

**SECTION 27 05 00
COMMON WORK RESULTS FOR COMMUNICATIONS**

SPEC WRITER NOTES:

1. Use this section only for NCA projects. Delete text between // _____ // not applicable to project. Edit remaining text to suit project.

2. Contact Department of Veterans Affairs' (VA) AHJ, Spectrum Management and COMSEC Service (SMCS), Special Communications Team (SMCS 07A2), Telephone (202 461 5301/5311), for technical assistance.

3. This specification section governs and is required when other Division 27 or Division 28 sections are specified.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

SPEC WRITER NOTE: Insert cemetery name and contract identification number.

1. New state-of-the-art fully functioning // communications // and // electronic safety and security // systems installed in VA's National Cemetery (NCA) // _____ // to regulate access to restricted buildings, // building areas, // and // fenced areas //. // Contract // Project // Number: // _____ //.

2. General administrative, product, and installation requirements governing // Division 27 // and // Division 28 // specifications.

B. In Circumstances of a need for additional detail or conflict resolution between drawings, specifications, reference to code or standards, comply with:

1. FAR 42-236-21 (<http://www.farmaster.com/farmaster/data/idx/FAR84/5202360021.html>), and:
2. VAAR 852.236.91 (<http://www.va.gov/oal/library/vaar852.asp>).

1.2 DEFINITIONS

A. Conduits means any raceway types such as raceways, cable tray and pathway.

B. Telecommunications (a.k.a. Telecom) means The science and practice of communications by electromagnet (EMF) and radio frequency (RF) means, as opposed, to merely just the processing information (IT).

1.3 RELATED REQUIREMENTS

SPEC WRITER NOTE: Update and retain references only when specified elsewhere in this section.

- A. Tests, Operations and Storage Areas, and Instructions: Section 01 00 01, GENERAL REQUIREMENTS.
- B. Communications System: Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS, Section 27 05 33, CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS, Section 27 10 00, STRUCTURED CABLING, Section 27 11 00 COMMUNICATIONS EQUIPMENT ROOM FITTINGS, Section 27 51 23, INTERCOMMUNICATIONS AND PROGRAM SYSTEMS.
- C. Security Systems: Section 28 10 00, ACCESS CONTROL, Section 28 20 00, VIDEO SURVEILLANCE, Section 28 31 00, INTRUSION DETECTION, Section 28 46 00, FIRE DETECTION AND ALARM.

1.4 PREINSTALLATION MEETINGS

- A. Conduct preinstallation meeting // at project site // minimum 30 days before beginning Work specified in // Division 27 // and // Division 28 //.

SPEC WRITER NOTE: Edit participant list to ensure entities influencing outcome attend.

- 1. Required Participants:
 - a. Contracting Officer's Representative (COR).
 - b. VA AHJ SMCS 07A2, for special communications systems.
 - c. // Architect/Engineer. //
 - d. // Inspection and Testing Agency. //
 - e. Contractor.
 - f. Installer.
 - g. // Field representative. //
 - h. Other installers responsible for adjacent and intersecting work, including electrical installer.

SPEC WRITER NOTE: Edit meeting agenda to incorporate project specific topics.

- 2. Meeting Agenda: Distribute agenda to participants minimum 3 days before meeting.
 - a. Installation schedule.

- b. Installation sequence.
 - c. Preparatory work.
 - d. Protection before, during, and after installation.
 - e. Installation.
 - f. Terminations.
 - g. Transitions and connections to other work.
 - h. Inspecting and testing.
 - i. Other items affecting successful completion.
3. Document and distribute meeting minutes to participants to record decisions affecting installation.

1.5 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American National Standards Institute/Telecommunications Industry Association/Electronics Industries Alliance (ANSI/TIA/EIA):
 - 1. 526-7 - Measurement of Optical Power Loss of Installed Single-mode Fiber Cable Plant.
 - 2. 526-14 - Optimal Power Loss Measurements of Installed Multimode Fiber Cable Plant.
 - 3. 568-D-15 - Generic Telecommunications Cabling for Customer Premises.
 - 4. 568-D.1-15 - Commercial Building Telecommunications Infrastructure Standard.
 - 5. 568-D.2-15 - Balanced Twisted-Pair Telecommunication Cabling and Components Standard.
 - 6. 568-D.3-15 - Optical Fiber Cabling Components Standard.
- C. Master Painters Institute (MPI):
 - 1. No. 18 - Primer, Zinc Rich, Organic.
- D. National Fire Protection Association (NFPA):
 - 1. 70-14 - National Electrical Code.
- E. CFM Telecommunications; and, Special Telecommunications Design Manual.
 - 1. CFM Electrical Design Manual.
 - 2. CFM OI&T Design Guide.

1.6 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

SPEC WRITER NOTE: Refer to PG-18-3 Topic 2 and PG-18-15 for NCA contract drawing requirements.

1. Submittal Drawings and As-Built Drawings: 4 sets paper format Architectural F size. 2 sets electronic format.

SPEC WRITER NOTE: COR will provide submittals to SMCS 07A2 for review.

- B. System Operational Description: Submit detailed description of system operation, performance, and interface with other entities, equipment, and systems.
- C. Submittal Drawings:
 1. Show size, configuration, fabrication, and installation details.
 2. Cover Sheet:
 - a. Identify each drawing included in submittal.
 - b. Show facility name, building name, floor, and sheet number.
 - c. Include security abbreviations and symbols lists.
 - d. Reference general notes included in submittal.
 - e. Specification and scope of work pages for individual security systems.
 - f. Include detailed device identification table.
 3. Floor Plans and Site Plans:
 - a. Show drawing scale in metric and English units.
 - b. Show each device identification and location.
 - c. Show control and power wiring.
 - d. Show pull box and conduit locations, sizes, and fill capacities.
 - e. Include general and drawing specific notes.
 4. Riser Diagram:
 - a. Include sequence of operation.
 - b. Show relationship of integrated components on 1 diagram.
 - c. Show number, size, identification, and maximum lengths of interconnecting wires.
 - d. Include wiring schedule showing conductor type, wiring drawing symbol, manufacturer's name, and part number.
 - e. Identify factory wiring and field wiring.
 5. System Drawing for Each Security System:
 - a. Show equipment, including panels and devices, and system layout.
 - b. Show point-to-point wiring.
 - c. Identify wire types.

- d. Show device locations on floor plans.
 - e. Include general and drawing specific notes.
6. System Equipment Schedule: Show the following:
- a. Device ID.
 - b. Device Location.
 - c. Mounting type.
 - d. Power supply or circuit breaker and power panel number.
 - e. Door number, door type, locking mechanism and control device.
7. Detail and Elevation Drawings: Show installation details.
- D. When requesting variations from contract requirements according to Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, coordinate connecting work and related components including additions or revisions to branch circuits, circuit protective devices, conduits, wire, feeders, controls, panels and installation methods.
- E. Obtain COR approval of equipment and material before delivery to project site. Delivery, storage, and installation of unapproved equipment and material will not be permitted.
- F. Submit product data, submittal drawings, and other data substantiating proposed equipment and materials comply with specified requirements. Submit legible product data clearly identifying equipment.
- G. For individual systems and equipment assemblies consisting of more than one item or component, submit complete system or assembly. Partial submittals will not be considered for approval.
- 1. Mark submittals, "SUBMITTED UNDER SECTION_ // _____ // ".
 - 2. Include specification section and paragraph numbers.
 - 3. Submit each section separately.
- H. Include the following:
- 1. Information substantiating compliance with contract requirements. Include manufacturer's name, model or catalog numbers, catalog information, technical data sheets, shop drawings, photographs, nameplate data and test reports as required.

SPEC WRITER NOTE: Include following paragraph for projects in seismic areas of moderate high, high and very high seismicities, as listed in Table 4 of VA Handbook H188, Seismic Design Requirements.

- 2. Equipment anchors and supports, including weights, dimensions, center of gravity, standard connections, vibration control, thermal

expansion accommodation, and manufacturer's instructions for proposed installation.

3. Elementary and interconnection wiring diagrams for communication and signal systems, control system, and equipment assemblies. Identify terminal points and wiring on wiring diagrams.
 4. Parts list, including replacement parts recommended by equipment manufacturer, quantity of parts, current price and availability of each part.
- I. Manufacturer's Literature and Data:
1. Description of each product.
 2. Installation instructions.
- J. Certificates: Certify products comply with specifications.
1. Show product is OSHA's NRTL (UL) Listed and Labeled for specified application.

SPEC WRITER NOTE: Ensure system description in Part 2 indicates components to be included in equipment list (a.k.a. bill of materials).

- K. Equipment Lists: As bill of materials.
1. Show quantities for each specified product.
 2. Identify products included on GSA Approved Products List and approval status.
- L. Samples:
1. After approval and before installation, submit one of each of the following for COR's approval:
 2. 300 mm (12 inch) length of each type and size of wire and cable with tag from reel coils from which samples were taken.
 3. Each type of conduit and pathway coupling, bushing and termination fitting.
 4. TCO with backbox, outlet (six ports), proper color coded female connectors (four RJ-45), two port plugs, cover plate, 300 mm (12 inch) length of connecting wire and conduit indicating completed installation (Contact SMCS 07A2 for typical detail if not provided in contract documents).
 5. // Raceway and pathway // conduit // hangers, clamps and supports.
 6. Duct sealing compound.
- M. Submit manufacture's certification of UL LLC (UL) listing as specified.
- N. Qualifications: Substantiate qualifications comply with specifications.

1. System integrator // with project experience list //.
 - a. Responsible BICSI RDCC Certified Architect/Engineer approved by AHJ SMCS 07A2 on team.
 2. Installer // with project experience list //.
 - a. Factory authorized representative.
 - b. BICSI RDCC Certified Architect/Engineer on team.
 3. Field representative // with project experience list //.
- O. Design Drawings and Calculations: Each signed, dated, and sealed by VA COR delegated BICSI RCDD certified responsible design professional.
1. Ensure no deviations from details shown on drawings and specifications.
- P. Factory Test Reports: Submit 4 certified copies containing test data and results maximum 90 days after test completion, before final inspection.
- Q. Field conditions report indicating differing conditions.
- R. Field survey report identifying equipment by manufacturer and model number wherever possible indicating:
1. Non-functioning equipment, proposed replacement equipment, and replacement cost.
 2. Existing equipment reuse, removal, and replacement schedule.
 3. Existing equipment connection and disconnecting schedule, including times for system interruption.
- S. Acceptance Test Plan: Submit minimum 30 days before testing.
1. Include individual component and subsystem acceptance testing procedures.
 2. Include integrated system test ensuring proper operation.
- T. Field Representative:
1. Observation reports and supplemental instructions issued.
 2. Installation certification.
- SPEC WRITER NOTE: COR will provide reports to SMCS 07A2 through VA Project Manager.**
- U. Field Quality Control Reports: 4 copies. Submit minimum 15 working days before scheduled acceptance test.
1. System pretest recorded measurements.
 2. Certifications system is acceptance test ready.

SPEC WRITER NOTE: COR will provide O&M data to SMCS 07A2 for review.

- V. Operation and Maintenance Data: 4 sets bound in hardback binders according to Section 01 00 01, GENERAL REQUIREMENTS. Submit one manual minimum 15 working days before scheduled performance tests. Submit remaining manuals before contract completion.
1. Section 01 00 01 Include following identification on cover:
 - a. "MAINTENANCE AND OPERATION MANUAL."
 - b. Name and location of system, equipment, building.
 - c. Contractor's name and contract number.
 2. Include in manual: Names, addresses, and telephone numbers of each subcontractor installing system or equipment and local representatives for system or equipment.
 3. Provide "Table of Contents" and assemble manual coordinated with table of contents. Include tab sheet separating each subject's instructions.
 4. Provide legible instructions with large sheets of drawings folded in.
 5. Manuals to include:
 - a. Installation, start up, maintenance, troubleshooting, emergency, and shut down instructions for each operational product.
 - b. Demonstration and training video recordings.
 - c. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of equipment.
 - d. Control sequence describing start-up, operation, and shutdown.
 - e. Description of each principal item of equipment's function.
 - f. Safety precautions.
 - g. Diagrams and illustrations.
 - h. Testing methods.
 - i. Performance data.
 - j. Pictorial "exploded" parts list with part numbers. Identify required special tools and instruments. Include recommended spare parts part supply sources, and servicing organization name.
 - k. Appendix: List qualified equipment service organizations, including addresses and qualifications.
 6. Approvals will be based on complete submission of manuals and submittal drawings.

W. Submit training schedule minimum 30 days before planned training.

SPEC WRITER NOTE: COR will provide 1
electronic set to SMCS 07A2 for review.

X. As-Built Drawings: Submit minimum 15 working days before scheduled performance tests.

1. Wiring diagrams showing labels, inputs, outputs, and room locations.
2. Electronic Format: Match NCA specified AutoCAD version.

1.7 QUALITY ASSURANCE

A. System Integrator: BICSI RCDD System designer and installer.

1. Regularly integrates // communications // and // electronic safety and security // systems and specified products.
2. Employs BICSI RCDD certified licensed design professional responsible for system design.
3. Integrated // communications // and // electronic safety and security // systems and specified products with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //

B. Manufacturer Qualifications:

1. Regularly manufactures specified products.
2. Manufactured specified products with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //
3. Factory Authorized Representative: As directed by COR.
4. Field Representative: BICSI certified Registered Communications Distribution Designer (RCDD) experienced with specified components and systems.

C. Installer Qualifications: // BICSI RCDD certified and licensed security contractor. // Manufacturer authorized representative.

1. Regularly installs specified products.
2. Installed specified products with satisfactory service on five similar installations for minimum five years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects. //

D. Product Qualifications:

1. Demonstrated satisfactory operation on three similar size and type projects for approximately 5 years.
 - a. // Project Experience List: Provide contact names and addresses for completed projects when requested by COR. //

SPEC WRITER NOTE: In the following paragraph use 4 hours for metropolitan areas and 8 hours for rural areas.

E. Service Provider Qualifications:

1. Qualified service organization, manufacturer maintained or trained by manufacturer capable of servicing installation within // 4 // 8 // hours of service request. Submit name and address of service organizations.

1.8 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, equipment brand, // color, // production run number, manufacture date, NRTL (i.e. UL) Label and point of manufacture.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.
- D. COR may inventory system equipment at time of delivery and recommend rejecting non-conforming items.

1.9 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight // conditioned // facility.
 1. Store products in approved location preventing physical damage, dirt, moisture, cold, rain, snow, and other detrimental exposure.
- B. Protect products from damage during handling and construction operations.

1.10 FIELD CONDITIONS

- A. Environment:
 1. Product Temperature: Minimum 21 degrees C (70 degrees F) for minimum 48 hours before installation.
 2. Work Area Ambient Conditions: HVAC systems are complete, operational, and maintaining facility design operating conditions continuously, beginning 48 hours before installation until Government occupancy.

3. Install products when building is permanently enclosed and when wet construction is completed, dried, and cured.

a. // Install products outdoors only when rated for exterior wet exposure //.

B. Existing Conditions: Review drawings and specifications with existing site conditions.

1. Report discrepancies affecting system design and installation and propose solution.

2. Request COR's approval for proposed solution.

C. Field Measurements: Verify field conditions affecting product fabrication and installation. Show field measurements on Submittal Drawings.

1. Coordinate field measurement and fabrication schedule to avoid delay.

2. Request COR instructions for proposed conflict resolution.

1.11 WARRANTY

SPEC WRITER NOTE: Always retain construction warranty. FAR includes Contractor's 1 year labor and material warranty.

A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

B. Manufacturer's Warranty: Warrant buried cables, equipment against material and manufacturing defects, and degradation.

SPEC WRITER NOTE: Specify customarily available warranty period for specified products, typically 5 to 10 years.

1. Warranty Period: // 5 // 10 // years.

PART 2 - PRODUCTS

SPEC WRITER NOTE: Include RCDD representative to be on site during installation.

2.1 SYSTEM DESCRIPTION

A. System: Nonproprietary system fully integrated with Sections 28 10 00, ACCESS CONTROL (PACS), 28 20 00, VIDEO SURVEILLANCE AND 28 31 00, INTRUSION DETECTION.

- B. Fully compatible components as systems, integrated with associated security subsystems, whether stand alone or computer network.
- C. Allow future modular expansion with minimal equipment modifications.
- D. Provide compatible system equipment and materials ensuring specified functional operation.
- E. Standalone, local access controls connected to remote host facility central station providing system software and access privileges database management for system functions.

SPEC WRITER NOTE: Ensure internet connection is shown in main computer room (MCR) for system interface and control.

- 1. Protocol: Internet, addressable, and programmable.

SPEC WRITER NOTE: Confirm and specify available computer interface.

- 2. Interface: Computer, via VA-FTS and Telco Tie Lines // or current federal communications media //.

F. System Capabilities:

- 1. Locate individual protected asset area and portals.
- 2. Locate specific coverage areas.
- 3. Locate individual system component failures.
- 4. Locate individual system component tampering.
- 5. Provide and adjust devices maximizing space and area coverage. When multiple devices are required, ensure device coverage is overlapping.

G. Detection Sensitivity: Provide maximum secure area coverage while limiting environmental and small animal's false alarms.

H. Detection Devices: Antimasking type, except video motion detection.

I. Provide dual sensor technology not defeated by single method when possible to minimize false alarms.

J. System General Components:

- 1. Communications and control panels.
- 2. Interface cabinet for hard wired existing and standalone system extension.
- 3. Head end cabinet for standalone system.
- 4. Exterior detection devices (sensors-digital, analog, video, etc.).
- 5. Interior detection devices (sensors-digital, analog, video, etc.).
- 6. Power supply.

7. Power and control wiring, raceways, and grounding.

SPEC WRITER NOTE: Retain option only when connecting access control system to host facility central station.

8. Electronic security management system // fully compatible with existing Host VAMC Security Management System //.
 9. Electronic Supervisory System for system fault notification, enunciated at a minimum // _____ // and // _____ //.
- K. Ease of Use: Design, install, and program IDS for ease of operation, programming, servicing, maintaining, testing, and upgrading.
- L. System Integration:
1. With other security subsystems via computer programming and direct/stand-alone hardwiring.
 2. Designed, date stamped and signed by approved BICSI RCDD design professional.
 3. Determine methodology when system is designed and engineered.
 4. Include output module for integration with other security subsystems.
 5. Include software and upgrades required to integrate systems before system start up.
 6. Provide programming according to manufacturer's instructions and COR for correct system operations.
 7. System integration computers must meet or exceed minimum system requirements specified in system software packages; and approved by Facility OI&T.

2.2 SYSTEM PERFORMANCE

- A. General:

SPEC WRITER NOTE: Retain required electrical location ratings. Edit when all interior locations are dry.

1. Environment Rating: NFPA 70.
 - a. Exterior Locations: Wet.
 - b. // Maintenance Building Interior Locations: Damp. //
 - c. // Other // Interior Locations: Dry.

SPEC WRITER NOTE: Retain hazardous locations for areas with combustible dust.

- d. Hazardous Locations: NFPA 70; Class II, Division 1, Group F rated.
- 2. Electrical Power: 120 Volts AC, 60 Hz.
- 3. Control Power: 12 Volts AC and 12 Volts DC.
- 4. Backup Power: 96 hour duration, on primary power loss.
- 5. UPS: // 1 hour for general systems/2 hour for emergency, security, safety systems //.

2.3 PRODUCTS - GENERAL

- A. Products, Equipment, and Assemblies specified singular in number include quantities required for complete installation shown on drawings.
- B. Provide each product type from 1 manufacturer.
- C. Products and Equipment: Currently produced with available replacement parts.
- D. Equipment Assemblies:
 - 1. Assembly Manufacturer: Assume complete responsibility for entire assembly.
 - 2. Components: Compatible with each other and with total assembly for intended service.
 - a. Provide each component type from 1 manufacturer.

2.4 // INTERFACE, // HEAD END, // ENVIRONMENTAL, // CONTROL, AND COMMUNICATIONS // CABINETS, OR PANELS PLUS STAND ALONE EQUIPMENT RACK

- A. Cabinet with Internal Equipment Mounting Rails:
 - 1. Construction: 1.37 mm (0.0538 inch) thick steel, with lockable access door and fully adjustable internal equipment mounting racks or rails allowing front panel equipment mounting and access.
 - 2. Install mounting rails to provide internal cabinet ground for each installed equipment items.
 - 3. Connect equipment grounding terminal to separate mounting hole on mounting rail to the right viewed from the rear with minimum 12 AWG stranded copper wire with protective jacket and connectors installed.
 - 4. Finish: Baked-on iron phosphate primer and baked enamel paint, color to be selected by COR or FMS Service Chief.
 - 5. Mounting: Floor or wall mounted with knock-out holes for cable.

6. Ventilation Fan: Quiet type with non-disposable air filter for equipment cooling.
7. Keying: Keyed alike. Provide 4 keys to COR for every 10 cabinets.
8. Provide minimum of 1 cabinet with blank rack space, for additional expansion equipment. Install blank panels covering unused rack space. Provide 2, 120 Volt AC power strips connected to surge protector, ventilation fan, and conduit or cable duct interfaced to adjacent cabinet and local room wire management system.
 - a. Blank Panels: 3 mm (1/8 inch) thick aluminum with vertical dimensions in increments of one rack unit (RU) or 44 mm (1.75 inches) with mounting holes spaced to accommodate EIA 482 mm (19 inches) rack dimensions. Color code blank panels matching cabinet.
 - b. Use single blank panels to fill unused panel or rack spaces. Install 1, 44 mm (1.75 inches) high blank panel between each equipment item.
9. Provide internal cabinet communications grounding system and connect to communications ground bus bar with minimum 6 AWG stranded copper wire with protective covering.
 - a. Connect cabinet to communications grounding system.
 - b. Connect communications system grounding wire to a cabinet provided ground terminal or bolted to each equipment mounting rail.
10. Technical Characteristics:

Overall Height	2,180 mm (85-7/8 inches), maximum
Overall Depth	650 mm (25-1/2 inches), maximum
Overall Width	535 mm (21-1/16inches), maximum
Front Panel Opening Width	480 mm (19 inches), EIA horizontal
Hole Spacing	per EIA and Industry Standards

11. Cabinet Minimum Internal Components:
 - a. AC Power Outlet Strip: "U" grounded AC outlets, self-contained in a metal enclosure with maximum 2 meter (6 feet) long connecting cords with three prong AC male plug.
 - 1) Quantity: 2 for each panel.

- 2) Provide as directed by OEM. Provide AC strips with minimum 8 AC power outlets at spare empty cabinet. Mount strips inside at rear of cabinet.
- 3) Technical Characteristics:
 - a) Power capacity 20 Ampere, 120 Volt AC continuous duty.
 - b) Wire gauge: Three conductor, 12 AWG copper.
- b. Cabinet AC Power Line Surge Protector and Filter:
 - 1) House surge protector and filter in single enclosure. Perform instantaneous regulation of AC input voltage and isolate and filter AC input line noise. Equip unit with AC voltage and current surge protectors to prevent damage to electronic equipment from power line induced voltage spikes, surges, lightning, etc.
 - 2) Surge Protector Construction: UL listed device.
 - a) Primary Surge Protection Components: Silicon semiconductors.
 - b) Incorporate visual device indicating surge suppression components are functioning.
 - c) Provide voltage and current surge protectors on ancillary equipment.
 - 3) Mounting: Cabinet mounted with cabinet AC power strips connected.
 - 4) Technical Characteristics:

Input Voltage range	120 Volt AC + 15%
Power capacity	20 AMP, 120 VAC
Voltage output regulation	+3.0%
Circuit breaker	15 AMP, may be self-contained
Noise filtering	Greater than -45 dB
AC outlets	Four (4) duplex grounded types, minimum
Response time	5.0 ns
Surge Suppression	10,000 A
Noise Suppression	-40 dB common, -45 dB differential

- 5) Current and Surge Protection Performance:
 - a) Voltage protection threshold, line to neutral, starts at no more than 220 Volts peak. The transient voltage shall

not exceed 300 volts peak. Provide documentation on peak clamping voltage as a function of transient AMP.

- b) Peak power dissipation minimum 35 Joules per phase, as measured for 1.0 ms at sub branch panels, 100 Joules per phase at branch panels and 300 Joules per phase at service entrance panels. Provide documentation of how ratings were measured or empirically derived.
- c) Surge protector must not short circuit AC power line any time.
- d) Power dissipation 12,000 Watts for 1.0 ms (or 12 Joules).
- e) Voltage protection threshold starts at maximum 100 VAC.

B. Uninterruptible Power Supply (UPS): Provide internal COTS UPS at each cabinet. UPS may be combined with Surge Protector and Filter when 50 percent expansion is provided.

1. Continuous Full Load Capacity: Provide minimum 1 hour // and 2 hours if working with emergency safety system //.
2. Continuous Full Load Reserve Capacity: 25 percent, minimum // 1 hour // 2 hours //, in event of Facility Primary or Emergency AC Power failure.
3. Supervision, Monitoring, and Signaling:

Protection switch	Automatically protect UPS unit and associated connected equipment.
First/fast charge unit	Provide clean predicable charge voltage/current when needed.
Over Voltage/Current protect	Must not short circuit the AC power line at any time.
Trickle charge unit	Maintain internal battery charge without damaging batteries.
Internally mounted	Per OEM's direction.
Proper ventilation	Not override cabinets' ventilation system.
Power change from AC input	Accomplish without interruption to communications link or subsystem being protected. Provide audible and visual alarms on power loss.
Electrical supervision	Audible and visual reported locally and remotely annunciating panel

	status via direct connection for trouble and alarm indication
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SPEC WRITER NOTE: Retain environmental cabinets used in hostile TR locations as identified in CFM's TDM and OI&T Design Guide.

C. Environmental Cabinet: OEM fully assembled unit. Provide at locations shown on drawings.

1. Fully sustain installed equipment as specified for cabinet with internal equipment mounting rails. Fully support installed equipment as if installed in standalone air handling area regardless of local area's air handling capabilities.
2. Multiple Cabinets for Any System Location: OEM assembled for consolidating or combining two or more enclosures in single unit to meet system space and equipment handling designs plus maintain OSHA spacing requirements.
3. Technical Characteristics:

Environmental control	Automatic, heating and cooling, as required
Temperature conditions (rated at 1,300 W of installed equipment heat generation):	
Internal Range	Maintains 80° to 105° of internal heat conditions, maximum
External Range	100° + 25°, maximum
Internals	
Forced air unit	Required with non-disposable air filter unobstructed and uninterruptible
Air conditioning	As required, fully internal mounted
Heater	As required, fully internal mounted
Uninterruptible power supply	As required, fully internal mounted
Input power	2 ea. minimum 120 VAC, 20 Ampere, maximum, independent circuit, conduit for fixed or armored cable for moveable installations
Externals:	

Front door	Full length, see through, EMI resistant, and lockable
Rear door	Full length, non-see through, EMI resistant, and lockable
Conduit wiring entrance	Top and bottom, fully sealed
Dimensions:	
Height	1980 mm (78 inches), maximum
Width	635 mm (25 inches), maximum
Depth	965 mm (38 inches), maximum
Front panel opening	482 mm (19 inches), with EIA mounting hole spacing

D. Distribution or System Interface Cabinet:

1. Construction: 1.37 mm (0.0538 inch) thick steel, with top and side panels and hinged front and rear (front door only if wall mounted) doors and fully adjustable internal equipment mounting racks or rails allowing front panel equipment mounting and access.
2. Finish: Baked-on iron phosphate primer and baked enamel paint, color to be selected by COR or FMS Service Chief.
3. When equipment, doors and panels are installed, install snap-in-place chrome trim strip covers covering front panel screw fasteners.
4. Equip pane same as cabinet with internal equipment mounting rails.
5. Technical Characteristics:

Overall height	2,180 mm (85-7/8 inches), maximum
Overall depth	650 mm (25-1/2 inches), maximum
Overall width	535 mm (21-1/16 inches), maximum
Equipment vertical mounting space	1,960 mm (77-1/8 inches), maximum
Front panel horizontal	484 mm (19-1/16 inches.), maximum width

SPEC WRITER NOTE: Following panel is sometimes called Radio Relay Rack.

E. Stand Alone Equipment Rack:

1. Construction: 1.37 mm (0.0538 inch) thick steel, with fully adjustable internal equipment mounting racks or rails allowing front panel equipment mounting and access.
2. Finish: Baked-on iron phosphate primer and baked enamel paint, color to be selected by COR or FMS Service Chief.
3. Mounting: Floor or wall mounted or mounted on casters as directed by COR.
4. Technical Characteristics:

Overall Height	2,180 mm (85-7/8 inches), maximum
Overall Depth	650 mm (25-1/2 inches), maximum
Overall Width	535 mm (21-1/16 inches), maximum
Front Panel Opening	480 mm (19 inches), EIA horizontal width
Hole Spacing	per EIA and Industry Standards

F. Panels: Expandable, network capable, expandable, providing entire facility access control through primary // interface // head end // panel.

1. Indoor Locations: NEMA 250; // Type 1 // Type 2 // Type 3 //.
2. Outdoor Locations: NEMA 250; // Type 3 // Type 4 // Type 4X //.
3. Mounting: // Wall // Floor //.

SPEC WRITER NOTE: Retain OSHA front and rear access door guidelines for floor mounted panels only.

4. Access Doors: Locking, // front only // front and rear //; operable without disturbing and damaging internal wiring.
5. Ventilation: Electric fan, non-disposable air filter, and enclosure openings required to dissipate heat from panel modules.
6. Signal Wiring Strips:
 - a. Input Strip: Top row, receiving output signal from connected devices.
 - b. Output Strip: Bottom row transmitting input signal to connected devices.
7. Power outlet strip.
8. Bulkhead connector panel.
9. Computer Access: Password protected.
10. Database: Single, integrated, relational type.

SPEC WRITER NOTE: Retain operating systems compatible with host facility central station.

11. Operating System:
 - a. Comply with client applications requirements.
 - b. Linux embedded OS, browser based thin-client.
12. Programming Source Code: Single, unified 32-bit program interfacing with panel modules.

SPEC WRITER NOTE: Retain only control modules integrated into PACS. General control and access control are always required. Coordinate with specified SMS functions.

13. Panel Modules: Programmable; general control, access control, // alarm monitoring, // credential management, // digital video, // visitor management, // intrusion detection, // asset management // and // _____ //.
- G. Client Applications: Web enabled using panel database.
1. Operating System Support:

SPEC WRITER NOTE: Retain latest operating system or system compatible with existing // host // equipment. Microsoft supports operating systems for 10 years from release date. Systems before 7 are no longer supported.

- a. Microsoft: Windows // NT // 95 // 98 // XP // 2000 // 7 // 8 // 10 //.
- b. Macintosh.
- c. UNIX.
- d. Linux.
- e. Solaris.

2.5 POWER SUPPLIES

- A. Use power supplies only when control panel cannot support IDS load requirements.
- B. Power Supplies: UL Listed; capable of powering two detection devices, continuously, without failure.
 1. Input Power: 110 Volt AC, 60 Hz, 2.0 Amperes.
 2. Output Power: // 12 Volt DC nominal (13.8 Volt DC) // and // 24 Volt DC nominal (27.6 Volt DC) //; filtered and regulated.

3. Battery: Minimum 14 Ampere-hour at full load, rechargeable.
4. Output Current: Maximum // 4 Amperes at 13.8 Volt DC // and // 3 Amperes at 27.6 Volt DC //.
5. Battery Fuse: 3.5 Ampere at 250 Volts AC.
6. Battery Charging Circuit: Manufacturer's standard.

2.6 LABELS

- A. Labeling Abbreviations: Use accepted industry standards consistent with submittal drawings and recorded in as-built drawings.
- B. Wire Labels: Permanent, with contrasting identification alpha or numeric, identifying each cable according to system submittal drawings.
- C. Equipment and AC Power Labels: Permanent with contrasting plastic laminate or Bakelite material.
 1. Equipment Nameplates: Laminated black phenolic resin with white core and engraved lettering, minimum 6 mm (1/4 inch) high. Secure nameplates with screws. Manufacturer's nameplates furnished as standard catalog item, or where other method of identification is herein specified, may be permitted by COR.

2.7 INSTALLATION KIT

- A. Include, at minimum, connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks, wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, cable tray, and other items required for neat and secure installation.
 1. Terminate wires in spade lug and barrier strip, wire wrap terminal or punch block.
 2. Unfinished and unlabeled wire connections are not allowed.
 3. Deliver unused and partially opened installation kit boxes, coaxial, fiber-optic, and twisted pair cable reels, conduit, cable tray, cable duct bundles, wire rolls, and physical installation hardware to COR.
- B. System Grounding Kit: Include cable and installation hardware required to connect head end equipment, power supplies, and following components to earth ground via internal building wiring, according to NFPA 70.
 1. Coaxial cable shields.
 2. Control cable shields.
 3. Data cable shields.
 4. Equipment racks.

5. Equipment cabinets.
 6. Conduits.
 7. Cable duct blocks.
 8. Cable trays.
 9. Power panels.
 10. Connector panels.
- C. Coaxial Cable Kit: Include coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, and other items required for neat and secure installation.
 - D. Wire and Cable Kit: Include connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels, and other items required for neat and secure installation.
 - E. Conduit, Cable Duct, and Cable Tray Kit: Include conduit, duct, trays, junction boxes, backboxes, cover plates, feed through nipples, hangers, clamps, and other hardware required for neat and secure conduit, cable duct, and cable tray installation according to NFPA 70.
 - F. Equipment Interface Kit: Include equipment, cable, mounting hardware, and materials to interface systems with subsystems according to manufacturer's instructions.
 - G. Labeling Kit: Include labels, tools, stencils, and materials to label each subsystem according to manufacturer's instructions and as-built drawings.
 - H. Documentation Kit: Include items, computer discs, as-built drawings, equipment, operation and maintenance manuals, and manufacturer's publications to fully document installed system.

2.8 ACCESSORIES

- A. Sealant: See Section 07 92 00, JOINT SEALANTS.
- B. Provide connectors, terminators, and other accessories required for operable system.
- C. Galvanizing Repair Paint: MPI No. 18.

2.9 SOURCE QUALITY CONTROL

- A. Special Inspections and Tests:
- B. Shop Inspections:
- C. Shop Tests:
- D. When Factory Testing Is Specified:
 1. Allow COR to witness factory tests.

2. Notify COR minimum 15 working days before manufacturer's factory tests.
3. When factory tests fail, provide additional tests and pay Government expenses to witness tests.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Examine and verify substrate suitability for product installation.
- B. Field survey, test, and inspect existing equipment and signal lines intended to be incorporated into the system.
 1. Equipment and wiring usable without modification may be reused with COR's approval.
- C. Prepare report of unforeseen conditions affecting Work performance. Submit recommendation signed, dated, and sealed by VA delegated BICSI RCDD certified design professional.
- D. Examine and verify substrate suitability for product installation.
- E. Cutting or Holes:
 1. Locate holes in advance where proposed in structural sections such as ribs or beams. Obtain COR's approval before drilling through structural sections.
 2. Cut holes through concrete and masonry in new and existing construction with diamond core drill or concrete saw. Pneumatic hammer, impact electric, hand or manual hammer type drills are not acceptable, except as permitted by COR as required by limited working space.
- F. Obtain COR's approval minimum 3 days before interrupting existing system service.
- G. Protect existing construction and completed work from damage.
 1. Repair damage caused by construction operations.
- H. Remove existing equipment and wiring to permit new installation.
 1. Retain existing serviceable equipment indicated for reuse.
 2. Dispose of // other // removed materials.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions, system specifications, // and approved submittal drawings //.
 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for COR consideration.

- B. Configure components with service points to pinpoint system trouble in less than 15 minutes.
- C. Ensure components are fully compatible with entire system and can be integrated with associated and remote subsystems, whether system is stand-alone, hardwired, or networked to meet requirements of AHJ SMCS 07A2.
- D. Install system components including Government furnished equipment, and appurtenances according to manufacturer's instructions. Provide necessary connectors, terminators, interconnections, services, and adjustments required for operable system.
- E. Connect existing equipment, wiring, and devices shown on drawings.
- F. Raceway Penetrations:
 - 1. Enter control panels through panel bottom.
 - 2. Seal penetrations located outdoors. Seal penetrations through building exterior enclosure.
 - 3. Firestop penetrations through fire rated assemblies. See Section 07 84 00, FIRESTOPPING.
 - 4. Terminate conduit riser in hot-dip galvanized metal cable terminator. Fill terminator with sealant recommended by cable manufacturer.
- G. Control Panels:
 - 1. Install control panels plumb and level, securely attached to // wall // floor //.
 - a. Mount panels allowing servicing and testing access.
 - 2. Connect wiring to control modules.
 - 3. Program control modules to provide specified functions.
- H. Touch up damaged factory finishes.
 - 1. Repair galvanized surfaces with galvanized repair paint.
- I. Perform // communications // and // electronic safety and security // work without interrupting existing systems. See Article OPERATIONS AND STORAGE AREAS, Section 01 00 01, GENERAL REQUIREMENTS.
- J. Make connections to existing work neatly and carefully. Replace or repair damaged work to its original condition, as required by Section 01 00 01, GENERAL REQUIREMENTS.
- K. Coordinate equipment, // pathways, // and // conduit // locations to minimize interferences.

3.3 EQUIPMENT INSTALLATION

- A. Locate equipment where shown on drawings.

- B. Inaccessible Equipment:
 - 1. Where COR determines equipment is not conveniently accessible for operation and maintenance, remove and reinstall equipment as directed by COR.
 - 2. "Conveniently accessible" is defined as being capable of being reached without using ladders and without climbing or crawling under or over obstacles such as motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

3.4 INSTALLATION - WIRING

- A. Grounding and Bonding: See Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- B. Raceway Installation: See Section 27 05 33, CONDUITS AND BACKBOXES FOR COMMUNICATIONS SYSTEMS.
- C. Wiring: See Section 27 10 00 - STRUCTURED CABLING.

3.5 LABELING

- A. Cable and Wires: Install labels on cables at each termination, pull box, and break in conductor run.
 - 1. Labels: Permanent, with contrasting identification alpha or numeric, identifying each cable according to system submittal drawings.
- B. Equipment: Label equipment, and equipment inputs and outputs.
 - 1. Permanently affix labels to equipment face with metal screws, permanent mounting devices, or cement.
 - 2. Label equipment corresponding to control source. Label remote control equipment corresponding to controlled equipment.
- C. AC Power: Label power panel circuit breaker identifying connected access control panel.
 - 1. Permanently affix labels to equipment face with metal screws, permanent mounting devices or cement.
- D. Conduit: Label access control system conduit with permanent marking devices or spray painted stenciling, maximum 3000 mm (10 feet) spacing.

3.6 SYSTEM START-UP

- A. Do not apply power to System until the following items have been completed:
 - 1. System equipment items and have been set up according to manufacturer's instructions.

2. Visual inspection of System has been conducted to ensure defective equipment items have not been installed and there are no loose connections.
3. System wiring has been tested and verified as correctly connected as indicated.
4. System communications and electrical grounding and transient protection systems have been verified as installed and connected as indicated.
5. Power supplies to be connected to CCTV System have been verified as correct Voltage, phasing, and frequency as indicated.
6. Satisfaction of above requirements will not relieve Contractor of responsibility for incorrect installation, defective equipment items, or collateral damage as result of Contractor's work efforts.

3.7 FIELD QUALITY CONTROL

SPEC WRITER NOTE: Section 01 45 29, TESTING LABORATORY SERVICES includes VA provided testing for large projects and contractor provided testing for small projects. Coordinate testing responsibility.

- A. Field Tests: Performed by testing laboratory specified in Section 01 45 29, TESTING LABORATORY SERVICES.
- B. Field Representative Services:
 1. Observe preparation and initial construction.
 2. Provide technical assistance and recommendations.
 3. Provide assistance with follow-up phases of quality control on as needed basis.
 4. Observe system start-up, testing, and certification.
 5. Certify system is fully operational according to contract requirements.

SPEC WRITER NOTE: When system is used as "Stand Alone" cable plant installation, include the following testing guidelines.

- C. Interim Inspection:
 1. The COR // RE // may require the test at approximately 50 // 75 // percent of the installation; and, 10 working days before inspection suggested start date.

2. Inspection to be conducted by OEM, factory-certified contractor, and witnessed by COR // RE //, // Facility // and AHJ 07A2 Representatives.
3. Verify equipment provided adheres to installation requirements. Perform interim inspection by a factory certified representative and witnessed by COR // RE //.
 - a. Check each item of installed equipment for appropriate UL certification markings.
 - b. Verify cabling terminations in telecommunications rooms and at workstations adhere to color code for ANSI/TIA/EIA 568 D, // T568B // T568A // pin assignments and cabling connections comply with ANSI/EIA/TIA standards.
 - c. Visually confirm // Category 6 // - // marking of outlets, faceplates, outlet/connectors and patch cords.
4. Perform fiber optical field inspection tests via attenuation measurements on factory reels. Provide results along with manufacturer certification for factory reel tests. Remove failed cable reels from project site upon attenuation test failure.

SPEC WRITER NOTE: Two methods for measuring the installed single mode fiber optic cable plant are described in ANSI/EIA/TIA 526 7. Method A uses optical power measurement equipment. Method B uses optical time domain reflector (OTDR). Method B is not recommended for installations containing branching devices and isolators. ANSI/EIA/TIA 526 14 does not recommend using OTDR for testing multimode fiber optic cables. Building Industry Consulting Service International (BICSI) recommends using Method A for testing and implementing Method B testing to isolate optical disparities in fiber links that fail Method A testing. Consult with TSSO 005N2 regarding recommended testing procedures.

5. Notify COR, in writing, estimated date for interim inspection, minimum 20 working days before requested inspection date.
6. Submit interim inspection results to COR. Repeat interim inspection when major or multiple deficiencies are discovered before continuing system installation.
7. COR will determine when additional inspection is required, or when allowed to proceed with installation. In either case, re inspection

of deficiencies noted during interim inspections, will be part of proof of performance test. Interim inspection may not affect Systems' completion date. COR will ensure test documents will become a part of Systems record documentation.

D. Pretesting:

1. Align and balance system when installation is complete. Pretest entire system.
2. Pretesting Procedure:
 - a. Verify (using approved spectrum analyzer and test equipment) System is fully operational and meets system performance requirements.
 - b. Pretest and verify System functions and specification requirements are met, and operational, no unwanted aural effects, such as signal distortion, noise pulses, glitches, audio hum, poling noise, etc. are present. Measure and record aural carrier levels of each system telephone and data channel, at each of the following points in system:
 - 1) Local Telephone Company Interfaces or Inputs.
 - 2) EPBX interfaces or inputs and outputs.
 - 3) MDF interfaces or inputs and outputs.
 - 4) EPBX output S/NR for each telephone and data channel.
 - 5) Signal Level at each interface point to distribution system, last outlet on each trunk line plus outlets installed as part of this contract.
 - 6) Submit four copies of recorded system pretest measurements and written certification that System is ready for formal acceptance test to COR.

E. Acceptance Test:

1. Submit system pretesting results and certification to COR. Notify COR 30 days before start of acceptance test.
2. Test System in the presence of COR and manufacturer's certified representative utilizing approved test equipment to certify proof of performance and Life Safety compliance. Test to verify total System meets specified requirements. Acceptance test notification includes expected test duration.

F. Verification Tests:

1. Test // UTP // STP // copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and

between conductors and shield, when cable has an overall shield.
Test operation of shorting bars in connection blocks. Test cables after termination and before cross connection.

2. Multimode Fiber Optic Cable: Perform end to end attenuation tests according to ANSI/EIA/TIA 568 D.3 and ANSI/EIA/TIA 526 14A using // Method A, Optical Power Meter and Light Source // and/or // Method B, OTDR //. Perform verification acceptance test.
 3. Single mode Fiber Optic Cable: Perform end to end attenuation tests according to ANSI/EIA/TIA 568 D.3 and ANSI/EIA/TIA 526 7 using // Method A, Optical Power Meter and Light Source // and/or // Method B, OTDR //. Perform verification acceptance test.
- G. Performance Testing:
1. Perform Category // 5e // 6 //tests according to ANSI /EIA/TIA 568 D.1 and ANSI/EIA/TIA 568 D.2. Test includes the following:
 - a. Wire map.
 - b. Length.
 - c. Insertion loss.
 - d. Return loss.
 - e. NEXT.
 - f. PSNEXT.
 - g. ELFEXT.
 - h. PSELFEXT.
 - i. Propagation delay.
 - j. Delay skew.
 2. Fiber Optic Links: Perform end to end fiber optic cable link tests according to ANSI/EIA/TIA 568 D.3.
- H. Total System Acceptance Test: Perform verification tests for // UTP // STP // copper cabling systems // and the // multimode // and // single mode // fiber optic cabling systems after complete telecommunication distribution system and workstation outlet are installed.

SPEC WRITER NOTES: Voice tests require dial tone service from Local Exchange Company (LEC) before voice testing can be completed. Data tests require installation of network devices by IRM to complete data testing.

- I. Voice Testing: Connect to network interface device at demarcation point. Go off hook and receive dial tone from LEC. When a test number

is available, place and receive a local, long distance, and FTS telephone call.

- J. Data Testing: Connect to network interface device at demarcation point. Log onto network to ensure proper connection to network is achieved.
- K. Test system to ensure all components are fully compatible as system and can be integrated with all associated subsystems, whether system is stand alone or part of complete Information Technology (IT) computer network.
- L. System Certification:
 - 1. COR and AHJ SMCS 07A2 will compare all recorded test results and determine when the system can be certified for VA use and execute appropriate government acceptance forms.
 - a. Read, approve and sign documents providing transfer of system ownership to VA.
 - 2. Develop, plan, and agree on retesting of system with COR, AHJ SMCS 07A2 and OEM when system cannot be certified.
 - 3. COR will make appropriate recommendation to CO when system retest costs shall be borne by contactor.
- M. Test Conclusion: See FAR clause 52.246 21, "Warranty of Construction."

3.8 DEMONSTRATION AND TRAINING

- A. Provide training according to Article, INSTRUCTIONS, Section 01 00 01, GENERAL REQUIREMENTS.
 - 1. Coordinate training schedule with COR with training approval from AHJ SMCS 07A2.
 - 2. Use training plan developed and approved in the Technical Submittal.

Spec Writer Note: Design professional shall ensure the original approved plan co-insides with system requirements.

 - a. Submit finalized plan to COR 30 days before expended training dates.
 - b. COR will obtain technical approval from AHJ SMCS 07A2 before plan submission for final project action.
 - 3. Provide factory authorized representative for demonstration and training.
 - 4. Training Time:

SPEC WRITER NOTE: Edit required training time to suit system complexity.

- a. VA Cemetery Director, Cemetery Foreman, and // _____ //: // Two (2) // Four (4) hour periods.
- b. Other Selected VA Facility Personnel: // Two (2) // Eight (8) hour periods.
- c. Schedule training sessions with COR. Complete training before final system certification.

3.9 PROTECTION

- A. Protect enclosures, equipment, controls, controllers, circuit protective devices, and other items against contamination. Vacuum clean both inside and outside before testing and operating system.
- B. Replace or repair damaged equipment, as determined by COR.
- C. Protect painted surfaces from damage with factory installed removable covering.

- - - E N D - - -