



ADDENDA# 2

**RFP NO. 5004-0-2020
MARTIN COUNTY HIGH SCHOOL (MCHS) IMPROVEMENTS**

DATE: 03/05/2020

A. The purpose of this section is to provide clarification to Contractor questions as follows:

1. Question: Are the entire Music and Cafeteria Buildings to be painted or are only selected areas on each building to be painted?

Answer: Contractor shall provide new primer & paint for those existing exterior areas on the Music and Cafeteria Buildings.

2. Question: On plan page A-401 detail 3&4 show a "new drip edge". How are we to install without removing the existing roof?

Answer: Intent is for the new drip edge to be installed under the existing metal roof.

3. Question: Details indicate a "PT Wood Blocking to be replaced/modified as required". What is the metal wrapping the lumber and is that to be replaced as well?

Answer: The metal fascia has to be removed for the installation of the new drip edge and/or gutter.

4. Question: On plan page A-401 detail # 5 says to replace wood where required. Will there be a line item cost per LF for any replacement or should we all just replace all the lumber in case?

Answer: As per Tab 5 of Section VII, cost proposal shall be provided separating cost items. Therefore, include your itemized cost and unit of measure to complete the work. It is the Contractor's responsibility to project their best option/alternative to complete the work.

NOTE: Requests for Proposals are commonly used when the District is not as certain of or written specific to the goods and/or services described in the RFP. With a Request for Proposal, the District requests Contractors to review the need as described in the RFP and propose solutions/proposition the District with the variety of services available to the District. The District is willing to consider any options proposed. Ensure those options are defined clearly and are able to be evaluated based on the criteria. Recommendation for award of an RFP is determined by using weighted "selection criteria" of which one may be price. Therefore, price may be a factor in the award of an RFP, but not necessarily the determining factor. However, it is the Contractor's position to identify cost savings. It is the Contractor's position to share how and where there are cost savings. All costs as a result of this RFP with respect to the terms, conditions and pricing may be negotiated with the proposer(s) after the proposals are opened and before a contract is awarded and executed.

B. Attached are the following Specifications as additions to Section X:

Attachment A: Section 27 11 16-Communications Cabinets, Racks, Frames, and Enclosure

Attachment B: Section 27 15 00-Communications Cabling

Attachment C: Section 27 18 00-Communications Testing

1. On Sheet E-204 – Remove 2 comments regarding data cable pulled by customer, change to: "Provide and install 12-strand multimode fiber optic cable in 2"C per section 27 15 00 and 3/8 pull tape (Data).



Note: This an MDF to IDF run requiring 12 strands. For this distance, (+-1100'- contractor is to provide exact distance), multimode fiber is to be used.

- 2. **On Sheet E-204** – Remove 2 comments regarding data cable pulled by customer, change to: Provide and install 12-strand multimode fiber optic cable in 2”C per section 27 15 00 and 3/8 pull tape (Data).
- 3. **On Sheet E-204** – Remove comment regarding location of distribution panel in gym electrical room, change to: Location of distribution pane/cabinet I in gym room 15-015A (Athletic Directors office). Contractor to coordinate with owner to examine existing distribution panel/cabinet and include necessary termination hardware and enclosures to terminate 6 of 12 strands, LC. Coordinate with Owner to identify location for MUTOA to terminate 6 of 12 strands, LC, in guard shack.
- 4. **On Sheet E-301** – Remove comment regarding 1” C and change to 1 ½” C.

All other terms and conditions of this RFP remain unchanged.

This Addendum shall be considered an integral part of the RFQ. Addendum must be signed and returned with your submittal on the designated time **on March 11, 2020.**

Lenora S. Darden

Lenora Darden, MCPP, CPPB, CPSM
Purchasing Supervisor

Acknowledgement is hereby made of Addenda #2 to RFP# 5004-0-2020: Martin County High School (MCHS) Improvements.

Authorized Signature

Firm

Printed, Title

Date

Email Address

ATTACHMENT A

SECTION 27 11 16 COMMUNICATIONS CABINETS, RACKS, FRAMES, AND ENCLOSURE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Supply and installation of cabinets, racks, frames, enclosures, anchorage attachments and accessories required for communications room equipment.

1.02 RELATED SECTIONS

- A. Section 01 25 13 - Product Substitution Procedures.
- B. Section 01 31 00 - Project Coordination.
- C. Section 01 33 00 - Submittal Procedures.
- D. Section 01 42 19 - Reference Standards.
- E. Section 01 45 00 - Quality Control.
- F. Section 01 66 00 – Product Storage and Handling Requirements.
- F. Section 01 78 00 - Closeout Submittals.
- G. Section 27 05 00 – Common Work Results for Communications Systems.
- H. Section 27 05 26 – Grounding and Bonding for Communications Systems.
- I. Section 27 05 28 – Pathways for Communications Systems.
- J. Section 27 11 19 – Communications Termination Blocks and Patch Panels.
- K. Section 27 11 23 - Communications Cable Management and Ladder Rack
- L. Section 27 11 26 – Communications Rack mounted Power Protection and Power Strips.

1.03 REFERENCES

- A. See Section 01 42 00 – References, and Section 27 05 00 – Common Work Results for Communications Systems for additional reference standards, definitions, abbreviations and acronyms.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008 Edition.

1.04 QUALITY ASSURANCE

- A. Comply with Section 01 45 00 – Quality Control.
- B. Communications network installer shall be certified by equipment manufacturer. Installer shall have five continuous years experience in telecommunications installations.
- C. Installer shall have Registered Communications Distribution Designer (RCDD) on his staff to certify that installation is compliant with applicable industry standards, and is installed in accord with contract documents.
- D. Ground equipment racks in accord with Section 27 05 26 Grounding and Bonding for Communications Systems.

1.05 SUBMITTALS

- A. Comply with Section 01 78 00 – Closeout Submittals.

- B. Project Record Drawings shall be submitted indicating layouts of cabling locations and communications room layouts.

1.06 STORAGE AND HANDLING

- A. Comply with Section 01 66 00 – Product Storage and Handling Requirements.
- B. SCS Installer shall be responsible for coordinating storage of equipment at project with Contractor/CM in secure and conditioned space.
- C. Protect equipment from environmental and physical damage from project delivery to Owner's final acceptance of project.
- D. Installer shall have separate keying system for equipment storage spaces, MDT and IDF rooms, so that other building trades shall coordinate with the SCS installer for entrance to those spaces.
- E. SCS installer and Contractor/CM shall be responsible for SCS vandalism, theft, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Approved Manufacturer's.
 - 1. Manufacturers. The Siemon Company, Siemon Business Park, 101 Siemon Company Dr., Watertown, CT 06795-0400; Tel: 860-945-4200; Fax: 860-945-4225; Website: www.siemon.com.
 - 2. Ortronics Corporation, 125 Eugene O'Neill Dr., New London, CT 06320; Tel: 1 887 599-5393; Fax: 1 888 282-0043; website: www.ortronics.com.
 - 3. Chatsworth Products Inc., 701 Industrial Dr., New Bern, NC 28562. Tel: 252-514-2779; Fax: 252-514-2977; website: www.chatsworth.com.
 - 4. Communications Supply Corp. (Hubbell), 200 East Lies Rd., Carol Stream, IL 60188. Tel: 1-877-462-7271; website: gocsc.com.
 - 5. Middle Atlantic Products, Inc., Tel: 873-839-1011; Fax: 973-839-1976; website: middleatlantic.com.
 - 6. Hellerman Tyton, 7930 N. Faulkner Rd., P. O. Box 245017, Milwaukee, Wisconsin 53224. Tel: 800-537-1512; Fax: 800-848-9866; website: hellermantytan.com.
 - 7. Panduit Corp., 17301 Ridgeland Ave., Tinley Park, IL 60477; Tel: 800-777-3300, 708-532-1800; Fax: 708-532-1811; Website: www.panduit.com.
- B. Other manufacturers shall comply with Section 01 25 13 - Product Substitution Procedures.
- C. Four Post Racks
 - 1. Manufacturer: Chatsworth Products Inc.
 - a. Quadrarack™ Server Frame, Model #15053-703, 84" (213cm) H x 19" (48 cm) W x 29" D (73.7 cm), 45RMU, black with square punched hardware Kits #1261-001, as required.
 - 2. Manufacturer: Ortronics Corp.
 - a. Mighty-Mo 10 Server Rack, Model #OR-MM107SVR, 84" (213cm) H, 19" (48 cm) W x 12.5" (30.5 cm) to 30" (76.2 cm) D (adjustable), 45 RMU, black.
- D. Standard Racks
 - 1. Manufacturer: Chatsworth Products Inc.

- a. Model #: 55053-703, 84" (213cm) H x 19" (48cm) W x 29" D (73.7cm) W, 45RMU.
 - 2. Manufacturer: Ortronics Corp.
 - a. Mighty-Mo 6 Cable Management Rack, Model #OR-MM6706, 84" (213cm) H, 19" (48 cm) W x 6.5" (16.5 cm) D, 45 RMU, black.
- E. Rack Base Insulator Kit
 - 1. Manufacturer: Chatsworth Products Inc.
 - a. Part #: 10605-019, 2 isolation plates and 4 isolation grommets.
 - 2. Manufacturer: Ortronics Corp.
 - a. Part #: OR-MMIPK Isolation Pad Kit with 2 isolation plates and 4 isolation grommets.
- F. Vertical Cable Management
 - 1. Manufacturer: Panduit, Corp.
 - a. Model #: WMPV45E, 83" H x 4.24" W with Front and Rear Duct, black, 45RMU ROHS with round head machine screws, wire retainers and covers.
- G. Horizontal Cable Management
 - 1. Manufacturer: Panduit, Corp.
 - a. Model #: WMPH2E, 3.5" (88.9mm) H x 19" (482.6mm) W x 8.9" (225.5mm) D; 2 Rack Space Manager, Front and Rear.
- H. Fiber Connect Panel
 - 1. Manufacturer: Siemon, Corp.
 - a. Model #: FCP3-DWR, black rack mounted fiber enclosure with 72-port fiber connect panel in one RMU with sliding tray and includes mounting brackets, housing/tray, fiber managers, grommets, label holders, and labels.
 - b. Adapter Plates: Model #RIC-FSC6-02 and # RIC-F-SC8-02, as required.
 - 2. Manufacturer: Ortronics, Corp.
 - a. Model #: OptiMo HD FC Series Rack-Mount fiber Cabinets, Model #OR-FC01U-M, black rack mounted fiber enclosure with 96-port fiber connect panel with sliding tray and includes mounting brackets, housing/tray, fiber managers, grommets, label holders, and labels.
 - b. Adapter Plate: Model #OR-HDFP-MPA72LA and #OR-OFP-MPA96LA, as required.
- H. Rack Mounted Interconnect Center (Fiber Cabinet)
 - 1. Manufacturer: Siemon, Corp.
 - a. Model #: RIC3-36, 48 or 72-01, with 6 or 8 fiber adapter plates, as required, based on fiber count and density.
 - b. Adapter Plates: Model #: RIC-F-SC6-02 or RIC-F-SC8-02.
 - 2. Manufacturer: Ortronics, Corp.
 - a. Model #: OR-625MMC-48PD1B or OR-625MMC-96PL1B, with 6 or 8 fiber adapter plates multimode two rack units, as required, based on fiber count and density.
 - b. Adapter Plates: OR-OFP-SCD06MB or OR-OFP-SCD08MB.
- I. Horizontal Cable Management Trays shall be 12" (30.4cm), 18" (56.4cm) or 24" (60.8cm) wide as required to support cable bundles not greater than 3" high across full panel width.
 - 1 Manufacturer: Ortronics, Corp.

- a. Telco Style Tubular Runway, Part # OR-TRT10-12B, black 12" (304mm) W x 9'-8.5" (2.96m) L, 115 lb/ft (172.5 kg/m) load rating. Stringers shall be 0.375" (9.5mm) W x 1.5" (3.81cm) D tubular steel, with 0.5" (1.27mm) W x 1.5" (3.81mm) D cross slats, 12" (304mm) o.c. Provide Part #OR-WRTRT-12B for rack supports at walls.
 - 2. Chatsworth Products, Inc.
 - a. Part # 10250-712, 12" (304mm) W x 9'-11.5" (3.035m) L, 132 lb/ft (197.7 kg/m) load rating. Stringers and cross slats shall be 0.375" x 1.5" tubular steel, with cross slats, 12" (304mm) o.c.
- J. Duplex Fiber Optic Patch Cords
 - 1. Manufacturer: Siemon, Corp.
 - a. Part # FJ2-LCSC5L-02AQ, XGLO 300 50/125µm, Multimode OM3, LC to ST aqua duplex jumper, LC to SC adapters with 2 meter cables.
 - 2. Manufacturer: Ortronics, Corp.
 - a. Part #OR-P3DF2LFRZGZ002M, OptiM LOMF (50/125) PC/OFNR, duplex fiber optic patch cord, LC to SC adapters with 2 meter cables.
- K. Accessories.
 - 1. Manufacturer: Hellermann Tyton - Flexiform Grommet.
 - 2. Manufacturer: Middle Atlantic Products - protective grommet (GR-30).

PART 3 EXECUTION

3.01 INSPECTION

- A. SCS installer shall inspect spaces where equipment is to be located. Immediately notify Contractor/CM of conditions that precludes successful equipment installation.
- B. Buildings in which equipment is to be placed shall be thoroughly cleaned and shall have operating HVAC system to maintain temperature and humidity at conditions equal to final building occupancy.
- C. Start of equipment installation shall be deemed installer's acceptance of building conditions.

3.02 INSTALLATION

- A. Install cabinets, racks, enclosures and accessories in accord with manufacturer's printed installation instructions where indicated.
- B. Provide full louver door on front and back of equipment cabinets with one fan rack unit, and two 5" (127mm) grommet holes in each side and top protected with plastic or rubber edging.
- C. Locate power outlet strips in equipment racks.
- D. Provide wire management rings, ladder rack, brackets, wire management panels for neat and workmanlike installation.
- E. Use velcro cable ties in network rooms. No plastic or metal cable ties shall be used.
- F. When configuring multiple racks in line, vertical cable management between racks shall be larger size, while smaller channels may be used at ends. Do not down-size end of racks.
- G. Securely fasten side-by-side racks to each other using rack manufacturer's standard hardware.

- H. Bag and leave attached to rack unused mounting screws or other hardware upon completion.
- I. Provide vertical cable management sized for no more than 40 percent fill.
- J. Mount with minimum of 36" (914.4 mm) clear access behind and in front of rack/cabinets.
- K. Ground rack/enclosure to TMGB/TGB with Grounding Wire.

END OF SECTION 27 11 16

ATTACHMENT B

SECTION 27 15 00 COMMUNICATIONS CABLING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Single copper and multi-pair copper, fiber optical channel solution, riser or plenum rated cabling as required for horizontal cable and backbone fiber and copper distribution cable required for complete and fully functional communications system.

1.02 RELATED SECTIONS

- A. Section 01 25 13 - Product Substitution Procedures.
- B. Section 01 31 00 - Project Coordination.
- C. Section 01 33 00 - Submittal Procedures.
- D. Section 01 35 53 - Security Procedures.
- E. Section 01 42 00 - References.
- F. Section 01 45 00 - Quality Control.
- G. Section 01 66 00 – Product Storage and Handling Requirements
- H. Section 01 78 00 - Closeout Submittals.
- I. Section 26 05 19 – Low Voltage Electrical Power Cables.
- J. Section 26 05 33 – Raceways and Boxes for Electrical Systems.
- K. Section 27 05 00 – Common Work Results for Communications.
- L. Section 27 05 26 – Grounding and Bonding for Communications Systems.
- M. Section 27 05 28 – Pathways for Communication Systems.
- N. Section 27 11 00 – Communications Equipment Room Fittings.
- O. Section 27 15 43 – Communications Faceplates and Connectors.
- P. Section 27 18 00 – Communications Testing.
- Q. Section 27 32 23 – Elevator Telephones.

1.04 QUALITY ASSURANCE

- A. Comply with NFPA 70 - National Electrical Code; National Fire Protection Association; 2008 Edition.
- B. See Section 01 42 00 – References for additional reference standards, definitions, abbreviations and acronyms.
- C. See Section 01 45 00 – Quality Control for additional requirements.
- D. Only cable manufacturers who comply with Siemon warranty requirements will be allowed to bid this work.
- E. Project shall utilize Siemon System 6 solution. Installer and manufacturer shall provide warranty for single channel solution for complete and fully functional communications system.
- F. Cabling indicated shall be rated for plenum or riser locations, and as indicated for given environment.

1.05 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures and Section 01 78 00 – Closeout Submittals.
- B. Product Data: Submit data for each specified product in accord with Section 01 33 00 – Submittal Procedures, and Section 27 05 00 – Common Work Results for Communications Systems.

1.06. WARRANTY

- A. Manufacturer and SCS installer shall warranty Cat 6 structured cabling system for end to end channel model installation covering applications assurance, cable, connecting hardware and labor cost for repair and replacement for twenty (20) years from date of project's substantial completion.
- B. See Sections 01 78 00 – Closeout Submittals and 27 05 00 – Common Work Results for Communications for additional warranty requirements.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with Section 01 66 00 – Product Storage and Handling Requirements.
- B. Protect products from damage during delivery, storage and installation. Replace damaged products at no added cost to Owner.

PART 2 PRODUCTS

2.01 CABLE MANUFACTURERS

- A. Approved Cable Manufacturer's:
 - 1. The Siemon Company, Siemon Business Park, 101 Siemon Company Dr., Watertown, CT 06795-0400; Tel: 860-945-4200; Fax: 860-945-4225; Website: www.siemon.com.
 - 2. Berk-Tek, A Nexans Company, 132 White Rd., New Holland, PA 17557; Tel: 800-237-5835, 717-354-6200; Fax: 717-354-7944; Website: berktek.com.
 - 3. General Cable Corporation, 4 Tesseneer Dr., Highland Heights, KY 41076; Tel: 859 572-8000; Fax: 859-572-8458; Website: www.generalcable.com.
 - 4. Hitachi Cable America, Inc., 900 Holt Ave., Manchester, NH 03109; Tel: 603-669-4347, 800-772-0116; Fax: 603-669-6629; Website: hitachi-cable.com.
 - 5. Superior Essex Cable, 6120 Powers Ferry Rd., Suite 150, Atlanta, GA 30339; Tel: 800-551-8948, 770-657-6000; Fax: 777-657-6154; Website: www.superioressex.com.
- B. Other manufacturers not listed shall comply with Section 01 25 13 - Product Substitution Procedures.

2.02 COPPER HORIZONTAL CABLING

- A. Unshielded twisted pair, 4-pair 100 ohm, Category 6, plenum and/or non-plenum, blue:
 - 1. Siemon Company, Premium 6™, UTP, 4-pair cable.
 - a. Plenum: Part #9C6P4-E3-06-RXA (blue).
 - b. Riser: Part #9C6R4-E3-06-RXA (blue).
 - 2. Berk-Tek, A Nexans Company, LANmark 1000 Enhanced Series 4-pair cable:
 - a. Plenum: Part #10032093 (blue).
 - b. Riser: Part #10032455 (blue).
 - 3. Hitachi Cable America, Inc., Premium 4-pair cable.

- a. Plenum: Part #: 30183-8 (blue).
- b. Riser: Part #: 30212-8 (blue).

B. Category 6 Cabling Channel Performance shall meet following performance specifications for Data/Voice Drops:

Frequency	10 MHz	100 MHz	200 MHz	250 MHz	Units
Insertion Loss	6.3	21.3	31.5	35.6	Db
NEXT	56.6	39.9	34.8	33.1	Db
PSNEXT	54.0	37.1	31.9	30.2	Db
ELFEXT	43.3	23.3	17.2	15.3	Db
PSELFEXT	40.3	20.3	14.2	12.3	Db
Return Loss	19	12	9	8	Db
Delay	<555	N/A	N/A	N/A	N/Sec
Delay Skew	<50	N/A	N/A	N/A	N/Sec

2.03 COPPER BACKBONE CABLING

A. 25 Pair Copper backbone (Riser/Tie) telephone cabling shall be provided between MDF and IDF locations, continuous runs with no splices with ground shields at each end.

- 1. Building Interior Locations:
 - a. General Cable Corporation: CMR Category 3, 25 Pair, Part #2133033.
 - b. Hitachi Cable America, Inc.: Part #39228-50.
- 2. Outside Plant (direct burial) Locations:
 - a. General Cable Corporation: Part #PE89 Type, Category 3, 25 Pair, Part #7525785.
 - b. Superior Essex Cable: Caspic®-FSF RDUP PE-89, Cat 3, 25 Pair, Part # 09-97-92.

B. Category 3 Cabling Electrical Characteristics:

Frequency	Ins. Loss	Next Loss	ACR	Structural Return Loss	Units
1	2.6	41.3	38.7	12.0	dB/100m
4	5.6	32.3	26.7	12.0	dB/100m
8	8.5	27.8	19.3	12.0	dB/100m
10	9.7	26.3	16.6	12.0	dB/100m
16	13.1	23.2	10.1	10.0	dB/100m

C. Multi-Pair Cable Specifications:

- 1. Gage: 24 AWG.
- 2. DC Resistance: 27.3w/1000' (8.96w/100m), maximum.
- 3. Mutual Capacitance (at 1khz).
- 4. Impedance: 100w (25 pair).

5. Buried/Underground Attenuation (db/1,000' [305m]) at 1.0 MHz: 6.4 (25 pair), maximum.
6. Aerial Cable Attenuation (db/1,000' [305m]) at 1.0 MHz: 6.7 (25 pair), maximum.

2.03 OPTICAL FIBER (Single Mode) CABLING

A. Single Mode Fiber Construction:

1. Number of fibers: 12 stand from MDF to IDF rooms.
2. Core/Cladding: 8.3/125 microns.
3. Buffering: 900 microns.
4. Fiber shall be optimized for VCSEL system. Fiber shall exceed TIA/EIA 568-B.3 and 10Gigabit Standards.
5. Sheath construction: Non-metallic.

B. Minimal Optical Specifications:

Fiber Type	SM 8.3/125
Wavelength	1310/1550
Maximum Attenuation (Db/Km)	.5/1.5
Minimum Bandwidth (MHz.Km)	Unlimited
Gigabit Ethernet Min. Distance (m)	5000/NA

C. Singlemode Fiber Cable:

1. Siemon Company, 8.3/125 Micron, XGLO fiber.
 - a. 12 Strand: Part #-9F8LJ1-12D.
 - b. Riser: 4 Strand, Part #9C6R4-E3-06-RXA (blue).
 - c. Plenum: 4 Strand, Part #9C6P4-E3-06-RXA (blue).
2. Berk-Tek, A Nexans Company, LANmark 1000 Enhanced Series 4-pair cable:
 - a. Plenum: Part #10032093 (blue).
 - b. Riser: Part #10032455 (blue).
3. Hitachi Cable America, Inc., Premium 4-pair cable.
 - a. Plenum: Part #: 30183-8 (blue).
 - b. Riser: Part #: 30212-8 (blue).

2.04 OPTICAL FIBER (Multimode) CABLING

A. Multimode Fiber Construction:

1. Number of fibers: 12 stand from MDF to IDF rooms, and 4 strand from IDF rooms to D2FO (communications outlet) locations.
2. Core/Cladding: 50/125 microns.
3. Buffering: 900 microns.
4. Fiber shall be optimized for VCSEL system. Fiber shall exceed TIA/EIA 492.AAAC, and IEEE 802.3 10Gigabit Standards.
5. Sheath construction: Non-metallic.

B. Minimal Multimode Fiber Specifications:

Fiber Type	SM 50/125
Wavelength	850/1300
Maximum Attenuation (Db/Km)	3.5/1
Minimum Bandwidth (MHz.Km)	1500/500
Gigabit Ethernet Min. Distance (m)	900/600

C. Multimode Fiber Cable:

1. Siemon Company:

- a. 12 Strand (50/125, Multimode) Fiber, Indoor/Outdoor, XGLO 10G300, OM2, Part # 9F5LJ1-12D.
- b. 4 Strand (50/125, Multimode) Fiber, Riser Rated, OM3. Indoor cable, XLGO 10G300, Part # 9BB5R004C-T312A.
- 2. Berk-Tek/Ortronics:
 - a. 12 Strand (50/125, Multimode) Fiber, GIGAlite-10, OM2, Indoor/Outdoor, Part #OPD012-EB3010/25.
 - b. 6 Strand (50/125, Multimode), GIGAlite-10, riser rated, OM3, Premises Distribution cable, Part #PDR006-EB3010/25.
- 3. Hitachi Cable America:
 - a. 12 Strand (50/125, Multimode) Fiber, riser rated, OM2, 10 Gigabit, Part #60710-12.
 - b. 4 Strand (50/125, Multimode) Fiber, riser rated, OM3, 10 Gigabit, Part #60104-4.

PART 3 EXECUTION

3.01 PROJECT COORDINATION

- A. Comply with Section 01 31 00 – Project Coordination. Contractor/CM shall coordinate and conduct meeting with cabling installer and affected trades to plan, organize and facilitate timely and orderly work to minimize project delay and work interference between trades.
- B. Existing facility operations shall not be interrupted by communications installer’s work activities. Active cable plant associated with specific work activities beyond construction area shall not be disrupted.
- C. Circumstances (e.g. voice cutovers) that require service disruptions in existing facilities shall be scheduled with as much notice as possible. Service disruptions, if needed, shall be coordinated by Owner’s Project Manager.

3.02 CABLING INSTALLATION

- A. Work shall be installed per manufacturer’s printed instructions to ensure certified channel solution.
- B. Install plenum or non-plenum cable types, where indicated based on environmental conditions.
- C. Install horizontal cable in star topology with WAO’s connected by cable directly to floor distributor.
- D. Horizontal cabling shall be terminated in IDF room on same floor as WAO’s. Exceptions may be made, if approved in advance, by Owner’s Project Manager.
- E. Cables routed through floors (poke-thrus, conduits, floor boxes, etc.) to utilize ceiling space on the level below may be routed to network room on adjacent floor (approved deviation from BICSI methodologies).
- F. Install cables, WAO’s, and network room equipment installation in accord with methodologies contained in latest BICSI Telecommunications Distribution Methods Manual and Information Transport Systems Installation 5th Addition unless noted otherwise for cable attachments, firestopping, cable routing, equipment rack grounding & bonding, pulling tensions, and EMI protection methods.
- G. Cables placement in conduit shall not exceed fill capacities per ANSI/EIA/TIA-569.

- H. Upon entering floor distributor, separate cabling according to service application (voice, data, life safety and security), and extend around interior perimeter of room via specified cabling tray, and then routed to floor at furthest point of appropriate service backboard for voice, data, video systems.
- I. Smaller network rooms with cable tray extending directly from wall penetration to rack need not encircle room. Provide 5' (1.524m) cable service slack. Added cables shall follow established path.
- J. Provide 12" (305 mm) of cable slack in in-wall, surface-mounted, and raceway boxes, provided manufacturer's bend radius is not exceeded. Some of slack may be pulled back into junction boxes, raceways, cable trays, or concealed ceiling space. Slack beyond outlet box shall be easily pulled out of box and shall not be secured with cable ties or otherwise secured beyond box.
- K. Each type of material (fiber optic cable, equipment rack components and termination hardware) shall be selected and installed to be compatible with manufacturer's warranty.
- L. Cables shall be one continuous piece without splices.
- M. Cables may be installed within existing conduits, wire-ways or spaces if approved by Owner's Project Manager, where cables do not exceed conduit or junction box capacity. Cabling components and faceplates, shall be new.
- N. Voice and data cables shall be color coded throughout building.
 - 1. Standard voice cables: white.
 - 2. Standard data cables: blue.
 - 3. Security and life safety cables: red or placed in red conduit.
- O. Install pull strings with horizontal cables as cables are pulled.
- P. Specify placement of horizontal cables in cable trays in random overlapping fashion. Cable ties in cable tray shall not be used, except as needed to maintain bend radii when changing directions. Plastic cable ties shall not be used.
- Q. Install horizontal cable free of surface damage, kinks, twists, and with NO visible anomalies.
- R. Cables shall be labeled and documented as specified in Section 27 05 53 – Identification of Communications Systems.
- S. Copper horizontal cable lengths:
 - 1. Horizontal cables from IDF room to WAO's, shall not exceed 295' (90 m).
 - 2. Horizontal cables used for patch cords and cross-connect jumpers in MDF and IDF rooms, shall not exceed 16' (4.88 m).
 - 3. Provide 33' (10.6 m) allowance for combined length of patch cords and cables used to connect equipment at WAO and in MDF and IDF rooms.
 - 4. Total length for components shall not exceed 328' (100 m).
- T. Each horizontal data cable provided to individual WAO shall consist of 4-pair 100 ohm, Category 6, UTP cable.
- U. Coordinate with other trades to complete work above ceilings and below raised floors prior to ceiling tile and floor panel installation.

- T. Cabling shall not be exposed, except when in cable tray or within IDF and MDF rooms. Raceway shall be used in corridors to individual spaces where conduit shall run perpendicular into spaces and to WAO locations.

END OF SECTION 27 15 00

ATTACHMENT C

SECTION 27 18 00 COMMUNICATIONS TESTING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. System validation testing for voice and data communications cabling and connecting hardware for verification that structured cabling system has been installed properly and performs as specified.
- B. Communications system validation testing shall in accord with ANSI/TIA 568.B.1, for Category 6 Structured Cabling System (SCS).

1.02 RELATED SECTIONS

- A. Section 01 31 00 - Project Coordination.
- B. Section 01 33 00 - Submittal Procedures.
- C. Section 01 42 00 - References.
- D. Section 01 45 00 - Quality Control.
- E. Section 01 78 00 - Closeout Submittals.
- F. Section 27 05 00 – Common Work Results for Communications Systems.
- G. Section 27 05 26 – Grounding and Bonding.

1.03 REFERENCES

- A. See Section 01 42 00 – References for additional reference standards, abbreviations definitions and acronyms.
- B. Comply with ANSI/TIA/EIA standards.

1.04 QUALITY ASSURANCE

- A. Comply with Section 01 45 00 – Quality Control.
- B. Installed voice and data communications systems to verify that cable has been installed and functions properly.
- C. Perform validation testing on horizontal and backbone cabling testing in accord with ANSI/TIA/EIA-568-B.1 and CAT6 addendum for copper cabling.
- D. Third Party Testing: Owner may elect to employ independent testing and certification firm to provide testing of all or part of Structured Cabling System.
- E. SCS installer shall set wiring tester for channel configuration for DATA which includes patch cord, patch panel, UTP Cable, work-area jack and work area cord, with permanent link configuration for VOICE.
- F. SCS installer's RCDD shall sign off on copper and fiber optic cable test results, indicating that cable testing procedures and cables testing are in compliance with contract documents and referenced standards.

1.05 SUBMITTALS

- A. Comply with Section 01 33 00 – Submittal Procedures.
- B. Comply with Section 01 78 00 – Closeout Submittals.

- C. Provide list of test equipment proposed for certification testing for review prior to testing.
- D. Provide names of personnel performing testing. Personnel shall have attended training program in operation of specified manufacturer's equipment and shall provide certificates demonstrating successful completion of training.
- E. Test Results:
 - 1. Provide Owner's Project Manager with printed and electronic forms of test results as noted in Part 3 Execution.
 - 2. Test results shall be unedited and as presented by tester's software. Provide software from tester's manufacturer with test results to enable viewing of test results in native format.
- F.

1.06 PROJECT CONDITIONS

- A. Owner reserves right to be present during testing.
- B. For additions and renovations to existing occupied facilities, testing of existing and active connections is likely to be restricted until after normal working hours. Owner's Project Manager will determine if testing can occur during normal business hours.
- C. Testing shall occur only after channel is installed. If channel components are moved or re-positioned after testing, retest cables, faceplates, and other components in final position.

1.06 WARRANTY

- A. Warranty: Comply with Section 27 05 00 – Common Work Results for Communications, Para. 1.09.
- B. Manufacturer shall provide 20-year Channel Performance Warranty for complete communications system.
 - 1. System shall be Siemon Systems 6 solution.
 - 2. Manufacturer's shall warranty worst-case performance data for installed cabling system, and performance data indicated in warranty documents/certificate.
 - 3. Twenty (20) year warranty for Cat 6 structured cabling system shall provide for end to end channel model installation which covers applications assurance, cable, connecting hardware, and labor cost for repair or replacement.
 - 4. Warranty shall indicate compliance with Margin claimed by manufacturer's over Cat 6 channel specifications on transmission parameters across entire frequency range of 1-250 MHz as indicated in manufacturer's catalogs and product literature.
- C. SCS installer shall provide 3 year warranty for communications system installation to include materials and labor warranty for replacement of defective installation or equipment including cables, jacks, patch cords, patch panels, devices and cabling.
- D. Date of warranty period shall begin from date of project's substantial completion.

PART 2 PRODUCTS

2.01 APPROVED TESTING EQUIPMENT

- A. Approved Copper Cable Testing Equipment Manufacturer's:

1. Agilent Technologies, Inc., Electronic Test & Measurement Div., P.O. Box 4026, Englewood, CO 80155-4026; Tel: 800-829-4444; Fax: 800-829-4433; Website: www.agilent.com.
 2. Fluke Networks, Inc., 6920 Seaway Blvd., Everett, WA 98203; Tel: 425-446-4519; Website: www.flukenetworks.com.
 3. IDEAL Industries, Inc., Becker Place, Sycamore, IL 60178; Tel: 800-435-0705; Fax: 800-533-4484; Website: www.idealindustries.com.
 4. JDS Uniphase Corp., Wavetek Div., 430 N. McCarthy Blvd., Milpitas, CA 95035; Tel: 408-546-5000; Fax: 408-546-4300; Website: www.jdsu.com.
- B. Approved Fiber Optic Cable Testing Equipment Manufacturer's:
1. Agilent Technologies, Inc., Electronic Test & Measurement Div., P.O. Box 4026, Englewood, CO 80155-4026; Tel: 800-829-4444; Fax: 800-829-4433; Website: www.agilent.com.
 2. Fluke Networks, Inc., 6920 Seaway Blvd., Everett, WA 98203; Tel: 425-446-4519; Website: www.flukenetworks.com.
 3. IDEAL Industries, Inc., Becker Place, Sycamore, IL 60178; Tel: 800-435-0705; Fax: 800-533-4484; Website: www.idealindustries.com.
 4. Anritsu Company, Inc., GN NETTEST Div., 1155 East Collins Blvd., Suite 100, Richardson, TX 75081; [Tel.:972-644-1777](tel:972-644-1777); Fax: 972-671-1877; Website: anritsu.com.
 5. AFL Global, Inc., Noyes Test and Inspection Div., 170 Ridgeview Center Dr., Duncan, SC 29334; Tel: 800-235-3423; Fax: 864-433-0333; Website: www.aflglobal.com.
 6. Tektronix, Inc., 14200 SW Karl Braun Dr., P.O. Box 500, Beaverton, OR 97077; Website: www.tek.com.
 7. JDS Uniphase Corp., Wavetek Div., 430 N. McCarthy Blvd., Milpitas, CA 95035; Tel: 408-546-5000; Fax: 408-546-4300; Website: www.jdsu.com.
- C. Other test equipment manufacturers shall submit requests for product substitution in accord with Section 01 25 13 – Product Substitution Procedures.

PART 3 EXECUTION

3.01 GENERAL

- A. Owner reserves right to be present during testing.
- B. Provide required test equipment and personnel necessary to support certification and validation tests indicated and in accord with Section 01 45 00 – Quality Control.
- C. Fail, fail*, Pass*, or Warning test result yields Fail result for channel or permanent link under test. To achieve overall Pass condition, result of each individual test shall be Pass. Test results shall come from tester with permanently enabled marginal reporting feature.
- D. Test result shall indicate compliance with margin claimed by manufacturer over Cat 6 channel specifications for frequency range of 1-250 MHz as indicated in manufacturer's catalogs and product literature.

3.02 CATEGORY 6 COPPER CABLE TESTING

- A. Category 6 field testing shall be performed with approved Level III balanced twisted-pair field test device.

- B. Installed category 6 channels shall comply with ANSI/TIA/EIA standards for Category 6. Use cable manufacturer's test standards if more stringent.
- C. Category 6 balanced twisted-pair horizontal and backbone cables shall not exceed 90 m (295 ft) for basic link, and 100 m (328 ft) for channel shall be tested per ANSI/TIA/EIA-568-B.2. Test parameters include wire map plus ScTP shield continuity (when present), length, NEXT loss (pair-to-pair), NEXT loss (power sum), ELFEXT (pair-to-pair), ELFEXT loss (power sum), return loss, insertion loss, propagation delay, and delay skew.
- D. Copper riser cabling for VOICE shall be tested for length, continuity, polarity, checks and wire map.

3.03 COPPER TEST EQUIPMENT

- A. Balanced twisted-pair field testers shall be factory calibrated each calendar year by field test equipment manufacturer as stipulated by manuals provided with field test unit. Calibration certificate shall be provided to Owner's Project Manager for review prior to start of testing.
- B. Set testers to correct cable, by manufacturer and name, to ensure correct parameters are used during testing. Test settings selected from options provided in field testers shall be compatible with installed cable under test.
- C. Level III balanced twisted-pair field test device. Scanners shall be in good working order and have current calibration stickers from manufacturer-approved calibration facility.
- D. Balanced twisted-pair field testers shall be factory calibrated each calendar year by field test equipment manufacturer as stipulated by manuals provided with field test unit.
- E. Set tester manufacturer's cable and name, to ensure using correct parameters during testing. Test settings selected from options provided in field testers shall be compatible with installed cable under test.

3.04 CATEGORY 6 TESTING

- A. Category 6 testing shall be performed with approved Level III balanced twisted-pair field test device. Scanners shall be in good working order with current calibration stickers from manufacturer's approved calibration facility.
- B. Installed Category 6 channels shall comply with ANSI/TIA/EIA standards or use cable manufacturers test standards to certify total solution installed, if more stringent.
- C. Category 6 balanced twisted-pair horizontal and backbone cables shall not exceed 90 m (295 ft) for basic link, and 100 m (328 ft) for channel shall be 100 percent tested in accord to ANSI/TIA/EIA-568-B.2.
- D. Provide test results indicating CAT 6 cable tests in text files on flash drive(s), and two print copies in 3-ring binders. Provide text files for each building. Each test page shall be separated by standard page break (one test per page).
- E. Cat 6 Channel Performance Testing Requirements shall meet or exceed following:

Frequency	10 MHZ	100 MHZ	200 MHZ	250 MHZ	UNITS
Insertion Loss	6.3	21.3	31.5	35.6	DB
NEXT	56.6	39.9	34.8	33.1	DB

PSNEXT	54.0	37.1	31.9	30.2	DB
ELFEXT	43.3	23.3	17.2	15.3	DB
PSELFEXT	40.3	20.3	14.2	12.3	DB
Return Loss	19.0	12.0	9.0	8.0	DB
Delay	<555	N/A	N/A	N/A	NSec
Delay Skew	<50	N/A	N/A	N/A	NSec

- F. Calculations shall be derived from tests and provide results for following:
1. Continuity.
 2. Polarity checks.
 3. Wire map.
 4. Attenuation.
 5. PSNEXT.
 6. PSFEXT.
 7. ELFEXT.
 8. PSELFEXT.
 9. ACR.
 10. Installed length of CAT 6 cable.
- G. Correct cable NVP shall be entered into test equipment to ensure proper length and attenuation readings. Cables not in accord with EIA/TIA 568B, Category 6 tests shall be identified to AE and RCDD for corrective action. Cable replacement shall be at no additional cost to Owner.
- H. Data jacks in each outlet shall be tested for CAT 6 compliance in channel configuration to verify integrity of conductors and correctness of termination sequence indicated.
- I. Prior to testing UTP runs, test equipments shall be calibrated per manufacturer's printed guidelines. Correct cable NVP shall be entered into test equipment to ensure proper length and attenuation readings.

3.05 FIBER OPTIC TEST EQUIPMENT

- A. Optical fiber test equipment shall be factory calibrated (with date of last calibration) as recommended by field test equipment manufacturer. Manufacturer's calibration certificates shall indicate equipment name and serial number, and shall be provided for review prior to start of testing.

3.06 OPTICAL FIBER CABLING TESTING

- A. Optical fiber horizontal and backbone cabling shall be verified in accord with ANIA/TIA/EIA-568-B.1 with Addendum for fiber optic cabling testing.
- B. Each strand in fiber optic cables shall be tested for correctness of termination, overall transmission loss, and defects using approved Optical Time Domain Reflectometer (OTDR) and power meter.
- C. Tests shall be performed for reach stand of fiber in two-way averaging measurement of fiber. Engineer of record shall be notified at least one week prior to testing to allow his observation of testing optical fiber strands for insertion loss and length and bi-directional OTDR tests on OSP optical fiber strands.
- D. Test for insertion loss at 850 nm and 1300 nm per TIA/EIA-526-14 method B, one jumper reference. System loss measurements (both calculated and measured) shall be provided for 50/125mm multimode cabling in at least one direction.

- E. Test for insertion loss at 1310 and 1550 for single mode cabling in at least one direction using Method A.1 (1-jumper) test procedure as specified in ANSI/TIA/EIA-526-7.
- F. Acceptable losses shall calculate allowable attenuated loss based on final installed length, attenuation coefficient, and connector loss per attached chart.
- G. Fiber Optic links compliance tests with following loss budget for link types:

Fiber Insertion Loss			
Link Type	Loss (dB)	Wavelength (nm)	Length (m)
Horizontal, MM	≤2.0	850 or 1300	≤90
Backbone, MM	≤3.5/km + 0.75/conn +0.3/spl	850	≤2000
	≤1.5/km + 0.75/conn +0.3/spl	1300	≤2000
Backbone, SM	≤1.0/km + 0.75/conn +0.3/spl	1310	≤3000
	≤1.0/km + 0.75/conn +0.3/spl	1550	≤3000
Centralized, MM	≤3.3	850 or 1300	≤90

- H. Channel attenuation for Gigabit Ethernet shall be per IEEE 802.3z as noted below:

Maximum Channel Attenuation (dB)			
Fiber Type	50/125μ		
1000BASE-SX	3.2		
1000BASE-LX	4		

- I. Test Reports:
 1. Certification report shall be provided listing both calculated and measured loss for each fiber optic strand and submitted with test results as noted above. Cable lengths shall be verified with OTDR or Light Source/Power Meter with length testing capacity.
 2. Provide printed and electronic forms of tests results. Test results shall be unedited and as presented by tester's software. Supplemental summaries may be provided to Owner's Project Manager. Provide Fiber performance calculation worksheets and fiber link attenuation records as illustrated in Section 21 (Figures 21.14 and 21.15) of BICSI Telecommunications Cabling Installation Workbook, Technician, 2nd Edition.
 3. Test reports shall indicate fiber wavelength, fiber and cable manufacturer's part numbers, type, attenuation, bandwidths specifications, and measurement direction.
- J. Test optical fiber strands for insertion loss and length. Perform bi-directional OTDR tests on OSP optical fiber strands. OTDR trace(s) shall be in project closeout submittals.
- K. Calculate allowable attenuated loss based on final installed length, attenuation coefficient, and connector loss.

- L. Immediately remediate strands testing above calculated limits.
- M. Owner reserves right to have third party testing to confirm test results. Remediate, at Contractor's expense, strands exceeding calculated limits by third party testing.

3.07 COMMUNICATIONS AND GROUNDING SYSTEM TESTING

- A. See Section 27 05 26 – Grounding and Bonding for Communications Systems.
- B. Testing shall be performed for impedance of bonds of grounding system, including cable armor bonding to ground. Impedance of two-point bonding test across any bond shall not exceed 0.1 ohm. Remediate bond(s) over limit or which contribute to total impedance exceeding 0.1 ohm from any point in network room to bussbar in that room.
- C. Bonds installed shall be tested for impedance with earth ground resistance test in its two-point setup (LEM Handy GEO tester, or approved testor). Place QA label (with date and inspector) in proximity to each bond tested.
- D. Test grounding conductors, once installed, for current. Measure AC and bi-directional DC current. Report AC current over 1 Amp. Report any DC current, in either direction, over 500 milliamps.

END OF SECTION 27 18 00