

SECTION 270500 - VOICE AND DATA COMMUNICATION

PART 1 - GENERAL

1.1 SUMMARY

- A. SECTION DESCRIBES THE PRODUCTS AND EXECUTION REQUIREMENTS RELATING TO FURNISHINGS AND INSTALLATION OF HORIZONTAL CABLING, COPPER AND FIBER BACKBONES ALONG WITH RELATED SUB-SYSTEMS AS PART OF A STRUCTURED CABLING SYSTEM ARE COVERED UNDER THIS DOCUMENT.
B. PRODUCT SPECIFICATIONS, GENERAL DESIGN CONSIDERATIONS, AND INSTALLATION GUIDELINES ARE PROVIDED IN THIS DOCUMENT. QUANTITIES FOR ALL STRUCTURED CABLING PRODUCTS SHALL BE PROVIDED AS REQUIRED TO COMPLETE THE HORIZONTAL CABLING FOR ALL WORK STATIONS AS SHOWN ON FLOOR PLANS.
C. THIS SECTION DESCRIBES THE PRODUCTS AND EXECUTION REQUIREMENTS RELATING TO FURNISHING AND INSTALLATION OF TELECOMMUNICATIONS CABLING AND TERMINATION COMPONENTS AND WORK ALSO INCLUDES REMOVAL AND RECYCLING OF UNUSED, UNDOCUMENTED AND OTHERWISE "ABANDONED" CABLES AS IDENTIFIED IN PART 3 OF THIS SECTION UNDER "SALVAGE MATERIALS".
D. THE SAME MANUFACTURER'S PRODUCT SHALL BE UTILIZED THROUGHOUT THE ENTIRE PROJECT FOR ALL COPPER AND FIBER OPTIC STRUCTURED CABLING.
E. SUBSTITUTIONS: NO SUBSTITUTED PRODUCTS SHALL BE INSTALLED EXCEPT WITH WRITTEN APPROVAL BY OWNER.

1.2 SYSTEM DESCRIPTION

A. GENERAL:

- 1. FURNISH ALL LABOR, MATERIALS, TOOLS, EQUIPMENT AND SERVICES FOR THE INSTALLATION IN ACCORDANCE WITH GENERAL PROVISIONS OF SPECIFICATIONS AND THE CONTRACT DRAWINGS.
2. COMPLETELY COORDINATE WITH WORK OF ALL OTHER TRADES.
3. PROVIDE ALL SUPPLEMENTARY OR MISCELLANEOUS ITEMS, APPURTENANCES AND DEVICES INCIDENTAL TO OR NECESSARY FOR A SOUND, SECURE AND COMPLETE INSTALLATION, WHETHER OR NOT SPECIFICALLY INDICATED IN THE CONTRACT DOCUMENTS.
4. PROVIDE ALL FLOOR PENETRATIONS, FLOOR SLEEVES, CONDUIT RACEWAYS, WALL PENETRATIONS, ETC. NOT SHOWN ON THE ELECTRICAL PLANS BUT NEEDED FOR THE ROUTING OF CABLING PROVIDED HEREIN.
5. PROVIDE LABOR FOR TESTING HORIZONTAL AND BACKBONE CABLING.
6. PROVIDE RE-ENTERABLE FIRE STOPPING.
7. PROVIDE TELECOMMUNICATIONS BONDING AND GROUNDING SYSTEM.

B. PROVIDE COMPLETE INSTALLATION FOR STRUCTURED CABLING SYSTEM AND PHYSICAL SUPPORT SYSTEM INCLUDING BUT NOT LIMITED TO:

- 1. BACKBONE PATHWAY: CONFORM TO EIA/TIA-569-B USING CONDUIT AS INDICATED.
2. HORIZONTAL PATHWAY: CONFORM TO EIA/TIA-569-B USING CONDUIT AS INDICATED.
3. PREMISE WIRING: BY CONTRACTOR, COMPLETE FROM FACILITY ENTRANCE TO EACH OUTLET USING WIRING, CABLE, EQUIPMENT, AND DEVICES AS SPECIFIED OR NOT SPECIFICALLY MENTIONED OR SHOWN, WHICH MAY BE NECESSARY TO COMPLETE OR PERFECT ALL PARTS OF THE INSTALLATION.
4. CATEGORY 6 UTP HORIZONTAL CABLES.
5. SINGLE-MODE AND MULTI-MODE OPTICAL FIBER BACKBONE CABLES.
6. WORK AREA TELECOMMUNICATION OUTLETS.
7. WALL MOUNTED OUTLETS.
8. EQUIPMENT MOUNTING RACKS AND RACK ENCLOSURES.
9. CATEGORY 6 SHIELDED MODULAR AND DISCRETE PATCH PANELS.
10. OPTICAL FIBER ENCLOSURES.
11. OPTICAL FIBER CONNECTORS.
12. CATEGORY 6 SHIELDED PATCH AND EQUIPMENT CORDS
13. OPTICAL FIBER PATCH CORDS.
14. WIRE MANAGEMENT.
15. FIELD TESTING.
16. CONDUIT FLOOR SLEEVES, CONDUIT AND SUPPORTS REQUIRED FOR INSTALLATION OF ALL CABLING.
17. RE-ENTERABLE FIRE STOPPING.

1.3 RELATED SECTIONS

- A. APPLICABLE PROVISIONS OF DIVISION 1 GOVERN WORK UNDER THIS SECTION.
B. DIVISION 26 SECTION 'COMMON WORK RESULTS FOR ELECTRICAL'
C. DIVISION 26 SECTION 'GROUNDING AND BONDING'
D. DIVISION 26 SECTION 'RACEWAY AND BOXES'
E. DIVISION 26 SECTION 'WIRING DEVICES'
F. SECTION 281300 ACCESS CONTROL
G. SECTION 282300 VIDEO SURVEILLANCE

1.4 REFERENCES

- A. DESIGN, CONSTRUCT, TEST AND INSTALL TELECOMMUNICATIONS CABLING NETWORKS PER MANUFACTURER'S REQUIREMENTS AND IN ACCORDANCE STATE CODES, LOCAL CODES, AND REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION (A.H.). DEMONSTRATE A THOROUGH KNOWLEDGE AND UNDERSTANDING OF ALL CURRENT INDUSTRY STANDARDS AND INSTALLATION MANUALS THAT RELATE PRINCIPALLY TO THE FOLLOWING STANDARDS:
1. NFPA 70 --- NATIONAL ELECTRICAL CODE (NEC)
2. NFPA 101 --- LIFE SAFETY CODE
3. ANSI/NECA/IBCS 568-2006 --- STANDARD FOR INSTALLING COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING
4. ANSI/TIA STANDARDS:

a. ANSI/TIA-568-C.0 --- GENERIC TELECOMMUNICATIONS CABLING FOR CUSTOMER PREMISES

b. ANSI/TIA-568-C.1 --- COMMERCIAL BUILDING TELECOMMUNICATIONS CABLING STANDARD

c. ANSI/TIA-568-C.2 --- BALANCED TWISTED-PAIR TELECOMMUNICATIONS CABLING AND COMPONENTS STANDARD

d. ANSI/TIA-568-C.3 --- OPTICAL FIBER CABLING COMPONENTS STANDARD

e. TIA-569-B --- COMMERCIAL BUILDING STANDARD FOR TELECOMMUNICATIONS PATHWAYS AND SPACES

f. ANSI-J-STD-607-B --- COMMERCIAL BUILDING GROUNDING (EARTHING) AND BONDING REQUIREMENTS FOR TELECOMMUNICATIONS

g. ANSI/TIA-758-A --- CUSTOMER-OWNED OUTSIDE PLANT TELECOMMUNICATIONS INFRASTRUCTURE STANDARD

h. ANSI/TIA-606-A --- ADMINISTRATIVE STANDARD FOR COMMERCIAL TELECOMMUNICATIONS INFRASTRUCTURE

i. TIA-1152 --- REQUIREMENTS FOR FIELD TEST INSTRUMENTS AND MEASUREMENTS FOR BALANCED TWISTED-PAIR CABLING

j. NECA/FOA-301-2009 --- STANDARD FOR INSTALLING AND TESTING FIBER OPTICS

5. INSTALL CABLING IN ACCORDANCE WITH THE MOST RECENT EDITION OF BICSI PUBLICATIONS:

- a. BICSI --- TELECOMMUNICATIONS DISTRIBUTION METHODS MANUAL (TDMM)
b. BICSI --- INFORMATION TECHNOLOGY SYSTEMS INSTALLATION METHODS MANUAL (ITSMIM)
c. BICSI --- NETWORK DESIGN REFERENCE DESIGN MANUAL (NDRM)
d. BICSI --- OUTSIDE PLANT DESIGN REFERENCE MANUAL (OSPDRM)
e. BICSI --- WIRELESS DESIGN REFERENCE MANUAL (WDRM)
f. ANSI/BICSI 005-2013 --- ELECTRONIC SAFETY AND SECURITY (ESS) SYSTEM DESIGN AND IMPLEMENTATION BEST PRACTICES
g. BICSI --- ELECTRONIC SAFETY AND SECURITY REFERENCE MANUAL (ESSDRM)
h. INFOCOMM/BICSI --- AUDIO VISUAL DESIGN REFERENCE MANUAL (AVDRM)
i. NECA/BICSI 607-2011 --- STANDARD FOR TELECOMMUNICATIONS BONDING AND GROUNDING PLANNING AND INSTALLATION METHODS FOR COMMERCIAL BUILDINGS

1.5 SUBMITTALS

- A. SEE DIVISION 1 SECTION 'SUBMITTAL PROCEDURES' FOR SUBMITTING PRODUCT DATA.
B. PRODUCT DATA: PROVIDE THE MOST CURRENT CATALOG DATA FOR ALL PRODUCTS SPECIFICALLY SHOWN ON DRAWINGS, THESE SPECIFICATIONS AND CONTRACT DOCUMENTS.
C. SHOP DRAWINGS: THE CONTRACTOR SHALL SUBMIT COMPLETE INFORMATION (SHOP DRAWINGS AND EQUIPMENT SUBMITTALS) ON PROPOSED ITEMS IN THIS DIVISION OF THE SPECIFICATIONS TO THE ENGINEER AND/OR OWNER FOR REVIEW. SUCH SUBMITTALS SHALL INDICATE WHERE THE PROPOSED EQUIPMENT OR MATERIAL WILL BE INSTALLED AND SHALL INCLUDE SUFFICIENT MANUFACTURER'S INFORMATION TO DETERMINE THAT THE MATERIAL IS IN ACCORDANCE WITH THESE SPECIFICATIONS.
D. FIELD QUALITY-CONTROL TEST REPORTS.
E. WARRANTIES: THE CONTRACTOR SHALL WARRANTY THE EQUIPMENT AND THE INSTALLATION THEREOF FROM DEFECT FOR A PERIOD OF TWENTY (20) YEARS AFTER FINAL ACCEPTANCE OF THE BUILDING (UNLESS NOTED OTHERWISE FOR A SPECIFIC ITEM OF EQUIPMENT OR INDICATED OTHERWISE IN THE GENERAL OR SUPPLEMENTAL CONDITIONS)

1.6 PROJECT RECORDS

- A. SEE DIVISION 1 SECTION 'PROJECT RECORD DOCUMENTS' FOR SUBMITTING RECORD DRAWINGS, RECORD SPECIFICATIONS AND RECORD PRODUCT DATA
B. PROVIDE PROJECT MEP RECORD DRAWINGS, SUCH DRAWINGS SHALL FULLY REPRESENT INSTALLED CONDITIONS, INCLUDING ACTUAL LOCATION OF OUTLETS AND LABELING OF OUTLETS. THE RECORD WILL SHOW THE CABLE NAME, AND MUST DESCRIBE THE ORIGIN POINT AND DESTINATION POINT OF THE CABLE. THE CABLE RECORD WILL PROVIDE FIELDS FOR WHAT SERVICES AND/OR CONNECTIONS ARE ASSIGNED TO EACH CABLE PAIR OR OPTICAL FIBER STRAND INCLUDED IN THE INFRASTRUCTURE. RECORDS MUST BE MAINTAINED IN A COMPUTER WORKSHEET OR IN A COMPUTER DATABASE, E.G. MICROSOFT EXCEL 2010. A CABLE RECORD IS PREPARED FOR EACH BACKBONE CABLE, FULL ELECTRONIC FILE SET OF THE RECORD DRAWINGS SHALL BE MADE BY QUALIFIED DRAFTSPERSONS TO MATCH EXISTING LINE WORK AND LETTERING AS ACCURATE AS POSSIBLE.
C. LABELING AND ADMINISTRATION DOCUMENTATION
D. MANUFACTURERS EXTENDED WARRANTY
E. COPPER AND OPTICAL CABLE CERTIFICATION TEST RESULTS AND FILES IN DIGITAL FORM
F. OPTICAL FIBER POWER METER/LIGHT SOURCE TEST RESULTS IN DIGITAL FORM

1.7 QUALITY ASSURANCE

- A. ALL DIVISION 27 DESIGN SERVICES SHALL BE DIRECTLY PERFORMED BY A BICSI (BUILDING INDUSTRY CONSULTING SERVICE) RCDD (REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER) HAVING A MINIMUM OF FIVE (5) YEARS ACTIVE DESIGN EXPERIENCE UNDER THIS CREDENTIAL. SPECIFIC DUTIES ASSIGNED TO THE RCDD SHALL INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING: ALL ASPECTS OF STRUCTURED CABLING, RACK ELEVATIONS, PATHWAYS, ENTRANCES, GROUNDING AND BONDING, ETC. THE ARCHITECT/DESIGNER SHALL BE RESPONSIBLE TO ASSURE THAT OTHER MEP FUNCTIONS DO NOT INTERFERE WITH, OR OTHERWISE INFRINGE UPON, CRITICAL ELEMENTS OF THE DESIGN.
B. THE STRUCTURED CABLING SYSTEM SHALL BE PANDUIT ALONG WITH BELDEN CABLING SYSTEMS. THE TELECOMMUNICATION TECHNICIANS EMPLOYED SHALL BE CERTIFIED, FULLY TRAINED AND QUALIFIED IN THE INSTALLATION AND TESTING OF THE EQUIPMENT TO BE INSTALLED. EVIDENCE THAT THE CONTRACTOR AND ITS TECHNICIANS ARE QUALIFIED TO INSTALL THIS EQUIPMENT SHALL BE INCLUDED WITH SHOP DRAWING SUBMITTALS. THE CONTRACTOR SHALL HAVE AS AN EMPLOYEE AT LEAST ONE BICSI RCDD ON

STAFF.

- C. MANUFACTURER CERTIFICATIONS SHALL NOT BE PROJECT SPECIFIC AND SHOULD BE VALID FOR ANY AND ALL PROJECTS COMPLETED BY CONTRACTOR.
D. THE CONTRACTOR FOR ALL NEW CONSTRUCTION INVOLVING RENOVATIONS OR REMODELING IN ANY BUILDINGS OR STRUCTURES WERE A 20-YEAR EXTENDED SYSTEM WARRANTY IS IN EFFECT SHALL BE AN APPROVED AND AUTHORIZED INSTALLER OF THE EXISTING INSTALLED SYSTEM. ANY NEW COMMUNICATIONS CABLING SHALL BE OF THE SAME MANUFACTURER AND WARRANTY UPDATED TO INCLUDE ANY NEW INSTALLATIONS.

- E. THE ONSITE SUPERVISOR AND/OR PROJECT LEAD OF THE INSTALLATION TEAM SHALL BE CURRENT WITH THE MANUFACTURER'S PARTNER TRAINING REQUIREMENTS AS A MINIMUM REQUIREMENT PRIOR TO, DURING AND THE CLOSING OF THE PROJECT.
F. MATERIAL AND EQUIPMENT SHALL BE NEW AND CONFORM TO GRADE, QUALITY, AND STANDARDS SPECIFIED. EQUIPMENT AND MATERIALS OF THE SAME TYPE SHALL BE A PRODUCT OF THE SAME MANUFACTURER THROUGHOUT.
G. SUBCONTRACTORS SHALL ASSUME ALL RIGHTS AND OBLIGATIONS TOWARD THE CONTRACTOR THAT THE CONTRACTOR ASSUMES TOWARD THE OWNER AND ENGINEER/DESIGNER.

PART 2 - PRODUCTS

2.20 CABLE AND WIRING

A. HORIZONTAL CABLE

- 1. PLENUM CAT-6 BELDEN MEDIA TWIST BONDED-PAIR NETWORK CABLE 1874A OR APPROVED EQUAL WILL BE ALLOWED FOR ALL INDOOR CATEGORY 6 SHIELDED PLENUM CABLES, CONNECTING HARDWARE, PATCH PANELS, FACEPLATES OR MOUNTING FRAMES CONTAINED WITHIN SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES CONFORM TO THE REQUIREMENTS OF THE WORK AND OF THE CONTRACT DOCUMENTS.
2. CORNING LANSCAPE SOLUTIONS OR APPROVED EQUAL WILL BE ALLOWED FOR ALL INDOOR OR OUTDOOR OPTICAL FIBER PREMISES CABLING, CONNECTING HARDWARE, PATCH PANELS, FACEPLATES OR MOUNTING FRAMES CONTAINED WITHIN SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES CONFORM TO THE REQUIREMENTS OF THE WORK AND OF THE CONTRACT DOCUMENTS.
3. WHERE NO MANUFACTURER IS SPECIFIED OR COLOR AVAILABLE, PROVIDE PRODUCTS OF MANUFACTURERS IN COMPLIANCE WITH REQUIREMENTS. SUBSTITUTE WITH EQUIVALENT IN SPECIFICATIONS; SUBMIT FOR OWNER'S APPROVAL.
4. THE COMPONENTS AND CABLE SHALL BE FROM THE COMPONENT MANUFACTURER'S APPROVED SYSTEM AND ALL OF THE PRODUCTS SHALL BE MANUFACTURED BY ONE OF THE APPROVED MANUFACTURERS OR DOCUMENTED AND APPROVED EXCEPTION AND SHALL BE INCLUDED WITHIN THE WARRANTY.
5. PROVIDE PRODUCTS OF MANUFACTURERS AS NAMED IN INDIVIDUAL ARTICLE SECTIONS.
6. NOTICE*** THIRD PARTY INSTALLED PREMISE CABLING SYSTEMS THAT ARE NOT INCLUDED IN THIS SECTION SHALL BE AN ALTERNATE JACKET COLOR THAT IS NOT DESIGNATED IN THIS SECTION SHALL BE APPROVED BY OWNER BEFORE INSTALLATION. E.G. ACTIVE AND PASSIVE ELECTRONIC ADAPTER DEVICES UTILIZED TO CONNECT COMPONENTS OVER LOW-VOLTAGE CABLE.

2.21 WORK AREA OUTLETS

A. ACCEPTABLE MANUFACTURERS:

- 1. PANDUIT
2. SUBSTITUTIONS: PERMITTED
B. SINGLE-GANG WHITE WALL PLATE WITH LABEL HOLDERS AND TWO (2) OPENINGS INSTALLED IN T-GANG RECESSED MOUNTING FRAME, CONTAINING THE FOLLOWING DEVICES:
1. DATA OUTLET --- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
2. WALL PLATE: PANDUIT #CFP4
3. BLANK OUTLET COVER - BLACK OR GRAY

2.22 WALL OR HARD LID DATA WORK AREA OUTLETS (WIRELESS ACCESS POINT)

A. ACCEPTABLE MANUFACTURERS:

- 1. PANDUIT
2. SUBSTITUTIONS: PERMITTED
B. SINGLE-GANG WHITE WALL PLATE WITH LABEL HOLDERS AND TWO (2) OPENINGS INSTALLED IN T-GANG RECESSED MOUNTING FRAME, CONTAINING THE FOLLOWING DEVICES:
1. DATA OUTLET --- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS/USE CEILING DATA ONLY WORK AREA OUTLETS (WIRELESS ACCESS POINT)
A. ACCEPTABLE MANUFACTURERS:
1. PANDUIT
2. SUBSTITUTIONS: PERMITTED
B. CATEGORY 6 CABLE INSTALLED WITH A FIFTEEN (15) FOOT SERVICE LOOP AND TERMINATED WITH A UTP MODULE (KEYSTONE JACK). CABLE SHALL BE INSTALLED WITHOUT A FACEPLATE AND STORED ABOVE ACCESSIBLE CEILING TO BE LOCATED BY INSTALLER.

2.24 WALL OR HARD LID DATA ONLY WORK AREA OUTLETS (SECURITY CAMERA)

A. ACCEPTABLE MANUFACTURERS:

- 1. PANDUIT
2. SUBSTITUTIONS: PERMITTED
B. SINGLE-GANG WHITE WALL PLATE WITH LABEL HOLDERS AND TWO (2) OPENINGS INSTALLED IN T-GANG RECESSED MOUNTING FRAME, CONTAINING THE FOLLOWING DEVICES:
1. DATA OUTLET --- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
2. BLANK OUTLET COVER - BLACK OR GRAY

2.25 ABOVE CEILING DATA ONLY WORK AREA OUTLETS (SECURITY CAMERA)

A. ACCEPTABLE MANUFACTURERS:

- 1. PANDUIT

2. SUBSTITUTIONS: PERMITTED

B. CATEGORY 6 CABLE INSTALLED WITH A FIFTEEN (15) FOOT SERVICE LOOP AND TERMINATED WITH A UTP MODULE (KEYSTONE JACK). CABLE SHALL BE INSTALLED WITHOUT A FACEPLATE AND STORED ABOVE ACCESSIBLE CEILING TO BE LOCATED BY INSTALLER:

- 1. DATA OUTLET --- 8-PIN MODULAR, CATEGORY 6, STANDARD, T568B. PANDUIT MINI-COM TX-6 PLUS.
2. BLANK OUTLET COVER - BLACK OR GRAY

2.26 RACK MOUNTED COPPER PATCH PANEL AND JACKS (CATEGORY 6)

A. ACCEPTABLE MANUFACTURERS:

- 1. ANGLED PATCH PANEL. PANDUIT: #JUMPPA48BLY
2. SUBSTITUTIONS: PERMITTED

2.27 RACK MOUNTED OPTICAL FIBER TERMINATION PANEL AND SHELF

A. ACCEPTABLE MANUFACTURERS:

- 1. CORNING LANSCAPE SOLUTIONS, CCH-01U, CCH-02U, CCH-04U, CLOSET CONNECTOR HOUSING (CCH)
2. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AE-POORE, 24 F, LC, UPC, DUPLEX, SINGLE-MODE (OSI), CCH PIGTAILED CASSETTES
3. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AD-POOGE, 24 F, LC, UPC, DUPLEX, MULTIMODE (OM4), CCH PIGTAILED CASSETTES
4. CORNING LANSCAPE SOLUTIONS, CCH-CS24-AE-POORJ, 24 F, LC, UPC, DUPLEX, SINGLE-MODE (OSI), CCH RIBBON PIGTAILED CASSETTES
5. FIBER OPTIC ARMOR GROUNDING MANUFACTURERS CORNING, ELECTRIC MOTION COMPANY, PANDUIT, TE, SIEMON, COMSCOPE OTHERS; SUBMIT EQUIVALENTS FOR GROUNDING AND BONDING ONLY.
6. SUBSTITUTIONS: PERMITTED

B. CCH 19" RACK MOUNTED, OPTICAL FIBER TERMINATION SHELF, 1U SHELF HOLDS UP TO TWO (2) CCH PANELS, 2U SHELF HOLDS UP TO FOUR (4) CCH PANELS, 4U SHELF HOLDS UP TO TWELVE (12) CCH PANELS. EACH CASSETTE HOLDS UP TO TWENTY-FOUR (24) LC DUPLEX SHUTTERED ADAPTERS.

C. CAMPUS BUILDING SHALL PROVIDE SPACE FOR TERMINATING AND ORGANIZATION OF OPTICAL FIBERS. TERMINATION OF OPTICAL FIBER SHALL BE LC TYPE CONNECTION IN ALL NEW WORK AND ANY REPLACED CONNECTIONS FROM AFFECTED OLD WORK CONSTRUCTION. OPTICAL FIBER SHELVING SHALL BE RACK MOUNTABLE AND SIZED TO ACCOMMODATE TOTAL NUMBER OF OPTICAL FIBERS BEING TERMINATED IN THE RACK. COUPLINGS SHALL ACCOMMODATE THE TYPE OF FIBER. ANY OTHER CONNECTING HARDWARE OR EXPANSION PANELS FOR THE SHELVES WILL BE INSTALLED PER THE MANUFACTURER. COORDINATE QUANTITIES AND TYPES WITH OWNER.

D. STRAIN RELIEF BRACKET FOR RACK MOUNT HARDWARE AND ARMORED CABLE GROUNDING SHALL BE FURNISHED AND INSTALLED TO SUPPORT EACH CABLE INDEPENDENTLY. CABLES SHARING THE SAME CLAMP AND/OR BRACKET BUILT TO SUPPORT MORE THAN ONE CABLE AT THE SAME TIME AND CAN BE USED TO PROPERLY BOND THE METALLIC ARMOR MAY BE ACCEPTABLE UPON APPROVAL OF SUBMITTAL. PROVIDE MINIMUM 4" SERVICE LOOP.

E. GROUNDING AND BONDING ACCESSORIES AS SPECIFIED AND REQUIRED.

2.28 DATA AND TELECOMMUNICATIONS SERVICE BACKBONE CABLE

A. ACCEPTABLE MANUFACTURERS:

- 1. CORNING, SINGLE-MODE (OS1) SMF-28E+®, RIBBON INTERLOCKING PLENUM CABLE
2. CORNING, 50 MM MULTIMODE (OM4), RIBBON INTERLOCKING PLENUM CABLE
3. SUPERIOR ESSEX ARM (VERTICAL RISER DISTRIBUTION), CATEGORY 6 VOICE GRADE
4. SUPERIOR ESSEX CATEGORY 3 (HORIZONTAL DEMARCATION EXTENSION)
5. CIRCA, EMERSON, SIEMON, PANDUIT, SUPERIOR ESSEX, TE, ORTRONICS, ITW, HUBBELL, HOFFMAN, PREFORMED (HARDWARE, TERMINAL HARDWARE, PROTECTION)
6. SUBSTITUTIONS: PERMITTED

B. MULTIMODE 50/125 µm DIAMETER TIGHT-BUFFERED, INSIDE PLANT OM4 OPTICAL FIBER, WITH FIBER COUNTS AS INDICATED ON DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.3.

C. NOTE: LISTED TYPE OFCP (AS REQUIRED IN THE NEC 2011)

D. SINGLE-MODE 9/125 µm DIAMETER TIGHT-BUFFERED, INSIDE PLANT OS1 OPTICAL FIBER, WITH FIBER COUNTS AS INDICATED ON DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.3.

E. NOTE: LISTED TYPE OFCP (AS REQUIRED IN THE NEC 2011)

F. SOLID COPPER, 24 AWG, 100 BALANCED, MULTI-PAIR, CATEGORY 3 CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.2.

G. NOTE: LISTED TYPE CMP (AS REQUIRED IN THE NEC 2011)

H. SOLID COPPER, 24 AWG, 100 BALANCED, MULTI-PAIR, ARMED RISER RATED SHIELDED CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WITH MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS THAT MEET OR EXCEED ANSI/TIA-568-C.2.

I. NOTE: LISTED TYPE CMR (AS REQUIRED IN THE NEC 2011)

2.29 UNDERGROUND DATA STATION AND TELECOMMUNICATIONS CABLE (COPPER)

A. ACCEPTABLE MANUFACTURERS:

- 1. SUPERIOR ESSEX OSP BROADBAND, ALUMINUM TAPE SHIELD (BBDN6)
2. ELECTRIC MOTION COMPANY, SHIELD BOND CONNECTOR, EM 9556-BW S,(218) C,(31)
3. ELECTRIC MOTION COMPANY, SHIELD BOND CONNECTOR WITH LEADS, (EM R886B10HD)
4. SUBSTITUTIONS: PERMITTED
B. SOLID COPPER, 23 AWG, 100 BALANCED FULLY SCREENED UNSHIELDED

TWISTED-PAIR (S/UTP) CATEGORY 6 BROADBAND OSP CABLES WITH FOUR INDIVIDUALLY TWISTED-PAIRS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS IN ANSI/TIA-568-C.2 UP TO 250MHZ, FOLLOW TECHNICAL GUIDELINES, T036, FOR OSP BROADBAND INSTALLATION.

C. SOLID COPPER, 24 AWG, 100 BALANCED MULTI-PAIR, GEL-FILLED DUCTS PE-89 CABLE, IN SIZES AS INDICATED ON THE DRAWINGS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.2 AND ANSI/TIA-758-A.

D. OVERVOLTAGE BUILDING ENTRANCE PROTECTORS ARE REQUIRED ON BOTH ENDS OF THE CABLE FOR LENGTHS LONGER THAN 150' FROM PERIMETER OF CABLE SERVICE ENTRANCE.

2.30 UNDERGROUND TELECOMMUNICATIONS CABLE (OPTICAL FIBER)

A. ACCEPTABLE MANUFACTURERS:

- 1. CORNING LANSCAPE SOLUTIONS, SST-RIBBON™ SINGLE-TUBE, GEL-FREE, ARMORED CABLE, AND SINGLE-MODE (OS1) SMF-28E+® OUTDOOR RATED PE OUTER JACKET, E.G. PART NUMBER: 048EC5-14100053.
2. CORNING LANSCAPE SOLUTIONS, GEL-FREE, ARMORED CABLE, AND MULTI-MODE (OM4) SMF-28E+® OUTDOOR RATED PE OUTER JACKET.
3. SUBSTITUTIONS: PERMITTED

B. SINGLE-MODE 9/125 µm DIAMETER, SINGLE JACKET/SINGLE ARMOR, GEL-FREE OUTDOOR, STRANDED LOOSE TUBE, OSI OPTICAL FIBER CABLE, WITH NUMBER OF USABLE FIBERS AS SHOWN ON DRAWINGS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.3 AND ANSI/TIA-758-A.

C. MULTI-MODE 50/125 µm DIAMETER, SINGLE JACKET/SINGLE ARMOR, GEL-FREE OUTDOOR, STRANDED LOOSE TUBE, OM4 OPTICAL FIBER CABLE, WITH NUMBER OF USABLE FIBERS AS SHOWN ON DRAWINGS, WHICH MEET OR EXCEED THE MECHANICAL AND TRANSMISSION PERFORMANCE SPECIFICATIONS LISTED IN ANSI/TIA-568-C.3 AND ANSI/TIA-758-A.

D. EXISTING OUTSIDE PLANT FIBER OPTIC CABLE NEEDS TO BE ACCESSED FOR VIABILITY OF BEING USED IN PLACE OF INSTALLING NEW. A NEW EQUIVALENT OR LARGER STRAND COUNT OPTICAL FIBER CABLE SHALL BE REQUIRED TO BE INSTALLED IF EXISTING CABLE CAN'T BE UTILIZED FOR PROJECT.

2.31 UNDERGROUND INNERDUCT

A. ACCEPTABLE MANUFACTURERS:

- 1. MAXCELL TRACEABLE INNERDUCT (WWW.MAXCELLINNERDUCT.COM)
2. SUBSTITUTIONS: PERMITTED

2.32 TERMINATION BACKBONE

A. MATERIALS: PLYWOOD FIRE RESISTANCE COVERING EVERY WALL DETERMINED BY INFORMATION TECHNOLOGY SERVICES ENGINEER. THE WALLS WILL BE COVERED FROM 18" A.F.F. TO CEILING OR 10" A.F.F. SEE CODES AND TDMM CHAPTER 6 PAGE 19 FOR TELECOMMUNICATIONS ROOM BUILD OUT.

B. SIZE: AS INDICATED, 3/4 INCH THICK, GRADE AC

C. FINISH: PPG SPEEDHIDE 42-7 INTERIOR FIRE RETARDANT FLAT LATEX (INTUMESCENCE)

2.33 UNDERGROUND VAULT

A. ACCEPTABLE MANUFACTURERS:

- 1. ARMORCAST POLYMER CONCRETE VAULT, A6001440TAP48MT, 48" X 48" VAULT AND COVER ASSEMBLY, TORSION ASSIST, 48" DEPTH
2. SUBSTITUTIONS: PERMITTED

2.34 FABRICATION

A. FABRICATE CUSTOM-MADE EQUIPMENT WITH CAREFUL CONSIDERATION GIVEN TO AESTHETIC, TECHNICAL, AND FUNCTIONAL ASPECTS OF EQUIPMENT AND ITS INSTALLATION.

2.35 EQUIPMENT RACKS AND CABLE SUPPORT SYSTEM

A. ACCEPTABLE MANUFACTURERS:

- 1. PANDUIT: #CMR19X84, CABLE MANAGEMENT RACK
2. CHATSWORTH: #46353-703, CABLE MANAGEMENT RACK
3. B-LINE: #SB556084XU, CABLE MANAGEMENT RACK
4. PANDUIT: #NCMV8, VERTICAL MANAGER
5. CHATSWORTH: #30095-703, VERTICAL MANAGER
6. B-LINE: #SB-571-66D-084, VERTICAL MANAGER
7. SUBSTITUTIONS: PERMITTED

B. RACKS ARE TO BE MOUNTED SECURELY TO THE FLOOR PER MANUFACTURER'S RECOMMENDATIONS WITH CONCRETE ANCHORS AND SAE GRADE 8 BOLTS. PLACEMENT OF FOOTPRINT TO BE DETERMINED BY OWNER'S ITS ENGINEER. THERE WILL BE A MINIMUM OF ONE CABLE TRAY SECTION THAT SPANS OVER THE RACKS TO DISTRIBUTE CABLE. THE CABLE WILL EXIT THE CABLE TRAY ON WATERFALL AND OR SPILLWAYS. THE LADDER RACK OR CABLE TRAY SYSTEM WILL BE UL RATED FOR GROUNDING AND BONDING ACCORDING TO THE STANDARD ANSI/TIA-607-B IN LIEU OF INSTALLING GROUNDING STRAPS, GRINDING PAINT AND DRILLING HOLES THROUGH SUPPORT STRUCTURE TO MOUNT BOLTS. PROVIDE RACK EXTENSIONS TO CONNECT FLOOR MOUNT RACK TO LADDER RACK. THE TR DESIGN TO BE COORDINATED AND APPROVED BY THE OWNER'S ITS ENGINEER.

C. THERE WILL BE A MINIMUM OF TWO (2) SPECIFIED RACKS FURNISHED FOR EVERY 350 DATA WORK AREA OUTLET TERMINATIONS OR 70% FILL OF RACK UNIT SPACES. THERE WILL BE A MINIMUM OF ONE (1) SPECIFIED RACK FOR DATA STATION WORK AREA OUTLETS AND ONE (1) FOR OWNER PROVIDED NETWORK EQUIPMENT. FURNISH AND INSTALL SPECIFIED VERTICAL CABLE MANAGEMENT SYSTEM CHANNELS BETWEEN RACKS AND ON THE ENDS. THE ROOM WILL BE SIZED TO ALLOW FOR 3' OF WORKING CLEARANCE AROUND FRONT SIDE OF THE RACK INCLUDING THE CABLE MANAGEMENT BASED ON AN ESTIMATED 2'X2' RACK FOOTPRINT.

2.36 TV SYSTEM

A. COAXIAL CABLE SHALL BE RG-6 (TYPICAL) AND RG-11 FOR CHANNEL LENGTHS LONGER THAN 150'. TYPE SHALL BE QUAD SHIELDED; SWEEP TESTED A MINIMUM UP TO 1GHz AND LISTED TYPE CMP, AS REQUIRED PER NEC 2011).

B. OUTLETS: COMPRESSION F-CONNECTOR SUITABLE FOR INSTALLATION IN COMMON WALL PLATE WITH VOICE AND DATA OUTLETS. OUTLETS MANUFACTURER SHALL BE THE SAME AS THE WALL PLATE FOR THE STRUCTURED CABLING SYSTEM MANUFACTURER.



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HR PHASE II & III EXTERIOR RENOVATION

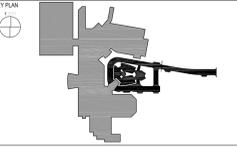


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E005 Scale

01 January, 2020



C. ACCEPTABLE MANUFACTURERS:

- 1. BELDEN, E.G. 1189AP, RG-6, COAX - BROADBAND CATV COAXIAL CABLE
2. BELDEN, E.G. 1523AP, RG-11, COAX - CATV CABLE
3. EXTRON
4. LIBERTY
5. SUPERIOR ESSEX
6. CONNECTOR: SINGLE PIECE COMPRESSION F-PLUG FOR PLENUM QUAD SHIELD 1GHZ CABLE
7. CONNECTOR MANUFACTURERS: BELDEN, HOLLAND ELECTRONICS
8. SUBSTITUTIONS: PERMITTED

PART 3 - EXECUTION

3.1 INSIDE PLANT RACEWAY AND LOW VOLTAGE CABLE

- A. ALL CONDUIT ENDS SHALL HAVE PLASTIC BUSHINGS INSTALLED BEFORE THE CABLE IS PULLED INTO THE CONDUIT.
B. CONDUITS WILL NOT BE RUN NEXT TO HOT WATER LINES, STEAM PIPES, OR OTHER UTILITIES THAT MAY PRESENT A SAFETY HAZARD OR CAUSE A DEGRADATION OF SYSTEM PERFORMANCE.
C. CONDUITS ENTERING THE TELECOMMUNICATIONS ROOM (TR) SHOULD BE DESIGNED AND ENTER A MINIMUM OF 6" INCHES ABOVE CABLE TRAY ALLOWING FOR THE MOST FLEXIBILITY IN THE ROUTING AND RACKING OF CABLES.
D. CONDUITS OR CONDUIT SLEEVES ENTERING THROUGH THE FLOOR OF THE TR SHALL TERMINATE FOUR (4) INCHES ABOVE THE FINISHED FLOOR TO MAXIMIZE THE USABLE FLOOR SPACE...
E. ALL METALLIC TELECOMMUNICATIONS CONDUITS ENTERING THE TR, EQUIPMENT ROOM (ER), OR ENTRANCE FACILITY (EF) SHALL BE BONDED TOGETHER, AND BONDED TO THE TELECOMMUNICATIONS MAIN GROUNDING BUSBAR (TOMB) OR TELECOMMUNICATIONS GROUNDING BUSBAR (TOB) WITH #6 AWG GROUND CABLE PER ANSI/TIA-607-B.
F. ALL IN-USE AND SPARE CONDUITS ENTERING THE TR, ER, OR EF SHALL BE SEALED AND PLUGGED TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT...
G. ALL ISP CONDUITS AND INNER-DUCT, USED AND SPARE, SHALL BE PLUGGED WITH WATER-TIGHT PLUGS AT BOTH ENDS TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT.
H. ALL ISP CONDUITS SHALL HAVE PULL LINES RATED AT A MINIMUM OF 90 KG (200 LB.) PULLING TENSION INSTALLED...
I. PRIOR TO RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLES, ALL ISP CONDUITS MUST BE CLEANED WITH A BRUSH PULLED THROUGH THE CONDUIT AT LEAST TWO TIMES IN THE SAME DIRECTION AND SWABBED WITH CLEAN RAGS UNTIL THE RAG COMES OUT OF THE CONDUIT CLEAN AND DRY...
J. PULL BOXES USED WITH TELECOMMUNICATIONS CONDUITS IN INTERIOR LOCATIONS SHALL BE RATED NEMA-1.
K. PULL BOXES USED IN DAMP OR WET LOCATIONS SUCH AS PLUMBING CHASES OR OUT OF DOORS SHALL BE RATED NEMA-3R.
L. PULL BOXES SHALL BE INSTALLED IN CONDUITS AT AN INTERVAL NO GREATER THAN EVERY 100 FEET.
M. A PULL BOX SHALL BE INSTALLED IN CONDUIT RUNS WHENEVER THERE ARE TWO 90°SWEEPS, OR A TOTAL OF 180° SWEEPS, IN A CONDUIT RUN.

3.2 HORIZONTAL AND BACKBONE CABLE INSTALLATION

- A. INSTALL PREMISE CABLING FROM EACH INFORMATION OUTLET TO THE BACKBONE SYSTEM. INSTALL THE BACKBONE CABLING FROM THE MAIN CROSS CONNECTS TO THE INTERMEDIATE CROSS CONNECTS AND HORIZONTAL CROSS-CONNECTS AS INDICATED.
B. EACH RUN OF CABLE BETWEEN THE CROSS CONNECT BLOCKS AND THE INFORMATION OUTLET SHALL BE CONTINUOUS WITHOUT ANY JOINTS OR SPLICES AND SHALL NOT EXCEED 90 METERS. CABLE SHALL BE RUN IN CONDUIT OR AS INDICATED. CONDUIT RUNS SHALL NOT CONTAIN MORE THAN TWO (2) 90-DEGREE BENDS AND SHALL NOT EXCEED 100 FEET WITHOUT UTILIZING APPROPRIATELY SIZED BOXES. LONG SWEEP ELBOWS WITH A BEND RADIUS AT LEAST SIX TIMES CONDUIT DIAMETER SHALL BE USED. ALL ELBOWS FOR COMMUNICATIONS CABLE WILL BE SMART CONDUIT BODY™ BY SMART PATHWAYS (WWW.SMARTLB.COM).
C. CABLE THAT IS NOT RUN IN CONDUIT OR TRAY SHALL BE BUNDLED WITH VELCRO STRAPS SPACED NOT LESS THAN FIVE (5) FEET. THE BUNDLING SHALL BE SUPPORTED VIA J-hooks SECURELY ATTACHED TO THE BUILDING OR BUILDING STRUCTURE AND SHALL NOT BE SUPPORTED BY CEILING SUSPENSION WIRES. PLENUM-RATED CABLE SHALL BE USED IN ALL APPROPRIATE AREAS AND WHERE INDICATED. CABLE TIES ARE NOT TO BE USED. COAXIAL CABLE SHALL BE SUPPORTED INDEPENDENTLY OF VOICE/DATA CABLING. CABLES WILL NOT REST ON LIGHTS, WATER, CEILING SYSTEMS OR POWER LINES.
D. MAXIMUM CABLE FILL OF CONDUIT SHALL BE 40%.

3.3 INFORMATION OUTLET INSTALLATION

- A. ALL WORK AREA OUTLETS (WAO) AND PATCH PANELS SHALL BE CLEARLY MARKED USING PERMANENT MEANS. USE THE FOLLOWING SYSTEM OF NUMBERING (MDF/IDF + WAO ROOM # + PHYSICAL NUMBER OF OUTLET 1-24, E.G. MDF-1234-01)
1. ALL WAO AND PATCH PANEL LABELS MUST MATCH ACTUAL OWNERROOM NUMBERS. CAREFUL CONSIDERATION SHOULD BE GIVEN WHEN DOCUMENTING AND MAINTAINING A NUMBERING SCHEME THAT IT MATCHES EXACTLY THE ACTUAL ROOM NUMBERS; NOT THE CONSTRUCTION DOCUMENT ROOM NUMBER.
2. ALL VOICE AND DATA TERMINATIONS MADE IN THE TELECOM ROOM (TR) SHALL BE MADE IN A NUMERICAL ORDER BY ROOM NUMBER OF EACH JACK.
3. OUTLET NUMBERS SHALL BE MARKED BY PERMANENT MEANS ON EACH CABLE AT THE OUTLET AND AT THE TR. THE ORDER SHOULD BEGIN WITH THE UPPER FLOORS FIRST WORKING YOUR WAY DOWN IF APPLICABLE.
B. WIRELESS ACCESS POINTS (WAP) AND SECURITY CAMERAS (SC) INSTALLED, LABELED, AND TERMINATED. USE THE FOLLOWING SYSTEM OF NUMBERING (MDF/IDF + PHYSICAL NUMBER OF OUTLET 1-24, E.G. MDF-1234-WAPO1 OR MDF-1234-CAM01)

- C. THE TYPICAL WIRELESS ACCESS POINT OR SECURITY CAMERA WORK AREA CAN BE INSTALLED IN ACCESSIBLE CEILING SPACE THAT TYPICALLY CONSISTS OF A FIFTEEN (15) FOOT SERVICE LOOP AND ONE (1) STANDARD COMPLIANT WORK AREA OUTLETS INSTALLED FROM THE WORK AREA OUTLET TO THE TR. TERMINATE DATA CABLES ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK, UNLESS NOTED OTHERWISE.
D. THE TYPICAL WIRELESS ACCESS POINT OR SECURITY CAMERA INDOOR WORK AREA IS INSTALLED IN HARD LID CEILING CATCH WALL MOUNTED LOCATION CONSISTS OF A RECESSED JUNCTION BOX, SINGLE-GANG STAINLESS STEEL PLATE WITH LABEL HOLDERS AND ONE (1) STANDARD COMPLIANT WORK AREA OUTLETS INSTALLED FROM THE WORK AREA OUTLET TO THE TR. TERMINATE DATA CABLES ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK. OUTLETS CAN BE ADJUSTED APPROPRIATELY.
E. ONE WORK AREA OUTLET CONSISTS OF TWO (2) FOUR-PAIR DATA CATEGORY 6 PLENUM CABLES AND TWO (2) BLANKS. INSTALLED FROM THE WORK AREA OUTLET TO THE TR. QUANTITIES OF WORK AREA OUTLETS TO BE SHOWN ON ELECTRICAL DRAWINGS. TERMINATE DATA CABLE ON RACK MOUNTED MODULAR PATCH PANELS LOCATED IN THE DESIGNATED TR RACK.

- F. VERTICAL/HORIZONTAL BACKBONE, RISER SYSTEM, HORIZONTAL DATA AND VOICE CABLING WITH ASSOCIATED TERMINATIONS, MOUNTING EQUIPMENT, CABLE PATHWAY AND MANAGEMENT SYSTEMS, TESTING AND OTHER ITEMS/MATERIALS, AS SPECIFIED IN DRAWINGS, THESE SPECIFICATIONS, AND CONTRACT DOCUMENTS.
G. VERTICAL/HORIZONTAL CAMPUS BACKBONE CABLING CONSISTS OF 50/125 μM OM4 MULTIMODE OR 9/125 μM OS1 SINGLE-MODE FOR RUNS OVER 400 FEET, GEL-FREE, SINGLE LAYER ARMOR, LOOSE TUBE RIBBON OPTICAL FIBER SHALL BE INSTALLED FROM THE MAIN CROSS-CONNECT ON CAMPUS BACKBONE FIBER NODE TO THE INTERMEDIATE CROSS-CONNECT IN THE APPROPRIATE EF. THE SINGLE-MODE WILL BE UTILIZED FOR INTER-BUILDING DATA COMMUNICATIONS, TELECOMMUNICATION SERVICE AND PREMISES NETWORK SWITCHING EQUIPMENT.
H. VERTICAL/HORIZONTAL RISER SYSTEM CABLING CONSISTS OF 50/125 μM OM4 MULTIMODE OR 9/125 μM OS1 SINGLE-MODE (FOR RUNS OVER 400 FEET), GEL-FREE, INTER-LOCKING ARMOR, OPTICAL FIBER PLENUM ARMORED CABLE SHALL BE INSTALLED FROM THE INTERMEDIATE CROSS-CONNECT TO THE APPROPRIATE EF TO EACH TR. THE MULTIMODE WILL BE UTILIZED FOR INTERIOR INSTALLATIONS ONLY FOR EXTENDING DATA COMMUNICATIONS, TELECOMMUNICATION SERVICE AND INTERCONNECTING PREMISE NETWORK SWITCHING EQUIPMENT BETWEEN TR'S.

- I. WAO MOUNTED IN SURFACE MOUNTED METALLIC RACEWAY, E.G. WIREMOLD'S 2000, 4000, OR 5000 SERIES RACEWAYS SHALL BE FURNISHED WITH A COMPATIBLE MOUNTING FRAME OR PLATE TO FIT INSTALLED APPROVED SCS WAO. THE WAO SHALL BE SURFACE OR FLUSH MOUNTED AS INDICATED ON THE DRAWINGS AND AS SPECIFIED IN DRAWINGS, THESE SPECIFICATIONS, AND CONTRACT DOCUMENTS.
J. ALL INDOOR WAO SHALL HAVE A MINIMUM THREE-QUARTER INCH CONDUIT WITH PULL STRING. INCREASE THE CONDUIT SIZE AS NECESSARY FOR THE QUANTITY OF CABLES TO BE INSTALLED. CABLE FILL SHALL NOT EXCEED 40%.

- K. ALL INDOOR WAO OUTLETS, INSTALLED IN WET LOCATIONS SHALL HAVE A MINIMUM 1" INCH CONDUIT AND CABLING WILL BE RATED FOR WET LOCATION PER NEC. INCREASE THE CONDUIT SIZE AS NECESSARY FOR THE QUANTITY OF CABLES TO BE INSTALLED. CABLE FILL SHALL NOT EXCEED 40%.
L. ALL WAO SHALL BE MOUNTED IN A MINIMUM FOUR (4)-INCH BY FOUR (4)-INCH BY TWO AND ONE-HALF (2 1/2)-INCH DEEP DOUBLE GANG OUTLET BOX WITH A SINGLE GANG MUD RING.
M. ALL INDOOR WALL MOUNTED OR HARD LID WAO OR SECURITY CAMERA WAO SHALL BE MOUNTED IN A DEEP SINGLE GANG RECESSED ELECTRICAL BOX.
N. ALL EXTERIOR WALL/CEILING MOUNTED WAO OR SECURITY CAMERA WAO SHALL BE MOUNTED IN A WEATHER PROOF SINGLE GANG JUNCTION BOX VERTICALLY FLUSH-MOUNTED WITH CONDUIT AND PULL STRING EXTENDING INSIDE THE BUILDING TO AN ACCESSIBLE SPACE. JUNCTION BOX SHALL BE COVERED WITH A STAINLESS STEEL JACAPLATE. THE JUNCTION BOX MAY NOT BE UTILIZED FOR OTHER PURPOSES OR CONTAIN NON-NETWORK CONNECTIONS. VISUAL OBSTRUCTIONS OR BRIGHT LIGHTS THAT MAY PREVENT APPROPRIATE VIEWING ANGLES OR PICTURE QUALITY FOR THE SECURITY CAMERA MAY NOT EXIST WITHIN FOUR (4) FEET OF SECURITY CAMERA IN ANY DIRECTION.

- O. ALL EXTERIOR POLE MOUNTED SECURITY CAMERA WAO SHALL CONTAIN A SUITABLY-SIZED 10" X 10" X 5" WEATHERPROOF ENCLOSURE AT THE BASE OF THE POLE. ENCLOSURE SHOULD BE DEDICATED TO SECURITY CAMERA EQUIPMENT. ENCLOSURE SHOULD BE CAPABLE OF HOLDING A 2" X 4.5" X 7" MEDIA CONVERTER AND 3.5" X 6.5" X 9" POWER INJECTOR. FIBER CABLE IS TERMINATED IN THE BASE OF THE POLE WITH A MINIMUM OF 6 FEET OF SLACK CABLE. 120 VAC POWER SHOULD BE PROVIDED IN A STANDARD NEMA 5-20R RECEPTACLE INSIDE THE ENCLOSURE. POWER SHOULD BE INDEPENDENT OF THE POLE'S LIGHTING AND ALWAYS ENERGIZED (NO TIMERS). POWER SHOULD BE ON ITS OWN CIRCUIT AND CAPABLE OF BEING POWER CYCLED VIA ELECTRICAL BREAKER IN BUILDING. LOCATION SHOULD BE PROVIDED AT TOP OF POLE FOR A SECURITY CAMERA TO BE INSTALLED WITH STRAP AND PENDANT. MOUNT ACCESS PANEL OR HOLE (MINIMUM 1.5" DIAMETER) SHOULD BE PROVIDED AT SECURITY CAMERA LOCATION WITH PULL STRING TO ENCLOSURE AT BASE OF POLE. ACCESS PANEL OR HOLE SHOULD BE FITTED WITH APPROPRIATE REMOVABLE WEATHERPROOF COVERING.

- P. AN ELECTRICAL OUTLET SHALL ALWAYS BE LOCATED WITHIN THREE (3) FEET OF A TELECOMMUNICATIONS OUTLET EXCLUDING SPECIAL CIRCUIT DEVICES LIKE POE POWERED DEVICES, E.G. WIRELESS ACCESS POINT AND IP SECURITY CAMERAS.

3.4 OUTSIDE PLANT PIPING AND CABLE

- A. DIRECT BURIAL OF TELECOMMUNICATIONS CABLE WILL NOT BE APPROVED.
B. ALL OSP TELECOMMUNICATIONS CONDUITS SHALL BE SCHEDULE-40 OR SCHEDULE-80 (IF PLACED NEAR THE PHYSICAL PLANT WATER LINES) RIGID NONMETALLIC CONDUIT, POLYVINYL CHLORIDE (PVC), AND MUST MEET THE REQUIREMENTS OF NEMA TO 8. ALL CONDUIT SECTIONS SHALL BE GLUED WITH PVC PIPE GLUE TO FORM A WATER-TIGHT JOINT. SPACERS ARE REQUIRED TO MAINTAIN PROPER SEPARATION BETWEEN MULTIPLE CONDUITS IN A RUN.
C. ALL OSP CONDUITS SHALL BE INSTALLED WITH A SLIGHT DRAIN SLOPE (0.125 INCHES-PER-FOOT) AWAY FROM BUILDINGS TO PREVENT THE ACCUMULATION OF WATER IN THE CONDUIT OR INGRESS TO THE BUILDINGS.
D. ALL DISTRIBUTION CONDUITS MUST BE BURIED A MINIMUM OF 24"-INCHES BELOW GRADE, WITH PREPARED TOP OF CONDUIT DEPTH OF 36"-INCHES AND MARKER TAPE 12"-INCHES ABOVE THE TOP OF THE CONDUIT IF PLACED BY THE CONVENTIONAL TRENCHING METHOD.
E. ALL CABLE SHALL BE INSTALLED IN THE LOWEST AVAILABLE CONDUIT IN A DUCT BANK, WORKING UP AS ADDITIONAL CABLES ARE INSTALLED.

- F. ALL OSP CONDUITS AND INNER-DUCT, USED AND SPARE, SHALL BE PLUGGED WITH WATER-TIGHT PLUGS AT BOTH ENDS TO PREVENT THE INTRUSION OF WATER, GASSES, AND RODENTS THROUGHOUT THE CONSTRUCTION PROJECT. ALL OSP CONDUITS SHALL HAVE QUARTER (1/4)-INCH POLYPROPYLENE PULL ROPES INSTALLED. THE PULL ROPES MUST BE RE-PULLED EACH TIME AN ADDITIONAL CABLE IS INSTALLED. ALL OSP CONDUITS MUST BE TESTED WITH A MANDEREL TO PROVE COMPLIANCE WITH THE BEND RADIUS REQUIREMENTS THROUGHOUT THE CONDUIT RUN. WITHIN FIVE DAYS OF RELEASING THE CONDUIT FOR THE INSTALLATION OF CABLE, THE CONDUIT INSTALLATION CONTRACTOR SHALL PROVE ALL CONDUITS TO BE CLEAN AND DRY. UTILIZING MAXCELL REUSABLE TERMINATION BAGS IS THE PREFERRED METHOD FOR OCCUPIED DUCTS TO WATER SEAL. TYPICAL PLASTIC AND RUBBER EXPANSION PLUGS CAN BE USED FOR EMPTY DUCTS AND CONDUITS.

- G. IN NEW CONSTRUCTION AND NEW CONDUIT, FIBER OPTIC BACKBONE CABLES SHALL ALWAYS BE INSTALLED IN FIBER OPTIC INNER-DUCT. NORMALLY, THREE TO FOUR LOBED MAX-CELL TRACEABLE INNER-DUCTS CAN BE PLACED IN A FOUR (4)-INCH CONDUIT, WHERE FIBER OPTIC CABLE IS INSTALLED INTO EXISTING CONDUITS. THE USE OF FIBER OPTIC INNER-DUCT IS PREFERRED IF SPACE IS AVAILABLE. INNER-DUCT IS USED TO SEPARATE AND SEGREGATE CABLES, AND TO PREVENT THE TANGLING OF CABLES IN A CONDUIT. TYPES OF TEXTILE INNER-DUCT, MAXCELL, ARE THE PREFERRED PRODUCT TO BE USED, OTHERWISE, NEW CONDUIT SHALL BE INSTALLED TO MAINTAIN WORKING OSP SYSTEM.
H. ALL PIPING AND CABLES WILL BE AFFIXED TO THE INTERIOR WALL AND LID IN EACH OSP VAULT AND PULL-BOX WITH APPROPRIATE WEATHER PROOF SELF-ADHESIVE LABELS THAT WILL TELL THE OWNER'S I.T. PERSONNEL WHICH BUILDINGS THE CABLING IS INSTALLED AND WHAT BUILDING IT IS GOING TO RESIDE. UTILIZE ANSI/TIA/EIA-606-A LABELING SCHEME.

- I. EVERY INDIVIDUAL INSTALLED PIPING WILL HAVE A NEPTCO TRACE-SAFE (RT8000 19-GAUGE WATER BLOCKING ORANGE CONDUIT) AND CONNECTORS AS NEEDED PULLED THROUGH IT FOR LOCATING PURPOSES. INSTALL TRACER LINE IN ALL OLD WORK IF NONE EXISTS.
J. ALL TRENCHES AFTER PIPE HAS BEEN INSTALLED SHALL HAVE WARNING CAUTION TAPE OR RIBBON PLACED NO LESS THAN 12" ABOVE PIPING.
K. ALL CABLE THAT ENTERS OR LEAVES THE PULL BOXES WILL HAVE NO LESS THAN A 12' FOOT SLACK LOOP IN EACH BOX OR VAULT. IT WILL BE MANAGED, ORGANIZED, LABELED AND SECURED ON THE WALL OF THE BOX WITH PURPOSE BUILT SUPPORT RACKS AND RAILS TO ALLOW FREE ACCESS TO PULL BOX FOR FUTURE USE.

- L. TELECOMMUNICATIONS HAND-HOLES SHALL BE PLACED IN OUTSIDE PLANT CONDUIT RUNS AT AN INTERVAL NO GREATER THAN EVERY 500 FEET. CONDUITS RUN BETWEEN TWO TRG COMMUNICATIONS HAND-HOLES, OR BETWEEN A HAND-HOLE AND A BUILDING, SHALL CONTAIN NO MORE THAN TWO 90°SWEEPS OR A TOTAL OF 180° SWEEPS. IF ADDITIONAL CONDUIT SWEEPS ARE REQUIRED, PLACE ADDITIONAL HAND-HOLES AS NEEDED. TELECOMMUNICATIONS HAND-HOLES SHALL BE TYPICALLY CONSTRUCTED IN PRE-FABRICATED CAST CONCRETE, TIER-15 RATING FOR WALL AND LID(S). TYPICAL HAND-HOLE SIZE SHALL BE 4'X4'X4'.
1. IF WALL SECTIONS MUST BE STACKED, THESE TELECOMMUNICATIONS HAND-HOLE SECTIONS MUST BE INSTALLED WITH A WATER-TIGHT JOINT SEALER BETWEEN THE SECTIONS OF THE MANHOLE.
2. BARE EARTH FOR THE FLOOR OF A HAND-HOLE IS NOT ALLOWED. GRAVEL PACKED FLOOR PER MANUFACTURER, I.E. ARMORCAST.
3. TELECOMMUNICATIONS HAND-HOLES MUST CONTAIN CABLE RACKS FOR DRESSING AND SECURING CABLES THAT ROUTE THROUGH THE MANHOLE. EACH MUST CONTAIN STRUTS OR RAILS FOR INSTALLING CANTILEVER SUPPORT RACK ARMS PER HAND-HOLE WALL.
4. ALL METAL HARDWARE IN THE HAND-HOLE (RACKS AND LADDERS) MUST BE GROUNDED TO THE BONDING TABS PRE-CAST IN THE HAND-HOLE, WITH THE BONDING TABS BONDED TO THE GROUND ROD IF APPLICABLE.
5. THE COVER OF ALL TELECOMMUNICATIONS MANHOLES MUST BE A MINIMUM OF ONE (1) INCH ABOVE THE FINISHED GRADE AFTER ALL LANDSCAPING IS COMPLETED. IF MANHOLES ARE LOCATED IN PAVED AREAS, THE PAVEMENT MUST BE TAPESSED UP TO THE MANHOLE COVER.

3.5 PATHWAY INSTALLATIONS

- A. ALL CONCEALED WIRING IN BUILDING PERIMETER WALLS AND NON-ACCESSIBLE CEILINGS SHALL BE INSTALLED IN CONDUIT NOT TO EXCEED 40% FILL RATE. ALL WIRING IN ACCESSIBLE CEILING SPACES SHALL BE INSTALLED IN A PREDETERMINED AND DESIGNED PATHWAY CREATED USING A SUPPORT METHOD BY PENDUIT PRO J-HOOK, J-HOOK LIKE, TRAYS, BASKETS, AND LADDERS SECURELY FASTENED TO THE BUILDING STRUCTURE AT A MAXIMUM OF 5' FOOT INTERVALS. ALL CONCEALED WIRING IN BUILDING INTERIOR WALLS SHALL HAVE A MINIMUM OF 3/4" EMT WITH NYLON PULL STRING IN WALL CAVITY TO 6" INCHES INTO OR ABOVE ACCESSIBLE CEILING. PROVIDE PROTECTIVE BUSHING AT WALL STUD PENETRATIONS FOR BUILDING INTERIOR WALL INSTALLATIONS TO PREVENT THE CABLE FROM BEING IN CONTACT WITH THE SHARP EDGES BEFORE CABLE IS INSTALLED. WHERE PREMISE CABLE MAKES TRANSITION FROM CONDUIT TO ANOTHER METHOD, THE END OF THE CONDUIT SHALL HAVE AN INSULATING BUSHING TO PREVENT THE CABLE FROM BEING IN CONTACT WITH THE SHARP EDGES.
B. INSTALL POLYETHYLENE FLAT PULL STRING WITH FOOTAGE MARKS WITH THE MINIMUM BREAKING STRENGTH OF 200-LB IN ONE PIPE OR SMALLER AND PULLING STRENGTH OF 1200-LB IN EXIST 1-1/4" AND LARGER.
C. CABLES THAT PENETRATE FIRE-RATED WALLS SHALL BE FIRE AND SMOKE STOPPED WITH UL APPROVED METHODS AND MATERIALS SUITABLE FOR THE RE-ENTERABLE PENETRATION:

- 1. APPROVED MANUFACTURERS:
a. SPECIFIED TECHNOLOGIES INC. - EZ-PATH SERIES
b. SPECIFIED TECHNOLOGIES INC. - EZ-PATH FIRESTOP GROMMET
c. WIREMOLD/LEGRAND - FLAME STOPPER FS SERIES
d. HILTI CORP. - FIRESTOP SLEEVE CP 653
e. SUBSTITUTIONS: PERMITTED
D. INSTALL ALL CONDUCTORS, CONNECTIONS, AND DEVICES IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE OR AHI.

- E. PATHWAYS BETWEEN TR, ER, AND EF SHALL HAVE A MINIMUM OF TWO (2) 2" INCH RACEWAYS FOR UTP DATA STATION CABLING AND ONE (2) 4" INCH RACEWAY DEDICATED FOR ACCESS CONTROL CABLING. QUANTITY DETERMINED BY FILL AND FUTURE WORK.
F. ALL CORE-DRILLED HOLES THROUGH FLOORS AND PENETRATIONS THROUGH FIRE WALLS SHALL BE SLEEVED AND THE CORRECT FITTINGS WILL BE PLACED AT BOTH ENDS OF THE PIPE FOR PROTECTING THE CABLE.
G. ALL COMPONENTS WILL MEET OR EXCEED ANSI/TIA/EIA-569-B STANDARDS.
H. FOR POWER SYSTEMS OPERATING AT 480V OR GREATER, INCLUDING ELECTRICAL DISTRIBUTION PANELS, STEP DOWN DEVICES OR TRANSFORMERS, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 6 M (20 FT.) FROM ALL TELECOMMUNICATIONS CROSS-CONNECTS.
I. FOR POWER SYSTEMS OPERATING AT 480V OR GREATER, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 10' FEET (3-METERS) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO ELECTRICAL POWER CABLES OR CONDUITS.
J. FOR LARGE ELECTRICAL MOTORS OR TRANSFORMERS, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 4' FEET (1.2-METERS) FROM ALL TELECOMMUNICATIONS CABLING.

- K. FOR LIGHTNING PROTECTION SYSTEM CONDUCTORS (NEC 800-13), MAINTAIN A MINIMUM SEPARATION DISTANCE OF 6' FEET (1.8-METERS) FROM ALL TELECOMMUNICATIONS CABLING.
L. FOR POWER SYSTEMS OPERATING AT LESS THAN 480V, INCLUDING ALL CONDUIT AND CABLES USED FOR ELECTRICAL POWER DISTRIBUTION, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 2' FEET (0.6-METERS) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO ELECTRICAL POWER CABLES OR CONDUITS.
M. FOR FLUORESCENT LIGHTING, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 5" INCHES (12-CM) FROM ALL TELECOMMUNICATIONS CABLING. PATHWAYS SHOULD CROSS PERPENDICULAR TO FLUORESCENT LIGHTING.

- N. FOR BRANCH CIRCUITS (SECONDARY) POWER (120/240V, 20A) WHERE ELECTRIC LIGHT OR POWER CIRCUITS COEXIST WITH TELECOMMUNICATIONS CABLING, MAINTAIN A MINIMUM SEPARATION DISTANCE OF 2" INCHES (0.50 MM).

3.6 TESTING

- A. TESTING OF COPPER CABLING SHALL BE PERFORMED PRIOR TO COMPLETION OF THE WORK AND PROJECT CLOSURE. ONE HUNDRED (100%) PERCENT OF THE COPPER BACKBONE AND HORIZONTAL WIRING PAIRS SHALL BE TESTED FOR OPENS SHORTS, CORRECT POLARITY, PAIR TRANSPOSITION, AND PRESENCE OF A/C VOLTAGE WITH FLUKE NETWORKS OR EQUIVALENT CERTIFYING TESTER. VOICE AND DATA HORIZONTAL WIRING LINK SHALL BE TESTED FROM THE WAO TO THE TR. THE NETWORKING STRUCTURED CABLING SYSTEM WILL BE TESTED FOR CONFORMANCE TO THE SPECIFICATIONS OF ANSI/TIA-568-C.2 CATEGORY 6 PERMANENT LINK. THE TEST SHALL INCLUDE MUTUAL CAPACITANCE, CHARACTERISTIC IMPEDANCE, ATTENUATION, NEAR-END CROSS TALK, AND RESISTANCE.
B. ALL FIBER OPTIC CABLE MUST BE VISUALLY INSPECTED AND OPTICALLY TESTED ON THE REEL UPON DELIVERY TO THE INSTALLATION SITE. USING AN OPTICAL TIME DOMAIN REFLECTOMETER (OTDR), AN ACCESS JUMPER WITH LIKE FIBER, A PIGTAIL, AND A MECHANICAL SPLICE, ALL FIBERS SHALL BE TESTED FOR CONTINUITY AND ATTENUATION. TESTING FOR CONTINUITY AND ATTENUATION ON THE BULK CABLE REEL MUST CONFIRM FACTORY SPECIFICATIONS TO ENSURE THAT THE FIBER OPTIC CABLE WAS NOT DAMAGED DURING SHIPMENT. THE TEST RESULTS MUST MATCH THE RESULTS OF THE FACTORY ATTACHED TAG ON THE REEL OR THE FIBER. SHALL NOT BE USED. REEL DATA SHEET MUST BE PROVIDED SHOWING TEST RESULTS.

- C. END-TO-END OTDR AND OTLS TEST MEASUREMENTS SHALL BE PROVIDED FOR OS1 SINGLE-MODE AND OM4 MULTIMODE OPTICAL FIBERS (2 WAVE LENGTHS PER TEST ARE REQUIRED PER FIBER TYPE) PER ANSI/TIA-568-C.3 STANDARD. TEST RESULTS MUST BE SUBMITTED FOR REVIEW AS PART OF THE INSTALLATION INSPECTION REQUIREMENTS. TEST RESULTS SHALL BE IN PAPER AND ELECTRONIC FORM, AND MUST CONTAIN THE NAMES AND SIGNATURES OF THE TECHNICIANS PERFORMING THE TESTS.
D. OPTICAL FIBERS MUST BE CERTIFIED, TESTED, RATED AND GUARANTEED FOR A MINIMUM PERFORMANCE OF GIGABIT ETHERNET TRANSMISSION OVER FIBER (100GBASE-X) AND MAXIMUM OF 10 GIGABIT ETHERNET (10GBASE-X). ADDITIONALLY, ALL FIBER OPTIC CABLE LINKS MUST PASS ALL INSTALLATION AND PERFORMANCE TESTS BOTH RECOMMENDED AND MANDATED BY THE CABLE MANUFACTURER.

- E. RECORDS OF ALL TESTS SHALL BE COMPILED ONTO COMPACT DISC OR PORTABLE MEDIA AND SUBMITTED TO THE OWNER UPON COMPLETION OF THE WORK. THE TEST RESULTS SUMMARY, RAW TEST FILE, CSV, AND PDF VERSIONS MUST BE SUBMITTED (E.G. FLUKE NETWORKS LINK WARE) AS PER THE MANUFACTURER'S WARRANTY SUBMITTAL PROCEDURE DEFINES. TEST RESULTS MAY BE ELECTRONICALLY SUBMITTED DIRECT TO THE OWNER'S I.T. DEPARTMENT. A FINALIZED REPORT WITH ALL RECORD DRAWINGS, WARRANTY AND TEST RESULTS WILL BE SUBMITTED TO THE OWNER'S I.T. DEPARTMENT IN AN ORGANIZED 3-RING BINDER. THE REPORT WILL BE SUBMITTED WITH SECTIONS DEFINED WITHIN A TABLE OF CONTENTS MATCHING THE TABBED SECTIONS. SEE DIVISION 1 GENERAL REQUIREMENTS.
F. THE OPTICAL FIBER MANUFACTURER WARRANTY MUST BE REGISTERED WITH CORNING CABLING SYSTEMS OR APPROVED SUPPLIER SEPARATELY BY THE SAME LOW-VOLTAGE CONTRACTOR FOR THE COPPER STRUCTURED CABLING SYSTEM.

3.7 OPTICAL FIBER AND COPPER SPLICES

- A. THE SPLICING OF OPTICAL FIBER CABLE SHALL ONLY BE ALLOWED TO TERMINATE FACTORY PIGTAIL CONNECTORS AND RIBBON CABLES CONNECTORS.
B. COPPER COUNT SPLICES SHALL UTILIZE 710 SPLICE METHOD CONNECTIONS PER THE CONDITION.
C. TELECOM SPLICE CANISTERS WILL BE FROM PREFORMED ARMADILLO STAINLESS STEEL MODELS AND JELLY FILLED TO FACTORY PRESSURE ONCE ALL OF THE MULTI-PAIR CABLE HAS BEEN CERTIFIED FOR PRECISION AND ACCURACY IN BEING IDENTIFYING AND LABELED.

3.8 TRASH AND MATERIALS

- A. TRASH WILL BE KEPT CLEARED FROM THE WORK AREAS DAILY.
B. MATERIALS WILL BE KEPT IN A NEAT AND WORKMANSHIP LIKE MANNER.
3.9 SALVAGE MATERIALS
A. REMOVE AND RECYCLE UNUSED, UNDOCUMENTED AND OTHERWISE "ABANDONED" CABLES PRIOR TO THE COMPLETION OF THE PROJECT.
B. "ABANDONED CABLE" IS DEFINED PER NEC 2008 ARTICLES: 640, 645, 725, 760, 770, 800, 820 AND 830. FURTHER DEFINITION IS CONTAINED IN NFPA-75, NFPA-76 AND NFPA-90A.
C. DISCONNECT ABANDONED TELECOMMUNICATIONS OUTLETS, WORK AREAS AND REMOVE DEVICES.
D. REMOVE CABLING AND COMMUNICATIONS DEVICES IN WALLS, FLOORS, AND CEILINGS SCHEDULED FOR REMOVAL.
E. PROVIDE BLANK COVER FOR ABANDONED TELECOMMUNICATIONS OUTLET AND WORK AREA BOXES THAT ARE NOT REMOVED.

- F. SCHEDULE WORK WITH OWNER AND OTHER CONTRACTORS.
G. IF SALVAGED MATERIALS ARE TO BE RE-USED OR OTHERWISE RETURNED TO THE OWNER, MAKE SURE THE ITEMS TO BE REMOVED FROM SERVICE AND TURNED OVER TO THE OWNER ARE IDENTIFIED ON THE DRAWINGS.
H. EXCEPT WHERE NOTED ON THE PROJECT DRAWINGS, MATERIALS REMOVED SHALL BECOME THE PROPERTY OF AND SHALL BE DISPOSED/RECYCLED BY THE CONTRACTOR.
I. MAINTAIN MATERIALS AND EQUIPMENT TO BE TURNED OVER TO THE OWNER AND/OR REUSED IN CONDITION EQUAL TO THAT EXISTING BEFORE WORK BEGAN. REPAIR OR REPLACE MATERIALS OR EQUIPMENT DAMAGED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.



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HR PHASE II & III EXTERIOR RENOVATION



Table with 3 columns: No., Description, Date. The table is currently empty.

PROJECT: HR PHASE II & III EXTERIOR RENOVATION
REVISION:
SHEET TITLE: ELECTRICAL SPECIFICATIONS

PROJECT NO: H17018
DRAWN BY: RGS
CHECKED BY: BDH
ISSUE DATE: 11/24/2020

E006
Scale



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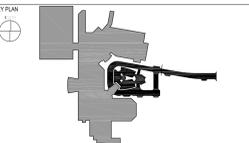
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Cherokee Hard Rock Hotel & Casino



**HR PHASE II & III
 EXTERIOR
 RENOVATION**

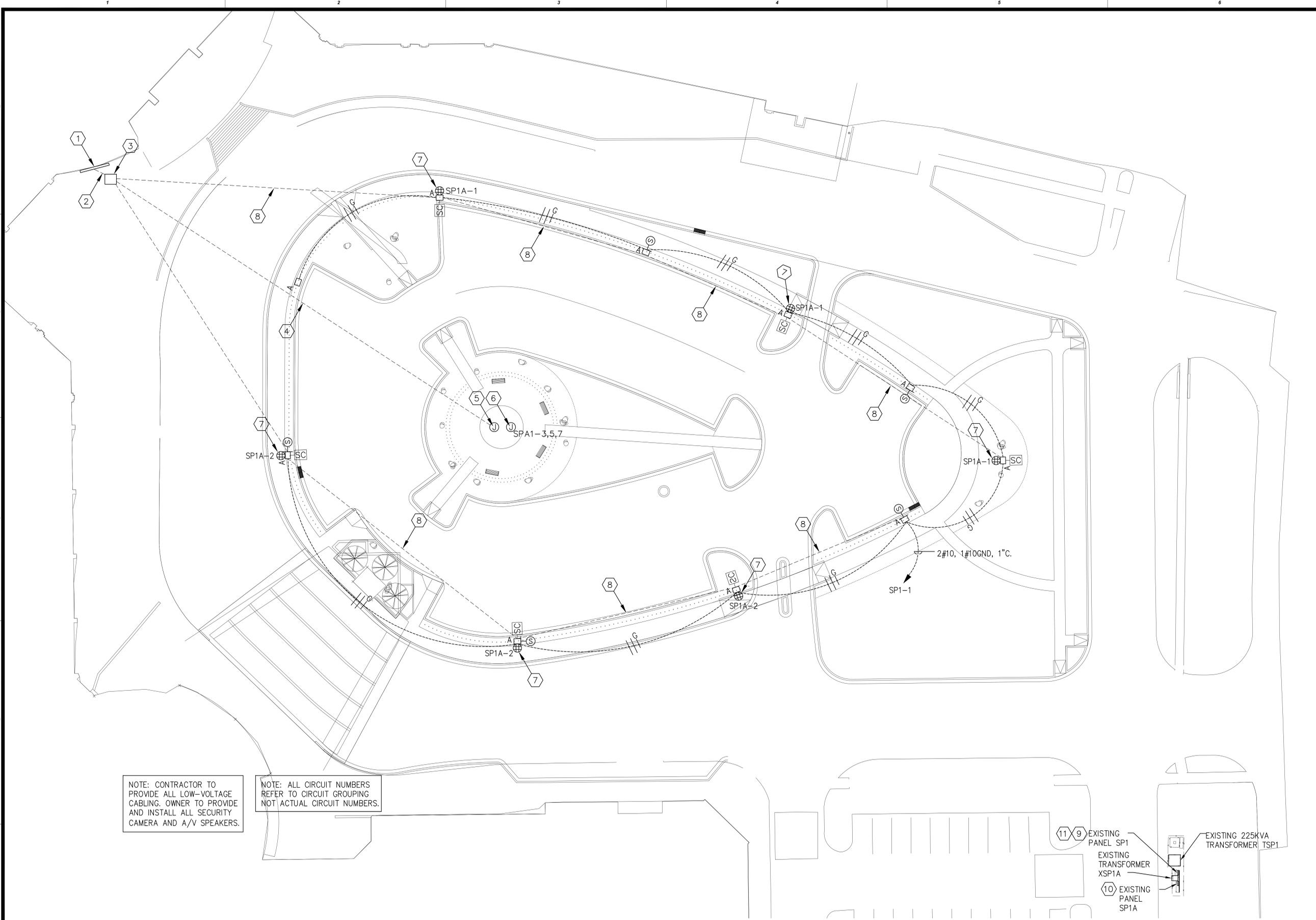


No.	Description	Date

**ELECTRICAL LIGHTING
 PLAN**

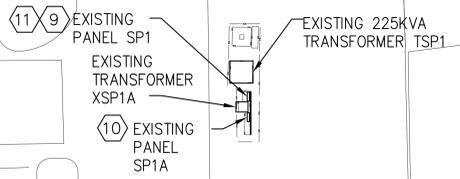
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E101
 Scale AS SHOWN



NOTE: CONTRACTOR TO PROVIDE ALL LOW-VOLTAGE CABLING. OWNER TO PROVIDE AND INSTALL ALL SECURITY CAMERA AND A/V SPEAKERS.

NOTE: ALL CIRCUIT NUMBERS REFER TO CIRCUIT GROUPING NOT ACTUAL CIRCUIT NUMBERS.



A ELECTRICAL LIGHTING PLAN
 SCALE: 1/16"=1'-0"
 NORTH

01 January, 2000

