

PART 1 - GENERAL

1.1 DESCRIPTION

The Department of Veterans Affairs, Facilities Management Service, Project Planning, Contracting Officer's Technical Representative (hereinafter referred to as the "COTR"), and the Office of Information and Technology (hereinafter referred to as "OI&T") intends to upgrade the Information Transport Horizontal Data Cabling Infrastructure of its existing buildings located in the Hines V A Hospital, Hines, IL. The General Contractor, Cabling Contractor, or Certified Installer -as applicable to the contract (hereinafter referred to as the "Contractor") -shall be responsible for all parts, material, labor and all other associated apparatus necessary to completely install, test, certify and turn-over for acceptance to the OI&T COTR, the Information Transport Cabling Infrastructure detailed herein. Include and supply all necessary labor, material, tools and equipment for the proper construction and installation of information transport cabling in accordance with this document, accompanying drawings, and manufacturer's specifications. The OI&T COTR has a requirement to improve the horizontal data cabling infrastructure to enable 1 Gbps throughput performance to its work areas. The existing voice cables and termination blocks will remain unchanged.

The Contractor will ensure that all projects will adhere to the following standards and criteria as defined by Hines' OI&T:

A. Voice Data overview for Hines VAH

1. The National Electrical Code (NEC) will be adhered to for all installations in addition to the any site specific requirements.
2. Materials and workmanship hereinafter specified and furnished shall be fully guaranteed by the Contractor for one year (365 calendar days) from transfer of title against any defects. In addition, defects which may occur as the result of faulty materials or workmanship within one year after installation and acceptance by the OI&T COTR shall be corrected by the Contractor at no additional cost to the OI&T COTR. The Contractor shall promptly, at no cost to the OI&T COTR, correct any nonconforming or defective work within one (1) year after completion of the project of which the work is a part. The period of the Cabling Contractor's warranty(ies) for any items herein are not exclusive remedies, and the OI&T COTR has recourse to any warranties of additional scope given by The Contractor to The OI&T COTR and all other remedies available at law or in equity. The Cabling Contractor's warranties shall commence with acceptance of/or payment for the work in full.

Given that the Contractor will be procuring equipment or materials under the Contract, the Contractor shall obtain for the benefit of the OI&T COTR a minimum of 20-year Structured Connectivity Solutions (SCS) warranty from the manufacturer,

including all application assurance, labor & extended product warranties. The Contractor submit any additional warranties offered by the manufacturers, at no additional cost, to the OI&TI COTR, should said warranties extend beyond the one-year period specified herein. This warranty shall in no manner cover equipment that has been damaged or rendered unserviceable due to negligence, misuse, acts of vandalism, or tampering by The OI&TI COTR or anyone other than employees or agents of The Cabling Contractor. The Cabling Contractor's obligation under its warranty is limited to the cost of repair of the warranted item or replacement thereof, at The Cabling Contractor's option. Insurance covering installed equipment from damage or loss is to be borne by The Contractor until full acceptance of equipment and services.

3. Contractor will coordinate activities through the COTR -as specified in contract documents -to meet with the OI&T staff to discuss their plans on conducting the actual work in and all Data or Voice operations prior to the start of the project. The purpose of this meeting is to identify any potential issues or constraints to the scope of work.

1.2 Installation Requirements:

- A. All work shall be performed by a Manufacturer's Certified Business Partner (MCBP); furthermore, the Contractor shall follow the current design and installation guidelines in this specification and those of the VA Master Specifications (<http://www.cfm.va.gov/tillspec.asp>). Installers must be able to furnish proof that they are currently certified, by the product manufacturer, to install the product in accordance with the requirements to meet the 20 manufacturer's product warranty. The prime/general contractor (GC) shall be responsible furnish a photocopy of the installers' certification to the VA Contracting Officer's Technical Representative (COTR) before any installation can take place.
- B. In addition to the above MCBP certification, the Contractor shall obtain and supply proofing documents that the installer(s) are current on their federal, state, and local certifications (where applicable), which shall be in accordance with the current edition of the National Electrical Code, the current edition of the National Electrical Safety Code, the current edition of the Building Industry Consulting Services, International (BICSI) Telecommunications Distribution Methods Manual, the current edition of the BICSI Cabling Installation Manual, the latest issue of the ANSI/TIA/EIA Standards as published by Global Engineering Documents as TIA/EIA Telecommunications Building Wiring Standards, and all local codes and ordinances.
- C. All installations of Information Systems equipment (data, telephone, racks, arrays, panels, etc) shall be tested by a certified professional, as described by the Product Manufacturer supplying the warranty. The test results and warranty information will be submitted to the COTR and OI&T representative before turn-over and final billing will be processed.

- D. Furthermore, before work can begin, the Contractor shall provide the following submittals to the COTR:
1. Cut-Sheets of Fire Stopping material and components shall be supplied when penetrations or other equipment passing between floors, walls, or applicable subsystems being part of the implementation.
 2. Cut-Sheets shall be provided the COTR for all proposed items used to implement a plan, to include: panels, cabinets, switches, racks, cabling, hangars, etc. to ensure that they meet or exceed this specification or the specification set forth in design drawings provided by an A/E firm.
 3. CAD and/or Shop Drawings, as specified by the Scope of Work or Design Drawings, shall be submitted to the COTR and OI&T representative prior to installation of a system or subsystem, upon any recommended or directed deviation, and upon completion of installations for use as As-Built documentation.

1.3 RELATED WORK

- A. Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Specification Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- C. Specification Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- E. Specification Section 26 27 26, WIRING DEVICES.
- F. Specification Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- G. Specification Section 27 51 16, PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS.
- H. Specification Section 27 41 31, MASTER ANTENNA TV EQUIPMENT AND SYSTEMS.
- I. H-088-C3 VA HANDBOOK DESIGN FOR TELEPHONE SYSTEMS

1.4 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in text by basic designation only. Except for a specific date given the issue in effect (including amendments, addenda, revisions, supplements, and errata) on

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the date the system's submittal is technically approved by VA, shall be enforced.

B. National Fire Protection Association (NFPA):

70	NATIONAL ELECTRICAL CODE (NEC)
75	Protection of Electronic Computer/Data Processing Equipment
77	Recommended Practice on Static Electricity
	Standard for Health Care Facilities
101	Life Safety Code
1221	Emergency Services Communication Systems

C. Underwriters Laboratories, Inc. (UL):

65	Wired Cabinets
96	Lightning Protection Components
96A	INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS
467	Grounding and Bonding Equipment
497/497A/497B	PROTECTORS FOR PAIRED CONDUCTORS/ COMMUNICATIONS CIRCUITS/DATA COMMUNICATIONS AND FIRE ALARM CIRCUITS
884	Underfloor Raceways and Fittings

D. ANSI/EIA/TIA Publications:

568B	Commercial Building Telecommunications Wiring Standard
569B	Commercial Building Standard for Telecommunications Pathways and Spaces
606A	ADMINISTRATION STANDARD FOR THE TELECOMMUNICATIONS INFRASTRUCTURE OF COMMERCIAL BUILDINGS
607A	Grounding and Bonding Requirements for Telecommunications in Commercial Buildings
758	Grounding and Bonding Requirements for Telecommunications in Commercial Buildings

- E. Lucent Technologies: Document 900-200-318 "Outside Plant Engineering Handbook".
- F. International Telecommunication Union - Telecommunication Standardization Sector (ITU-T).
- G. Federal Information Processing Standards (FIPS) Publications.
- H. Federal Communications Commission (FCC) Publications: Standards for telephone equipment and systems.
- I. United States Air Force: Technical Order 33K-1-100 Test Measurement and Diagnostic Equipment (TMDE) Interval Reference Guide.
- J. Joint Commission on Accreditation of Health Care Organization (JCAHO): Comprehensive Accreditation Manual for Hospitals.
- K. National and/or Government Life Safety Code(s): The more stringent of each listed code.

PART 2 - PRODUCTS

2.1 Cable requirements:

A. Copper

- 1. All data drops will use two white colored Category 6, four pair, 100 ohm VTP (24 AWG solid conductor), Systimax #.1071 1071004EWH or equivalent, unless otherwise specified. All materials shall be supplied by the contractor.
- 2. All voice drops will use gray colored Category 5e, four pair, 100 ohm UTP (24 A WG solid conductor), unless otherwise specified. All materials shall be supplied by the contractor.

B. Fiber

- I. When fiber optics is required the minimum pull shall be 12 strands of 50 micron multimode terminated at both ends with fiber connectors to be determined by OI&T representative. All materials shall be provided by the contractor, every installation shall be tested and identified with documentation provided to the V A representative

C. Data *only* drops shall be in dual jack configurations as described below:

- 1. Data legacy dual jack configuration, no phone:
 - a. Face plate shall be an ivory colored, dual faceplate
 - b. Left side jack shall be 1 black colored RJ45 Cat-6 grade Systimax (or equivalent) data jack on left side position.
 - c. Right side jack shall be 1 ivory colored RJ45 Cat-6 grade Systimax (or equivalent) data jack on right side position.

2. Data horizontal dual jack configuration, no phone:
 - i. Horizontal installation will rotate faceplate clockwise and data positions clockwise.
 - ii. Top jack shall be 1 black colored RJ45 Cat-6 grade Systimax (or equivalent) black data jack on top position.
 - iii. Bottom jack shall be 1 ivory colored RJ45 Cat-6 grade Systimax (or equivalent) ivory data jack on bottom position.
- D. Voice Data Drops shall be in quad jack configurations as described below:
 1. Quad jack configuration:
 - a. Voice/data face plate shall be ivory quad faceplate with 2 eight position RJ45 Systimax data jacks or equivalent; on top #1 Blackjack MGS-400-003 and #2 Ivory jack MGS-400-246, one data cable for each jack.
 - b. Bottom two jacks #3, and #4 shall be white voice six position RJ11 Systimax MIAH-262 jack or equivalent, one wire split with one pair to each jack and 2 pair spare (1 jack has 2 pairs terminated (Blue and Orange) and the second jack also has 2 pairs terminated (green and brown).
 - c. For horizontal configuration faceplate will be rotated clockwise with jack orientation also rotated clockwise remaining as #1 =black, #2 =ivory, #3 ,#4 =phone

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All cable runs shall follow the cable trays that are above the suspended ceilings and terminated at the closet specified by design drawings, COTR, and/or OI&T.
- B. Cables shall not be attached to removable ceiling grid supports or laid directly on the ceiling grid. Cables shall not be attached to or Supplied by fire sprinkler heads or delivery systems or any environmental sensor in the ceiling air space.
- C. In areas where the cable does not traverse conduit, cable trays or ducts, the contractor shall bundle the cables in bundles of 48 (1 bundle per 48-port patch panel). Cable bundles shall then be supplied by l-hooks attached to existing building structure at a maximum of five (5) foot intervals.
- D. All work shall be installed with Cat-6 equipment and cables. In the case in which existing Cat-5 patch panels are available in the voice/data closets, and there is no further room on the racks to accommodate a new Cat-6 patch panel, then the Contractor will seek further guidance from OI&T and COTR on how to proceed.
- E. If a voice/data closet contains new and existing patch panels with

current manufacturer's product warranties, then the contractor must be certified to perform additional work, installation, and use only approved equipment (i.e. cables, jacks, etc.) such that any additional work on that patch panel will not null and void the current manufacturer's product warranty.

- F. The Contractor will be responsible for ensuring that the smoke and fire-rated structures (walls, ceiling, and floors) retain their existing smoke or fire-rating in accordance with VA Specification 078400 FIRES TOPPING. Contractors should be aware of any submittals required prior to work commencement. Refer to document located at <http://www.ciin.va.gov/tillspec.asp>
- G. All previously abandoned Voice and/or Data cable in construction area will be removed completely from end to end. If the cable that is to be removed is installed in such a way that it cannot be removed without damaging other cables or equipment, the Contractor shall notify the COTR and OI&T to allow for further direction. If the cable that is to be removed is installed in such a way that it cannot be removed without damaging other cables or equipment, the Contractor shall notify the COTR and OI&T to allow for further direction.
- H. The Contractor is responsible for grounding and bonding all the infrastructure provided in this project. Specifically:
 - 1. Use #6 grounding conductors and two-hole irreversible compression connectors to bond racks to the room's telecommunications grounding bus-bar (TGB).
 - 2. The contractor shall provide and install the proper grounding kits for the 66 Block and Patch Panels as required by manufacturer.
 - 3. The contractor shall ground and bond the telecommunications rack:
- I. The Contractor is responsible to completely clean and dust all areas that work was performed, whether installing or removing cabling or equipment.
- J. The Contractor is responsible for labeling the following:
 - 1. Terminated Cables --at both ends of each cable (the label shall be installed at 3 inches from the termination).
 - 2. Termination equipment (66 block and/or patch panels)
 - 3. Faceplates.
 - 4. Panels to be sequentially numbered with electronic labels of OT&T number scheme #.1 #.2 with no omissions or duplications.
 - 5. IRM will provide the appropriate location numbers to the COTR, and contractors will only use those numbers to label the jack, cable, and panel

- K. The Contractor shall certify the data cables as a TTA Cat6 Permanent Link and test the cables using Fluke DTX1800 or equivalent tester. Test results shall be furnished to OI&T upon completion of testing via electronic in .pdf compatible format.
- L. Certified PASS test result and warranty should be provided to IRM at least three weeks before activation.
- M. If the connected cable in the faceplate does not pass certification, the cable from the faceplate shall be re-terminated and re-certified. In the case with the Voice runs the cables must PASS continuity, opens and wire-map certification. If any line should not PASS, the contractor shall install a new Cat6 cable up to the limit established for the project.
- N. OI&T requires a minimum of one (1) week to review test results, verify locations, and problem areas in order to confirm the resolutions measure necessary for the Contractor to resolve. Furthermore, the test results shall be supplied to OI&T at least 3 weeks before cable plant system is scheduled to be put into operation. Contractor must meet OJ.&T's entire Cabling Standards and Criteria, as outlined in this document, before COTR signs off on the project.
- O. Additional Specifications for Basic Data Cable Installations
 - 1. Data closets shall be designed and/or constructed so that ease of use, maintenance, and sprinkler covering (where applicable) is foremost. The data racks shall be standard 'free' standing 2 post data racks or 'wall mounted cabinet' types (to be approved in submittal form -refer to Section 4). The fiber optic panel shall be the topmost panel on the rack and subsequent panels will be below the fiber panel and shall alternate between Patch Panels and Cable Management Panels (3-1/2" patch panels to be separated by 3-1/2" cable management panels), while leaving available room for network equipment. A drip loop of all wires will be provided from closet sleeve to closet floor before terminating in rack panels. Additionally, vertical cable management systems shall be provided for both sides of the rack -front and. rear cable management -from the floor to top of rack. Panels shall be sequentially numbered with electronically printed labels per OI&T's number scheme (#.1 #.2), with no omissions or duplications.
 - 2. All information system closets -including telephone only, data only, or combined telephone and data -shall be designed and/or constructed to provide, at the minimum, unobstructed access to:
 - a. One (1) ivory colored duplex or quad 110 vac, 15 or 20-amp electrical outlet with an ivory colored cover plate, on a dedicated circuit with isolated ground, for use in the *normal* power circuitry.

- b. One (1) red colored duplex or quad 110 vac, 15 or 20-amp electrical outlet with an red colored cover plate, on a dedicated circuit with isolated ground for use on the hospital's *critical* power circuitry.

The location of the outlets will be determined by the COTR and OI&T.

- 3. All cable will be fished through the wall and above the suspended ceiling (if applicable). If construction is to be performed where there is no suspended ceiling or access above and through the suspended ceiling or walls is severely limited, the Contractor may use an approved "surface mounted raceway" (to be approved in submittal, refer to Section 1) and shall have accompanying surface mounted jacks.
 - 4. Terminate the data closet side using Systimax 48 Port CA T6 Patch Panel 11 00GS3-48 or equivalent, IA W the 20 year product manufacturer's warranty.
 - 5. The Contractor shall be required to install a new Cat-6 patch panel in any cases where new Cat-6 wires are being pulled into an existing closet that currently has only Cat-5 patch panels. At no time will the Contractor terminate Cat-6 cables on to a Cat-5 patch panel. If there is a density issue on the patch panel which prevents the additional Cat-6 patch panel, the cable contractor will work with the COTR and OI&T representative to develop solutions.
 - 6. In the case of renovations where Cat-6 cabling exists, the cat-6 data cable can be saved and re-used with original numbering system where feasible and approved by the COTR and OI&T representative. In this instance, if any of the data lines are not being re-used, the Contractor shall remove all abandoned cable from the station side to data closet.
 - 7. Upon completion of job, data closets will be cleaned of all dust and debris from rack, rack panels, cable managers, walls, floor and ceilings.
- Q. Additional Specifications for Basic Voice Cable Installations
- 1. Phone closet should be terminated using Siemon Co. S66M1-50 66 blocks wall mounted using 89B brackets or the equivalent. Each station will be tested for continuity and labeled in accordance with OI&T's numbering system with documentation provided to the VA representative.
 - 2. One cable will be run from the station side to OI&T designated Phone closet that is identified with an electronically printed label.
 - 3. All cable will be fished though the walls if possible. Otherwise,

Panduit surface raceway systems will be used along with surface mounted jacks. Terminate the station side with Systimax MIAH-262 white voice jacks or equivalent. Terminate the phone closet side using Siemon Co. S66M 1-50 66 blocks wall mounted using 89B brackets. Each station will be tested and labeled in accordance with VA numbering system with documentation provided to the VA representative.

4. If area is being remodeled, existing data and voice drops will be saved and re-used with original numbering system where economical. If any data or voice lines are not being reused, contractor will remove all cable from station to phone closet. Phone locations to be identified by numbering system provided by Hines OI&T, who will also direct installation requirements as necessary.

R. Product Delivery, Storage and Handling:

1. Delivery: Deliver materials to the job site in OEM's original unopened containers, clearly labeled with the OEM's name and equipment catalog numbers, model and serial identification numbers. The RE may inventory the cable, patch panels, and related equipment.
2. Storage and Handling: Store and protect equipment in a manner, which will preclude damage as directed by the RE.

- S. The Contractor shall install all equipment and systems in a manner that complies with accepted industry standards of good practice, OEM instructions, the requirements of this specification, and in a manner which does not constitute a safety hazard. The Contractor shall insure that all installation personnel understands and complies with all the requirements of this specification.

T. Conduit and Signal Ducts:

1. Conduit:
 - a. The Contractor shall employ the latest installation practices and materials. The Contractor shall provide conduit, junction boxes, connectors, sleeves, weatherheads, pitch pockets, and associated sealing materials not specifically identified in this document as GFE. Conduit penetrations of walls, ceilings, floors, interstitial space, fire barriers, etc., shall be sleeved and sealed. The minimum conduit size shall be 19 mm (3/4 in.).

- b. All cables shall be installed in separate conduit and/or signal ducts (exception from the separate conduit requirement to allow telephone cables to be installed in partitioned cable tray with data cables may be granted in writing by the RE if requested.) Conduits shall be provided in accordance with Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and NEC Articles 517 for Critical Care and 800 for Communications systems, at a minimum.
- c. When metal, plastic covered, etc., flexible cable protective armor or systems are specifically authorized to be provided for use in the System, their installation guidelines and standards shall be as specified herein, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and the NEC.
- d. Conduit (including GFE) fill shall not exceed 40%. Each conduit end shall be equipped with a protective insulator or sleeve to cover the conduit end, connection nut or clamp, to protect the wire or cable during installation and remaining in the conduit. Electrical power conduit shall be installed in accordance with the NEC. AC power conduit shall be run separate from signal conduit.
- e. When metal, plastic covered, etc., flexible cable protective armor or systems are specifically authorized to be provided for use in the System, their installation guidelines and standards shall be as specified herein, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and the NEC.
- f. Ensure that Critical Care -----Nurse Call, and PA Systems (as identified by NEC Section 517) are completely separated and protected from all other systems.

U. Outlet Boxes, Back Boxes, and Faceplates:

- 1. Outlet Boxes: Signal, power, interface, connection, distribution, and junction boxes shall be provided as required by the system design, on-site inspection, and review of the contract drawings.

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2. Back Boxes: Back boxes shall be provided as directed by the OEM as required by the approved system design, on-site inspection, and review of the contract drawings.
3. Face Plates (or Cover Plates): Faceplates shall be of a standard type, stainless steel, anodized aluminum or UL approved cyclac plastic construction and provided by the Contractor for each identified system outlet location. Connectors and jacks appearing on the faceplate shall be clearly and permanently marked.

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