REQUEST FOR PROPOSAL
Hillside Clinical Services Building Structured Cabling

Issue Date: September 6, 2024
Bid Due Date: September 16, 2024

Metrocare Services, Inc
1345 River Bend Dr
Suite 200
Dallas, TX 75247
Ph: 214-743-1200

METROCARE SERVICES

REQUEST FOR PROPOSAL
Hillside Clinical Services Building Structured Cabling

Responses due Friday, September 16, 2024, by 4:30pm CST

I. GENERAL DESCRIPTION of CENTER:

The mission of Metrocare Services is to serve our neighbors with developmental or mental health challenges by helping them find lives that are meaningful and satisfying. We are an agency committed to quality gender-responsive, trauma-informed care to individuals experiencing serious mental illness, development disabilities, and co-occurring disorders. Metrocare programs focus on the issues that matter most in the lives of the children, families, and adults we serve.

II. OVERALL PROJECT OBJECTIVE

Metrocare Services is building a new 46,000 sq./ft. Clinical Services building. The clinic will provide mental health services for adults and children and dispense pharmaceutical products from an onsite pharmacy. Metrocare seeks a structured cable provider/installer to provide materials, service, installation and warranty service for structured interior and exterior cabling.

III. SPECIFICATION OF DELIVERABLES

- Work is to begin no later than Monday, October 14, 2024.
- Structured Cabling - Turn-key installation of structured data cable systems in Metrocare Services' new Clinical Services building at 1353 N. Westmoreland Road, Dallas, TX 75211. (new construction).
- Refer to Sections for details of project.
    - 2024-08-29 Metrocare Hillside Clinic - Technology Drawings
    - 270500 - COMMON WORK RESULTS FOR COMMUNICATIONS
    - 270526 - GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
    - 271100 - COMMUNICATIONS EQUIPMENT ROOM FITTINGS
    - 271300 - COMMUNICATIONS BACKBONE CABLE
    - 271500 - COMMUNICATION HORIZONTAL CABLE
- All data cables will consist of a 4-pair Category 6 F/UTP 250 MHz Plenum Cable (COMMSCOPE UN874043904/10)
    - Data cables will be Blue
    - Camera cables will be Green
    - Wireless cables will be Yellow
    - Outside cables will be Black

- Project will include
  - Data cabling for network and access controls
  - Testing and labeling of all terminations (face plates & patch panels)
  - Provide testing report and any remediation activities required
  - Network closet installation as defined in the Technical Drawings exhibit and by the requirements contained in this RFP
  - Project management services to manage and track all the services related to completion of the cabling services provided via this RFP.

IV. PROPOSAL REQUIREMENTS:

A submission must, at a minimum, include the following elements:

- Description of your firm including general overview, names, certifications, and any credentials of owners/team leaders.
- Description of the functionality of the solution being installed
- A brief description of the firm's strengths, related experience and skills or capabilities as they might relate to Metrocare Services and this project.
- Define any hardware/specific system requirements
- Outline of the implementation process to be used
- Pricing Breakdown for services offered (use Pricing Table found in document 270500, page 7)
- Timeline of project completion (estimate)

V. RFP CONTACT INTRODUCTION

Requests for Proposals will be accepted for Metrocare Services by Katisha Clark, Director of Purchasing, at the Corporate Headquarters Office, 1345 River Bend Dr, Dallas, TX 75247 until **4:30 P.M. CST on Friday, September 9, 2024.**

Submissions will be sent via email to katisha.clark@metrocareservices.org, with a subject line of "*Vendor Name:* Hillside Clinical Services Structured Cabling RFP Response" The Request for Proposal document is available via download from Metrocare's web site.

VI. DESCRIPTION OF THE RFP PROCESS

The RFP process shall consist of a two (2) step process.

a. Step 1 – Submission of Proposal
   Metrocare Services will establish an RFP Committee/Internal Working Group to review and evaluate the responses to the RFP in accordance with the evaluation criteria identified herein. Metrocare reserves the right to interview vendors if deemed a necessary step. The vendor may request a meeting to clarify any questions.
b. Step 2 – Selection and Recommendation Stage
   The RFP Committee will select a vendor to install and deliver the structured cable plant for Metrocare's new Clinical Services building.

SHEET NUMBER	SHEET NAME	2024.06.18 50% CD	2024.07.17 95% CD	2024.08.29 ADDENDUM 13
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T0-04C	C - LEGEND AND NOTES - SECURITY	■	■	■
T0-05C	C - PROJECT REQUIREMENTS AND DIVISION OF RESPONSIBILITIES	■		■
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T5-01C	C - TECHNOLOGY DETAILS - IT INFRASTRUCTURE	■		■
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T6.01C	C - SECURITY SYSTEM SCHEDULES	■	■	■
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T9-01C	C - ENLARGED FLOOR PLANS & DETAILS - AUDIOVISUAL	■		■
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N.T.S.

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phase issue description:
ADDENDUM 13

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revision schedule

#	date	description

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C - INDEX OF SHEETS - TECHNOLOGY

T0-01C

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GENERAL CONTRACTOR AND ELECTRICAL CONTRACTOR SHALL REVIEW AND COORDINATE TELECOM DRAWINGS AND SPECIFICATIONS RELATED TO SCOPE OF WORK FROM DIVISIONS 1, 26, AND 27.

1. THE TELECOM CONTRACTOR SHALL HAVE A PRE-INSTALLATION COORDINATION MEETING WITH THE PROJECT ARCHITECT AND ENGINEER TO OVERVIEW THE COMPLETE SCOPE OF WORK AS WELL AS TO VERIFY LOCATIONS AND PLACEMENTS OF TELECOMMUNICATIONS OUTLETS, DEVICES AND EQUIPMENT. THE PRE-INSTALLATION MEETING SHALL BE INITIATED BY CONTRACTOR AND TAKE PLACE AT LEAST FOUR (4) WEEKS PRIOR TO CONTRACTOR COMMENCES WORK.
2. TELECOM CONTRACTOR SHALL COORDINATE FINAL PLACEMENTS AND LOCATIONS OF TELECOMMUNICATIONS DEVICES WITH ARCHITECT. CONTRACTOR SHALL UTILIZE THE ARCHITECTURAL FLOORPLANS TO LOCATE THE EXACT PLACEMENT OF TELECOMMUNICATIONS OUTLETS FOR THE VOICE AND DATA SYSTEMS.
3. TELECOM CONTRACTOR SHALL COORDINATE TELECOMMUNICATIONS CONDUIT TYPE, PATH AND PLACEMENT WITH MEP SPECIFICATIONS AND MEP ENGINEER.
4. ALL TELECOM CABLE SHALL BE INSTALLED IN APPROVED SUPPORT SYSTEMS AND CONDUIT OR ABOVE CEILING LEVEL AND CONCEALED. CONTRACTOR SHALL NOT INSTALL EXPOSED CABLE.
5. TELECOM CONTRACTOR SHALL COMPLY WITH THE NFPA, NEC, EIA/TIA, FCC, UL, IEEE STANDARDS, & LOCAL AHJ ORDINANCES FOR THE INSTALLATION OF CABLE AND TELECOMMUNICATIONS EQUIPMENT.
6. ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS AND THE NFPA AND NEC CODES NEED TO BE REPORTED TO ENGINEER BEFORE PURCHASING AND INSTALLATION OF CABLE AND EQUIPMENT.
7. ALL FURNISHED CABLE AND EQUIPMENT SHALL BE PROVIDED WITH ALL ACCESSORIES AND ANCILLARY HARDWARE REQUIRED FOR A COMPLETE FUNCTIONAL TELECOMMUNICATIONS PLANT. CONTRACTOR SHALL INCLUDE PATCH CABLES PER SPECIFICATIONS AND A 10' STATION CABLE FOR EVERY WORKSTATION.
8. CABLE CONTRACTOR SHALL INSTALL ALL DEVICES IN ACCORDANCE WITH ADA REQUIREMENTS.
9. THE TECHNOLOGY CABLING INFRASTRUCTURE SHALL BE AN APPROVED MANUFACTURER'S SOLUTION WITH A 15-YEAR MANUFACTURER'S EXTENDED WARRANTY.
10. ALL CONDUITS SHALL BE INSTALLED BY THE ELECTRICAL CONTRACTOR, HOWEVER IT IS THE RESPONSIBILITY OF THE CABLING CONTRACTOR TO COORDINATE THE CONDUIT SHOWN ON THE TELECOMMUNICATIONS DRAWINGS WITH THE ELECTRICAL CONTRACTOR.
11. ALL VOICE, DATA, AUDIO, VIDEO AND SECURITY CABLING SHALL COMPLY WITH THE NFPA AND NEC STANDARDS AND CODES. CONTRACTOR SHALL NOTIFY AND REQUEST CLARIFICATION FROM TECHNOLOGY CONSULTANT AND ARCHITECT OF ANY APPARENT DEVIATIONS FROM THE NFPA AND NEC CODES BEFORE PURCHASING AND INSTALLATION OF MATERIALS AND EQUIPMENT.
12. CONTRACTOR SHALL INSTALL THE CONDUIT PLANT WITH BENDING RADIUS A MINIMUM OF 10 TIMES THE INSIDE CONDUIT DIAMETER AND FOLLOW THE STANDARDS AND REQUIREMENTS OF THE NEC, ANSI, TIA, EIA-569B AND BICSI-TDMM STANDARDS. GENERAL AND ELECTRICAL CONTRACTORS SHALL COORDINATE WITH DIVISION 26 FOR INSTALLATION REQUIREMENTS OF DIVISION 27 CONDUIT PLANT.

01 NOTES - GENERAL
N.T.S.

1. THE ELECTRICAL CONTRACTOR SHALL HAVE A PRE-INSTALLATION COORDINATION MEETING WITH THE PROJECT ARCHITECT AND ENGINEER TO VERIFY LOCATIONS AND PLACEMENTS OF TELECOMMUNICATIONS BACKBOXES, CONDUITS, AND ELECTRICAL REQUIREMENTS FOR THE TELECOMMUNICATIONS EQUIPMENT ROOMS. THE PRE-INSTALLATION MEETING SHALL BE INITIATED BY CONTRACTOR AND TAKE PLACE AT LEAST FOUR (4) WEEKS PRIOR TO CONTRACTOR COMMENCES WORK.
2. COORDINATE MOUNTING HEIGHT AND PLACEMENT LOCATIONS OF TELECOMMUNICATIONS OUTLETS WITH ARCHITECT AND ENGINEER.
3. COORDINATE EXACT PLACEMENT LOCATIONS OF OUTLETS INSTALLED WITH ARCHITECT AND ENGINEER.
4. TECHNOLOGY OUTLETS SHALL BE MOUNTED AT SAME HEIGHT AS ELECTRICAL OUTLETS UNLESS NOTED OTHERWISE. COORDINATE HEIGHT WITH ARCHITECT.
5. GENERAL CONTRACTOR SHALL COORDINATE CABLE PLANT REQUIREMENTS FOR TELECOMMUNICATIONS, AUDIO-VISUAL AND ELECTRICAL SYSTEMS. COORDINATION SHALL BE DONE BY EXAMINATION OF DRAWINGS AND SPECIFICATIONS FROM EACH DISCIPLINE AS WELL AS BY HOLDING COORDINATION MEETINGS BETWEEN THE ARCHITECT, THE CONTRACTORS AND THE CONSULTANTS FOR TELECOM, ELECTRICAL AND AUDIO-VISUAL.
6. ELECTRICAL CONTRACTOR SHALL PROVIDE STANDARD DOUBLE-GANG BACKBOXES WITH SINGLE-GANG MUD RINGS AT EACH TELECOM OUTLET.
7. GENERAL CONTRACTOR SHALL BE RESPONSIBLE IN OVERSEEING THAT THE ELECTRICAL AND TELECOMMUNICATIONS CONTRACTOR COORDINATE THE PLACEMENT, INSTALLATION, LOCATION AND ROUTING OF THE CONDUIT PATHWAY FOR TELECOM CABLE THROUGHOUT THE FACILITY AS REQUIRED.
8. ELECTRICAL CONTRACTOR SHALL REFER TO TELECOMMUNICATIONS DRAWINGS FOR LOCATIONS WHERE TELECOMMUNICATIONS GANG BOXES AND CONDUIT NEED TO BE PROVIDED. REFER TO DIVISION 26 FOR THE FURNISHING, PROVISIONING AND INSTALLATION REQUIREMENTS OF CONDUITS, RACEWAY AND BOXES.
9. ELECTRICAL CONTRACTOR SHALL INSTALL PULL BOXES AS REQUIRED BY DIVISION 26, NEC AND EIA/TIA STANDARDS IN TELECOMMUNICATIONS CONDUIT RUNS. SIZE PULL BOXES TO MAINTAIN PROPER BEND RADIUS OF TELECOMMUNICATIONS FIBER OPTIC AND COPPER CABLES. COORDINATE EXACT PLACEMENT OF PULL BOXES WITH ARCHITECT AND ENGINEER.
10. MEP/ELECTRICAL CONTRACTOR SHALL COORDINATE CONDUIT AND SLEEVE REQUIREMENTS WITH TECHNOLOGY 'T'-SERIES DRAWINGS INCLUDING CONDUIT, RACEWAYS, OUTLET LOCATIONS AND ER/TR CONDUIT REQUIREMENTS.
11. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL TELECOMMUNICATIONS OUTSIDE AND INSIDE CONDUIT PLANT IN ACCORDANCE WITH PROJECT MANUAL SPECIFICATIONS AND REQUIREMENTS, NEC AND EIA/TIA STANDARDS AND DIVISIONS 1, 26 AND 27 DRAWINGS AND SPECIFICATIONS. REFER TO THE PROJECT UTILITY PLAN AND SPECIFICATIONS FOR THE INSTALLATION DETAILS AND LOCATION OF THE OUTSIDE PLANT CONDUIT. COORDINATE WITH CIVIL ENGINEER AS REQUIRED.
12. ALL OUTSIDE CONDUIT PLANT UNDER DRIVEWAYS SHALL BE SCHEDULE 80 AND ENCASED IN CONCRETE WITH CONCRETE 3' PAST DRIVEWAY EDGE.
13. METALLIC IDENTIFICATION TAPE SHALL BE INSTALLED ABOVE ALL OSP CONDUIT RUNS.
14. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUITS FOR INSIDE AND OUTSIDE PLANT.

02 NOTES - GENERAL AND ELECTRICAL CONTRACTORS
N.T.S.

GENERAL NOTES FOR WORK IN AREAS WHERE CEILING DECK CONSTRUCTION WILL BE EXPOSED TO VIEW:

1. ALL ELECTRICAL, MECHANICAL, PLUMBING, SPRINKLER, AND FIRE PROTECTION WORK, AND ALL ASSOCIATED HANGING, FASTENING, AND RESTRAINING DEVICES ASSOCIATED WITH THEIR INSTALLATION, MUST BE INSTALLED IN A CONSISTENT, REGULAR, AND WORKMAN-LIKE MANNER.
2. NO PRE-MANUFACTURED BRIDGING MATERIAL SUCH AS UNISTRUT, OR SIMILAR COMPONENTS, MAY BE USED FOR INSTALLING CONDUIT, MECHANICAL WORK, PLUMBING LINES, SPRINKLER LINES, OR OTHER EQUIPMENT UNLESS SPECIFICALLY APPROVED BEFOREHAND BY THE ARCHITECT.
3. ALL EQUIPMENT HUNG FROM OR SUSPENDED FROM SLOPED CEILING/ROOF PLANES MUST BE HUNG WITH A CONNECTION THAT ALLOWS THE HANGER TO HANG TRULY VERTICALLY WITHOUT INTRODUCING BENDING STRESSES INTO THE HANGER OR THE EQUIPMENT BEING SUSPENDED.
4. ALL CONDUIT MUST BE INSTALLED RUNNING PARALLEL OR PERPENDICULAR TO THE STRUCTURAL MEMBERS.
5. ALL HANGERS, ATTACHMENTS, AND OTHER REGULAR COMPONENTS SHALL BE, TO THE EXTENT POSSIBLE, INSTALLED IN AN ALIGNED MANNER AND EQUALLY SPACED .
6. ALL CONDUIT MUST BE INSTALLED TIGHT TO THE STRUCTURAL DECK AND IF POSSIBLE RUNNING RECESSED IN THE STRUCTURAL DECK FLUTING.
7. WHEREVER POSSIBLE AND ALLOWED BY THE APPLICABLE CODES, CONNECTIONS, TURNS, AND JUNCTIONS IN CONDUITING SHALL BE PERFORMED USING THE APPROPRIATE CONDULET BOX RATHER THAN SQUARE ROUND, OR OCTAGONAL JUNCTION BOXES.
8. WHERE ELECTRICAL BOXES WILL BE LEFT EXPOSED TO VIEW, BOXES, COVER PLATES, AND ASSOCIATED COMPONENTS WILL BE OF STANDARD CAST ALUMINUM.
9. CABLING CONTRACTOR SHALL APPLY CADDY® NAIL GUARDS FOR METAL AND WOOD STUDS AND USE CADDY® EASY SNAP PLASTIC GROMMETS WHERE CABLING IS ROUTED HORIZONTALLY WITHOUT CONDUIT THROUGH THE METAL STUD FRAMING.

03 NOTES - CEILING INSTALLATION
N.T.S.

AFF	ABOVE FINISHED FLOOR
AFS	ABOVE FINISHED SURFACE
AWG	AMERICAN WIRE GAUGE
CATV	COMMUNITY ANTENNA TELEVISION
CCTV	CLOSED CIRCUIT TELEVISION
COE	CENTRAL OFFICE EQUIPMENT
dB	DECIBEL
DEMARC	DEMARCATION POINT
EQ.	EQUAL
EMT	ELECTRIC METALLIC TUBING
EQUIP.	EQUIPMENT
ER	EQUIPMENT ROOM
FC	FIELD COORDINATE
HH	HANDHOLE
IDF	INTERMEDIATE DISTRIBUTION FRAME
LAN	LOCAL AREA NETWORK
MDF	MAIN DISTRIBUTION FRAME
MH	MANHOLE
MM	MULTIMODE
NEC	NATIONAL ELECTRICAL CODE
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
PB	PULLBOX
PIC	PLASTIC INSULATED CONDUCTOR
PR	PAIR
PVC	POLYVINYL CHLORIDE
RFI	RADIO FREQUENCY INTERFERENCE
SM	SINGLE MODE
STP	SHIELDED TWISTED PAIR
TBB	TELECOMMUNICATIONS BONDING BACKBONE
TC	TELECOMMUNICATIONS CLOSET
TDR	TIME DOMAIN REFLECTOMETER
TR	TELECOMMUNICATIONS ROOM
TELCO	TELEPHONE COMPANY
TGB	TELECOMMUNICATIONS GROUNDING BAR
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
UPS	UNINTERRUPTIBLE POWER SUPPLY

04 ABBREVIATIONS
N.T.S.

- DATA OUTLET, CAT.6 PLENUM, "X" INDICATES NUMBER OF CABLE RUNS (JACKS), IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- WAP — WIRELESS ACCESS DATA OUTLET, PROVIDE ONE (1) CAT.6A PLENUM CABLE RUN.
- POS — POINT-OF-SALE DATA OUTLET, CAT.6 PLENUM. IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- FP — DATA OUTLET FOR FLAT PANEL DISPLAY, CAT.6 PLENUM. IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK). COORDINATE TERMINATION WITH AV FACEPLATE PROVISIONS.
- WAP — CEILING-MOUNTED WIRELESS ACCESS DATA OUTLET. PROVIDE ONE (1) CAT.6A PLENUM DATA CABLE AT EACH WAP LOCATION. PROVIDE 20' CABLE SERVICE LOOP ABOVE CEILING WHERE APPLICABLE.
- X — CEILING-MOUNTED DATA OUTLET, CAT.6A PLENUM. "X" INDICATES NUMBER OF CABLE RUNS (JACKS), IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- CP — CEILING-MOUNTED DATA OUTLET FOR VIDEO PROJECTOR, CAT.6A PLENUM. "X" INDICATES NUMBER OF CABLE RUNS (JACKS), IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- X — FLUSH FLOOR-MOUNTED DATA OUTLET, CAT.6 PLENUM, "X" INDICATES NUMBER OF CABLE RUNS (JACKS). IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- X — VOICE "POTS" OR DIGITAL OUTLET, CAT.6 PLENUM, "X" INDICATES NUMBER OF CABLE RUNS (JACKS), IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- W — WALL-MOUNTED VOICE OUTLET, CAT.6 PLENUM, AT 48" A.F.F. UNLESS OTHERWISE NOTED.
- R — WALL-MOUNTED VOICE OUTLET, CAT.6 PLENUM, AT 48" A.F.F. FOR "RED PHONE" BRIDGED TO ADJACENT ANALOG FAX LINE UNLESS OTHERWISE NOTED.
- F — "POTS" OR DIGITAL OUTLET, CAT.6 PLENUM, FOR FACSIMILE LINE UNLESS OTHERWISE NOTED.
- X — FLOOR-MOUNTED VOICE OUTLET, CAT.6 PLENUM, "X" INDICATES NUMBER OF CABLE RUNS (JACKS). IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- X — VOICE OVER IP (VoIP) OUTLET, CAT.6 PLENUM, "X" INDICATES NUMBER OF CABLE RUNS (JACKS), IF THERE IS NO NUMBER INDICATED THERE SHALL BE ONE CABLE RUN (JACK).
- W — WALL-MOUNTED VOICE OVER IP (VoIP) OUTLET, CAT.6 PLENUM, AT 48" A.F.F. UNLESS OTHERWISE NOTED.
- X Y — VOICE & DATA OUTLET, CAT.6 PLENUM, "X" & "Y" INDICATES NUMBER OF CABLE RUNS (JACKS). IF THERE ARE NO NUMBERS INDICATED THERE SHALL BE TWO CABLE RUNS (JACKS). ALL CABLES TERMINATE IN A SINGLE FACEPLATE UNLESS OTHERWISE NOTED.
- X Y — VOICE OVER IP (VoIP) AND DATA OUTLET, CAT.6 PLENUM, "X" & "Y" INDICATES NUMBER OF CABLE RUNS (JACKS). IF THERE ARE NO NUMBERS INDICATED THERE SHALL BE TWO CABLE RUNS (JACKS). ALL CABLES TERMINATE IN A SINGLE FACEPLATE UNLESS OTHERWISE NOTED.
- DOUBLE-GANG BOX ROUGH-IN & CONDUIT WITH PULL ROPE.
- X Y — FLOOR-MOUNTED VOICE & DATA OUTLET, CAT.6 PLENUM, "X" & "Y" INDICATES NUMBER OF CABLE RUNS (JACKS). IF THERE ARE NO NUMBERS INDICATED THERE SHALL BE TWO CABLE RUNS (JACKS). ALL CABLES TERMINATE IN A SINGLE FACEPLATE UNLESS OTHERWISE NOTED.
- FIBER TERMINATION, SIZE AND TYPE AS SPECIFIED.
- FLOOR-MOUNTED DOUBLE-GANG BOX ROUGH-IN & CONDUIT WITH PULL ROPE.
- FB — FLOOR BOX PER SPECIFICATIONS. FLOOR BOX TO CONTAIN 120VAC 20A POWER RECEPTACLE, VOICE AND DATA OUTLETS AND AUDIO-VISUAL FACEPLATE. RE: DETAILS FOR ADDITIONAL INFORMATION.
- TV — VIDEO OUTLET, COAXIAL CABLE RUN, TYPE RG6 AS SPECIFIED. SUPERSCRIPT X INDICATES NUMBER OF CABLE RUNS. WHERE USED IN CONJUNCTION WITH OTHER SYMBOL, MOUNT IN COMBINED FACEPLATE.
- TV — FLOOR-MOUNTED VIDEO OUTLET, COAXIAL CABLE RUN, TYPE RG6 AS SPECIFIED. SUPERSCRIPT X INDICATES NUMBER OF CABLE RUNS. WHERE USED IN CONJUNCTION WITH OTHER SYMBOL, MOUNT IN COMBINED FACEPLATE. COORDINATE INSTALLATION WITH FLOOR BOX PROVIDER.
- N — KEYNOTE NUMBER N
- V1 — VIDEO DISPLAY WALL-BOX ASSEMBLY. RE: DETAILS AND SPECIFICATIONS.
- V2 — INFRASTRUCTURE FOR CEILING-MOUNTED VIDEO DISPLAY. RE: DETAILS AND SPECIFICATIONS.
- S1 — CEILING-MOUNTED SPEAKER
- FP X TV +XX" AFF — DATA AND COAXIAL VIDEO OUTLETS SHOWN ARE MOUNTED INSIDE "V1" DISPLAY BACKBOX AT INDICATED HEIGHT

05 VOICE, DATA AND VIDEO SYMBOLS
N.T.S.

06 NOTES - COORDINATION
N.T.S.

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phase issue description:
ADDENDUM 13

project issue date:
08/29/2024
drawn by: ATG
checked by: ATG

revision schedule

#	date	description

project number: 19-029

C - LEGEND AND NOTES - IT

T0-02C

8/29/2024 2:24:45 PM

GENERAL NOTES FOR AUDIOVISUAL WORK:

1. CONTRACTOR SHALL COORDINATE FINAL PLACEMENT, LOCATION, AND MOUNTING HEIGHTS OF ALL TELECOMMUNICATIONS DEVICES WITH ARCHITECTURAL DRAWINGS. CONTRACTOR SHALL UTILIZE THE ARCHITECTURAL FLOOR PLANS, AND INTERIOR ELEVATIONS TO LOCATE THE EXACT PLACEMENT OF TELECOMMUNICATIONS OUTLETS FOR THE AUDIOVISUAL SYSTEMS DEVICES.

01 AUDIOVISUAL GENERAL NOTES
N.T.S.

CAM	CAMERA	S1	SPEAKER PAGING CEILING MOUNTED
ER	AV EQUIPMENT RACK	S2	SPEAKER CONFERENCE CEILING MOUNTED
FB	FLOOR BOX	TM	TABLE MIC
HA	HEARING ASSIST ANTENNA WALL MOUNTED	CM	CEILING MIC
HA	HEARING ASSIST ANTENNA CEILING MOUNTED	CC	CABLE CUBBY
IC	INTERCOM	CAM	CONFERENCING CAMERA WALL MOUNTED
JBL x	JUNCTION BOX LINE LEVEL	CAM	CONFERENCING CAMERA CEILING MOUNTED
JBM x	JUNCTION BOX MIC LEVEL	VP	VIDEO PROJECTOR WALL MOUNTED
JBS x	JUNCTION BOX SPEAKER LEVEL	VP	VIDEO PROJECTOR CEILING MOUNTED
TP	TOUCH PANEL TABLE TOP	PS	PROJECTOR SCREEN
TP	TOUCH PANEL WALL MOUNTED	WA	WIRELESS ANTENNA WALL MOUNTED
SW	SUB WOOFER CEILING MOUNTED	WA	WALL MOUNTED ANTENNA CEILING MOUNTED
SW	SUB WOOFER WALL MOUNTED	AV	AV TRANSMITTER PLATE
S	SPEAKER WALL MOUNTED	WP x	AV CUSTOM WALL PLATE

02 AUDIOVISUAL SYMBOLS
N.T.S.

03 NOT USED
N.T.S.

04 NOT USED
N.T.S.

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project number: 19-029

C - LEGEND AND NOTES - AUDIOVISUAL

T0-03C

8/29/2024 2:24:49 PM

1. THE SECURITY CONTRACTOR SHALL HAVE A PRE-INSTALLATION COORDINATION MEETING WITH THE PROJECT ARCHITECT AND ENGINEER TO OVERVIEW THE COMPLETE SCOPE OF WORK AS WELL AS TO VERIFY LOCATIONS AND PLACEMENTS OF THE SECURITY DEVICES AND EQUIPMENT. THE PRE-INSTALLATION MEETING SHALL BE INITIATED BY CONTRACTOR AND TAKE PLACE AT LEAST FOUR (4) WEEKS PRIOR TO CONTRACTOR COMMENCES WORK.
2. SECURITY CONTRACTOR SHALL COORDINATE FINAL PLACEMENTS AND LOCATIONS OF DEVICES WITH ARCHITECT. CONTRACTOR SHALL UTILIZE THE ARCHITECTURAL FLOOR PLANS TO LOCATE THE EXACT PLACEMENT OF DEVICES (CAMERAS, CARD READERS, ETC.)
3. SECURITY CONTRACTOR SHALL COORDINATE TELECOMMUNICATIONS CONDUIT TYPE, PATH AND PLACEMENT WITH MEP SPECIFICATIONS AND MEP ENGINEER.
4. TELECOM CONTRACTOR SHALL COMPLY WITH THE NFPA, NEC, EIA/TIA, FCC, UL, IEEE STANDARDS, & LOCAL AHJ ORDINANCES FOR THE INSTALLATION OF CABLE AND SECURITY AND NETWORKING EQUIPMENT.
5. ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS AND THE NFPA AND NEC CODES NEED TO BE REPORTED TO ENGINEER BEFORE PURCHASING AND INSTALLATION OF CABLE AND EQUIPMENT.
6. ALL FURNISHED EQUIPMENT AND CABLING SHALL BE PROVIDED WITH ALL ACCESSORIES AND ANCILLARY HARDWARE REQUIRED FOR A COMPLETE FUNCTIONAL ELECTRONIC ACCESS CONTROL, SURVEILLANCE AND INTRUSION DETECTION SYSTEMS.
7. ALL DEVICES SHALL BE IN ACCORDANCE WITH ADA REQUIREMENTS.
8. ALL CONDUITS SHALL BE INSTALLED BY THE ELECTRICAL CONTRACTOR, HOWEVER IT IS THE RESPONSIBILITY OF THE SECURITY CONTRACTOR TO COORDINATE THE CONDUIT SHOWN ON THE TELECOMMUNICATIONS DRAWINGS WITH THE ELECTRICAL CONTRACTOR.
9. ALL SECURITY CABLING SHALL COMPLY WITH THE NFPA AND NEC STANDARDS AND CODES. CONTRACTOR SHALL NOTIFY AND REQUEST CLARIFICATION FROM TECHNOLOGY CONSULTANT AND ARCHITECT OF ANY APPARENT DEVIATIONS FROM THE NFPA AND NEC CODES BEFORE PURCHASING AND INSTALLATION OF MATERIALS AND EQUIPMENT.
10. GENERAL CONTRACTOR AND ELECTRICAL CONTRACTOR SHALL REVIEW AND COORDINATE TELECOM DRAWINGS AND SPECIFICATIONS RELATED TO SCOPE OF WORK FROM DIVISIONS 1, 26, AND 27.

01 NOTES - GENERAL
N.T.S.

1. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL CONDUIT PULL STRINGS AND JUNCTION BOXES FOR SECURITY DEVICES AS SHOWN ON DRAWINGS.
2. ELECTRICAL CONTRACTOR SHALL PROVIDE 120V AC FOR SECURITY COMMON EQUIPMENT AS REQUIRED. SECURITY CONTRACTOR SHALL IDENTIFY LOCATIONS ON SUBMITTALS.
3. SECURITY CONTRACTOR SHALL PROVIDE AND INSTALL ALL LOW VOLTAGE CABLE AS REQUIRED. RE: SECURITY SPECIFICATIONS.
4. ELECTRICAL CONTRACTOR SHALL REFER TO SECURITY DRAWINGS FOR LOCATIONS OF SECURITY GANG BOXES AND CONDUIT. REFER TO DIVISION 26 FOR THE PROVISION AND INSTALLATION REQUIREMENTS OF CONDUITS, RACEWAY AND BOXES.
5. CAMERA LOCATIONS: CONTRACTOR SCOPE OF WORK TO PROVIDE CONDUIT INFRASTRUCTURE TO CAMERA LOCATIONS AND CAT.6 PVC CABLE COILED IN A 20' SERVICE LOOP.
6. REFER TO DIVISION 28 SPECIFICATIONS FOR THE DEVICE MANUFACTURER AND MODEL TO ACCOMPANY LAYOUTS AND DETAILS SHOWN IN THESE DRAWINGS.
7. SECURITY CONTRACTOR SHALL PROVIDE A COMPLETE SET OF SHOP DRAWINGS TO BE REVIEWED AND APPROVED BY THE CITY OF DALLAS AHJ BEFORE EQUIPMENT PURCHASING AND INSTALLATION. REFER TO SPECIFICATIONS SECTION 280000 FOR DOCUMENTATION FORMAT REQUIREMENTS.

02 NOTES - GENERAL
N.T.S.

1. CONTRACTOR SHALL PROVIDE THE NETWORK SWITCHES THAT PROVIDES POE POWER TO THE VIDEO SURVEILLANCE CAMERAS AND ANCILLARY DEVICES.
2. CONTRACTOR SHALL REFERENCE THE DRAWINGS TO SIZE AND LOCATE THE SWITCHES IN THEIR CORRESPONDING TELECOMMUNICATIONS EQUIPMENT ROOM.
3. **CONTRACTOR IS TO COORDINATE WITH THE OWNER FOR THE SELECTION, LOCATION, SIZING AND FEATURES OF THE NETWORKING SWITCHES BEFORE PURCHASING AND INSTALLATION.**

03 NOTES - SECURITY NETWORK
N.T.S.

04 NOT USED
N.T.S.

ANNOTATION

M/T M=MOUNT T=TECHNOLOGY/TYPE

M:
- P = PEDESTAL
- T = TURNSTILE
- S = SURFACE
- F =- FLUSH
- R = RACK
- M = MULLION
- D = DESK
- W = WALL
- C = CEILING
- H = HIDDEN
- FUT = INFRASTRUCTURE ONLY
- OF = OWNER FURNISHED

T: SPECIFIC TO DEVICE

ACCESS CONTROL

M/T CARD ACCESS READER

M:
- I = INTEGRATED IN LOCKSET
- F = FLUSH MOUNT
- S = SURFACE MOUNT

T:
- B = BARCODE
- W = WIEGAND
- P = PROXIMITY
- M = MAG. STRIPE
- F = ELEVATOR FLOOR CALL
- H = ELEVATOR HALL CALL
- BIO = BIOMETRIC
- S = SMART CARD

CARD ACCESS READER WITH INTEGRATED KEYPAD

BIOMETRIC ACCESS READER

M:
- H = HAND GEOMETRY
- F = FINGER PRINT
- V = VOICE
- R = EYE RETINA
- I = EYE IRIS

SURVEILLANCE

CCTV STATIC CAMERA. PROVIDE ONE (1) CAT.6A DATA DROP AT ALL CAMERA LOCATIONS.

T:
- S = SCOOP/WEDGE
- C = CORNER
- D = DOME
- B = BOARD
- E = ENVIRONMENTAL

CCTV CAMERA (PTZ) PAN/TILT/ZOOM. PROVIDE ONE (1) CAT.6A DATA DROP AT ALL CAMERA LOCATIONS.

T:
- D = DOME
- E = ENVIRONMENTAL

SWITCHES

M/T AUTOMATIC MONITORING SWITCH

T:
- T = TEMP
- B = BALANCE MAG.
- H = HUMIDITY
- W = WATER
- L = LATCH
- G = GATE
- D = DOOR STATUS

M/T PUSH BUTTON

T:
- P = PANIC
- D = DURESS
- R = DOOR RELEASE
- B = BELL PUSH
- X = REQUEST-FOR-EXIT
- PP = DOOR OPERATOR PUSH PLATE

SENSORS

M/T MOTION DETECTOR

T:
- M = MICROWAVE
- IR = INFRARED
- U = ULTRASONIC
- X = REQUEST-FOR-EXIT
- D = DUAL TECHNOLOGY

DOOR AND LOCKING HARDWARE

M/T ELECTRIC LOCK

T:
- M =MAGNETIC
- S = STRIKE
- L = LATCH SET
- H = HYBRID
- D = DEADBOLT
- T = ELECTRIFIED TRIM

T EXIT DEVICE

T:
- E = ELECTRIFIED
- M = MECHANICAL
- D = DELAYED EGRESS
- X = HIGH SECURITY
- RX = REQUEST-TO-EXIT SWITCH
- EL = ELECTRIFIED LATCH

ELECTRIC POWER TRANSFER

M/T DOOR ACTUATOR PUSH BUTTON

T:
- P = PANIIC
- D = DURESS
- R = DOOR RELEASE
- B = DOORBELL
- X = REQUEST-FOR-EXIT
- D = DOOR OPERATOR PUSH PLATE

COMMUNICATIONS

M/T VIDEO INTERCOM EMERGENCY CALL STATION

05 SECURITY SYMBOLS
N.T.S.

06 NOT USED
N.T.S.

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phase issue description:
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project issue date:
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checked by: ATG

revision schedule

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C - LEGEND AND NOTES - SECURITY

T0-04C

TABLE OF DIVISION OF RESPONSIBILITIES

REFERENCE	COMPONENT	SPECIFICATION BY	OFOI	OFCI	CFCI	CFOI	NOTES
DIVISION 27	PLYWOOD BACKBOARDS	ATG			X		
	OVERHEAD RUNWAY	ATG			X		
	19" EQUIPMENT RACKS	ATG			X		
	COPPER AND FIBER OPTIC CABLE PATCH PANELS	ATG			X		
	COPPER AND FIBER OPTIC PATCH CORDS	ATG			X		
	CATEGORY 6/6A, FIBER OPTIC CABLE AND CONNECTORS	ATG			X		
	WORKSTATION HORIZONTAL CABLING	ATG			X		
	COPPER AND FIBER OPTIC RISER CABLING	ATG			X		
	RJ-45 JACKS AND WALL PLATES	ATG			X		
	FIRESTOPPING, BACKBOXES AND CONDUIT	ATG			X		
	CONDUIT FROM DEMARC ROOMS TO PROPERTY LINE FOR SERVICE PROVIDERS	ATG			X		
	ACCESS BOXES AT PROPERTY LINE FOR SERVICE PROVIDERS	ATG			X		
	CORE DRILLING & SLEEVES FOR PATHWAYS	ATG			X		
	VIDEO MONITORS	ATG			X		
	VIDEO MOUNTS	ATG			X		
	SPEAKERS AND ASSOCIATED CABLING	ATG			X		
	AUDIO-VIDEO CONFERENCING CONTROL EQUIPMENT AND SOFTWARE	ATG			X		
	AUDIO-VIDEO RACK MOUNTED UPS	ATG			X		
	PROJECTORS	ATG			X		
	PROJECTION SCREENS	ATG			X		
	AV SYSTEMS PROGRAMMING	ATG			X		
DIVISION 28	CATEGORY 6/6A COPPER CABLING	ATG			X		
	SECURITY ACCESS CONTROL WIRING	ATG			X		
	ACCESS CONTROL SYSTEM EQUIPMENT, SERVERS & SOFTWARE	ATG			X		
	CCTV SYSTEM EQUIPMENT, SWITCHES, SERVERS & SOFTWARE	ATG			X		
	DOOR POSITION SWITCHES	ATG			X		
	CARD READERS	ATG			X		
	CCTV CAMERAS AND MONITORS	ATG			X		
	ELECTRONIC LOCKS AND HARDWARE	DIVISION 8			X		
OTHER	DATA NETWORK SWITCHES	OWNER*			X		
	VOICE NETWORK SWITCHES	OWNER*	X				
	RACK MOUNTED POWER DEVICES AND UPS	OWNER*	X				
	WORKSTATIONS AND SERVERS	OWNER*	X				
	WIRELESS ACCESS POINTS	OWNER*	X				
	VOICE AND DATA SOFTWARE APPLICATIONS	OWNER*	X				
	VOICE AND DATA SERVICES AND DEVICES	OWNER*	X				
	VOICE AND DATA SYSTEMS PROGRAMMING	OWNER*	X				
	CABLING FOR PUBLIC BROADCAST VIDEO SERVICES TO DEMARC ROOM & IN-BUILDING	SERVICE PROVIDER**					
	DATA CABLING FOR INTERNET AND WIRELESS SERVICES TO DEMARC ROOM & IN-BUILDING	SERVICE PROVIDER**					
	VOICE CABLING FOR POTS AND EMERGENCY SERVICES TO DEMARC	SERVICE PROVIDER**					
	DAS SYSTEM CABLING AND EQUIPMENT (IF APPLICABLE)	INTEGRATOR					
ACRONYMS	OFOI - OWNER FURNISHED OWNER INSTALLED OFCI - OWNER FURNISHED CONTRACTOR INSTALLED CFCI - CONTRACTOR FURNISHED CONTRACTOR INSTALLED CFOI - CONTRACTOR FURNISHED OWNER INSTALLED						

* BUILDING IT/OPERATOR
** SERVICE PROVIDER EQUIPMENT AND INSTALLATION

01 DIVISION OF RESPONSIBILITIES
N.T.S.

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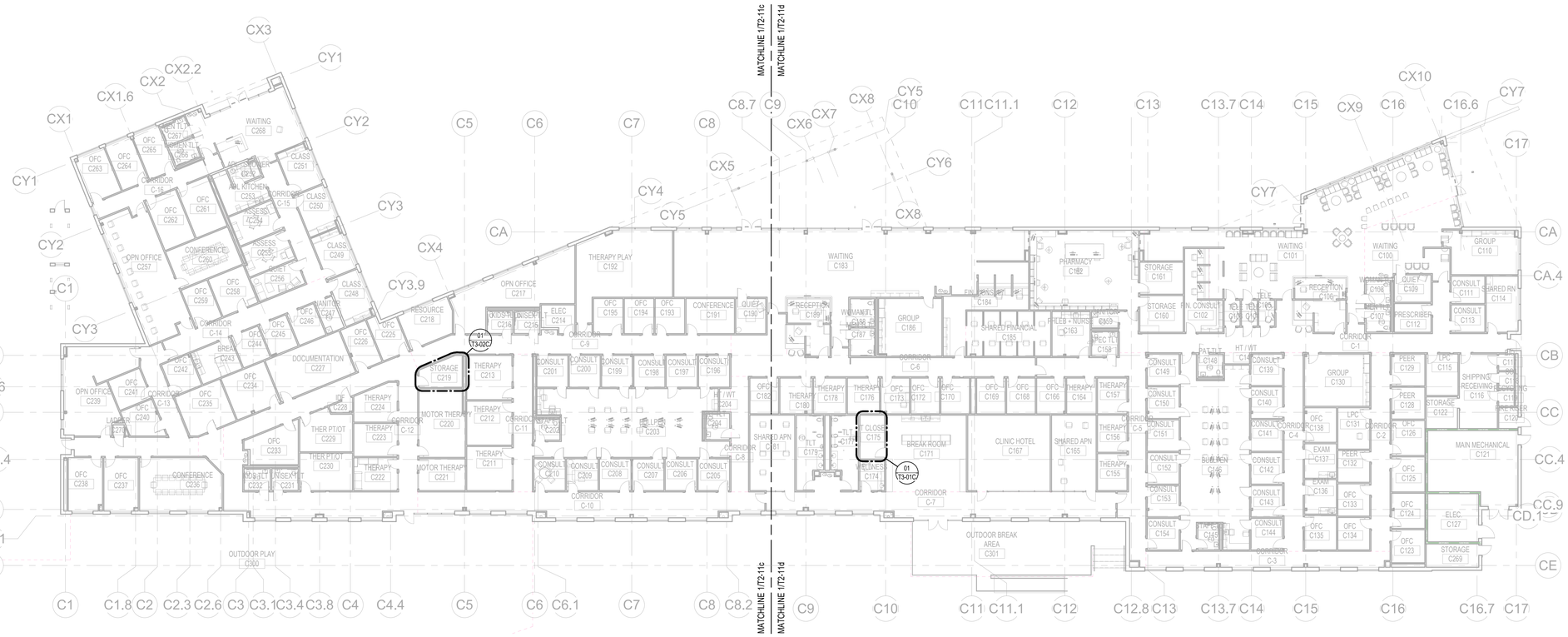
C - PROJECT REQUIREMENTS AND DIVISION OF RESPONSIBILITIES

T0-05C



01 **L1 - CLINIC BUILDING - OVERALL FLOOR PLAN - TECHNOLOGY**
1/16" = 1'-0"

KEY PLAN

NORTH

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C - LEVEL 1 - OVERALL FLOOR PLAN - TECHNOLOGY

T2-01C

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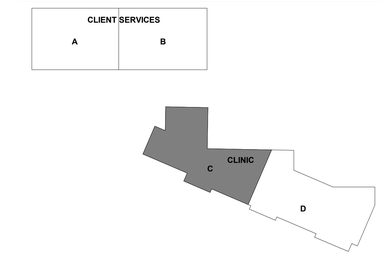
01 **L1 - CLINIC BUILDING - FLOOR PLAN - AREA C - IT**
1/8" = 1'-0"

KEY PLAN



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C - LEVEL 1 - FLOOR PLAN - AREA C - IT

T2-11c

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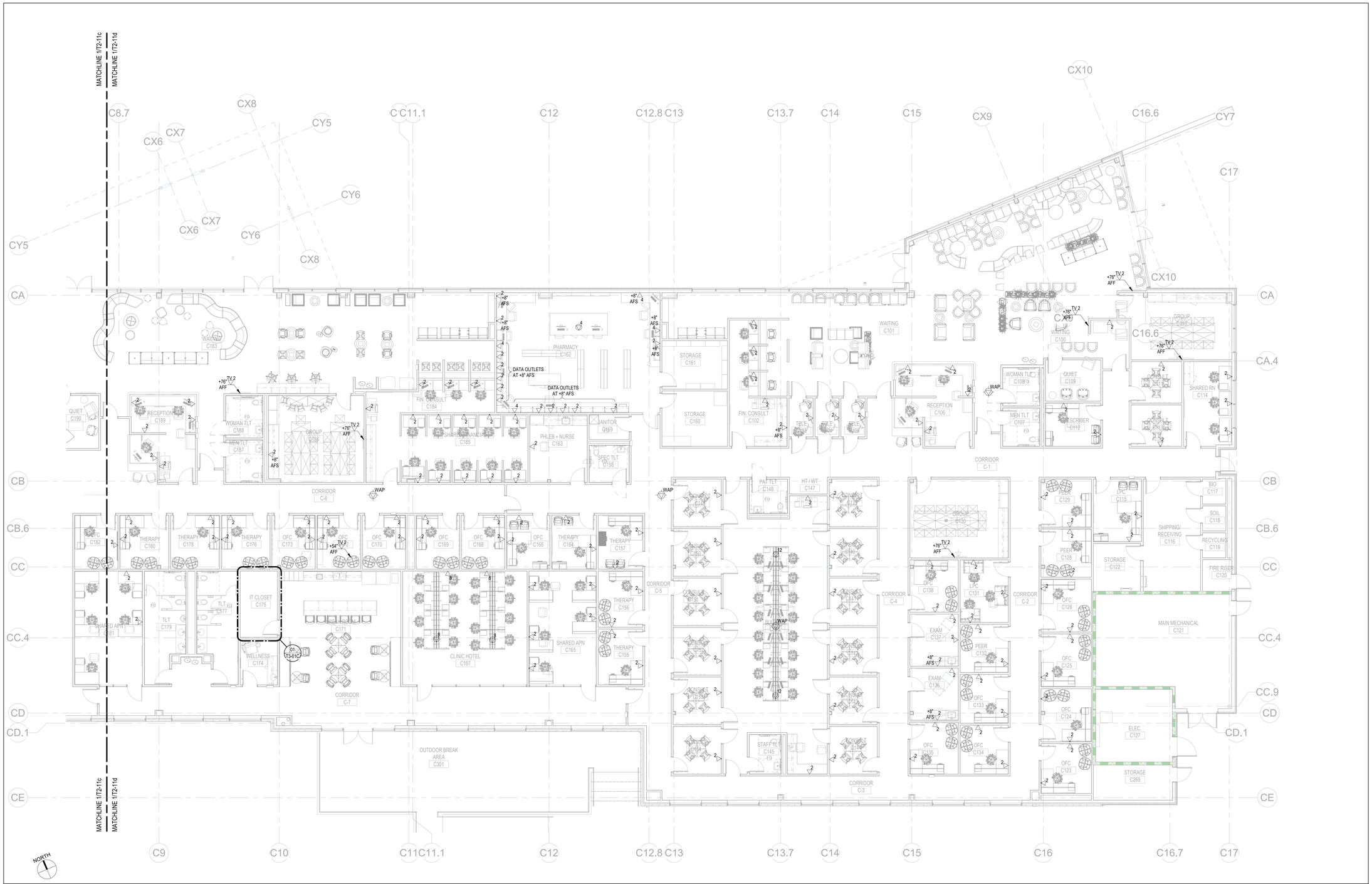
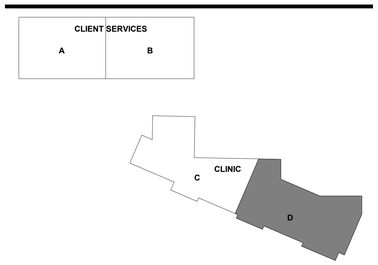


01 L1 - CLINIC BUILDING - FLOOR PLAN - AREA D - IT
1/8" = 1'-0"

KEY PLAN



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C - LEVEL 1 - FLOOR PLAN - AREA D - IT

T2-11d

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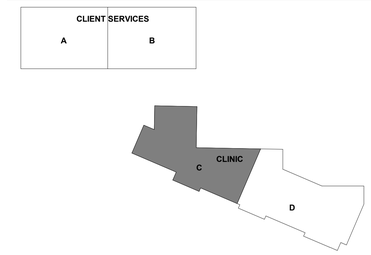
01 **L1 - CLINIC BUILDING - FLOOR PLAN - AREA C - AV**
1/8" = 1'-0"

KEY PLAN

NORTH



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C - LEVEL 1 - FLOOR PLAN - AREA C - AV

T2-12c

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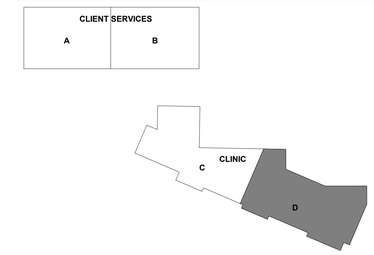
01 L1 - CLINIC BUILDING - FLOOR PLAN - AREA D - AV
1/8" = 1'-0"

KEY PLAN



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C - LEVEL 1 - FLOOR PLAN - AREA D - AV

T2-12d

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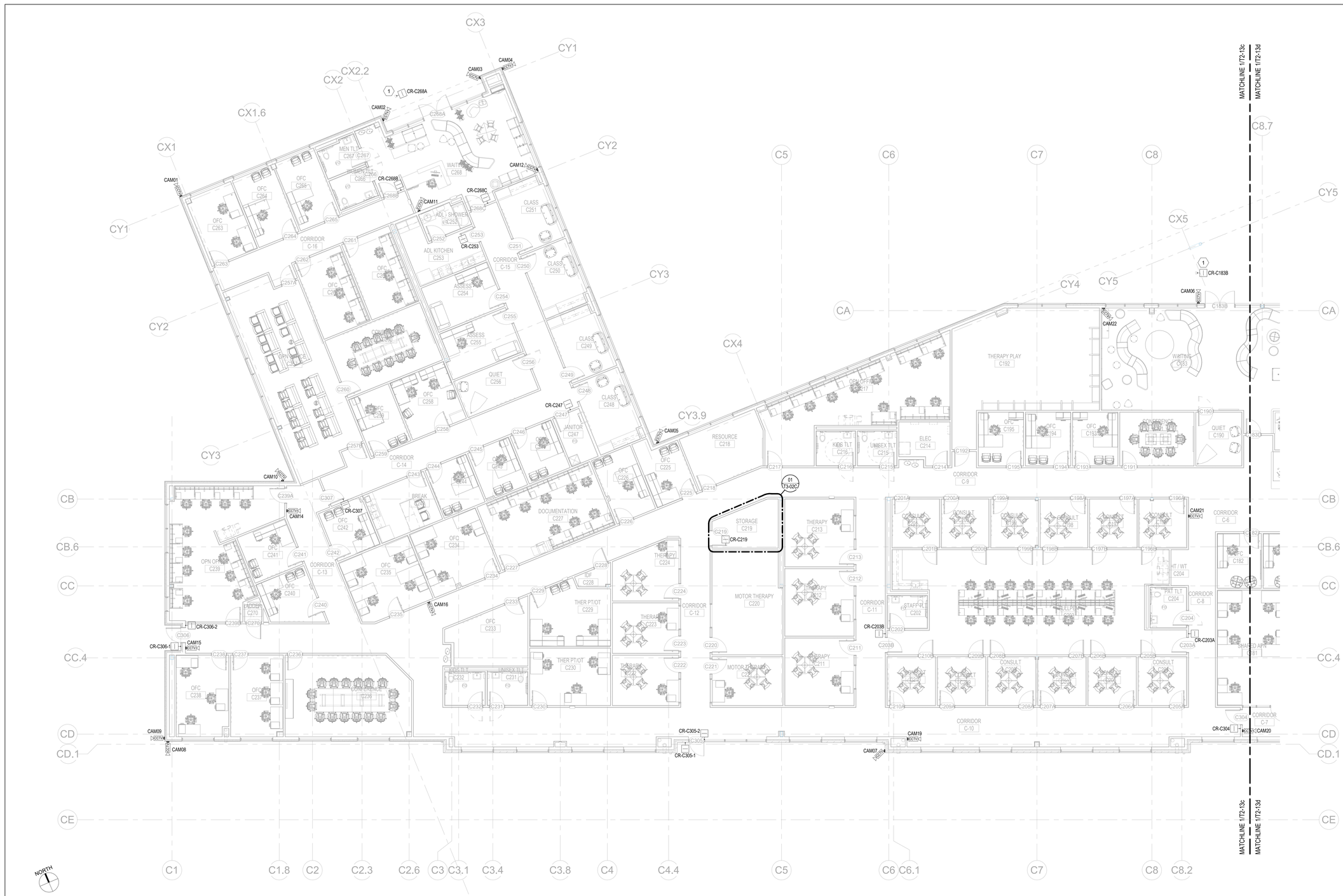
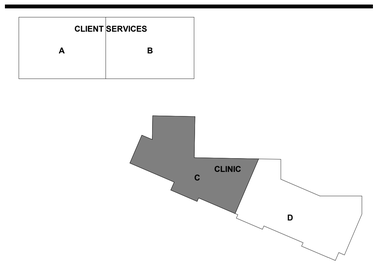


01 **L1 - CLINIC BUILDING - FLOOR PLAN - AREA C - SECURITY**
1/8" = 1'-0"

KEYNOTES

1. COORDINATE ACCESS CONTROL MOUNTING AND INTEGRATION WITH ADA PEDESTAL. RE: DETAILS.

KEY PLAN



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C - LEVEL 1 - FLOOR PLAN - AREA C - SECURITY

T2-13c

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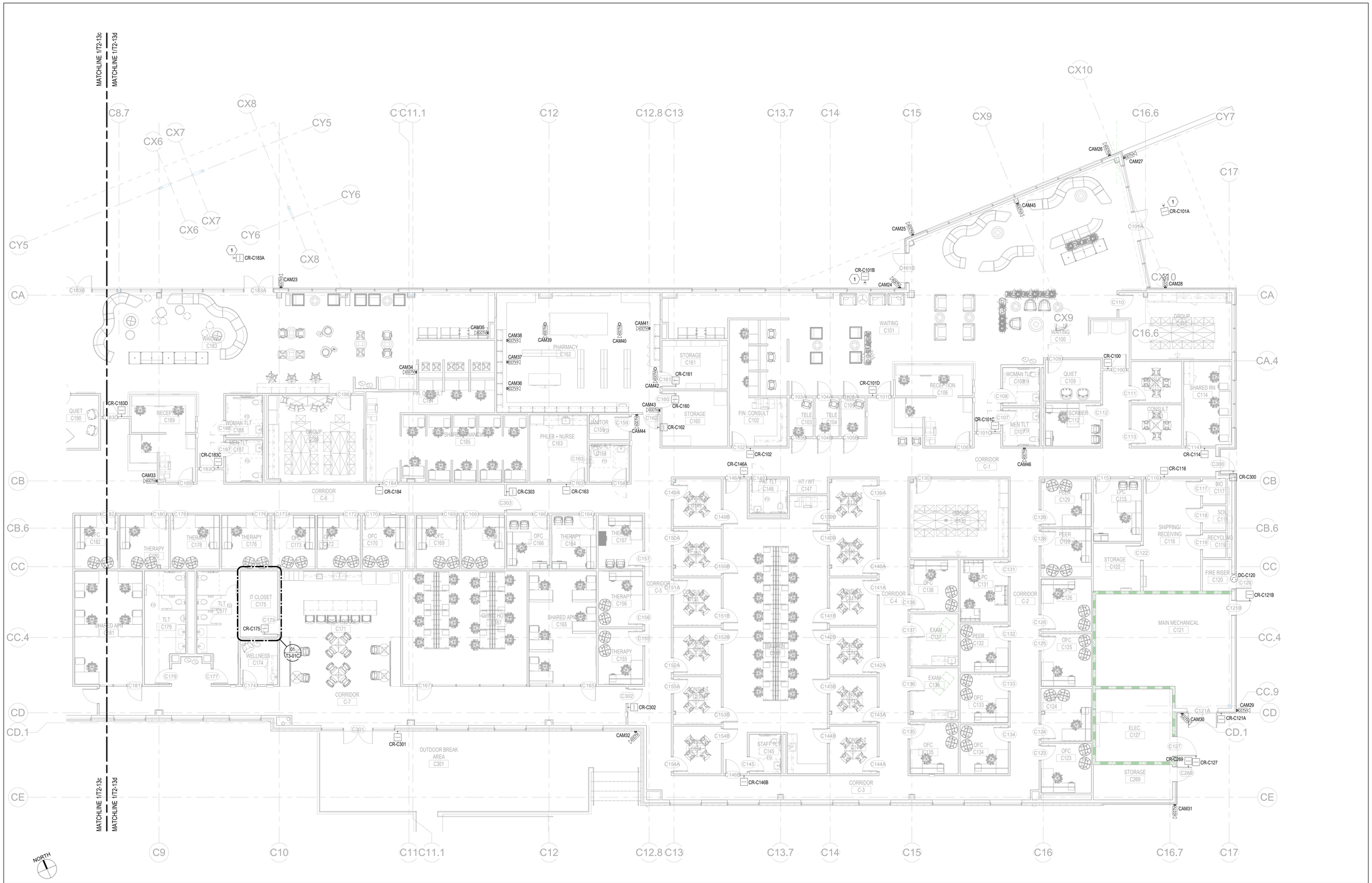
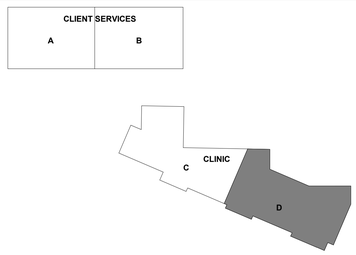


01 **L1 - CLINIC BUILDING - FLOOR PLAN - AREA D - SECURITY**
1/8" = 1'-0"

KEYNOTES

1. COORDINATE ACCESS CONTROL MOUNTING AND INTEGRATION WITH ADA PEDESTAL. RE: DETAILS.

KEY PLAN



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C - LEVEL 1 - FLOOR PLAN - AREA D - SECURITY

T2-13d

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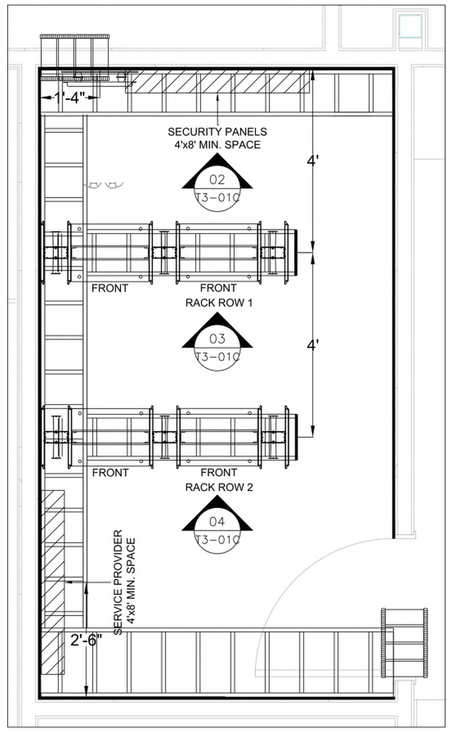
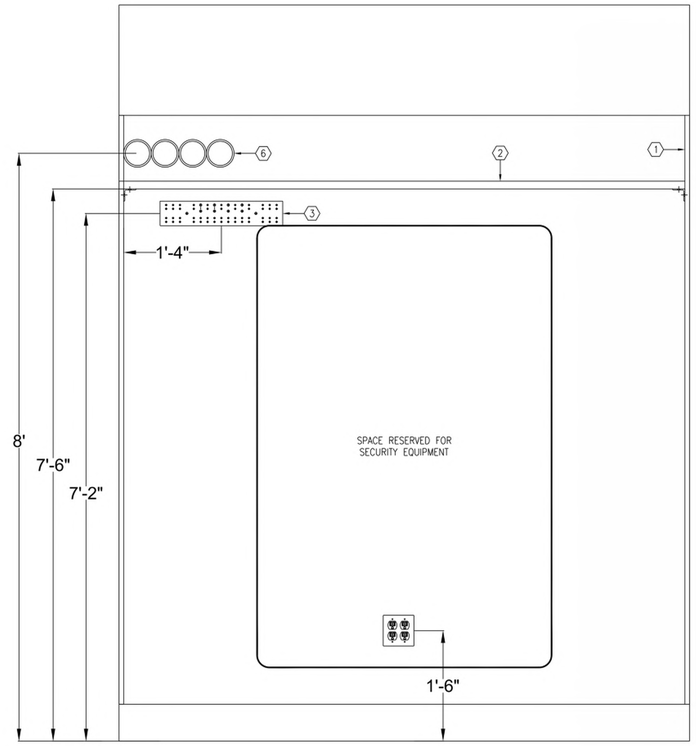
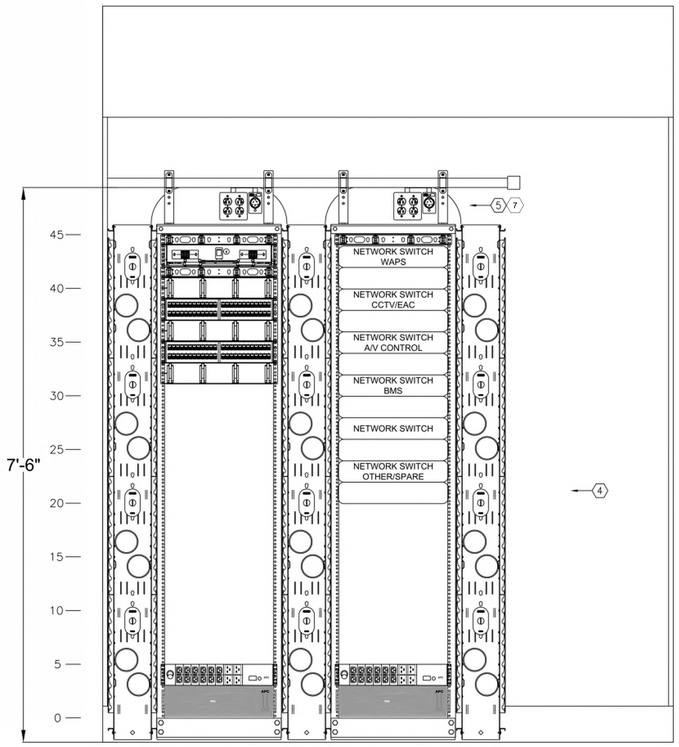


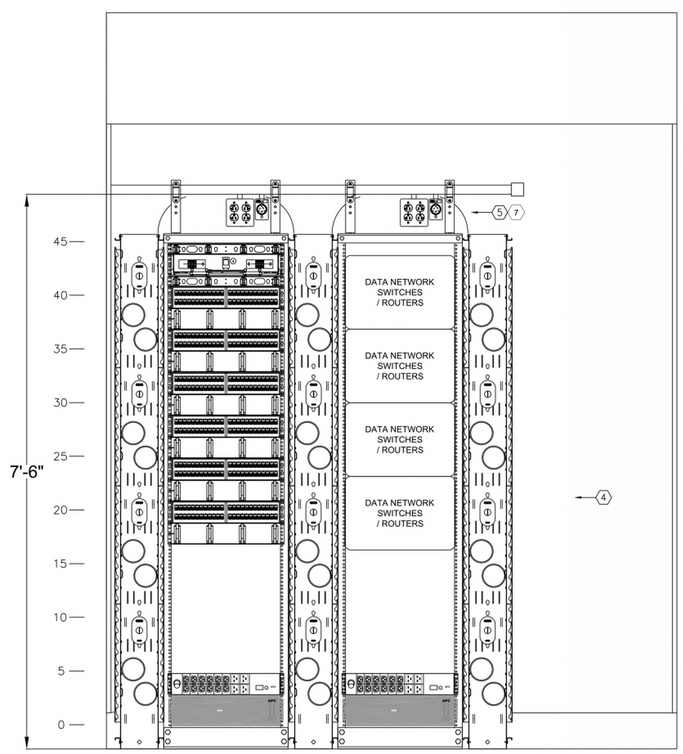
01 ENLARGED PLAN - IT CLOSET C175 (MDF)
3/4" = 1'-0"



02 IT CLOSET C175 (MDF) - SECURITY WALL EQUIPMENT ELEVATION
N.T.S.



03 EQUIPMENT RACK ROW 1 ELEVATION
N.T.S.



04 EQUIPMENT RACK ROW 2 ELEVATION
N.T.S.

PLAN NOTES

1. FIRE-RATED PLYWOOD BACKBOARD, 4' X 8' X 3/4". APPLY TO WALLS WITH LONG DIMENSION VERTICAL. PAINT WITH FIRE- RETARDANT COATING TO MATCH EXISTING WALLS. A-C GRADE OR BETTER WITH BEST FINISH TO INSIDE OF TELECOMMUNICATIONS ROOM.
2. OVERHEAD RUNWAY, 12" WIDE WITH BLACK POWDER-COAT FINISH. MOUNT AT 7'-6" A.F.F. TO BOTTOM OF CROSS-RUNGS. ATTACH TO PLYWOOD BACKBOARDS, RACKS, AND WALLS WITH MANUFACTURER-APPROVED ANCHORS, BRACKETS, BRACES, AND STAND-OFFS.
3. COPPER BUS-BAR FOR TMGB (TELECOMMUNICATIONS MAIN GROUNDING BUS-BAR) OR TGB (TELECOMMUNICATIONS BUS BAR). BUILDING SERVICE ENTRANCE M.P.O.P (MDF) SHALL CONTAIN A TMGB, ALL OTHERS SHALL CONTAIN A TGB. TMGB DIMENSIONS SHALL BE 4"H X 20" W. X 1/4" THICK. TGB DIMENSIONS SHALL BE 4"H. X 10"W. X 1/4" THICK.

   GROUNDING BOND CONDUCTOR. MINIMUM #6 A.W.G., GREEN INSULATED STRANDED WIRE. ROUTE BETWEEN ALL METALLIC EQUIPMENT, RACKS, AND RUNWAYS TO THE TGB OR TMGB.

   MAIN GROUNDING BOND CONDUCTOR BY ELECTRICAL CONTRACTOR, REFER TO ELECTRICAL DRAWINGS.
4. 19" W. X 84" H. FREE-STANDING RELAY RACK WITH 6" WIDE VERTICAL WIRE MANAGERS. VERTICAL WIRE MANAGERS SHALL HAVE WIRE ROUTING CHAMBERS FRONT AND BACK, PLUS HINGED COVERS. HORIZONTAL WIRE MANAGERS, 19" W. X 1 RMU H. AND 19" W. X 2 RMU H.

   48-PORT, CATEGORY 6 PATCH PANEL WITH IDC PUNCH-DOWN TERMINATIONS ON REAR FOR CATEGORY 6 4-PAIR, UTP DATA CABLING. PROVIDE ONE (1) PORT FOR EVERY DATA JACK IN OFFICES, COMMON AREAS AND TV's (COMMON CHANNELS AND INFORMATIONAL) IN CORRIDORS AND OTHER SPACES.

   48-PORT, CATEGORY 6A PATCH PANEL WITH IDC PUNCH-DOWN TERMINATIONS ON REAR FOR CATEGORY 6A 4-PAIR, UTP DATA CABLING. PROVIDE ONE (1) PORT FOR EVERY WIRELESS ACCESS POINT.

   QUANTITIES AS SHOWN IN ELEVATION DETAILS.
5. 6" RACK TO OVERHEAD RUNWAY STAND-OFF BRACKET. TYPICAL FOR EACH SHOWN.
6. 4-4" CONDUIT SLEEVES INTO CORRIDOR CEILING SPACE BEYOND. ROUTE ALL FIBER OPTIC RISER AND HORIZONTAL UTP VOICE/DATA/VIDEO DISTRIBUTION CABLES INTO TELECOM ROOMS.
7. 208V/30A CIRCUITS ARE TO BE TERMINATED ON L6-30R TYPE RECEPTACLE IN A SINGLE GANG BOX.

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ADDENDUM 13

project issue date:
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checked by: ATG

revision schedule

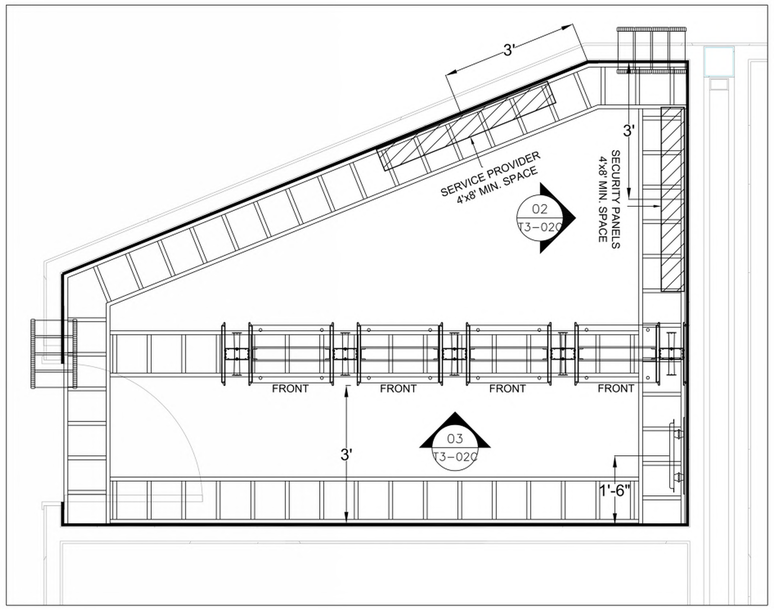
#	date	description

project number: 19-029

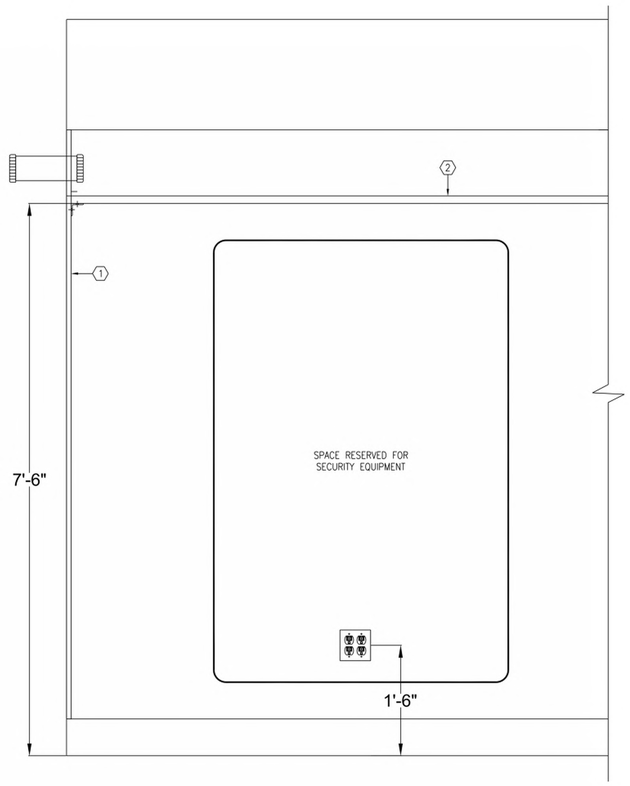
C - TELECOM EQUIPMENT ROOM DETAILS

T3-01C

9/29/2024 2:25:40 PM



01 ENLARGED PLAN - IDF C219
3/4" = 1'-0"



02 IDF C219 - SECURITY WALL EQUIPMENT ELEVATION
N.T.S.

PLAN NOTES

1. FIRE-RATED PLYWOOD BACKBOARD, 4' X 8' X 3/4". APPLY TO WALLS WITH LONG DIMENSION VERTICAL. PAINT WITH FIRE- RETARDANT COATING TO MATCH EXISTING WALLS. A-C GRADE OR BETTER WITH BEST FINISH TO INSIDE OF TELECOMMUNICATIONS ROOM.
2. OVERHEAD RUNWAY, 12" WIDE WITH BLACK POWDER-COAT FINISH. MOUNT AT 7'-6" A.F.F. TO BOTTOM OF CROSS-RUNGS. ATTACH TO PLYWOOD BACKBOARDS, RACKS, AND WALLS WITH MANUFACTURER-APPROVED ANCHORS, BRACKETS, BRACES, AND STAND-OFFS.
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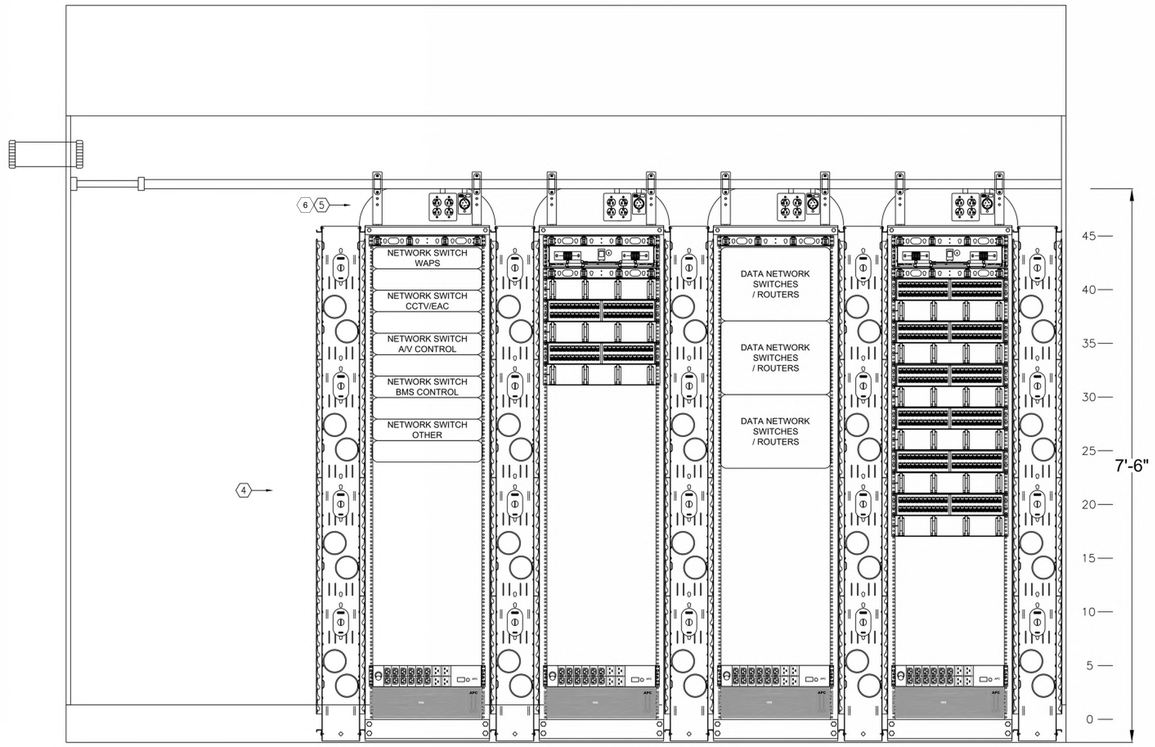
   GROUNDING BOND CONDUCTOR. MINIMUM #6 A.W.G., GREEN INSULATED STRANDED WIRE. ROUTE BETWEEN ALL METALLIC EQUIPMENT, RACKS, AND RUNWAYS TO THE TGB OR TMGB.

   MAIN GROUNDING BOND CONDUCTOR BY ELECTRICAL CONTRACTOR, REFER TO ELECTRICAL DRAWINGS.
4. 19" W. X 84" H. FREE-STANDING RELAY RACK WITH 6" WIDE VERTICAL WIRE MANAGERS. VERTICAL WIRE MANAGERS SHALL HAVE WIRE ROUTING CHAMBERS FRONT AND BACK, PLUS HINGED COVERS. HORIZONTAL WIRE MANAGERS, 19" W. X 1 RMU H. AND 19" W. X 2 RMU H.

   48-PORT, CATEGORY 6 PATCH PANEL WITH IDC PUNCH-DOWN TERMINATIONS ON REAR FOR CATEGORY 6 4-PAIR, UTP DATA CABLING. PROVIDE ONE (1) PORT FOR EVERY DATA JACK IN OFFICES, COMMON AREAS AND TV's (COMMON CHANNELS AND INFORMATIONAL) IN CORRIDORS AND OTHER SPACES.

   48-PORT, CATEGORY 6A PATCH PANEL WITH IDC PUNCH-DOWN TERMINATIONS ON REAR FOR CATEGORY 6A 4-PAIR, UTP DATA CABLING. PROVIDE ONE (1) PORT FOR EVERY WIRELESS ACCESS POINTS.

   QUANTITIES AS SHOWN IN ELEVATION DETAILS.
5. 6" RACK TO OVERHEAD RUNWAY STAND-OFF BRACKET. TYPICAL FOR EACH SHOWN.
6. 208V/30A CIRCUITS ARE TO BE TERMINATED ON L6-30R TYPE RECEPTACLE IN A SINGLE GANG BOX.



03 EQUIPMENT RACK ELEVATION
N.T.S.

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#	date	description

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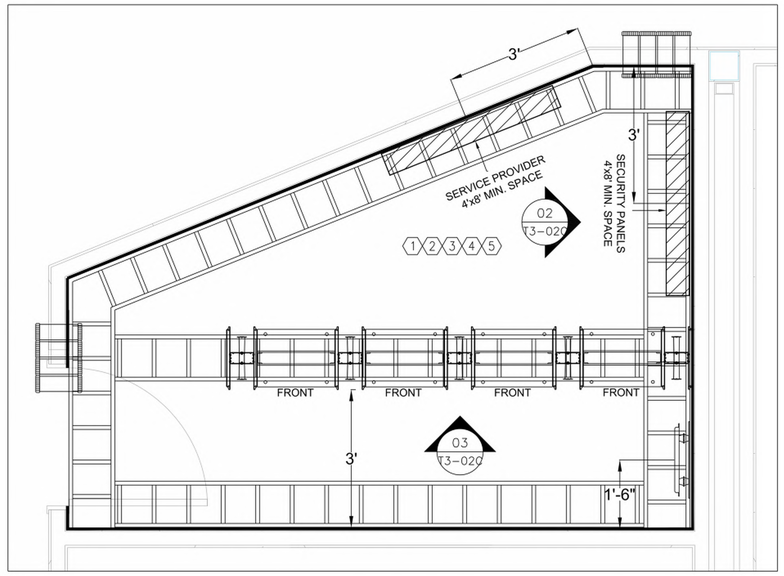
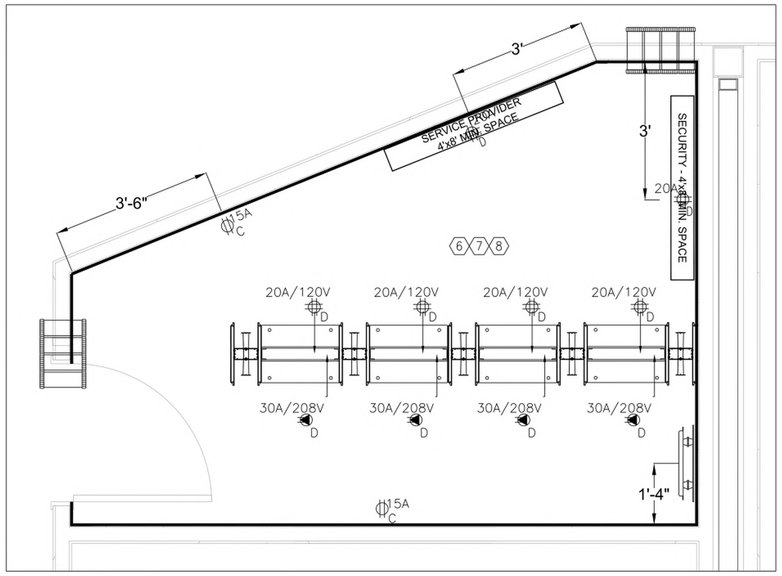
C - TELECOM EQUIPMENT ROOM DETAILS

T3-02C

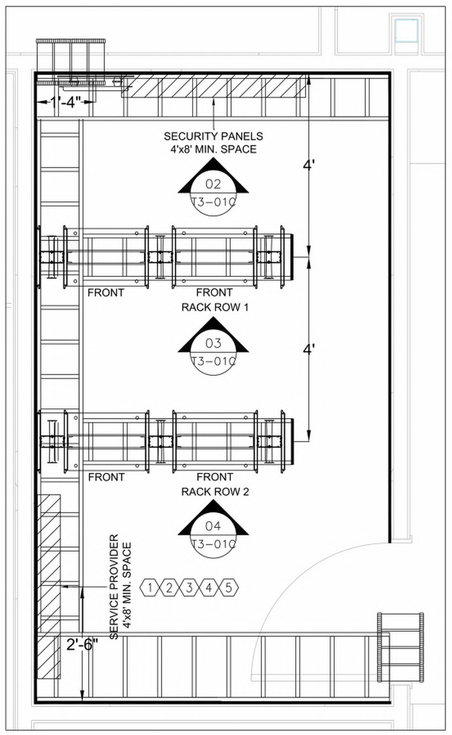
8/29/2024 2:25:45 PM



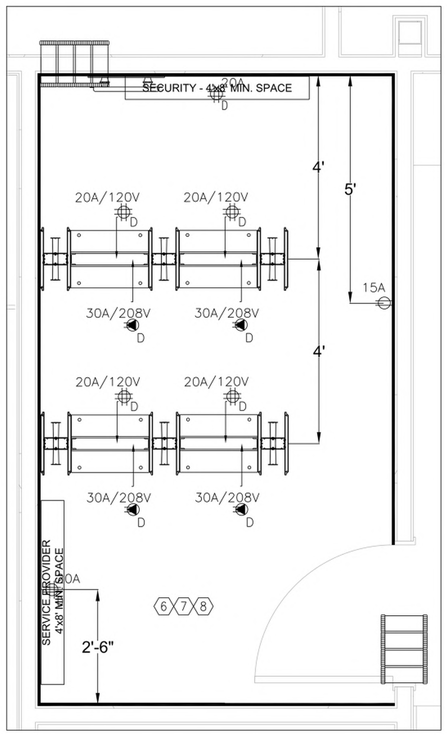
01 ENLARGED PLAN - IDF C219 - ENVIRONMENTAL REQUIREMENTS
3/4" = 1'-0"



02 ENLARGED PLAN - IDF C219 - ELECTRICAL REQUIREMENTS
3/4" = 1'-0"



03 ENLARGED PLAN - IT CLOSET C175 (MDF) - ENVIRONMENTAL REQUIREMENTS
3/4" = 1'-0"



04 ENLARGED PLAN - IT CLOSET C175 (MDF) - ELECTRICAL REQUIREMENTS
3/4" = 1'-0"

PLAN NOTES

1. THE TELECOM ROOMS SHALL BE PROVIDED WITH DEDICATED AIR CONDITIONING (AC) 24 HOURS PER DAY, 365 DAY OPERATION.
2. THE EQUIPMENT HEAT LOAD FOR EACH TELECOM ROOMS IS BETWEEN 12,000 TO 18,000 BTU/HR.
3. THE TELECOM ROOMS TEMPERATURE MUST BE MAINTAINED BETWEEN 60 °F AND 75 °F.
4. THE TELECOM ROOMS RELATIVE HUMIDITY MUST BE MAINTAINED BETWEEN 30% AND 55%, NON-CONDENSING.
5. THE TELECOM ROOMS MUST BE INDEPENDENTLY THERMOSTATICALLY CONTROLLED FROM THE REST OF THE FACILITY.
6. THE ELECTRICAL CIRCUITS SERVING THE COMMUNICATIONS EQUIPMENTS SHALL BE DEDICATED ISOLATED GROUND CIRCUITS.
7. CONVENIENCE CIRCUITS DO NOT REQUIRE ISOLATED GROUND.
8. A TRANSIENT VOLTAGE SUPPRESSION SYSTEM AT THE TRANSFORMER OR PANEL IS RECOMMENDED FOR THE COMMUNICATIONS CIRCUITS.

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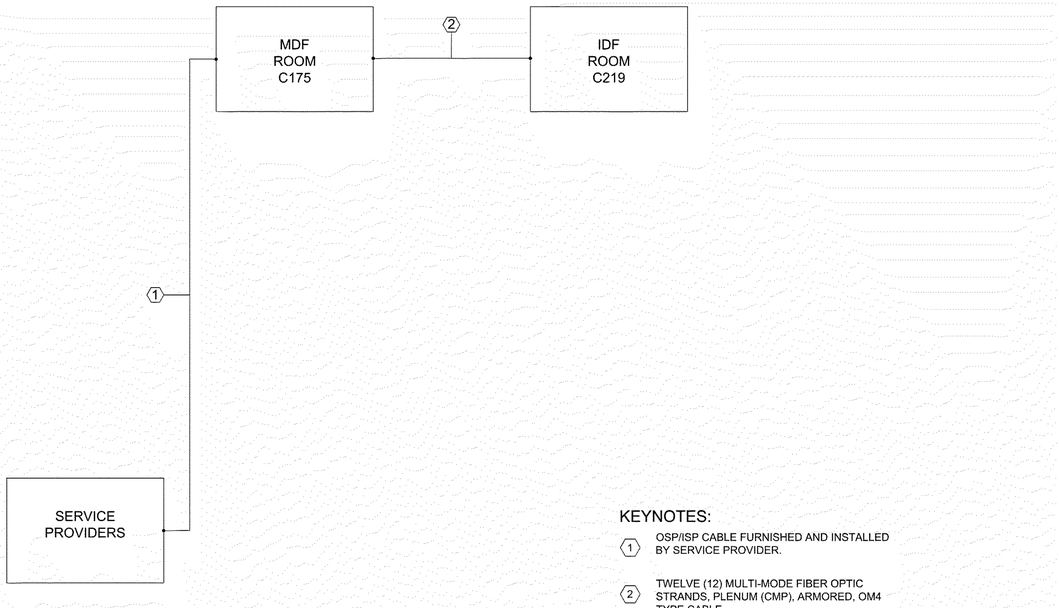
C - TELECOM EQUIPMENT ROOM ELECTRICAL AND ENVIRONMENTAL REQUIREMENTS

T3-03C

8/29/2024 2:25:49 PM



KEYNOTES:

1. OSP/ISP CABLE FURNISHED AND INSTALLED BY SERVICE PROVIDER.
2. TWELVE (12) MULTI-MODE FIBER OPTIC STRANDS, PLENUM (CMP), ARMORED, OM4 TYPE CABLE.

01 FIBER OPTIC RISER DIAGRAM
N.T.S.

02 NOT USED
N.T.S.

03 NOT USED
N.T.S.

05 NOT USED
N.T.S.

06 NOT USED
N.T.S.

07 NOT USED
N.T.S.

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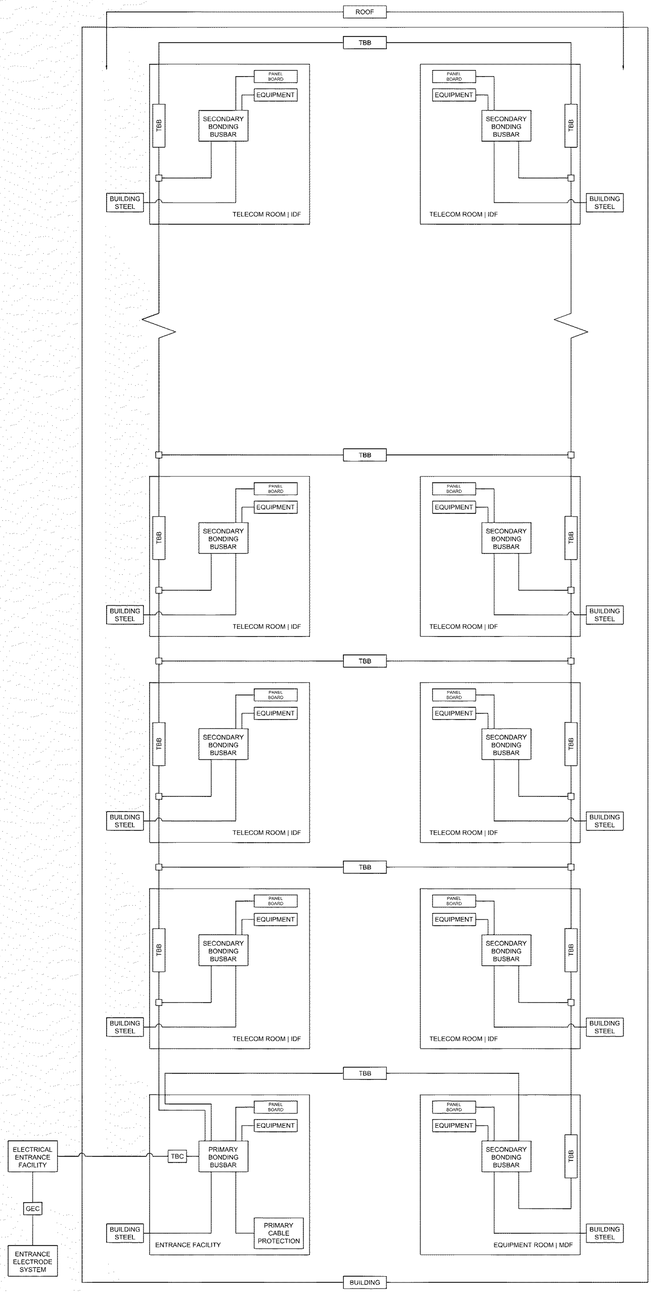
C - TELECOM
RISER DIAGRAMS

T4-01C

8/29/2024 2:25:53 PM



ABBREVIATIONS:

GEC = GROUNDING ELECTRODE CONDUCTOR

TBC = TELECOMMUNICATIONS BONDING CONDUCTOR

ACEG = ALTERNATING CURRENT EQUIPMENT GROUND

NOTES:

1. ALL FERROUS METAL ENCLOSURES MUST BE BONDED AT BOTH ENDS REGARDLESS OF LENGTH WHEN CONTAINING A BONDING CONDUCTOR. (© 2020 BICSI, TDMM 14TH EDITION)

01 TYPICAL GROUNDING DIAGRAM
N.T.S.

02 NOT USED
N.T.S.

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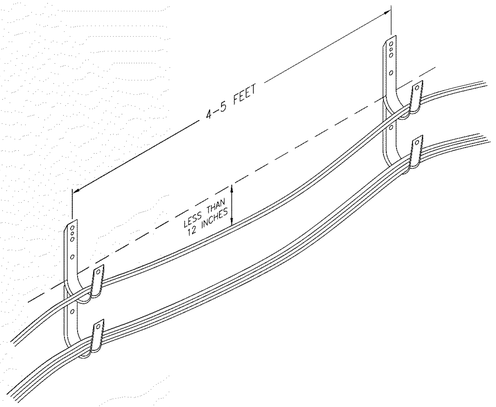
C - GROUNDING RISER DIAGRAM

T4-02C

8/29/2024 2:23:58 PM



01 J-HOOK CABLE SUPPORT
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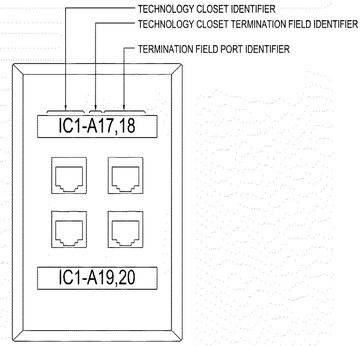

02 TELECOM OUTLET LABELING SCHEME
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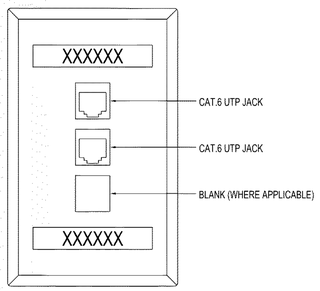

03 TELECOM OUTLET
N.T.S.

04 NOT USED
N.T.S.

GENERAL NOTES

KEYNOTES

SPECIAL NOTES

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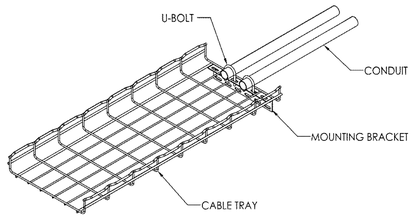
C - TECHNOLOGY DETAILS - IT INFRASTRUCTURE

T5-01C

8/29/2024 2:26:02 PM



01 CABLE TRAY CONDUIT TRANSITION
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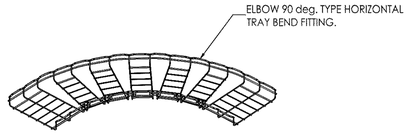

02 CABLE TRAY HORIZONTAL SWEEP
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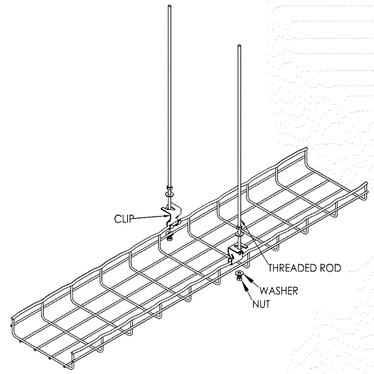
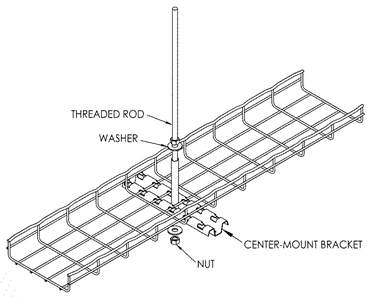


03 CABLE TRAY SUPPORT
N.T.S.

GENERAL NOTES



04 CABLE TRAY CENTER-HUNG SUPPORT
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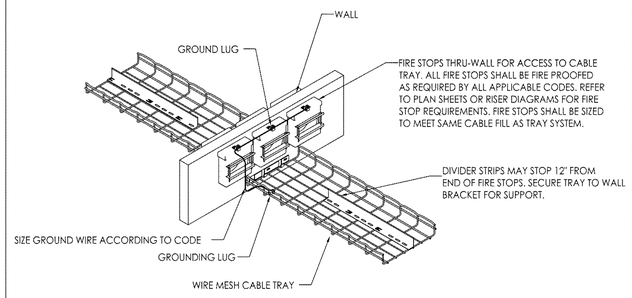

05 CABLE TRAY WALL PENETRATION WITH FIRESTOP
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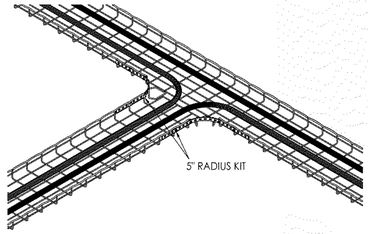
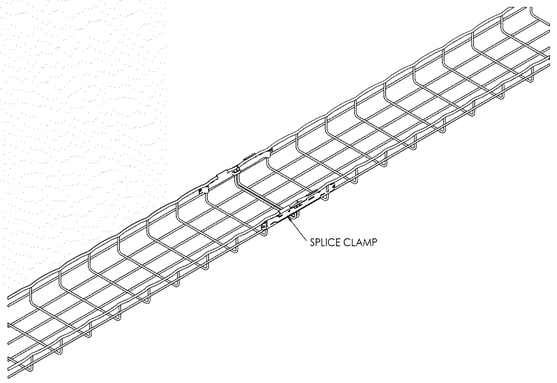
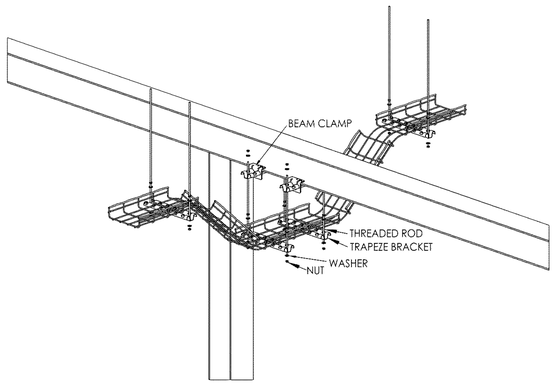


06 CABLE TRAY TEE JUNCTURE
N.T.S.

KEYNOTES



07 CABLE TRAY SPLICING
N.T.S.



08 CABLE TRAY TRANSITION
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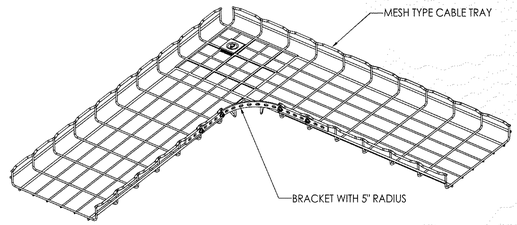

09 CABLE TRAY 90 DEGREE BEND
N.T.S.

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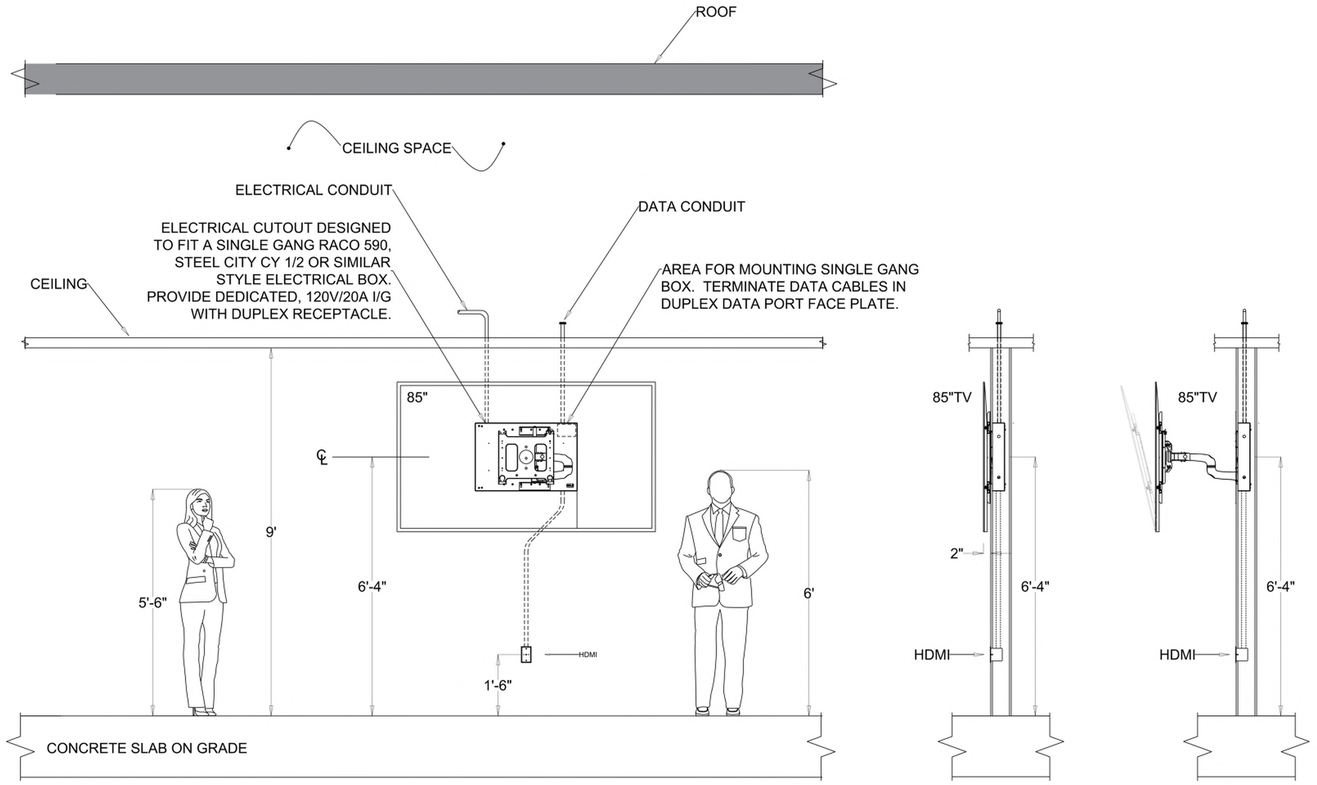
C - TECHNOLOGY DETAILS - IT INFRASTRUCTURE

T5-02C

9/29/2024 2:26:06 PM



01 INFRASTRUCTURE REQUIREMENTS FOR ROOMS AND SPACES C110, C100, C130, C183, C218,C257 (BASE)
N.T.S.

IN-WALL BOX
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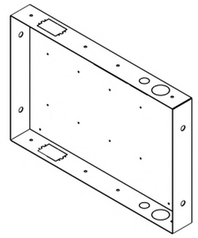
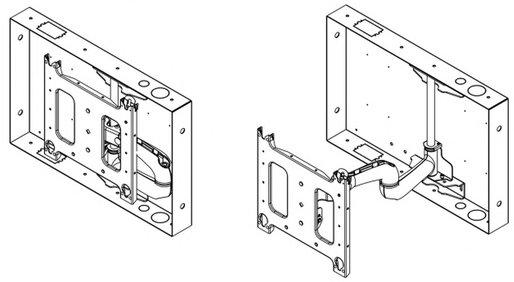


IN-WALL SWING ARM MOUNT
PART NO. LEGRAND CHIEF NO. PWRIW



02 TV/MONITOR IN-WALL ENCLOSURE AND SWING ARM
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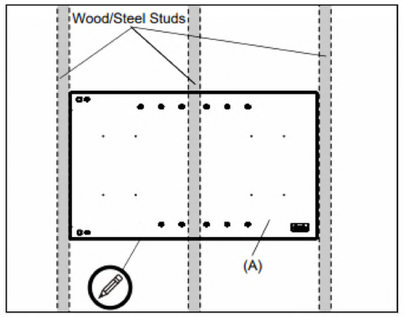
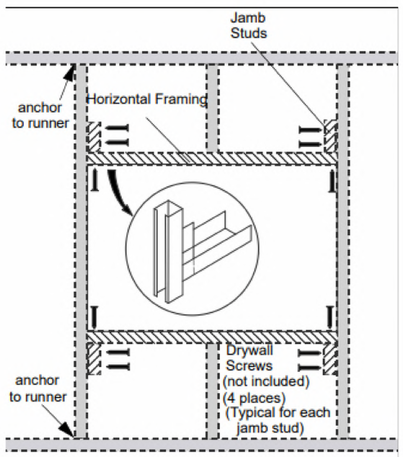
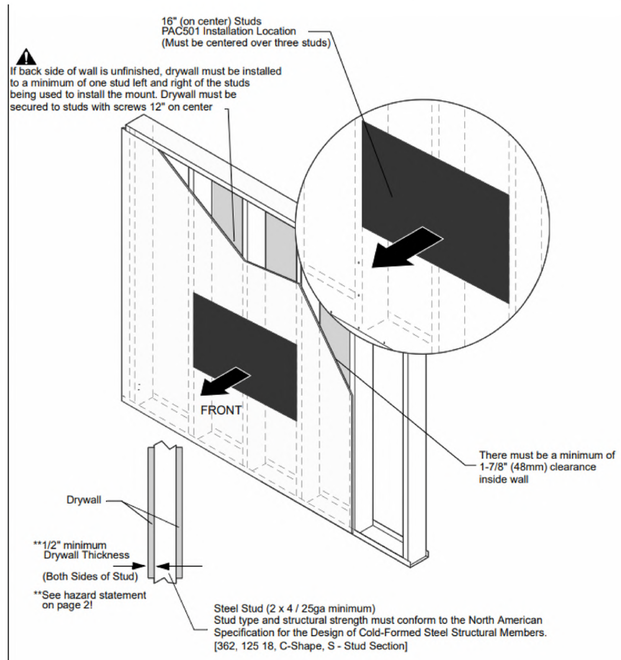






NOTE:

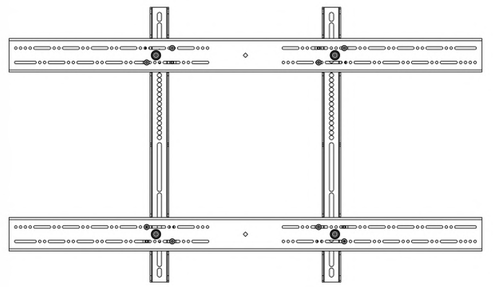
REFER TO THE MANUFACTURERS INSTRUCTIONS FOR THE INSTALLATION OF THE TV/MONITOR IN-WALL BOX (BACKBOX), CHIEF NO. PAC501

03 BACKBOX MANUFACTURERS INSTALLATION INSTRUCTIONS
N.T.S.

NOTE:

MOUNT ADAPTER IS TO BE ORDERED CONCURRENTLY WITH TV/MONITORS ONLY

PART NO. LEGRAND CHIEF NO. PSB-U



04 TV/MONITOR MOUNT ADAPTER - CHIEF PSB-U
N.T.S.

Kirksey ARCHITECTURE
Dallas + Houston + Austin
1506 Griffin Street West
Dallas Texas 75215
214 522 1100
kirksey.com

Metrocare

Applied Tech Group LLC
TECHNOLOGY CONSULTANTS
AUSTIN
9600 Great Hill Trail
Suite 150 W
Austin, Texas 78759
737.990.9200
DALLAS
5050 Quorum Drive
Suite 700
Dallas, Texas 75254
972.400.3838

METROCARE
HILLSIDE CAMPUS
1353 N WESTMORELAND RD
DALLAS, TX 75211

phase issue description:
ADDENDUM 13

project issue date:
08/29/2024
drawn by: Author
checked by: Checker

revision schedule

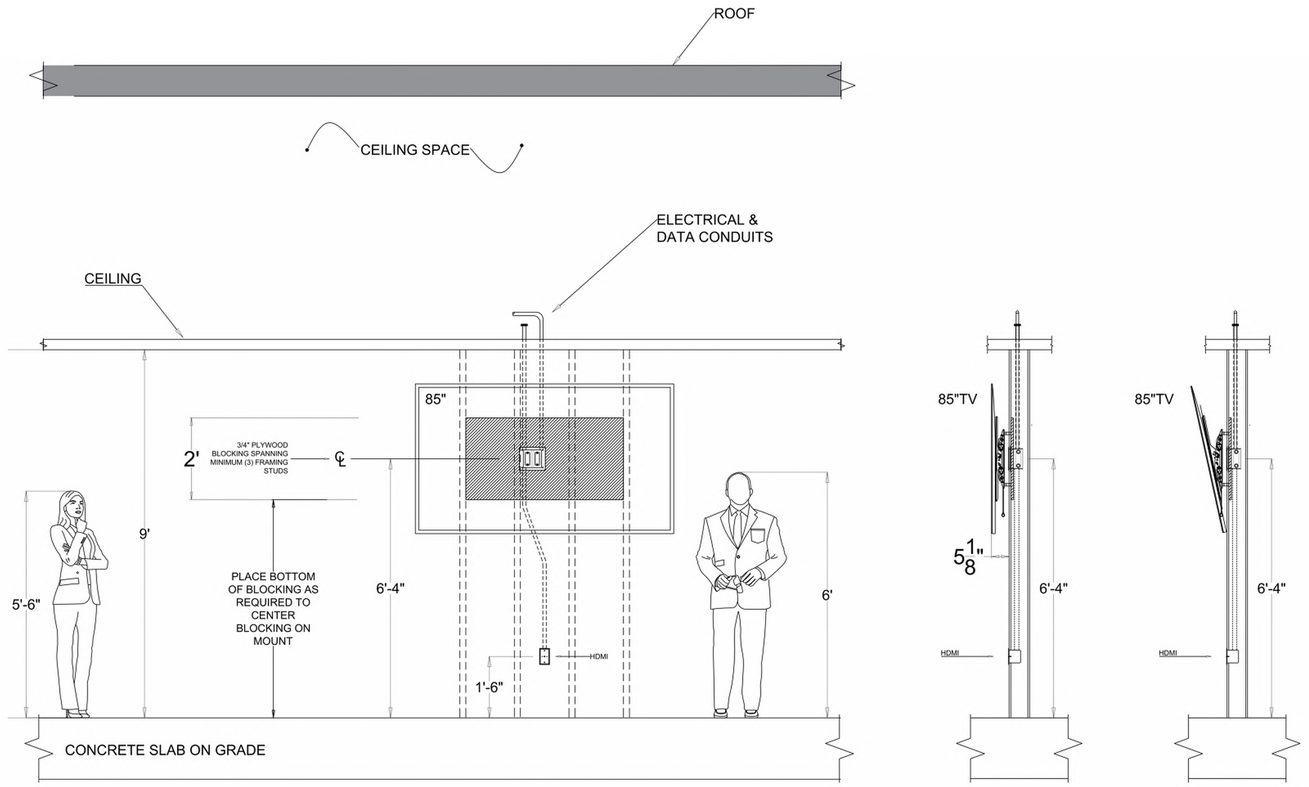
#	date	description

project number: 19-029

C - TECHNOLOGY DETAILS - AV INFRASTRUCTURE

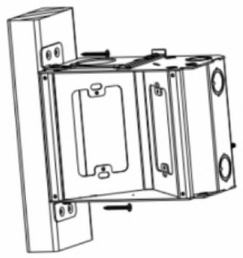
T5-04C

8/29/2024 2:26:07 PM



01 INFRASTRUCTURE REQUIREMENTS FOR ROOMS AND SPACES C110, C100, C130, C183, C218,C257 (ALTERNATE)
N.T.S.

02 NOT USED
N.T.S.



SIDE MOUNT
INSTALLATION

NOTE:

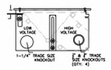
REFER TO THE MANUFACTURERS INSTRUCTIONS FOR THE INSTALLATION OF THE TV/MONITOR IN-WALL BOX

FRONT VIEW

AUDIOVISUAL & DATA
LEFT FACEPLATE

DUPLEX ELECTRICAL OUTLET
RIGHT FACEPLATE

TOP VIEW



PASS & SEYMOUR RECESSED TV
BACKBOX, 2 GANG
PART NO. TV2MW

LEGRAND CABLE ACCESS STRAP W/WALL PLATE - WHITE
#WP1014-WH-V1

ISOLATED GROUND, DECORATOR, RECEPTACLE, 20A, 125V - WHITE

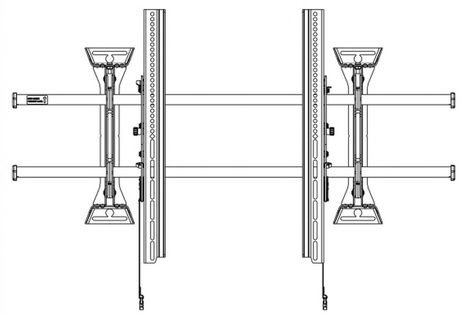
SIDE VIEW

03 AV & ELECTRICAL TV/MONITOR IN-WALL BOX
N.T.S.

NOTE:

TV MOUNT IS TO BE ORDERED CONCURRENTLY WITH TV/MONITORS ONLY

PART NO. LEGRAND CHIEF NO. XTMIU



04 TV/MONITOR MOUNT - CHIEF XTMIU
N.T.S.

Kirksey ARCHITECTURE
Dallas + Houston + Austin
1506 Griffin Street West
Dallas Texas 75215
214 522 1100
kirksey.com

Metrocare

Applied Tech Group LLC
TECHNOLOGY CONSULTANTS
AUSTIN
9600 Great Hill Trail
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Austin, Texas 78759
737.900.9200
DALLAS
5050 Quorum Drive
Suite 700
Dallas, Texas 75254
972.400.3838

METROCARE
HILLSIDE CAMPUS
1353 N WESTMORELAND RD
DALLAS, TX 75211

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C - TECHNOLOGY
DETAILS - AV
INFRASTRUCTURE

T5-05C

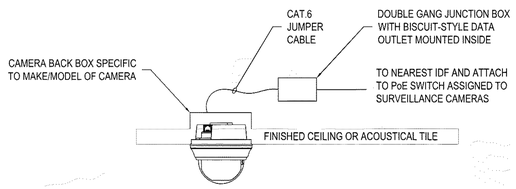
8/29/2024 2:26:08 PM

SECURITY CABLE TYPES

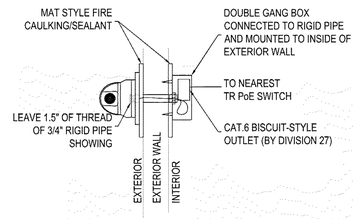
TYPE	DESCRIPTION	RECOMMENDED PART NUMBER
A	18AWG, 4-CONDUCTOR, STRANDED, UNSHEILDED	SUPERIOR ESSEX 2F-C3x-43
B	18AWG, 6-CONDUCTOR, OVERALL SHIELDED	SUPERIOR ESSEX 2F-C4x-44
C	16AWG, 2-CONDUCTOR, STRANDED, UNSHEILDED	SUPERIOR ESSEX 2F-D1x-43
D	CATEGORY 6 (BLUE OUTER JACKET)	PER DIVISION 27 SPECIFICATIONS
E	18AWG, 2-CONDUCTOR, STRANDED, UNSHEILDED	SUPERIOR ESSEX 2F-C1x-44
F	ACCESS CONTROL COMPOSITE CABLE (YELLOW OUTER JACKET)	SUPERIOR ESSEX AC-A1x-68

NOTE: CABLES COM AS PLENUM WITH WHITE OUTER JACKET BY DEFAULT UNLESS OTHERWISE NOTED. COORDINATE EXACT COLOR WITH OWNER/ENGINEER PRIOR TO ORDERING.

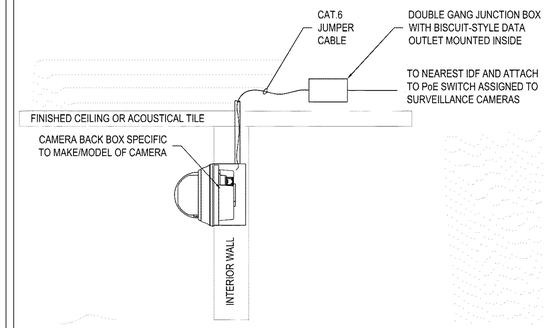
01 SECURITY CABLING TYPES TABLE
N.T.S.



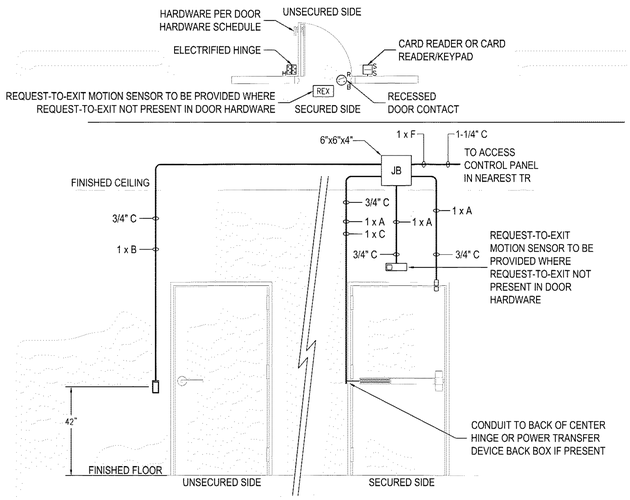
02 CEILING-MOUNT CAMERA DETAIL
N.T.S.



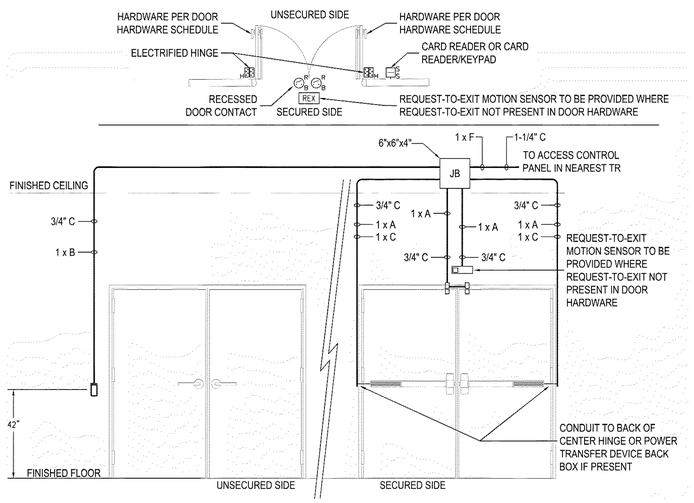
03 EXTERIOR CAMERA DETAIL
N.T.S.



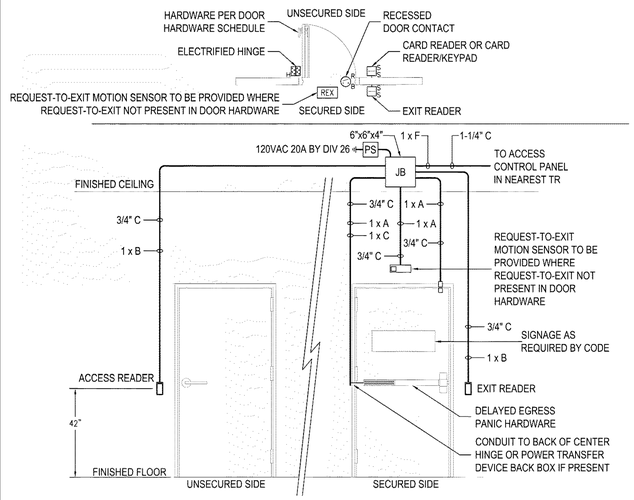
04 WALL-MOUNT CAMERA DETAIL
N.T.S.



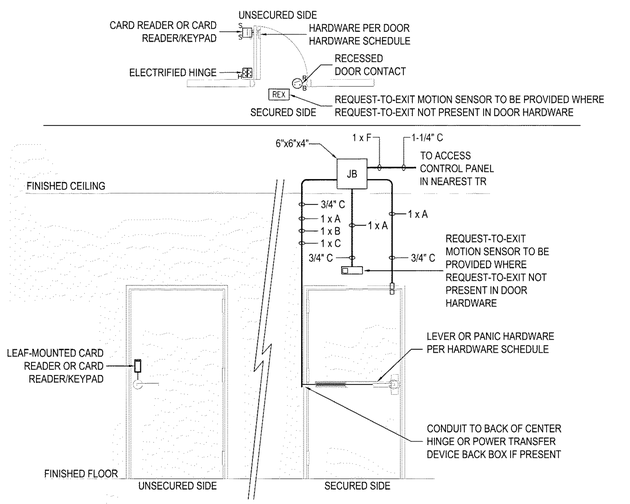
05 SINGLE DOOR CARD READER DETAIL
N.T.S.



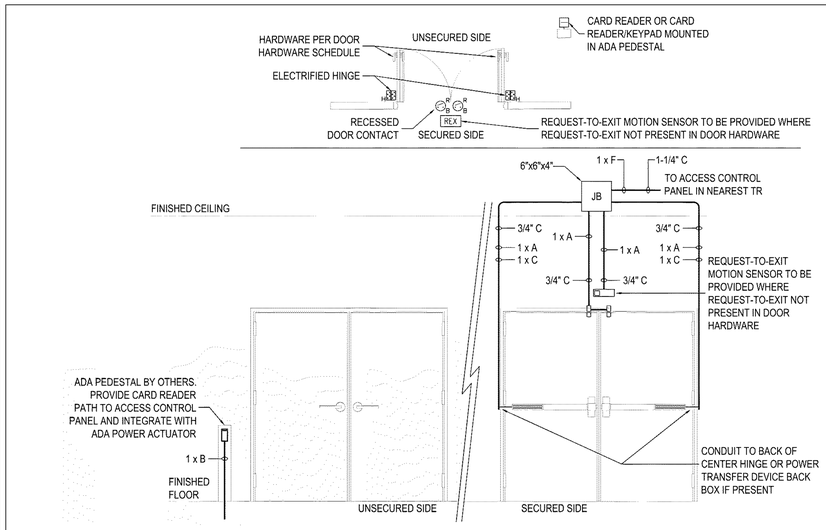
06 DOUBLE DOOR CARD READER DETAIL
N.T.S.



07 DELAYED EGRESS DOOR DETAIL
N.T.S.



08 DOOR LEAF-MOUNT CARD READER DETAIL
N.T.S.



09 ADA PEDESTAL CARD READER DOUBLE DOOR DETAIL
N.T.S.

Kirksey ARCHITECTURE
Dallas + Houston + Austin
1506 Griffin Street West
Dallas Texas 75215
214 522 1100
kirksey.com

Metrocare

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DALLAS
5050 Quorum Drive
Suite 700
Dallas, Texas 75254
972.400.3838

METROCARE HILLSIDE CAMPUS
1353 N WESTMORELAND RD
DALLAS, TX 75211

phase issue description:
ADDENDUM 13

project issue date:
08/29/2024
drawn by: ATG
checked by: ATG

revision schedule

#	date	description

project number: 19-029

C - TECHNOLOGY DETAILS - SECURITY INFRASTRUCTURE

T5-06C

9/29/2024 2:26:08 PM

SECURITY ACCESS CONTROL SCHEDULE								
ID	DEVICE TYPE	DOOR NUMBER	UNSECURE SIDE	SECURE SIDE	DOOR TYPE	CONNECTS TO	DRAWING NO.	DETAIL DESC.
CR-C100	CARD READER	C100	WAITING C100	CORRIDOR C-1	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C101A	CARD READER	C101A	EXTERIOR	WAITING C100	DOUBLE	IT CLOSET C175 (MDF)	T2-13d	09/T5-06C
CR-C101B	CARD READER	C101B	EXTERIOR	WAITING C101	DOUBLE	IT CLOSET C175 (MDF)	T2-13d	09/T5-06C
CR-C101C	CARD READER	C101C	WAITING C101	CORRIDOR C-1	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C101D	CARD READER	C101D	WAITING C101	CORRIDOR C-1	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C102	CARD READER	C102	CORRIDOR C-1	FIN. CONSULT C102	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C114	CARD READER	C114	CORRIDOR C-1	SHARED C114	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C116	CARD READER	C116	CORRIDOR C-1	SHIPPING/RECEIVING C116	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C121A	CARD READER	C121A	EXTERIOR	MAIN MECHANICAL C121	DOUBLE	IT CLOSET C175 (MDF)	T2-13d	06/T5-06C
CR-C121B	CARD READER	C121B	EXTERIOR	MAIN MECHANICAL C121	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C127	CARD READER	C127	EXTERIOR	ELEC. C127	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C146A	CARD READER	C146A	CORRIDOR C-1	BULLPEN C146	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C146B	CARD READER	C146B	CORRIDOR C-3	BULLPEN C146	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C160	CARD READER	C160	PHARMACY C162	STORAGE C160	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C161	CARD READER	C161	PHARMACY C162	STORAGE C161	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C162	CARD READER	C162	CORRIDOR C-1	PHARMACY C162	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C163	CARD READER	C163	CORRIDOR C-5	PHLEB + NURSE C163	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C175	CARD READER	C175	BREAK ROOM C171	IT CLOSET C175	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C183A	CARD READER	C183A	EXTERIOR	WAITING C183	DOUBLE	IT CLOSET C175 (MDF)	T2-13d	09/T5-06C
CR-C183B	CARD READER	C183B	EXTERIOR	WAITING C183	DOUBLE	IT CLOSET C175 (MDF)	T2-13c	09/T5-06C
CR-C183C	CARD READER	C183C	WAITING C183	CORRIDOR C-6	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C183D	CARD READER	C183D	WAITING C183	CORRIDOR C-6	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C184	CARD READER	C184	CORRIDOR C-6	FIN. CONSULT C184	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C203A	CARD READER	C203A	CORRIDOR C-8	BULLPEN C203	SINGLE	IT CLOSET C175 (MDF)	T2-13c	05/T5-06C
CR-C203B	CARD READER	C203B	CORRIDOR C-11	BULLPEN C203	SINGLE	IDF C219	T2-13c	05/T5-06C
CR-C219	CARD READER	C219	CORRIDOR C-12	IDF C219	SINGLE	IDF C219	T2-13c	08/T5-06C
CR-C247	CARD READER	C247	CORRIDOR C-14	JANITOR C247	SINGLE	IDF C219	T2-13c	05/T5-06C
CR-C253	CARD READER	C253	CORRIDOR C-15	ADL KITCHEN C253	SINGLE	IDF C219	T2-13c	08/T5-06C
CR-C268A	CARD READER	C268A	EXTERIOR	WAITING C268	DOUBLE	IDF C219	T2-13c	09/T5-06C
CR-C268B	CARD READER	C268B	WAITING C268	CORRIDOR C-16	SINGLE	IDF C219	T2-13c	05/T5-06C
CR-C268C	CARD READER	C268C	WAITING C268	CORRIDOR C-15	SINGLE	IDF C219	T2-13c	05/T5-06C
CR-C269	CARD READER	C269	EXTERIOR	STORAGE C269	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C300	CARD READER	C300	EXTERIOR	CORRIDOR C-1	SINGLE	IT CLOSET C175 (MDF)	T2-13d	08/T5-06C
CR-C301	CARD READER	C301	OUTDOOR BREAK AREA C301	CORRIDOR C-7	DOUBLE	IT CLOSET C175 (MDF)	T2-13d	06/T5-06C
CR-C302	CARD READER	C302	CORRIDOR C-5	CORRIDOR C-7	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C303	CARD READER	C303	CORRIDOR C-5	CORRIDOR C-6	SINGLE	IT CLOSET C175 (MDF)	T2-13d	05/T5-06C
CR-C304	CARD READER	C304	CORRIDOR C-10	CORRIDOR C-7	SINGLE	IT CLOSET C175 (MDF)	T2-13c	05/T5-06C
CR-C305-1	CARD READER	C305	EXTERIOR	CORRIDOR C-12	SINGLE	IDF C219	T2-13c	07/T5-06C
CR-C305-2	CARD READER	C305	CORRIDOR C-12	EXTERIOR	SINGLE	IDF C219	T2-13c	07/T5-06C
CR-C306-1	CARD READER	C306	EXTERIOR	CORRIDOR C-13	SINGLE		T2-13c	07/T5-06C
CR-C306-2	CARD READER	C306	CORRIDOR C-13	EXTERIOR	SINGLE	IDF C219	T2-13c	07/T5-06C
CR-C307	CARD READER	C307	CORRIDOR C-14	CORRIDOR C-13	SINGLE	IDF C219	T2-13c	08/T5-06C
DC-C120	AUTOMATIC MONITORING SWITCH	C120	EXTERIOR	FIRE RISER C120	SINGLE	IT CLOSET C175 (MDF)	T2-13d	06/T5-06C

01 SECURITY ACCESS CONTROL SCHEDULE
N.T.S.

SECURITY SURVEILLANCE CAMERA SCHEDULE								
DEVICE ID	DEVICE TYPE	LOCATION	MOUNT TYPE	MOUNT HEIGHT	CONNECTS TO	DETAIL DESC.	DRAWING NO.
CAM01	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM02	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM03	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM04	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM05	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM06	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+9'-6" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13c
CAM07	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	SOUTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM08	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	SOUTH EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM09	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WEST EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM10	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WEST EXTERIOR	WALL	+12'-0" AFG	IDF C219	03/T-506C	T2-13c
CAM11	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C268	WALL	+9'-0" AFF	IDF C219	04/T-506C	T2-13c
CAM12	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C268	WALL	+9'-0" AFF	IDF C219	05/T-506C	T2-13c
CAM13	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-14	CEILING	CEILING	IDF C219	02/T-506C	T8-13c
CAM14	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-13	WALL	+8'-6" AFF	IDF C219	04/T-506C	T2-13c
CAM15	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-13	WALL	+8'-6" AFF	IDF C219	04/T-506C	T2-13c
CAM16	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-12	WALL	+8'-6" AFF	IDF C219	04/T-506C	T2-13c
CAM17	8-12MP, MULTI-SENSOR 180°, COLOR DOME CAMERA	CORRIDOR C-12	CEILING	CEILING	IDF C219	02/T-506C	T8-13c
CAM18	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-10	CEILING	CEILING	IDF C219	02/T-506C	T8-13c
CAM19	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-10	WALL	+8'-6" AFF	IDF C219	04/T-506C	T2-13c
CAM20	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-7	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13c
CAM21	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-6	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13c
CAM22	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C183	WALL	+9'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13c
CAM23	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+10'-6" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM24	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+10'-6" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM25	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM26	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	NORTH EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM27	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	EAST EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM28	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	EAST EXTERIOR	WALL	+9'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM29	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	EAST EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM30	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	EAST EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM31	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	SOUTH EXTERIOR	WALL	+12'-0" AFG	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM32	OUTDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	OUTDOOR BREAK AREA C301	WALL	+12'-0" AFF	IT CLOSET C175 (MDF)	03/T-506C	T2-13d
CAM33	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-6	WALL	+9'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM34	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C183	WALL	+9'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM35	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C183	WALL	+9'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM36	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	WALL	+8'-0" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM37	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	WALL	+8'-0" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM38	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	WALL	+8'-0" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM39	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	CEILING	CEILING	IT CLOSET C175 (MDF)	02/T-506C	T8-13d
CAM40	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	CEILING	CEILING	IT CLOSET C175 (MDF)	02/T-506C	T8-13d
CAM41	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM42	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	CEILING	CEILING	IT CLOSET C175 (MDF)	02/T-506C	T8-13d
CAM43	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	PHARMACY C162	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	02/T-506C	T8-13d
CAM44	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	CORRIDOR C-1	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM45	INDOOR, 5MP, FIXED 90°-110°, COLOR DOME CAMERA	WAITING C101	WALL	+9'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d
CAM46	8-12MP, MULTI-SENSOR 180°, COLOR DOME CAMERA	CORRIDOR C-1	WALL	+8'-6" AFF	IT CLOSET C175 (MDF)	04/T-506C	T2-13d

01 SECURITY SURVEILLANCE CAMERA SCHEDULE
N.T.S.

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METROCARE HILLSIDE CAMPUS
1353 N WESTMORELAND RD
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phase issue description:
ADDENDUM 13

project issue date:
08/29/2024
drawn by: Author
checked by: Checker

revision schedule

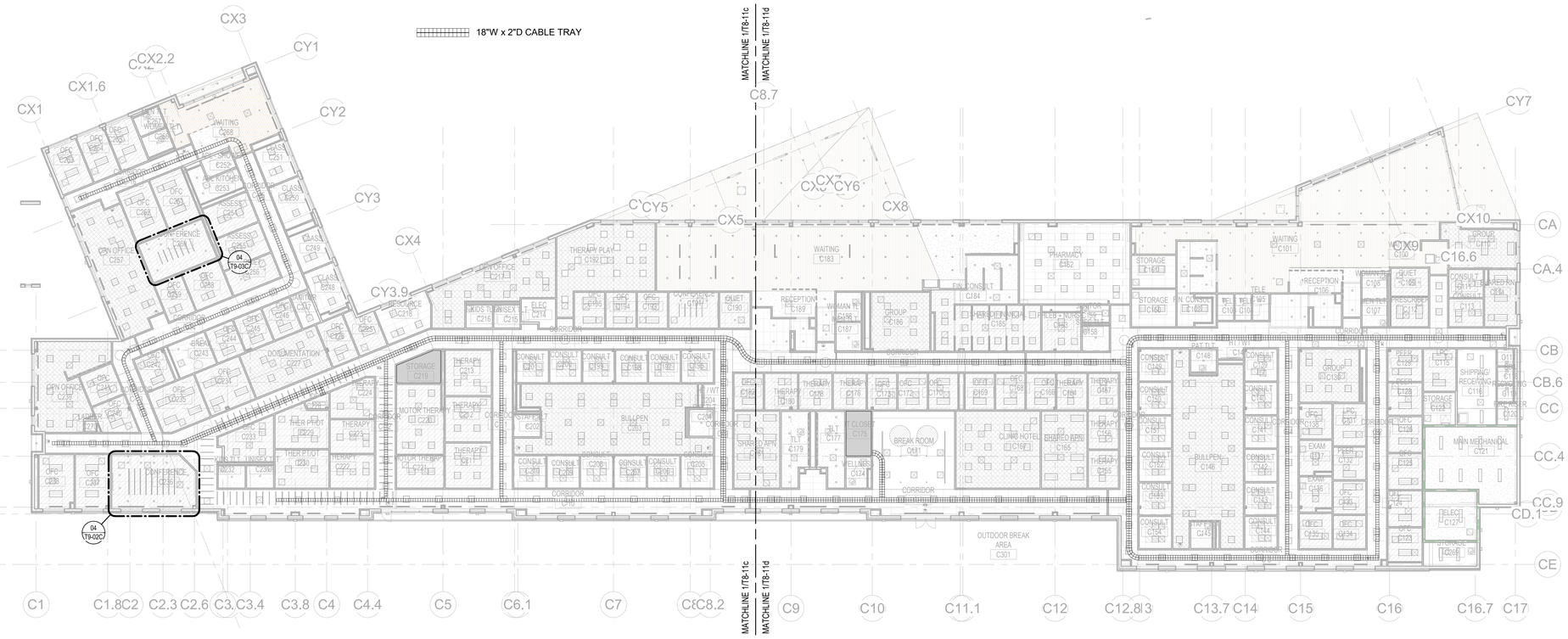
#	date	description

project number: 19-029

C - SECURITY SYSTEM SCHEDULES

T6.01C

8/29/2024 2:26:09 PM



01 L1 - CLINIC BUILDING - OVERALL REFLECTED CEILING PLAN - TECHNOLOGY
1/16" = 1'-0"

KEY PLAN

NORTH

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#	date	description

project number: 19-029

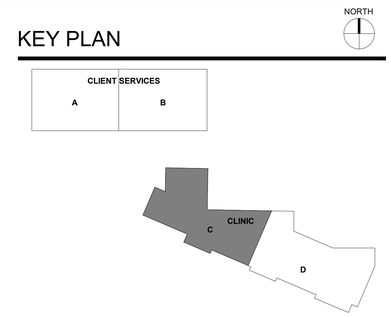
C - LEVEL 1 - OVERALL REFLECTED CEILING PLAN - TECHNOLOGY

T8-01C

8/29/2024 2:26:16 PM

01 L1 - CLINIC BUILDING - REFLECTED CEILING PLAN - AREA C - IT
1/8" = 1'-0"

KEY PLAN



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phase issue description:
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project issue date:
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checked by: Checker

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#	date	description

project number: 19-029

C - LEVEL 1 - REFLECTED CEILING PLAN - AREA C - IT

T8-11c

8/29/2024 2:26:20 PM

01 **L1 - CLINIC BUILDING - REFLECTED CEILING PLAN - AREA D - IT**
1/8" = 1'-0"

KEY PLAN

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phase issue description:
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drawn by: Author
checked by: Checker

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#	date	description

project number: 19-029

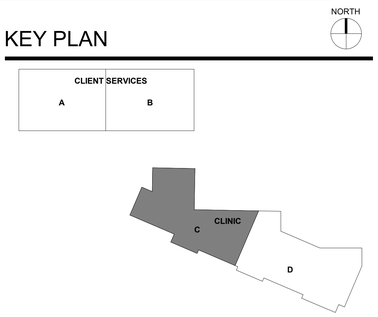
C - LEVEL 1 - REFLECTED CEILING PLAN - AREA D - IT

T8-11d

9/29/2024 2:26:24 PM

01 **L1 - CLINIC BUILDING - REFLECTED CEILING PLAN - AREA C - SECURITY**
1/8" = 1'-0"

KEY PLAN



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C - LEVEL 1 - REFLECTED CEILING PLAN - AREA C - SECURITY

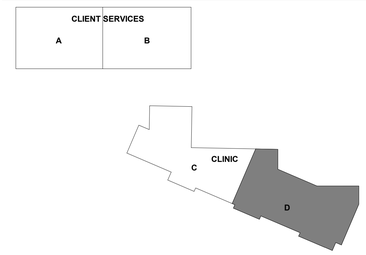
T8-13c

8/29/2024 2:26:29 PM

01 **L1 - CLINIC BUILDING - REFLECTED CEILING PLAN - AREA D - SECURITY**
1/8" = 1'-0"

KEY PLAN

NORTH



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phase issue description:
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revision schedule

#	date	description

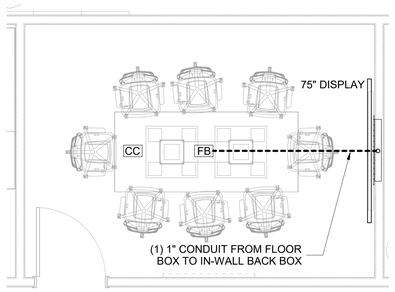
project number: 19-029

C - LEVEL 1 - REFLECTED CEILING PLAN - AREA C - SECURITY

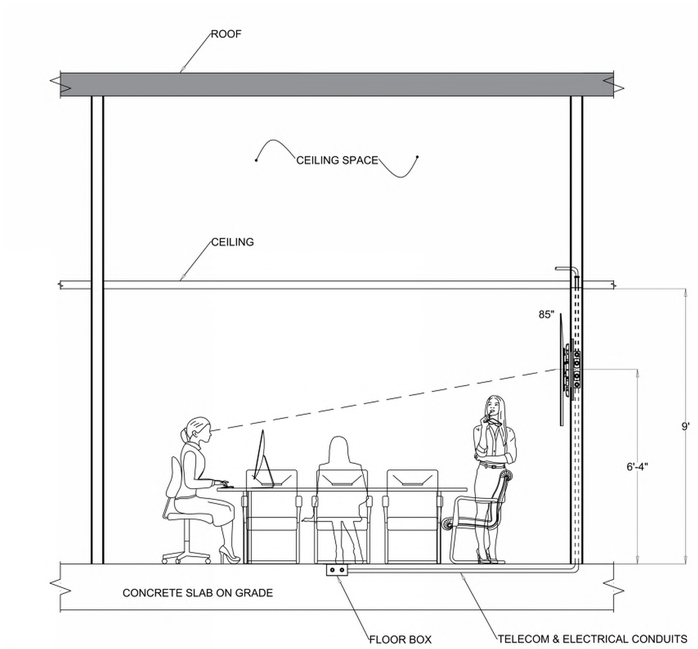
T8-13d

9/29/2024 2:26:33 PM

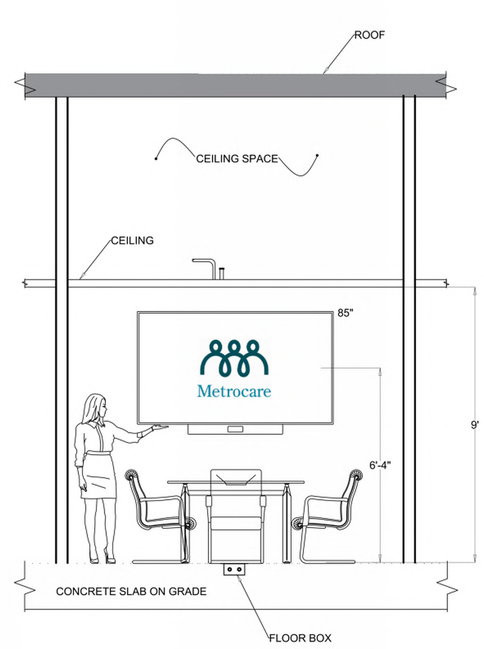
REFER TO SPECIFICATIONS SECTION 274100, PART 2 - PRODUCTS, FOR COMPONENTS AND EQUIPMENT PARTS FOR THE CONFERENCE ROOM.



01 ENLARGED PLAN - CONFERENCE C191 - AV
3/8" = 1'-0"



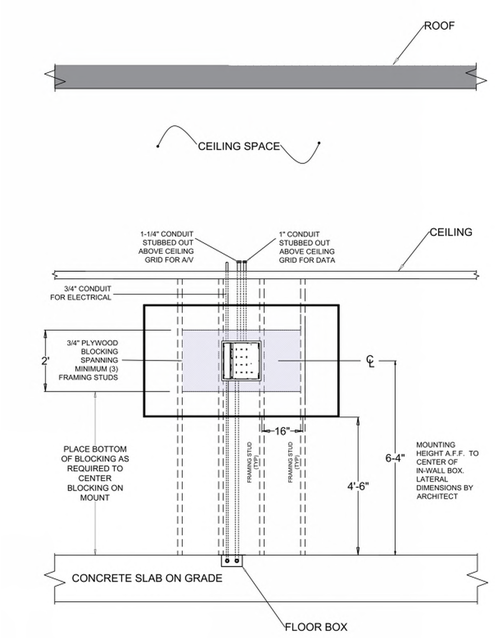
02 CONFERENCE ROOM C191 - SECTION - AV
N.T.S.



03 CONFERENCE ROOM C191 - ELEVATION - AV
N.T.S.

04 NOT USED
N.T.S.

05 NOT USED
N.T.S.



06 CONFERENCE ROOM C191 - MONITOR/TV WALL INFRASTRUCTURE - AV
N.T.S.

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phase issue description:
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project issue date:
08/29/2024
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checked by: Checker

revision schedule

#	date	description

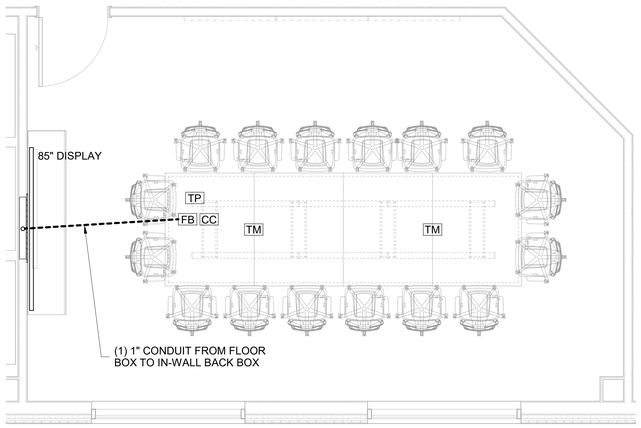
project number: 19-029

C - ENLARGED FLOOR PLANS & DETAILS - AUDIOVISUAL

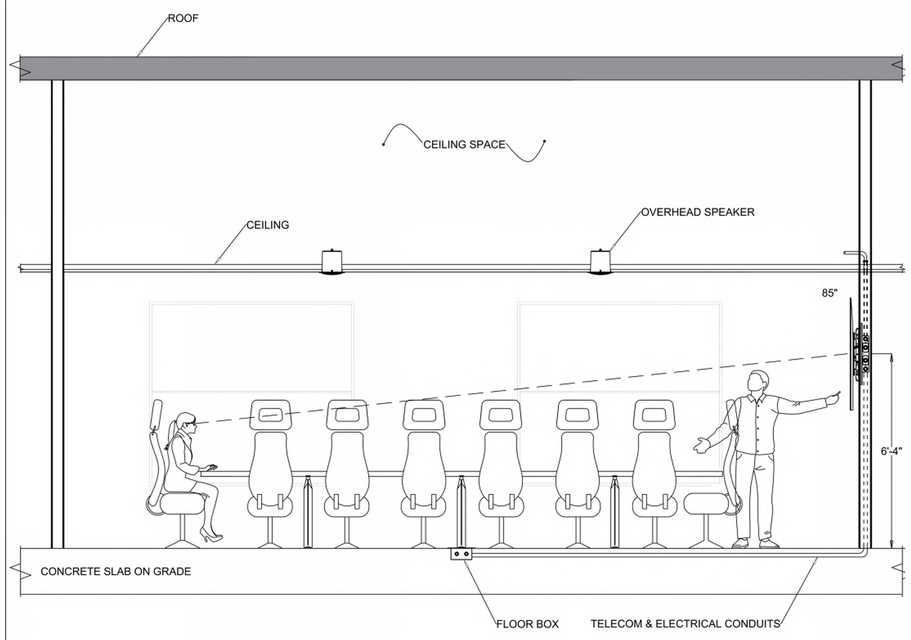
T9-01C

8/29/2024 2:26:34 PM

REFER TO SPECIFICATIONS SECTION 274100, PART 2 - PRODUCTS, FOR COMPONENTS AND EQUIPMENT PARTS FOR THE CONFERENCE ROOM.



01 ENLARGED PLAN - CONFERENCE C236 - AV
3/8" = 1'-0"



02 CONFERENCE ROOM C236 - SECTION - AV
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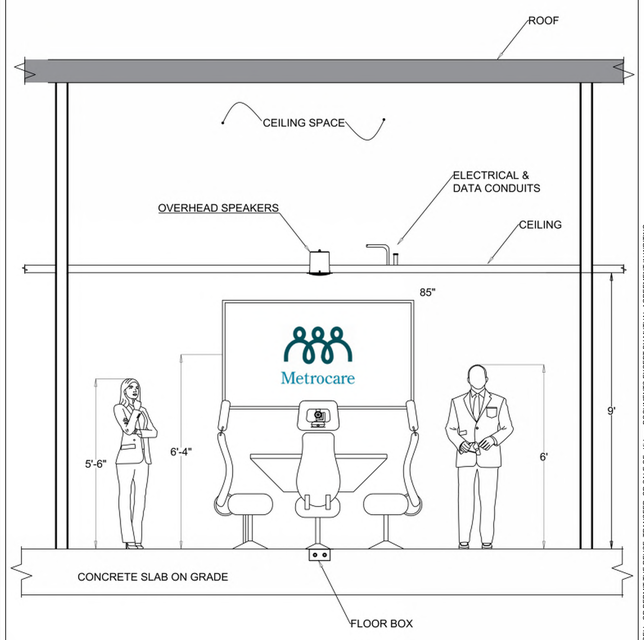
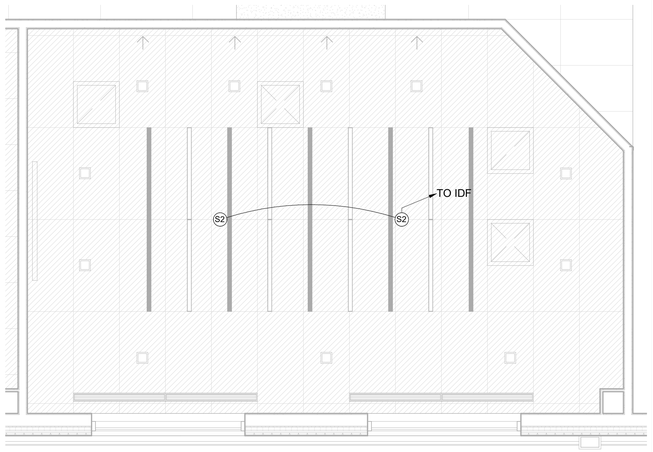
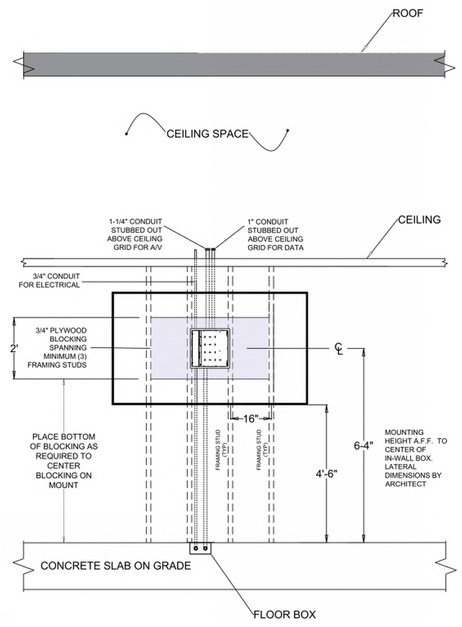


03 CONFERENCE ROOM C236 - ELEVATION - AV
N.T.S.



04 ENLARGED REFLECTED CEILING PLAN - CONFERENCE C236 - AV
3/8" = 1'-0"

05 NOT USED
N.T.S.



06 CONFERENCE ROOM C236 - WALL INFRASTRUCTURE - AV
N.T.S.

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phase issue description:
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project issue date:
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checked by: Checker

revision schedule

#	date	description

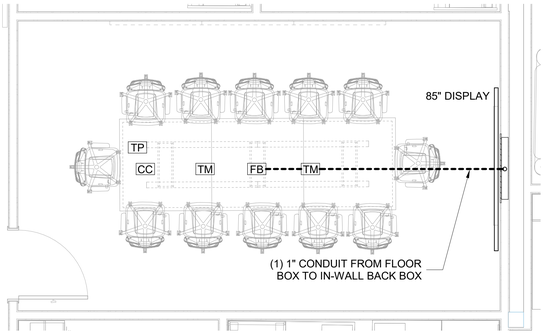
project number: 19-029

C - ENLARGED FLOOR PLANS & DETAILS - AUDIOVISUAL

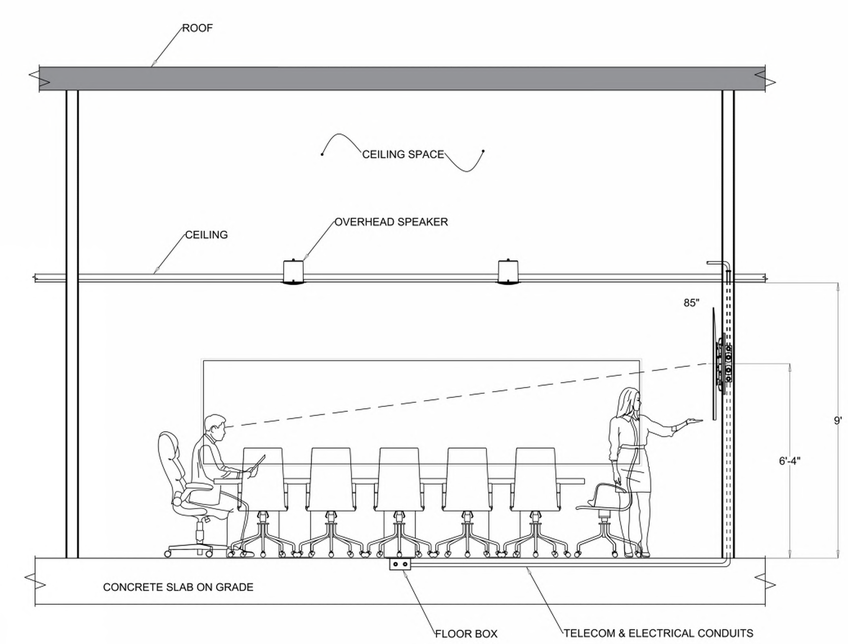
T9-02C

8/29/2024 2:26:37 PM

REFER TO SPECIFICATIONS SECTION 274100, PART 2 - PRODUCTS, FOR COMPONENTS AND EQUIPMENT PARTS FOR THE CONFERENCE ROOM.



01 ENLARGED PLAN - CONFERENCE C260 - AV
3/8" = 1'-0"



02 CONFERENCE ROOM C260 - SECTION - AV
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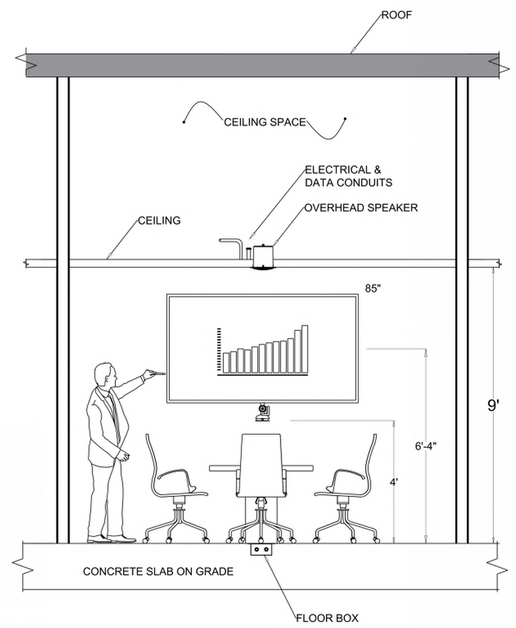

03 CONFERENCE ROOM C260 - ELEVATION - AV
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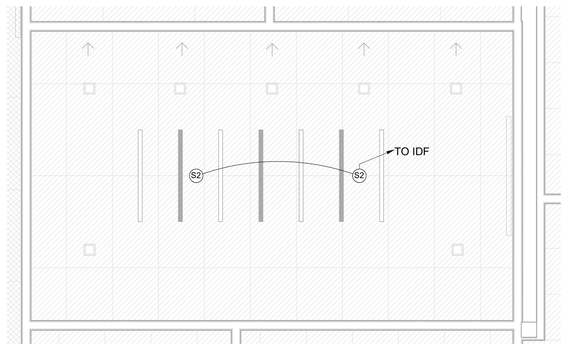
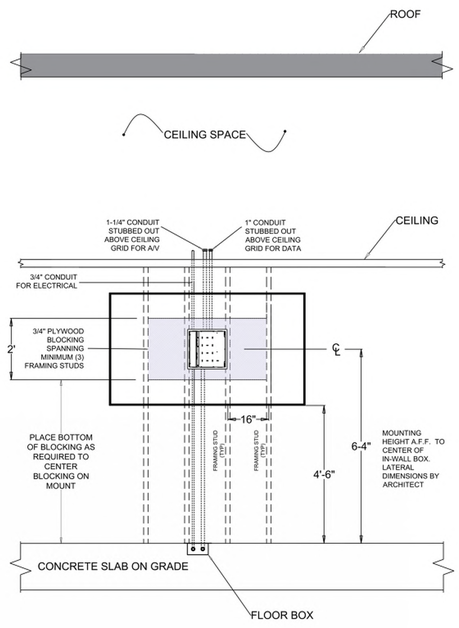


04 ENLARGED REFLECTED CEILING PLAN - CONFERENCE C260 - AV
3/8" = 1'-0"

05 NOT USED
N.T.S.



06 CONFERENCE ROOM C260 - WALL INFRASTRUCTURE - AV
N.T.S.

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revision schedule

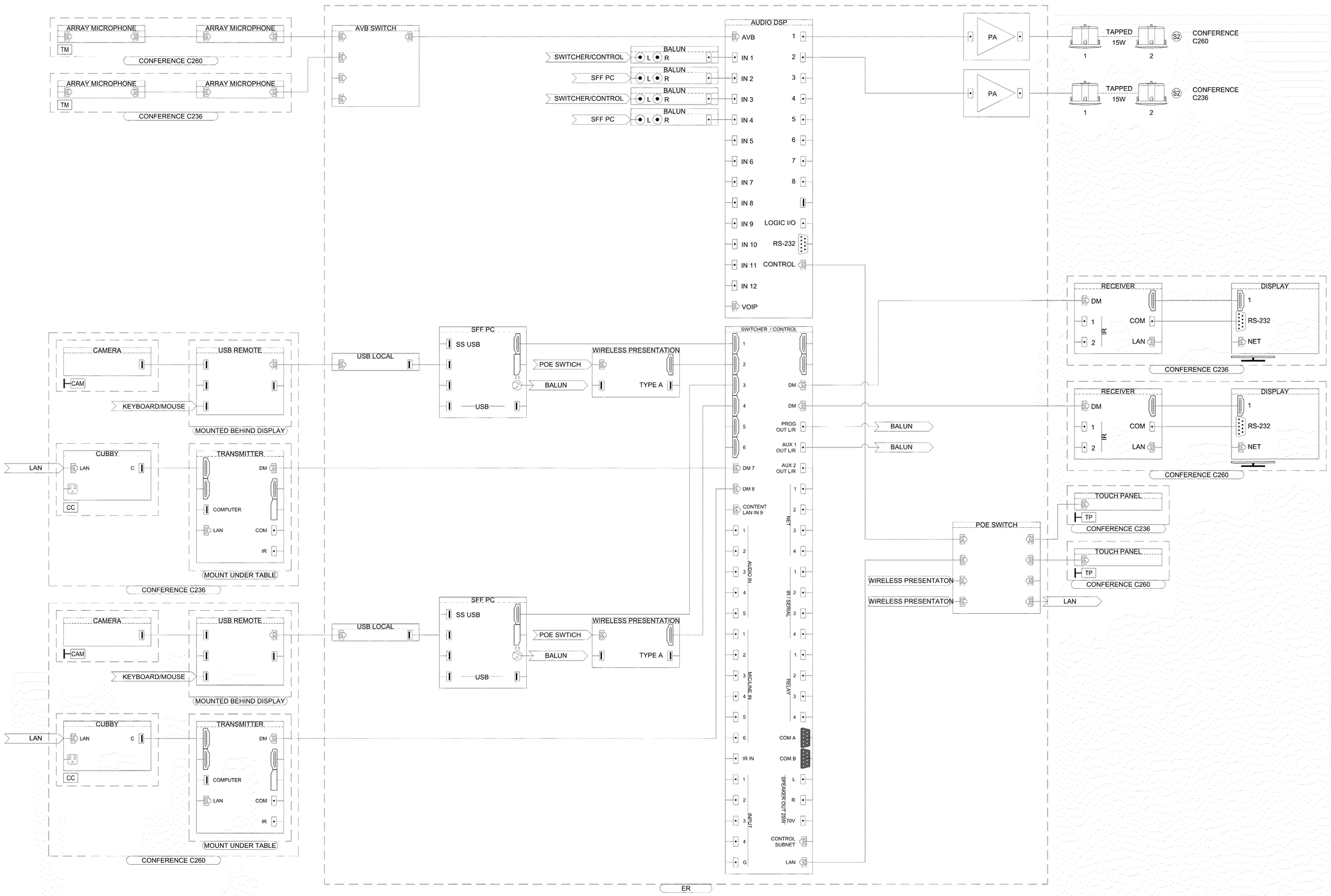
#	date	description

project number: 19-029

C - ENLARGED FLOOR PLANS & DETAILS - AUDIOVISUAL

T9-03C

8/29/2024 2:26:39 PM



01 **CONFERENCE ROOMS C236 AND C260 FUNCTIONAL DIAGRAM**
12" = 1'-0"

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project issue date:
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revision schedule

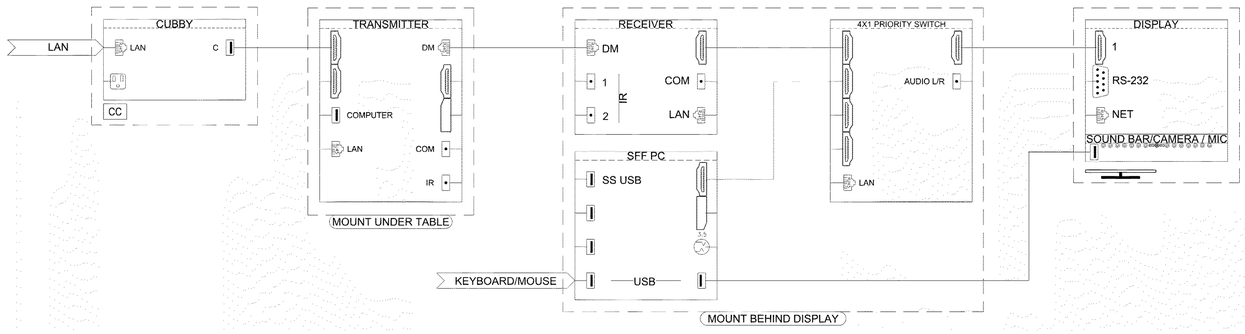
#	date	description

project number: 19-029

C - BLOCK DIAGRAMS - AUDIOVISUAL

T10-01C

8/29/2024 2:26:43 PM



01 CONFERENCE ROOM C191 FUNCTIONAL DIAGRAM

12" = 1'-0"

8/29/2024 2:26:43 PM

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phase issue description:
ADDENDUM 13

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08/29/2024
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checked by: Checker

revision schedule

#	date	description

project number: 19-029

C - BLOCK DIAGRAMS - AUDIOVISUAL

T10-02C

INSURANCE REQUIREMENTS:

Without limiting any of the obligations or liabilities of Vendor, Vendor shall carry and maintain, at its own expense (including any applicable deductibles or retentions), as long as respective, applicable statute(s) of limitation or repose are in effect relating to the specific purposes of this Agreement, insurance policies of the kind and limits listed below and with insurers with an A.M. Best's Rating of not less than A-VIII at all times. Accordingly, vendor will maintain the following insurance requirements:

1. Workers Compensation with statutory limits & Employers' Liability with minimum limits of $1,000,000 Each Accident, $1,000,000 Disease - Each Employee, and $1,000,000 Disease - Policy Limit.

2. Commercial General Liability including Premises/Operations, Products/Completed Operations, Contractual Liability, Independent Contractor's Liability, Broad Fonn Property Damage, Bodily Injury, Personal/ Advertising Injury with minimum limits of $1,000,000 per occurrence and $3,000,000 general aggregate.

3. Submit proof of insurance with the RFP response.

Attachment C
Signature Page

Date:	
RFP Number:	
Direct Inquiries to:	
Phone:	
Email:	
Deliver Proposal to:	
Due Date/Time:	

NOTICE: Proposals submitted in response to the RFP MUST be accompanied by this "SIGNATURE PAGE". Respondents should read the entire RFP document before submitting a proposal. Proposals MUST be signed.

Printed Name

Signature

Title

Date

Company Name

Address

Phone

Email

metrocare.

Conflict of Interest Disclosure Form

The following disclosure form must be completed at the time of hire and annually by all Metrocare staff members or when a disclosure needs to be made.

References: **Board Policy on Conflict of Interest – Employees 5.04**
Administrative Procedure for Ethical Conduct 5.04.01

Note: A potential or actual conflict of interest exists when Metrocare staff member(s)' duties, commitments, and obligations as employees of Metrocare are likely to be compromised or adversely affected by their, or their immediate family member(s)', ownership interests, material interests, or relationships, particularly if those interests or relationships are not disclosed.

This Conflict of Interest Form should be completed to indicate whether the Metrocare staff member(s) has disclosed any personal, business, current other employment or volunteer affiliations that may give rise to a real or apparent conflict of interest.

Please list and describe below any relationships, interests, activities, and/or positions you hold (volunteer or otherwise), or circumstances that you believe could contribute to a conflict of interest:

- ☐ I have no conflict of interest to report.
- ☐ I have the following conflict of interest to report:

1.
2.
3.

I hereby certify that I have reviewed Board Policy on Conflict of Interest – Employee 5.04 and Administrative Procedure for Ethical Conduct 5.04.01 and the information set forth above is true and complete to the best of my knowledge.

Employee Signature:
Employee Printed Name:
Date:

CLEAR FORM

metrocare.

Vendor Information

Vendor Number: _____

Please complete all fields below before submitting. Thank you.

Substitute W –9

Name	
Business Name (If different from above)	
Address	
City, State, Zip	
Phone Number	
Check Appropriate Box:	☐ Individual/Sole Proprietor ☐ LLC (Tax Class: C Corp) ☐ C Corporation ☐ LLC (Tax Class: S Corp) ☐ S Corporation ☐ LLC (Tax Class: Partnership) ☐ Partnership ☐ Other _____
Social Security Number	
OR	
Employer ID Number	
Backup Withholding (Check One)	☐ I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, ☐ I have been notified by the IRS that I am currently subject to backup withholding

Historically Underutilized Business Information

HUB Status (**required**)	☐ Certified HUB ☐ Government/Non-Profit ☐ Uncertified HUB ☐ Non-HUB Individual /Partnership ☐ Public Corporation
HUB Classification (**required**)	☐ African American ☐ Native American ☐ Asian Indian ☐ Hispanic ☐ Asian Pacific ☐ Woman-owned

Signature: _____

Date: _____

SUBMIT

SECTION 270500

COMMON WORKS RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1, 26 and 27 Specification Sections, apply to this Section.

B. This document describes the products and execution requirements relating to Communications Backbone Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings. Contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty.

1.2 REQUIREMENTS

A. The Contractor shall thoroughly examine all documents, drawings and specifications for any conflicts between these documents. In the case where the specifications are not clear or do not agree with the corresponding drawings; it is the responsibility of the Contractor to submit a request-for-information (RFI) specifying the discrepancy stating the locations on the specifications and the drawings. Any conflicts of information shall be resolved before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

B. The work and materials included in these specifications and corresponding drawings shall conform in every detail to the rules and requirements of the National Fire Protection Agency, the National Electrical Code and local codes and standards by the AHJ (Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications). In the event of any conflicts between documents referenced herein and the contents of this specification or drawings, the Contractor shall notify in writing to consultant of any such occurrences before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

C. The Contractor shall furnish and install a complete functional and operational system as intended in the specifications and drawings. Quantities are responsibility of the Contractor, specifications and drawings are to be used for intent and reference only. The Contractor shall include all costs associated with the provision of a fully operational, tested, certified and warranted system in the bid amount

1.3 SUMMARY

A. Section Includes:
   1. Communications equipment coordination and installation.
   2. Sleeves for pathways and cables.
   3. Sleeve seals.
   4. Grout.

5. Common communications installation requirements.

1.4 RELATED SECTIONS

A. Section 270526 - Grounding and Bonding for Communications Systems

B. Section 271100 - Communications Equipment Room Fittings

C. Section 271300 - Communications Backbone Cabling

D. Section 271500 - Communications Horizontal Cabling

1.5 REFERENCES

A. This Technical Specification and Associated Drawings

B. American National Standards Institute / Telecommunications Industry Association (ANSI/TIA)
   1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises".
   2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard".
   3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
   4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
   5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
   6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
   7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
   8. ANSI/TIA-607-B "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
   9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
   10. ANSI/TIA-862-A "Building Automation Systems Cabling Standard".

C. Building Industry Consulting Service International (BICSI)
   1. BICSI Outside Plant Design Reference Manual.
   2. BICSI Telecommunications Distribution Methods Manual (TDMM).

D. Local, county, state and federal regulations and codes in effect as of the date of the installation.

E. Equipment of foreign manufacture must meet U.S. codes and standards.

F. InternationalStandards Organization/International Electromechanical Commission (ISO/IEC)
   1. ISO/IEC 11801:2002, Information technology -- Generic cabling for customer premises.

G. Underwriters Laboratories (UL)

1. UL Cable Certification and Follow Up Program.
2. UL Testing Bulletin.

H. National Electrical Manufacturers Association (NEMA).

I. American Society for Testing Materials (ASTM).

J. National Electric Code (NEC).

K. Institute of Electrical and Electronic Engineers (IEEE).

1.6 DEFINITIONS

A. ABR: Acrylonitrile-butadiene rubber.

B. CFCI: Contractor Furnished Contractor Installed

C. CFOI: Contractor Furnished Owner Installed

D. EPDM: Ethylene-propylene-diene terpolymer rubber.

E. OAR: Owner/Architect Representative

F. OFOI: Owner Furnished Owner Installed

G. OFCI: Owner Furnished Contractor Installed

1.7 SUBMITTALS

A. Product Data: For sleeve seals.

1.8 COORDINATION

A. Coordinate arrangement, mounting, and support of communications equipment:
   1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
   2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
   3. To allow right of way for piping and conduit installed at required slope, so that, connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed.

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 7.

1.9 CONTRACTOR RESPONSIBILITIES

A. Submittals - If the Owner rejects the Contractor's submittals (Rejected, Revise and Resubmit) more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

B. As-Builts – As-Built Documentation that is incomplete, deviates significantly from the requirements of the Construction Documents, or contain numerous errors will be returned without review for rework and resubmittal. If the Owner rejects the Contractor's As-Built Documentation more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

C. Punch Lists and System Acceptance – Upon inspection of Contractor's work as substantial completion or re-inspection of work to determine Contractor's clearing of punch list items, should Owner find the work to be incomplete, requiring additional trips and hours to complete final system acceptance, Contractor shall compensate Owner for all subsequent site visits in the amount of $1,200 per man-day plus expenses plus $240 per hour in excess of eight (8) man hours at no additional cost to the Owner. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment

PART 2 - PRODUCTS

2.1 SLEEVES FOR PATHWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

C. Sleeves for Rectangular Openings: Galvanized sheet steel.
   1. Minimum Metal Thickness:
      a. For sleeve cross-section rectangle perimeter, less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
      b. For sleeve cross-section rectangle perimeter, equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 SLEEVE SEALS

A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following. Substitutions are permitted only with written pre-approval by OAR.

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Advance Products & Systems, Inc.
   b. Calpico, Inc.
   c. Metraflex Co.
   d. Pipeline Seal and Insulator, Inc.
   e. Owner Approved Equivalent.
3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
4. Pressure Plates: Carbon steel. Include two for each sealing element.
5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestopping systems used are fabricated during construction of floor or wall.

E. Cut sleeves to length for mounting flush with both surfaces of walls.

F. Extend sleeves installed in floors 1 to 3 inches above finished floor level.

G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and pathway or cable, unless indicated otherwise.

H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
   1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint.

J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 7 Section "Firestopping."

K. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.

L. Above-ground, Exterior-Wall Penetrations: Seal penetrations using steel or cast-iron pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

A. Install to seal exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 7 specifications.

PART 4 - PRICING FORMS

4.1 FORMAT OF CONTRACTOR'S PROPOSAL

A. Contractor shall submit with bid a line-by-line compliance statement indicating his understanding and compliance or exception to the specification requirements. The statement shall consist of a copy of the specification notated with one of the following terms. Understand and will comply, Product not compliant with specification requirement, Description of means or method of providing similar or equal feature or performance level to specification requirement.

B. In addition to all other required bid forms, Contractor shall prepare and present to Owner and Owner's representative pricing based on the requirements of these specifications and complementary drawings.

C. Pricing shall include the list of equipment and labor in tabular form including part number, item description, unit price, number of units, extended price and totals, as indicated in the example table provided in this section. The pricing shall breakdown the material and labor in the categories as shown in these specifications.

D. Following is the format of the Price Form:

Project:
Subject:
Contractor:
Date:

Line No.	Item Description	Manufacturer Part No.	Manufacturer	Quantity	Material Unit	Material Unit Cost	Material Total Cost	Labor (hours)	Labor Cost p/hour	Labor Total Cost	Sub-Total	Total
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
6					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
7					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
8					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
9					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
10					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Documentation											
1	Submittal Documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2	Shop Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3	As-Built Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4	Close-out documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Other											
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Totals						**Material** $0.00			**Labor** $0.00		**Project** $0.00

END OF SECTION

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SECTION 270526

GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1, 26 and 27 Specification Sections, apply to this Section.

B. This document describes the products and execution requirements relating to Communications Bonding and Grounding.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings.

1.2 REQUIREMENTS

A. The Contractor shall thoroughly examine all documents, drawings and specifications for any conflicts between these documents. In the case where the specifications are not clear or do not agree with the corresponding drawings; it is the responsibility of the Contractor to submit a request-for-information (RFI) specifying the discrepancy stating the locations on the specifications and the drawings. Any conflicts of information shall be resolved before bidding on the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

B. The work and materials included in these specifications and corresponding drawings shall conform in every detail to the rules and requirements of the National Fire Protection Agency, the National Electrical Code and local codes and standards by the AHJ (Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications). In the event of any conflicts between documents referenced herein and the contents of this specification or drawings, the Contractor shall notify in writing to Consultant of any such occurrences before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

C. The Contractor shall furnish and install a complete functional and operational system as intended in the specifications and drawings. Quantities are responsibility of the Contractor, specifications and drawings are to be used for intent and reference only. The Contractor shall include all costs associated with the provision of a fully operational, tested, certified and warranted system in the bid amount

1.3 SUMMARY

A. This Section Includes the following:

1. Grounding conductors.
2. Grounding connectors.
3. Grounding busbars.
4. Grounding labeling.

1.4 RELATED SECTIONS

A. Section 01 3300 “Submittal Procedures”

B. Section 27 0500 “Common Work Results for Communications”

C. Section 27 1100 "Communications Equipment Room Fittings" for equipment associated with system panels and devices.

D. Section 27 1300 “Communications Backbone Cabling”

E. Section 27 1500 “Communications Horizontal Cabling” for equipment associated with horizontal distribution cabling.

1.5 REFERENCES

A. This Technical Specification and Associated Drawings

B. American National Standards Institute / Telecommunications Industry Association (ANSI/TIA)

1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises”.
2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard”.
3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
8. ANSI/TIA-607-B "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
10. ANSI/TIA-862-A “Building Automation Systems Cabling Standard”.

C. Building Industry Consulting Service International (BICSI)

1. BICSI Outside Plant Design Reference Manual.
2. BICSI Telecommunications Distribution Methods Manual (TDMM).

D. Local, county, state and federal regulations and codes in effect as of the date of the installation.

E. Equipment of foreign manufacture must meet U.S. codes and standards.

F. International Standards Organization/International Electromechanical Commission (ISO/IEC)

1. ISO/IEC 11801:2002, Information technology -- Generic cabling for customer premises.

G. Underwriters Laboratories (UL)
1. UL Cable Certification and Follow Up Program.
2. UL Testing Bulletin.

H. National Electrical Manufacturers Association (NEMA).

I. American Society for Testing Materials (ASTM).

J. National Electric Code (NEC).

K. Institute of Electrical and Electronic Engineers (IEEE).

1.6 DEFINITIONS

A. TBC: Telecommunications Bonding Conductor.

B. CFCI: Contractor Furnished Contractor Installed

C. CFOI: Contractor Furnished Owner Installed

D. EMT: Electrical metallic tubing.

E. OFOI: Owner Furnished Owner Installed

F. OFCI: Owner Furnished Contractor Installed

G. SBB: Secondary Busbar.

H. PBB: Primary Busbar.

1.7 SUBMITTALS

A. Submit in accordance with Section 01 33 00 – Submittal Procedures

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For communications equipment room signal reference grid. Include plans, elevations, sections, details, and attachments to other work.

1.9 INFORMATIONAL SUBMITTALS

A. As-Built Data: Plans showing as-built locations of grounding and bonding infrastructure, including the following:

B. TBC, PBB, SBBs, and routing of their bonding conductors.

C. Qualification Data: For each installer, qualified layout technician, installation supervisor, and field inspector, submit the individual's manufacturer certifications on the equipment and cabling being installed.

1. Submit copies of the certification of the company and names of staff that will be performing the installation and termination of the installation to provide proof of compliance of this specification. Include names of subcontracting or supplemental labor personnel along with proof of compliance.

2. At least 25 percent of the installation and termination crew must be certified from BICSI or the manufacturers for the installation of the copper and fiber optic cable plant.

1.10 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Result of the ground-resistance test, measured at the point of BCT connection.

b. Result of the bonding-resistance test at each TGB and its nearest grounding electrode.

1.11 QUALITY ASSURANCE

A. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

B. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD.

C. Installation Supervision: Installation shall be under the direct supervision of a Registered Technician or Level 2 Installer, who shall be present at all times when Work of this Section is performed at Project site.

D. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.12 CONTRACTOR RESPONSIBILITIES

A. Submittals - If the Owner rejects the Contractor's submittals 9Rejected, Revise and Resubmit) more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

B. As-Builts – As-Built Documentation that is incomplete, deviates significantly from the requirements of the Construction Documents, or contain numerous errors will be returned without review for rework and resubmittal. If the Owner rejects the Contractor's As-Built Documentation more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

C. Punch Lists and System Acceptance – Upon inspection of Contractor's work as substantial completion or re-inspection of work to determine Contractor's clearing of punch list items, should Owner find the work to be incomplete, requiring additional trips and hours to complete final system acceptance, Contractor shall compensate Owner for all subsequent site visits in the amount of $1,200 per man-day plus expenses plus $240 per hour in excess of eight (8) man hours at no additional cost to the Owner. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Comply with ANSI/TIA-607-C.

2.2 CONDUCTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Harger Lightning and Grounding.
2. CommScope
3. Tyco Electronics Corp.

B. Comply with UL 486A-486B.

C. Insulated Conductors: Stranded copper wire, green or green with yellow stripe insulation, insulated for 600 V, and complying with UL 83.

1. Communications Grounding Conductors: Copper American Wire Gauge (AWG) wire of the following sizes.
   a. Telecommunications Bonding Conductor (TBC): #4/0
   b. Telecommunication Bonding Backbone (TBB): #3/0
   c. Telecommunications Equipment Bonding Conductor (TEBC): #4
   d. Rack Bonding Conductor (RBC): #6
2. All Equipment Rooms (ER) will have a Primary Busbar (PBB). It will:
   a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
   b. Sized for the immediate requirements and allow for 25% growth.
   c. The minimum dimensions shall be 0’-¼” thick X 0’-4” wide X 2’-0” long.
   d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
   e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression-type copper lugs.
3. All Telecom Rooms (TR) will have a Secondary Busbar (SBB). It will:
   a. Use pre-drilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors.
   b. Sized for the immediate requirements and allow for 25% growth.
   c. The minimum dimensions shall be 0’-¼” thick X 0’-4” wide X 1’-0” long.
   d. Contain (2) tiers of pre-drilled holes for use with standard sizes of two-hole copper compression lugs.
   e. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression type copper lugs
4. Ground wire for custom-length equipment ground jumpers shall be No. 6 AWG, 19-strand, UL-listed, Type THHN wire.
5. Cable Tray Equipment Grounding Wire: No. 6 AWG.

D. Cable Tray Grounding Jumper:

1. Not smaller than No. 6 AWG and not longer than 12 inches (300 mm). If jumper is a wire, it shall have a crimped grounding lug with two holes and long barrel for two crimps. If jumper is a flexible braid, it shall have a one-hole ferrule. Attach with grounding screw or connector provided by cable tray manufacturer.

E. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmils (14.2 sq. mm), 14 strands of No. 17 AWG conductor, and 1/4 inch (6.3 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Tinned-copper tape, braided conductors terminated with two-hole copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.3 CONNECTORS

A. Irreversible connectors listed for the purpose. Listed by an NRTL as complying with NFPA 70 for specific types, sizes, and combinations of conductors and other items connected. Comply with UL 486A-486B.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. Chatsworth Products, Inc.
3. Harger Lightning and Grounding.
4. CommScope
5. Tyco Electronics Corp.

C. Compression Wire Connectors: Crimp-and-compress connectors that bond to the conductor when the connector is compressed around the conductor. Comply with UL 467.

1. Electroplated tinned copper, C and H shaped.

D. Signal Reference Grid Connectors: Combination of compression wire connectors, access floor grounding clamps, bronze U-bolt grounding clamps, and copper split-bolt connectors, designed for the purpose.

E. Busbar Connectors: Cast silicon bronze, solderless compression or exothermic-type, mechanical connector; with a long barrel and two holes spaced on 5/8- or 1-inch (15.8- or 25.4-mm) centers for a two-bolt connection to the busbar.

F. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

2.4 GROUNDING BUSBARS

A. Telecommunications Ground Busbars: Each TGB, located in each communications room, shall comply with the following:

1. Predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used.
2. Sized for the immediate requirements and allow for growth. The minimum dimensions shall be ¼ inch thick by 2 inches wide by 10 inches long.
3. Electro-tin plated for reduced contact resistance.

4. Pre-drilled holes, which shall support a minimum of two tiers of eight No. 6 AWG two-hole copper compression lugs.
5. ASTM-B187-C11000 Copper bar suitable for use with two-hole compression-type copper lugs.
6. Manufacturer: CPI, CommScope or Erico
   a. ER: ¼"x 4"x 20", for 2-hole connectors
   b. TR: ¼"x 4" x 10", for 2-hole connectors

2.5 LABELING

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Brother International Corporation.
   2. Hellermann Tyton.
   3. CommScope

B. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the AC grounding electrode system and equipment grounding for compliance with requirements for maximum ground-resistance level and other conditions affecting performance of grounding and bonding of the electrical system.

B. Inspect the test results of the AC grounding system measured at the point of BCT connection.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with connection of the BCT only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Bonding shall include the ac utility power service entrance, the communications cable entrance, and the grounding electrode system. The bonding of these elements shall form a loop so that each element is connected to at least two others.

B. Comply with NECA 1.

C. Comply with ANSI/TIA-607-C.

3.3 APPLICATION

A. Conductors: Install stranded conductors for No. 6 AWG and larger unless otherwise indicated.

1. The bonding conductors between the SBB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

2. The bonding conductors between the PBB and structural steel of steel-frame buildings shall not be smaller than No. 6 AWG.

B. Underground Grounding Conductors: Install bare tinned-copper conductor, No. 2 AWG minimum.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.

2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.

3. Connections to Ground Rods at Test Wells: Bolted connectors.

4. Connections to Structural Steel: Welded connectors.

D. Conductor Support:

1. Secure grounding and bonding conductors at intervals of not less than 36 inches (900 mm.)

E. Grounding and Bonding Conductors:

1. Install in the straightest and shortest route between the origination and termination point, and no longer than required. The bend radius shall not be smaller than eight times the diameter of the conductor. No one bend may exceed 90 degrees.

2. Install without splices.

3. Support at not more than 36-inch (900-mm) intervals.

4. Install grounding and bonding conductors in 3/4-inch (21-mm) PVC conduit until conduit enters a telecommunications room. The grounding and bonding conductor pathway through a plenum shall be in EMT. Conductors shall not be installed in EMT unless otherwise indicated.

5. If a grounding and bonding conductor is installed in ferrous metallic conduit, bond the conductor to the conduit using a grounding bushing that complies with requirements in ANSI/TIA 607C “Bonding and Grounding”, and bond both ends of the conduit to a TGB.

3.4 GROUNDING ELECTRODE SYSTEM

A. The TBC between the PBB and the ac service equipment ground shall not be smaller than No. 1/0 AWG.

3.5 GROUNDING BUSBARS

A. Install busbars horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 96 inches (300 mm) above finished floor unless otherwise indicated.

3.6 CONNECTIONS

A. Bond metallic equipment in a telecommunications equipment room to the grounding busbar in that room, using equipment grounding conductors not smaller than No. 6 AWG.

B. Stacking of conductors under a single bolt is not permitted when connecting to busbars.

C. Assemble the wire connector to the conductor, complying with manufacturer's written instructions and as follows:

D. Use crimping tool and the die specific to the connector.

1. Pre-twist the conductor.

2. Apply an antioxidant compound to all bolted and compression connections.

E. Primary Protector: Bond to the PBB with insulated bonding conductor.

F. Interconnections: Interconnect all SBBs with the PBB with the telecommunications backbone conductor. If more than one PBB is installed, interconnect PBBs using backbone bonding conductor (BBC). The telecommunications backbone conductor and backbone bonding conductor size shall not be less than 2 kcmils/linear foot (1 sq. mm/linear meter) of conductor length, up to a maximum size of No. 3/0 AWG 168 kcmils (85 sq. mm) unless otherwise indicated.

G. Telecommunications Enclosures and Equipment Racks: Bond metallic components of enclosures to the telecommunications bonding and grounding system. Install top-mounted rack grounding busbar unless the enclosure and rack are manufactured with the busbar. Bond the equipment grounding busbar to the PBB or SBB with No. 2 AWG bonding conductors.

H. Structural Steel: Where the structural steel of a steel frame building is readily accessible within the room or space, bond each SBB and PBB to the vertical steel of the building frame.

I. Electrical Power Panelboards: Where an electrical panelboard for telecommunications equipment is located in the same room or space, bond each PBB or SBB to the ground bar of the panelboard.

J. Rack- and Cabinet-Mounted Equipment: Bond powered equipment chassis to the cabinet or rack grounding bar. Power connection shall comply with NFPA 70; the equipment grounding conductor in the power cord of cord- and plug-connected equipment shall be considered as a supplement to bonding requirements in this Section.

K. Access Floors: Bond all metal parts of access floors to the PBB or SBB.

3.7 IDENTIFICATION

A. Labels shall be preprinted or computer-printed type.

1. Label PBB(s) with "fs-PBB," where "fs" is the telecommunications space identifier for the space containing the PBB.

2. Label SBB(s) with "fs-SBB," where "fs" is the telecommunications space identifier for the space containing the SBB.

3. Label the TBC and each telecommunications backbone conductor at its attachment point: "WARNING! TELECOMMUNICATIONS BONDING CONDUCTOR. DO NOT REMOVE OR DISCONNECT!"

3.8 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. The maximum acceptable connection resistance and ac loop current values are based on recommendations of BICSI TDMM.

C. Tests and Inspections:

1. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
2. Test the bonding connections of the system using an ac earth ground-resistance tester, taking two-point bonding measurements in each telecommunications equipment room containing a PBB and an SBB and using the process recommended by BICSI TDMM. Conduct tests with the facility in operation.
3. Measure the resistance between the busbar and the nearest available grounding electrode. The maximum acceptable value of this bonding resistance is 100 milliohms.
4. Test for ground loop currents using a digital clamp-on ammeter, with a full-scale of not more than 10 A, displaying current in increments of 0.01 A at an accuracy of plus/minus 2.0 percent.
5. With the grounding infrastructure completed and the communications system electronics operating, measure the current in every conductor connected to the PBB and each PBB. Maximum acceptable ac current level is 1 A.

D. Excessive Ground Resistance: If resistance to ground at the BCT exceeds 5 ohms, notify Architect promptly and include recommendations to reduce ground resistance.

E. See Section 014000 "Quality Requirements" for retesting and re-inspecting requirements and Section 01 7300 "Execution" for requirements for correcting the Work.

F. Grounding system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

PART 4 - PRICING FORMS

4.1 FORMAT OF CONTRACTOR'S PROPOSAL

A. Contractor shall submit with bid a line-by-line compliance statement indicating his understanding and compliance or exception to the specification requirements. The statement shall consist of a copy of the specification notated with one of the following terms. Understand and will comply, Product not compliant with specification requirement, Description of means or method of providing similar or equal feature or performance level to specification requirement.

B. In addition to all other required bid forms, Contractor shall prepare and present to Owner and Owner's representative pricing based on the requirements of this specifications and complementary drawings.

C. Pricing shall include the list of equipment and labor in tabular form including; part number, item description, unit price, number of units, extended price and totals, as indicated in the example table provided in this section. The pricing shall breakdown the material and labor in the categories as shown in these specifications.

D. Following is the format of the Price Form:

Project:
Subject:
Contractor:
Date:

Line No.	Item Description	Manufacturer Part No.	Manufacturer	Quantity	Material Unit	Material Unit Cost	Material Total Cost	Labor (hours)	Labor Cost p/hour	Labor Total Cost	Sub-Total	Total
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
6					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
7					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
8					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
9					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
10					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Documentation											
1	Submittal Documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2	Shop Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3	As-Built Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4	Close-out documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Other											
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Totals						**Material** $0.00			**Labor** $0.00		**Project** $0.00

END OF SECTION

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SECTION 271100

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 01, 26 and 27 Specification Sections, apply to this Section.

B. This document describes the products and execution requirements relating to Communications Backbone Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings. Contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty.

1.2 REQUIREMENTS

A. The Contractor shall thoroughly examine all documents, drawings and specifications for any conflicts between these documents. In the case where the specifications are not clear or do not agree with the corresponding drawings; it is the responsibility of the Contractor to submit a request-for-information (RFI) specifying the discrepancy stating the locations on the specifications and the drawings. Any conflicts of information shall be resolved before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

B. The work and materials included in these specifications and corresponding drawings shall conform in every detail to the rules and requirements of the National Fire Protection Agency, the National Electrical Code and local codes and standards by the AHJ (Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications). In the event of any conflicts between documents referenced herein and the contents of this specification or drawings, the Contractor shall notify in writing to Consultant of any such occurrences before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

C. The Contractor shall furnish and install a complete functional and operational system as intended in the specifications and drawings. Quantities are responsibility of the Contractor, specifications and drawings are to be used for intent and reference only. The Contractor shall include all costs associated with the provision of a fully operational, tested, certified, and warranted system in the bid amount

1.3 SUMMARY

A. Section Includes:

1. Requirements for new Communication Equipment Room.
2. Telecommunications mounting elements.
3. Backboards.
4. Grounding.

1.4 RELATED SECTIONS:

A. Section 013300 - Submittal Procedures

B. Section 270500 - Common Work Results for Communications

C. Section 270526 - Bonding and Grounding for Communications Systems

D. Section 271300 - Communications Backbone Cabling

E. Section 271500 - Communications Horizontal Cabling

1.5 REFERENCES

A. This Technical Specification and Associated Drawings

B. American National Standards Institute/Telecommunications Industries Association (ANSI/TIA)
   1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises”.
   2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard”.
   3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
   4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
   5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
   6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
   7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
   8. ANSI/TIA-607-C "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
   9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
   10. ANSI/TIA-862-A “Building Automation Systems Cabling Standard”.

C. Building Industry Consulting Service International (BICSI)
   1. BICSI Outside Plant Design Reference Manual. Current version.
   2. BICSI Telecommunications Distribution Methods Manual (TDMM). Current version.

D. Local, county, state and federal regulations and codes in effect as of the date of the installation.

E. Equipment of foreign manufacture must meet U.S. codes and standards.

F. International Standards Organization/International Electromechanical Commission (ISO/IEC)
   1. ISO/IEC 11801:2002, Information technology—Generic cabling for customer premises.

G. Underwriters Laboratories (UL)
   1. Cable certification and Follow UP Program

H. National Fire Protection Association (NFPA)
   1. NFPA 70—National Electrical Code (NEC)

I. Occupational Safety and Health Administration (OSHA)
   1. 29CRF Part 1910, Permit-Required Confined Spaces for General Industry; Final Rule.

J. National Electrical Manufacturers Association (NEMA).

K. American Society for Testing Materials (ASTM).

L. Institute of Electrical and Electronic Engineers (IEEE).
   1. National Electrical Safety Code (NESC).

M. Underwriters Laboratory (UL)
   1. UL Testing Bulletin.

1.6 DEFINITIONS

A. AHJ: Authority Having Jurisdiction

B. ANSI: American National Standards Institute

C. BICSI: Building Industry Consulting Service International.

D. CFCI: Contractor Furnished Contractor Installed

E. CFOI: Contractor Furnished Owner Installed

F. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

G. EMI: Electromagnetic Interference.

H. IDF: Intermediate Distribution Frame, also known as TR.

I. LAN: Local area network.

J. MDF: Maid Distribution Frame, also known as ER.

K. ER: Main Equipment Room

L. NRTL: Nationally Recognized Testing Laboratory

M. OAR: Owner’s Authorized Representative

N. OFOI: Owner Furnished Owner Installed

O. OFCI: Owner Furnished Contractor Installed

P. RCDD: Registered Communications Distribution Designer.

Q. SCS: Structured Cabling System

R. TIA/EIA: Telecommunications Industry Association/Electronics Industries Alliance

S. TR: Telecommunications Room

T. UTP: Unshielded Twisted Pair

1.7 RESPONSIBILITY AND RELATED WORK

A. The Contractor Shall:
   1. Provide labor, tools and transportation required to support the installation in accordance with the established time line and standards.

2. Deliver submittals, shop drawings, and hardware and configurations as specified herein.
3. Obtain permits, licenses, or other municipal requirements and pay any fees required for the execution of this work.
4. Coordinate with other trades to assure completeness of telecommunications cabling systems, equipment rack assemblies, Telecom AC power, Telecom Grounding and Bonding, Plywood wall liner in TR locations and housekeeping pads where required.
5. Execute all work in accordance to the National Electric Code, The National Electric Safety Code, and all applicable state codes, ordinances and regulations.
6. Supply accessories and minor equipment items regularly required for a complete system, even if not specifically mentioned in these specifications or on the associated “T” series drawings, without claim of additional payment.
7. Provide instruction to owner-designated personnel on the system documentation and the proper methods of use and maintenance of the system and related components.

B. Where Conflict exists between contract documents, the more stringent requirement shall prevail. Where conflict exists between contract documents and a Code, the Code shall prevail.

C. Discrepancies in part numbers or quantities shall be reported to The Owner prior to bid opening for clarification as necessary. Failing to provide such notification requires the Contractor to supply items and quantities according to the intent of the specifications and associated drawings without claim of additional payment.

D. Notwithstanding any detailed information in the contract documents, it is the responsibility of the contractor to supply systems in full working order.

1.8 ACTION SUBMITTALS

A. The Preconstruction Submittal is required to verify the Contractor will obtain the specified product, understands the processes and procedures, and understands the design and installation requirements in order to provide a complete and working system.

B. The Contractor is to provide the quantity of submittals (sets) as specified in Division 1, General Requirements, or the minimal requirements as follows:

C. Four (4) copies of documents such as installation schedules, valid copies of technician certifications, material lists, specification sheets, and small size shop drawings as required. Two (2) copies of a CD containing and of the same information as these binders shall be submitted in Adobe® Portable Document Format (PDF).

D. Assurance/Quality Control Submittals:
1. Documentation of current certification: a BICSI RCDD must be engaged to manage all installations and testing procedures.
2. Documentation of current certification for BICSI certified installers and for installers certified by the manufacturer of the submitted cabling system. The Contractor shall have certified personnel on site during all work.

E. Record drawings shall be kept on site. Record drawings shall include marked up floor plans showing outlet locations, type of cable, and cable label identification.

F. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

G. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.
   1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   2. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
   3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

1.9 CONTRACTOR CLOSE OUT SUBMITTALS

A. These submittals must be submitted and approved prior to final billing and payment. They should be submitted within thirty days of completion of the project.

B. Certification of level of performance as evidenced by comprehensive test results for fiber riser, copper riser and UTP horizontal cabling as specified in this document. Test results should be provided as hard copies and on electronic media.

C. Record drawings with as-built information and finalized versions of the shop drawings. These submittals shall be on the base plan as provided by the Architect or Owner. These submittals shall be three (3) copies in reproducible print form and one (1) in electronic format (AutoCAD).

D. Plan drawings indicating locations and identification of work area outlets.

E. Telecommunications rooms (MER & TR), and backbone (riser) runs.

F. Manufacturer’s system certification supporting the product warranty. Transfer manufacturer’s warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item il list form along with any certification test results. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty all proprietary equipment systems involved in the contract during the guarantee period. Final payment shall not relieve the Contractor of these obligations.

1.10 QUALITY ASSURANCE

A. The selected Contractor must be a Certified Integrator/Installer authorized to provide the approved network equipment and integration to the Owner, covering all network hardware and software products comprising this installation site.

B. Contractor’s Qualifications: A Firm experienced in the provision of systems similar in complexity to those required for this project.

C. Manufacturer’s Qualifications: No less than 5 years continuous experience in the production of specified types of product, with production capabilities per applicable standards.

D. All equipment shall be installed in a neat and workman-like manner. All methods of construction that are not specifically described or indicated in the contract documents

shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

E. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.
   1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD, employed full-time by the Contractor.
   2. Installation Supervision: Installation shall be under the direct supervision of a Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.
   3. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.11 WORK

A. The Work shall be performed in compliance with the applicable manufacturer's installation instructions, Standards, and certifications listed herein, the Contract Documents, and governing codes and regulations of the authorities having jurisdiction.

B. The drawing and specification requirements govern where they exceed Code and Regulation requirements.

C. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.

D. Nothing in the Contract Documents grants authority or permission to disregard or violate any legal requirements.

E. Coordinate exact location and installation of equipment, power, grounding, and raceway requirements with the Architect.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damage or entrance of foreign matter. Handling and shipping in accordance with manufacturer's recommendation.

B. Provide protective covering during construction, to prevent damage or entrance of foreign matter.

C. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.13 PROJECT CONDITIONS

A. Verify conditions of the job site applicable to this work. Notify Architect, in writing, of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.14 WARRANTY

A. Effect replacement or substitutions of equipment within 24 hours of first notification. Complete repairs to equipment within 72 hours. If repairs cannot be completed during this time period, or if ordering of parts is required, forward the owner, every 72 hours, documentation of progress repairs. This repair capability is mandatory. Include costs anticipated to comply with this requirement in the bid.

1.15 USE OF THE SITE

A. Use of the site shall be at the Owner's direction in matters in which the Owner deems it necessary to place restriction.

B. Access to building wherein the work is performed shall be as directed by the Owner.

C. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the Owner.

D. All Contractor Personnel must check in with the General Contractor upon arrival and upon departure.

1.16 CONTINUITY OF SERVICES

A. Take no action that will interfere with, or interrupt, existing building services unless previous arrangements have been made with the Owner's Representative. Arrange the work to minimize shutdown time.

B. Owner's personnel will perform shutdown of operating systems. The Contractor shall give three (3) days' advance notice for systems shutdown.

C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

1.17 CONTRACTOR RESPONSIBILITIES

A. Submittals - If the Owner rejects the Contractor's submittals (Rejected, Revise and Resubmit) more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

B. As-Builts – As-Built Documentation that is incomplete, deviates significantly from the requirements of the Construction Documents, or contain numerous errors will be returned without review for rework and resubmittal. If the Owner rejects the Contractor's As-Built Documentation more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

C. Punch Lists and System Acceptance – Upon inspection of Contractor's work as substantial completion or re-inspection of work to determine Contractor's clearing of punch list items, should Owner find the work to be incomplete, requiring additional trips and hours to complete final system acceptance, Contractor shall compensate Owner for all subsequent site visits in the amount of $1,200 per man-day plus expenses plus $240 per hour in excess of eight (8) man hours at no additional cost to the Owner. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment

PART 2 - PRODUCTS

2.1 BACKBOARDS

A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels specified in Section "Miscellaneous Rough Carpentry."

1. Paint all backboards with a minimum of 2 coats of fire retardant paint on all sides and edges.
2. For all new TR or MER locations, provide a minimum of 2 walls with 8’ high X ¾” plywood backboard covering full length or as noted on the contract documents.
3. Paint plywood backboard white.

2.2 LADDER RACK, SUPPORTS, AND ACCESSORIES

A. Ladder Rack (Universal Cable Runway

1. Ladder rack shall be manufactured from tubular steel. Stringers (sides) will be made from 3/8” wide by 1-1/2” high tubular steel with .065” wall thickness. Cross members (rungs) will be made from 1” wide by ½” high tubular steel with .065” wall thickness.
2. Ladder rack (stringers) will be 9-81/2” long. Cross members will be welded in between stringers on 9” centers beginning 4-1/4” from one end so that there are thirteen cross members per ladder rack. There will be 8” of open space in between each cross member.
3. Ladder rack will be UL Classified for suitability as an equipment grounding conductor only. Minimum combined cross sectional area of the stringers will be 0.40 square inches. A label affixed to the side stringer of the ladder rack will identify the manufacturer, the UL Classification and the minimum combined cross sectional area of the stringers (the installer must remove paint or use ground straps at splices and intersections).
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.
5. Design Make: Chatsworth Products, Inc. (CPI), Universal Cable Runway or approved equivalent.
    a. Universal Cable Runway, 12” Wide, Black.

B. Ladder Rack Splices

1. Splice kits will provide a method of mechanically connection ladder rack sections and turns together end-to-end or side-to-side to form a continuous pathway for cables.
2. Grounding kits will provide a method of binding ladder rack sections and turns together that is independent of the pathway splices. The grounding kit should be constructed of UL Listed components. The preferred solution is a #6 AWG green insulated stranded copper conductor connected on both ends to ladder rack using two-hole compression lugs and stainless steel hardware.
3. An insulator bar kit will provide a means of electrically isolating individual ladder rack sections through and end-to-end splice separated with a non-conductive

material. The preferred solution is a 3/8” wide by 1-1/2” high by 5-1/2” long insulator bar made of Delrin (by DuPont, Delrin is a registered trademark of E.I. DuPont de Nemours and Company).

4. Splices (splice plates) will be manufactured from steel. Splice, grounding and insulator bar kits will include installation hardware.
5. Finish (of splice plates and hardware) shall be zinc plate in the color(s) specified below. Colors are applied as a chem. Film over the zinc plate.
6. Design Make: Chatsworth Products, Inc. (CPI), Cable Runway Splices or approved equivalent
    a. Butt-Splice Kit, Gold
    b. Junction Splice Kit, Gold
    c. Grounding Kit, Zinc
    d. Insulator Bar Kit, White

C. Ladder Rack Supports
1. Supports will be sized to match the width of the ladder rack that is supported.
2. Each support will include a means of mechanically securing ladder rack to the support.
3. Supports will be manufactured from steel or aluminum.
4. Finish shall be epoxy-polyester hybrid powder coat (paint) in the color(s) specified below or zinc plate with a gold chem.
5. Design Make: Chatsworth Products, Inc. (CPI), Cable Runway Supports or approved equivalent.
6. Triangular Support Bracket, for 6”-12” Wide Cable Runway (Ladder Rack), 100 lb. capacity, Aluminum, Black.
7. Part Number 11421-712, Wall Angle Support Kit, For 12” Wide Cable Runway (Ladder Rack), Steel, Black.
8. Rack-To-Runway Mounting Plate, For 9” to 12” Wide Cable Runway (Ladder Rack), for Standard and Universal Racks with 3” Deep Equipment Mounting Channels, Steel, Black.

D. Ladder Rack Accessories
1. Cable straps used for attaching cable bundles to the ladder rack cross members must be reusable with a hook and loop style closure, at least ¾” wide, and sized for cable bundles that are 2”, 3”, or 4” in diameter.
2. Cable retaining posts used to keep cable from falling off of the side of the ladder rack shall be manufactured from 1” by ½” tubular steel with .065” wall thickness. Cable retaining posts will be 8” high and will attach to the side stringer of the ladder rack with included hardware. The top of the cable retaining posts will be fitted with a rubberized end cap to protect cables.
3. End caps used to cover the ends of ladder rack will be manufactured from al black fire-retardant rubberized material. End caps will be sized for 3/8” wide by 1-1/2” high side stringers and will be sold in pairs.

4. End closing kits used to cover the end of ladder rack will be manufactured from 3/8” side by 1-1/2” high tubular steel with .065” wall thickness. Kits will consist of a bar cut to match the width of the ladder rack and the hardware required to attach the bar to the end of a length of ladder rack.
5. Radius drops used to create a radius to form cables over as the cables exit or enter the ladder rack will be manufactured from aluminum extrusion. The extrusion will be formed in a 90 deg. Arc with a minimum bend radius of 3”. Radius drops will attach to either the side stringer or the cross member of the ladder rack using a clevis pin. Radius drops will include 1-1/2” high cable spools that attach to the top of the radius drop to guide cables.

2.3 EQUIPMENT RACKS/CABINETS/SHELVES

A. Equipment Racks
   1. Free Standing Relay Racks (Standard Rack/4-Post Rack)
      a. Racks shall be manufactured from aluminum extrusion.
      b. Each rack shall have two L-shaped top angles, two L-shaped base angles and two C-shaped equipment-mounting channels. The rack shall assemble with nut and bolt hardware. The base angles shall be pre-punched for attachment to the floor.
      c. Equipment mounting channels shall be 3” (76 mm) deep and punched on the front and rear flange with the EIA-310-D Universal hole pattern, 1-3/4” (44.45 mm) rack-mount spaces (U), to provide 45U, 52U or 58U for equipment. Each mounting space (U) shall be marked and numbered on the mounting channel.
      d. When assembled with top and bottom angles, equipment-mounting channels shall be spaced to allow attachment of 19” EIA rack-mount equipment. Equipment attachment points shall be threaded with 12-24 roll-formed threads. The rack shall include assembly and equipment-mounting hardware. Racks shall include 50 each combination pan head, pilot point mounting screws.
      e. The assembled rack shall measure 7’ (2.1 m)/84” (2133 mm) high, 8’ (2.4 m)/96” (2438 mm) high or 9’ (2.7 m)/108” (2743 mm) high; 20.3” (515.9 mm) wide and 15” (381.0 mm) deep. The sides (webs) of the equipment-mounting channels shall be punched to allow attachment of vertical cable managers along the sides of the rack or for rack-to-rack baying.
      f. Assembly hardware shall electrically bond the top angles, side channels and base angles together when assembled, and there shall be a masked ground attachment point with 1/4-20 threaded studs spaced 5/8” apart on the inside of the side channel to attach a ground lug allowing easy attachment to the Telecommunications Ground.
      g. The rack shall be rated for 1,000 lb (453.6 kg) of equipment.
      h. The rack shall be UL and CUL Listed as a Communications Circuit Accessory, DUXR and DUXR7 category, file number 140851.
      i. Finish shall be either clear grained aluminum or epoxy-polyester hybrid powder coat in the color as specified below.
      j. 4-Post Racks to be used for Access Control/Surveillance equipment.
   2. Wall-Mounted Equipment Rack (Heavy-Duty Wall-Mount Equipment Rack)
      a. Wall-mounted racks shall be manufactured from sheet aluminum and aluminum extrusion.

b. The rack will support 19” EIA or 23” wide equipment, as specified below.

c. The rack will be EIA-310-D compliant. Rack-mount spaces/units (U) will be 1-3/4” (44.45 mm) high. The rack will have a single pair of C-shaped equipment mounting rails. The front and back of the mounting rails will be punched with the Universal hole pattern. Mounting holes will be spaced vertically on alternating 5/8”-5/8”-1/2” (15.9 mm – 15.9 mm – 12.7 mm) centers and will be roll-formed with #12-24 threads. Mounting rails will provide 20 or 40 rack-mount spaces (U) for equipment as specified below.

d. Overall dimensions of the rack will be 41.2” (1046 mm) or 76.2” (1935 mm) high; 23.0” (584 mm) or 27.0” (686 mm) wide; and 18” (457 mm) or 24” (610 mm) deep, as specified below.

e. The rack will be rated to support 350 pounds (158.8 kg) of equipment. Load bearing capacity will be stated in the manufacturer’s product literature.

f. Finish shall be clear (brushed/grained aluminum) or epoxy-polyester hybrid powder coat (paint) in the color(s) specified below.

g. Each rack will include 50 each #12-24 equipment mounting screws and installation hardware (1/4” x 2” hex lag screws for wood stud walls).

3. Finish:
   a. Black
4. Depth (wall-mounted)
   a. 18” (preferred)
   b. 12” (only if mounting space depth is constrained, requires individual approval)
5. Height
   a. 40 U max.
   b. 20 U min.
6. Acceptable Manufacturers:
   a. CommScope
   b. CPI

2.4 GROUNDING

A. Comply with requirements in Section 270526 "Grounding and Bonding for Communications Systems" for grounding conductors and connectors.

B. A telecommunications backbone bonding conductor (TBC) shall be routed from the Primary Busbar (PBB) to the farthest TR Secondary Busbar (SBB). The bonding conductor shall be a minimum 4 AWG solid copper, insulated conductor. The TBB shall be bonded at each end.

C. For any intermediate TR locations (between the ER and the farthest TR), the TBC shall be to the intermediate TR SBB with a #6 AWG conductor (larger, if distance if over 50 feet) and bonded to the SBB.

D. Each TR SBB shall be bonded to the building ground with a #6 AWG conductor (larger if over 50 feet).

E. All backbone cabling with metallic sheaths shall be bonded at each sheath opening.

F. Grounding and bonding conductors shall be #6 AWG. They shall be routed with a minimum number of bends. The bends shall be sweeping.

G. Make all bonding connections with listed bolts, crimp pressure connector, clamps or lugs with a similar metal to prevent oxidation. Dissimilar metals may be used with matching gel. Exothermic welding may be used.

H. Ground and bond all equipment racks.

I. Ground cable trays with bonded jumper on both ends. Cable tray sections shall be bonded in accordance with manufacturers' guidelines. Keep bonding jumpers on one side of the tray throughout. Comply with TIA-607-C.

2.5 LABELING

A. Comply with TIA/EIA-606-B and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

B. Refer to sections 271300 or 271500 for additional information.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

A. Coordinate with telecommunications service provider(s) and arrange for installation of demarcation point, protected entrance terminals, and other service provider-supplied equipment.

3.2 INSTALLATION

A. Comply with NECA 1-2015 Standard for Good Workmanship in Electrical Construction.

B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.

C. Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.

1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
2. Record agreements reached in meetings and distribute them to other participants.
3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.
4. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.

D. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

E. Ladder Rack

1. All cable shall be supported inside the ER and/or TR via ladder rack either mounted overhead or vertically on the perimeter walls.
2. Provide all components of the ladder rack system from a single manufacturer.

3. Ladder rack shall be installed with side stringers facing down so that the ladder forms an inverted U-shape and so that welds between the stringers and cross members face away from cables.
4. Ladder rack shall be secured to the structural ceiling, building truss system, wall, floor, or the tops of equipment racks and/or cabinets using the manufacturer's recommended supports and appropriate installation hardware and methods as defined by local code or the authority having jurisdiction (AHJ).
5. Ladder rack splices will be made in mid-span, not over a support, with the manufacturer's recommended splice hardware.
6. Ladder rack shall be supported every 5' or less in accordance with TIA-569-B. Ladder rack shall be supported within 2' of every splice and within 2' on both/all sides of every change in elevation. Support ladder every 2' when attached vertically to wall.
7. When the pathway is overhead, ladder rack shall be installed with a minimum clearance of 12" above the ladder rack. Leave a minimum of 12" in between ladder rack and ceiling/building truss structure. Leave a minimum of 3" in between ladder rack the tops of equipment racks and/or cabinets. When located above an acoustical drop ceiling, leave a minimum of 3" clearance between the top of the drop ceiling tiles and the bottom of the ladder rack.
8. Within each telecommunications room, ladder rack should be bonded together, electrically continuous, and bonded to the SBB, unless otherwise noted in the specifications and contract documents. Ladder rack and turns shall be bonded across each splice with a bonding kit or with splices per the manufacturer's installation instructions. Ladder rack shall be bonded to the Telecommunications Grounding Busbar (SBB) using an approved ground lug on the ladder rack and a minimum #6 AWG grounding wire or as recommended by the AHJ. Remove paint from the ladder rack where bonding/ground lugs or splices contact the ladder rack so that the lug or splice will contact bare metal. Use antioxidant joint compound in between the bare metal on the ladder rack and ground lug or splice. Use antioxidant joint compound in between the bus bar and the ground lug. Verify continuity through the bonds at splices and intersections between individual ladder rack sections and turns and through the bond to the SBB.
9. Cover the exposed ends of cable runway that do not terminate against a wall, the floor or the ceiling with end caps or an end closing kit.
10. Whenever possible, maintain a 6' separation between ladder rack used for communications cables and pathways for other utilities or building services.
11. The installer will provide touch-up paint color-matched to the finish on the ladder rack and will correct any minor cosmetic damage (chips, small scratches, etc.) resulting from normal handling during the installation process prior to delivery to the owner. If a component is cosmetically damaged to the extent that correction in the field is obvious against the factory finish, the component will be replaced with a new component finished from the factory. If a component is physically damaged due to mishandling or modification during the installation process, it shall not be used as part of the ladder rack system.

3.3 SLEEVE AND SLEEVE SEAL INSTALLATION FOR PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 270500 "Common Results for Communications."

3.4 FIRESTOPPING

A. Comply with requirements in Section "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.5 GROUNDING

A. Install grounding per BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with TIA-607-C.

C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

1. Retain subparagraph below if screened twisted-pair cables and coaxial cables are in communications equipment rooms.
2. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.6 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-B.

B. Comply with requirements in Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. Paint and label colors for equipment identification shall comply with TIA/EIA-606-B for Class 2 level of administration.

D. Labels shall be preprinted or computer-printed type.

PART 4 - PRICING FORMS

4.1 FORMAT OF CONTRACTOR'S PROPOSAL

A. Contractor shall submit with bid a line-by-line compliance statement indicating his understanding and compliance or exception to the specification requirements. The statement shall consist of a copy of the specification notated with one of the following terms. Understand and will comply, Product not compliant with specification requirement, Description of means or method of providing similar or equal feature or performance level to specification requirement.

B. In addition to all other required bid forms, Contractor shall prepare and present to Owner and Owner's representative pricing based on the requirements of these specifications and complementary drawings.

C. Pricing shall include the list of equipment and labor in tabular form including; part number, item description, unit price, number of units, extended price and totals, as indicated in the example table provided in this section. The pricing shall breakdown the material and labor in the categories as shown in these specifications.

Following is the format of the Price Form:

Project:
Subject:
Contractor:
Date:

Line No.	Item Description	Manufacturer Part No.	Manufacturer	Quantity	Material Unit	Material Unit Cost	Material Total Cost	Labor (hours)	Labor Cost p/hour	Labor Total Cost	Sub-Total	Total
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
6					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
7					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
8					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
9					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
10					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Documentation											
1	Submittal Documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2	Shop Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3	As-Built Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4	Close-out documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Other											
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Totals						**Material** $0.00			**Labor** $0.00		**Project** $0.00

END OF SECTION

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SECTION 271300

COMMUNICATIONS BACKBONE CABLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1, 26 and 27 Specification Sections, apply to this Section.

B. This document describes the products and execution requirements relating to Communications Backbone Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings. Contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty

1.2 REQUIREMENTS

A. **The Contractor shall thoroughly examine all documents, drawings and specifications for any conflicts between these documents. In the case where the specifications are not clear or do not agree with the corresponding drawings; it is the responsibility of the Contractor to submit a request-for-information (RFI) specifying the discrepancy stating the locations on the specifications and the drawings. Any conflicts of information shall be resolved before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor**.

B. The work and materials included in these specifications and corresponding drawings shall conform in every detail to the rules and requirements of the National Fire Protection Agency, the National Electrical Code and local codes and standards by the AHJ (Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications). In the event of any conflicts between documents referenced herein and the contents of this specification or drawings, the Contractor shall notify in writing to Consultant of any such occurrences before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

C. The Contractor shall furnish and install a complete functional and operational system as intended in the specifications and drawings. Quantities are responsibility of the Contractor, specifications and drawings are to be used for intent and reference only. The Contractor shall include all costs associated with the provision of a fully operational, tested, certified and warranted system in the bid amount

1.3 SUMMARY

A. This Section includes the following:

1. This section will include all the Communications Backbone Cabling specifications for the installation of a Structured Cabling System (SCS).

1.4 RELATED SECTIONS

A. Section 013300 - Submittal Procedures

B. Section 270500 - Common Work Results for Communications

C. Section 270528 - Grounding and Bonding for Communications Systems

D. Section 271100 - Communications Equipment Room Fittings

E. Section 271500 - Communications Horizontal Cabling

1.5 REFERENCES

A. This Technical Specification and Associated Drawings

B. American National Standards Institute / Telecommunications Industry Association (ANSI/TIA)

1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises".
2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard".
3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
8. ANSI/TIA-607-C "Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises".
9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
10. ANSI/TIA-862-A “Building Automation Systems Cabling Standard”.

C. Building Industry Consulting Service International (BICSI)

1. BICSI Outside Plant Design Reference Manual. Current version.
2. BICSI Telecommunications Distribution Methods Manual (TDMM). Current version.

D. Local, county, state and federal regulations and codes in effect as of the date of the installation.

E. Equipment of foreign manufacture must meet U.S. codes and standards.

F. International Standards Organization/International Electromechanical Commission (ISO/IEC)

1. ISO/IEC 11801:2002, Information technology -- Generic cabling for customer premises.

G. Underwriters Laboratories (UL)

1. UL Cable Certification and Follow Up Program.
2. UL Testing Bulletin.

H. National Electrical Manufacturers Association (NEMA).

I. American Society for Testing Materials (ASTM).

J. National Electric Code (NEC).

K. Institute of Electrical and Electronic Engineers (IEEE).

1.6 DEFINITIONS

A. AHJ: Authority Having Jurisdiction.

B. ANSI: American National Standards Institute

C. BICSI: Building Industry Consulting Service International.

D. CFCI: Contractor Furnished Contractor Installed

E. CFOI: Contractor Furnished Owner Installed

F. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

G. EMI: Electromagnetic interference.

H. LAN: Local Area Network.

I. MDF: Main Distribution Frame, also known as ER

J. MER: Main Equipment Room

K. NTRL: Nationally Recognized Testing Laboratory

L. OAR: Owner's Authorized Representative

M. OFOI: Owner Furnished Owner Installed

N. OFCI: Owner Furnished Contractor Installed

O. IDC: Insulation displacement connector.

P. IDF: Intermediate Distribution Frame, also known as TR

Q. LAN: Local area network.

R. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

S. RCDD: Registered Communications Distribution Designer.

T. SCS: Structured Cabling System

U. TIA/EIA: Telecommunications Industry Association / Electronics Industries Alliance

V. TR: Telecommunications Room

W. UTP: Unshielded twisted pair.

1.7 RESPONSIBILITY AND RELATED WORK

A. The Contractor's responsibility includes, but is not limited to, provision, installation and integration of:

1. 8.3/125-micron, single mode fiber optic cabling
2. 50/125-micron, OM4, Multimode fiber optic cabling
3. Termination hardware, housings, and LC connectors for 50/125 micron, multimode and 8.3/125-micron single mode fiber optic cabling.
4. Managed patch cords fiber optic riser cabling.

B. The Contractor Shall:

1. Provide labor, tools and transportation required to support the installation in accordance with the established time line and standards.
2. Deliver submittals, shop drawings, and hardware and configurations as specified herein.
3. Obtain permits, licenses, or other municipal requirements and pay any fees required for the execution of this work.
4. Coordinate with other trades to assure completeness of telecommunications cabling systems, equipment rack assemblies, Telecom AC power, Telecom Grounding and Bonding, Plywood wall liner in TR locations and housekeeping pads where required.
5. Execute all work in accordance to the National Electric Code, The National Electric Safety Code, and all applicable state codes, ordinances and regulations.
6. Supply accessories and minor equipment items regularly required for a complete system, even if not specifically mentioned in these specifications or on the associated "T" series drawings, without claim of additional payment.
7. Provide instruction to owner-designated personnel on the system documentation and the

proper methods of use and maintenance of the system and related components.

C. Where Conflict exists between contract documents, the more stringent requirement shall prevail. Where conflict exists between contract documents and a Code, the Code shall prevail.

D. Discrepancies in part numbers or quantities shall be reported to The Owner prior to bid opening for clarification as necessary. Failing to provide such notification requires the Contractor to supply items and quantities according to the intent of the specifications and associated drawings without claim of additional payment.

E. Notwithstanding any detailed information in the contract documents, it is the responsibility of the contractor to supply systems in full working order.

1.8 QUALITY ASSURANCE

A. The selected Contractor must be a Certified Integrator/Installer authorized to provide the approved network equipment and integration to the Owner, covering all network hardware and software products comprising this installation site.

B. Contractor's Qualifications: A Firm experienced in the provision of systems similar in complexity to those required for this project.

C. Manufacturer's Qualifications: No less than 5 years continuous experience in the production of specified types of product, with production capabilities per applicable standards.

D. All equipment shall be installed in a neat and workman-like manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject to approval.

E. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff.

1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD, employed or engaged by the Contractor.

2. Installation Supervision: Installation shall be under the direct supervision of a Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.

3. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.9 WORK

A. The Work shall be performed in compliance with the applicable manufacturer's installation instructions, Standards, and certifications listed herein, the Contract Documents, and governing codes and regulations of the authorities having jurisdiction.

B. The drawing and specification requirements govern where they exceed Code and Regulation requirements.

C. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.

D. Coordinate exact location and installation of equipment, power, grounding, and raceway requirements with the Architect.

1.10 SUBMITTALS

A. The Preconstruction Submittal is required to verify the Contractor will obtain the specified product, understands the processes and procedures, and understands the design and installation requirements in order to provide a complete and working system,

B. The Contractor is to provide the quantity of submittals (sets) as specified in Division 1, General Requirements, or the minimal requirements as follows:

1. Four (4) copies of documents such as installation schedules, valid copies of technician certifications, material lists, specification sheets, and small size shop drawings as required. Two (2) copies of a CD containing all of the same information as these binders shall be submitted in Adobe® Portable Document Format (PDF).

C. Assurance/Quality Control Submittals:

1. Documentation of current certification for BICSI RCDD to manage all installations and testing procedures.

2. Documentation of current certification for BICSI certified installers and for installers certified by the manufacturer of the submitted cabling system. The Contractor shall have certified personnel on site during all work.

D. Record drawings shall be kept on site. Record drawings shall include marked up floor plans showing outlet locations, type of cable, and cable label identification.

1.11 CONTRACTOR CLOSEOUT SUBMITTALS

A. These submittals must be submitted and approved prior to final billing and payment. They should be submitted within thirty days of completion of the project.

B. Certification of level of performance as evidenced by comprehensive test results for fiber riser, copper riser and UTP horizontal cabling as specified in this document. Test results should be provided as hard copies and on electronic media.

C. Record drawings with as-built information and finalized versions of the shop drawings. These submittals shall be on the base plan as provided by the Architect or Owner. These submittals shall be three (3) copies in reproducible print form and one (1) in electronic format (AutoCAD).

1. Plan drawings indicating locations and identification of work area outlets.

2. Telecommunications rooms (MER & TR), horizontal cable runs.

D. Manufacturer's system certification supporting the product warranty. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form along with any certification test results. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty all proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve the Contractor of these obligations.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damage or entrance of foreign matter.

B. Handling and shipping in accordance with manufacturer's recommendation.

C. Provide protective covering during construction, to prevent damage or entrance of foreign matter.

D. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.13 PROJECT CONDITIONS

A. Verify conditions of the job site applicable to this work. Notify Architect, in writing, of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.14 WARRANTY

A. The Contractor shall provide a **Manufacturer's certified structured cable plant system with a minimum of a twenty-five (25) year Extended Product Warranty covering applications,**

parts, materials, & service warranty from the manufacturer. The contractor shall provide a three (3) year warranty for labor and installation of the cable plant system and ancillary equipment. Refer to Section 271500 for additional information and requirements.

B. Complete documentation regarding the manufacturer's warranty shall be submitted as part of the bid proposal. This shall include, but is not limited to a sample of the warranty that would be provided to the customer when the installation is complete and documentation of the support procedure for warranty issues.

C. Effect replacement or substitutions of equipment within 24 hours of first notification. Complete repairs to equipment within 72 hours. If repairs cannot be completed during this time period, or if ordering of parts is required, forward the owner, every 72 hours, documentation of progress repairs. This repair capability is mandatory. Include costs anticipated to comply with this requirement in the bid.

1.15 USE OF THE SITE

A. Use of the site shall be at the Owner's direction in matters in which the Owner deems it necessary to place restriction.

B. Access to the building wherein the work is performed shall be as directed by the Owner.

C. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the Owner.

D. All Contractor Personnel must check in with the General Contractor upon arrival and upon departure.

1.16 CONTINUITY OF SERVICES

A. Take no action that will interfere with, or interrupt, existing building services unless previous arrangements have been made with the Owner's Representative. Arrange the work to minimize shutdown time.

B. Owner's personnel will perform shutdown of operating systems. The Contractor shall give three (3) days' advance notice for systems shutdown.

C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

1.17 WORK INCLUDED

A. The work included under this specification consists of furnishing all labor, equipment, materials, supplies and performing all operations necessary to complete the installation. The Contractor will provide and install all of the required material whether specifically addressed in the Specification or not.

1.18 CONTRACTOR RESPONSIBILITIES

A. Submittals - If the Owner rejects the Contractor's submittals (Revise and Resubmit) more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

B. As-Builts – As-Built Documentation that is incomplete, deviates significantly from the requirements of the Construction Documents, or contain numerous errors will be returned without review for rework and resubmittal. If the Owner rejects the Contractor's As-Built Documentation more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

C. Punch Lists and System Acceptance – Upon inspection of Contractor's work as substantial completion or re-inspection of work to determine Contractor's clearing of punch list items, should Owner find the work to be incomplete, requiring additional trips and hours to complete final system acceptance, Contractor shall compensate Owner for all subsequent site visits in

the amount of $1,200 per man-day plus expenses plus $240 per hour in excess of eight (8) man hours at no additional cost to the Owner. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment

PART 2 - PRODUCTS

2.1 GENERAL

A. All communications material and equipment furnished shall be new and unused and free of defects. They shall be clean and free of damage or corrosion and shall be of the best quality obtainable for the purpose intended.

B. All communications materials used shall be UL listed. When such listing is not available for a piece of equipment, it will be accepted provided it is furnished in accordance with submittals and is approved by the owner.

C. Material not specifically identified within this document but which is required for the successful implementation of the intended systems(s), shall b of the same class and quality as the specified material and equipment.

D. All related Divisions and articles remain applicable to the products specified herein. Any prepetition of related specifications for emphasis only.

E. Product: New, free from defects and listed by UL when an applicable UL Standard exists. Provide product of a given type from one manufacturer.

F. Regardless of the length or completeness of the descriptive paragraph herein, provide product complying with the specified manufacturers published specifications.

G. Material not specifically identified within this document but which is required for the successful implementation of the intended system(s), shall be of the same class and quality as the specified material and equipment.

H. All cable and wiring devices provided shall be listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

2.2 APPROVED PRODUCTS

A. General

1. All cable must be suitable for the environment that it is installed in throughout the riser and horizontal distribution.

2. Verify exact quantities and lengths of the patch cords with Owner prior to purchase.

B. Intrabuilding Optical Fiber Backbone Cable (MDF-IDF)

1. Fiber optic cable, armored, OFCP, OM4 type, 12 strands, multimode 50/125 micron.

   a. CommScope

   b. Systimax

C. Interbuilding Optical Fiber Backbone Cable (Bldg – Bldg)

1. Fiber optic cable, armored, indoor/outdoor, OFCP, OM4 type, 12 or 24 strands, multimode 50/125 micron

   a. CommScope

   b. Systimax

2. Fiber optic cable, armored, indoor/outdoor, OFCP, OS2 type, 12 or 24 strands, singlemode 8.3/125 micron

   a. CommScope

   b. Systimax

D. Fiber Optic Patch Cords

1. Singlemode patch cables shall be uniboot, polarity reversible fiber with an 8.3 µm core and a 125 micron cladding.
    a. OS2 type.
    b. Made and warrantied by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in the TIA standards.
    c. Patch cords shall be in original packaging when presented to the Owner.
2. Multimode patch cables shall be uniboot, polarity reversible fiber with an 50 µm core and a 125 micron cladding.
    a. OM4 type.
    b. Made and warrantied by the manufacturer of the cabling system installed in this project and shall meet or exceed patch cord specifications as outlined in the TIA standards.
    c. Patch cords shall be in original packaging when presented to the Owner.

E. Optical Fiber Connectors

1. OS2 single-mode.
    a. The optical fiber field-installable connector shall be splice-on LC/UPC, for installation onto a 8.3/125 micron singlemode fiber.
2. OM4 multimode
    a. The optical fiber field-installable connector shall be splice-on LC/UPC, for installation onto a 50/125 micron multimode fiber.

F. Fiber Termination Shelf

1. Modular in design and used in fiber interconnection, cross-connection, and splicing applications
2. 1’-7” (19”) rack-mountable
3. 2 Rack Unit (RU) design, accommodating G2 modular components
4. 12-fiber or 24-fiber splice cassettes shall be used for superior fiber organization and protection

PART 3 - EXECUTION

3.1 BACKBONE CABLES

A. All fiber optic cables shall be furnished and installed without splicing between termination points.

B. Cables shall be dressed and terminated in accordance with the recommendations made in ANSI/TIA-568-C.0 and/or ANSI/TIA-568-C.1, manufacturer's recommendations and best industry practices.

C. Backbone cables shall be installed separately from horizontal distribution cables

D. A plastic or nylon pull cord with a minimum test rating of 90 Kg (200 lb.) shall be co-installed with all cable installed in any conduit.

E. Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits

F. Exposed cables must be OFCP rated if installed in an air return plenum.

G. Where backbone cables and distribution cables are installed in a cable tray or wireway, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.

H. Cable Support

1. Cable hooks shall be factory assembled for direct attachment to walls, hanger rods, beam flanges, purlins, strut, floor posts, etc. to meet job conditions
2. Cable hooks shall have a flat bottom and provide a minimum of 0’-1.625” cable-bearing surface.
3. Cable hooks shall have 90° radius edges to prevent damage while installing cables.
4. Cable hooks shall be designed so that the mounting hardware is recessed to prevent cable damage.
5. Cable hooks for non-corrosive areas shall be pre-galvanized steel. Where additional strength is required, cable hooks shall be spring steel with a zinc-plated finish.
6. Cable hooks for corrosive areas shall be stainless steel.
7. Cable hooks shall have a stainless-steel cable latch retainer to provide containment of cables within the hook.
8. The retainer shall be removable and reusable.

I. Leave 10' of slack on each end of copper backbone cable.

J. Backbone cables spanning more than three floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.

K. Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.

L. Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.

M. The cable's minimum bend radius and maximum pulling tension shall not be exceeded. Refer to manufacturer's requirements.

N. Copper cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.

O. Each copper cable shall be clearly labeled on the cable jacket behind the patch panel or block at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable.

P. Copper backbone cables shall be installed separately from horizontal distribution cables

3.2 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.

1. Administration Class: 2.
2. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.

B. Comply with requirements in Section 099123 "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.

C. level of administration, including optional identification requirements of this standard.

D. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

E. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and

positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

F. Cable and Wire Identification:

1. Label each cable within 12 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
    a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
    b. Label each unit and field within distribution racks and frames.
5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.

G. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Use flexible vinyl or polyester labels that flex as cables are bent.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-C.1.
2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
4. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturers for channel or link test configuration.
5. Optical Fiber Cable Tests:

a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-C.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

b. Link End-to-End Attenuation Tests:

1) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.

2) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-C.1.

3.4 FIBER TESTING REQUIREMENTS

A. All installed fiber links shall be field-tested and pass the following tests:

1. OLTS (Optical Loss Test Set) length and dual wavelength attenuation.
2. Image captures of connector end-faces.

B. OLTS (Optical Loss Test Set)

1. The length and attenuation of each installed fiber link shall be measured and documented.
2. System loss measurements requirements:
   a. 850 and 1300 nanometers for Multimode
   b. 1310 and 1550 nanometers for Singlemode
3. Reflective events (connections) shall not exceed 0.75 dB.
4. Non-reflective events (splices) shall not exceed 0.3 dB.
5. The acceptable link attenuation for Multimode horizontal fiber is based on the maximum distance of 295’-0”.
6. Optical sources shall be turned on for a minimum of 5 minutes prior to referencing.
7. Fiber links shall be measured and reported for attenuation one
8. Polarity shall be verified for duplex connector systems
9. The light source shall be referenced to the meter a minimum of twice daily (i.e., in the morning and noon).

C. End-face Image Capture

1. An image of each fiber optic connector end-face shall be taken, recorded and provided as part of the records.

D. Maximum Attenuation

1. Single Mode ISP (Inside) 1.0 dB/km at 1310 nm and 1550 nm
2. Single Mode OSP (outside) 0.5 dB/km at 1310 nm and 1550 nm
3. Multimode 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm

E. Test Cords (Jumpers)

1. Testing of the cabling shall be performed using high-quality test cards of the same fiber type and core size as the cabling under test. Use a single patch cord reference for fiber testing.
   a. OLTS test cords shall be between 3’-3” (1m) and 16’-4” (5m).
2. The test jumper, the adapters, and fiber under test shall be cleaned immediately prior to each fiber being tested.

a. Dry cleaning shall be performed.

3. Test Failure

a. Any fiber link that fails these requirements shall be diagnosed and corrected.

b. Any corrective action that must take place shall be documented and followed with a new test to prove that the corrected link meets performance requirements.

F. Acceptable Testers

1. All fiber optic cable links installed shall be tested in accordance with the field test specifications defined in ANSI/TIA-568-C standard.

2. 100% of the installed cable shall be tested and must pass the requirements of ANSI/TIA-568-B and C

3. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the Owner's representative in both hard and soft copy.

4. Only BICSI Certified Technicians shall perform all fiber optic link testing.

5. Field test equipment for Multimode fiber optic cables shall meet the requirements of ANSI/TIA-526-14A.

6. The light source shall meet the launch requirements of ANSI/TIA-455-50B.

7. Field test equipment for Single Mode fiber optic cables shall meet the requirements of ANSI/TIA-526-7.

8. All fiber optic launch cables and test adapters used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between strand tests. Test results that indicated anomalies between strands within the same sheath shall be declared a failure unless all strands within the same sheath unconditionally pass testing. The Contractor shall diagnose and repair any fiber optic cable exhibiting strand-to-strand anomalies that result in any test failure(s).

9. The Contractor shall test and certify all fiber optic cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with unapproved test equipment or tester(s) that are not within their calibration period.

10. The Contractor shall invite the Owner's representative to witness/verify field testing prior to final acceptance. The Owner's representative shall randomly select 5% of the installed links for test verification purposes. The Contractor shall re-test these links in the presence of the Architect/Engineer and the results shall be compared to the previously Contractor submitted test results. If 2% of the verification tests differ in terms of pass/fail from the previously submitted test results, testing shall be declared a failure and the Contractor shall re-test 100% of the installed links with the cost of such tests borne by the Contractor.

11. Fiber optic connector attenuation shall not exceed 0.75dB.

12. Fiber optic splice attenuation (if allowed) shall not exceed 0.3dB.

13. Multimode fiber optic cables shall be tested using the following attenuation coefficient parameters:

a. 50/125 Multi Mode 850nm < 3.5 Db/km

b. 50/125 Multi Mode 1300nm < 1.5 dB/km

14. Singlemode fiber optic cables shall be tested using the following attenuation coefficient parameters:

a. 8.3/125 Singlemode 1310nm < .35 dB/km

b. 8.3/125 Singlemode 1550nm < .25 dB/km

15. Link attenuation for all fiber optic strands shall be calculated using the ANSI/TIA-568-B Standards formula.
16. Failing links shall be diagnosed and corrected by the Contractor. Corrective actions shall be followed by a new test of the previously failing link(s). The Contractor shall promptly submit all link re-test data to the owner or their representative in both hard and soft copy.
17. Only BICSI Certified Technicians shall perform cable testing.
18. All test interfaces used for testing shall be of high quality and devoid of excessive wear or exhibit anomalies between pairs. Test results that indicated anomalies between pairs shall be declared a failure unless all pairs unconditionally pass testing. The Contractor shall diagnose and repair any cable exhibiting pair-to-pair anomalies that result in any Fail or*Pass conditions.
19. The Contractor shall test and certify the entire cable plant with approved field tester(s) that are within their calibration period. The Contractor shall be liable for all re-testing required in the event tests are performed with unapproved test equipment or tester(s) that are not within their calibration period.
20. Any Fail or *Pass result yields a Fail for the link under test. To achieve an overall Pass condition, the results for each individual test parameter must pass.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

PART 4 - PRICING FORMS

4.1 FORMAT OF CONTRACTOR'S PROPOSAL

A. Contractor shall submit with bid a line-by-line compliance statement indicating his understanding and compliance or exception to the specification requirements. The statement shall consist of a copy of the specification notated with one of the following terms. Understand and will comply, Product not compliant with specification requirement, Description of means or method of providing similar or equal feature or performance level to specification requirement.

B. In addition to all other required bid forms, Contractor shall prepare and present to Owner and Owner's representative pricing based on the requirements of this specifications and complementary drawings.

C. Pricing shall include the list of equipment and labor in tabular form including; part number, item description, unit price, number of units, extended price and totals, as indicated in the example table provided in this section. The pricing shall breakdown the material and labor in the categories as shown in these specifications.

D. Following is the format of the Price Form:

Project:
Subject:
Contractor:
Date:

Line No.	Item Description	Manufacturer Part No.	Manufacturer	Quantity	Material Unit	Material Unit Cost	Material Total Cost	Labor (hours)	Labor Cost p/hour	Labor Total Cost	Sub-Total	Total
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
6					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
7					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
8					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
9					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
10					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Documentation											
1	Submittal Documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2	Shop Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3	As-Built Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4	Close-out documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Other											
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Totals						**Material** $0.00			**Labor** $0.00		**Project** $0.00

END OF SECTION

SECTION 271500

COMMUNICATION HORIZONTAL CABLE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Divisions 1, 26 and 27 Specification Sections, apply to this Section.

B. This document describes the products and execution requirements relating to Communications Backbone Cabling.

C. Product specifications, general design considerations, and installation guidelines are provided in this document. The successful vendor shall meet or exceed all requirements described in this document and on the drawings. The contractor is responsible for the complete Bill of Materials (BOM), installation of the solution, and warranty.

1.2 REQUIREMENTS

A. **The Contractor shall thoroughly examine all documents, drawings and specifications for any conflicts between these documents. In the case where the specifications are not clear or do not agree with the corresponding drawings; it is the responsibility of the Contractor to submit a request-for-information (RFI) specifying the discrepancy stating the locations on the specifications and the drawings. Any conflicts of information shall be resolved before bidding on the project and/or the purchasing of any equipment, materials and/or installation by the Contractor**.

B. The work and materials included in these specifications and corresponding drawings shall conform in every detail to the rules and requirements of the National Fire Protection Agency, the National Electrical Code and local codes and standards by the AHJ (Contractor shall not supersede specifications and standards from the latest NFPA and NEC publications). In the event of any conflicts between documents referenced herein and the contents of this specification or drawings, the Contractor shall notify in writing to Consultant of any such occurrences before bidding the project and/or the purchasing of any equipment, materials and/or installation by the Contractor.

C. The Contractor shall furnish and install a complete functional and operational system as intended in the specifications and drawings. Quantities are responsibility of the Contractor, specifications and drawings are to be used for intent and reference only. The Contractor shall include all costs associated with the provision of a fully operational, tested, certified and warranted system in the bid amount

1.3 SECTION INCLUDES

A. This Section includes the following:

1. This section will include all the Horizontal Cabling specifications for the installation of a Structured Cabling System (SCS).

1.4 RELATED SECTIONS

A. Section 01 3300 - Submittal Procedures

B. Section 27 0500 - Common Work Results for Communications

C. Section 27 1100 - Communications Equipment Room Fittings

D. Section 27 1300 - Communications Backbone Cabling

1.5 REFERENCES

A. This Technical Specification and Associated Drawings

B. American National Standards Institute / Telecommunications Industry Association (ANSI/TIA)

1. ANSI/TIA-568-C.0 "Generic Telecommunications Cabling for Customer Premises".
2. ANSI/TIA-568-C.1 "Commercial Building Telecommunications Cabling Standard".
3. ANSI/TIA-568-C.2 "Balanced Twisted-Pair Telecommunication Cabling and Components Standard".
4. ANSI/TIA-568-C.3 "Optical Fiber Cabling Components Standard".
5. ANSI/TIA-568-C.4 "Broadband Coaxial Cabling and Components Standard".
6. ANSI/TIA-569-C "Telecommunications Pathways and Spaces".
7. ANSI/TIA-606-B "Administration Standard for Commercial Telecommunications Infrastructure".
8. ANSI/TIA-607-B "Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications".
9. ANSI/TIA-758-B "Customer-Owned Outside Plant Telecommunications Infrastructure Standard".
10. ANSI/TIA-862-A “Building Automation Systems Cabling Standard”.

C. International Standards Organization/International Electromechanical Commission (ISO/IEC)

1. ISO/IEC 11801:2002, Information technology -- Generic cabling for customer premises.

D. Underwriters Laboratories (UL)

1. UL Cable Certification and Follow Up Program.
2. UL Testing Bulletin.

E. National Electrical Manufacturers Association (NEMA).

F. American Society for Testing Materials (ASTM).

G. National Electric Code (NEC).

H. Institute of Electrical and Electronic Engineers (IEEE).

1.6 DEFINITIONS

A. AHJ: Authority Having Jurisdiction.

B. ANSI: American National Standards Institute

C. BICSI: Building Industry Consulting Service International.

D. CFCI: Contractor Furnished Contractor Installed

E. CFOI: Contractor Furnished Owner Installed

F. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.

G. EMI: Electromagnetic interference.

H. LAN: Local Area Network.

I. MDF: Maid Distribution Frame, also known as ER.

J. MER: Main Equipment Room

K. NTRL: Nationally Recognized Testing Laboratory

L. OAR: Owner's Authorized Representative

M. OFOI: Owner Furnished Owner Installed

N. OFCI: Owner Furnished Contractor Installed

O. IDC: Insulation displacement connector.

P. IDF: Intermediate Distribution Frame, also known as TR.

Q. LAN: Local area network.

R. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.

S. RCDD: Registered Communications Distribution Designer.

T. SCS: Structured Cabling System

U. TIA/EIA: Telecommunications Industry Association / Electronics Industries Alliance

V. TR: Telecommunications Room

W. UTP: Unshielded twisted pair.

1.7 RESPONSIBILITY AND RELATED WORK

A. The Contractor's responsibility includes, but is not limited to, provision, installation and integration of:

1. Category 6 and 6A UTP horizontal cabling.
2. Category 6 and 6A Patch panels
3. Managed Category 6 and 6A patch cords

B. The Contractor Shall:

1. Provide labor, tools and transportation required to support the installation in accordance with the established time line and standards.
2. Deliver submittals, shop drawings, and hardware and configurations as specified herein.
3. Obtain permits, licenses, or other municipal requirements and pay any fees required for the execution of this work.
4. Coordinate with other trades to assure completeness of telecommunications cabling systems, equipment rack assemblies, Telecom AC power, Telecom Grounding and Bonding, Plywood wall liner in TR locations and housekeeping pads where required.
5. Execute all work in accordance to the National Electric Code, The National Electric Safety Code, and all applicable state codes, ordinances and regulations.
6. Supply accessories and minor equipment items regularly required for a complete system, even if not specifically mentioned in these specifications or on the associated "T" series drawings, without claim of additional payment.
7. Provide instruction to owner-designated personnel on the system documentation and the proper methods of use and maintenance of the system and related components.

C. Where Conflict exists between contract documents, the more stringent requirement shall prevail. Where conflict exists between contract documents and a Code, the Code shall prevail.

D. Discrepancies in part numbers or quantities shall be reported to The Owner prior to bid opening for clarification as necessary. Failing to provide such notification requires the Contractor to supply items and quantities according to the intent of the specifications and associated drawings without claim of additional payment.

E. Notwithstanding any detailed information in the contract documents, it is the responsibility of the contractor to supply systems in full working order.

1.8 QUALITY ASSURANCE

A. The selected Contractor must be a Certified Integrator/Installer authorized to provide the approved network equipment and integration to the Owner, covering all network hardware and software products comprising this installation site.

B. Contractor's Qualifications: A Firm experienced in the provision of systems similar in complexity to those required for this project.

C. Manufacturer's Qualifications: No less than 5 years continuous experience in the production of specified types of product, with production capabilities per applicable standards.

D. All equipment shall be installed in a neat and workman-like manner. All methods of construction that are not specifically described or indicated in the contract documents shall be subject to the control and approval of the Owner or Owner Representative. Equipment and materials shall be of the quality and manufacturer indicated. The equipment specified is based upon the acceptable manufacturers listed. Where "approved equal" is stated, equipment shall be equivalent in every way to that of the equipment specified and subject toapproval.

E. Installer Qualifications: Cabling Installer must have personnel certified by BICSI onstaff.

1. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD, employed or engaged by the Contractor.

2. Installation Supervision: Installation shall be under the direct supervision of a Registered Technician, who shall be present at all times when Work of this Section is performed at Project site.

3. Field Inspector: Currently registered by BICSI as an RCDD to perform the on-site inspection.

1.9 WORK

A. The Work shall be performed in compliance with the applicable manufacturer's installation instructions, Standards, and certifications listed herein, the Contract Documents, and governing codes and regulations of the authorities having jurisdiction.

B. The drawing and specification requirements govern where they exceed Code and Regulation requirements.

C. Where requirements between governing Codes and Regulations vary, the more restrictive provision applies.

D. Coordinate exact location and installation of equipment, power, grounding, and raceway requirements with the Architect.

1.10 SUBMITTALS

A. The Preconstruction Submittal is required to verify the Contractor will obtain the specified product, understands the processes and procedures, and understands the design and installation requirements in order to provide a complete and working system.

B. The Contractor is to provide the quantity of submittals (sets) as specified in Division 1, General Requirements, or the minimal requirements as follows:

1. Four (4) copies of documents such as installation schedules, valid copies of technician certifications, material lists, specification sheets, and small size shop drawings as required. Two (2) copies of a CD containing all the same information as these binders shall be submitted in Adobe® Portable Document Format (PDF).

C. Assurance/Quality Control Submittals:

1. Documentation of current certification for BICSI RCDD to manage all installations and testing procedures.

2. Documentation of current certification for BICSI certified installers and for installers certified by the manufacturer of the submitted cabling system. The Contractor shall have certified personnel on site during all work.

D. Record drawings shall be kept on site. Record drawings shall include marked up floor plans showing outlet locations, type of cable, and cable label identification.

1.11 CONTRACTOR CLOSEOUT SUBMITTALS

A. These submittals must be submitted and approved prior to final billing and payment. They should be submitted within thirty days of completion of the project.

B. Certification of level of performance as evidenced by comprehensive test results for fiber riser, copper riser and UTP horizontal cabling as specified in this document. Test results should be provided as hard copies and on electronic media.

C. Record drawings with as-built information and finalized versions of the shop drawings. The Record drawings shall identify the port identification of each outlet at all the termination locations. These submittals shall be on the base plan as provided by the Architect or Owner. These submittals shall be three (3) copies in reproducible print form and one (1) in electronic format (AutoCAD).

1. Plan drawings indicating locations and identification of work area outlets.

2. Telecommunications rooms (MER & TR), horizontal cable runs.

D. Manufacturer's system certification supporting the product warranty. Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form along with any certification test results. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty all proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve the Contractor of these obligations.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Ship product in its original container, to prevent damage or entrance of foreign matter.

B. Handling and shipping in accordance with manufacturer's recommendation.

C. Provide protective covering during construction, to prevent damage or entrance of foreign matter.

D. Replace at no expense to Owner, product damaged during storage, handling or the course of construction.

1.13 PROJECT CONDITIONS

A. Verify conditions of the job site applicable to this work. Notify Architect, in writing, of discrepancies, conflicts, or omissions promptly upon discovery.

B. The Drawings diagrammatically show cabling and arrangements of equipment fitting the space available without interference. If conditions exist which make it impossible to install work as shown, recommend solutions and/or submit drawings to the Architect for approval, showing how the work may be installed.

1.14 WARRANTY

A. The Contractor shall provide a **Manufacturer's certified structured cable plant system with a minimum of a twenty-five (25) year Extended Product Warranty covering applications, parts, materials, & service warranty from the manufacturer**. The contractor

shall provide a three (3) year warranty for labor and installation of the cable plant system and ancillary equipment.

B. Complete documentation regarding the manufacturer's warranty shall be submitted as part of the bid proposal. This shall include, but is not limited to a sample of the warranty that would be provided to the customer when the installation is complete and documentation of the support procedure for warranty issues

C. Effect replacement or substitutions of equipment within 24 hours of first notification. Complete repairs to equipment within 72 hours. If repairs cannot be completed during this time period, or if ordering of parts is required, forward the owner, every 72 hours, documentation of progress repairs. This repair capability is mandatory. Include costs anticipated to comply with this requirement in the bid.

1.15 USE OF THE SITE

A. Use of the site shall be at the Owner's direction in matters in which the Owner deems it necessary to place restriction.

B. Access to building wherein the work is performed shall be as directed by the Owner.

C. Proceed with the work without interfering with ordinary use of streets, aisles, passages, exits, and operations of the Owner.

D. All Contractor Personnel must check in with the General Contractor upon arrival and upon departure.

1.16 CONTINUITY OF SERVICES

A. Take no action that will interfere with, or interrupt, existing building services unless previous arrangements have been made with the Owner's Representative. Arrange the work to minimize shutdown time.

B. Owner's personnel will perform shutdown of operating systems. The Contractor shall give three (3) days' advance notice for systems shutdown.

C. Should services be inadvertently interrupted, immediately furnish labor, including overtime, material, and equipment necessary for prompt restoration of interrupted service.

1.17 CONTRACTOR RESPONSIBILITIES

A. Submittals - If the Owner rejects the Contractor's submittals (Revise and Resubmit) more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

B. As-Builts – As-Built Documentation that is incomplete, deviates significantly from the requirements of the Construction Documents, or contain numerous errors will be returned without review for rework and resubmittal. If the Owner rejects the Contractor's As-Built Documentation more than two (2) times, the Contractor shall compensate Owner for all subsequent reviews, whether partial or comprehensive. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for payment.

C. Punch Lists and System Acceptance – Upon inspection of Contractor's work as substantial completion or re-inspection of work to determine Contractor's clearing of punch list items, should Owner find the work to be incomplete, requiring additional trips and hours to complete final system acceptance, Contractor shall compensate Owner for all subsequent site visits in the amount of $1,200 per man-day plus expenses plus $240 per hour in excess of eight (8) man hours at no additional cost to the Owner. The amount of such compensation will be incorporated by Change Order and withheld from the Contractor's Application for Payment.

PART 2 – PRODUCTS

2.1 GENERAL

A. All communications material and equipment furnished shall be new and unused and free of defects. They shall be clean and free of damage or corrosion and shall be of the best quality obtainable for the purpose intended.

B. All communications materials used shall be UL listed. When such listing is not available for a piece of equipment, it will be accepted provided it is furnished in accordance with submittals and is approved by the owner.

C. Material not specifically identified within this document but which is required for the successful implementation of the intended systems(s), shall be of the same class and quality as the specified material and equipment.

D. All related Divisions and articles remain applicable to the products specified herein. Any prepetition of related specifications for emphasis only.

E. Product: New, free from defects and listed by UL when an applicable UL Standard exists. Provide product of a given type from one manufacturer.

F. Regardless of the length or completeness of the descriptive paragraph herein, provide product complying with the specified manufacturers published specifications.

G. Material not specifically identified within this document but which is required for the successful implementation of the intended system(s), shall be of the same class and quality as the specified material and equipment.

H. All cable and wiring devices provided shall be listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.

2.2 APPROVED MANUFACTURERS

A. Model numbers and manufacturers included in this specification are listed to establish a standard of product quality. Approved manufacturers are:

1. CommScope
2. Systimax
3. Oberon (wireless access point enclosures)

B. Material not specifically identified within this document but which is required for the successful implementation of the intended system(s), shall be of the same class and quality as the specified material and equipment.

2.3 UTP DISTRIBUTION SYSTEM

A. All Wireless Access Cables shall be Category 6A UTP cable.

B. All CCTV/Security Surveillance cabling for cameras shall be Category 6 UTP cable.

C. All Voice and Data cables shall be Category 6 UTP cable.

D. Provide one (1) Category 6 cable at all Intercom locations.

E. Horizontal UTP Distribution Cable:

1. Category 6, 4-pair UTP cable
    a. CommScope plenum-rated
    b. Systimax plenum-rated
2. Category 6A, 4-pair UTP cable
    a. CommScope plenum-rated

b. Systimax plenum-rated

3. Jacket color
   a. Voice & Data: Blue
   b. Wireless Access Points: Green
   c. CCTV/Security Surveillance: White
   d. Intercom: Slate

F. UTP, 8p8c Connector Outlets:
   1. Typical data outlet to contain Category 6 or Category 6A RJ-45 modules located as directed with the color scheme indicated in the paragraphs above.
      a. Outlet category shall match cable category
   2. (8)-pin modular outlets capable of 568A or 568B wiring configuration.
   3. Approved manufacturer
      a. CommScope
      b. Systimax

G. Category 6 and 6A UTP Copper Data Patch Panels
   1. Provide a quantity of cables per outlet location as indicated on T-Series drawings.
   2. Provide patch cables for each patch panel port, Voice, Data, CCTV/Security, Intercom, or Wireless
   3. Provide 3’ patch cables for bidding purposes, final lengths are to be coordinated with owner prior to purchase.
   4. Typical patch cord color to match the color scheme indicated in the paragraphs above.
      a. Patch cord category shall match cable category
   5. Approved manufacturers
      a. CommScope
      b. Systimax

H. Wall Outlets (Jacks and Plates)
   1. Wall Plate Type: Single-gang, 1-port, 2-port, or 4-port as required.
   2. Color: Match electrical outlet color

I. Patch Cables
   1. Provide patch cables for each patch panel port, Voice, Data, or Wireless
   2. Patch cable performance shall match or exceed the performance of its assigned port circuit
   3. Provide 3’ patch cables for bidding purposes, final lengths are to be coordinated with owner prior to purchase

2.4 WIRELESS ACCESS POINT (WAP) ENCLOSURES

A. Wireless Access Point (WAP) Enclosures
   1. Oberon
   2. Suspended, Cloud, Pedestal, or Canopy ceiling styles as required.
   3. Coordinate with Owner for brand purchased by Owner for aesthetic concealment

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify conduit, raceways, boxes, fittings and bodies are properly installed as described in Division 26.

B. Verify grounding and bonding following Section 270526

1. All protected telecommunication terminations require bonding, grounding and a busbar.

C. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 PREPARATION

A. Maintain temperature of between 65 degrees Fahrenheit and 78 degrees Fahrenheit and between 30 and 50 percent humidity in areas of voice and data system work.

3.3 INSTALLATION

A. Install work following drawings, manufacturer's instructions and approved submittal data. The number of cables per run, outlet configuration, and other pertinent data will be included on the drawings.

B. All installation shall be done in conformance with ANSI/TIA 568C and BICSI standards The Contractor shall ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. Failure to follow the appropriate guidelines will require the Contractor to provide in a timely fashion the additional material and labor necessary to properly rectify the situation. This shall also apply to any and all damages sustained to the cables by the Contractor during the implementation.

C. The SCS installation should meet all applicable national and local codes pertaining to low voltage cable system installations.

D. The Contractor will adhere to the installation schedule of the General Contractor and should attend all construction meetings scheduled by the General Contractor.

E. The connection to voice systems shall be performed by the vendors installing and/or maintaining those systems. Coordinate all cross-connects with the owner prior to work.

F. The Contractor shall provide service loops (slack) for cable terminating in the main equipment room or the telecommunications closets. A 6-foot service loop will be provided above the access ceiling or cable trays unless specified otherwise. This will allow for future changes or expansion without installing new cables.

G. The installation will include coordination, testing, and problem resolution with the system vendors.

H. The Owner will require open-ceiling inspection of cable plant prior to ceiling tile installation.

3.4 COPPER CABLE

A. Test all cable prior to installation. Upon failure to perform testing, the installer shall accept the cable as good and assume all liability for the replacement of the cable should it be found defective at a later date.

B. All conformance standards must be certified for multi-pair and individual cable runs. Jacketing and insulation must satisfy the Underwriter's Laboratories (UL) listed fire rated cable insulation requirements in plenum areas

C. Any pulling compound or lubricant used in cable installation must not deteriorate the conductor or the insulation. Provide 3M type WLC or and approved equal.

D. Copper cable runs shall not exceed 295 feet. All runs shall be continuous. No splicing is

allowed.

E. The Contractor shall install copper cable with a minimum bend radius of six times the diameter of the cable.

F. Install 10 feet of spare copper cable (service loop) in each closet prior to termination. Provide Velcro type tie wrap for cable support and organization.

G. Install minimum 12 inches of spare copper cable in ceiling plenum prior to dropping down wall to outlet. Support slack to structure with J-Hook and Velcro ties. If there is no plenum, loop shall be located in box prior to termination. Provide box of sufficient size to accommodate spare cable, termination equipment if applicable and maintain bending radius.

J. The maximum pulling tension for 4-pair, 24 AWG, horizontal UTP cables shall not exceed 25 lbf. The Contractor shall provide a tension meter during the pulling of all cables. If the meter shows that the tensions has exceeded 25 lbf, the Contractor shall discard the cable and pull new cable.

3.5 DEVICES AND PATCH PANELS

A. The amount of untwisting in a pair when terminating to connecting hardware shall be no greater than 0.5 inches for Category 6 cables and above.

B. Cables should be connected with connecting hardware of the same category or higher. The connecting hardware used for copper cabling shall be installed to provide minimal signal impairment by preserving wire pair twists as closely as possible to the point of termination.

C. If applicable, coordinate wall plate color with General Contractor. Color shall match electrical receptacle color.

D. If applicable, provide stainless steel faceplate when mounted in mechanical spaces, electrical closets, or unfinished areas.

E. The connecting hardware shall be installed to provide a well-organized installation with cable management and termination practices.

F. Strip back only as much jacket as necessary to terminate the cable.

G. Avoid kinking or crimping the cable wire.

H. Using a proper punch down tool, punch each termination down tight, right up to the jacket. Keep the jacket as close to the connector sleeve as possible.

I. Maintain straight through polarity, do not split pairs.

J. Install devices only in electrical boxes which are clean and free from excess building materials, debris, etc.

K. Gang devices installed at one location together under one faceplate.

L. Align the tops of all group-mounted devices install plumb and aligned in the plane of the wall.

M. Install devices in vertical position unless otherwise noted.

N. Mounting Heights:

1. Refer to contract documents.

3.6 FIRESTOPPING

A. Comply with requirements in Section 07 8413 "Penetration Firestopping."

B. Comply with TIA-569-B, Annex A, "Firestopping."

C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.7 GROUNDING

A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

B. Comply with TIA-607-C.

1. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

C. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.8 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A.

B. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration, including optional identification requirements of this standard.

C. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.

D. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by Owner.

E. Cable and Wire Identification:

1. Label each cable within 12 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.

2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.

3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).

4. Label each terminal strip and screw terminal in each cabinet, rack, or panel.

a. Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.

b. Label each unit and field within distribution racks and frames.

5. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.

F. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.

1. Use flexible vinyl or polyester labels that flex as cables are bent.

3.9 CABLE LABELING SCHEMES

A. General

1. The labeling scheme is designed to identify the type of cable (Data, Wireless, , Intrusion Detection, Access Control/Data Gathering Panel and Energy Management), which wiring closet the cable originates in and is unique for the site.
2. All cables shall be provided with a label 12" from the end of each cable in the ER and/or TR and the classroom, office, large area, splice point, etc.
3. As room numbers sometimes change, the room number is not used in the scheme.
4. The method for labeling each type of cable is given below with an example.
5. Each cable must be labeled uniquely.
    a. Contractor shall, as part of submittal processes, provide example documentation of labeling for review and approval.
    b. The label shall be affixed to the faceplate above the drop it represents.
    c. The location of the label is important since, in the case of voice and data, multiple drops of these two cables will be housed in the same faceplate.
    d. Each drop shall be clearly identified and labeled on the as-built drawings to be given to Owner before the cabling is accepted.
    e. Example: (N1)(N2)(A1)(N3)
        1) N1=Telecommunications Room Number, if applicable
        2) N2=Relay Rack Number, if applicable
        3) A1=Patch Panel Designation (lettered)
        4) N3=Patch Panel Port Number (01-24 or 01-48)

B. UTP Performance Tests:
1. Test for each outlet. Perform the following tests according to TIA/EIA-568-C.1 and TIA/EIA-568-C.2:
    a. Wire map.
    b. Length (physical vs. electrical, and length requirements).
    c. Insertion loss.
    d. Near-end crosstalk (NEXT) loss.
    e. Power sum near-end crosstalk (PSNEXT) loss.
    f. Equal-level far-end crosstalk (ELFEXT).
    g. Power sum equal-level far-end crosstalk (PSELFEXT).
    h. Return loss.
    i. Propagation delay.
    j. Delay skew.
2. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-C.1 and TIA/EIA-568-C.3.
3. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
    a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.

b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.

C. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.

D. End-to-end cabling will be considered defective if it does not pass tests and inspections.

3.10 CERTIFICATION AND WARRANTY

A. Upon completion of testing, the manufacturer or his representative shall issue to the Owner a letter of Certification attesting to the fact he has tested and adjusted the system, that all components are properly installed and free of defects and that the system is installed in compliance with this specification and manufacturer requirements.

B. An official Registered Document and a registration number from the manufacturer shall be provided to Owner.

C. The Contractor shall provide a minimum one-year warranty on all components, outside of the cable plant, to begin upon system acceptance of the site by Owner.

D. The contractor shall list the length of any warranties over one-year and all components associated with the warranty.

E. Owner expects the warranty coverage will be no less than the services provided in a full maintenance program at no additional cost to Owner. This includes parts, labor, and on-site maintenance with manufacturer-certified personnel.

3.11 ACCEPTANCE

A. All systems must be installed and functional, test results, documentation, drawings, and warranty information provided before any site may be accepted.

B. Owner will test and inspect a 5% random sample of data drops. Any failure will constitute a complete re-test of the entire project by the Contractor.

C. Payment may be requested upon receipt of documentation and final acceptance by the Owner.

D. The Contractor shall provide the following to the Owner upon final acceptance and completion of the cable plant installation:

1. One Original Reproducible Drawing indicating the “as-built” cable plant denoting cable placements, routing, pathways, outlet labeling and equipment room details. Drawings are to be provided in AutoCAD electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by Owner.
2. One set of Power Meter and Light Source Fiber Optic Tests in accordance with this specification in electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by Owner
3. One set of Category 6 and 6A Test results for each cable drop in accordance with this specification in electronic and hardcopy. Electronic documentation shall be provided by uploading to the project-specific website, thumb drive, or other electronic means as directed by Owner.
4. One original Manufacturer Certificate of Warranty for the Structured Cable System.

PART 4 - PRICING FORMS

4.1 FORMAT OF CONTRACTOR'S PROPOSAL

A. Contractor shall submit with bid a line-by-line compliance statement indicating his understanding and compliance or exception to the specification requirements. The statement shall consist of a copy of the specification notated with one of the following terms. Understand and will comply, Product not compliant with specification requirement, Description of means or method of providing similar or equal feature or performance level to specification requirement.

B. In addition to all other required bid forms, Contractor shall prepare and present to Owner and Owner's representative pricing based on the requirements of this specifications and complementary drawings.

C. Pricing shall include the list of equipment and labor in tabular form including; part number, item description, unit price, number of units, extended price and totals, as indicated in the example table provided in this section. The pricing shall breakdown the material and labor in the categories as shown in these specifications.

D. Following is the format of the Price Form:

Project:
Subject:
Contractor:
Date:

Line No.	Item Description	Manufacturer Part No.	Manufacturer	Quantity	Material Unit	Material Unit Cost	Material Total Cost	Labor (hours)	Labor Cost p/hour	Labor Total Cost	Sub-Total	Total
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
6					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
7					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
8					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
9					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
10					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Documentation											
1	Submittal Documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2	Shop Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3	As-Built Drawings				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4	Close-out documents				ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
	Other											
1					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
2					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
3					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
4					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
5					ea.	$0.00	$0.00		$0.00	$0.00	$0.00	
							Material			**Labor**		**Project**
	Totals						**$0.00**			**$0.00**		**$0.00**

END OF SECTION 271500