37	Reserved for Future Sumitomo FT-9-288XFQX2U	37
36		36
35		35
34	Cisco NCS-2006	34
33		33
32		32
31	Cisco ONS 15216	31
30		30
29		29
28	Cisco NCS2K-MF-1RU=	28
27		27
26	Nokia SAR 7705-18	26
25		25
24		24
23		23
22		22
21		21
20		20
19		19
18		18
17		17
16		16
15		15
14	ADC Di-M2GU1	14
13		13
12		12
11		11
10		10
09		09
08		08
07		07
06		06
05		05
04		04
03		03
02		02
01		01

R2 - CCTN RACK 1 2-Post 19"

RR #0101.02

R1 - DC Powerplant / Battery Rack 2-Post 23"

45	Copper Buss Bar (rear of rack)	45
44		44
43		43
42		42
41	CXPS-E3 Power System 0919006-002	41
40		40
39		39
38	Cordex 2.4kW Rectifier Module 0100003-001	38
37		37
36		36
35		35
34		34
33		33
32		32
31	100 AH shelf 4	31
30		30
29		29
28		28
27		27
26		26
25		25
24		24
23	100 AH shelf 3	23
22		22
21		21
20		20
19		19
18		18
17		17
16	100 AH shelf 2	16
15		15
14		14
13		13
12		12
11		11
10		10
09		09
08		08
07	100 AH shelf 1	07
06		06
05		05
04		04
03		03
02		02
01		01

R1 - DC Powerplant / Battery Rack 2-Post 23"

RR #0101.01

Items shown in green shall be supplied and installed by the LAN Cabling Contractor.

Items Shown in yellow shall be supplied by Con Ed and Installed by the LAN Cabling Contractor.

Items shown in red shall be supplied and installed by the Corporate Security Contractor.

Items shown in orange shall be supplied and installed by ConEd and the CCTN Contractor.

ATTACHMENT 04 - 2nd Floor LAN Room Rack Elevations

R2 - LAN EQUIPMENT RACK		
45	Copper Buss Bar (rear of rack)	45
44		44
43	Schneider Electric NetBotz 250A	43
42	Schneider Electric AP4450	42
41	Siemon 1U Blank panel	41
40	Cisco C9200L-48P-4G LAN 1 Switch 1	40
39	CPI 30139-719 - 1U Wire Manager	39
38	Cisco C9200L-48P-4G LAN 1 Switch 2	38
37	CPI 30139-719 - 1U Wire Manager	37
36	Cisco C9200L-48P-4G LAN 1 Switch 3	36
35	CPI 30139-719 - 1U Wire Manager	35
34	Cisco C9200L-48P-4G LAN 2 Switch 1	34
33	CPI 30139-719 - 1U Wire Manager	33
32	Cisco C9200L-48P-4G LAN 2 Switch 2	32
31	CPI 30139-719 - 1U Wire Manager	31
30	Cisco C9200L-48P-4G LAN 2 Switch 3	30
29	CPI 30139-719 - 1U Wire Manager	29
28	Cisco C9200L-48P-4G Corp Sec	28
27	CPI 30139-719 - 1U Wire Manager	27
26	Siemon 3U Blank panel	26
25		25
24		24
23	Siemon 3U Blank panel	23
22		22
21		21
20	Siemon 3U Blank panel	20
19		19
18		18
17	Siemon 3U Blank panel	17
16		16
15		15
14	Siemon 3U Blank panel	14
13		13
12		12
11	Siemon 1U Blank panel	11
10	AP7800B PDU 1	10
09	AP7800B PDU 2	09
08	APC SRT2200RMXLA	08
07		07
06	SRT72RMBP	06
05		05
04	APC SRT2200RMXLA	04
03		03
02	SRT72RMBP	02
01		01
R2 - LAN EQUIPMENT RACK		

RR #0201.02

R1 - LAN CABLING RACK		
45	Copper Buss Bar (rear of rack)	45
44		44
43	Fiber Tray CCH-04U	43
42		42
41		41
40		40
39	Siemon 1U Blank panel	39
38	Siemon MAX-PNL-48 Wireless AP CAT 6A Drops 1-12	38
37		37
36	CPI 30139-719 - 1U Wire Manager	36
35	Siemon MAX-PNL-48 Corp. Sec. CAT 6 Drops 1 - 9	35
34		34
33	Siemon MAX-PNL-72 Work Area CAT 6 Drops 1-36	33
32		32
31	CPI 30139-719 - 1U Wire Manager	31
30	Siemon MAX-PNL-72 Work Area CAT 6 Drops 37-72	30
29		29
28	CPI 30139-719 - 1U Wire Manager	28
27	Siemon MAX-PNL-72 Work Area CAT 6 Drops 73-108	27
26		26
25	CPI 30139-719 - 1U Wire Manager	25
24	Siemon MAX-PNL-72 Work Area CAT 6 Drops 109-144	24
23		23
22	CPI 30139-719 - 1U Wire Manager	22
21	Siemon MAX-PNL-72 Work Area CAT 6 Drops 145-146	21
20		20
19	CPI 30139-719 - 1U Wire Manager	19
18	Siemon 3U Blank panel	18
17		17
16		16
15	Siemon 3U Blank panel	15
14		14
13		13
12	Siemon 3U Blank panel	12
11		11
10		10
09	Siemon 3U Blank panel	09
08		08
07		07
06	Siemon 3U Blank panel	06
05		05
04		04
03	Siemon 3U Blank panel	03
02		02
01		01
R1 - LAN CABLING RACK		

RR #0201.01

Items shown in green shall be supplied and installed by the LAN Cabling Contractor.

Items Shown in yellow shall be supplied by Con Ed and Installed by the LAN Cabling Contractor.

ATTACHMENT 04 - 3rd Floor LAN Room Rack Elevations

R2 - LAN EQUIPMENT RACK		
45	Copper Buss Bar (rear of rack)	45
44		44
43	Schneider Electric NetBotz 250A	43
42	Schneider Electric AP4450	42
41	Siemon 1U Blank panel	41
40	Cisco C9200L-48P-4G LAN 1 Switch 1	40
39	CPI 30139-719 - 1U Wire Manager	39
38	Cisco C9200L-48P-4G LAN 1 Switch 2	38
37	CPI 30139-719 - 1U Wire Manager	37
36	Cisco C9200L-48P-4G LAN 1 Switch 3	36
35	CPI 30139-719 - 1U Wire Manager	35
34	Cisco C9200L-48P-4G LAN 2 Switch 1	34
33	CPI 30139-719 - 1U Wire Manager	33
32	Cisco C9200L-48P-4G LAN 2 Switch 2	32
31	CPI 30139-719 - 1U Wire Manager	31
30	Cisco C9200L-48P-4G LAN 2 Switch 3	30
29	CPI 30139-719 - 1U Wire Manager	29
28	Cisco C9200L-48P-4G Corp Sec	28
27	CPI 30139-719 - 1U Wire Manager	27
26	Siemon 3U Blank panel	26
25		25
24		24
23	Siemon 3U Blank panel	23
22		22
21		21
20	Siemon 3U Blank panel	20
19		19
18		18
17	Siemon 3U Blank panel	17
16		16
15		15
14	Siemon 3U Blank panel	14
13		13
12		12
11	Siemon 1U Blank panel	11
10	AP7800B PDU 1	10
09	AP7800B PDU 2	09
08	APC SRT2200RMXLA	08
07		07
06	SRT72RMBP	06
05		05
04	APC SRT2200RMXLA	04
03		03
02	SRT72RMBP	02
01		01
R2 - LAN EQUIPMENT RACK		

RR #0301.02

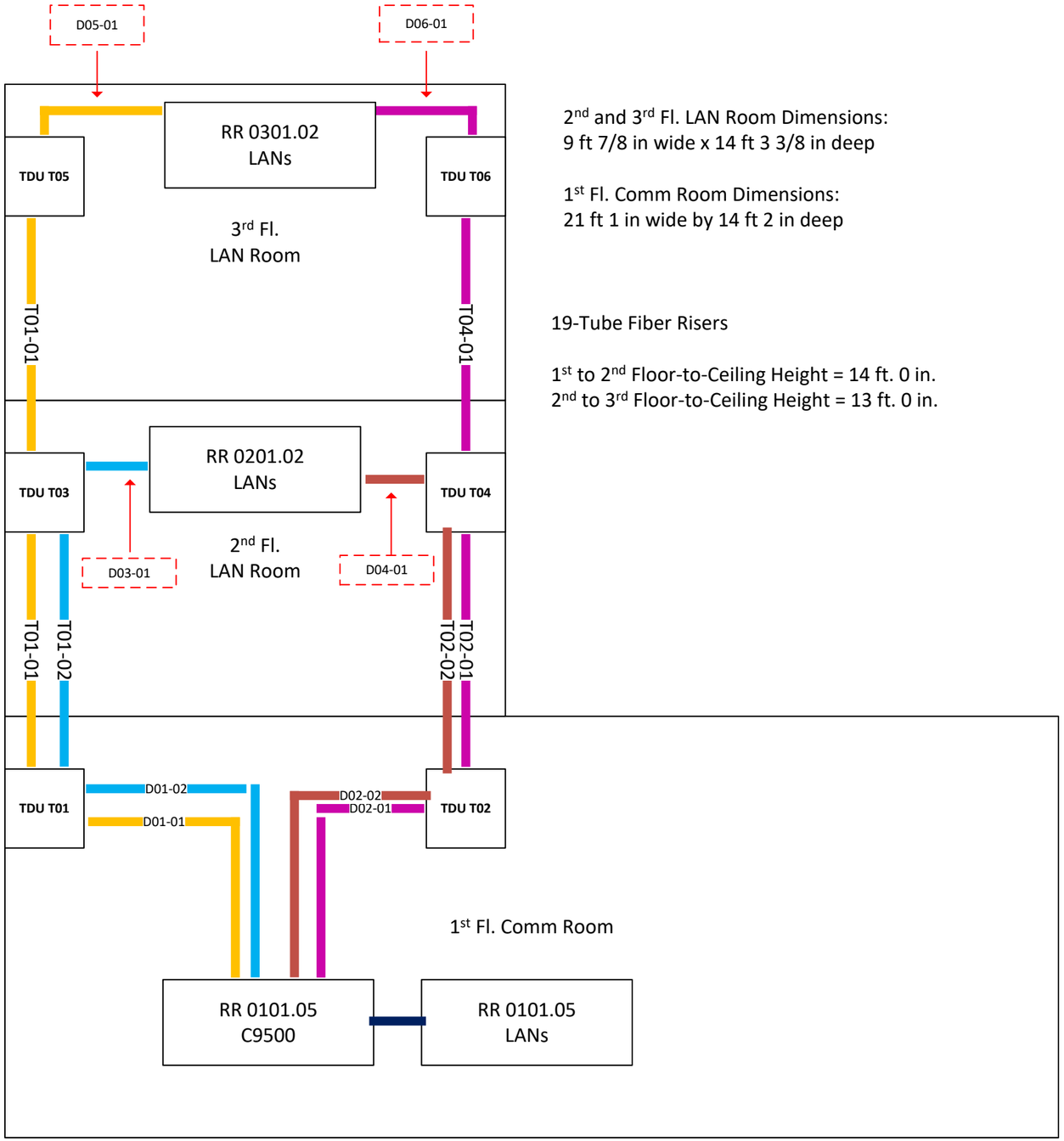
R1 - LAN CABLING RACK		
45	Copper Buss Bar (rear of rack)	45
44		44
43	Fiber Tray CCH-04U	43
42		42
41		41
40		40
39	Siemon 1U Blank panel	39
38	Siemon MAX-PNL-48 Wireless AP Cat 6A Drops 1-12	38
37		37
36	CPI 30139-719 - 1U Wire Manager	36
35	Siemon MAX-PNL-48 Corp. Sec. CAT 6 Drops 1 - 23	35
34		34
33	CPI 30139-719 - 1U Wire Manager	33
32	Siemon MAX-PNL-72 Work Area CAT 6 Drops 1-36	32
31		31
30	CPI 30139-719 - 1U Wire Manager	30
29	Siemon MAX-PNL-72 Work Area CAT 6 Drops 37-72	29
28		28
27	CPI 30139-719 - 1U Wire Manager	27
26	Siemon MAX-PNL-72 Work Area CAT 6 Drops 73-100	26
25		25
24	CPI 30139-719 - 1U Wire Manager	24
23	Siemon 3U Blank panel	23
22		22
21		21
20	Siemon 3U Blank panel	20
19		19
18		18
17	Siemon 3U Blank panel	17
16		16
15		15
14	Siemon 3U Blank panel	14
13		13
12		12
11	Siemon 3U Blank panel	11
10		10
09		09
08	Siemon 3U Blank panel	08
07		07
06		06
05	Siemon 3U Blank panel	05
04		04
03		03
02	Siemon 2U Blank panel	02
01		01
R1 - LAN CABLING RACK		

RR #0301.01

Items shown in green shall be supplied and installed by the LAN Cabling Contractor.

Items Shown in yellow shall be supplied by Con Ed and Installed by the LAN Cabling Contractor.

ATTACHMENT 05 – LAN Fiber Ties



2nd and 3rd Fl. LAN Room Dimensions:
9 ft 7/8 in wide x 14 ft 3 3/8 in deep

1st Fl. Comm Room Dimensions:
21 ft 1 in wide by 14 ft 2 in deep

19-Tube Fiber Risers

1st to 2nd Floor-to-Ceiling Height = 14 ft. 0 in.
2nd to 3rd Floor-to-Ceiling Height = 13 ft. 0 in.

Direct Patch to C9500

Fiber Bundle FB1

Fiber Bundle FB2

Fiber Bundle FB3

Fiber Bundle FB4

D01 – D06 Tube Cables Between Cabling Racks and TDUs.

T01 – T04 – 19-Tube Fiber Riser

RR Relay Rack. Numbers Right to Left

REVISION NOTES

REV: 1	DATE: -	REVISED BY: -
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REV: 3	DATE: -	REVISED BY: -
REV: 4	DATE: -	REVISED BY: -
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REV: 8	DATE: -	REVISED BY: -
REV: 9	DATE: -	REVISED BY: -
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DEPARTMENT:
IT Communications & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – Spring Valley Operations Center Building Expansion

WORK DESCRIPTION:
-

JOB NUMBER:

DRAWN BY: Ron Devito

SCALE: N.T.S.

DATE: 03/11/2025

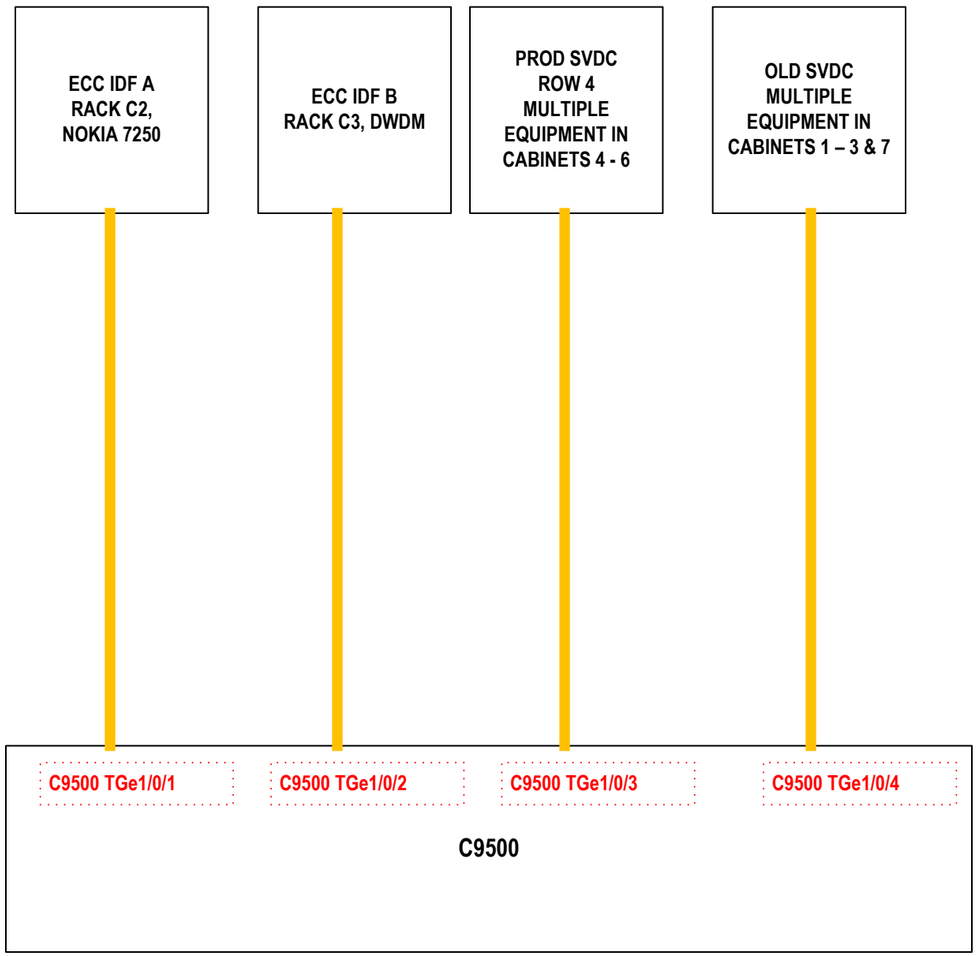
REVISION No. REV 1

FILE NAME:
-

DRAWING TYPE:
-

SHEET: 1 OF 3

ATTACHMENT 05 – C9500 Backbone Connections



LEGEND

C9500 Fiber Circuit Connection

REVISION NOTES

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REV: 2	DATE: -	REVISED BY: -
REV: 3	DATE: -	REVISED BY: -
REV: 4	DATE: -	REVISED BY: -
REV: 5	DATE: -	REVISED BY: -
REV: 6	DATE: -	REVISED BY: -
REV: 7	DATE: -	REVISED BY: -
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DEPARTMENT:
IT
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&
Site Design
(IT-CISD)

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NETWORK ENG. TEL No.

PROJECT MANAGER
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PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 – Spring Valley
Operations Center
Building Expansion

WORK DESCRIPTION:

JOB NUMBER:

DRAWN BY:
Ron Devito

SCALE: N.T.S.

DATE: 03/11/2025

REVISION No. REV 1

FILE NAME:
-

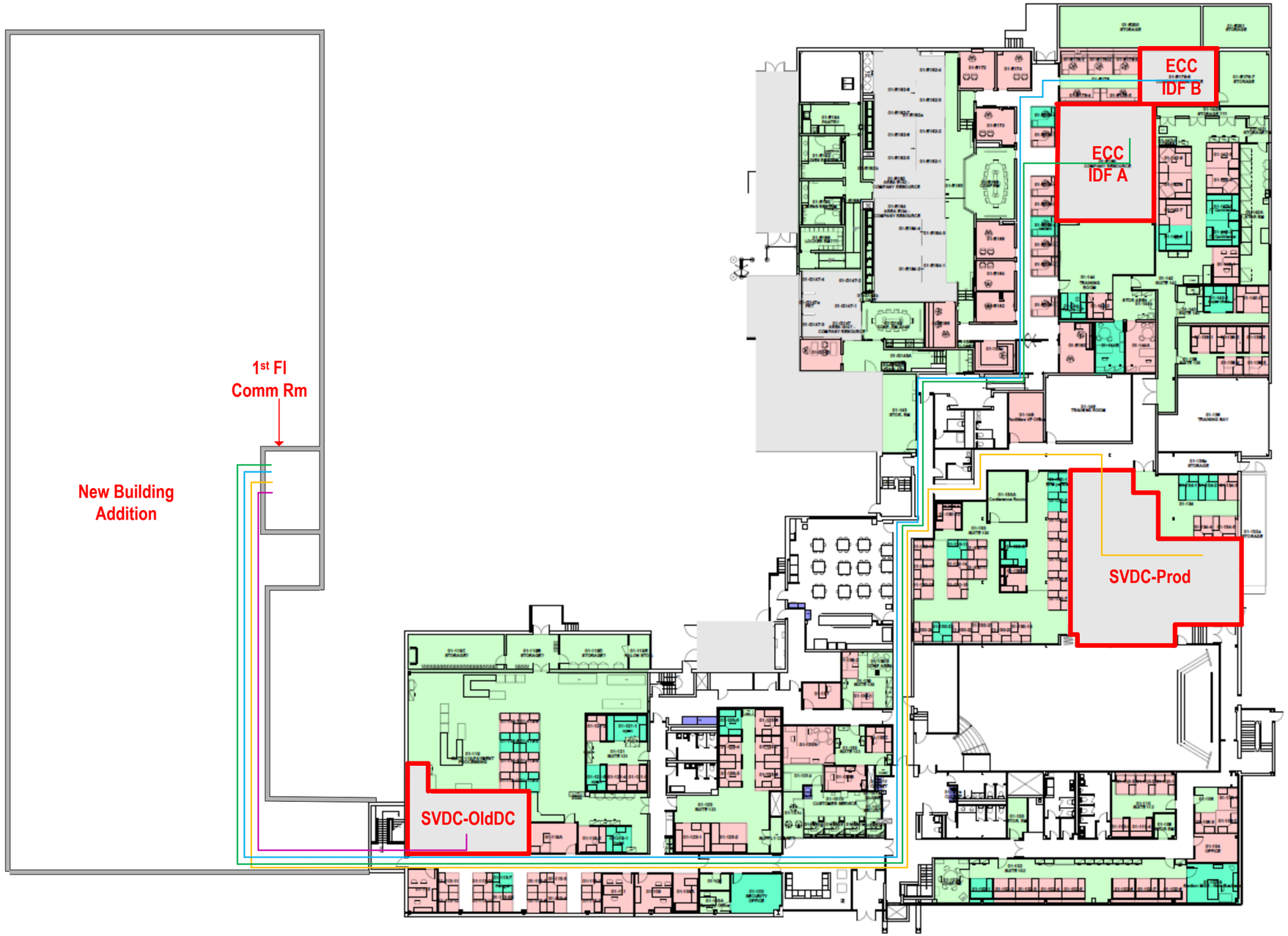
DRAWING TYPE:
-

SHEET: 2 OF 3

ATTACHMENT 05 – CCTN Fiber Tie Routes

T05 – T08
19-Tube CCTN Fiber Ties

- T-05
- T-06
- T-07
- T-08



REVISION NOTES			
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REV: 5	DATE: -	REVISED BY: -	-
REV: 6	DATE: -	REVISED BY: -	-
REV: 7	DATE: -	REVISED BY: -	-
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DEPARTMENT:
IT Communications & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

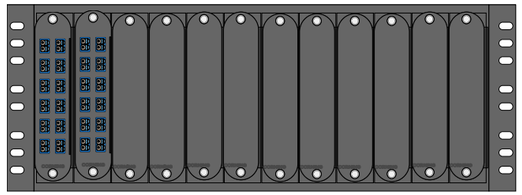
PROJECT MGR. TEL No.
-

SITE LOCATION:
- R900 – Spring Valley
- Operations Center
- Building Expansion

WORK DESCRIPTION:
-
-

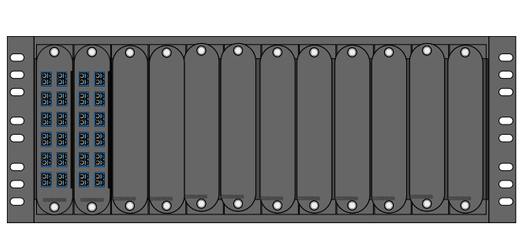
JOB NUMBER:	DRAWN BY: Ron Devito	
SCALE: N.T.S.	DATE: 03/27/2025	REVISION No. REV 1
FILE NAME: -		
DRAWING TYPE: -		SHEET: 3 OF 3

ATTACHMENT 06 – LAN FIBER TRAY LAYOUT AND LABELING



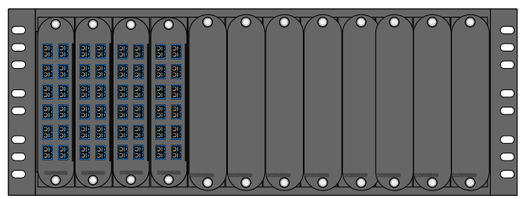
3RD Fl. LAN Room R2 T1

COL A: 24-STRAND SM FIBER INTERNAL RTE 1 TO 1st Fl Comm ROOM R4-T1-COL A
COL B: 24-STRAND SM FIBER INTERNAL RTE 2 TO 1st Fl Comm ROOM R4-T1-COL B



2nd Fl. LAN Room R2 T1

COL A: 24-STRAND SM FIBER INTERNAL RTE 1 TO 1st Fl Comm ROOM R4-T1-COL C
COL B: 24-STRAND SM FIBER INTERNAL RTE 2 TO 1st Fl Comm ROOM R4-T1-COL D



1st Fl. Comm Room R4 T1

COL A: 24-STRAND SM FIBER INTERNAL RTE 1 TO 3rd Fl LAN ROOM R2-T1-COL A
COL B: 24-STRAND SM FIBER INTERNAL RTE 2 TO 3rd Fl LAN ROOM R2-T1-COL B
COL C: 24-STRAND SM FIBER INTERNAL RTE 1 TO 2nd Fl LAN ROOM R2-T1-COL A
COL D: 24-STRAND SM FIBER INTERNAL RTE 2 TO 2nd Fl LAN ROOM R2-T1-COL B

REVISION NOTES

REV:	1	DATE:	-	REVISED BY:	-
REV:	2	DATE:	-	REVISED BY:	-
REV:	3	DATE:	-	REVISED BY:	-
REV:	4	DATE:	-	REVISED BY:	-
REV:	5	DATE:	-	REVISED BY:	-
REV:	6	DATE:	-	REVISED BY:	-
REV:	7	DATE:	-	REVISED BY:	-
REV:	8	DATE:	-	REVISED BY:	-
REV:	9	DATE:	-	REVISED BY:	-
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DEPARTMENT:

IT Communications & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 Spring Valley Operations Center Building Expansion

WORK DESCRIPTION:
Attachment 06 - Fiber Tray Layout and Labeling

JOB NUMBER:	DRAWN BY: Ron Devito	
SCALE: N.T.S.	DATE: 03/11/2025	REVISION No. REV 1
FILE NAME: -		
DRAWING TYPE: -		SHEET: 1 OF 4

ATTACHMENT 06 – CCTN FIBER TRAY LAYOUT AND LABELING

Sumitomo FutureFlex FT-9-288XFQX2U Fiber Tray																							
144 Strand Fiber Circuit												144 Strand Fiber Circuit											
72 Strands						72 Strands						72 Strands						72 Strands					
A 1 - 12	B 13 - 24	C 25 - 36	D 37 - 48	E 49 - 60	F 61 - 72	G 73 - 84	H 85 - 96	I 97 - 108	J 109 - 120	K 121 - 132	L 133 - 144	M 1 - 12	N 13 - 24	O 25 - 36	P 37 - 48	Q 49 - 60	R 61 - 72	S 73 - 84	T 85 - 96	U 97 - 108	V 109 - 120	W 121 - 132	X 133 - 144

1st Fl Comm Room R2 T1

COLS A-L: 72-STRAND SM FIBER TO ECC-IDF-A-RACK B2-TRAY-5-COLS A-X
COLS M-X: 72-STRAND SM FIBER TO SVDC-PROD-ROW-4-CABINET-1-TRAY-4-COLS A-X

Sumitomo FutureFlex FT-9-288XFQX2U Fiber Tray																							
144 Strand Fiber Circuit												144 Strand Fiber Circuit											
72 Strands						72 Strands						72 Strands						72 Strands					
A 1 - 12	B 13 - 24	C 25 - 36	D 37 - 48	E 49 - 60	F 61 - 72	G 73 - 84	H 85 - 96	I 97 - 108	J 109 - 120	K 121 - 132	L 133 - 144	M 1 - 12	N 13 - 24	O 25 - 36	P 37 - 48	Q 49 - 60	R 61 - 72	S 73 - 84	T 85 - 96	U 97 - 108	V 109 - 120	W 121 - 132	X 133 - 144

1st Fl Comm Room R3 T1

COLS A-L: 72-STRAND SM FIBER TO ECC-IDF-B-RACK-B1-TRAY-6-COLS A-X
COLS M-X: 72-STRAND SM FIBER TO SVDC-OLDDC-CABINET-5-TRAY-4-COLS A-X

REVISION NOTES

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REV: 3	DATE: -	REVISED BY: -
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REV: 5	DATE: -	REVISED BY: -
REV: 6	DATE: -	REVISED BY: -
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DEPARTMENT:
IT Communications & Site Design (IT-CISD)

NETWORK ENGINEER:
NETWORK ENG. TEL No.
PROJECT MANAGER: -
PROJECT MGR. TEL No.: -

SITE LOCATION:
R900 Spring Valley Operations Center Building Expansion

WORK DESCRIPTION:
Attachment 06 - Fiber Tray Layout and Labeling

JOB NUMBER:	DRAWN BY: Ron Devito	
SCALE: N.T.S.	DATE: 04/07/2025	REVISION No. REV 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 2 OF 4

ATTACHMENT 06 – CCTN FIBER TRAY LAYOUT AND LABELING

Sumitomo FutureFlex FT-9-144XFQX1U Fiber Tray																							
144 Strand Fiber Circuit																							
72 Strands												72 Strands											
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
01 - 06	07 - 12	13 - 18	19 - 24	25 - 30	31 - 36	37 - 42	43 - 48	49 - 54	55 - 60	61 - 66	67 - 72	73 - 78	79 - 84	85 - 90	91 - 96	97 - 102	103 - 108	109 - 114	115 - 120	121 - 126	127 - 132	133 - 138	139 - 144

ECC IDF A RACK B2 TRAY 5

COLS A-X: 72-STRAND SM FIBER TO NEW BLDG 1ST FL COMM ROOM R2-T1-COLS A-L

Sumitomo FutureFlex FT-9-144XFQX1U Fiber Tray																							
144 Strand Fiber Circuit																							
72 Strands												72 Strands											
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
01 - 06	07 - 12	13 - 18	19 - 24	25 - 30	31 - 36	37 - 42	43 - 48	49 - 54	55 - 60	61 - 66	67 - 72	73 - 78	79 - 84	85 - 90	91 - 96	97 - 102	103 - 108	109 - 114	115 - 120	121 - 126	127 - 132	133 - 138	139 - 144

ECC IDF B RACK B1 TRAY 6

COLS A-X: 48-STRAND SM FIBER TO NEW BLDG 1ST FL COMM ROOM R3-T1-COLS A-L

REVISION NOTES

REV: 1	DATE: -	REVISED BY: -
REV: 2	DATE: -	REVISED BY: -
REV: 3	DATE: -	REVISED BY: -
REV: 4	DATE: -	REVISED BY: -
REV: 5	DATE: -	REVISED BY: -
REV: 6	DATE: -	REVISED BY: -
REV: 7	DATE: -	REVISED BY: -
REV: 8	DATE: -	REVISED BY: -
REV: 9	DATE: -	REVISED BY: -
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DEPARTMENT:
IT Communications & Site Design (IT-CISD)

NETWORK ENGINEER:

NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
R900 Spring Valley Operations Center Building Expansion

WORK DESCRIPTION:
Attachment 06 - Fiber Tray Layout and Labeling

JOB NUMBER:	DRAWN BY: Ron Devito	
SCALE: N.T.S.	DATE: 04/07/2025	REVISION No. REV 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 3 OF 4

ATTACHMENT 06 – CCTN FIBER TRAY LAYOUT AND LABELING

Sumitomo FutureFlex FT-9-144XFQX1U Fiber Tray																							
72 Strands												72 Strands											
A 01 - 06	B 07 - 12	C 13 - 18	D 19 - 24	E 25 - 30	F 31 - 36	G 37 - 42	H 43 - 48	I 49 - 54	J 55 - 60	K 61 - 66	L 67 - 72	M 73 - 78	N 79 - 84	O 85 - 90	P 91 - 96	Q 97 - 102	R 103 - 108	S 109 - 114	T 115 - 120	U 121 - 126	V 127 - 132	W 133 - 138	X 139 - 144

COLS A-X: 72-STRAND SM TO NEW BLDG 1ST FL COMM ROOM R2-T1-COLS M-X

SVDC PROD ROW 4, CABINET 1 TRAY 4

Sumitomo FutureFlex FT-9-144XFQX1U Fiber Tray																							
144 Strand Fiber Circuit																							
72 Strands												72 Strands											
A 01 - 06	B 07 - 12	C 13 - 18	D 19 - 24	E 25 - 30	F 31 - 36	G 37 - 42	H 43 - 48	I 49 - 54	J 55 - 60	K 61 - 66	L 67 - 72	M 73 - 78	N 79 - 84	O 85 - 90	P 91 - 96	Q 97 - 102	R 103 - 108	S 109 - 114	T 115 - 120	U 121 - 126	V 127 - 132	W 133 - 138	X 139 - 144

COLS A-X: 48-STRAND SM FIBER TO NEW BLDG 1ST FL COMM ROOM R3-T1-COLS M-X

SVDC OLD DATA CENTER CABINET 5 TRAY 4

REVISION NOTES

REV: 1	DATE: -	REVISED BY: -
REV: 2	DATE: -	REVISED BY: -
REV: 3	DATE: -	REVISED BY: -
REV: 4	DATE: -	REVISED BY: -
REV: 5	DATE: -	REVISED BY: -
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NETWORK ENGINEER:
NETWORK ENG. TEL No.
PROJECT MANAGER -
PROJECT MGR. TEL No. -

SITE LOCATION:
R900 Spring Valley Operations Center Building Expansion

WORK DESCRIPTION:
Attachment 06 - Fiber Tray Layout and Labeling

JOB NUMBER:	DRAWN BY: Ron Devito	
SCALE: N.T.S.	DATE: 04/07/2025	REVISION No. REV 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 4 OF 4

ABF TUBE CABLE MASTER

ATTACHMENT 07: AIR BLOWN FIBER TUBE CABLE PLANT

MASTER LIST #	TUBE CABLE ID	FROM	TO	CABLE TYPE	CABLE ROUTING	STATUS
N/A	D-01	1st Fl. Comm Rm (LAN Cable Rack)	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
N/A	T-01	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	2nd Fl. LAN Room TDU (2FL-LAN-TDU-T03)	19-TUBE PLENUM JACKETED	COMMRM-TDU-T01, C0001, 2FL-LAN-TDU-T03	Planned
NA	D-02	1st Fl. Comm Rm (LAN Cable Rack)	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
N/A	T-02	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	2nd Fl. LAN Room TDU (2Fl-LAN-TDU-T04)	19-TUBE PLENUM JACKETED	COMM-RM-TDU-T02, C0002, 2FL-LAN-TDU-T04	Planned
N/A	D-03	2nd Fl. LAN Rm (LAN Cable Rack)	2nd Fl. LAN Rm TDU (2FL-LAN-TDU-T03)	19-TUBE PLENUM JACKETED	2nd Fl. LAN Rm CABLE LADDER SYSTEM	Planned
N/A	T-03	2nd Fl. LAN Rm TDU (2FL-LAN-TDU-T03)	3rd Fl. LAN Rm TDU (3FL-LAN-TDU-T05)	19-TUBE PLENUM JACKETED	2FL-LAN-TDU-T03, C0003, 3FL-LAN-TDU-T05	Planned
NA	D-04	2nd Fl. LAN Rm (LAN Cable Rack)	2nd Fl. LAN Rm TDU (2FL-LAN-TDU-T04)	19-TUBE PLENUM JACKETED	2nd Fl. LAN Rm CABLE LADDER SYSTEM	Planned
N/A	T-04	2nd Fl. LAN Rm TDU (2FL-LAN-TDU-T04)	3rd Fl. LAN Rm TDU (3FL-LAN-TDU-T06)	19-TUBE PLENUM JACKETED	2FL-LAN-TDU-T04, C0004, 3FL-LAN-TDU-T06	Planned
NA	D-05	3rd Fl. LAN Rm (LAN Cable Rack)	3rd Fl. LAN Rm TDU (3FL-LAN-TDU-T05)	19-TUBE PLENUM JACKETED	3rd Fl. LAN Rm CABLE LADDER SYSTEM	Planned
NA	D-06	3rd Fl. LAN Rm (LAN Cable Rack)	3rd Fl. LAN Rm TDU (3FL-LAN-TDU-T06)	19-TUBE PLENUM JACKETED	3rd Fl. LAN Rm CABLE LADDER SYSTEM	Planned
N/A	D-07	1st Fl. Comm Rm (CCTN Rack 1)	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
NA	T05	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	ECC IDF A (ECC-IDF-A-RACK-B2-TRAY-5)	19-TUBE PLENUM JACKETED	COMM-RM-TDU-T01, CCTN EZ-Path, ECC IDF A	Planned
N/A	D-08	1st Fl. Comm Rm (CCTN Rack 2)	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
N/A	T-06	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	ECC IDF B (ECC-IDF-B-RACK-B1-TRAY-6)	19-TUBE PLENUM JACKETED	COMM-RM-TDU-T02, CCTN EZ-Path, ECC IDF B	Planned
N/A	D-09	1st Fl. Comm Rm (CCTN Rack 1)	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
NA	T-07	1st Fl. Comm Rm TDU (COMMRM-TDU-T01)	SVDC PROD ROW 4 (SVDC-PROD-ROW-4-CABINET-1-TRAY-4)	19-TUBE PLENUM JACKETED	COMM-RM-TDU-T01, CCTN EZ-Path, SVDC PROD ROW 4	Planned
N/A	D-10	1st Fl. Comm Rm (CCTN Rack 2)	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	19-TUBE PLENUM JACKETED	1st Fl. Comm Rm CABLE LADDER SYSTEM	Planned
NA	T-08	1st Fl. Comm Rm TDU (COMMRM-TDU-T02)	SVDC OLDDC (SVDC-OLD-DATA-CENTER-CABINET-5-TRAY-4)	19-TUBE PLENUM JACKETED	COMM-RM-TDU-T02, CCTN EZ-Path, SVDC OLDDC	Planned

ABF MASTER BUNDLE

ATTACHMENT 7: AIR BLOWN FIBER BUNDLE PLANT

MASTER LIST #	FIBER BUNDLE ID	FROM	TO	BUNDLE TYPE	BUNDLE ROUTING	Estimated LENGTH	STATUS
N/A	FB1	1ST FL COMM RM CABLE RACK	3RD FL LAN RM CABLE RACK	SINGLEMODE, 24-STRAND LC	LAN CABLE RACK, T1, SLOT A, D-01 (MICRODUCT 1), T-01 (MICRODUCT 1), D-05 (MICRODUCT 1) LAN CABLE RACK, T1, SLOT A	100	Planned
N/A	FB2	1ST FL COMM RM CABLE RACK	3RD FL LAN RM CABLE RACK	SINGLEMODE, 24-STRAND LC	LAN CABLE RACK, T1, SLOT B, D-02 (MICRODUCT 1), T-02 (MICRODUCT 1), D-06 (MICRODUCT 1) LAN CABLE RACK, T1, SLOT B	100	Planned
N/A	FB3	1ST FL COMM RM CABLE RACK	2ND FL LAN RM CABLE RACK	SINGLEMODE, 24-STRAND LC	LAN CABLE RACK, T1, SLOT C, D-01 (MICRODUCT 2), T-01 (MICRODUCT 2), D-03 (MICRODUCT 2) LAN CABLE RACK, T1, SLOT C	100	Planned
N/A	FB4	3RD FL LAN RM CABLE RACK	2ND FL LAN RM CABLE RACK	SINGLEMODE, 24-STRAND LC	LAN CABLE RACK, T1, SLOT D, D-06 (MICRODUCT 2), T-02 (MICRODUCT 2), D-04 (MICRODUCT 2) LAN CABLE RACK, T1, SLOT D	100	Planned
N/A	FB5	1ST FL COMM RM CCTN RACK 1	ECC IDF A	SINGLEMODE, 72-STRAND LC	CCTN RACK 1, T1, SLOTS A-F, D-07 (MICRODUCT 1), T-05 (MICRODUCT 1), ECC IDF A, RACK B2, TRAY 5, SLOTS A-L	TBD	Planned
N/A	FB6	1ST FL COMM RM CCTN RACK 1	ECC IDF A	SINGLEMODE, 72-STRAND LC	CCTN RACK 1, T1, SLOTS G-L, D-07 (MICRODUCT 2), T-05 (MICRODUCT 2), ECC IDF A, RACK B2, TRAY 5, SLOTS M-X	TBD	Planned
N/A	FB7	1ST FL COMM RM CCTN RACK 2	ECC IDF B	SINGLEMODE, 72-STRAND LC	CCTN RACK 2, T1, SLOTS A-F, D-08 (MICRODUCT 1), T-06 (MICRODUCT 1), ECC IDF B, RACK B1, TRAY 6, SLOTS A-L	TBD	Planned
N/A	FB8	1ST FL COMM RM CCTN RACK 2	ECC IDF B	SINGLEMODE, 72-STRAND LC	CCTN RACK 2, T1, SLOTS G-L, D-08 (MICRODUCT 2), T-06 (MICRODUCT 2), ECC IDF B, RACK B1, TRAY 6, SLOTS M-X	TBD	Planned
N/A	FB9	1ST FL COMM RM CCTN RACK 1	SVDC PROD ROW 4	SINGLEMODE, 72-STRAND LC	CCTN RACK 1, T1, SLOTS M-R, D-09 (MICRODUCT 1), T-07 (MICRODUCT 1), SVDC PROD ROW 4, CABINET 1, TRAY 4, SLOTS A-L	TBD	Planned
N/A	FB10	1ST FL COMM RM CCTN RACK 1	SVDC PROD ROW 4	SINGLEMODE, 72-STRAND LC	CCTN RACK 1, T1, SLOTS S-X, D-09 (MICRODUCT 2), T-07 (MICRODUCT 2), SVDC PROD ROW 4, CABINET 1, TRAY 4, SLOTS M-X	TBD	Planned
N/A	FB11	1ST FL COMM RM CCTN RACK 2	SVDC OLDDC	SINGLEMODE, 72-STRAND LC	CCTN RACK 2, T1, SLOTS M-R, D-10 (MICRODUCT 1), T-08 (MICRODUCT 1), SVDC OLDDC, CABINET 5, TRAY 4, SLOTS A-L	TBD	Planned
N/A	FB12	1ST FL COMM RM CCTN RACK 2	SVDC OLDDC	SINGLEMODE, 72-STRAND LC	CCTN RACK 2, T1, SLOTS S-X, D-10 (MICRODUCT 2), T-08 (MICRODUCT 2), SVDC OLDDC, CABINET 5, TRAY 4, SLOTS M-X	TBD	Planned

Attachment 08: R900 - SVOC BUILDING EXPANSION ABF Documentation Matrix
TDU Sheet
Last Updated: 04/07/2025

Tube Cable Label Sample	Line 1 Line 2 Line 3	TDU-T01 South Wall of 1st Fl. Comm Rm. Installed by: [Contractor] on 04/07/2025

TDU #	Location	Installed by	Job #	Date
COMMRM-TDU-T01	South Wall of 1st Fl. Comm Rm.			
COMMRM-TDU-T02	North Wall of 1st Fl. Comm Rm.			
2FL-LAN-TDU-T03	South Wall of 2nd Fl. LAN Rm.			
2FL-LAN-TDU-T04	North Wall of 2nd Fl. LAN Rm.			
3FL-LAN-TDU-T05	South Wall of 3rd Fl. LAN Rm.			
3FL-LAN-TDU-T06	North Wall of 3rd Fl. LAN Rm.			

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Attachment 08: R900 - Spring Valley Operations Center Bldg. Expansion ABF Documentation Matrix
Tube Trunk Sheet
Last Updated: 04/07/2025

Tube Cable Label Sample	Line 1 Line 2 Line 3 Line 4	T1 TDU-T01 to TDU-T03 TC19TP2 Installed by: [Contractor] on 03/27/2025

Trunk #	End #1	End #2	Cable Type	Tube Count	Trunk Length	Installed By	Job #	Date	Comments
D01	COMMRM 0101.05	COMMRM-TDU-T01	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T01	COMMRM-TDU-T01	2FL-LAN-TDU-T03	TC19TP2	19					COMMRM-TDU-T01, C0001, 2FL-LAN-TDU-T03
D-02	COMMRM 0101.05	COMMRM-TDU-T02	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T-02	COMMRM-TDU-T02	2FL-LAN-TDU-T04	TC19TP2	19					COMM-RM-TDU-T02, C0002, 2FL-LAN-TDU-T04
D-03	2FL-LAN 0201.02	2FL-LAN-TDU-T03	TC19TP2	19					2nd Fl. LAN Rm CABLE LADDER SYSTEM
T-03	2FL-LAN-TDU-T03	3FL-LAN-TDU-T05	TC19TP2	19					2FL-LAN-TDU-T03, C0003, 3FL-LAN-TDU-T05
D-04	2FL-LAN 0201.02	2FL-LAN-TDU-T04	TC19TP2	19					2nd Fl. LAN Rm CABLE LADDER SYSTEM
T-04	2FL-LAN-TDU-T04	3FL-LAN-TDU-T06	TC19TP2	19					2FL-LAN-TDU-T04, C0004, 3FL-LAN-TDU-T06
D-05	3FL-LAN 0301.02	3FL-LAN-TDU-T05	TC19TP2	19					3rd Fl. LAN Rm CABLE LADDER SYSTEM
D-06	3FL-LAN 0301.02	3FL-LAN-TDU-T06	TC19TP2	19					3rd Fl. LAN Rm CABLE LADDER SYSTEM
D-07	COMMRM 0101.02	COMMRM-TDU-T01	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T05	COMMRM-TDU-T01	ECC-IDF-A-RACK-B2-TRAY-5	TC19TP2	19					COMMRM-TDU-T01, CCTN EZ-Path, ECC-IDF-A, RACK B2, TRAY 5
D-08	COMMRM 0101.03	COMMRM-TDU-T02	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T-06	COMMRM-TDU-T02	ECC-IDF-B-RACK-B1-TRAY-6	TC19TP2	19					COMM-RM-TDU-T02, CCTN EZ-Path, ECC-IDF-B, RACK B1 TRAY 6
D-09	COMMRM 0101.02	COMMRM-TDU-T01	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T-07	COMMRM-TDU-T01	SVDC-PROD-ROW-4-CABINET-1-TRAY-4	TC19TP2	19					COMMRM-TDU-T01, CCTN EZ-Path, SVDC-PROD-ROW-4, CABINET 1, TRAY 4
D-10	COMMRM 0101.03	COMMRM-TDU-T02	TC19TP2	19					1st Fl. Comm Rm CABLE LADDER SYSTEM
T-08	COMMRM-TDU-T02	SVDC-OLD-DC-CABINET-5-TRAY-4	TC19TP2	19					COMMRM-TDU-T02, CCTN EZ-Path, SVDC-OLDDC, CABINET 5, TRAY 4

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Attachment 08: R900 - Spring Valley Operations Center Building Expansion ABF Documentation Matrix
Fiber Bundle Sheet
Last Updated: 03/27/2025

Legends

TCS	Tube Cable Segment
FB	Fiber Bundle
TU	Tube
COMMRM	1st Fl. Comm Room
2FL-LAN	2nd Fl. LAN Room
3FL-LAN	3rd FL. LAN Romm
ECC IDFA	Electric Control Center IDF A
ECC IDFB	Electric Control Center IDF B
SVDC Prod	Spring Valley Data Center - Production
Old SVDC	Old Spring Valley Data Center

Tube Cable Label Sample		
	Line 1	FB1
	Line 2	COMMRM RTE 1 to 3FL-LAN
	Line 3	Installed by: ABC on 04/07/2025

Fiber Bundle #	Fiber Type	Strand Count	Bundle Length	Installed By	Job #	Date	End #1	End #2	Tube Section #1 (Cable#-Tube#)	Tube Segment #2 (Cable#-Tube#)	Tube Segment #3 (Cable#-Tube#)	Tube Segment #4 (Cable#-Tube#)	Tube Segment #5 (Cable#-Tube#)
FB1	Single-Mode	24					COMMRM Cable-Rk	3FL-LAN Cable-Rk	D-01-1	T-01-1	T-03-1	D-05-01	
FB2	Single-Mode	24					COMMRM Cable-Rk	3FL-LAN Cable-Rk	D-02-1	T-02-1	T-04-1	D-06-01	
FB3	Single-Mode	24					COMMRM Cable-Rk	2FL-LAN Cable-Rk	D-01-2	T-01-2	T-03-2	D-03-1	
FB4	Single-Mode	24					3FL-LAN Cable-Rk	2FL-LAN Cable-Rk	D-06-1	T-04-2	D-04-1		
FB5	Single-Mode	72					COMMRM CCTN-Rk 1	ECC IDFA RACK B2, TRAY 5	D-07-01	T-05-1			
FB6	Single-Mode	72					COMMRM CCTN-Rk 1	ECC IDFA RACK B2, TRAY 5	D-07-02	T-05-2			
FB7	Single-Mode	72					COMMRM CCTN-Rk 2	ECC IDFB RACK B1, TRAY 6	D-08-01	T-06-01			
FB8	Single-Mode	72					COMMRM CCTN-Rk 2	ECC IDFB RACK B1, TRAY 6	D-08-02	T-06-02			
FB9	Single-Mode	72					COMMRM CCTN-Rk 1	SVDC Prod Row 4, CABINET 1 TRAY 4	D-09-01	T-07-01			
FB10	Single-Mode	72					COMMRM CCTN-Rk 1	SVDC Prod Row 4, CABINET 1 TRAY 4	D-09-02	T-07-02			
FB11	Single-Mode	72					COMMRM CCTN-Rk 2	Old SVDC, CABINET 5, TRAY 4	D-10-01	T-08-01			
FB12	Single-Mode	72					COMMRM CCTN-Rk 2	Old SVDC, CABINET 5, TRAY 4	D-10-02	T-08-02			

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Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
T-01	1	FB1
T-01	2	FB3
T-01	3	
T-01	4	
T-01	5	
T-01	6	
T-01	7	
T-01	8	
T-01	9	
T-01	10	
T-01	11	
T-01	12	
T-01	13	
T-01	14	
T-01	15	
T-01	16	
T-01	17	
T-01	18	
T-01	19	
D-01	1	FB1
D-01	2	FB3
D-01	3	
D-01	4	
D-01	5	
D-01	6	
D-01	7	
D-01	8	
D-01	9	
D-01	10	
D-01	11	
D-01	12	
D-01	13	
D-01	14	
D-01	15	
D-01	16	
D-01	17	
D-01	18	
D-01	19	
T-02	1	FB2
T-02	2	FB4
T-02	3	
T-02	4	
T-02	5	
T-02	6	
T-02	7	
T-02	8	
T-02	9	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
T-02	10	
T-02	11	
T-02	12	
T-02	13	
T-02	14	
T-02	15	
T-02	16	
T-02	17	
T-02	18	
T-02	19	
D-02	1	FB2
D-02	2	FB4
D-02	3	
D-02	4	
D-02	5	
D-02	6	
D-02	7	
D-02	8	
D-02	9	
D-02	10	
D-02	11	
D-02	12	
D-02	13	
D-02	14	
D-02	15	
D-02	16	
D-02	17	
D-02	18	
D-02	19	
T-03	1	FB1
T-03	2	
T-03	3	
T-03	4	
T-03	5	
T-03	6	
T-03	7	
T-03	8	
T-03	9	
T-03	10	
T-03	11	
T-03	12	
T-03	13	
T-03	14	
T-03	15	
T-03	16	
T-03	17	
T-03	18	

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Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
T-03	19	
D-03	1	FB3
D-03	2	
D-03	3	
D-03	4	
D-03	5	
D-03	6	
D-03	7	
D-03	8	
D-03	9	
D-03	10	
D-03	11	
D-03	12	
D-03	13	
D-03	14	
D-03	15	
D-03	16	
D-03	17	
D-03	18	
D-03	19	
T-04	1	FB2
T-04	2	
T-04	3	
T-04	4	
T-04	5	
T-04	6	
T-04	7	
T-04	8	
T-04	9	
T-04	10	
T-04	11	
T-04	12	
T-04	13	
T-04	14	
T-04	15	
T-04	16	
T-04	17	
T-04	18	
T-04	19	
D-04	1	FB4
D-04	2	
D-04	3	
D-04	4	
D-04	5	
D-04	6	
D-04	7	
D-04	8	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
D-04	9	
D-04	10	
D-04	11	
D-04	12	
D-04	13	
D-04	14	
D-04	15	
D-04	16	
D-04	17	
D-04	18	
D-04	19	
D-05	1	FB1
D-05	2	
D-05	3	
D-05	4	
D-05	5	
D-05	6	
D-05	7	
D-05	8	
D-05	9	
D-05	10	
D-05	11	
D-05	12	
D-05	13	
D-05	14	
D-05	15	
D-05	16	
D-05	17	
D-05	18	
D-05	19	
D-06	1	FB2
D-06	2	
D-06	3	
D-06	4	
D-06	5	
D-06	6	
D-06	7	
D-06	8	
D-06	9	
D-06	10	
D-06	11	
D-06	12	
D-06	13	
D-06	14	
D-06	15	
D-06	16	
D-06	17	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
D-06	18	
D-06	19	
D-07	1	FB5
D-07	2	FB6
D-07	3	
D-07	4	
D-07	5	
D-07	6	
D-07	7	
D-07	8	
D-07	9	
D-07	10	
D-07	11	
D-07	12	
D-07	13	
D-07	14	
D-07	15	
D-07	16	
D-07	17	
D-07	18	
D-07	19	
T-05	1	FB5
T-05	2	FB6
T-05	3	
T-05	4	
T-05	5	
T-05	6	
T-05	7	
T-05	8	
T-05	9	
T-05	10	
T-05	11	
T-05	12	
T-05	13	
T-05	14	
T-05	15	
T-05	16	
T-05	17	
T-05	18	
T-05	19	
D-08	1	FB7
D-08	2	FB8
D-08	3	
D-08	4	
D-08	5	
D-08	6	
D-08	7	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
D-08	8	
D-08	9	
D-08	10	
D-08	11	
D-08	12	
D-08	13	
D-08	14	
D-08	15	
D-08	16	
D-08	17	
D-08	18	
D-08	19	
T-06	1	FB7
T-06	2	FB8
T-06	3	
T-06	4	
T-06	5	
T-06	6	
T-06	7	
T-06	8	
T-06	9	
T-06	10	
T-06	11	
T-06	12	
T-06	13	
T-06	14	
T-06	15	
T-06	16	
T-06	17	
T-06	18	
T-06	19	
D-09	1	FB9
D-09	2	FB10
D-09	3	
D-09	4	
D-09	5	
D-09	6	
D-09	7	
D-09	8	
D-09	9	
D-09	10	
D-09	11	
D-09	12	
D-09	13	
D-09	14	
D-09	15	
D-09	16	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
D-09	17	
D-09	18	
D-09	19	
T-07	1	FB9
T-07	2	FB10
T-07	3	
T-07	4	
T-07	5	
T-07	6	
T-07	7	
T-07	8	
T-07	9	
T-07	10	
T-07	11	
T-07	12	
T-07	13	
T-07	14	
T-07	15	
T-07	16	
T-07	17	
T-07	18	
T-07	19	
D-10	1	FB11
D-10	2	FB12
D-10	3	
D-10	4	
D-10	5	
D-10	6	
D-10	7	
D-10	8	
D-10	9	
D-10	10	
D-10	11	
D-10	12	
D-10	13	
D-10	14	
D-10	15	
D-10	16	
D-10	17	
D-10	18	
D-10	19	
T-08	1	FB11
T-08	2	FB12
T-08	3	
T-08	4	
T-08	5	
T-08	6	

Attachment 08: R900 - Spring Valley Operations Center Bldg Expansion
ABF Documentation Matrix
Tube Utilization Sheet
Last Updated: 04/07/2025

Tube cable #	Tube #	Fiber Bundle #
T-08	7	
T-08	8	
T-08	9	
T-08	10	
T-08	11	
T-08	12	
T-08	13	
T-08	14	
T-08	15	
T-08	16	
T-08	17	
T-08	18	
T-08	19	

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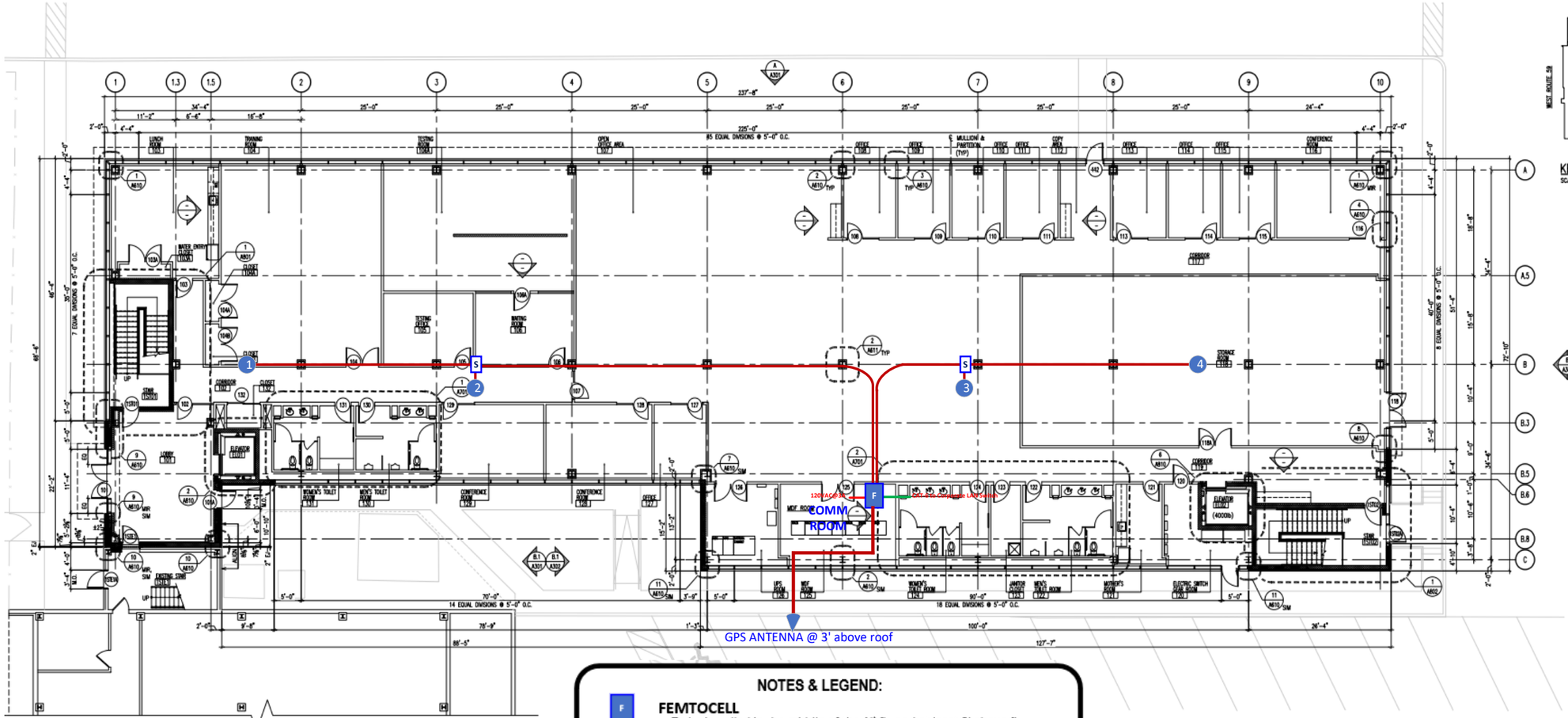
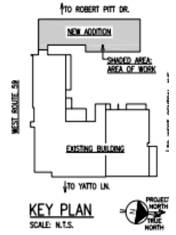
ATTACHMENT 09 – R900 – 1ST FLOOR FEMTOCELL INSTALLATION



1 FIRST FLOOR CONSTRUCTION PLAN
SCALE: 1/8" = 1'-0"



KEY PLAN
SCALE: N.T.S.

NOTES & LEGEND:

FEMTOCELL
- To be installed in the middle of the 1st fl. and at least 8' above fl.
- Dimension: (9.5"x9.5"x2.6")
- Power requirement: 120VAC@3A

LDF4-50 RF CABLE
- LDF4-50 RF cable shortest run between Femtocell & GPS antenna on the roof and between Femtocell & internal antennas. Avoid sharp bends.

1 **INTERNAL ANTENNA 1**

2 **INTERNAL ANTENNA 2**

3 **INTERNAL ANTENNA 3**

4 **INTERNAL ANTENNA 4**

CAT-6 Duplex Drop
- nearest run to corporate network switch

S **RF SPLITTER**

GPS ANTENNA

REVISION NOTES

REV: 1	DATE: -	REVISED BY: -	-
REV: 2	DATE: -	REVISED BY: -	-
REV: 3	DATE: -	REVISED BY: -	-
REV: 4	DATE: -	REVISED BY: -	-
REV: 5	DATE: -	REVISED BY: -	-
REV: 6	DATE: -	REVISED BY: -	-
REV: 7	DATE: -	REVISED BY: -	-
REV: 8	DATE: -	REVISED BY: -	-
REV: 9	DATE: -	REVISED BY: -	-
REV: 10	DATE: -	REVISED BY: -	-

conEdison
4 Irving Place
New York, N.Y. 10003
Tel: 212-460-4600 Fax: 212-982-7816

DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

NETWORK ENGR.
Virgilio Veloso

NETWORK ENG. TEL No.

PROJECT MANAGER
-

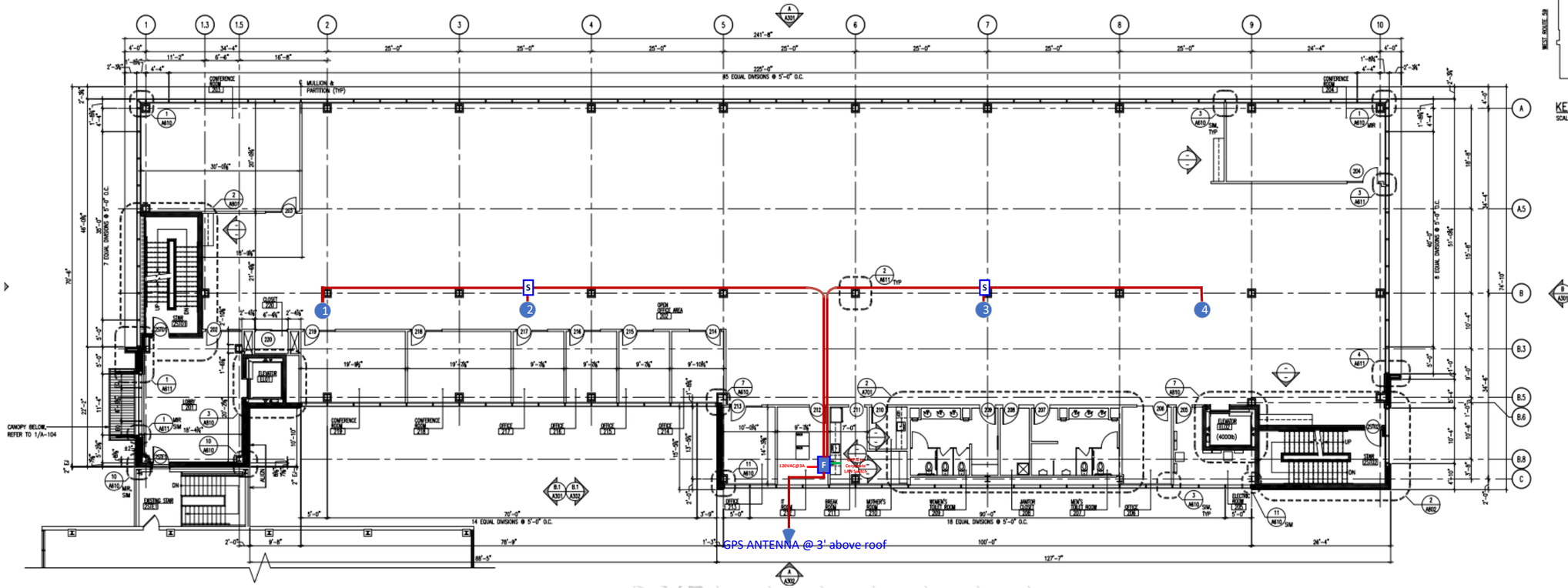
PROJECT MGR. TEL No.
-

SITE LOCATION:
-
-
-

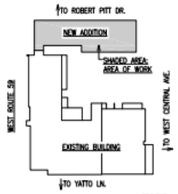
WORK DESCRIPTION:
SVOC Building Expansion
Femtocell Installation – Floor 1
-

JOB NUMBER:	DRAWN BY: Virgilio Veloso	
SCALE: N.T.S.	DATE: 03/26/2025	REVISION No. 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 1 OF 4

ATTACHMENT – R900 – 2ND FLOOR FEMTOCELL INSTALLATION



1 SECOND FLOOR CONSTRUCTION PLAN
SCALE: 1/8" = 1'-0"



KEY PLAN
SCALE: N.T.S.

NOTES & LEGEND:

FEMTOCELL
- To be installed in the middle of the 1st fl. and at least 8' above fl.
- Dimension: (9.5"x9.5"x2.6")
- Power requirement: 120VAC@3A

LDF4-50 RF CABLE
- LDF4-50 RF cable shortest run between Femtocell & GPS antenna on the roof and between Femtocell & internal antennas. Avoid sharp bends.

1 **INTERNAL ANTENNA 1**

2 **INTERNAL ANTENNA 2**

3 **INTERNAL ANTENNA 3**

4 **INTERNAL ANTENNA 4**

CAT-6 Duplex Drop
- nearest run to corporate network switch

S **RF SPLITTER**

GPS ANTENNA

REVISION NOTES

REV: 1	DATE: -	REVISED BY: -
REV: 2	DATE: -	REVISED BY: -
REV: 3	DATE: -	REVISED BY: -
REV: 4	DATE: -	REVISED BY: -
REV: 5	DATE: -	REVISED BY: -
REV: 6	DATE: -	REVISED BY: -
REV: 7	DATE: -	REVISED BY: -
REV: 8	DATE: -	REVISED BY: -
REV: 9	DATE: -	REVISED BY: -
REV: 10	DATE: -	REVISED BY: -

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DEPARTMENT:

IT Communications Infrastructure & Site Design (IT-CISD)

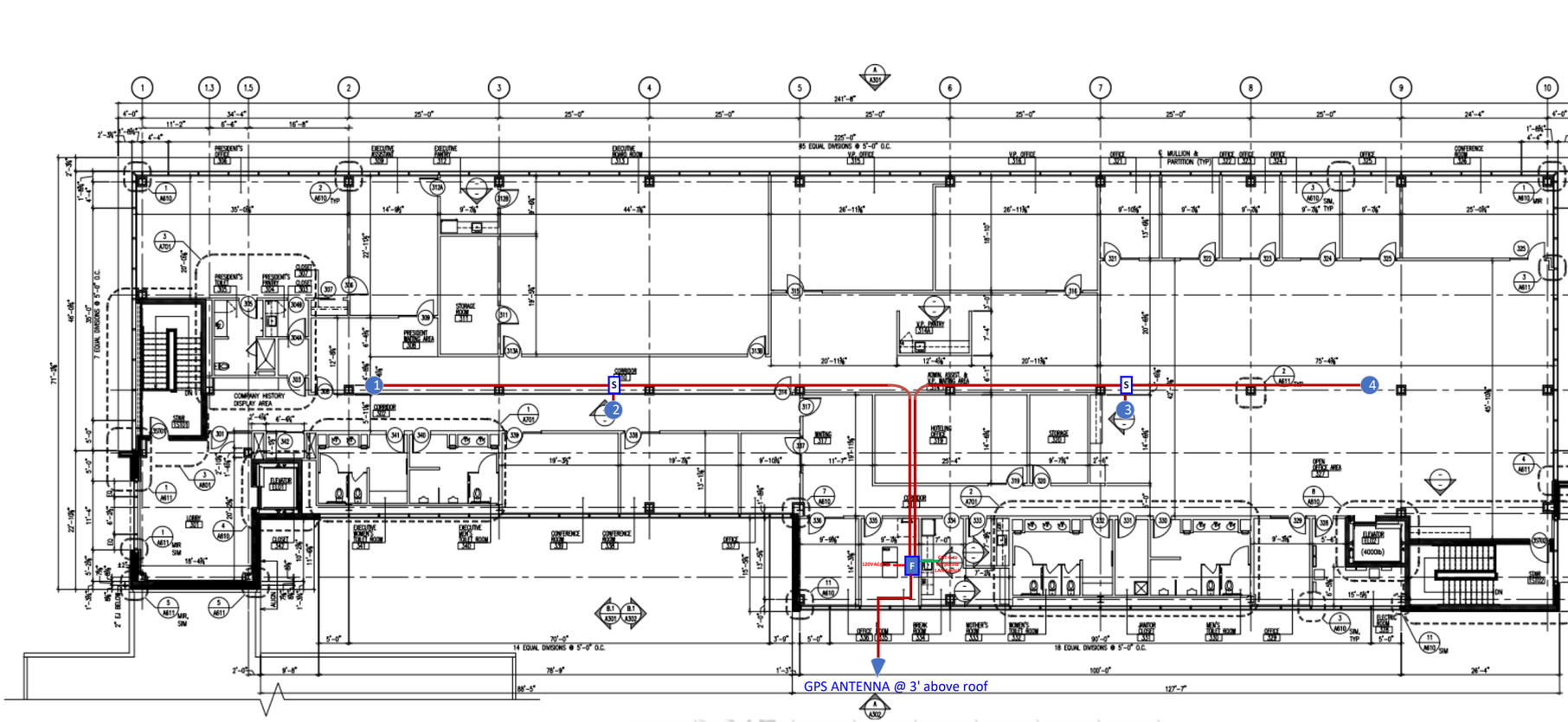
NETWORK ENGR.: Virgilio Veloso
NETWORK ENG. TEL No.:
PROJECT MANAGER: -
PROJECT MGR. TEL No.: -

SITE LOCATION:
-
-
-

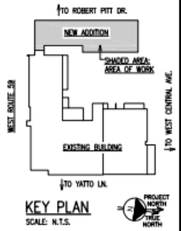
WORK DESCRIPTION:
SVOC Building Expansion
Femtocell Installation – Floor 2
-

JOB NUMBER:	DRAWN BY: Virgilio Veloso	
SCALE: N.T.S.	DATE: 03/26/2025	REVISION No. 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 2 OF 4

ATTACHMENT – R900 – 3RD FLOOR FEMTOCELL INSTALLATION



1 THIRD FLOOR CONSTRUCTION PLAN
SCALE: 1/8" = 1'-0"



KEY PLAN
SCALE: N.T.S.

NOTES & LEGEND:

FEMTOCELL
- To be installed in the middle of the 1st fl. and at least 8' above fl.
- Dimension: (9.5"x9.5"x2.6")
- Power requirement: 120VAC@3A

LDF4-50 RF CABLE
- LDF4-50 RF cable shortest run between Femtocell & GPS antenna on the roof and between Femtocell & internal antennas. Avoid sharp bends.

1 **INTERNAL ANTENNA 1**

2 **INTERNAL ANTENNA 2**

3 **INTERNAL ANTENNA 3**

4 **INTERNAL ANTENNA 4**

CAT-6 Duplex Drop
- nearest run to corporate network switch

S **RF SPLITTER**

GPS ANTENNA

REVISION NOTES			
REV: 1	DATE: -	REVISED BY:	-
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REV: 3	DATE: -	REVISED BY:	-
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REV:10	DATE: -	REVISED BY:	-

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Virgilio Veloso

NETWORK ENG. TEL No.

PROJECT MANAGER
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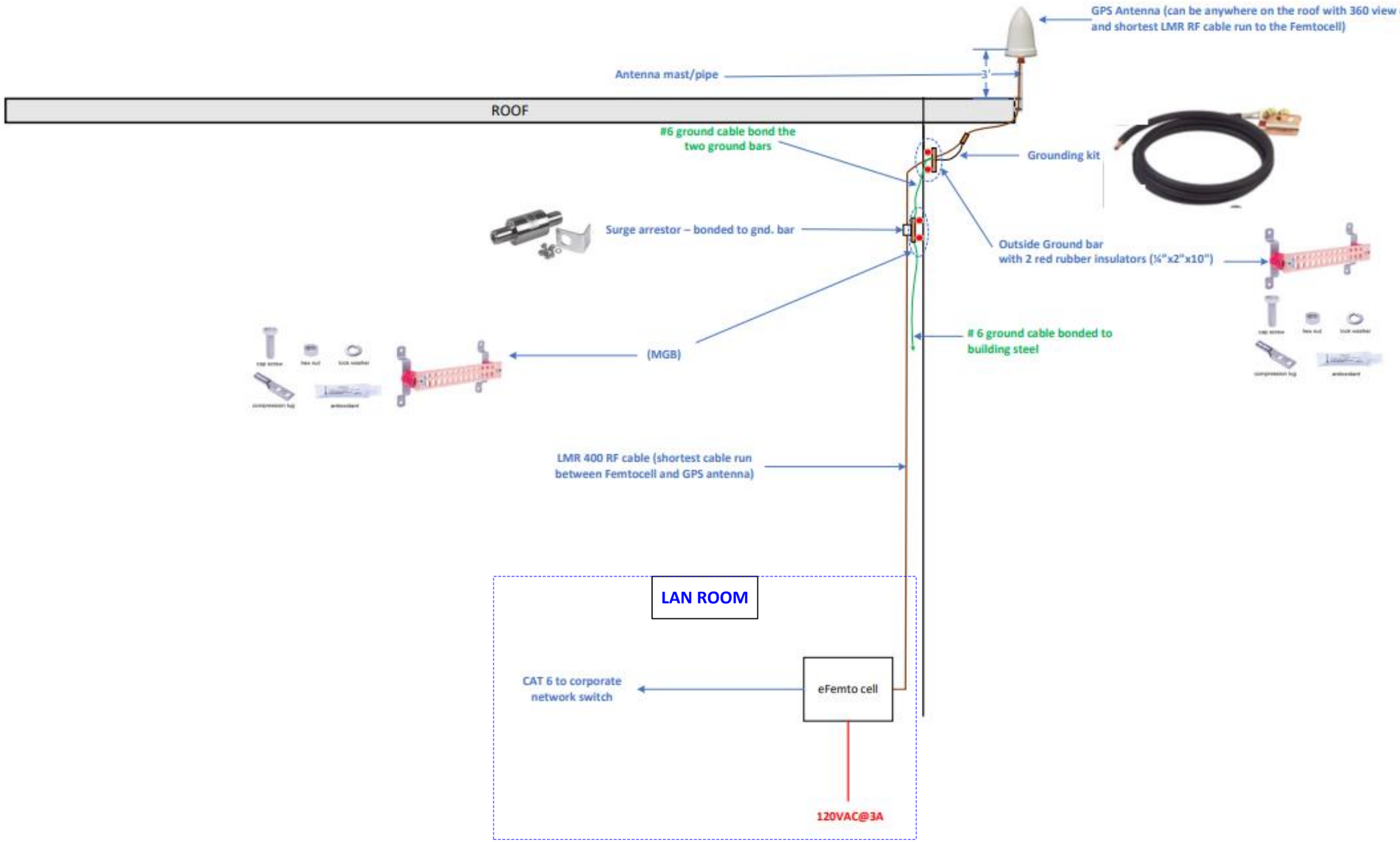
PROJECT MGR. TEL No.
-

SITE LOCATION:
-
-
-

WORK DESCRIPTION:
SVOC Building Expansion
Femtocell Installation – Floor 3
-

JOB NUMBER:		DRAWN BY: Virgilio Veloso
SCALE: N.T.S.	DATE: 03/26/2025	REVISION No. 2
FILE NAME: -		
DRAWING TYPE: -		SHEET: 3 OF 4

ATTACHMENT – R900 - Femtocell GPS Antenna Installation and Grounding Reference



REVISION NOTES			
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REV: 5	DATE: -	REVISED BY:	-
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REV: 9	DATE: -	REVISED BY:	-
REV: 10	DATE: -	REVISED BY:	-

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NETWORK ENG. TEL No.

PROJECT MANAGER
-

PROJECT MGR. TEL No.
-

SITE LOCATION:
-
-
-

WORK DESCRIPTION:
.SVOC Building Expansion Femtocell GPS
-Antenna Installation and Grounding Reference

JOB NUMBER:	DRAWN BY: Virgilio Veloso	
SCALE: N.T.S.	DATE: 03/26/2025	REVISION No. 1
FILE NAME: -		
DRAWING TYPE: -		SHEET: 4 OF 4

SPECIFICATION NO. IT-CISD-COPPER-CAT-6-and-6A-STD-01

Consolidated Edison Company of New York
4 Irving Place, New York, New York 10003

Information Technology
Communications Infrastructure & Site Design
(CISD)

DESCRIPTION

Standard Specification for Installation of CAT-6 and 6A Cabling Infrastructure

Prepared By: Ron Devito Date: May 28, 2024
Systems Specialist

Reviewed By: Paul Nardelli Date: August 6, 2024
Systems Specialist

Approved By: Michael J. Ribarich Date: August 6, 2024
Systems Manager

Printed on 8/6/2024

Table of Contents

1.0 PURPOSE 3
3.0 USERS, REVIEWERS AND APPROVERS 3
4.0 EXCEPTIONS / DEVIATION PROCESS 3
5.0 TECHNICAL REQUIREMENTS 4
5.1 Technical Scope 4
5.2 Cable Pathways 4
5.3 Copper Data Cable Material Requirements 4
5.3.1 Indoor Rated CAT-6 Cable 4
5.3.2 Outdoor Rated and Indoor/Outdoor CAT-6A Cable 5
5.3.3 Cable Managers 6
5.3.4 CAT-6 Panels – UltraMAX Hybrid 6
5.3.6 CAT-6 Boxes and Faceplates 6
5.3.7 CAT-6 Connectors 9
5.3.8 CAT-6 Connector Termination 11
5.3.9 CAT-6 Patch Cables 12
5.4 Copper Cable Installation Requirements 13
5.4.6 Horizontal Pathways 13
5.4.7 Horizontal Runs 13
5.4.8 LAN Room 14
5.4.9 Patch Cables 15
5.4.10 Blanking Panels and Horizontal Cable Managers 16
5.4.11 Workstation 16
5.4.12 Siemon Component Colors 18
5.4.13 Voice Demarcation 18
5.5 Microwave Radios and Associated Cabling 18

1.0 PURPOSE

1.1 This specification provides the technical requirements for the design and installation of CAT-6 structured cabling systems used to connect devices within a local area network (LAN), and CAT-6A for outside plant, high-wattage wireless access points, and short-haul 10GB data transmission over copper.

2.0 APPLICABILITY

2.1 This specification applies to new or renovated / rebuilt corporate sites, control, centers, data centers and field sites. CAT-6 should not be mixed and matched with existing 5e installations in the same patch panels. All panels where cables originate should be clearly marked with the correct CAT standard: CAT-5e, CAT-6, CAT-6A. Any addition to the existing CAT-5e plant should be done in 5e.

2.2 In 2023, Siemon announced that it was discontinuing the manufacture of MAX jacks but keeping the remainder of the MAX line intact.

2.3 In 2024, IT-CISD adopted Siemon UltraMax Hybrid CAT-6 as the standard for new LAN and communication room build-outs, to modernize and begin phasing out CAT-5e. UltraMax Hybrid jacks will fit all MAX panels, faceplates and surface-mount boxes.

2.4 UltraMax panels should not be used, because they require a panel-specific jack, making them more labor and material-intensive to install.

2.5 Some specialized installations require CAT-6A. It is specifically required when 10GB must pass over its entire 100-meter length. CAT-6A, therefore, is ideal for use in on-premises data centers in lieu of sub-100-meter fiber circuits. CAT-6A is also specified for higher voltage and wattage required by some wireless access points, and being generally shielded, outdoor CAT-6A is a more robust outdoor copper cabling standard.

3.0 USERS, REVIEWERS AND APPROVERS

3.1 The users of this specification are members of IT Communications Infrastructure & Site Design (CISD) group responsible for the design and build of LAN physical infrastructure including copper structured cabling systems. Other users are contractors who also design and build copper structured cabling systems.

3.2 The approver of the document is the CISD Systems Manager. The group's LAN physical infrastructure SMEs will propose changes to the CISD Systems Manager. Revised documents will be placed in the group's SharePoint public folder.

3.3 The review process is ongoing as new parts and technologies develop and are utilized. A formal review will take place annually in January by the CISD group to capture any changes that may not yet been incorporated.

3.4 Training requirements will be met by formal technical training by outside groups such as The Siemon Company, by internal on the job training, and group collaboration.

4.0 EXCEPTIONS / DEVIATION PROCESS

4.1 CISD will follow a review and approval process for interim changes required during emergent situations.

4.2 Interim changes will be handled by email or verbal notification by the CISD Systems Manager and/or the appropriate CISD SMEs.

4.3 The process and forum for communicating Interim changes will be periodic staff meetings or by teleconference scheduled by the CISD Systems Manager.

5.0 TECHNICAL REQUIREMENTS

5.1 Technical Scope

5.1.1 Unless otherwise stated in the bid specification or MiniPO, the work to be done by the Contractor as described in the Scope of Work section of the project specification (bid spec or MiniPO) shall be done in accordance with the requirements set forth in this document

5.1.2 Any deviation from the CISD Materials and Installation requirements listed below must receive prior approval from the CISD Project Manager. Deviations not receiving prior written approval will be subject to replacement and/or correction at the Contractor's expense.

5.2 Cable Pathways

5.2.1 The CISD project manager is responsible for identifying preliminary cable pathways.

5.2.2 Since the pathways provided by the CISD project manager are preliminary, it is the Contractor's responsibility to develop a defined cable pathway.

5.2.3 The Contractor is responsible for adhering to all local and environmental regulations regardless of what might be stated in the Specification or Scope of Work. If directions conflict with regulations, these need to be raised and discussed. A solution needs to be provided by the CISD project manager and/or an EH&S representative, in writing, before work can proceed.

5.2.4 The Contractor shall ensure that pathways qualify for Siemon Certification and extended warranty whether cabling is being installed as a Siemon certified project or not.

5.2.5 Con Edison CISD, and the site Environmental representative must review and approve the cable pathway design before installation begins.

5.2.6 The Contractor's certification technician is required to review the proposed cable pathway with the CISD Project Manager.

5.2.7 The Contractor shall obtain from the CISD project manager, prior to beginning any work, approval of the finalized cable pathways.

5.3 Copper Data Cable Material Requirements

5.3.1 Indoor Rated CAT-6 Cable

5.3.1.1 Category 6 cabling shall be Plenum rated, 23 AWG, and must be approved by Siemon for their 25-year System 6^{SM} certification. CAT-6A installations are covered under UltraMAX™6A or Z-MAX® 6A Warranty, also 25 years.

5.3.1.2 Some acceptable manufactures of Plenum Rated CAT-6 cable are Belden, BerkTek, CommScope, Mohawk, and Siemon.

- Belden 2413 CAT-6 cable
    - Part # 2413 004A1000 – Yellow
    - Part # 2413 D15A1000 – Blue
    - Part # 2413 008A1000 – Grey
    - Part # 2413 005A1000 – Green
- BerkTek LANMARK06 CAT-6 Plenum
    - Berk-Tek LANMark06 CAT 6 Plenum 4-Pair UTP Cable Blue 6P4P24-BL-P-BER-AP-NS
    - Berk-Tek LANMark06 CAT 6 Plenum 4-Pair UTP Cable White 6P4P24-WH-P-BER-AP-NS

- Berk-Tek LANMark06 CAT 6 Plenum 4-Pair UTP Cable Yellow 6P4P24-YL-P-BER-AP-NS
- Berk-Tek LANMark06 CAT 6 Plenum 4-Pair UTP Cable Green 6P4P24-GN-P-BER-AP-NS

- Siemon CAT-6 UTP E4 Plenum Cable
  - Siemon CAT-6 UTP E4 Plenum Reel-in-Box Blue 9C6P4-E4-06-RBA
  - Siemon CAT-6 UTP E4 Plenum Reel-in-Box White 9C6P4-E4-02-RBA
  - Siemon CAT-6 UTP E4 Plenum Reel-in-Box Yellow 9C6P4-E4-05-RBA
  - Siemon CAT-6 UTP E4 Plenum Reel-in-Box Green 9C6P4-E4-07-RBA

5.3.1.3 Some acceptable manufactures of Low-Smoke Zero Halogen (LSZH) CAT-6 cable are Belden, CommScope, and L-Com®. “PVC-Free” is NOT available in CAT-6. LSZH cable is a specialty product with limited availability and long lead time. This cabling generally used for runs inside generating stations.

- Belden LSZH CAT-6 cable – ONE color available only.
  - 7860ENS Cat 6 Cable, SF/UTP, LSZH, 4 Pair bonded, AWG 23, Indoor CPR Dca #BEL7860ENS
- CommScope LSZH Cable – 3,000 Foot Reels Only.
  - GigaSPEED XL® 5071A ETL Verified Category 6 U/UTP Cable, LSZH, non-plenum CMR rated, black jacket, 4 pair count, 3000 ft (914 m) length, reel 760175281 | 5071A BLK
  - GigaSPEED XL® 5071A ETL Verified Category 6 U/UTP Cable, LSZH, non-plenum CMR rated, green jacket, 4 pair count, 3000 ft (914 m) length, reel 760177394 | 5071A GRN
  - GigaSPEED XL® 5071A ETL Verified Category 6 U/UTP Cable, LSZH, non-plenum CMR rated, yellow jacket, 4 pair count, 3000 ft (914 m) length, reel 760177410 | 5071A YEL

5.3.1.3.3 L-Com LSZH CAT-6

- L-Com Category 6 UTP LSZH Rated 23 AWG 4-Pair Solid Conductor Blue, 1KFT

5.3.2 Outdoor Rated and Indoor/Outdoor CAT-6A Cable

5.3.2.1 Outside Copper Plant Cabling is best performed with Shielded CAT-6A.

5.3.2.2 CAT-6A Shielded may be used in lieu of fiber circuits for temporary structure LAN cabinet uplinks when distances are 100 meters or less.

5.3.2.3 Some acceptable manufactures of Outdoor rated CAT-6A cable are BerkTek, CommScope, Mohawk, and Siemon. Outdoor Cables are generally offered in black jacket only.

5.3.2.4 Outdoor-only cables may run indoors for a maximum of 50 lineal feet, after which, all cabling must transition to indoor cabling. Indoor/Outdoor cables are

preferred where runs may extend beyond 50 lineal feet of cable into the building envelope.

5.3.2.5 Following examples of available cabling:

5.3.2.6 Show Me Cables CAT-6A Outdoor Only Solid PVC UTP - 85-665-314 BK:1000

5.3.2.7 Show Me Cables CAT-6A Indoor/Outdoor UV Resistance, STP - 85-665-417 BK:1000

5.3.2.8 Show Me Cables CAT-6A Outdoor Direct Burial Solid Water Block STP - 85-665-636 BK:1000

5.3.2.9 Siemon CAT-6A Shielded OSP Cable for Direct Burial, Lashed Aerial, Duct and Underground Conduit. 1000-foot spool. 9A6O4-A5-01AR1A.

5.3.3 Cable Managers

5.3.3.1 The following Siemon (or equivalent) hook & loop type Cable Managers shall be used to bundle or manage cables:

- VCM-500-060-X (Velcro 2” Diameter Cable Managers)
- VCM-500-120-X (Velcro 4” Diameter Cable Managers)
- VCM-500-180-X (Velcro 6” Diameter Cable Managers)

5.3.4 CAT-6 Panels – UltraMAX Hybrid

5.3.4.1 Siemon MAX Panels shall be used on racks for Category 6 UltraMax cable terminations, as follows:

- For up to 16 connectors use (Siemon part # MX-PNL-16)
- For up to 24 connectors use (Siemon part # MX-PNL-24)
- For up to 48 connectors use (Siemon part # MX-PNL-48)
- For up to 72 connectors use (Siemon part # MX-PNL-72)

5.3.5 CAT-6 Panels - UltraMAX Keystone

5.3.5.1 Siemon Keystone Panels should be used when performing an end-to-end Keystone installation, typically large office spaces with modular furniture.

- For up to 24 connectors use (Siemon part # KPNL-F1-24-01S)
- For up to 48 connectors use (Siemon part # KPNL-F1-48-01S)
- Siemon Keystone panels do not come in sizes other than 24- or 48-ports.

5.3.6 CAT-6 Boxes and Faceplates

5.3.6.1 Siemon SM series White surface-mount (SM) boxes shall be used for Category 6 cable terminations in modular furniture without accessible raceway and integrated furniture outlet opening. SM boxes shall also be used where flush-mount faceplates are not possible. Use boxes as follows:

- For Single drops use (Siemon part # MX-SM1-02)
- For Duplex drops use (Siemon part # MX-SM2-02)
- For Quad drops use (Siemon part # MX-SM4-02)

Figure 1 - Surface-Mount (SM) Boxes

Siemon SM series White surface-mount boxes (Siemon part # MX-SM2-02) shall be used for Category 6 for duplex drop cable terminations associated with access point support. Alternatively, the specialized recessed box (Siemon part # MX-WB1-02-02) may be used.

Siemon White single-gang flush-mount faceplates shall be used for Category 6 cable terminations in private offices and other non-modular work areas.

- For single drops use (Siemon part # MX-FP-S-01-02)
- For duplex drops use (Siemon part # MX-FP-S-02-02)
- For triplex drops use (Siemon part # MX-FP-S-03-02)
- For quad drops use (Siemon part # MX-FP-S-04-02)
- For hex drops use (Siemon part # MX-FP-S-06-02)

Figure 2 – Single-gang Flush-Mount Faceplates – UltraMax 6 Hybrid

Siemon White double-gang flush-mount faceplates shall be used for Category 6 cable terminations where a larger number of cables need to be accommodated.

- For 8-cable drops use (Siemon part # MX-FP-S-08-02)
- For 12-cable drops use (Siemon part # MX-FP-S-12-02)

Figure 3 – Double-gang Flush-Mount Faceplates – UltraMax 6 Hybrid

- Siemon Stainless Steel single-gang flush-mount faceplates shall be used for Category 6 cable terminations in substations, power generating stations, machine shops, other industrial environments, or high-traffic areas.
- For duplex drops use (Siemon part # MX-FP-S-02-SS)
- For quad drops use (Siemon part # MX-FP-S-04-SS)

Figure 4 – Siemon Stainless Steel Faceplates – UltraMax 6 Hybrid

Figure 5 – Siemon Plastic and Stainless Steel Faceplates – UltraMax 6 Keystone

5.3.6.2 Siemon Ruggedized MAX faceplates shall be used for drops located outdoors or in wet environments, such as pump houses. Ruggedized installations will most likely use CAT-6A Shielded.

- For single drops use (Siemon part # XFP-S-01-SS)
- For duplex drops use (Siemon part # XFP-S-02-SS)
- For triplex drops use (Siemon part # XFP-D-03-SS)
- For quad drops use (Siemon part # XFP-D-04-SS)

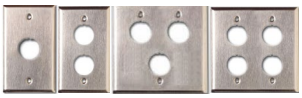

Figure 6 – Ruggedized MAX Stainless Steel Faceplates

5.3.6.7 Siemon Ruggedized G2 Z-MAX Outlets must be used in conjunction with the Ruggedized MAX faceplates. The prior Industrial MAX outlets have been discontinued along with standard MAX jacks.

- For CAT-6 UTP use (Siemon part # XG2-Z6). CAT-6 is only available un-shielded.
- For CAT-6A UTP use (Siemon part # XG2-Z6A).
- For CAT-6A STP use (Siemon part # XG2-Z6AS).

5.3.6.3 The appropriate modular furniture adapter must be used for the furniture in which it is being installed, considering dimensions, color and the existence or non-existence of factory installed faceplates.

5.3.6.4 When furniture has pre-installed Keystone faceplates with outlet openings, the installation should be performed as Keystone end-to-end to maintain a singular standard throughout the LAN. In this environment, modular furniture adapters are not applicable as they are built into the furniture.

5.3.6.5 Siemon MAX White modular furniture adapters (Siemon part # MX-MFP-02) shall be used for Category 6 cable terminations in modular furniture with accessible raceway and integrated furniture blank outlet openings sized 1.35” x 2.35”.

5.3.6.6 Siemon MAX White Modular furniture adapters (Siemon part # MX-MFP-HMA-02) shall be used for Category 6 cable terminations in modular furniture with accessible raceway and integrated furniture blank outlet openings sized 1.88” x 2.98”.

Figure 7 – Modular Furniture Adapters

5.3.6.7 Siemon MAX White modular furniture adapters (Siemon part # MX-UMA-02) shall be used for Category 6 cable terminations in all other modular furniture with accessible raceway and integrated furniture blank outlet openings.

5.3.6.8 For gray Herman Miller Ethospace, where it is still in use, the Universal adapter should be used (Siemon part # MX-UMA-04). Herman Miller-specific faceplates have been discontinued.

5.3.6.9 Blank modules shall be used to fill unused Max connector positions as Follows:

- (Siemon part # MX-BL-01) - Black
- (Siemon part # MX-BL-02) - White
- (Siemon part # MX-BL-04) – Gray

Figure 8 – Blank MAX Modules

5.3.7 CAT-6 Connectors

5.3.7.1 Siemon UltraMAX 6 Hybrid Yellow (U6-H05NB) and Violet (U6-H08NB) coupler modules should be used and the icons dispensed with. Note: the B in each part number denotes a 100-jack bulk pack.

5.3.7.2 Siemon UltraMax 6 Hybrid Yellow (U6-H05NB) and Violet (U6-H08NB) coupler modules should be used and the icons dispensed with. Note: the B in each part number denotes a 100-module bulk pack.

Figure 9 – Flat UltraMAX Coupler Module

IMPORTANT: UltaMax Panels are only compatible with a Siemon proprietary Panel Mounted coupler module (U6-P00NB) for CAT-6 and (U6A-P00NB) for CAT-6A, the B in both part numbers denoting a 100-module bulk pack.

5.3.7.3 NOTE: Angled Coupler Modules are not available in CAT-6 or 6A.

5.3.7.4 UltraMax 6 Keystone Modules (U6-KXX-NB), where XX denotes the color code and B denotes a bulk pack shall be used for modular furniture build-outs, where the furniture is factory built for Keystone. The same modules should be used at the LAN room along with Keystone Panels # KPNL-F1-24-01S or # KPNL-F1-48-01S to maintain a consistent standard.

5.3.7.5 Siemon Ruggedized MAX outlets shall be used for drops terminated in Ruggedized MAX faceplates.

- CAT-6 UTP Part # (XG2-Z6).
- CAT-6A UTP Part # (XG2-Z6A).
- CAT-6A STP Part # (XG2-Z6AS).
- NOTE: There is no shielded CAT-6 outlet in this product line. All shielded Ruggedized infrastructure, therefore, will be installed with CAT-6A.

Figure 10 – Industrial Z-MAX Outlet

5.3.8 CAT-6 Connector Termination

5.3.8.1 CAT-6 cable shall be terminated on Siemon UltraMAX coupler modules using Siemon recommended procedures.

5.3.8.2 To properly terminate CAT-6 cables on UltraMAX connectors, speed up the termination process and provide more uniform terminations, it is highly recommended that a Siemon UltraMAX TurboTool (Part# UMAX-TT) be used.

Figure 11 – UltraMAX TurboTool

5.3.8.3 Alternatively a Siemon Punchdown Tool (Part# UMAX-PD) may be used.

Figure 12 – Siemon UltraMax Punchdown Tool with Replacement Head

5.3.8.4 Ruggedized Z-MAX connectors in either CAT-6 or 6A should be terminated with the Z-Tool, which comes in three versions:

- (Z-Tool) – Straight cable orientation
- (Z-Tool-45) – 45-degree cable orientation
- (Z-Tool-Plug) – Field-terminated Z-Plugs.

Figure 13 – Siemon Z-Tool

5.3.9 CAT-6 Patch Cables

5.3.9.1 Patch cables installed at the rack, between the patch panels and the LAN switches, shall have a matching cable & boot color.

5.3.9.2 Patch cables shall be supplied as needed in 5 lengths between 2 and 10 feet.

5.3.9.3 Patch cables shall be available in the following five lengths:

- Two feet
- Three feet
- Five feet
- Seven feet
- Ten feet

5.3.9.4 Patch cables shall be available in 10 different colors as follows:

- Black
- White
- Blue
- Red
- Green
- Yellow
- Gray
- Orange
- Purple
- Pink

5.3.9.5 Patch cables from any vendor that has factory terminated & tested, Cat 6 certified cables in the required colors is acceptable. Some vendors meeting these requirements are:

Video Products Inc
1275 Danner Dr
Aurora, OH 44202
Telephone: 330-562-2622
Toll Free: 800-626-7801
Fax: 330-562-1999

ShowMeCables.com
18079 Edison Avenue
Chesterfield, MO 63005
Phone # 888.519.9505
Fax # 888.519.9515
Email Sales: Sales@ShowMeCables.com

5.3.9.6 VPI Patch cable part #'s use the following nomenclature:

- CAT6-XX-"COLOR", where the XX signifies the length and "COLOR" signifies the cable and boot color
  - Example: CAT6-10-ORANGE represents a 10' orange patch cable with orange boots

5.3.9.7 ShowMeCables Patch cable part #'s use the following nomenclature:

- 600-XX-"COLOR", where the XX signifies the length and "COLOR" signifies the cable and boot color
  - Example: 600-10-OR represents a 10' orange patch cable with orange boots

5.4 Copper Cable Installation Requirements

5.4.6 Horizontal Pathways

5.4.6.1 All cable shall be installed along previously defined and approved pathways.

5.4.6.2 Cabling shall be installed using a combination of cable supports as required for Siemon certification.

5.4.6.3 Cable supports shall be provided by means that are structurally independent of the suspended ceiling, its framework, or support rods.

5.4.6.4 When hangers such as J - hooks are used for main cable runs, J - hook trees with a minimum capacity of four J – hooks per tree shall be used. The cable installation contractor should ensure that at least 2 unused (spare) J - hooks are available after all runs are completed.

5.4.6.5 Panduit J-PRO line of nonconductive J-Hooks shall be used for CAT-6 and CAG-6A cabling supports.

5.4.6.6 The cable installation contractor shall identify, supply and install all required cable support products.

5.4.7 Horizontal Runs

5.4.7.1 Cable drops are defined as follows:

- Hex drops – Contain 6 cables from the LAN room to a single location
- Quad drops – Contain 4 cables from the LAN room to a single location
- Duplex drops – Contain 2 cables from the LAN room to a single location
- Single drops – Contain 1 cable from the LAN room to a single location

5.4.7.2 All Category 6 and 6A cables entering the LAN room shall be neatly combed through and bundled as groups of no more than 48 cables.

5.4.7.3 Hook and loop type cable managers shall be used to bundle and manage and secure all cable runs and patch cables.

5.4.7.4 Tie-wraps shall never be used for bundling, managing or securing any copper cables.

5.4.8 LAN Room

5.4.8.1 MX panels shall be installed on the Cabling rack in the panel sizes and in rack positions depicted in the Rack elevation sketch associated with the supplied Work Scope.

5.4.8.2 P-Touch or equivalent label with lettering that is at least 7 mm high shall be affixed to the left of each panel.

5.4.8.3 The text shall contain the following:

- Row 1 – the Word “CAT-6” or “CAT-6A” and the type of drop supported on this Panel (Single, Duplex, Quad or Various)
- Row 2 – Panel number (topmost panel is 1 and continues sequentially down the rack)
- Row 3 – Drop numbers installed on this Panel.
  - Example: The second panel from the top supporting Duplex drops number 2 through 48 would be labeled

CAT-6 – Duplex
Panel 2
Drops 2 through 48

5.4.8.4 Labels (Black with white lettering) shall be affixed to each MX panel and annotated with the drop number associated with each coupler.

5.4.8.5 All CAT-6 and 6A cables and associated couplers shall be installed into MX or Keystone panels as applicable.

5.4.8.6 Each of the cables in a Plenum rated cable “drop” shall be of a different cable color. The “drop” or “outlet” position of each cable color shall remain constant throughout a project. The cable colors shall be installed as follows:

- Cable A – Yellow
- Cable B – Blue
- Cable C – Gray
- Cable D – Green

5.4.8.7 Drops shall use cable colors as follows:

- Single drop shall use cable A
- Duplex drops shall use cables A & B
- Quad drops shall use cables A, B, C & D

5.4.8.8 Each of the cables in a Low Smoke Zero Halogen rated cable “drop” shall use one of two different available cable colors. The “drop” or “outlet” position of each cable color shall remain constant throughout a project. The cable colors shall be installed as follows in these examples. Actual colors may differ based on product availability:

- Cable A – Blue
- Cable B – White

- Cable C – Blue
- Cable D – White

5.4.8.9 Drops shall use cable colors as follows:

- Single drop shall use cable A
- Duplex drops shall use cables A & B
- Quad drops shall use cables A, B, C & D

5.4.8.10 All CAT-6 Cabling shall be terminated, tested and documented following all required Siemon procedures, in a manner that will qualify them for Siemon System 6™ Certification.

5.4.8.11 All CAT-6A cabling shall be terminated, tested and documented following all required Siemon procedures in a manger that will qualify them for Siemon UltraMAX™6A or Z-MAX® 6A Warranty as applicable.

5.4.8.12 Following termination, all Category 6 or 6A cables shall have a firmly attached cable number label, located ~2" behind the connector at each end of the cable.

5.4.8.13 The Cable number label shall be annotated, using a professional cable label maker such as Brady or Panduit, with the drop # and the letters A, B, C or D for the cables in each “drop”.

- Example: Drop #12, position “A” shall have the following label – 012A

5.4.9 Patch Cables

5.4.9.1 All patch cables for a particular MX panel shall be the same color.

5.4.9.2 Patch cable lengths shall be sized for proper cable management without excessive slack cable.

5.4.9.3 Patch cable colors shall follow the following color scheme:

- Connected to 1st Station Panel use – Black
- Connected to 2nd Station Panel use – White
- Connected to 3rd Station Panel use – Blue
- Connected to 4th Station Panel use – Red
- Connected to 5th Station Panel use – Green
- Connected to 6th Station Panel use – Yellow
- Connected to 7th Station Panel use – Gray
- Connected to 8th Station Panel use – Orange
- Connected to 9th Station Panel use – Purple
- Connected to 10th Station Panel use – Pink

5.4.9.4 One patch cable shall be supplied for each Single drop.

5.4.9.5 Two patch cables shall be supplied for each Duplex or greater drop.

5.4.9.6 The cable connected to the coupler with a Yellow Tab shall be connected between the patch panel and the Con Edison supplied LAN switch.

5.4.9.7 The patch cables installed between the CAT-6 or CAT-6A patch panels and LAN switches shall be routed and managed inside the Vertical Wire Manager, on the side closest to the switches, in neatly groomed bundles secured with hook & loop cable managers.

5.4.9.8 Patch cables shall be labeled with a Brady or Panduit labeling system. The labels on the patch cables shall provide the following information: a three-digit drop number followed by the first letter of the jack color.

Example: A patch cable to be plugged into drop #12 with the Yellow Jack coupler shall have the following label – 012Y

5.4.10 Blanking Panels and Horizontal Cable Managers

5.4.10.1 Blank Rack Unit (RU) spaces on a rack are to be filled as indicated on the Rack Elevation attachment using a combination of the following Siemon (or equivalent) blank panels:

- Siemon PNL-BLNK-1 (1 RU Blank Panel)
- Siemon PNL-BLNK-2 (2 RU Blank Panel)
- Siemon PNL-BLNK-3 (3 RU Blank Panel)

5.4.10.2 1-RU Flush mount Horizontal Cable Organizers with brush strip APC (part# AR8429) shall be used for passing cables from the front to the rear of a rack

Figure 14 – APC Horizontal Brush Strip Cable Organizer

5.4.11 Workstation

5.4.11.1 The contractor is responsible for the movement of furniture, file cabinets or any other obstacles as needed to perform this work. The contractor shall return all moved items to their original positions following work each shift.

5.4.11.2 It is recommended that when the Contractor will be working in an occupied space, pictures should be taken of the space before and after work in the event complaints of damage or cleanliness issues are raised by the occupants.

5.4.11.3 Where standard mounting heights result in inaccessibility to the user, the drop should be located (higher/lower) as field conditions dictate.

5.4.11.4 Category 6 cables that are installed in modular furniture with accessible raceway and integrated furniture outlet openings shall terminate in the correct size Siemon MAX modular furniture adapters with UltraMax 6 modules (U6-HXX) wired to the T568B scheme.

5.4.11.5 Category 6 cables that are installed in modular furniture with accessible raceway and integrated Keystone furniture outlet openings shall terminate in the factory-installed Keystone faceplates with Siemon UltraMAX Keystone modules (U6-KXX-NB – the B denoting a bulk pack) wired to the T568B scheme. LAN room should use Keystone Panels and jacks to maintain a consistent standard.

5.4.11.6 Category 6A cables should ***NOT*** be installed in modular furniture.

5.4.11.7 Category 6 cables that are installed in private offices and other non-modular work areas where subsurface “GEM” boxes or “Caddy” type fasteners can be installed, shall terminate in Siemon single gang faceplates shall be used as follows:

- For quad drops use (Siemon part # MX-FP-S-06-02)
- For quad drops use (Siemon part # MX-FP-S-04-02)
- For duplex drops use (Siemon part # MX-FP-S-02-02)
- For single-cable drops use (Siemon part # MX-FP-S-01-02)

5.4.11.8 Siemon UltraMAX 6 Hybrid modules (U6-HXX) wired to the T568B scheme shall be used with the faceplates, except in Keystone environments where Keystone Faceplates and Jacks shall be used.

5.4.11.9 Category 6 cables that are installed in modular furniture without accessible raceway and integrated furniture outlet openings shall terminate in Siemon SM series surface mount boxes (SM-4-02) for quad drops and (SM-2-02) for duplex drops with Siemon UltraMax hybrid modules (U6-HXX) wired to the T568B scheme.

5.4.11.10 Category 6 or 6A cables for access point support will be installed in the ceiling plenum using an SM2 mount with a 5' minimum service loop, or Siemon specialized AP recessed box MX-WB1-02-02.

5.4.11.11 Category 6 cables that are installed in private offices and other non-modular work areas where subsurface "GEM" boxes or "Caddy" type fasteners cannot be installed shall terminate in Siemon SM series surface mount boxes (SM-4-02) for quad drops and (SM-2-02) for duplex drops with Siemon UltraMax Hybrid 6 modules (U6-HXX), wired to the T568B scheme.

5.4.11.12 For applications where a larger number of CAT-6 cables need to be accommodated, Siemon White double-gang flush-mount faceplates (MX-FP-S-12-02) for 12-cable drops and (MX-FP-S-08-02) for 8-cable drops shall be used for Category 6 cable terminations.

5.4.11.13 Category 6 Cables entering SM boxes mounted to walls shall be contained in a raceway. White Panduit, size LD 3, LD5, LD10 size raceway shall be used.

5.4.11.14 Each faceplate or surface mount box shall be labeled, using label included with the faceplate or an appropriate P-Touch type, as follows: The rack number supporting this drop and the drop number.

- Example: Drop #12 being distributed from rack #1 would be labeled R1-012.

5.4.11.15 The cable installation contractor shall supply two (2) 10' Category 6 Patch Cable (VPI Part # CAT6-10-WHITE) or equivalent per drop for use at the work area.

5.4.12 Siemon Component Colors

5.4.12.1 The cable installation contractor shall consult with the Con Edison IT Project manager and/or architect before ordering materials for which a color has not been specified.

5.4.13 Voice Demarcation

5.4.13.1 The cable installation contractor shall supply, as directed in the bid specification's detailed Scope of Work, one 25-pair category 3 cable within the LAN Room with factory terminated male Amphenol connector.

5.4.13.2 The cable installation contractor shall supply and install 25-pair RJ66 Block male/female on backboard.

5.4.13.3 The cable installation contractor shall run the cables within the LAN room to the location directed in the bid specification's detailed Scope of Work.

5.4.13.4 The cable installation contractor shall supply and install within the cable racks one (1) DataPatch 25-port, 1-pair, RJ11 Panel (DataPatch part # RJ11-25-2T) for the 25-pair Category 3 cable.

5.4.13.5 The cable installation contractor shall connect both ends of Amphenol between the RJ66 Block & DataPatch panel and test for continuity.

5.4.13.6 The cable installation contractor shall supply and install black Category 3 (RJ11 plug to RJ45 plug) in a quantity to be called out in bid specification's detailed Scope of Work.

5.4.13.7 Patch cables shall be 7 feet in length for interconnection between the station panels and DataPatch panels. These cables shall be labeled and installed in neatly groomed bundles secured with Velcro strips, by the cable installation contractor according to a wiring connection matrix provided by Con Edison IT-CISD.

5.4.13.8 The pin-out for the RJ11 to RJ45 patch cable is as follows:

RJ11 End			RJ45 End	
Pin #	Pair ID		Pin #	Pair ID
			1	Not Connected
1	T3		2	T3
2	T2		3	T2
3	R1		4	R1
4	T1		5	T1
5	R2		6	R2
6	R3		7	R3
			8	Not Connected

5.5 Microwave Radios and Associated Cabling

5.5.1 Cambium Networks™ Microwave Radios PTP820E and PTP850E operate at greater than 1 GB throughput. When this radio is deployed, the Cambium Networks CAT-6A cable is to be encased in conduit through its entire length of travel, run, terminated, and tested.

5.5.1.1 Cambium Networks™ has two model numbers for the same CAT-6A cable depending on the length.

5.5.1.1.1 N000000L155A - 100 Meters / 328 Feet
5.5.1.1.2 N000082L172B - 305 Meters / 1000 Feet

5.5.2 Cambium Networks™ Microwave Radio PTP670 has a maximum throughput speed of 450Mbps. This is the CECONY standard microwave radio. When it is deployed, an outdoor copper clad CAT-5e cable is to be run, terminated, and tested. As this cable is armored and copper clad, it does not require conduit. The cable is purpose-built to be deployed with this radio.

5.5.2.1 Cambium Networks™ has two model numbers for the same CAT-5e cable depending on the length.

5.5.2.1.1 WB3176A - 100 Meters / 328 feet
5.5.2.1.2 WB3175A - 305 Meters / 1000 Feet

Figure 15 – Cambium Networks™ WB3175A (100m) or WB3176A (305m) Copper Clad Armored CAT-5e for PTP670.

5.5.2.1.3 All microwave cables, whether 5e or 6A must be grounded with a Cambium Networks™ Grounding Kit, Part Number: C000065L007B.

Figure 16 - Cambium Networks™ Grounding Kit, Part Number: C000065L007B.

SPECIFICATION NO. IT-CISD-FIB-STD-03

Consolidated Edison Company of New York
4 Irving Place, New York, New York 10003

Information Technology
Communications Infrastructure & Site Design

DESCRIPTION

Standard Specification for Installation of Air Blown (ABF) & Conventional Fiber

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Table of Contents

PURPOSE *3*
2.0 APPLICABILITY *3*
3.0 USERS, REVIEWERS AND APPROVERS *3*
4.0 EXCEPTIONS / DEVIATION PROCESS *3*
5.0 TECHNICAL REQUIREMENTS *4*
5.1 Technical Scope *4*
5.2 Cable Pathways *4*
5.3 Fiber Material Requirements *5*
5.4 Fiber Installation Requirements *13*
5.5 Fiber Termination Requirements *22*
5.6 Testing Requirements *24*
5.7 Fiber Labeling and Documentation Requirements *24*
5.8 Attachments *27*
5.9 Change Log *27*

PURPOSE

1.1 This specification provides the technical requirements for the design and installation of ABF and conventional fiber structured cabling systems used to connect devices within a local area network (LAN).

2.0 APPLICABILITY

2.1 This specification applies to corporate sites, control, centers, data centers and field sites.

3.0 USERS, REVIEWERS AND APPROVERS

3.1 The users of this specification are members of IT Communications Infrastructure & Site Design (CISD) group responsible for the design and build of LAN physical infrastructure including fiber structured cabling systems. Other users are contractors who also design and build copper structured cabling systems.

3.2 The approver of the document is the CISD Systems Manager. The group's LAN physical infrastructure SMEs will propose changes to the CISD Systems Manager. Revised documents will be placed in group's SharePoint public folder.

3.3 The review process is ongoing as new parts and technologies develop and are utilized. A formal review will take place annually in January by the CISD group to capture any changes that may not yet been incorporated.

3.4 Training requirements will be met by formal technical training by outside groups such as Sumitomo Electric Lightwave, by internal on the job training, and group collaboration.

4.0 EXCEPTIONS / DEVIATION PROCESS

4.1 CISD will follow a review and approval process for interim changes required during emergent situations.

4.2 Interim changes will be handled by email or verbal notification by the CISD Systems Manager and/or the appropriate CISD SMEs.

4.3 The process and forum for communicating Interim changes will be periodic staff meetings or by teleconference scheduled by the CISD Systems Manager.

5.0 TECHNICAL REQUIREMENTS

5.1 Technical Scope

5.1.1 Unless otherwise stated in the bid specification or MiniPO, the work to be done by the Contractor as described in the Scope of Work section of the project specification (bid spec or MiniPO) shall be done in accordance with the requirements set forth in this document.

5.1.2 Any deviation from the CISD Materials and Installation requirements listed below, must receive prior approval from the CISD Project Manager. Deviations not receiving prior written approval will be subject to replacement and/or correction at the Contractors expense.

5.2 Cable Pathways

5.2.1 The CISD project manager is responsible for identifying preliminary cable pathways.

5.2.2 Since the pathways provided by the CISD Project manager are preliminary, it is the Contractors responsibility to develop a defined cable pathway.

5.2.3 The Contractor is responsible for adhering to all local and environmental regulations regardless of what might be stated in the Specification or Scope of Work. If directions conflict with regulations, these need to be raised and discussed. A solution needs to be provided by the CISD PM or an EH&S representative, in writing, before work can proceed.

5.2.4 The Contractor shall ensure that pathways qualify for Sumitomo Certification and extended warranty if ABF is being installed.

5.2.5 Con Edison CISD, and the site Environmental representative must review and approve the cable pathway design before installation begins.

5.2.6 The Contractor’s certification technician is required to review the proposed cable pathway with the CISD Project Manager.

5.2.7 The Contractor shall obtain from the CISD project manager, prior to beginning any work, approval of the finalized cable pathways.

5.3 Fiber Material Requirements

5.3.1 Sumitomo Air Blown Fiber Materials

5.3.1.1 Tube Cable

5.3.1.1.1 When an Outdoor-rated aerial or duct tube cable requiring enhanced thermal stability is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19MSOS
- For 7-Tube cable, use Sumitomo part #TC07MSOS
- For 4-Tube cable, use Sumitomo part #TC04MSOS
- For 2-Tube cable, use Sumitomo part #TC02MSOS

Figure 1 - MSOS Tube Cable

5.3.1.1.2 When an Outdoor-rated aerial or duct tube cable requiring enhanced thermal stability and extremely rugged, high crush resistance armoring is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19MSOS-2
- For 7-Tube cable, use Sumitomo part #TC07MSOS-2
- For 4-Tube cable, use Sumitomo part #TC04MSOS-2
- For 2-Tube cable, use Sumitomo part #TC02MSOS-2

5.3.1.1.3 When an Outdoor-rated duct or direct buried tube cable is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TOX
- For 7-Tube cable, use Sumitomo part #TC07TOX
- For 4-Tube cable, use Sumitomo part #TC04TOD
- For 2-Tube cable, use Sumitomo part #TC02TOX

Figure 2 - TOX & TOD Tube Cable

5.3.1.1.4 When an Outdoor-rated duct or direct buried tube cable requiring extremely rugged, high crush resistance armoring is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TOX-2
- For 7-Tube cable, use Sumitomo part #TC07TOX-2

- For 4-Tube cable, use Sumitomo part #TC04TOD-2
- For 2-Tube cable, use Sumitomo part #TC02TOX-2

Figure 3 - TOX-2 Tube Cable

5.3.1.1.5 When an Indoor Riser-rated jacketed tube cable is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TRC
- For 7-Tube cable, use Sumitomo part #TC07TRC
- For 4-Tube cable, use Sumitomo part #TC04TRC
- For 2-Tube cable, use Sumitomo part #TC02TRC

Figure 4 - TRC Tube Cable

5.3.1.1.6 When an Indoor Riser-rated jacketed tube cable with extremely rugged, high crush resistance armoring is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TRC-1
- For 7-Tube cable, use Sumitomo part #TC07TRC-1
- For 4-Tube cable, use Sumitomo part #TC04TRC-1
- For 2-Tube cable, use Sumitomo part #TC02TRC-1

5.3.1.1.7 When an Indoor Plenum-rated jacketed tube cable is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TP2
- For 7-Tube cable, use Sumitomo part #TC07TP2
- For 4-Tube cable, use Sumitomo part #TC04TP2
- For 2-Tube cable, use Sumitomo part #TC02TP2

Figure 5 - TP2 Tube Cable

5.3.1.1.8 When an Indoor Plenum-rated jacketed tube cable with extremely rugged, high crush resistance armoring is called for, the following shall be used:

- For 19-Tube cable, use Sumitomo part #TC19TP2-1
- For 7-Tube cable, use Sumitomo part #TC07TP2-1
- For 4-Tube cable, use Sumitomo part #TC04TP2-1
- For 2-Tube cable, use Sumitomo part #TC02TP2-1

5.3.1.1.9 When a low tube count general purpose-rated non-jacketed tube cable that will be run entirely in Conduit is called for, the following may be used:

- For 7-Tube Speed Wrapped cable, use Sumitomo part #TC07TGX (special order)
- For 2-Tube Speed Wrapped cable, use Sumitomo part #TC02TGX (special order)
- For 1-Tube cable, use Sumitomo part #TC01TGX

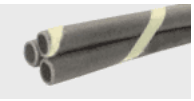

Figure 6 - TGX Tube Cable
(3-tube shown no longer available)

5.3.1.1.10 When tube interconnections inside Tube Distribution Units (TDUs) or at fiber termination points a clear tube shall be used.

- For 8mm clear tube cable, use Sumitomo Part# TC01TCX
- For 5mm clear tube cable, use Sumitomo Part# TC01T5M

5.3.1.2 Air Blown Fiber

5.3.1.2.1 Blown fiber is available in 4 sizes - 6, 12, 18 & 24-strand fiber bundles, in both single-mode and multi-mode types. The following fiber shall be used as required.

- Single-mode 6-strand – Part# FB06SX
- Single-mode 12-strand – Part# FB12SX
- Single-mode 24-strand – Part# FB24SX
- 50 micron (μ) Multi-mode 6-strand – Part# FB06M5
- 50μ Multi-mode 12-strand – Part# FB12M5
- 50μ Multi-mode 24-strand – Part# FB24M5

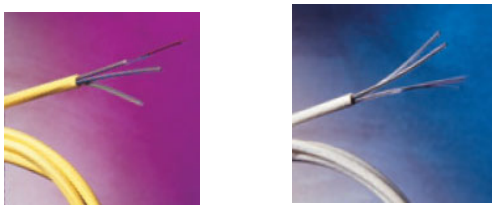

Figure 7 - SM & 50 micron MM Fiber Bundle

5.3.1.3 Fiber Preparation

5.3.1.3.1 Fiber breakout kits shall be used when terminating multi-mode fiber directly onto fiber connectors at both ends of a fiber bundle. The following breakout kits shall be used.

- 6-strand breakout kit – Part# FTFLD06
- 12-strand breakout kit – Part# FTFLD12
- 24-strand breakout kit – Part# FTFLD24

Figure 8 - 24-fiber Bundle Breakout Kit (w/ 900 micron Tubing)

5.3.1.4 Tube Distribution Units

5.3.1.4.1 Tube interconnections are made within Tube Distribution Units (TDU). TDU's are available as needed in various sizes as follows:

- Wall Mount, indoor TDU 16"H x 16"W x 4"D, 5 Lbs with a Tube Capacity for 42 Tubes – Sumitomo Part# DE06MDU
- Wall Mount, indoor NEMA 1-rated TDU 20"H x 20"W x 6.5"D, 27 Lbs with a Tube Capacity for 84 Tubes – Sumitomo Part# DE20IDU or equivalent
- Wall Mount, indoor NEMA 12-rated TDU 36"H x 30"W x 6.5"D, 70 Lbs with a Tube Capacity for 168 Tubes – Sumitomo Part# DE24IDU or equivalent
- For outdoor-rated TDU's, a Stainless Steel Hoffman box with rubber gasket and O-Ringed screws shall be used.

5.3.1.5 Tube Splicing

5.3.1.5.1 8mm straight tube couplers (Sumitomo part# DE08MC2) shall be used to splice (connect) two segments of tube cable; such as when making interconnections within TDU's or when connecting tubes to clear tubing.

Figure 9 - DE08MC2 Straight Tube Coupling (8mm)

5.3.1.5.2 8mm-to-5mm reducing tube couplers (Sumitomo part# DE05RC2) shall be used to splice (connect) a segment of 8mm tube cable to a segment of 5mm clear tube (e.g. when routing tubes into a fiber termination panel).

Figure 10 - DE05RC2 8mm-to-5mm Reducing Coupling (8mm)

5.3.1.5.3 Bulkhead Tube Coupler (Sumitomo part# DE08MB) shall be used to couple tubes segments passing through a TDU bulkhead.

Figure 11 - DE08MB Bulkhead Tube Coupler

5.3.1.5.4 Tube caps (Sumitomo part# DE08MA) shall be used to seal unused tubes.

Figure 12 - DE08MA Tube Cap to Seal Empty Tubes

5.3.2 Conventional Fiber Material

5.3.2.1 Cable

5.3.2.1.1 When used for indoor applications, use Corning MIC® DX armored plenum cables which are standard MIC subunits placed inside a dielectric armor for ruggedness and superior crush resistance without the conductive properties of traditional armor. These cables are designed for use in intra-building backbone and horizontal installations.

5.3.2.1.2 For Multi-Mode, use XXXT88-31180-D3 - MIC® DX Tight-Buffered Armored Cable, Plenum, 12 F, 50 µm multimode (OM3), where XXX represents the number of strands (in increments of 6).

5.3.2.1.3 For Single-Mode, use XXXE88-33131-D3 - MIC® DX Tight-Buffered Armored Cable, Plenum, 24 F, Single-mode (OS2), where XXX represents the number of strands (available in 6, 12 & 24 Strands).

5.3.2.1.4 When used for indoor/outdoor applications, use Corning FREEDM® loose tube gel-free plenum cables, which are flame-retardant, indoor/outdoor,

plenum-rated cables suitable for installation in inter-building and intra-building backbones in aerial, duct and riser or plenum applications.

5.3.2.1.5 For Multi-Mode, use XXXT8P-31180-29 - FREEDM® One Tight-Buffered Cable, Plenum, 12 F, 50 µm multimode (OM3), where XXX represents the number of strands (in increments of 6).

5.3.2.1.6 For Single-Mode, use XXXE8P-31131-29 - FREEDM® One Tight-Buffered Cable, Plenum, 24 F, Single-mode (OS2), where XXX represents the number of strands (available in 6, 12, 18 & 24 Strands).

5.3.2.1.7 When used for outdoor applications, use Corning ALTOS® all-dielectric gel-free cables, which are designed for outdoor and limited (up to total of 50') indoor use for campus backbones in lashed aerial and duct installations

5.3.2.1.8 For Multi-Mode use, 012TU4-T4180D20 - ALTOS® Loose Tube, Gel-Free Cable, 12 F, 50 µm multimode (OM3), where XXX represents the number of strands (in increments of 6).

5.3.2.1.9 For Single-Mode, use 060EU4-T4100D20 ALTOS® Loose Tube, Gel-Free Cable, 60 F, Single-mode (OS2), where XXX represents the number of strands (in increments of 6).

5.3.2.2 Fiber Preparation

5.3.2.2.1 Buffer Tube Fan-Out Kits shall be installed on the end of an ALTOS® Loose Tube fiber cables.

5.3.2.2.2 The following breakout kits shall be used when terminating fiber connectors directly onto a cable end that will be installed in an outdoor environment.

- 6-strand outdoor breakout kit – Part# FAN-OD25-06
- 12-strand outdoor breakout kit – Part# FAN-OD25-12

Figure 13 - FAN-OD25-12 Outdoor Breakout Kit

5.3.2.2.3 The following breakout kits shall be used when terminating fiber connectors directly onto a cable end that will be installed in an indoor environment.

- 6-strand indoor breakout kit – Part# FAN-BT25-06
- 12-strand indoor breakout kit – Part# FAN-BT25-12

Figure 14 - FAN-BT25-12 Indoor Breakout Kit

5.3.3 Pre-Terminated MPO Fiber Material

5.3.3.1 Trunk Cables

5.3.3.1.1 The advent of high speed (40/100 Gb) in backbone and server farm applications necessitates use of multi-pair fiber connections. To accommodate high pair counts, MPO (Multi-fiber Push On) type connectors

are used. Specifically an enhanced performance MTP® type MPO connector shall be used.

5.3.3.1.2 For relatively short runs of fiber where factory terminated connections are desirable such as in Server Farms, pre-terminated fiber trunk cables with non-pinned connectors shall be installed.

5.3.3.1.3 Ordering information for Corning MTP® Trunk cable is as follows:

- For Box 1 (**Grips**) select:
  A = Grip on one end only
  N = No grip
- For Box 2 & 3 (**MTP Connector type**) select:
  75 = 50 MM (OM3/OM4)
  90 = Single-mode (OS2)
- For Box 4 **(# Fibers**) select:
  12 = 12 fibers 72 = 72 fibers
  24 = 24 fibers 96 = 96 fibers
  36 = 36 fibers E4 = 144 fibers
  48 = 48 fibers
- For Box 5 (**Fiber type**) select:
  T = 50 multimode (OM3)
  Q = 50 multimode (OM4)
  G = Single-mode (OS2)
- For Box 6 (**Armored cable**) select:
  PN = Non-armored plenum
  AD = Armored plenum
- For Boxes 7 & 8 (**Furcation Leg Length**) select:
  A = 24”
  B = 36”
- For Box 9 (**Cable Length**) select:
  001-999
- For Box 10 (**Unit of Measure**) select:
  M = Meters
  F = Feet

5.3.3.1.4 For typical Server Farm Single-Mode applications, use Corning Part# A909024GPNBBUyyyF trunk cable (or equivalent), This corresponds to a Single-mode (OS2), non-Armored trunk cable with non-pinned MTP to non-pinned MTP connectors, 36” legs on both ends, with pulling grip at one end and where yyy represents the cable length.

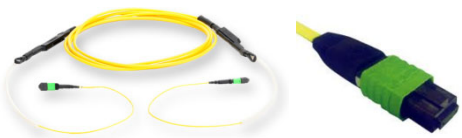

Figure 15 - A909024GPNBBUyyyF

5.3.3.2 For typical Server Farm Multi-Mode applications, use Corning Part# A757524QPNBBUyyyF trunk cable (or equivalent), This corresponds to a Multi-mode (OM3), non-Armored trunk cable with non-pinned MTP to non-pinned MTP connectors, 36” legs on both ends, with pulling grip at one end and where yyy represents the cable length.

5.3.3.3 Coupler Panels

5.3.3.3.1 Where a limited number of trunk cables need to be installed, Corning Plug & Play™ Universal Module should be used to breakout the individual fiber strands onto LC connector couplers.

5.3.3.3.2 A Plug & Play Module (Corning Part# CCH-UM12-04-89G, CCH-UM24-04-89G) shall be used for 12-Strand and 24-strand SM Trank cables respectively.

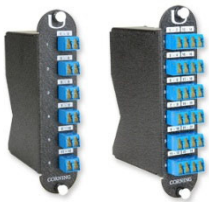

Figure 16 - CCH-UM12-04-89G, CCH-UM24-04-89G
Plug & Play™ Universal Module, 12 and 24 F,
Shuttered LC to MTP®, Single-mode (OS2)

5.3.3.3.3 A Plug & Play Module (Corning Part# CCH-UM12-05-93T, CCH-UM24-05-93T) shall be used for 12-Strand and 24-strand MM trunk cables respectively.

5.3.3.3.4 For trunk cables that contain more than 24 strands of fiber, a combination of 12 & 24 strand modules shall be used.

5.3.3.3.5 For applications that will require a large number of trunk cables or high strand count trunk cables, a MTP adapter panel should be used.

5.3.3.3.6 For SM (OS2) fiber Trunks use a CCH Panel with six MTP adapters (Corning Part# CCH-CP72-89).

Figure 17 - CCH-CP72-E3 –Closet Connector Housing (CCH) Panel
MTP® adapters, 72 F, Single-mode (OS2)

5.3.3.3.7 For MM fiber Trunks use a CCH Panel with six MTP adapters (Corning Part# CCH-CP72-89).

5.3.3.3.8 When CCH MTP panels are used, a female MTP fanout harness should be used to interface with equipment.

5.3.3.3.9 The MTP fanout harness cables are available as MTP to LC and MTP to SC in both SM (OS2) and MM (OM3) fiber.

5.3.3.3.10 These harnesses are available from various vendors such as:

- SANSPOT.COM
- FIBERTRONICS.COM
- LEVITON.COM

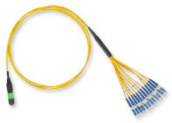

Figure 18 - MTP® to LC Single-mode (OS2) Fanout Cable

5.4 Fiber Installation Requirements

5.4.1 Sumitomo Air Blown Fiber Installation Requirements

5.4.1.1 Any deviation from the Sumitomo ABF installation requirements listed below, must receive prior approval from the CISD Project Manager. Deviations not receiving prior written approval will be subject to correction at the Contractors expense.

5.4.1.2 Tube cable shall be installed as described in the Sumitomo FutureFLEX Tube Cable Installation Procedure Document #SP-F04-008.

5.4.1.3 TP2 type tube cable shall be installed as described in the Sumitomo Recommended Procedure Document #SRP SP-F04-029 – Plenum-Rated Jacketed Tube Cable TCXXTP2 Installation Procedures.

5.4.1.4 All tube cables containing internal metallic elements (i.e. any cables with a -1 or -2 suffix) shall be properly grounded as described in the Sumitomo Recommended Procedure Document #SRP SP-F04-030 – Plenum-Grounding & Bonding Metallic Tube Cable Procedure using a DE09SBK Bonding Kit.

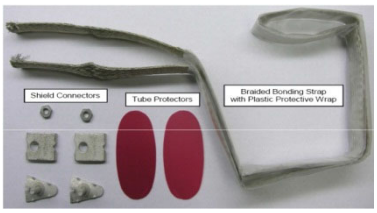

Figure 19 - DE09SBK Bonding Kit

5.4.1.5 Fiber bundles shall be installed in accordance with the Sumitomo Blowing Equipment Set-up and Fiber Bundle Installation Procedure Document SP-F04-001 & SP-F04-002.

5.4.1.6 Fiber bundle preparation for terminations shall be installed in accordance with the Field Termination Kit Installation Procedure Document SP-F04-010.

5.4.1.7 All vertical fiber runs shall have strain relief installed at a minimum of every 15 feet, using Single Weave Rod Closing Grips in accordance with the Kellems Grips Installation Procedure Document SP-F04-024.

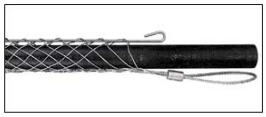

Figure 20 - Single Weave Rod Closing Strain Relief Grips

5.4.1.8 Vertical fiber runs that will attach to a Messenger Cable, shall utilize a Q Span Clamp attached to the messenger cable, to which the Kellems grip will attach.

Figure 21 - Q Span Clamp

5.4.1.9 Tube Cable entering an outdoor TDU, shall have strain relief applied using a **Liquid Tight Grips** fitting (see Figure 22A), attached to the TDU as detailed in Kellems Grips Installation Procedure Document SP-F04-024 and Table I.

5.4.1.10 Tube Cable entering an indoor TDU and that requires Strain Relief, shall have strain relief applied using a **Dust Tight Grips** fitting (see Figure 22B), attached to the TDU as detailed in Kellems Grips Installation Procedure Document SP-F04-037 and Table I.

5.4.1.11 Tube Cable entering an indoor TDU and that doesn't require Strain Relief, shall have strain relief applied using a **Cable Entry Seal** fitting (see Figure 22C), attached to the TDU as detailed in Kellems Grips Installation Procedure Document SP-F04-037 and Table I.

Figure 22A - Liquid Tight Grip

Figure 22B - Dust Tight Grip

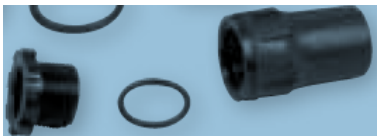

Figure 22C – Cable Entry Seal

5.4.1.12 See below for a complete list of SRP's (**S**umitomo **R**ecommended **P**rocedures

INDEX OF SUMITOMO RECOMMENDED PROCEDURES SP-F04-XXX

NO.	SUMITOMO RECOMMENDED PROCEDURE TITLE	ISSUE	REV
001	Blowing Equipment Set-up Procedure	08/13	19
002	Fiber Bundle Installation Procedure (with Addendum)	08/13	21
003	Tube Pressure Testing Procedure (with Addendum)	03/11	13
004	Tube Obstruction Testing Procedure (with Addendum)	03/11	14
005	Indoor, Wall-Mount TDU Installation Procedure	03/11	7
006	Fiber Bundle Stripping Procedure	03/11	6
008	Tube Cable Installation Procedures	03/11	8
010	Field Termination Kit Procedure for FTFLD02 thru FTFLD18 900µm Sub-Unit Kits	03/11	6
011	Restoration Procedure - Dielectric Tube Cables & Tube Cable Splice Kits	03/11	5
012	Restoration Procedure – Armored Tube Cables & Splice Case Kits	03/11	3
013	Rack-Mount Tube Cable Termination Panel Assembly Procedure	03/11	5
015	Splice Case Kit Installation Procedures	09/11	10
016	Tube Cable Splice Kit Installation Procedure	03/11	8
019	Tube & Tube Cable Sealing Procedures	03/11	5
024	Installation Procedures for Liquid-Tight Kellems® Grips	08/13	13
025	Fiber Bundle Removal Procedure	08/13	8
026	Tandem Blowing Procedure	08/13	10
027	Mid-Span Blowing with a Figure 8 Procedure	08/13	10
028	Segment Blowing with a Figure 8 Procedure	08/13	10
029	Plenum-Rated Jacketed Tube Cable TCxxTP2 Installation Procedures	03/11	5
030	Grounding & Bonding Armored Tube Cable Procedures	03/11	3
031	Tube Cable Splicing Procedures	03/11	3
032	Sealing Procedures for FutureFLEX Tube Cables Located in Class I, Division 1 & 2 Environments (with Addendum)	03/11	7
033	Sealing Procedures for FutureFLEX Tubes Located In Class I, Division 1 & 2 Environments	03/11	3
036	Field Termination Kit Procedure for FTFLD24 900µm Sub-Unit Kit	03/11	2
037	Installation Procedures for Strain Relief Kellems Grips	01/12	4
038	Installation Procedures for Cable Entry Seals	03/11	3
039	Armored Tube Cable Installation Procedures	03/11	0

Sumitomo Electric Lightwave reserves the right to improve or modify these specifications without notice.

Figure 23 - Master List of SRP's

5.4.1.13 Tube cable shall be installed such that it is supported using cable hangers at 5' intervals. This support may consist of cable runway, conduit and/or split Inner-duct with J-hooks as applicable, but in a manner that does not void Sumitomo extended warranty.

5.4.1.14 Tube cable runs in areas where cable hangers cannot be installed at 5' intervals shall utilize messenger wire and ring baskets or equivalent means.

5.4.1.15 Aerial portions of tube cable runs shall utilize messenger wire and ring baskets or equivalent means.

5.4.1.16 A minimum bend radius of 20 times the cables outer diameter shall be adhered to throughout the pull of the cable. A minimum bend radius of 10 times the cables outer diameter shall be adhered to at final installation position. Bends should not exceed 90 degrees during pull or final installations (see Attachment 2 Figure 10 for an illustration of proper and improper bend radius).

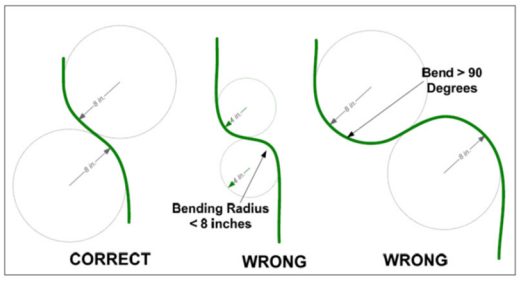

Figure 24 - Example of the correct way to measure a minimum bend radius

5.4.1.17 TP2 Jacketed Plenum-rated Tube cable shall never be installed with any portion of the tube cable resting on a horizontal surface, unless it is enclosed in conduit or split Inner-duct.

5.4.1.18 When in-line tube cable splicing is required, it shall be done utilizing a 4” by 4” by 2’ Wireway with screw down cover and end caps, Milbank Part# 4424-GHC1-NK & 44GE-NK or equivalent.

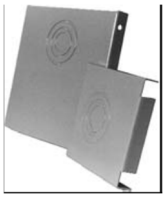

Figure 25 - Milbank 4424-GHC1-NK
4” by 4” by 24” GHC1 Lay-In Wireway Type 1 (No Knockouts) and
44GE-NK – 4” by 4” End Cap (No Knockouts)

5.4.1.19 Wireway must be fixed to a solid surface or solidly supported by pencil rods. Holes shall be punched in both end caps to accommodate a properly sized Kellems grip based on the type & size tube cable.

5.4.1.20 Within the wireway, the tube cable outer jacketing shall be removed to expose individual tubes. Each tube shall have a label applied to the tube that clearly indicates the tube number. Labels shall consist of Panduit PAN Code Labels Part# PCMB-1 or equivalent (see Attachment Figure 4)

Figure 26 - Panduit PCMB-1 - Wire Marker Book, Vinyl Cloth, '0-9', 10 Pg

5.4.1.21 Tubes shall be coupled using a straight tube coupler. Splices should be installed in a staggered fashion, so that they don't bunch together as illustrated below.

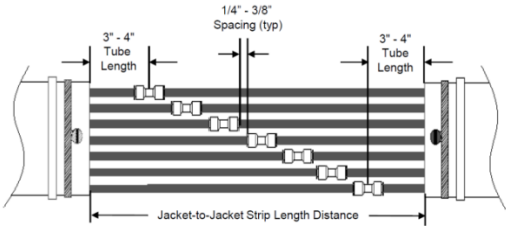

Figure 27 – Spliced Tube – Coupler spacing

5.4.1.22 When tube cable jacket is removed, such as in a TDU, Splice box or at the rack, the spaces in and around the tubes, should be filled with either a silicone based product or a fire-stop material. This is required to prevent smoke from using the tube cable as a pathway for smoke spreading to other areas.

5.4.1.23 Tubing shall be square cut prior to installing couplers using a tubing cutter (e.g. Sumitomo part# BETC001 or equivalent)

Figure 28 - BETC001 Tubing Cutter

5.4.1.24 When coupling tubes within a TDU in preparation for blowing fiber, a pair of couplers and a segment of 8mm clear tube cable (Sumitomo Part# TC01TCX) shall be installed between the two tubes. Pre-numbered vinyl cloth based Wraparound labels should be attached to each end of the translucent tube with

the label number indicating the tube number it is being coupled to (See Attachment 2 Figure 1).

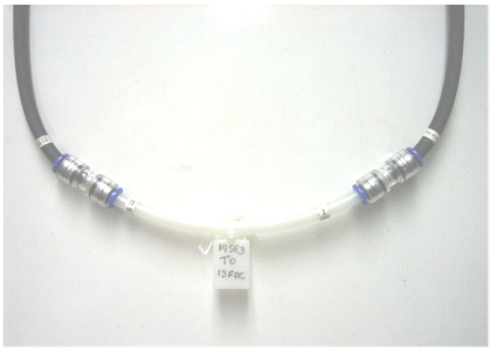

Figure 29 Sample of coupled tubes with translucent tube and labels

5.4.1.25 When a single 8mm clear tube (Sumitomo Part# TC01TCX) is brought directly into a TDU, a Bulkhead Tube Coupler (Sumitomo part# DE08MB) shall be used to couple tube to a second segment of tube within the TDU.

5.4.1.26 When routing tube cables into their respective racks, they shall be bundled and lashed to cable runways, utilizing Velcro straps only. Never use Nylon Tie-Wraps on TP2 type cable, even as a temporary support measure during installation.

5.4.1.27 Tube cable entering a cabinet; shall have the outer jacket surrounding the individual tubes removed within 12 inches after entering the cabinet.

5.4.1.28 When tube cable is brought to a rack, the outer jacket surrounding the individual tubes shall be removed within 12 inches before reaching the rack. When using a metallic jacketed tube cable, the jacket shall be removed within 2 feet from the entry into the room. The Braided Bonding Straps that are part of the DE09SBK Bonding Kit shall be bonded to a #4AWG green jacketed stranded wire, which in turn is bonded to the room's Master Ground Bar (MGB) at each end of the tube cable.

5.4.1.29 Individual tubes shall extend beyond the outer jacket separated by 1.5 inches in a staggered fashion, as follows:

- Tube #1: 3“ Tube #8: 3” Tube #14: 3”
- Tube #2: 4.5” Tube #9: 4.5” Tube #15: 4.5”
- Tube #3: 6” Tube #10: 6” Tube #16: 6”
- Tube #4: 7.5” Tube #11: 7.5” Tube #17: 7.5”
- Tube #5: 9” Tube #12: 9” Tube #18: 9”
- Tube #6: 10.5” Tube #13: 10.5” Tube #19: 10.5”
- Tube #7: 12”

5.4.1.30 8mm clear tubing (Sumitomo part# TC01TCX) shall be connected to the inner tubes of a tube cable using tube couplers to extend the tubes to racks.

5.4.1.31 5mm clear tubing (Sumitomo part# TC01T5M) shall be connected to the inner tubes of a tube cable using 8mm-to-5mm reducing couplers, to extend the tubes to into fiber termination panels.

5.4.1.32 All unused tubes shall be capped with a tube cap (Sumitomo part# DE08MA). This is required to prevent dirt or bugs from entering the tube. More importantly, this is required to prevent smoke from using the tube as a pathway for smoke spreading to other areas.

5.4.1.33 A service loop consisting of one 18” diameter coil of clear tubing shall be installed on the ladder leading to a rack or cabinet.

5.4.2 Conventional Fiber Installation Guidelines

5.4.2.1 Always follow the cable manufacturer's recommendations. Fiber optic cable is often custom-designed for a specific type of installation and the manufacturer may have specific instructions on its installation.

5.4.2.2 When installing fiber, never directly pull on the fiber itself; pull on the fiber cable strength members only!

5.4.2.3 Never exceed the maximum pulling load rating. On long runs, use proper lubricants and make sure they are compatible with the cable jacket. On exceptionally long runs pull from the middle out to both ends. If possible, use an automated puller with tension control or at least a breakaway pulling eye. Know and observe the maximum recommended load rating of the cable.

5.4.2.4 Never exceed the cable bend radius. Fiber is strong when you pull it straight, but it breaks easily when bent too tightly. Damage to the fibers may be immediate or may take a few years to develop, but will require replacement in any case.

5.4.2.5 In tray and rack installations, the minimum bend radius must also be monitored, because the cable will be routed around corners or through transitions. Where raceway or rack transitions expose the cable, flexible conduit such as Innerduct should be used for protection.

5.4.2.6 Always roll the cable off the spool instead of spinning it off the spool end to prevent putting a twist in the cable for every turn on the spool. Putting a twist in the cable can adversely stress the fibers.

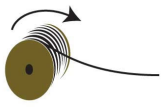

Figure 30 – Cable Unspooling

5.4.2.7 Unless space is an issue, fiber shall be installed in Innerduct. It provides a good way to identify fiber optic cable and protect it from damage. Innerduct is available with pulling tape already installed.

5.4.2.8 When fiber is pulled through conduit or duct, use fiber optic cable lubricant. Lubrication reduces the pulling load and the chance of breakage. The lubricant must be compatible with the cable jacket material.

5.4.2.9 Comply with vertical rise limits. Know and observe the maximum vertical rise distance limit. Exceeding this limit may result in fiber breakage, excess attenuation, and, in loose tube cables, fibers sliding from cables. Cables in vertical installations that are longer than the vertical rise limit must be tied off at distances less than this limit. Loose tube cables must be looped.

5.4.2.10 Support cables at frequent intervals to prevent excess stress on the jacket. Support can be provided by Hook-and-loop fastener ties are preferred for fiber optic cables, as they cannot apply crush loads sufficient to harm the cable or Kellems grips.

5.4.2.11 Drop vertical cables down rather than pulling them up whenever possible.

5.4.2.12 Allow for thermal expansion and contraction. In outdoor installations, allow for 2.5 foot sag per 150 foot span for thermal expansion and contraction. Failure to allow for thermal expansion may result in increased attenuation and breakage of fibers.

5.4.2.13 Check fiber continuity and attenuation. These checks should be performed as-received/before installation, after installation, after splicing, and after connector installation. This helps prevent wasted effort resulting from faulty cable or pulls.

5.4.2.14 Mark cable as “Fiber Optic Cable” in all locations in which it can be easily reached. Such marking will alert others to the nature of the cable.

5.4.2.15 Leave service loops 20-30 feet near the ends and mid-span on very long runs. Service loops allow the pull of the excess fiber into a location where a repair may be required.

5.4.2.16 Prevent heavy objects such as vehicles or heavy cable reels from rolling over the fiber cable.

5.4.2.17 When outdoor rated fiber cable enters a building, it should be spliced to an indoor-type fiber cable within 50 feet from the cable entrance to meet NEC code.

5.4.2.18 Design conduit runs with as few bends as possible. If a large number of bends are required in the run, install junction boxes to reduce the number of bends.

5.4.2.19 Use plastic bushings on conduit ends to avoid damage to the cable during the pull.

Figure 31 – Plastic Bushing

5.4.2.20 For cables using aramid yarn alone as the strength member, the jacket should be removed to expose the yarn. The yarn should be tied in a knot with the pull rope, so that the jacket will not be inadvertently used for strength. Optionally, the jacket can be tied into a tight knot before pulling. After pulling, the knot should be cut off.

Figure 32 – Knotted Cable

5.4.2.21 For cables using aramid yarn and a fiberglass central member, a pulling grip should be used. The strength member should be attached independently. This can be accomplished by weaving the strength member into the fingers of the grip, and then taping it together. All strength members should be gripped equally to ensure proper distribution of tension.

Figure 33 – Cable Pulling Grip

5.4.2.22 Always use a swivel pulling eye because pulling tension will cause twisting forces on the cable.

Figure 34 – Swivel Pulling Eye

5.4.2.23 Make every effort to pull cables from a conduit in as straight an angle as possible. Pulling on an angle can cause damage to the cable.

5.4.2.24 Maintain proper clearance between the fiber optic cable and power cable at all times. Always make allowances for power cable sag due to weather and current conditions. Cable sag increases in warm weather or when power cable is passing heavy current.

5.4.2.25 When a steel messenger wire is used for aerial installation, avoid installing the messenger wire in zigzag fashion from one pole side to the other. Instead, make sure it is kept on one side as much as possible

5.4.2.26 Cables should never be allowed to hang freely for long distances or to press against edges in an installation.

5.4.2.27 For horizontal conduit runs, length should be limited to 100 feet, with no more than two 90-degree bends between pull points or boxes.

5.4.2.28 Pull boxes should not be used for splicing cable.

5.4.2.29 Requirements for conduit installation and sizing as stated in the Electronic Industries Association/Telecommunications Industry Association 569 standard should be followed.

5.4.2.30 When Plenum runs or runs in dropped ceilings or raised floors are used for environmental air handling, the fiber cable must be plenum-rated.

5.4.2.31 Cables in these spaces should be supported in some way, ideally in organized, easy-maintenance trays, wireways or racks. At the very least, cables can be supported by I-hooks or bridle rings.

5.4.2.32 While cable trays provide sturdy support and basic protection for cable, there are still stresses to which the cable may be subjected. Routes should be inspected for sharp turns, snags (sometimes from other cables) and rough surfaces. Run fiber cable without pulling it under or between heavier cable and multiple cables that may stress the fiber.

5.4.2.33 For installations that require that the cable be installed in risers, use a cable rated as OFNR, at a minimum.

5.4.3 Pre-Terminated Fiber Installation Guidelines

5.4.3.1 Cables shall be installed in cable trays or runway.

5.4.3.2 Cables shall not be pulled; rather they shall be laid onto runway.

5.4.3.3 While cable trays provide sturdy support and basic protection for cable, there are still stresses to which the cable may be subjected. Routes should be inspected for sharp turns, snags (sometimes from other cables) and rough surfaces.

5.4.3.4 Cable must not be installed under or between heavier cable and multiple cables that may stress the fiber.

5.5 Fiber Termination Requirements

5.5.1 The contractor shall terminate multi-mode fiber using Corning UniCam ceramic LC Connectors (Corning part # 95-050-99).

Figure 35 - Corning 95-050-99 LC Unicam Fiber connector

5.5.2 The contractor shall terminate all single-mode fiber using a fusion splice method.

5.5.3 The contractor shall obtain prior training from Sumitomo in the proper methodology for using and splicing the LYNX2 connectors.

5.5.4 The Single-Mode fiber shall be spliced onto Sumitomo part# LYNX2-LCUPCSM-900LT splice-on LC connectors. This connector comes as a kit that includes the connector, an integral fiber pigtail as well as a heat shrink splice protector.

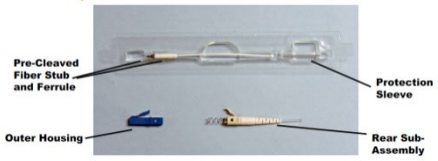

Figure 36 – Sumitomo LYNX2-LCUPCSM-900LT splice-on LC connector

5.5.5 The LYNX2 connector splice is applied to the Single-Mode fiber using a Sumitomo TYPE 25e or equivalent Sumitomo approved Fusion Splicer.

Figure 37 - Sumitomo TYPE 25e Fusion Splicer

5.5.6 Terminated Multimode and Single-Mode fiber shall be connected to coupler panels. Acceptable coupler panels are available in two sizes, either 12 or 24 LC duplex fiber couplers.

5.5.7 The 12-fiber adapter panels shall be used to support the 6 and 12-strand multi-mode fiber bundles. When used for a 6-strand fiber bundle, panel label shall indicate that the last three couplers are blank

5.5.8 The 24-fiber adapter panels shall be used to support the 18 and 24-strand multi-mode fiber bundles. When used for a 18-strand fiber bundle, panel label shall indicate that the last three couplers are blank.

5.5.9 Pre-terminated fiber shall be installed onto the rear of a Plug & Play™ Universal Module.

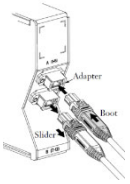

Figure 38 – Rear view of a Corning Plug & Play™ Universal Module

5.5.10 Coupler panels shall be installed in a Corning PCH Pretium connector housing. Use Part# PCH-04U to support up to twelve coupler panels. When space is limited, use a Corning part# CCH-03U, where six or less coupler panels are required, a PCH-02U where four or less couplers are required or a PCH-01U where two or less coupler panels are required. If space is not available for 19” rack mount housings, use a SPH-01P for a single coupler panel.

Figure 39 - Corning PCH-04U, CCH-04U, CCH-03U & SPH-01P Fiber Coupler Housings

5.6 Testing Requirements

5.6.1 Following tube cable installation, a pressure test shall be performed for all tubes within a cable as described in the Sumitomo FutureFLEX Tube Pressure Testing Procedure Document SP-F04-003.

5.6.2 Following tube cable pressure testing, a plastic bead obstruction test shall be performed for all tubes within a cable as described in the Sumitomo FutureFLEX Tube Obstruction Testing Procedure Document SP-F04-004. **Please note:** When performing obstruction testing on TP2 Type cable, a 4mm OD Plastic Bead must be used for the obstruction test. All other tube cables are tested with a 5mm Bead

5.6.3 Prior to any fiber blow, a pressure and plastic bead obstruction test shall be performed on the complete tube circuit.

5.6.4 All ABF fiber cable shall be tested as required to qualify for Sumitomo Extended Warranty.

5.6.5 Multi-Mode Fiber terminations shall be tested using a dB attenuation loss meter.

5.6.6 Single-Mode Fiber terminations shall be tested using an OTDR and dB attenuation loss meter.

5.7 Fiber Labeling and Documentation Requirements

5.7.1 A label shall be applied to the lower left corner of a TDU when it is installed. It shall include the following information, Spec or MiniPO# under which the TDU was installed, date the TDU was installed, and a three letter designation assigned by Con Edison to each Contractor. As an example: ACME Fiber Installers (AFI) that installed TDU on 2/19/07 as part of Spec Job 291, states the following on the label: **Installed by: AFI on 02/19/07 – Spec 291.** Font size for this should be no smaller than 8 points.

5.7.2 Panduit label (Part# PST-FO - Self-Laminating Rigid Vinyl Fiber Cable Marker Tags for large cables and bundles - 3.00" x 1.31" - Yellow shall be used to identify Tube Cable.

Figure 40 - Panduit PC4 PST-FO - Self-Laminating Rigid Vinyl Fiber Cable Marker Tags

5.7.3 Tags attached to TP2 type cable shall not use Tie-Wraps, but shall use Velcro strips.

5.7.4 Tags shall be attached to Tube Cable as follows:

- At 25-foot intervals
- At every hand-hold in a Lock-Tile ceiling
- Mid-span at every floor in a riser shaft
- Where the fiber enters and exits a penetration
- At the termination points within TDU's and cabinets.

5.7.5 The tube cable label shall indicate the designation of the two locations between which the tube cable runs. As an example a tube cable running between 17NW1 WDC and the 18th Floor TDU in the South Shaft would have the following label: **17NW1 WDC to 18Fl South Shaft TDU**. Font size for this line should be no smaller than 14 points.

5.7.6 The tube cable label shall also include the following information, Spec or MiniPO# under which the cable was installed, date the tube cable was installed, and a three letter designation assigned by Con Edison to each Contractor. As an example: ACME Fiber Installers (AFI) that installed tube cable on 2/19/07 as part of Spec Job 291, add the following to the labels: **Installed by: AFI on 02/19/07 – Spec 291.** Font size for this should be no smaller than 8 points.

5.7.7 The above information should be included on every tag affixed to the tube cable. Please ensure that the label faces forward.

5.7.8 TP2 Tube Cable within a riser shaft shall have a Panduit label (Part# PST-FO - Self-Laminating Rigid Vinyl Fiber Cable Marker Tags attached to it at mid-span at every floor. The label shall indicate the following in bold lettering: **CAUTION: Do not use Nylon Tie Wraps to bundle this cable.** The font size on the label should be at least 14 points for readability. Please ensure that the label is securely fastened with Velcro type strap to the tube cable and faces forward.

5.7.9 Each tube in a tube cable shall have a label applied to the tube that clearly indicates the tube number. Labels shall consist of Panduit PAN Code Labels Part# PCMB-1 or equivalent (see Attachment 2 Figure 4). These are vinyl cloth based Wraparound labels imprinted with numbers 0-9. The tube # shall be visible without requiring the rotation or bending of the tube.

Figure 41 - Panduit PCMB-1 - Wire Marker Book, Vinyl Cloth, '0-9'

5.7.10 A Flag type marker tie, Panduit part# PLF1MA (see Attachment 2 figure 11) shall be attached to the segment of translucent tube that is installed between two tubes within

a TDU. The translucent tube shall be annotated with a permanent marker to indicate the “From” and “To” locations of the complete tube circuit. As an example a tube circuit containing a fiber running between 14SE3 WDC and 13th Floor Fiber distribution Center would have the text on the marker tie: 14SE3 to 13FDC.

Figure 42 - Panduit PLF1MA Flag type Marker Tie

5.7.11 All splice housings and connector housings shall be labeled with P-Touch type labels (labels should be 1/2" high, black lettering on yellow background, font should be Arial or a similar non-serif type font and Font size should be at least 12 points). The label shall also include the following information, Spec or MiniPO# under which the cable was terminated and the date, as well as the three letter designation assigned by Con Edison to each Contractor. As an example: ACME Fiber Installers (AFI) that terminates a fiber bundle on 2/19/07 as part of Spec Job 291, add the following to the labels: **Installed by: AFI on 02/19/07 – Spec 291.** Font size for this should be no smaller than 6 points.

5.7.12 Labels should be attached horizontally to the front panel. Labels shall start at the top left and proceed to the bottom right.

5.7.13 There should be a label for each installed coupler panel. Label should indicate the Slot, Strand count, fiber type (MM or SM), and the location of the other end of the cable. Labels shall have a Font size no smaller than 8 points.

5.7.14 All fiber cable shall be documented as required by Sumitomo to qualify for their Extended Warranty.

5.7.15 A tube cable installation report shall be prepared in an Excel spreadsheet and shall contain a row for each tube cable installed for a particular project, with the following information:

- **Page Heading:** The first line should state the Report Name “TUBE CABLE INSTALLATION REPORT”. The second line shall indicate the Spec or MiniPO number, the Order Release #, Contractor’s Name and the date project was completed. The third line shall contain a one line description of the job.
- **Columns as follows:**
- Type of tube cable (e.g. TRX, TP2, etc…)
- Tube count (i.e. 1, 2, 3, 4, 7, 19)
- From location room designation & endpoint (e.g. 17SW1-TDU 3 or Fiber Hut-Rack 5)
- To location room designation & endpoint (e.g. 13FDC-TDU 5 or DC1 BB-Rack 11)
- Length of tube cable based on cable jacket footage markers.

See Attachment 1 for a sample report

5.7.16 Report shall be submitted electronically to the CISD Project manager within one week of project completion.

5.7.17 dB loss results should be submitted electronically in an Excel spreadsheet to the CISD Project manager within one week of project completion.

5.7.18 OTDR Test results in the Test equipment's native results format including the reader program shall be submitted on CD, to the CISD Project manager within two weeks of project completion.

5.7.19 A copy of the, Warranty Submittal letter to Sumitomo, shall be submitted to the CISD Project manager within two weeks of project completion.

5.8 Attachments

5.8.1 Sample Tube Cable Installation Report

TUBE CABLE INSTALLATION REPORT
MiniPO #2042 - OR# 819-09-1427 - ACME Fiber Installers - July 24, 2009
Install Tube cable to support a new Fiber Channel Cabinet in 229 14th Avenue - Data Center 2

Tube Cable Type	Number of Tubes	Tube End Number 1	Tube End Number 2	Tube Cable Length (Ft)
TP2	7	TDU 17N in "Q" Riser Shaft	Cabinet 27 (Fiber Channel cab) in Data Center 2	247
TRX	19	TDU 13N in "Q" Riser Shaft	TDU 17N in "Q" Riser Shaft	65
TRX	19	TDU 7N in "Q" Riser Shaft	TDU 13N in "Q" Riser Shaft	130

5.9 Change Log

Date	Author	Rev #	Comments
6/10/22	Michael Ribarich	02	Added Change Log. Formatting. Changed references from LIS to CISD. Also changed references from IR to IT.

SPECIFICATION NO. IT-CISD-TGB-STD-11

Consolidated Edison Company of New York
4 Irving Place, New York, New York 10003

Information Technology
Communications Infrastructure & Site Design
(CISD)

DESCRIPTION

Standard Specification for Installation of LAN Telecommunications Grounding & Bonding (TGB)

Prepared By: Ron Devito
Systems Specialist
Date: April 4, 2022

Reviewed By: Michael J. Ribarich
Systems Manager
Date: June 10, 2022

Approved By: Michael J. Ribarich
Systems Manager
Date: August 8 10, 2022

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Table of Contents

1.0 PURPOSE 3
2.0 APPLICABILITY 3
3.0 USERS, REVIEWERS AND APPROVERS 3
4.0 EXCEPTIONS / DEVIATION PROCESS 3
5.0 TECHNICAL REQUIREMENTS 4
5.1 Technical Scope 4
5.2 Ground Cable Pathways 4
5.3 Telecommunications Grounding and Bonding 4
5.3.1 Approved Materials and Substitutions 4
5.3.2 Grounding Conductor (GrC) 4
5.3.3 Single Point Ground Bar (SPGB) 5
5.3.4 Master Ground Bar (MGB) 6
5.3.5 Equipment Ground Bar (EGB) 8
5.3.6 Floor Ground Bar (FGB) 8
5.3.7 Horizontal Rack-mount Ground Bar (HRGB) 9
5.3.8 Bonding to Bus Bars 10
5.3.9 Bonding Cables and Lugs 13
5.3.10 Equipment Cabinet Bonding Methodology 14
5.3.11 Equipment Isolation Methodology 15
5.3.12 Single Small Cabinet Installations 16
5.3.13 Outdoor Rated Cat/5e Grounding at a POE 17

1.0 PURPOSE

1.1 This specification provides the technical requirements for the design and installation of telecommunication grounding and bonding systems withing IT rooms and spaces.

2.0 APPLICABILITY

2.1 This specification applies to corporate sites, control, centers, data centers and field sites.

3.0 USERS, REVIEWERS AND APPROVERS

3.1 The users of this specification are members of IT Communications Infrastructure & Site Design (CISD) group responsible for the design and build of LAN physical infrastructure including telecommunication grounding and bonding systems. Other users are contractors who design and build telecommunication grounding and bonding systems.

3.2 The approver of the document is the CISD Systems Manager. CISD SMEs will propose changes to the CISD Systems Manager. Revised documents will be placed in group's SharePoint public folder.

3.3 The review process is ongoing as new parts and technologies develop and are utilized. A formal review will take place annually in January by the CISD group to capture any changes that may not yet been incorporated.

3.4 Training requirements will be met by formal technical training by outside by internal on the job training, and group collaboration.

4.0 EXCEPTIONS / DEVIATION PROCESS

4.1 CISD will follow a review and approval process for interim changes required during emergent situations.

4.2 Interim changes will be handled by email or verbal notification by the CISD Systems Manager and/or CISD SMEs.

4.3 The process and forum for communicating Interim changes will be periodic staff meetings or by teleconference scheduled by the CISD Systems Manager.

5.0 TECHNICAL REQUIREMENTS

5.1 Technical Scope

5.1.1 Unless otherwise stated in the bid specification or MiniPO, the work to be done by the Contractor as described in the Scope of Work section of the project specification (bid spec or MiniPO) shall be done in accordance with the requirements set forth in this document

5.1.2 Any deviation from the CISD materials and installation requirements listed below, must receive prior approval from the CISD project manager. Deviations not receiving prior written approval will be subject to replacement and/or correction at the Contractors expense.

5.2 Ground Cable Pathways

5.2.1 The CISD project manager is responsible for identifying preliminary ground cable pathways.

5.2.2 Since the pathways provided by the CISD project manager are preliminary, it is the Contractors responsibility to develop a defined cable pathway.

5.2.3 The pathways provided by the CISD Project manager are preliminary. It is the Contractors responsibility to ensure that NEC Code permits the pathways.

5.3 Telecommunications Grounding and Bonding

5.3.1 Approved Materials and Substitutions

5.3.1.1 All materials specified in the document shall be provided and installed by the installation contractor as indicated, using the listed parts. Equivalent parts may be supplied by providing the part specification sheet for review and obtaining written approval from the CISD project manager.

5.3.2 Grounding Conductor (GrC)

5.3.2.1 A Grounding Conductor shall be installed for all newly constructed and upgraded LAN Rooms. The term LAN Room applies to IT spaces housing LAN racks, cabinets, cable runway and equipment and can range in size to single wall-mount cabinets to multi-cabinet data centers.

5.3.2.2 Con Edison personnel or a designated Contractor shall be responsible for installing the grounding conductor as directed below.

5.3.2.3 Where a dedicated 4/0 AWG Communications Ground Riser exists:

5.3.2.3.1 A Grounding Conductor (GrC) consisting of a 4/0 AWG green insulated stranded copper wire shall be fused to the dedicated riser using a CADWELD process.

5.3.2.3.2 The weld between the GrC and the riser must remain visible for future inspection.

5.3.2.3.3 The GrC shall be routed to the LAN Room via the most direct route.

5.3.2.3.4 While routing the GrC to the LAN Room, it is imperative that there shall be no sharp bends in the cable.

5.3.2.3.5 The cable shall be electrically isolated from all structural metal. This includes concrete walls that may contain metal rebar.

5.3.2.3.6 The end of the GrC, minimally 5’ in length, shall be brought into the LAN Room.

5.3.2.3.7 A durable tag shall be affixed to the GrC that clearly notes the location of the weld to the Ground Riser.

5.3.2.4 Where there is no dedicated 4/0 AWG Communications Ground Riser:

5.3.2.4.1 Con Edison or their designated Contractor shall identify a main steel column or a steel beam that has electrical continuity with a main steel column.

5.3.2.4.2 Identify a clearly visible 3” by 3” section of building steel within the LAN Room and clear it of any insulating material (e.g. concrete, rust, paint, etc).

5.3.2.4.3 A 5’ length of GrC shall be fused to the previously cleared Building steel using a CADWELD process.

5.3.2.4.4 The weld between the GrC and the steel must remain visible for future inspection.

5.3.2.5 For either new construction or retrofit situations, where it is neither possible nor practical to use a CADWELD process due to potential fire or sparking damage, Contractor shall consult with and receive written approval from IT to use the following alternative method:

5.3.2.5.1 Con Edison personnel or a designated Contractor shall identify a main steel column or a steel beam that has electrical continuity with a main steel column.

5.3.2.5.2 Identify a 3” by 3” section of building steel that can be made easily accessible and clearly visible, within or as close to the LAN Room as possible.

5.3.2.5.3 Clear the section of any insulating material (e.g. concrete, rust, paint, etc.).

5.3.2.5.4 A 5’ length of 4/0 AWG Green insulated wire shall be high pressure crimped to a Thomas & Betts (Part# IBG20-40) I-Beam Ground Clamp’s lug. The Contractor shall attach the clamp and lug to building steel, ensuring that it is firmly attached and cannot be moved - see Figure 5.3.1.

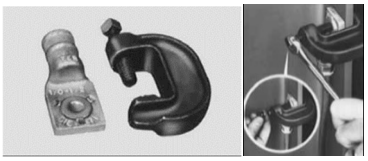


Figure 5.3.1

5.3.2.6 All deviations from the previously specified methodologies must be approved by the CISD PM, in writing, prior to proceeding. Failure to do so may require that the Contractor redo the work at the Contractors cost.

5.3.2.7 A bond resistance test shall be performed on the GrC using an AEMC Model 3731 Ground Resistance Tester or equivalent. Ground resistance shall not exceed 0.2 Ohms.

5.3.3 Single Point Ground Bar (SPGB)

5.3.3.1 An Un-sequenced Exterior Building Single Point Ground Bar (SPGB) (Harger Part# GBITP14412CE) Ground bar with wall mounting brackets, insulators and a 15’ exothermically bonded 2/0 AWG Stranded tail - see Figure 5.3.2 shall be installed in proximity (within 15 feet) to the GrC.

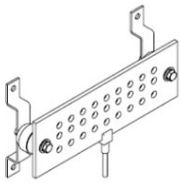


Figure 5.3.2

5.3.3.2 The Single Point Ground Bar shall be equipped with a Plexiglas cover with “SPGB” or “Single Point Ground Bar” stenciled on it - see Figure 5.3.3. The cover shall be stood-off the SPGB using insulated standoffs.

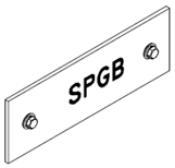


Figure 5.3.3

5.3.3.3 The 2/0 Stranded Copper CadWelded Tail shall be no longer than 15 feet.

5.3.3.4 The un-insulated stranded tail shall be electrically isolated from all structural metal. This includes concrete walls that may contain metal rebar.

5.3.4 Master Ground Bar (MGB)

5.3.4.1 A wall-mounted Master Ground Bar (MGB) with insulators (Harger Part# GPIB14420MMGB) - Universal 4" x 20" x 1/4" solid copper ground bar with 44 pairs of 7/16" pre-drilled universal lug holes, includes insulated mounting hardware - see Figure 5.3.4, shall be installed in the LAN Room, in a location specified in the Work Scope section of the job specific specification. The MGB shall contain pre-drilled double holes to accommodate two-hole lugs.

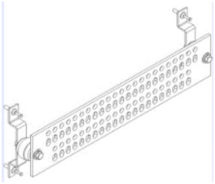


Figure 5.3.4

5.3.4.2 The MGB shall be equipped with a Plexiglas cover with “MGB” or “Master Ground Bar” stenciled on it - see Figure 5.3.5. The cover shall be stood-off the MGB using insulated standoffs.

Figure 5.3.5

5.3.4.3 The MGB shall be installed below the SPGB if the GrC comes from above. The MGB shall be installed above the SPGB if the GrC comes from below.

5.3.4.4 The MGB hole patterns are organized in a “PANI” layout as shown in Figure 5.3.6

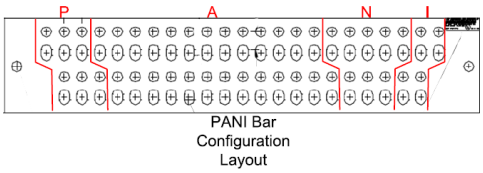


Figure 5.3.6

5.3.4.5 Each section on the PANI Bar may be expanded or contracted as needed, however the order cannot change. Lines shall be durably marked on the MGB in Red, delineating each PANI section (as show in the figure above).

5.3.4.6 The following ruleset shall be applied in determining the proper location on the PANI bar to which equipment or systems shall be connected - see Figure 5.3.13.

5.3.4.6.1 If the equipment or system can produce surge currents, carry surge currents, or carry lightning into a communications room, but is not designed to absorb and dissipate current, it shall be connected to the ‘P’ (**P**roducer) section of the MGB.

5.3.4.6.2 If the equipment is designed to absorb and dissipate fault current and lightning, or is inherently an alternate path to such system, it shall be connected to the ‘A’ (**A**bsorber) section of the MGB. The distinction here is that a ground to the MGB for AC-powered equipment, in which the AC Equipment Ground (ACEG) and ground to MGB are bonded together at the equipment through the chassis, is inherently an alternate path to the AC panel-board’s ground conductor. As such, it is classified as an absorber.

5.3.4.6.3 If the equipment is AC powered and the ACEG is isolated from the chassis and ground wire to the MGB, it shall be connected to the ‘N’ (**N**eutral) section of the MGB.

5.3.4.6.4 If the equipment is passive and is not connected to a piece of equipment or system that is connected to the AC panel-board ground, the equipment shall be connected to the ‘N’ section of the MGB.

5.3.4.6.5 If the equipment is passive and is connected to a piece of equipment or system that is connected to the AC panel-board ground and, the equipment shall be connected to the ‘A’ section of the MGB.

5.3.4.6.6 If the device is a ground bar for an intentional and properly designed Isolated Ground Zone (IGZ), it shall be connected to the ‘I’ (**I**solated) section of the MGB.

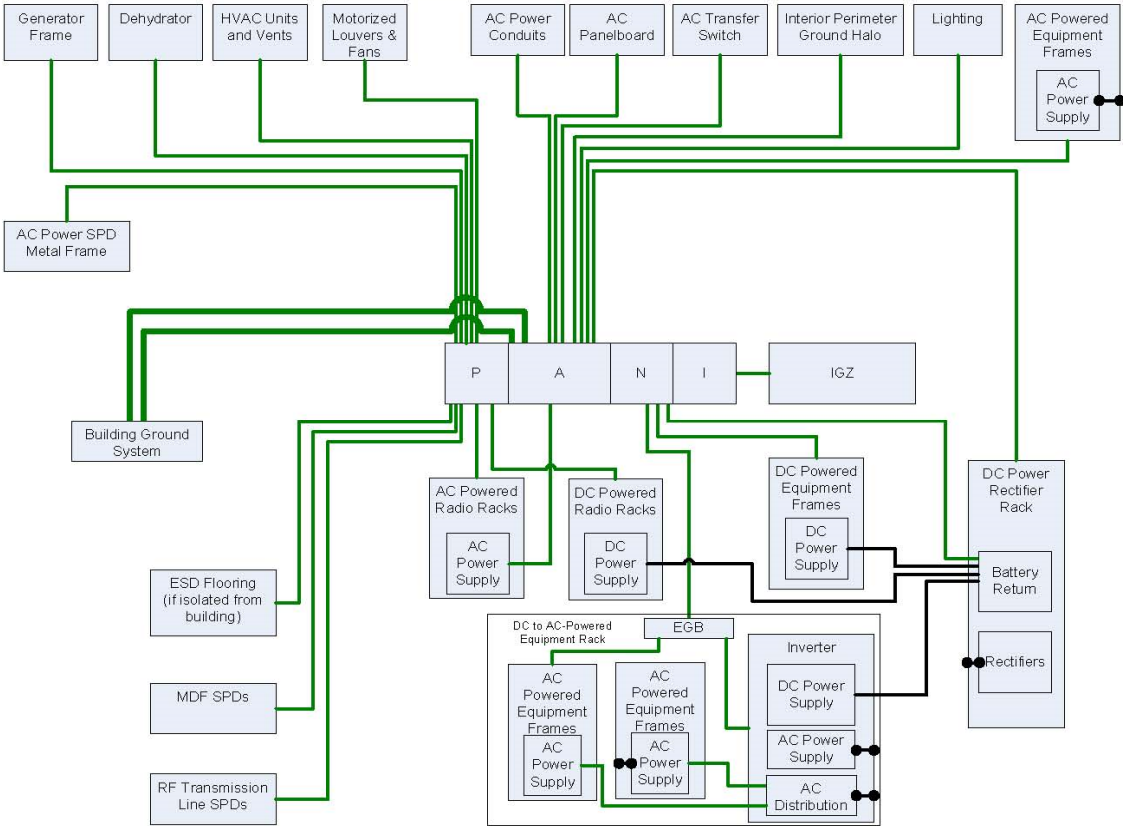


Figure 5.3.13

5.3.5 Equipment Ground Bar (EGB)

5.3.5.1 In large facilities it may be necessary to install supplemental Equipment Ground Bars (EGB) to minimize the length and number of individual ground wires connecting to the MGB. These bars (identical to the MGB, but without the PANI Markings) shall be used to bond racks, cabinets, cable runway and NetShelter ground bus cables.

5.3.5.2 The EGB shall be equipped with a Plexiglas cover with “EGB” or “Equipment Ground Bar” stenciled on it. The cover shall be stood-off the EGB using insulated standoffs.

5.3.6 Floor Ground Bar (FGB)

5.3.6.1 Where an anti-static floor is installed that uses Copper foil as its conducting medium, a Floor Grounding Bar (FGB) (Harger Part# GBIP1836CEFGB) shall be used.

5.3.6.2 The FGB consists of two 3" x 6" x 1/8" solid copper ground bars with a single pair of 7/16" pre-drilled universal lug holes. It includes insulated mounting hardware - see Figure 5.3.7.

Figure 5.3.7

5.3.6.3 The Floor Ground Bar shall be equipped with a Plexiglas cover with “FGB” or “Floor Ground Bar” stenciled on it. The cover shall be stood-off the FGB using insulated standoffs - see Figure 5.3.8.

Figure 5.3.8

5.3.6.4 The FGB shall be installed no more than 3” above the point that floor grounding foil protrudes from the floor.

5.3.7 Horizontal Rack-mount Ground Bar (HRGB)

5.3.7.1 A Horizontal rack-mounted Ground Bar (HRGB) - see Figure 5.3.9, (B-Line Part# SBHB119K), shall be installed in each Cabinet and/or Rack. For 23” racks, use B-Line Part# SBHB123K. These parts comes as a kit with the following material:

- 1 - Horizontal rack ground bar
- 2 - White insulators
- 4 - #12-24 x 5/8” (15.9mm) zinc plated screws & flat washers
- 20 - #12-24 x 1/2” (12.7mm) zinc plated screws
- 2 - Ground labels

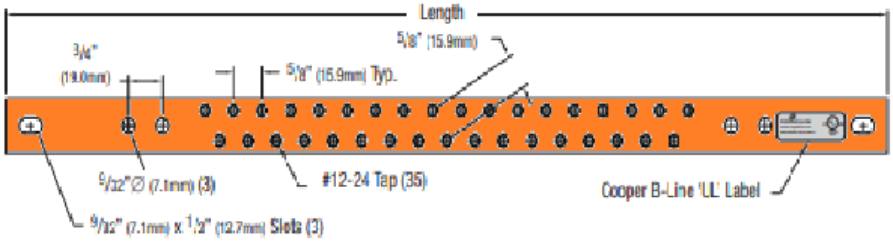


Figure 5.3.9

5.3.7.2 The HRGB shall be isolated from the cabinet and/or rack using (2) Rack Busbar Insulator Blocks supplied as part of the HRGB kit - see Figure 5.3.10 or equivalent. Unless otherwise directed by the CISD Project manager, the HRGB shall be installed at the topmost available RU mounting space.

Figure 5.3.10

5.3.7.3 In configurations where a 4-post rack or 4-rail cabinet is installed, the HRGB shall be installed on the rear set of posts or rails.

5.3.7.4 Rack and cabinet rail connections shall be installed in a manner that will minimize the rendering of RU spaces that become unusable. Where possible, bonding shall be done to built-in grounding studs.

5.3.7.5 All connections to the HRGB shall be installed in a manner that ensures that bends do not violate bend radius and bend angle limitations - see Figure 5.3.11. Two-hole lug connections to the Busbar shall face the direction from which the wire is routed to the Busbar.

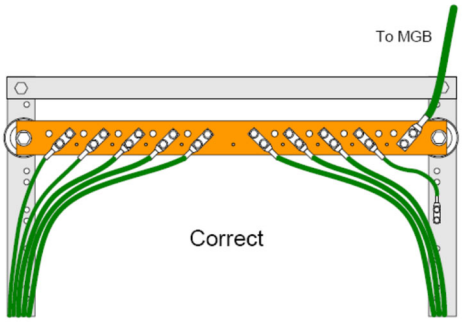


Figure 5.3.11

5.3.8 Bonding to Bus Bars

5.3.8.1 The SPGB shall be bonded to the LAN Room's 4/0 AWG ground wire GrC.

5.3.8.2 The stranded tail of the SPGB shall be attached to the attached to the GrC using a high pressure 4/0-2/0 "C" clamp - see Figure 5.3.12.

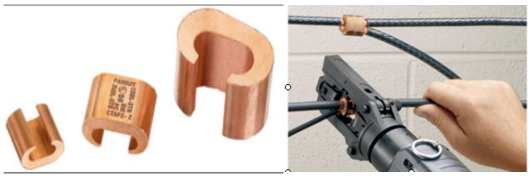


Figure 5.3.12

5.3.8.3 An MGB shall be bonded to the SPGB using a pair of 2/0 AWG green insulated stranded copper wire with double-hole lugs high pressure crimped on at each end. One lug of each cable shall be bolted to the first set of adjacent pairs of holes in the "A" section of the "PANI" layout closest to the "P" section. The other end shall be connected to an available pair of holes closest to the center of the SPGB.

5.3.8.4 Bonding cables are connected to the MGB using a specific set of rules (as described in the MGB section). When it is unknown where to ground a piece of equipment or system, the installer shall contact the CISD Project manager for the proper placement.

5.3.8.5 Unless otherwise noted, all CISD installed equipment and infrastructure shall be considered absorber type equipment and shall be bonded to the "A" section.

5.3.8.6 An EGB shall be bonded to the MGB using a #2 AWG green insulated stranded copper wire with high pressure crimped on double-hole lugs at each end. One lug of the cable shall be bolted to a pair of holes in the "A"

section of the “PANI” layout on the MGB and the other end shall be connected to a pair of holes closest to the left side of the EGB.

5.3.8.7 An HRGB shall be bonded to the “A” section of the MGB using a #6 AWG green insulated stranded cable a two-hole (5/8” OC Spacing), long barrel lug (Harger Part# GECLB62A) - see Figure 5.3.13 high pressure crimped to each end.

Figure 5.3.13

5.3.8.8 A #6 AWG Ground Strap kit (Chatsworth Part# 40164-001) - see Figure 5.3.14 or equivalent, shall be used to create a bonding connection between racks and/or cabinets and the rack mounted Bus bar.

Figure 5.3.14

5.3.8.9 The bonding strap shall be connected to the rail at the highest RU spacing below the Busbar that does not cause a sharp bend in the strap. The other end shall be bolted to the holes on the HRGB closest to the ground bonding cable.

5.3.8.10 Cable Runway Segments connected with butt splices shall be bonded using a #6 AWG Bonding Strap kit.

5.3.8.11 The bonding cable running between the various Bus bars shall be electrically isolated from all runways and conductive structures.

5.3.8.12 The bonding cable shall be routed along runways using non-conductive hangers such as the Panduit J-Pro hangers. Use of nylon ties or hook and loop straps to lash the cable to runways are not acceptable.

5.3.8.13 An anti-static tile floor that uses copper foil as the bonding medium shall be bonded to the floor’s copper foil by folding the foil three times which shall then be sandwiched between the two Copper plates - see Figure 5.3.15.

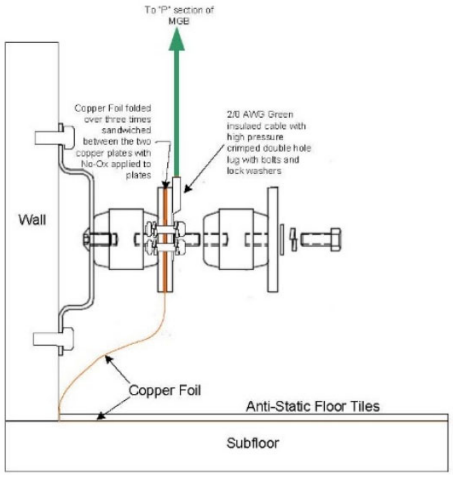


Figure 5.3.15

5.3.8.14 The FGB shall be bonded to the MGB using a 2/0 AWG green insulated stranded copper wire with double-hole lugs high pressure crimped to each end. One lug shall be bolted to the “P” section of the MGB. The other lug shall be bolted with lock washers, through the FGB’s Copper plates and foil.

5.3.8.15 A conductive anti-static rubberized tile floor shall be bonded to the MGB using a 2/0 AWG green insulated stranded copper wire with double-hole lugs high pressure crimped to each end. One lug shall be bolted to the “P” section of the MGB. The other lug shall be bolted to the tile using 1/4-20 T Nuts - see Figure 5.3.16 which shall be attached to the back of the tile.

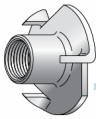


Figure 5.3.16

5.3.8.16 The cable connection to the floor shall be parallel and alongside the wall such that it does not cause a tripping hazard.

5.3.8.17 Raised floors shall be bonded and grounded as follows:

Install GPQC Access Floor Grounding clamps sized for the installed pedestal (Panduit Part # GPQCXX-1/0 - where XX represents type and size of pedestal), 2”-4” below top of pedestal and at 4’-6’ intervals - See Figure 5.3.16A

Figure 5.3.16A

5.3.8.17.1 Install bare #6AWG Copper Stranded cable in a continuous loop between as many GPQC’s as possible. - See Figure 5.3.16B – Floor Grounding Example

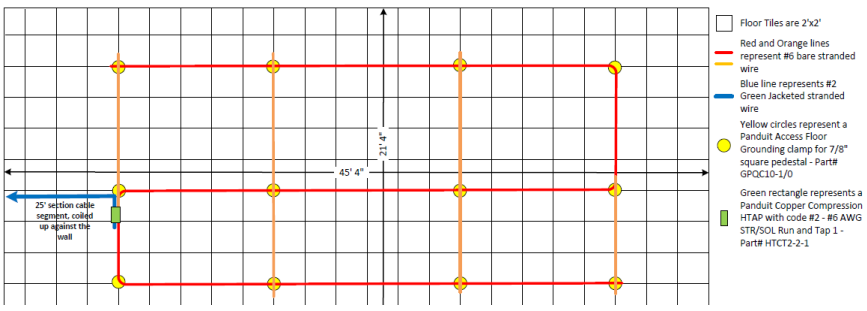


Figure 5.3.16B

5.3.8.17.2 Install segments of bare #6AWG Copper Stranded cable between any adjacent GPQC’s that were missed by the main loop.

5.3.8.17.3 Using a CTAP clamp, crimp a segment of #2AWG Green Jacketed Stranded copper cable long enough to reach the rooms' MGB, to the bare #6AWG Copper Stranded cable.

5.3.8.17.4 Attach the loose end of the #2AWG cable to the "P" section of the MGB.

5.3.9 Bonding Cables and Lugs

5.3.9.1 Bonding cables with high pressure crimped two-hole lugs shall be used with stainless steel bolts, lock washers & nuts when attaching Bus bars and other bonding points, to each other - see Figure 5.3.18.

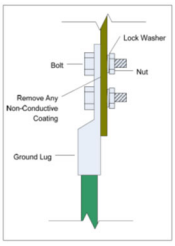


Figure 5.3.18

5.3.9.2 The table below - see Table 5.3.1, lists the wire gauge to be used for the bonding cable between the MGB and other Bus bars. Cable length shall not exceed the maximum length for a given wire gauge.

Conductor Size	Maximum Cable Length
#6 AWG	20 ft.
#2 AWG	33 ft.
2/0 AWG	66 ft.
4/0 AWG	>66 ft.

Table 5.3.1

5.3.9.3 Bonding cable exceeding the maximum length permitted for a particular wire gauge shall be sized to the appropriate gauge size.

5.3.9.4 The bonding cable shall be either green or green-coded black insulated stranded cable.

5.3.9.5 The bonding cable shall have each end terminated with a double hole, Irreversible high pressure crimped lug.

5.3.9.6 The following table - see Table 5.3.2, lists the lug to be used with a specific wire gauge when terminating the cable.

Conductor Size	Harger Part# (or equivalent)
#6 AWG	GECLB62C
#2 AWG	GECLB22C
2/0 AWG	GECLB2/02C
4/0 AWG	GECLB4/02C

Table 5.3.2

5.3.9.7 The metal surface that a bonding conductor will be bonded to shall be cleared of any foreign material and/or oxidation and shall be burnished to allow for good conductivity.

5.3.9.8 An approved antioxidant joint compound (Harger Part# HAAJC8) shall be applied between any bonding conductor and the burnished metal surface.

5.3.9.9 All bonding lugs shall be attached with Stainless Steel hardware and shall include a lock washer appropriate for the application.

5.3.9.10 All bonding cables (other than bonding straps) shall have identification tags (Panduit BM1M or equivalent) - see Figure 5.3.19, applied within 3”-5” of the lug.

5.3.9.11 At each end of the cable, the tag shall clearly identify, with permanent marker or printed label, the far endpoint of the cable. Each tag should contain a unique numeric identifier as well as the location of the other end.

Ex: at the MGB Bus bar end -- **#6 – Cab 4**
at the Cabinet end -- **#6 – MGB**

Figure 5.3.19

5.3.9.12 Bonding cables shall be routed in such a manner that results in the shortest cable length.

5.3.9.13 Bonding cables should always curve smoothly and never make sharp bends that exceed a 90 degree bend or exceed a minimum bend radius of 8 inches - see Figure 5.3.20.

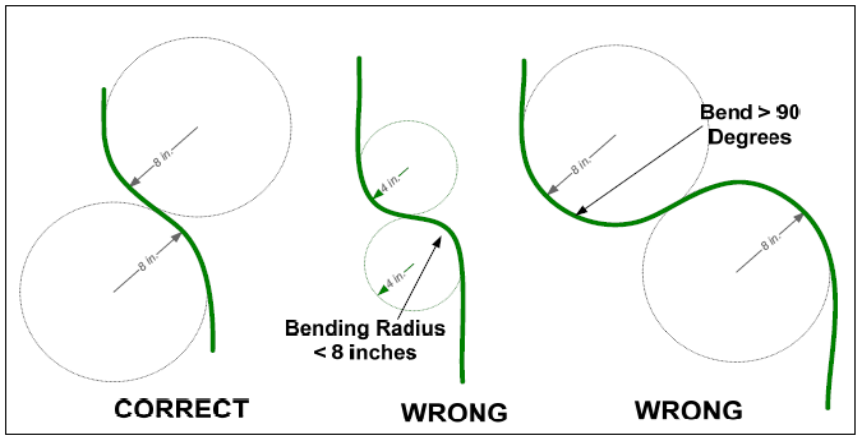


Figure 5.3.20

5.3.10 Equipment Cabinet Bonding Methodology

5.3.10.1 A #12 AWG green insulated stranded cable high pressure crimped to single-hole lugs at each end shall be used to bond all ground studs within a cabinet.

5.3.10.2 An HRGB shall be installed in the rear set of rails at the top RU position

5.3.10.3 The cabinet frame, power troughs & data partitions on NetShelter cabinets, shall be bonded as follows:

5.3.10.3.1 Two #2 AWG green insulated stranded copper ground buses (Cabinet and Data) shall be installed above the cabinet. These two Ground

Buss's shall be joined with a High-pressure C-Clamp just past the row of cabinets & before reaching the MGB or EGB.

5.3.10.3.2 The #2 AWG bonding cable shall be connected to an EGB or the "A" section of an MGB.

5.3.10.3.3 The cabinet and power trough (if installed) shall be bonded to the Cabinet Buss. The HRGB and data partition (if installed) shall be bonded to the Data Buss.

5.3.10.3.4 Bonds to the Ground Buss's shall use a short #6 AWG green insulated stranded copper bonding wire.

5.3.10.3.5 At one end of the bonding wire a one- or two-hole high pressure crimped lug (depending on the connection point) shall be mechanically connected to the threaded copper post or threaded bolt hole of the cabinet, trough, partition and HRGB - see Figure 5.3.21.

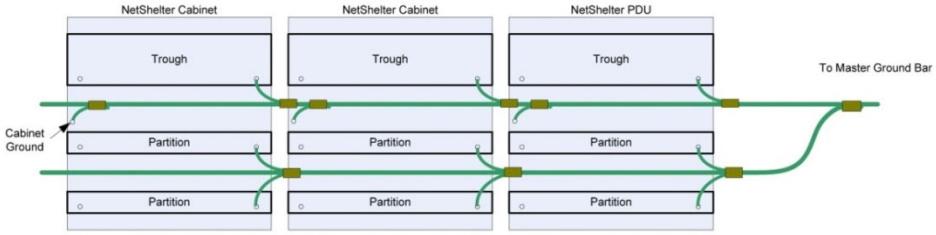


Figure 5.3.21

5.3.10.3.6 At the other end of the bonding cable an irreversible crimp connection shall be made to the Ground Buss using a Harger (Part# CT2248LD) or equivalent Light-duty C-Type Compression Tap - see Figure 5.3.22.

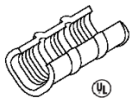


Figure 5.3.22

5.3.11 Equipment Isolation Methodology

5.3.11.1 Racks that will be bolted to the floor shall utilize a Rack isolation kit (CPI Part# 10605-019 for 19" Rack or 10605-023 for 23" Rack), that is placed under the rack - see Figure 5.3.23.

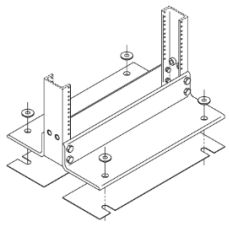


Figure 5.3.23

5.3.11.2 Cable Runway (ladder) shall be electrically isolated from racks or cabinets by using Runway Insulator bar kit (Chatsworth Part# 10842-001) - see Figure 5.3.24.

Figure 5.3.24

5.3.11.3 Cable Runway (ladder) shall be electrically isolated from walls, ceilings and any supporting structure using Runway Insulator bar kit (Chatsworth Part# 10842-001) or Stand-off Insulators (Chatsworth Part# 13622-000 or equivalent) - see Figure 5.3.25.

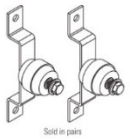
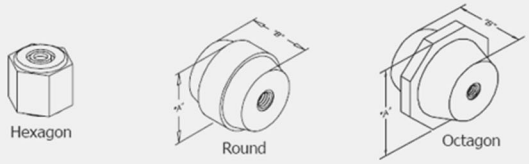


Figure 5.3.25

5.3.11.4 The following Harger Parts or equivalent - see Table 5.3.3, shall be used as applicable, when isolators are required:

Standoff Insulators - Red



Manufactured from glass reinforced thermoset polyester.

	Part No.	"A"	"B"	Shape	Thread Size	Voltage Rating	Tensile Strength (lbs.)	Box Qty.	Approx. Box Wt. (lbs.)
Add to BOM •	1100A1	1"	1"	Hex	1/4 - 20 x 1/4 AL	600	1200	25	1-1/2
Add to BOM •	4150S2	2"	1-1/2"	Oct	1/4 - 20 x 1/2 STL	1500	3000 - 4500	20	4-1/2
Add to BOM •	R4150S3	1-3/4"	1-1/2"	Round	5/16 - 18 x 1/2 STL	1500	2500 - 2700	20	5-1/2
Add to BOM •	R4150A4	1-3/4"	1-7/8"	Round	3/8 - 16 x 3/8 AL	2000	2500 - 2700	20	5-1/2
Add to BOM •	R4200S5	1-3/4"	2"	Round	3/8 - 16 x 5/8 STL	2500	2500 - 2700	20	6-3/4
Add to BOM •	4200S6	2"	2"	Oct	1/2 - 13 x 5/8 STL	2500	3000 - 4500	20	8
Add to BOM •	5250A5	2-1/2"	2-1/2"	Oct	3/8 - 16 x 5/8 AL	3200	5000 - 5700	10	4-1/2
Add to BOM •	5263A8	2-1/2"	2-5/8"	Oct	5/8 - 11 x 3/4 AL	3400	5000 - 5700	10	4-3/4

• BOM = Bill of Materials

Table 5.3.3

5.3.12 Single Small Cabinet Installations

5.3.12.1 Where an Installation consists of a single small cabinet, the Grounding and Bonding methodology changes as follows:

5.3.12.1.1 Con Edison or their designated Contractor shall identify a main steel column or a steel beam that has electrical continuity with a main steel column.

5.3.12.1.2 Identify a 3” by 3” section of building steel that can be made easily accessible and clearly visible, as close to the cabinet as possible.

5.3.12.1.3 Clear the section of any insulating material (e.g. concrete, rust, paint, etc).

5.3.12.1.4 A 5’ length of 4/0 AWG Green insulated wire shall be high pressure crimped to a Thomas & Betts (Part# IBG20-40) I-Beam Ground Clamp lug. The Contractor shall attach the clamp and lug to building steel, ensuring that it is firmly attached and cannot be moved. This cable will serve as the GrC for this cabinet.

5.3.12.1.5 A bond resistance test shall be performed on the GrC using an AEMC Model 3731 Ground Resistance Tester or equivalent. Ground resistance shall not exceed 0.2 Ohms.

5.3.12.1.6 A Horizontal Rack-mounted Ground Bar (HRGB) supplied by Con Edison, shall be installed in the cabinet.

5.3.12.1.7 The HRGB shall be installed at the topmost available RU mounting space.

5.3.12.1.8 The HRGB shall be isolated from the cabinet using (2) Rack Bus bar Insulator Blocks (Chatsworth Part# 40157-001) or equivalent.

5.3.12.1.9 The HRGB shall be bonded to the GrC using a #6 AWG Green insulated wire with high pressure crimped lug on one end. The other end shall remain bare and shall be bonded to the GrC using a high pressure crimped 4/0-#6 “C” clamp (Panduit Part# CTAP4/0-2-X).

5.3.12.1.10 All connections to the HRGB Bus bar shall be installed in a manner that ensures that there are no sharp bends. Two-hole lug connections to the Bus bar shall face the direction from which the wire is routed to the Bus bar.

5.3.12.1.11 A #6 AWG Ground Strap kit (Chatsworth Part# 40164-001) or equivalent shall be used to create a bonding connection between racks and/or cabinets and the rack mounted Bus bar.

5.3.12.2 Should a second cabinet be added in the future, then the following modifications shall be installed:

5.3.12.2.1 A SPGB shall be installed in close proximity to the GrC.

5.3.12.2.2 The bare 2/0 AWG Cad welded tail of the SPGB shall be bonded to the GrC using a high pressure crimped 4/0-2/0 “C” clamp (Panduit Part# CTAP4/0-2/0-X).

5.3.12.2.3 The #6 bonding cable from the HRGB shall be cut free from the GrC and a lug shall be high pressure crimped to the cable.

5.3.12.2.4 The lug shall be bolted to an available pair of holes closest to the center of the SPGB.

5.3.12.3 The second and/or any subsequent cabinet shall be grounded and bonded in the same manner as the first cabinet.

5.3.13 Outdoor Rated CatX Grounding at a POE

5.3.13.1 When an outdoor rated Cat/5e cable enters a facility, it needs to be grounded to isolate it and eliminate any induced current that may be present in the copper conductors. The follow methodology shall be used to affect this isolation and grounding.

5.3.13.2 For cable enclosed in above ground conduit or exposed to the environment:

5.3.13.2.1 An Altelicon Lightning Protector (Part# AL-CAT5EHPW) shall be installed at each end of the cable as close to the point of entry (POE) as practical - see Figure 5.3.26.

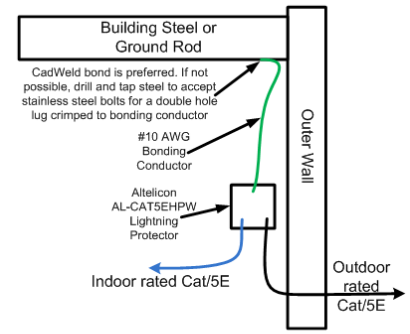


Figure 5.3.26

5.3.13.2.2 The Altelicon unit should be mounted in a location that permits simple access, should the unit need to be serviced.

5.3.13.2.3 The Outdoor rated cable, indoor rated cable and a #10 AWG Green insulated solid Copper cable shall be connected to the Altelicon as depicted in Figure 5.3.27.

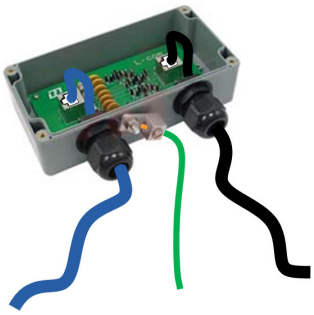


Figure 5.3.27

5.3.13.2.4 One end of the #10 AWG bonding conductor should be attached to the Altelicon's grounding lug and screwed down tightly so that it doesn't come loose.

5.3.13.2.5 The second end of the #10 AWG bonding conductor should be bonded to building steel or a properly installed ground rod.

5.3.13.2.6 The preferred method to bond to building steel or ground rod is by using a CadWeld process.

5.3.13.2.7 If it is not possible or practical to do the CadWeld, a two-hole lug should be attached to the bonding conductor using a high-pressure irreversible crimp.

5.3.13.2.8 A small section of steel beam flange should be cleared of concrete and/or rust and burnished to provide good conductivity.

5.3.13.2.9 When both sides of a beam flange are accessible, two holes should be drilled through the flange. An approved antioxidant joint compound shall be applied between the steel and lug. Two stainless steel bolts with lock washers and nuts shall be used to bond the lug to the steel.

5.3.13.2.10 When only one side of a beam flange is accessible, two holes should be drilled through the flange and tapped. An approved antioxidant joint compound shall be applied between the steel and lug. Three eights inch stainless steel bolts with lock washers screwed into the tapped holes shall be used to bond the lug to the steel. To prevent the screws from loosening over time, LOCTITE® 242™ medium strength thread lock shall be applied to the threads.

5.3.13.2.11 When the grounding will utilize a ground rod, a light duty ground rod clamp (Harger Part# 300LD) - see Figure 5.3.28, shall be used to bond the conductor to a properly installed ½" ground rod.

Figure 5.3.28

5.3.13.3 For cable enclosed in buried conduit:

5.3.13.3.1 Where a single device is being protected, an APC ProtectNet standalone surge protector (Part# PNET1GB) - see Figure 5.3.29, shall be installed at each end of the cable as close to the equipment that is being protected as practical.

Figure 5.3.29

5.3.13.3.2 The Green ground wire exiting the surge protector shall be attached to a properly installed ground point.

5.3.13.3.3 When multiple cables will be run between two locations, an APC 4 position chassis (Part# PRM4) or a 24-position chassis (Part# PRM24), shall be installed at the point of cable termination, typically on a rack or within a cabinet - see Figure 5.3.30.

Figure 5.3.30

5.3.13.3.4 A #10 AWG stranded Green insulated cable with a crimped on single-hole lug shall be attached to the chassis ground stud on the rear left of the chassis - see Figure 5.3.31.

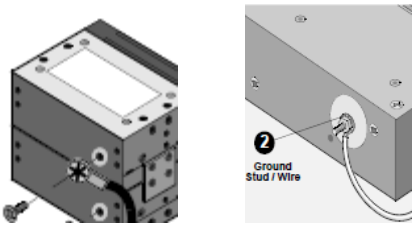


Figure 5.3.31

5.3.13.3.5 The other end of the cable shall be connected to the HRGB supporting the rack.

5.3.13.3.6 An APC Surge Module for Cat5e or CAT6 (Part# PNETR6) - see Figure 5.3.32, shall be installed in the chassis for each outdoor Cat5e cable that is to be protected.

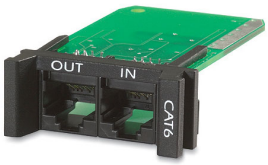


Figure 5.3.32

5.3.13.3.7 The outdoor cable shall be plugged into the “IN” port and the equipment being protected shall be plugged into the “OUT” port of the surge protection module.

6.0 Change Log

Date	Author	Rev #	Comments
6/10/22	Michael Ribarich	11	Changed references from LIS to CISD. Also changed references from IR to IT. Format changes.

IT-CISD-RRL-GDL-03

Information Technology
Communications Infrastructure and Site Design
(CISD)

Cable Runway and Rack Layout Design and Construction Guideline

Prepared By: Ron Devito
Systems Specialist
Date: August 6, 2024

Reviewed By: Michael J. Ribarich
Systems Manager
Date: August 6, 2024

Approved By: Michael J. Ribarich
Systems Manager
Date: August 6, 2024

Printed on 8/6/2024

Table of Contents

1.0 PURPOSE 3
2.0 APPLICABILITY 3
3.0 USERS, REVIEWERS AND APPROVERS 3
4.0 EXCEPTIONS / DEVIATION PROCESS 3
5.0 TECHNICAL REQUIREMENTS 4
5.3 Rack Material Requirements 14
6.0 Enclosure-Based LANs 18
7.0 Change Log 23

1.0 PURPOSE

1.1 This specification provides the technical requirements for the design and installation of cable runway and racks within IT rooms and spaces.

2.0 APPLICABILITY

2.1 This specification applies to corporate sites, control, centers, data centers and field sites.

3.0 USERS, REVIEWERS AND APPROVERS

3.1 The users of this specification are members of IT Communications Infrastructure & Site Design (CISD) group responsible for the design and build of LAN and Data Center physical infrastructure including cable runway and rack systems. Other users are structured cabling contractors who also design and build cable runway and rack systems.

3.2 The approver of the document is the CISD Systems Manager. The group's LAN physical infrastructure SMEs will propose changes to the CISD Systems Manager. Revised documents will be placed in group's SharePoint public folder.

3.3 The review process is ongoing as new parts and technologies develop and are utilized. A formal review will take place annually in January by the CISD group to capture any changes that may not yet been incorporated.

3.4 Training requirements will be met by formal technical training by outside groups such as structured cabling contractors, by internal on the job training, and group collaboration.

4.0 EXCEPTIONS / DEVIATION PROCESS

4.1 CISD will follow a review and approval process for interim changes during emergent situations.

4.2 Interim changes will be handled by email or verbal notification by the CISD Systems Manager and/or the appropriate CISD SMEs.

4.3 The process and forum for communicating Interim changes will be periodic staff meetings or by teleconference scheduled by the CISD Systems Manager.

5.0 TECHNICAL REQUIREMENTS

5.1 Technical Scope

5.1.1 The primary purpose of cable runways is to route cable (both Copper and Fiber) between room entry points and cable racks/enclosures. They are also used to route ground conductors between racks/enclosures and Main Ground Bars (MGB) or Equipment Ground Bars (EGB) and to route power cords between racks/enclosures and wall outlets.

5.1.2 Cable runway systems shall be electrically isolated from floors, walls, ceilings and any supporting structure by means described in the current revision of the **IT-CISD Standard Specification for Installation of LAN Telecommunications Grounding & Bonding (TGB)**

5.1.3 Cable runway systems shall be electrically isolated from ground conductors and power cords that they are used to route by means described in the current revision of the **IT-CISD Standard Specification for Installation of LAN Telecommunications Grounding & Bonding (TGB)**

5.1.4 Racks are used to house cable terminations (Copper and Fiber), cable cross-connects, active network equipment (switches and routers) and power distribution dedicated for this equipment (UPSs, ATSs and PDUs).

5.1.5 Racks shall be electrically isolated from floors, walls ceilings, cable runway and any other supporting structures by means described in the current version of the **IT-CISD Standard Specification for Installation of LAN Telecommunications Grounding & Bonding (TGB).**

5.2 Runway Material Requirements

5.2.1 All cable runway products shall be Chatsworth Products, Inc. (CPI) or equivalent and finished in black

5.2.2 The standard runway used shall be 12” wide **(CPI part # 10250-712 - - Figure 5.16A)**

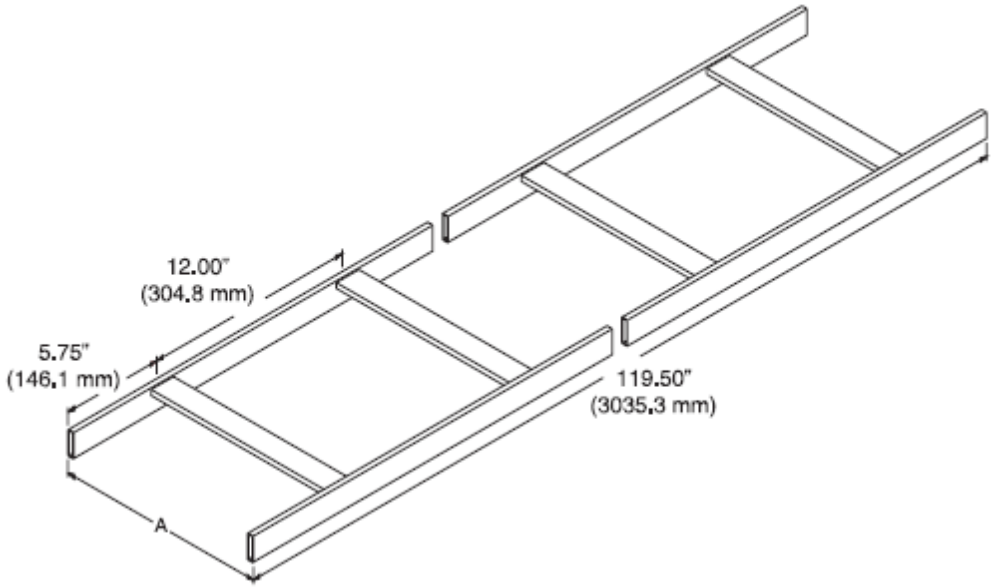


Figure 5.16A

5.2.3 Runway shall be installed with side stringers facing down so that the ladder forms an inverted U-shape

5.2.4 Cable runway shall be supported every 5’ or less in accordance with TIA-569-B

5.2.5 A minimum clearance of 12” shall be maintained between the top of horizontal cable runway and ceiling/building truss structure

5.2.6 A minimum of 3” in between cable runway and the tops of racks and/or cabinets should be maintained for proper cable routing

5.2.7 Multiple tiers of cable runway shall be installed with a minimum clearance of 12” in between each tier, when routing of power is required.

5.2.8 The primary support for horizontal runway shall be by 3/8”-16 thread threaded drop rods **(CPI part# 11440-001 or equivalent** -- **Figure 5.16B)** fitted with plastic tubing covers to protect cabling **(CPI part # 11085-001-- Figure 5.16C)**

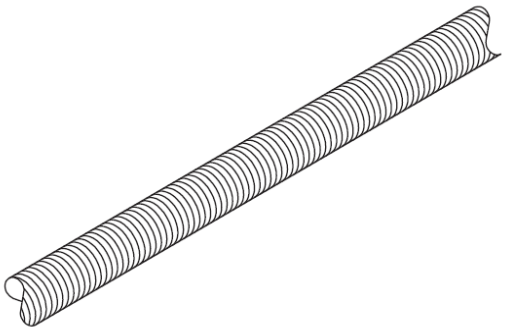


Figure 5.16B

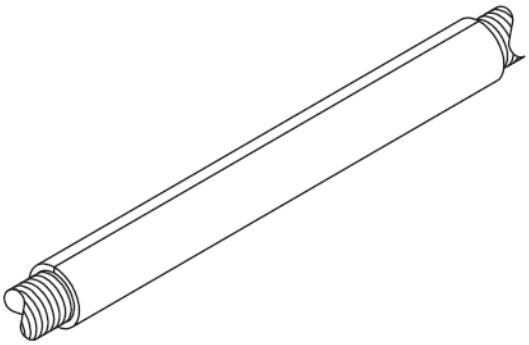


Figure 5.16C

5.2.9 3/8-16 thread **anchors (CPI part #20067-01 or equivalent - - Figure 5.16D)** can be used to secure drop rods to ceiling deck.

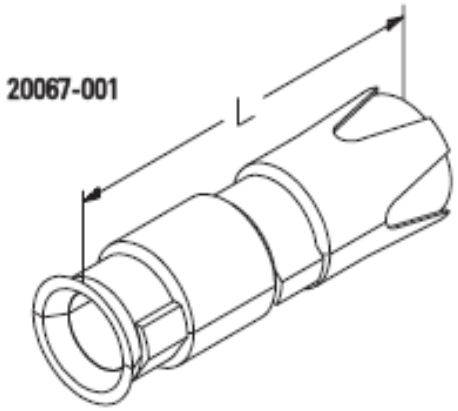


Figure 5.16D

5.2.10 An alternative means for suspending drop rods from a ceiling deck can be ceiling support brackets **(CPI part # 11406-001 – Figure 5.16E)**

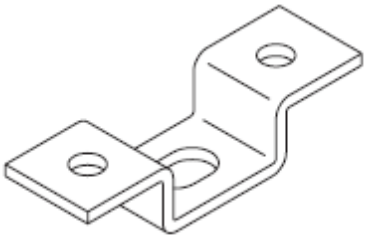


Figure 5.16E

5.2.11 If a building truss system is available, drops rods can be suspended by threaded rod I-beam clamps **(CPI part# 10557-001 or equivalent - - Figure 5.16F)**

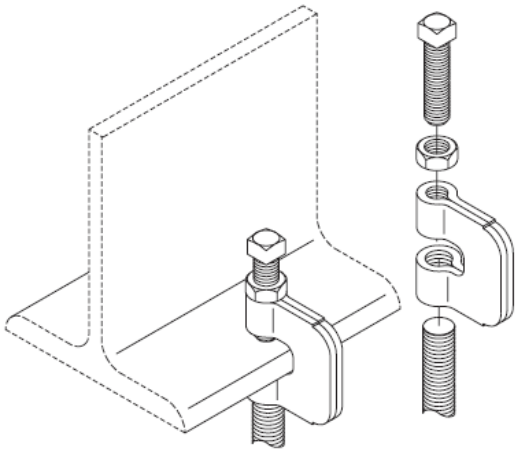


Figure 5.16F

5.2.12 The use of Kindorf brackets to suspend drops rods is also an acceptable means of support.

5.2.13 Drop rods are secured to the cable runway by slotted support brackets **(CPI part # 10607-002 - - Figure 5.16G)**.

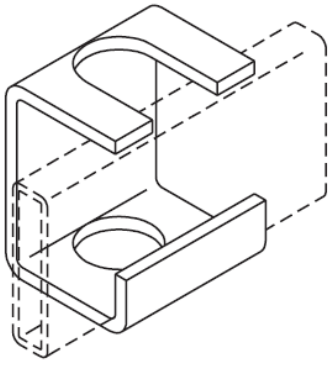


Figure 5.16G

5.2.14 Triangular support brackets **(CPI part # 11312-718 – Figure 5.16H)** can be used to supplement drop rod support on horizontal runway spans near walls to control swaying.

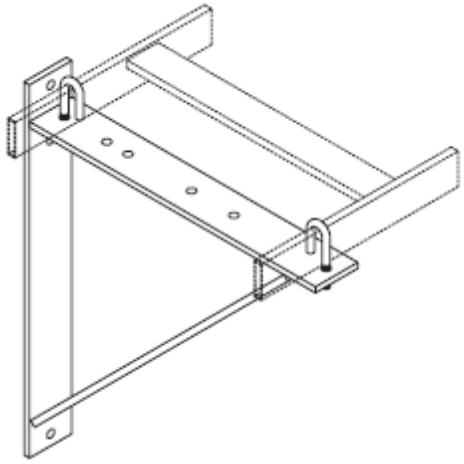


Figure 5.16H

5.2.15 The primary support for vertical runway shall be wall-mounted brackets **(APC part# 10608-001 - - Figure 5.16I)**.

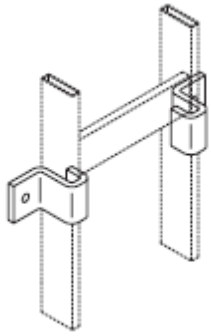


Figure 5.16I

5.2.16 If horizontal runway is located such that it is too far from the wall to be secured with wall-mounted brackets specified in 5.16.15, then a foot kit **(CPI part# 11309-001 – Figure 5.16J)** shall be used to secure the runway to the floor in lieu of the wall.

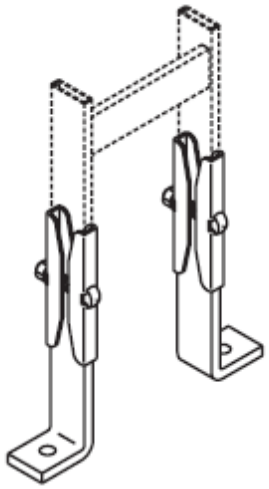
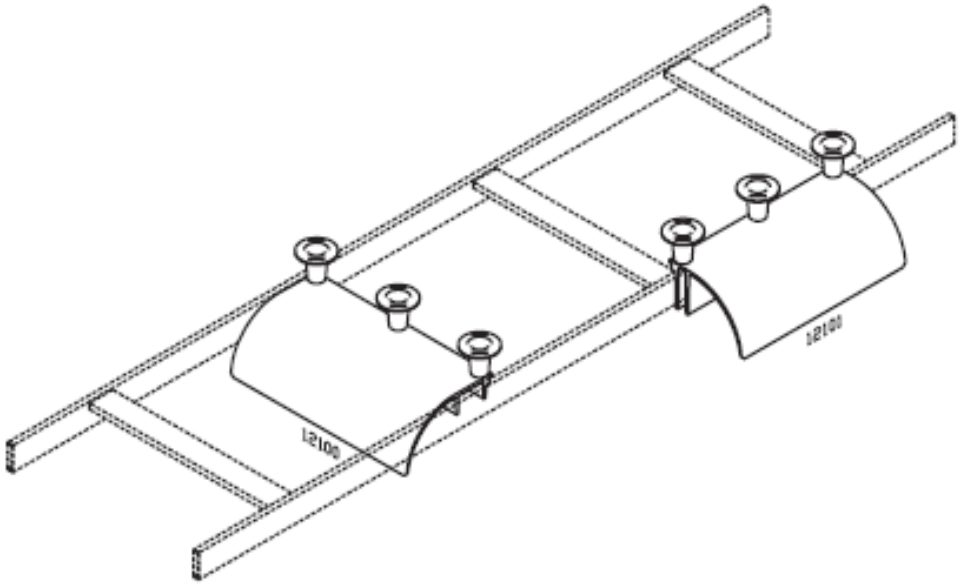


Figure 5.16J

5.2.17 Cable runway radius drops for routing cable over runway cross members **(CPI part# 12100-712 – Figure 5.16K)** and stringers **(CPI part# 12101-701 - - Figure 5.16L)** shall be used to help maintain proper cable bend radius.



Figures 5.16K and L

5.2.18 When the dropping of cables at any point between cross members is required, a movable cross member **(CPI part# 12115-712 - - Figure 5.16M)** shall be used with the above mentioned cross member radius drop.

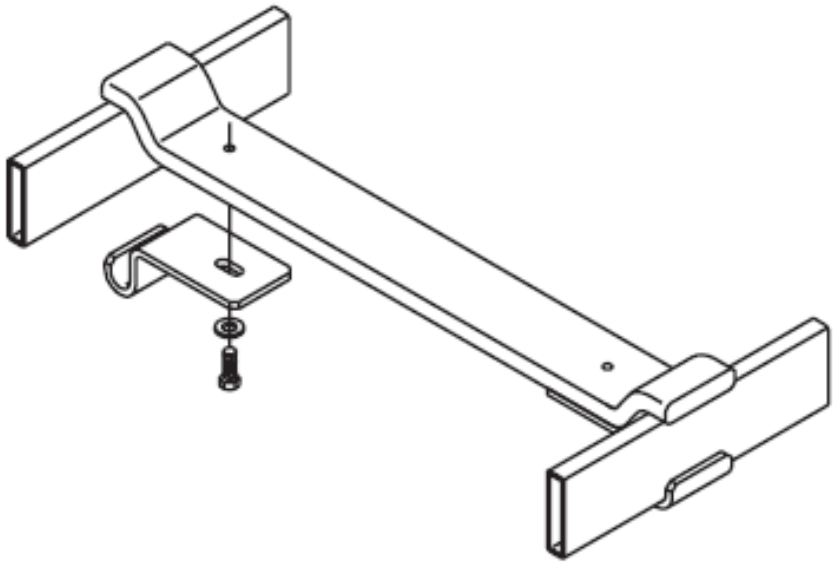
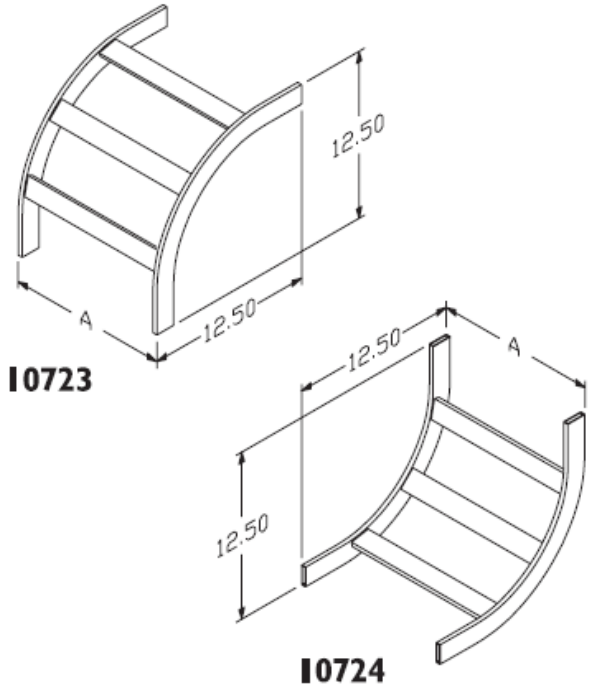


Figure 5.16M

5.2.19 Cascading cable runs shall use 90-degree outside (CPI part# 10723-712 - - Figure 5.16N) and inside (CPI part# 10724-712 - - Figure 5.16O) runway radius bends.



Figures 5.16N and O

5.2.20 90-degree turns in horizontal cable runs shall be made with runway sweeps **(CPI part# 10822-709 – Figure 5.16P)** or runway corner brackets **(CPI part# 11959-715 or 11959-724 - - Figure 5.16Q)** as an alternative.

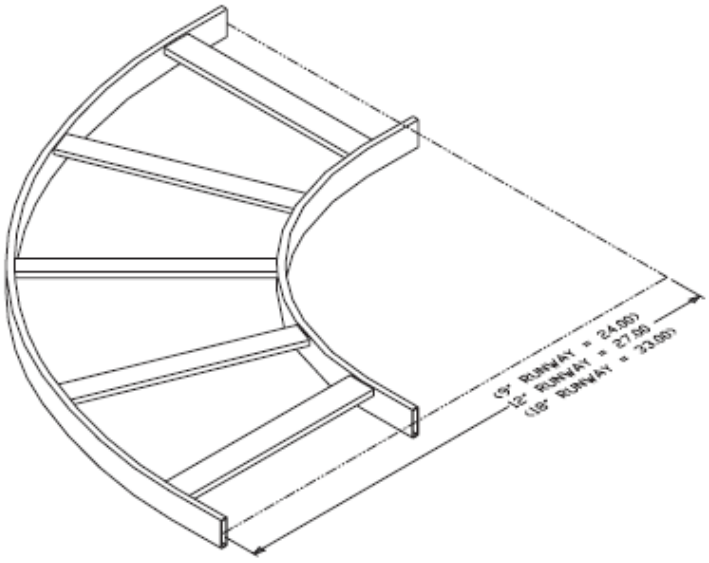
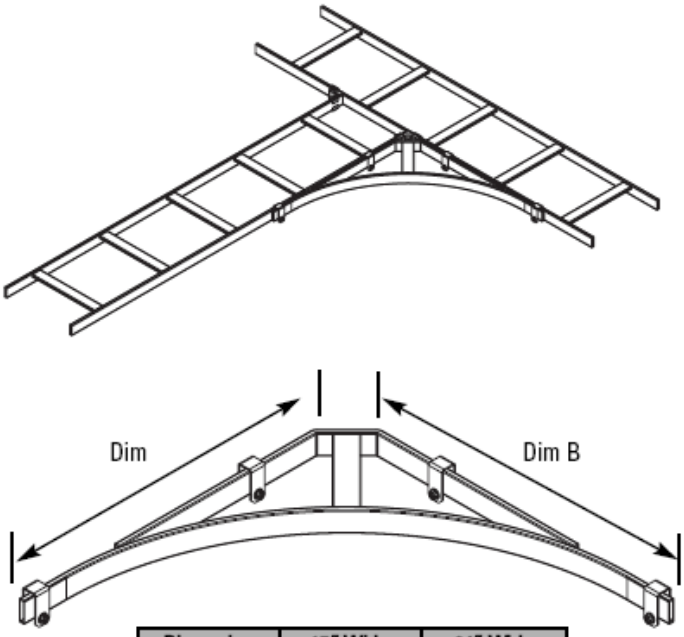


Figure 5.16P



Dimension	15" Wide	24" Wide
A	15.48	24.13
B	15.48	24.13

Figure 5.16Q

5.2.21 Junction products for butt splices **(CPI part #11301-701- - Figure 5.16R)** and 90-degree splices **(CPI part# 11302-701 - - Figure 5.16S)** shall be used for connecting runway on the horizontal plane.

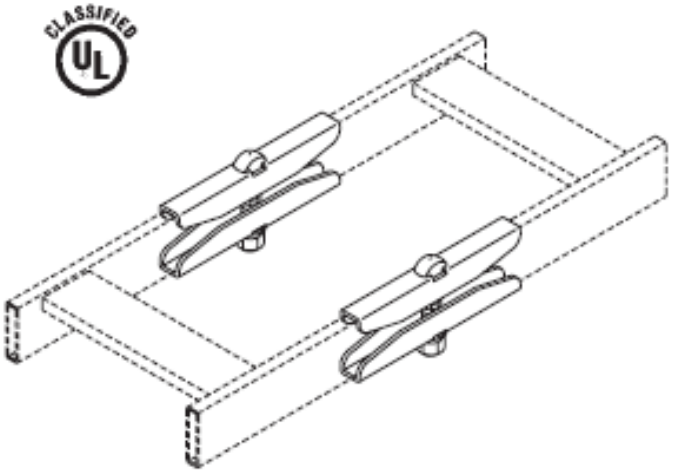


Figure 5.16R

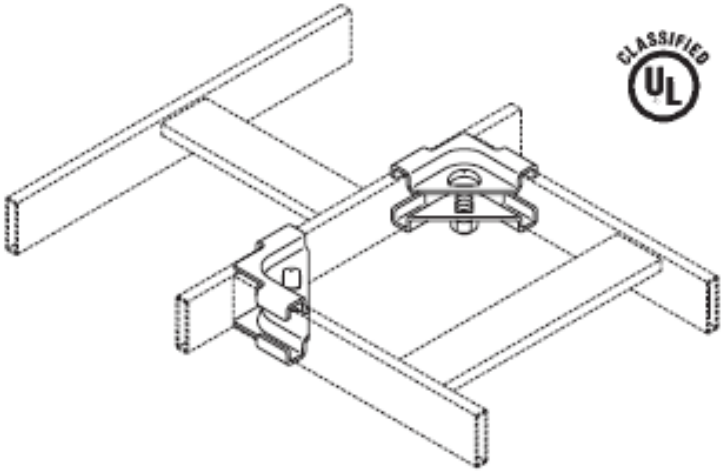


Figure 5.16S

5.2.22 Rack-to runway mounting plates **(CPI part# 10595-712 - - Figure 5.16T),** elevation kits **(CPI part# 10506-702 or 10506-706 - - Figure 5.16U)** and wall and support kits **(CPI part# 11421-712 - - Figure 5.16V)** are used to secure cable runway to racks and walls.

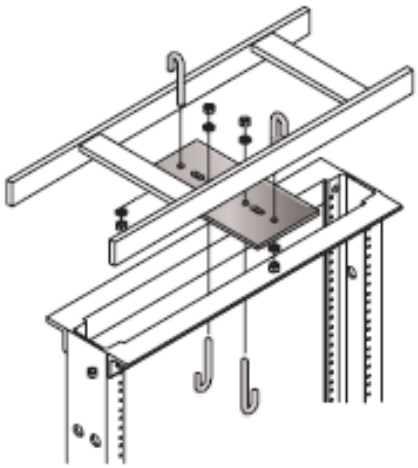


Figure 5.16S

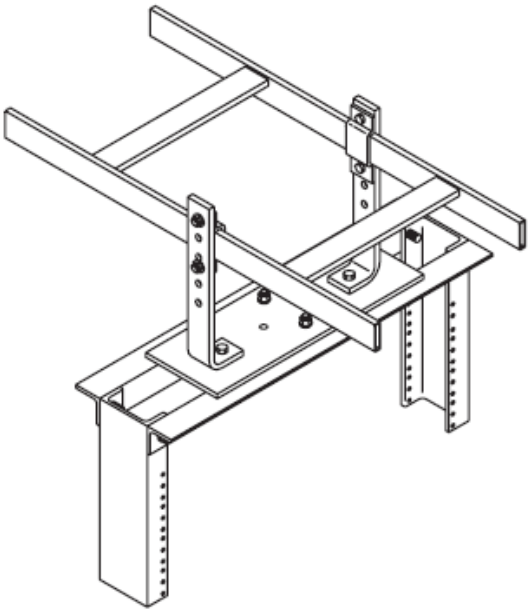


Figure 5.16T

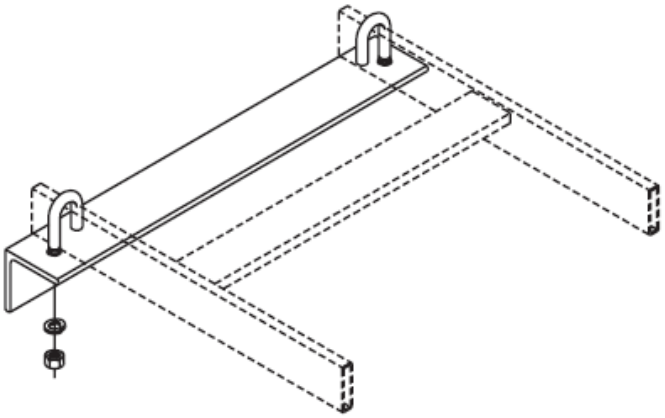


Figure 5.16U

5.2.23 Protective end caps **(CPI part # 10642-001 – Figure 5.16W)** shall be used on exposed runway stringers.

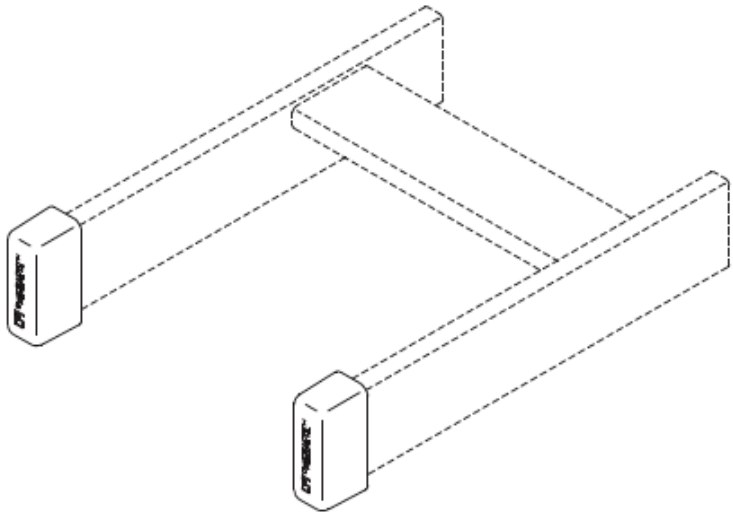


Figure 5.16W

5.3 Rack Material Requirements

5.3.1 The standard rack used shall be 7'Hx19"W, black in color **(CPI part# 46353-703)**. Other rack models or enclosures may be specified for special conditions.

5.3.2 Racks shall be installed with 36" clearance in front of and behind the deepest installed component.

5.3.3 One (1) vertical cable manager 6" **(CPI part # 30095-703) or 10" (CPI part # 30096-703 – Figure 5.17A)** shall be installed at the end of each rack and between each rack if more than one rack is installed. E.g. – One (1) rack would have a total of two (2) vertical cable managers. Two (2) racks together would have three (3). Five (5) racks would have six (6).

Figure 5.17A

5.3.4 When any UPSs or extended run batteries are installed in racks, QuadraRack 4-Post Frame **CPI part # 50120-703 – Figure 5.18A** shall be used, except where space does not permit the depth of the rack. Four-post racks are always designated as Equipment Racks.

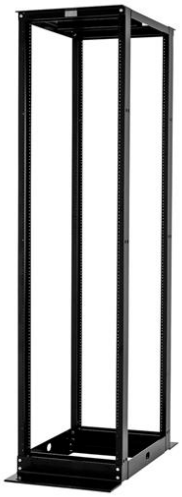


Figure 5.18A

5.3.5 When space considerations permit only a two-post rack, Schneider Electric (APC) Smart-UPS Modular Ultra 2 Post UPS Rail Kits, Part # SRYLOPT2 – 5.19A shall be used with all UPSs and extended run batteries, so their heavy weight concentrated in the rear does not exert torsion on the screws and rack threads. A two-post rack fitted with these rail cantilevers is always designated as an Equipment Rack.

Figure 5.19A

5.3.6 For CCTN Hut and Substation Communication Rooms, Information Technology (IT) vendor will install (1) – Moreng Telecom Products, Issue P Network Power Bay 7 Foot 23 Inch Wide 2 Post Blue Rack – Part # R084231R-3 – Figure 5.20A with Isolator Kits Part#CEC110113A for the Alpha CXPS-E3 DC Power Plant. Additionally, the following parts will be included with all Moreng Racks: Part # R8AC20-3 NTWK A/C RACEWAY; Part # R2-706-084 BAY EDGING (UL94); Part # R8R084-CTS CA TIES - STEEL - BLUE; Part # R8-503K2 ANCHOR SHIM KIT; Part # GP-4-23K ISOLATION BAY KIT (UEF); and Part # R7-208K4 SEISMIC ANCHOR KIT.

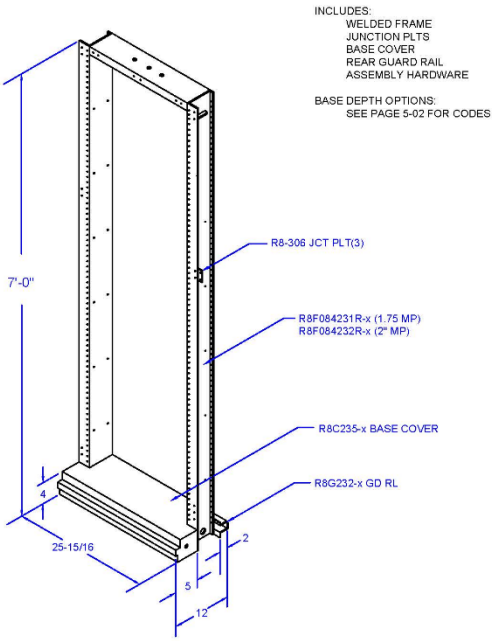


Figure 5.20A

5.3.7 Corporate Security DVR Rack Enclosures are Legrand AV (formerly Middle Atlantic) DRK Series 30-Inch Wide Racks Model DRK19-44-36LRD – Figure 5.21A. Corporate Security is responsible to procure, transport, stage, and provision these racks. They are included in this standard for inclusion in LAN / Comm Room / CCTN Hut layouts.

Figure 5.21A

6.0 Enclosure-Based LANs

Smaller LANs housed in temporary structures such as trailers and modular offices, or LANs at small sites will be housed in an enclosure rather than a dedicated room with open racks. These LANs are most typically specified on time and material jobs (what CISD calls “MiniPO”).

To allow for proper ventilation, all enclosures regardless of type must have mesh doors. Solid doors trap heat in the enclosure leading to premature equipment failure and UPS battery overheating, swelling and venting gasses.

Wall-Mounted Cabinets must be secured to studs, Kindorf/Unistrut, or a ¾” plywood backboard which is secured to struts, or Kindorf/Unistrut. Toggle bolts or anchors in sheetrock / false walls are not a safe or acceptable installation.

Each Wall-Mounted Cabinet has a weight limit which must be heeded.

Wall-Mounted cabinets must not be mounted at a height or position where passersby might strike their heads or other parts of the body. Wall-Mounted Cabinets must have sufficient clearance for all their sections to swing when equipment is being serviced or Move, Add, Change (MAC) work is being performed.

6.1 Floor Standing Full Height (7 feet)

Schneider Electric APC NetShelter (AR3105B2)

The Schneider Electric APC NetShelter SX Server Rack Gen 2, 45U, 2124H x 600W x 1070D mm, with Sides, Black (AR3105B2) is the standard full-height enclosure. This enclosure is also specified for on-premises data centers and server farms.

Figure 6.1

6.2 Floor Standing 48-Inch Height

CISD specifies Great Lakes ES Series 42” deep (GL480ES-2442-B-MS – Figure 6.2) OR E Series 32” deep (GL480E-2432-B-SQM6MS). The ES Series is preferred where space permits to provide the greatest flexibility with equipment depths. The correct depth arrived at must consider available floor space and the depth of the equipment being installed. UPSs including connected power cords have the largest depth profiles. For example, a Schneider Electric 1RU UPS form factor requires ES Series cabinets.

Figure 6.2

6.3 Wall-Mounted – 6U Horizontal Rail Orientation

For trailers, temporary structure, and other small LAN installations, the Chatsworth ThinLine II Wall-Mount Cabinet (Figure 6.3) in 6RU sizes are a CISD standard. The two sizes deployed are 26” tall x 26” wide x 12” deep (13050-713) and 36” tall x 26” wide x 12” deep (13050-723).

Figure 6.3

Intelligent Fan Kit (Figure 6.3A) for ThinLine II Wall-Mount Cabinet 4/6 RU size (13051-001) shall be supplied and installed with each ThinLine Wall-Mount Cabinet placed into service.

Figure 6.3A

6.4 Wall-Mounted – 12U, 19U, and 24U Cabinets

The Great Lakes WMCM Series cabinets are a CISD standard for the 12U (GL24WMCMP-B-SH-00-00 – Figure 6.4), 19U (GL36WMCMP-B-SH-00-00), and 24U (GL48WMCMP-B-SH-00-00) heights.

Figure 6.4

6.5 Wall-Mounted Open Frames

Chatsworth Flush-Mounted Vertical Wall Bracket (11754-X19 – Figure 6.5) is a grandfathered standard that was used in trailers and temporary structures in the early 2000s. At the time of writing, Chatsworth no longer shows a part number for this frame in its catalogue suggesting it has been discontinued. The bracket is documented here for reference purposes. A ThinLine II 26” square cabinet or 36” tall cabinet should be used where this bracket would have been specified.

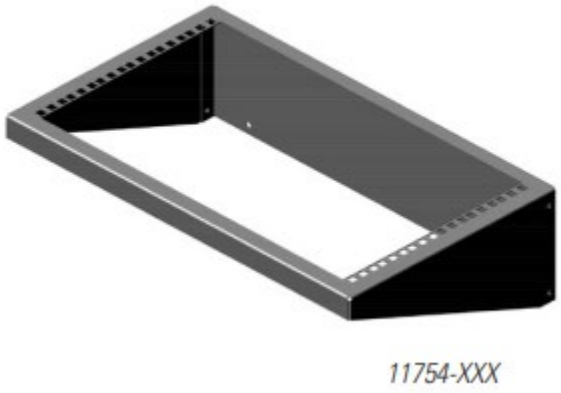


Figure 6.5

6.6 Hinged Panel Mounting Bracket

These brackets are ideal for mounting Cable Patch Panels for applications such as MDT/Toughbook Locker Banks. The 2U (11521-704 – Figure 6.6) will hold a Siemon MAX-PNL-48. The 5U (11524-704) will hold two Siemon MAX-PNL-48s allow for 1U of cable management between the patch panels.

Figure 6.6

7.0 Change Log

Date	Author	Rev #	Comments
6/10/22	Michael Ribarich	02	Changed references from LIS to CISD. Also changed references from IR to IT. Format changes.
08/01/2024	Ron Devito	03	Updated Vertical Cable Manager, Added 4-post Rack, Wall-Mount Racks and Open Frames, Moreng Rack

Conduit Installation

1. Conduit shall be installed to run in the most direct route possible, preferably with no more than two 90-degree bends between pull points or pull boxes.
2. 90-degree condulets shall not be utilized in conduit runs.
3. Conduit runs shall contain no continuous sections longer than 100 ft.
4. All bends must be long sweeping bends.
5. For conduit with an internal diameter of 2 inches or less, the bend radius must be at least six times the internal conduit diameter.
6. For conduit with an internal diameter greater than 2 inches, the bend radius must be at least ten times the internal conduit diameter.
7. Conduit bends shall be smooth and even and shall not contain kinks or other discontinuities that may have detrimental effects on pulling tension or cable integrity during or after installation.
8. If a conduit run requires more than two 90-degree bends, a pull box shall be provided between sections with two bends.
9. If a conduit run requires a reverse bend (between 100-degrees and 180-degrees), a pull box must be inserted at each end having an angle from 100-degrees to 180-degrees.
10. All conduit ends shall be reamed and fit with an insulated bushing to eliminate sharp edges that can damage cables during installation and service.
11. Conduits that protrude through the structural floor shall be terminated as close to the wall as possible to allow for proper vertical cable routing.
12. Conduits that protrude through the structural floor shall be terminated 1 to 3 inches above the surface.
13. All conduits shall be equipped with a plastic or nylon drag line with a minimal test rating of 200lb.
14. Pull boxes shall be installed in easily accessible locations.
15. Length of pull box shall be a minimum of eight times the diameter of the largest conduit