

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE	PAGE 1 OF 2 PAGES
2. AMENDMENT/MODIFICATION NO. AMENDMENT NO. 0004		3. EFFECTIVE DATE 09/16/08	4. REQUISITION/PURCHASE REQ. NO.	5. PROJECT NO. (If applicable) 08-0016
6. ISSUED BY Resident Officer in Charge of Construction 1005 Michael Road Camp Lejeune, NC 28547-2521		CODE mks	7. ADMINISTERED BY (If other than Item 6) See Item 6	
8. NAME AND ADDRESS OF CONTRACTOR (No., street, county, State and ZIP Code)			(X)	9A. AMENDMENT OF SOLICITATION NO. N40085-08-R-0016
			X	9B. DATED (SEE ITEM 11) 09/03/08
				10A. MODIFICATION OF CONTRACT/ORDER NO.
				10B. DATED (SEE ITEM 11)
CODE	FACILITY CODE			

11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS

The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers is extended, is not extended.
 Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods:
 (a) By completing items 8 and 15, and returning _____ copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted;
 or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment your desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.

12. ACCOUNTING AND APPROPRIATION DATA (If required)

**13. THIS ITEM ONLY APPLIES TO MODIFICATION OF CONTRACTS/ORDERS.
IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.**

CHECK ONE	A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.
	B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(b).
	C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:
	D. OTHER (Specify type of modification and authority)

E. IMPORTANT: Contractor is not, is required to sign this document and return _____ copies to the issuing office.

14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.)

08-0016, Interior/Exterior Repairs, Building 342

(CONTINUED)

Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.

15A. NAME AND TITLE OF SIGNER (Type or print)		16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
15B. CONTRACTOR/OFFEROR	15C. DATE SIGNED	16B. UNITED STATES OF AMERICA	16C. DATE SIGNED
(Signature of person authorized to sign)		(Signature of Contracting Officer)	

CONTINUATION SHEET

1. Question: On Drawing E-1, the symbol schedule for the telephone indicates “See Specifications for Cabling Requirements.” The specification does not indicate quantities. What is the clear scope of the telephone requirements?

1. Answer: On Drawing E-1 the description for the telecomm drop symbol in the Symbol Schedule indicates to "see specifications and/or drawings". Sheet E-2 shows existing conditions for comm. and Sheet E-3 shows renovated plans for comm., see specification section 27 10 00 for additional information.

2. Question: The Electrical drawings show us the telecommunication outlets. How many cables do you want pulled to each telephone outlet? No details are provided and the specs don't say.

2. Answer: Delete Specification Section 27 10 00 and replace with attached Specification Section 27 10 00. The contractor shall wire the building. Provide 4 CAT 5e cables from the patch panel to each telecommunications faceplate, one cable to each jack, include terminations and testing. Coordinate with Base Telephone for telephone system certification.

SECTION 27 10 00

STRUCTURED TELECOMMUNICATIONS CABLING AND PATHWAY SYSTEM

01/07

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ELECTRONIC INDUSTRIES ALLIANCE (EIA)

- TIA/EIA-492AAAA-A (1998) 62.5-um Core Diameter/125-um Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers (ANSI/TIA/EIA-492AAAA-A)
- TIA/EIA-526-7 (1988) OFSTP-7 Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (ANSI/TIA/EIA-526-7)
- TIA/EIA-568-B.1 (2001; Addendum 2001) Commercial Building Telecommunications Cabling Standard - Part 1: General Requirements (ANSI/TIA/EIA-568-B.1)
- TIA/EIA-568-B.2 (2001) Commercial Building Telecommunications Cabling Standard - Part 2: Balanced Twisted Pair Cabling Components (ANSI/TIA/EIA-568-B.2)
- TIA/EIA-568-B.3 (2000; Addendum 2002) Optical Fiber Cabling Components Standard (ANSI/TIA/EIA-568-B.3)
- TIA/EIA-569-A (1998; Addenda 2000, 2001) Commercial Building Standards for Telecommunications Pathways and Spaces (ANSI/TIA/EIA-569-A)
- ANSI/TIA/EIA-606-A (2002) Administration Standard for the Telecommunications Infrastructure (ANSI/TIA/EIA-606)
- TIA J-STD-607-A (2002) Commercial Building Grounding (Earthen) and Bonding Requirements for Telecommunications
- EIA/TIA TSB-75 (1996) Additional Horizontal Cabling Practices for Open Offices

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

- NEMA WC 63.1 (2000) Twisted Pair Premise Voice and Data Communications Cables

REGION

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 (2005) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1666 (2000; Rev thru Jul 2002) Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts

UL 1863 (2000) Communication Circuit Accessories

UL 444 (2002; Rev thru Aug 2002) Communications Cables

UL 467 (1993; Rev thru Apr 1999) Grounding and Bonding Equipment

UL 497 (2001) Protectors for Paired Conductor Communication Circuits

UL 1286 (1993; Bul. 1998, R 1998) Office Furnishings

UL 514C (1996; R 2002) Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers

UL 969 (1995; Rev thru Nov 2001) Marking and Labeling Systems

1.2 RELATED REQUIREMENTS

Section 26 00 00, "Basic Electrical Materials and Methods"; Section 26 51 00, "Interior Distribution System"; and Section 16 72 10, "Telephone Distribution System, Outside Plant," apply to this section with additions and modifications specified herein.

1.3 DEFINITIONS

1.3.1 Main Distribution Frame (MDF)

A physical structure at a central location for terminating permanent backbone cables to interconnect with service provider (SP) equipment at the activity minimum point of presence. The MDF generally includes vendor specific components to support voice and data circuits, building surge protector assemblies, main cross connect blocks, equipment support frames, and wood backboard (if MDF is wall mounted). Depending upon local site conditions, the MDF and BDF may be identical.

1.3.2 Building Distribution Frame (BDF)

A structure with terminations for connecting backbone, campus, and horizontal cabling. The BDF generally includes a cross connect, equipment support frame, and wooden backboard or terminal cabinet. The BDF shall include building protector assemblies when used for campus backbone or SP cabling.

REGION

1.3.3 Intermediate Distribution Frame (IDF)

An intermediate termination point for horizontal wiring and cross-connections within telecommunications rooms or wiring closets.

1.3.4 Telecommunications Room

An enclosed space for telecommunications equipment, terminations, and cross-connect wiring for horizontal cabling, minimum size shall be 8' x 10' but could be much larger. Telecommunications rooms should be centrally located unless multiple rooms are used. Access to Telecommunications Rooms should be from a common area such as a hallway and the door should swing out. Multiple Telecommunications Rooms are required if the usable floor space to be served exceeds 10,000 square feet, or the cable length between the horizontal cross-connect and the telecommunications outlet, including slack, exceeds 295 feet. Multiple telecommunications rooms will be connected by a minimum of two 75mm (3 inch) conduits. The minimum ceiling height will be eight and one half feet. The flooring shall be bare concrete instead of carpet or tile to reduce dust and static electricity. Two separately dedicated 20 amp double gang electrical outlets will be installed on the same wall as the conduits or communications backboard. There should not be an electrical panel within the telecommunications room. The lock on the door shall be keyed to a P4 key. At least three walls should be covered with plywood backboard for mounting equipment (see 2.7 BACKBOARDS below).

1.4 ENVIRONMENTAL REQUIREMENTS

Connecting hardware shall be rated for operation under ambient conditions of 0 to 60 degrees C (32 to 140 degrees F) and in the range of 0 to 95 percent relative humidity, non-condensing. Provide HVAC that will maintain continuous and dedicated environmental control (24 hours per day, 365 days per year). If emergency power is available, consider connecting it to the HVAC system.

1.5 SYSTEM DESCRIPTION

The structured telecommunications pathway system shall include permanently installed horizontal and backbone pathways, service entrance facilities, work area pathways, telecommunications outlet assemblies, conduit, and raceway, and hardware for splicing, terminating, and interconnecting. The horizontal system includes the pathway between the telecommunications room and the work area telecommunications outlet. The horizontal system shall be suitable for star topology with the IDF at the center or hub of the star. The backbone pathway system includes intrabuilding and interbuilding interconnecting pathway to provide connectivity between the MDF's, BDF's, and IDF's. The backbone system shall be suitable for star topology with the MDF at the center or hub of the star.

1.6 SUBMITTALS

The following shall be submitted in accordance with Section 01 33 00 "Submittal Procedures":

SD-02 Shop Drawings

Telecommunications drawings

REGION

Distribution frames

SD-03 Product Data

Telecommunications cabling (backbone and horizontal)

Patch panels

Telecommunications outlet/connector assemblies

Equipment support frame

Building protector assemblies

Connector blocks

Protector modules

SD-06 Test Reports

Telecommunications cabling testing

Factory reel tests

Furnish factory reel tests for optical fiber cables.

SD-07 Certificates

Contractor Qualifications

Manufacturer Qualifications

Test plan

SD-10 Operation and Maintenance Data

Telecommunications cabling and pathway system Data Package 5

Submit operations and maintenance data in accordance with Section 01 78 23, Operation and Maintenance Data and as specified herein.

1.7 ADDITIONAL SUBMITTAL REQUIREMENTS

All submittals of material, equipment and design must be approved by the Base Telephone Office.

1.7.1 Telecommunications Drawings

Provide registered communications distribution designer (RCDD) approved drawings complete with wiring diagrams and details required to prove that the distribution system shall properly support connectivity from the telecommunications equipment room to telecommunications work area outlets. Show the entrance facility and layout of cabling and pathway runs, cross connect points, MDF, BDF, IDF, grounding system, terminating block arrangements and type. Drawings shall depict final telecommunications cabling configuration, including location, color coding, gage, pair assignment, polarization, and terminating blocks layout at cross connect

REGION

points and patch panels after telecommunications cable installation. Provide a plastic laminated schematic of the as-installed telecommunications cable system showing cabling, MDF's, BDF's, IDF's, and equipment rooms keyed to floor plans by room number. Mount the laminated schematic in each telecommunications room as directed by the Contracting Officer. The Telecommunications Contractor will receive design approval from the Base Telephone Officer prior to installation.

1.7.2 Distribution Frames

Provide shop drawing showing layout of applicable equipment including incoming cable stub or connector blocks, building protector assembly, outgoing cable connector blocks and equipment spaces and racks.

1.7.2 Qualifications

1.7.2.1 Minimum Contractor Qualifications

Prior to installation, submit data of provider's experience and qualifications. All work under this section shall be performed by and all equipment shall be provided by a certified Telecommunications Contractor, hereinafter referred to as the Contractor. The Contractor shall have the following qualifications in Telecommunications Systems installation:

- a. Contractor shall have a minimum of 3 years experience in the application, installation and testing of the specified systems and equipment to be installed.
- b. All supervisors and installers assigned to the installation of this system or any of its components shall be Building Industry Consulting Services International (BICSI) Certified Cabling Installation Technicians, Installer Level 2, or have a minimum of 3 current consecutive years experience in the installation of the specified copper and fiber optic cable and components.
- c. Contractor shall include names and locations of two projects successfully completed using optical fiber and copper communications cabling systems. Include specific experience in installing and testing structured telecommunications distribution systems using optical fiber and Category 5e cabling systems. Include written correspondence from users that systems have performed satisfactorily for not less than 18 months.

1.7.2.2 Minimum Manufacturer Qualifications

The equipment and hardware provided under this contract will be from manufacturers that have a minimum of 3 years experience in producing the types of systems and equipment specified.

1.7.3 Test Plan

Provide a complete and detailed test plan for the telecommunications cabling system including a complete list of test equipment for the UTP and optical fiber components and accessories 60 days prior to the proposed test date. Include procedures for certification, validation, and testing.

REGION

1.7.4 Additions to Operation and Maintenance Manuals

In addition to requirements of Data package 5 for the telecommunications cabling and pathway system, include the requirements of paragraph entitled "Telecommunications Drawings."

1.8 DELIVERY AND STORAGE

Provide protection from weather, moisture, dirt, dust, and other contaminants for telecommunications cabling and pathway equipment placed in storage.

PART 2 PRODUCTS

2.1 PATHWAYS (BACKBONE AND HORIZONTAL)

TIA/EIA-569-A. Pathway shall be conduit, cable tray, under floor duct, access floor, and wireway installations. Provide grounding and bonding as required by **TIA J-STD-607-A**. Cable tray wiring shall comply with **NFPA 70**. All conduits entering the Telecommunications Room will be home run conduits with a plastic bushing and shall either extend up from the floor 3 to 4 inches onto the backboard or down from the ceiling 3 to 4 inches onto the backboard and will be bonded to the TMGB or TGB by a minimum number 6 green sheathed conductor. All penetrations will be sealed in accordance with code (fire-stopping). A minimum of two 3 inch conduits will be installed between the Main Telecommunications Room and any sub closets.

2.1.1 Work area Pathways

Comply with **TIA/EIA-569-A**, except 1-inch diameter conduit. System furniture pathways shall comply with **UL 1286**. Horizontal cabling for open offices shall comply with **EIA/TIA TSB-75**.

2.1.2 Pull Boxes

Construct of galvanized sheet steel with screw-fastened covers. Minimum size of boxes shall be not less than 4-inches wide by 4-inches in length by 3-inches deep for individual 1-inch diameter conduit; minimum size of boxes shall be not less than 12-inches wide by 60-inches long by 12-inches deep for 4-inch conduit. Provide pull boxes where length of conduit exceeds 100 feet or where there are more than two 90 degree bends, or equivalent. Align conduit ends on opposite side of pull boxes. Provide pull boxes in straight lengths of conduit; neither pull boxes nor conduit bodies shall be permitted in lieu of bends.

2.2 BENDS

Inside radius of conduit bend shall be at least 6 times the internal diameter of conduit.

2.3 TELECOMMUNICATIONS OUTLET BOXES

Telecommunications outlet boxes should be placed 6" to the left or right of every electrical outlet box in workable office areas or any area that could be converted into workable office area such as a storage closet; also any conference room should have one floor and one ceiling box. Boxes shall be

REGION

standard type 4 inches square by 2 1/8 inches deep with 1-inch diameter side knock-outs, with a single gang plaster ring. Mount flush in finished walls at height indicated. Outlet boxes for wall-mounted telephones shall be 2 by 4 by 2 1/8 inches deep; mounted at 60 inches above finished floor. Outlet boxes for handicapped telephone station shall be mounted at a height 48 inches above finished floor. Outlet boxes installed in floor for classrooms or open spaces shall be telecommunications floor boxes large enough to support a surge of users with proper cable management. Floor boxes should not be used in wet areas. Tele electric poles or furniture managed pathways fed from above the wet area should be used.

2.3.1 Telecommunications Cabling

Cabling shall be UL listed for the application and shall comply with TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3 and NFPA 70. Provide a labeling system for cabling as required by ANSI/TIA/EIA-606-A and UL 969. Cabling shall be manufactured in the USA and cabling manufactured more than 12 months prior to date of installation shall not be used.

2.3.1.1 Backbone Copper

ICEA S-80-576, TIA/EIA-568-B.1, TIA/EIA-568-B.2 and UL 444, copper backbone cable shall be solid conductor, 24 AWG, 100 ohm, 100-pair UTP (Unshielded twisted pair), NFPA 70 CMR rated formed into 25 pair binder groups covered with a thermoplastic jacket. NFPA 70 type CMP may be substituted for type CMR. Pair twist-lengths and frequency per unit length shall be determined by the manufacturer. A minimum of two conductor twists per foot is required. Color coding shall comply with industry standards for 25 pair cables. Two 4 pair 24 AWG Category 5e riser (CMR) rated cable will be installed between the MDF and each of the IDF's and terminated in the patch panel in the last position.

2.3.1.2 Backbone Optical Fiber between closets

TIA/EIA-492AAAA-A, TIA/EIA-568-B.3, UL 1666, NFPA 70. Optical fiber cable shall be 12-fiber multimode 62.5/125-um and 12-fiber singlemode 8/125-um, terminated on ST type connectors, with a non-conductive optical fiber riser cable (OFNR) rating. Nonconductive optical fiber Plenum (OFNP) cable may be substituted for type nonconductive optical fiber riser cable (OFNR). The cable jacket shall be orange & yellow.

Dual unit additional Optical fiber cable shall be terminated on ST type connectors, with a non-conductive optical fiber riser cable (OFNR) rating. Nonconductive optical fiber Plenum (OFNP) cable may be substituted for type nonconductive optical fiber riser cable (OFNR). The cable jacket shall be orange.

2.3.2 Horizontal Cabling

Comply with NFPA 70, NEMA WC 63.1, ICEA S-80-576 and performance characteristics in TIA/EIA-568-B.1.

2.3.2.1 Horizontal Copper

REGION

TIA/EIA-568-B.2, NFPA 70, UTP (unshielded twisted pair), 100 ohm. Provide four each individually twisted pair, 24 AWG conductors, Category 5e general purpose cable, with a white or gray PVC jacket for jack one and a blue PVC jacket for jack two. Plenum (CMP) or riser (CMR) cable may be substituted for general purpose cable. If the cabling passes thru a plenum air space then plenum (CMP) rated cable is required.

2.3.2.2 Horizontal Optical Fiber

TIA/EIA-492AAAA-A, TIA/EIA-568-B.3, NFPA 70. Optical fiber cable shall be 62.5/125-um, 2-fiber multimode, rated nonconductive optical fiber cable (OFN). Plenum (OFNP) or riser (OFNR) cable may be substituted for general purpose cable. The cable jacket shall be orange and be of single jacket construction. If the cabling passes thru a plenum air space then plenum (CMP) rated cable is required.

2.4 DISTRIBUTION FRAMES

Provide building distribution frames (BDF's), intermediate distribution frames (IDF's), and main distribution frames (MDF's) as shown on design drawings for terminating and cross connecting permanent cabling.

2.4.1 Equipment Support Frame

EIA-310-D.

a. Bracket, wall mounted, 8 gauge aluminum. Provide hinged bracket compatible with 482.6 mm panel mounting.

b. Rack, wall mounted, 16 gauge steel construction treated to resist corrosion. Shall be CPI 15320-724 or equivalent.

c. Racks, floor mounted modular type, 16 gauge steel construction treated to resist corrosion. Shall be Siemon's RS3-07-S or equivalent approved by base telephone. Provide rack with vertical and horizontal cable management channels, top cable troughs and grounding lug. Rack shall be compatible with 482.6 mm panel mounting.

2.4.2 Building Protector Assemblies

Building protector assembly shall have connector blocks for connection to the exterior cable at full capacity.

2.4.2.1 Protector Modules

UL 497, RUS TECM 823, three-electrode gas tube or solid state type rated for the application. Provide the number of surge protection modules equal to the number of pairs of exterior cable of the building protector assembly.

2.4.3 Connector Blocks

Insulation displacement type, Krone' 6652-1-880-10, for Category 5e and higher systems. Provide blocks for the number of backbone cables terminated on the block plus 25 percent spare.

REGION

2.4.4 Patch Panels

Provide ports for the number of horizontal cables terminated on the panel plus 25 percent spare. Provide pre-connectorized Optical fiber and copper patch cords for patch panels. Provide patch cords with connectors specified. Patch cords shall meet minimum performance requirements specified in TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3 for cables and hardware specified.

2.4.4.1 Modular to Patch Panel

TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3. Shall be Siemon's type CT patch panels, CT-PNL-XX. Panels shall be third party verified and shall comply with EIA/TIA Category 5e requirements. Panel shall be constructed of 2.2 mm minimum aluminum and shall be compatible with an EIA 482.6 mm equipment rack. Panel shall provide ## non-keyed, RJ-45 ports. Patch panels shall terminate the building cabling on 110-style insulation displacement connectors and shall utilize a printed circuit board interface, Siemon's CT Couplers, CT-F-C5-C5-01. The rear of each panel shall have incoming cable strain-relief and routing guides. Panels shall have each port factory numbered and be equipped with laminated plastic nameplates above each port.

2.4.4.2 Fiber Optic Patch Panel

Provide panel for maintenance and cross-connecting of optical fiber cables. Panel shall be constructed of 2.2 mm minimum aluminum and shall be compatible with EIA 482.6 mm equipment racks. Each panel terminating backbone fiber optic cable shall provide either 6 or 12 ST multimode adapters. Each panel terminating horizontal multi-mode fiber optic cable shall provide 6 multi-mode ST type adapters. Adapters shall utilize metallic alignment sleeves. Provide dust cover for all unused adapters. The rear of each panel shall have a cable management tray a minimum of 203 mm deep with removable cover, incoming cable strain-relief and routing guides. Panels shall have each adapter factory numbered and be equipped with laminated plastic nameplates above each adapter.

2.5 TELECOMMUNICATIONS OUTLET BOXES

Standard type 100 mm square by 54 mm deep with a single gang plaster ring. Mount flush in finished walls at height indicated. Depth of boxes shall be large enough to allow manufacturer's recommended conductor bend radii for fiber.

2.6 TELECOMMUNICATIONS OUTLET/CONNECTOR ASSEMBLIES

2.6.1 Outlet/Connector Copper

Outlet/connectors shall comply with FCC Part 68.5, TIA/EIA-568-B.1, and TIA/EIA-568-B.2. UTP Outlet/connectors shall be UL 1863 listed, non-keyed, 4-pair, constructed of high impact rated thermoplastic housing and shall be third party verified and shall comply with EIA/TIA Category 5e requirements, Siemon's CT couplers, CT-F-C5-C5-20, or indicated color. Outlet/connectors provided for Category 5e UTP cabling shall meet or exceed the requirements for the cable provided. Outlet/connectors shall be terminated using a 110-style PC board connector, color-coded for both T568A and T568B wiring. Each

REGION

jack shall be wired T568A as indicated. UTP outlet/connectors shall comply with TIA-455-21-A for 500 mating cycles.

2.6.2 Cover Plates

Telecommunications cover plates shall comply with UL 514C, and TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3; flush or oversized design constructed of high impact thermoplastic, Siemon's CT4-FP-20, of indicated color, factory numbered and be equipped with laminated plastic nameplates.

2.6.3 Optical Fiber Distribution Panel

Wall or rack mounted optical fiber distribution panel (OFDP) shall be constructed of 2.2 mm minimum anodized aluminum. Distribution section shall have strain relief, routing guides and shall be lockable, user section shall have a cover for patch cord protection. Each distribution panel shall provide 6 or 12 ST adapters. Adapters shall utilize metallic alignment sleeves. Provide dust covers for all adapters.

2.7 BACKBOARDS

Provide void-free, interior grade plywood 19 mm (3/4 inch) thick as indicated. Backboards shall be fire rated, with the fire stamp visible, or covered with two coats of gray or a lighter color, nonconductive, fire-retardant paint.

2.8 GROUNDING AND BONDING PRODUCTS

Comply with UL 467, TIA J-STD-607-A, and NFPA 70. Components shall be identified as required by ANSI/TIA/EIA-606-A. Ground rods shall be in accordance with Section 26 51 00, "Interior Distribution System." The preferred ground for the Telephone Main Grounding Bus (TMGB) bar will be to the Main Distribution Panel (MDP). All grounding and bonding conductors within the Telecommunications room will be green sheathed copper conductor, stranded, and labeled as suitable for use as such and tagged "DO NOT REMOVE". The minimum size of the TMGB shall be no smaller than 4" by 10" by 1/4 inch thick; bus bar should be factory made -not fabricated.

2.9 FIRESTOPPING MATERIAL

Provide in accordance with Section 07 84 00, "Fire stopping". Provide asbestos free fire stopping system capable of maintaining an effective barrier against flame and gases. System shall be UL listed and comply with ASTM E 814. Include UL system number UL listed print from manufacturer for each type of floor, wall, and ceiling penetration.

2.10 NAMEPLATES

Provide nameplates for equipment rooms and telecommunications rooms doors in accordance with schedule provided on drawings. Provide equipment nameplates in accordance with Section 26 00 00, "Basic Electrical Materials and Methods".

PART 3 EXECUTION

3.1 INSTALLATION

Telecommunications pathway systems, including the horizontal and backbone pathway systems, telecommunications outlet/connector assemblies, and associated hardware shall be installed in accordance with TIA/EIA-568-A, TIA/EIA-569-A, NFPA 70, and UL standards as applicable. Metal raceway bases, covers, and dividers shall be bonded and grounded in accordance with TIA J-STD-607-A. Pathways shall be installed in accordance with the following minimum clearance distances of 1.2 meters (4 feet) from motors, generators, frequency converters, transformers, x-ray equipment or uninterruptible power system, 300 mm (12 in) from power conduits and cable systems, 125 mm (5 inches) from fluorescent or high frequency lighting system fixtures.

3.1.1 Cabling

Install Category 5e UTP and optical fiber telecommunications cabling and pathway system as detailed in TIA/EIA-568-B.1, TIA/EIA-568-B.2, and TIA/EIA-568-B.3. Screw terminals shall not be used. Use an approved insulation displacement connection (IDC) tool kit for copper cable terminations. Do not untwist Category 5e UTP cables more than 12 mm from the point of termination to maintain cable geometry. Provide service loop on each end of the cable, 3 meters in the telecommunications closet, 150mm in the work area outlet for UTP. Do not exceed manufacturers' cable pull tensions for copper. Provide a device to monitor cable pull tensions. Do not exceed 110 Newton pull tension for four pair copper cables. Do not chafe or damage outer jacket materials. Use only lubricants approved by cable manufacturer. Do not over cinch cables, or crush cables with staples. Only Velcro type cable straps are allowed on Category 5e cable and optical fiber cable. For UTP cable bend radii shall not be less than four times the cable diameter.

3.1.1.1 Backbone Cable

- a. Copper Backbone Cable. Install backbone copper cable between MDF, BDF, and IDF equipment as indicated on drawings.
- b. Optical fiber Backbone Cable. Install backbone optical fiber in indicated pathways. Do not exceed manufacturer's recommended bending radii and pull tension. Prepare cable for pulling by cutting outer jacket 250 mm leaving strength members exposed for approximately 250 mm. Twist strength members together and attach to pulling eye. Vertical cable support intervals shall be in accordance with Manufacturer's recommendations.

3.1.1.2 Horizontal Cabling

Install horizontal cabling and pathway as indicated on drawings between MDF, BDF, IDF, and telecommunications outlet assemblies at workstations.

3.1.2 Pathway Installations

Comply with TIA/EIA-569-A, except 1-inch diameter conduit to each outlet from telecommunication room backboard. Conceal conduit under floor slabs and within finished walls, ceilings, and floors. Keep conduit minimum 150 mm (6 inches) away from parallel runs of electrical power equipment, flues, steam, and hot water pipes. Install conduit parallel with or at right angles to ceilings, walls, and structural members where located above

REGION

accessible ceilings and where conduit is visible after completion of project. Run conduits in crawl spaces and under floor slabs as if exposed. Install no more than two 1.57 radii (90 degree) bends for a single horizontal cable run. All bends/turns in conduits will be in straight runs of conduit with a pull box after every 180 degrees of bends; in no case will a turn be made within a pull box. The minimum size for a pull box in a one inch home run conduit will be 4" long by 4" wide by 3" deep, and for a four inch conduit 60" long by 12" wide by 12" deep. All conduits should contain a bushing at the end to protect the cable from damage.

3.1.2.1 Under Floor Duct Pathway Systems

Install cabling and under floor duct in accordance with manufacturers' recommendations.

3.1.2.2 Conduit Installed Under Floor Slabs

Conduit shall be located a minimum of 300 mm (12 inches) below the vapor barrier. Seal around conduits at penetrations through vapor barrier.

3.1.2.3 Service Entrance Conduit, Overhead

Galvanized rigid steel or IMC from service entrance to service entrance fitting or weather head outside of building.

3.1.2.4 Service Entrance Conduit, Underground

PVC Type EPC-40, galvanized rigid steel, or steel IMC. Underground portion shall be encased in minimum of 75 mm (3 inches) of concrete extending from the building entrance to 1500 mm (5 feet) out from the building and shall be a minimum of 450 mm (18 inches) below slab or grade.

3.1.2.5 Cable Tray Installation

Install cable tray components in accordance with [TIA/EIA-569-A](#). Only CMP and OFNP type cable shall be installed in a plenum.

3.1.2.6 Work Area Outlets

All work areas will contain at least two face plates. Any work area larger than 80 sq feet will require additional face plates to service any work location in the room within 6 feet of a faceplate. This also applies to any area that could be converted to work space in the future. All work area faceplates will contain four category 5e jacks, Siemon's CT-F-C5-C5-20 or equivalent approved by base telephone.

3.1.2.7 Terminations

Terminate UTP cable in accordance with [TIA/EIA-568-B.1](#), [TIA/EIA-568-B.2](#), [TIA/EIA-568-B.3](#) and wiring configuration as specified, T568A.

3.1.2.8 Faceplates

As a minimum, each jack shall be labeled as to its function with an icon and a unique number to identify cable link.

REGION

3.1.3 Cables

Unshielded twisted pair shall have a minimum of 152 mm (6 inch) slack cable loosely coiled into the telecommunications outlet boxes. Minimum manufacturer's bend radius for each type of cable shall not be exceeded.

3.1.3.1 Pull Cords

Pull cords shall be installed in all conduit serving telecommunications outlets which do not initially have cable installed.

3.1.3.2 Telecommunications Room Termination

Install termination hardware required for Category 5e and optical fiber system. An insulation displacement tool shall be used for terminating copper cable to insulation displacement connectors.

3.1.4 Equipment Support Frame

Install in accordance with [TIA/EIA-569-A](#):

a. Bracket, wall mounted. Mount bracket to plywood backboard per manufacturer's recommendations. Mount rack so height of highest panel does not exceed 1980 mm (76 inches) above floor.

b. Racks, floor mounted modular type, Siemon's RS3-07-S or equivalent approved by base telephone. Permanently anchor rack to the floor per manufacturer's recommendations.

3.1.5 Electrical Penetrations

Seal openings around electrical penetrations through fire resistance-rated wall, partitions, floors, or ceilings in accordance with Section [07 84 00](#), "Fire Stopping."

3.1.6 Grounding and Bonding

Will be conducted in accordance with [TIA J-STD-607-A](#), and [NFPA 70](#).

3.1.7 Fire Stopping

Seal openings around raceway penetrations through fire resistance rated walls, partitions, floors and ceiling utilizing proper fire stopping materials to maintain fire resistive integrity.

3.2 LABELING

3.2.1 Labels

All labels shall be in accordance with [ANSI/TIA/EIA-606-A](#). The jacks will be numbered in a logical, sequential, clockwise numbering system.

3.2.2 Cable

All cables shall be labeled using color labels on both ends with encoded identifiers per [ANSI/TIA/EIA-606-A](#).

3.2.3 Termination Hardware

All workstation outlets and patch panel connections shall be labeled using color coded labels with encoded identifiers as per ANSI/TIA/EIA-606-A.

3.3 TESTING

3.3.1 Telecommunications Cabling Testing

Perform telecommunications cabling inspection, verification, and performance tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3.

3.3.1.1 Inspection

Visually inspect cabling jacket materials for UL or third party certification markings. Visually inspect UTP and optical fiber jacket materials for UL or third party certification markings. Inspect cabling terminations in telecommunications rooms and at workstations to confirm color code for tip and ring pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, and TIA/EIA-568-B.3. Visually confirm Category 5e marking of outlets, wallplates, outlet/ connectors, and patch panels.

3.3.1.2 Verification Tests

UTP backbone copper cabling shall be tested for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has overall shield. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connected. Perform 100 MHz near-end-cross-talk (NEXT) and attenuation tests for Category 5e systems installations.

Perform optical fiber end to end attenuation tests using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures.

Perform tests in accordance with TIA/EIA-526-14-A, Method B for horizontal, multimode optical fiber and TIA/EIA-526-7, Method B for backbone, single mode optical fiber. Perform verification acceptance tests and factory reel tests.

3.3.1.3 Performance Tests

a. Category 5e Links. Perform UTP link tests in accordance with TIA/EIA-568-B.1, TIA/EIA-568-B.2, TIA/EIA-568-B.3. Tests shall include wire map, length, attenuation, NEXT, and propagation delay.

b. Optical Fiber Links. Perform optical fiber end-to-end attenuation tests and reel tests at jobsite.

c. As built drawings showing all telecommunications outlets and their numbers.

3.3.1.4 Final Verification Tests

Perform verification tests for UTP and optical fiber systems after the complete telecommunications cabling and workstation outlet/connectors are installed. The final QC and certification of installation will be performed by Base Telephone after the contractor has provided As built drawings

REGION

showing all telecommunications outlets and their numbers; test results with both a hard copy of summary and soft copy of detailed results to the government contract representative.

3.3.1.5 Records

a. Records to be provided for copper shall include the cable specification sheets from the manufacturer, the cable routing and locations, all splice point locations, patch panel and jack locations, cable length, cable reel numbers and installation location, the test results in both hard copy and electronic version.

b. Records to be provided for fiber shall include the cable specification sheets from the manufacturer, the cable routing and locations, all splice point locations, patch panel and jack locations, cable length, cable reel numbers and installation location, the test results in both hard copy and electronic version.

c. As built drawings showing all telecommunications outlets and their numbers.

3.4 SCHEDULE

Some metric measurements in this section are based on mathematical conversion of inch-pound measurements, and not on metric measurement commonly agreed to by the manufacturers or other parties. The inch-pound and metric measurements are as follows:

PRODUCTS	INCH-POUND	METRIC
Outlet Boxes		
1. Standard		
- Length/width	4 inches (square)	100 mm (square)
- Depth	2 1/8 inches	55 mm
2. Telephone Outlet		
- Length	4 inches	100 mm
- Width	2 inches	50 mm
- Depth	2 1/8 inches	55 mm
- Depth	1 1/2 inches	38 mm

-- End of Section --

REGION