

provided in enclosure(s) and shall be protected from the environment.

- c. All cable junctions and taps shall be accessible. Provide an 8" X 8" X 4" (minimum) junction box attached to the cable duct or raceway for installation of distribution system passive equipment. Ensure all equipment and tap junctions are accessible.

2. Routing and Interconnection:

- a. Wires or cables between consoles, cabinets, racks and other equipment shall be in an approved conduit, signal duct, cable duct, or cable tray that is secured to building structure.
- b. Wires and cables shall be insulated to prevent contact with signal or current carrying conductors. Wires or cables used in assembling consoles, panels, equipment cabinets and racks shall be formed into harnesses that are bundled and tied. Harnessed wires or cables shall be combed straight, formed and dressed in either a vertical or horizontal relationship to equipment, controls, components or terminations.
- c. Harnesses with intertwined members are not acceptable. Each wire or cable that breaks out from a harness for connection or termination shall have been tied off at that harness or bundle point, and be provided with a neatly formed service loop.
- d. Wires and cables shall be grouped according to service (i.e.: AC, grounds, signal, DC, control, etc.). DC, control and signal cables may be included with any group. Wires and cables shall be neatly formed and shall not change position in the group throughout the conduit run. Wires and cables in approved signal duct, conduit, cable ducts, or cable trays shall be neatly formed, bundled, tied off in 600 mm to 900 mm (24 in. to 36 in.) lengths and shall not change position in the group throughout the run. Concealed splices are not allowed.
- e. Separate, organize, bundle, and route wires or cables to restrict EMI, channel crosstalk, or feedback oscillation inside any enclosure. Looking at any enclosure from the rear (wall mounted enclosures, junction, pull or interface boxes from the front), locate AC power, DC and speaker wires or cables on the left; coaxial, control, microphone and line level audio and data wires or cables, on the right. This installation shall be accomplished

with ties and/or fasteners that will not damage or distort the wires or cables. Limit spacing between tied off points to a maximum of 150 mm (6 inches).

- f. Do not pull wire or cable through any box, fitting or enclosure where change of cable tray or signal or cable duct alignment or direction occurs. Ensure the proper bend radius is maintained for each wire or cable as specified by it's OEM.
- g. Employ temporary guides, sheaves, rollers, and other necessary items to protect the wire or cable from excess tension or damage from bending during installation. Abrasion to wire or cable jackets is not acceptable and will not be allowed. Replace all cables whose jacket has been abraded. The discovery of any abraded and/or damaged cables during the proof of performance test shall be grounds for declaring the entire system unacceptable and the termination of the proof of performance test. Completely cover edges of wire or cable passing through holes in chassis, cabinets or racks, enclosures, pull or junction boxes, conduit, etc., with plastic or nylon grommeting.
- h. Cable runs shall be splice free between conduit junction and interface boxes and equipment locations.
- i. Cables shall be installed and fastened without causing sharp bends or rubbing of the cables against sharp edges. Cables shall be fastened with hardware that will not damage or distort them.
- j. Cables shall be labeled with permanent markers at the terminals of the electronic and passive equipment and at each junction point in the System. The lettering on the cables shall correspond with the lettering on the record diagrams.
- k. Completely test all of the cables after installation and replace any defective cables.
- l. Wires or cables that are installed outside of buildings shall be in conduit, secured to solid building structures. If specifically approved, on a case by case basis, to be run outside of conduit, the wires or cables shall be installed, as described herein. The bundled wires or cables must: Be tied at not less than 460 mm (18 in.) intervals to a solid building structure; have ultra violet protection and be totally waterproof (including all connections). The laying of wires or cables directly on roof tops, ladders,

drooping down walls, walkways, floors, etc. is not allowed and will not be approved.

- m. Wires or cables installed outside of conduit, cable trays, wireways, cable duct, etc.
  - 1) Only when specifically authorized as described herein, will wires or cables be identified and approved to be installed outside of conduit. The wire or cable runs shall be UL rated plenum and OEM certified for use in air plenums.
  - 2) Wires and cables shall be hidden, protected, fastened and tied at 600 mm (24 in.) intervals, maximum, as described herein to building structure.
  - 3) Closer wire or cable fastening intervals may be required to prevents sagging, maintain clearance above suspended ceilings, remove unsightly wiring and cabling from view and discourage tampering and vandalism. Wire or cable runs, not provided in conduit, that penetrate outside building walls, supporting walls, and two hour fire barriers shall be sleeved and sealed with an approved fire retardant sealant.
  - 4) Wire or cable runs to system components installed in walls (i.e.: volume attenuators, circuit controllers, signal, or data outlets, etc.) may, when specifically authorized by the RE, be fished through hollow spaces in walls and shall be certified for use in air plenum areas.
- n. Wires or cables installed in underground conduit, duct, etc.
  - 1) Wires or cables installed in underground installations shall be waterproofed by the inclusion of a water protective barrier (i.e. gel, magma, etc.) or flooding compound between the outside jacket and first shield. Each underground connection shall be accessible in a manhole, recessed ground level junction box, above ground pedestal, etc., and shall be provided with appropriate waterproof connectors to match the cable being installed. Once the System has been tested and found to meet the System performance standards and accepted by VA, the Contractor shall provide waterproof shrink tubing or approved mastic to fully encompass each wire or cable connection and overlay at least 150 mm (6 inches) above each wire or cable jacket trim point.

2) It is not acceptable to connect waterproofed cable directly to an inside CCS punch block or directly to an equipment connection port. When an under ground cable enters a building, it shall be routed directly to the closest TC that has been designated as the building's IMTC. The Contractor shall provide a "transition" splice in this TC where the "water proofed" cable enters on one side and "dry" cable exits on the other side. The "transition" splice shall be fully waterproof and be capable of reentry for system servicing. Additionally, the transition splice shall not allow the waterproofing compound to migrate from the water proof cable to the dry cable.

3) Warning tape shall be continuously placed 300 mm (12 inches) above buried conduit, cable, etc.

E. 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.
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.

F. Connectors: Circuits, transmission lines, and signal extensions shall have continuity, correct connection and polarity. A uniform polarity shall be maintained between all points in the system.

1. Wires:

- a. Wire ends shall be neatly formed and where insulation has been cut, heat shrink tubing shall be employed to secure the insulation on each wire. Tape of any type is not acceptable.
- b. Audio spade lugs shall be installed on each wire (including spare or unused) end and connect to screw terminals of appropriate size barrier strips. AC barrier strips shall be provided with a protective cover to prevent accidental contact with wires

carrying live AC current. Punch blocks are approved for signal, not AC wires. Wire Nut or "Scotch Lock" connectors are not acceptable for signal wire installation.

2. Cables: Each connector shall be designed for the specific size cable being used and installed with the OEM's approved installation tool. Typical system cable connectors include; but, are not limited to: Audio spade lug, punch block, wirewrap, etc.
  3. Line or Microphone Audio: Each connector shall be installed according to the cable or connector OEM's instructions and use the OEM's approved installation tool. Install the connector's to provide and maintain the following audio signal polarity:
    - a. XLR type connectors Signal or positive conductor is pin 3; common or neutral conductor is pin 2; ground conductor is pin 1.
    - b. Two and 3 conductor 1/4" Signal or positive conductor is tip; neutral or 1/8" phono plugs conductor is ring and ground or shield and jacks conductor is sleeve.
    - c. RCA Phono Plugs the Signal or positive conductor is tip; and Jacks neutral or shield conductor is sleeve.
  4. Speaker Line Audio:
    - a. Each connector shall be installed according to the cable, transformer or speaker OEM instructions and using the OEM's approved installation tool. The Contractor shall ensure each speaker is properly phased and connected in the same manner throughout the System using two conductor type wires.
    - b. One of the conductors shall be color coded to aid in establishing speaker signal polarity. Each speaker line shall be permanently soldered or audio spade lug connected to each appropriate speaker or line matching transformer connection terminal. Speaker line connection to each audio amplifier shall use audio spade lugs, as described herein.
- G. AC Power: AC power wiring shall be run separately from signal cable.
- H. Grounding:
1. General: The Contractor shall ground all Contractor Installed Equipment and identified Government Furnished Equipment to eliminate all shock hazards and to minimize, to the maximum extent possible, all ground loops, common mode returns, noise pickup, crosstalk, etc. The total ground resistance shall be 0.1 Ohm or less.

- a. The Contractor shall install lightning arrestors and grounding in accordance with the NFPA and this specification.
  - b. Under no conditions shall the AC neutral, either in a power panel or in a receptacle outlet, be used for system control, subcarrier or audio reference ground.
  - c. The use of conduit, signal duct or cable trays as system or electrical ground is not acceptable and will not be permitted. These items may be used only for the dissipation of internally generated static charges (not to be confused with externally generated lightning) that may applied or generated outside the mechanical and/or physical confines of the System to earth ground. The discovery of improper system grounding shall be grounds to declare the System unacceptable and the termination of all system acceptance testing.
2. Cabinet Buss: A common ground buss of at least #10 AWG solid copper wire shall extend throughout each equipment cabinet and be connected to the system ground. Provide a separate isolated ground connection from each equipment cabinet ground buss to the system ground. Do not tie equipment ground busses together.
  3. Equipment: Equipment shall be bonded to the cabinet bus with copper braid equivalent to at least #12 AWG. Self grounding equipment enclosures, racks or cabinets, that provide OEM certified functional ground connections through physical contact with installed equipment, are acceptable alternates.
  4. Cable Shields: Cable shields shall be bonded to the cabinet ground buss with #12 AWG minimum stranded copper wire at only one end of the cable run. Cable shields shall be insulated from each other, faceplates, equipment racks, consoles, enclosures or cabinets; except, at the system common ground point. Coaxial and audio cables, shall have one ground connection at the source; in all cases, cable shield ground connections shall be kept to a minimum.
- I. Labeling: Provide labeling in accordance with ANSI/EIA/TIA-606-A. All lettering for voice and data circuits shall be stenciled using laser printers. Handwritten labels are not acceptable.
    1. Cable and Wires (Hereinafter referred to as "Cable"): Cables shall be labeled at both ends in accordance with ANSI/EIA/TIA-606-A.

- Labels shall be permanent in contrasting colors. Cables shall be identified according to the System "Record Wiring Diagrams".
2. Equipment: System equipment shall be permanently labeled with contrasting plastic laminate or bakelite material. System equipment shall be labeled on the face of the unit corresponding to its source.
  3. Conduit, Cable Duct, and/or Cable Tray: The Contractor shall label all conduit, duct and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum of 3 meters (10 ft.) identifying it as the System. In addition, each enclosure shall be labeled according to this standard.
  4. Termination Hardware: The Contractor shall label workstation outlets and patch panel connections using color coded labels with identifiers in accordance with ANSI/EIA/TIA-606-A and the "Record Wiring Diagrams".

### **3.2 TESTS**

#### **A. Interim Inspection:**

1. This inspection shall verify that the equipment provided adheres to the installation requirements of this document. The interim inspection will be conducted by a factory-certified representative and witnessed by a Government Representative. Each item of installed equipment shall be checked to insure appropriate UL certification markings. This inspection shall verify cabling terminations in telecommunications rooms and at workstations adhere to color code for T568A pin assignments and cabling connections are in compliance with ANSI/EIA/TIA standards. Visually confirm Category 6 marking of outlets, faceplates, outlet/connectors and patch cords.
2. Perform fiber optical field inspection tests via attenuation measurements on factory reels and provide results along with manufacturer certification for factory reel tests. Remove failed cable reels from project site upon attenuation test failure.
3. The Contractor shall notify the RE, in writing, of the estimated date the Contractor expects to be ready for the interim inspection, at least 20 working days before the requested inspection date.
4. Results of the interim inspection shall be provided to the COR and PM. If major or multiple deficiencies are discovered, a second

interim inspection may be required before permitting the Contractor to continue with the system installation.

5. The COR and/or the PM shall determine if an additional inspection is required, or if the Contractor will be allowed to proceed with the installation. In either case, re-inspection of the deficiencies noted during the interim inspection(s), will be part of the proof of performance test. The interim inspection shall not affect the Systems' completion date. The Contracting Officer shall ensure all test documents will become a part of the Systems record documentation.

B. Pretesting:

1. Upon completing the installation of the System, the Contractor shall align and balance the system. The Contractor shall pretest the entire system.
2. Pretesting Procedure:
  - a. During the system pretest, the Contractor shall verify (utilizing the approved spectrum analyzer and test equipment) that the System is fully operational and meets all the system performance requirements of this standard.
  - b. The Contractor shall pretest and verify that all 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. The Contractor shall measure and record the aural carrier levels of each system telephone and data channel, at each of the following points in the 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 the distribution system, the last outlet on each trunk line plus all outlets installed as part of this contract.
3. The Contractor shall provide four (4) copies of the recorded system pretest measurements and the written certification that the System is ready for the formal acceptance test shall be submitted to the COR.



C. Acceptance Test: After the System has been pretested and the Contractor has submitted the pretest results and certification to the COR, then the Contractor shall schedule an acceptance test date and give the COR 30 days written notice prior to the date the acceptance test is expected to begin. The System shall be tested in the presence of a Government Representative and an OEM certified representative. The System shall be tested utilizing the approved test equipment to certify proof of performance and Life Safety compliance. The test shall verify that the total System meets the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.

D. Verification Tests:

1. Test the UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors, and between conductors and shield, if cable has an overall shield. Test the operation of shorting bars in connection blocks. Test cables after termination and prior to cross-connection.
2. Multimode Fiber Optic Cable: Perform end-to-end attenuation tests in accordance with ANSI/EIA/TIA-568-B.3 and ANSI/EIA/TIA-526-14A using an OTDR. Perform verification acceptance test.
3. Single mode Fiber Optic Cable: Perform end-to-end attenuation tests in accordance with ANSI/EIA/TIA-568-B.3 and ANSI/EIA/TIA-526-7 using an OTD. Perform verification acceptance test.

E. Performance Testing:

1. Perform Category 6 tests in accordance with ANSI/EIA/TIA-568-B.1 and ANSI/EIA/TIA-568-B.2. Test shall include the following: wire map, length, insertion loss, return loss, NEXT, PSNEXT, ELFEXT, PSELFEXT, propagation delay and delay skew.
2. Fiber Optic Links: Perform end-to-end fiber optic cable link tests in accordance with ANSI/EIA/TIA-568-B.3.

F. Total System Acceptance Test: The Contractor shall perform verification tests for UTP copper cabling system(s) and the multimode and single mode fiber optic cabling system(s) after the complete telecommunication distribution system and workstation outlet are installed.

1. Voice Testing: Connect to the network interface device at the demarcation point. Go off-hook and receive dial tone from the LEC.

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

2. Data Testing: Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network is achieved.

### **3.3 TRAINING**

- A. Furnish the services of a factory-trained engineer or technician for a total of two four hour classes to instruct designated Facility IRM personnel. Instruction shall include cross connection, corrective, and preventive maintenance of the System and equipment.
- B. Before the System can be accepted by the VA, this training must be accomplished. Training will be scheduled at the convenience of the Facilities Contracting Officer and Chief of Engineering Service.

### **3.4 WARRANTY**

- A. Comply with FAR clause 52.246-21, except that warranty shall be as follows:
  1. The Contractor shall warranty that all installed material and equipment will be free from defects, workmanship, and will remain so for a period of one year from date of final acceptance of the System by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or Facility Contracting Officer if the Facility has taken possession of the building(s)), that certifies each item of equipment installed conforms to OEM published specifications.
  2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. The Contractor and OEM shall provide this contact capability at no additional cost to the VA.
  3. All Contractor installation, maintenance, and supervisor personnel shall be fully qualified by the OEM and must provide two (2) copies of current and qualified OEM training certificates and OEM certification upon request.
  4. Additionally, the Contractor shall accomplish the following minimum requirements during the one year warranty period:
    - a. Response Time:

- 1) The COR (or facility Contracting Officer if the facility has taken possession of the building[s]) are the Contractor's reporting and contact officials for the System trouble calls, during the warranty period.
  - 2) A standard workweek is considered 8:00 A.M. to 5:00 P.M., Monday through Friday exclusive of Federal Holidays.
  - 3) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
    - a) A routine trouble call within one working days of its report. A routine trouble is considered a trouble which causes a system outlet, station, or patch cord to be inoperable.
    - b) An emergency trouble call within 6 hours of its report. An emergency trouble is considered a trouble which causes a subsystem or distribution point to be inoperable at anytime. Additionally, the loss of a minimum of 50 station or system lines shall be deemed as this type of a trouble call.
  - 4) The Contractor shall respond on-site to a catastrophic trouble call within 4 hours of its report. A catastrophic trouble call is considered total system failure.
    - a) If a system failure cannot be corrected within four hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate system CSS or TCO equipment, or cables. The alternate equipment and/or cables shall be operational within four hours after the four hour trouble shooting time.
    - b) Routine or emergency trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) shall also be deemed as a catastrophic trouble call if so determined by the COR or Facility Director. The COR or Facility Contracting Officer shall notify the Contractor of this type of trouble call at the direction of the Facilities Director.
- b. Required on-site visits during the one year warranty period
- 1) The Contractor shall visit, on-site, for a minimum of eight hours, once every 12 weeks, during the warranty period, to

perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the System according the descriptions identified in this SPEC.

- a) The Contractor shall arrange all Facility visits with the COR or Facility Contracting Officer prior to performing the required maintenance visits.
  - b) The Contractor in accordance with the OEM's recommended practice and service intervals shall perform preventive maintenance during a non-busy time agreed to by the COR or Facility Contracting Officer and the Contractor.
  - c) The preventive maintenance schedule, functions and reports shall be provided to and approved by the COR or Facility Contracting Officer.
- 2) The Contractor shall provide the COR or Facility Contracting Officer a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Total System Acceptance Test. The following reports are the minimum required:
- a) Monthly Report: The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this warranty period to COR or Facilities Contracting Officer by the fifth working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and Systems for preventive and predictive maintenance
  - b) Contractor Log: The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the System. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future.

- 3) The COR or Facility Contracting Officer shall provide the Facility Engineering Officer, two (2) copies of actual reports for evaluation.
    - a) The COR or Facility Contracting Officer shall ensure copies of these reports are entered into the System's official acquisition documents.
    - b) The Facilities Chief Engineer shall ensure copies of these reports are entered into the System's official technical as-installed documents.
- B. Work Not Included: Maintenance and repair service shall not include the performance of any work due to improper use, accidents, other vendor, contractor, owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the COR or Facility Contracting Officer in writing upon the discovery of these incidents. The COR or Facility Contracting Officer will investigate all reported incidents and render findings concerning any Contractor's responsibility.

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**SECTION 27 31 00**  
**VOICE COMMUNICATIONS SWITCHING AND ROUTING EQUIPMENT**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section specifies the furnishing, installing, certification, testing, and guaranty of a complete and operating Telephone Electronic Private Branch Exchange (EPBX) equipment and interconnecting cable (not cable distribution plant) system (here-in-after referred to as "the System"), and associated equipment to be installed in the VA Medical Center here-in-after referred to as "the Facility". The System shall include, but not be limited to, telephone processing switch, equipment cabinets, interface enclosures, and relay racks, stand-by battery(s), necessary combiners, traps, and filters; interconnection nodes and/or amplifiers; telephone instruments; auxiliary systems; and necessary passive devices such as: protectors, isolators, splitters, couplers, cable "patch", "punch down", and cross-connector blocks or devices, cable management items, voice and digital cable distribution system, and associated hardware. The System shall additionally include, but not be limited to: telecommunication closets (TC); telecommunication outlets (TCO) copper and fiber-optic interconnecting cables, connectors, "patch" cables, and/or "break out" devices.
- B. The System shall be delivered free of engineering, manufacturing, installation, and operating defects. It shall be designed, engineered and installed for ease of operation, maintenance, and testing.
- C. The term "provide", as used herein, shall be defined as: designed, engineered, furnished, installed, certified, and tested, by the Contractor.
- D. The Telephone System is defined as an Emergency Critical Care Communication System by the National Fire Protection Association (NFPA). Therefore, its installation and operation shall adhere to all appropriate National, Government, and/or Local Life Safety and/or Support Codes, which ever are the more stringent for this Facility. At a minimum, the System shall be installed according to NFPA, Section 70, National Electrical Code (NEC), Article 517 and Chapter 7; NFPA, Section 99, Health Care Facilities, Chapter 3-4; NFPA, Section 101, Life Safety Code, Chapters 7, 12, and/or 13; Joint Commission on Accreditation of Health Care Organization (JCAHCO), Manual for Health

Care Facilities, all necessary Life Safety and/or Support guidelines; this specification; and the original equipment manufacturer's (OEM) suggested installation design, recommendations, and instructions. The OEM and Contractor shall ensure that all management, sales, engineering, and installation personnel have read and understand the requirements of this specification before the System is designed, engineered, delivered, and provided.

- E. The VA Project Manager (PM) and/or if delegated, Resident Engineer (RE) are the approving authorities for all contractual and mechanical changes to the System. The Contractor is cautioned to obtain in writing, all approvals for system changes relating to the published contract specifications and drawings, from the PM and/or COR before proceeding with the change.

## **1.2 RELATED WORK**

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- C. Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- D. Section 26 27 26, WIRING DEVICES.
- E. Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- F. Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- G. Section 27 51 16, PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS.

## **1.3 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 the date the system's submittal is technically approved by VA, shall be enforced.
- B. Joint Commission on Accreditation of Health Care Organization (JCAHO) Comprehensive Accreditation Manual for Hospitals
- C. National and/or Government Life Safety Code(s): The more stringent of each listed code.
- D. National Fire Protection Association (NFPA):

70	National Electrical Code (NEC)
75	Protection of Electronic Computer/Data Processing Systems

77	Recommended Practice on Static Electricity
99	Standard for Health Care Facilities
101	Life Safety Code
1221	Emergency Services Communication Systems

E. Underwriter's 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 Communication and Fire Alarm Circuits
884	Underfloor Raceways and Fittings

F. American National Standards Institute/Electronic Industries  
/Telecommunications Publications (ANSI/EIA/TIA):

568B	Commercial Building Telecommunications Wiring Standard
569B	Commercial Building Standard for Telecommunications Pathways and Spaces
598C	Optical Fiber Cable Color Coding
606A	Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
607A	Grounding and Bonding Requirements for Telecommunications in Commercial Buildings
758	Customer-Owned Outside Plant Telecommunications Infrastructure Standard

G. Lucent Technologies: Document 900-200-318 "Outside Plant Engineering Handbook."

H. International Telecommunication Union - Telecommunication  
(Standardization Sector (ITU-T)).

I. Federal Information Processing Standards (FIPS) Publications.



J. Federal Communications Commission (FCC) Publications: Standards for telephone equipment and systems.

K. United States Air Force: Technical Order 33K-1-100 Test Measurement and Diagnostic Equipment (TMDE) Interval Reference Guide.

#### **1.4 QUALITY ASSURANCE**

- A. The authorized representative of the System's OEM shall be responsible for the design, satisfactory total operation of the system, and its certification.
- B. The OEM shall meet the minimum requirements identified in Paragraph 2.1.A. Additionally, the Contractor shall have had experience with three or more installations of systems of comparable size and complexity with regard to coordinating, engineering, testing, certifying, supervising, training, and documentation. Each of these installations shall have been in successful operation for a minimum of three years after final acceptance by the user. These installations shall be provided as a part of the submittal identified in Paragraph 1.5.
- C. The System Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of three (3) years. The System Contractor shall be authorized by the OEM to certify and warranty the installed equipment. In addition, the OEM and System Contractor shall accept complete responsibility for the design installation, certification, and physical support for the system. This documentation, along with the System Contractor and OEM certifications must be provided in writing as a part of the Contractor's Technical submittal.
- D. The Contractor's Telecommunications Technicians assigned to the system shall be fully trained, qualified, and certified by the OEM on the engineering, installation, and testing of the System. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the COR before being allowed to commence work on the System.

#### **1.5 SUBMITTALS**

- A. Provide submittals in accordance with Specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. The COR shall retain one copy for review and approval.

1. If the submittal is approved the COR shall retain one copy for Official Records and return three (3) copies to the Contractor.
  2. If the submittal is disapproved, three copies will be returned to the Contractor with a written explanation attached indicating the areas where the submittal deviated from the System Specifications. The COR shall retain one copy for Official Records.
- B. Documents: The submittal shall be separated into sections for each subsystem and shall contain the following:
1. Title page to include:
    - a. VA Medical Center
    - b. Contractor's name, address, and telephone (including FAX) numbers
    - c. Date of Submittal
    - d. VA Project No.
  2. List containing a minimum of three locations of installations of similar size and complexity as identified herein. These locations shall contain the following:
    - a. Installation Location and Name: Owner's or User's name, address, and telephone (including FAX) numbers.
    - b. Date of Project Start and Date of Final Acceptance by Owner.
    - c. System Project Number.
    - d. Brief (three paragraphs minimum) description of each system's function, operation, and installation.
  3. Narrative Description of the system as it is expected to be installed.
  4. A list of the equipment to be furnished. The quantity, make and model number of each item is required.

The following is the minimum equipment required by the System:

QUANTITY	UNIT
1 ea.	EPBX
1 ea.	Back-up Battery Power Supply
As required	AC Power Supply
As required	TMS
As required	Attendant Console
As required	Equipment Cabinets

As required	CCS
As required	Wire Management System/Equipment
Reference Only	Telephone Instruments
Reference Only	Distribution System
1 ea.	Installation Kit
As required	Separate List Containing Each Equipment Spare(s)
As required	System Conduits, Cable Duct, and/or Cable Tray
As required	Telephone Paging Adapter (one each required for PA, Radio, and Dial Dictation sub-systems)
As required	Time Out Device (one each required for PA, Radio, and Dial Dictation sub-systems)

5. EPBX cabinet and each interface cabinet layout drawing, as each is to be installed.
  6. Equipment technical literature detailing the electrical and technical characteristics of each item of equipment to be furnished.
  7. Engineering drawings of the System, showing calculated signal levels at the EPBX output, each input and output distribution point, proposed telephone outlet values, and signal level at each telephone outlet multipin jack.
  8. List of test equipment as per paragraph 1.5.D below.
  9. Letter certifying that the Contractor understands the requirements of the Samples Paragraph 1.5.E.
  10. Letter certifying that the Contractor understands the requirements of Section 3.2 concerning tests.
- C. Environmental Requirements. Technical submittals shall confirm the environmental specifications for physical TC areas occupied by the System. These environmental specifications shall identify the requirements for initial and expanded System configurations for:
1. Floor loading for batteries and cabinets.
  2. Minimum floor space and ceiling heights.
  3. Minimum size of doors for equipment passage.

4. Power requirements: The Contractor shall provide the specific voltage, amperage, phases, and quantities of circuits required.
5. Air conditioning, heating, and humidity requirements. The Contractor shall identify the ambient temperature and relative humidity operating ranges required to prevent equipment damage.
6. Air conditioning requirements (expressed in BTU per hour, based on adequate dissipation of generated heat to maintain required room and equipment standards).
7. Proposed floor plan, based on the expanded system configuration of the bidder's proposed EPBX for this Facility.
8. Conduit size requirement (between main TC, computer, and console rooms).

D. Test Equipment List

1. The Contractor is responsible for furnishing all test equipment required to test the System in accordance with the parameters specified. Unless otherwise stated, the test equipment shall not be considered part of the System. The Contractor shall furnish test equipment of an accuracy better than the parameters to be tested.
2. The test equipment furnished by the Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a minimum:
  - a. Spectrum Analyzer
  - b. Signal Level Meter
  - c. Volt-Ohm Meter
  - d. Time Domain Reflectometer (TDR) with strip chart recorder
  - e. Bit Error Test Set (BERT)
  - f. Camera with a minimum of 60 pictures to that will develop immediately to include appropriate test equipment adapters. A video camera in VHS format is an acceptable alternate.

E. Samples: A sample of each of the following items shall be furnished to the COR for approval prior to installation. The samples may be returned to the Contractor at the discretion of the RE:

1. TCO Wall Outlet Box 100 mm x 100 mm x 63 mm (4" x 4"x 2.5") with:
  - a. One each telephone (or voice) RJ45 jack installed.
  - b. Two each multi pin data RJ45 jacks installed.

- c. Cover Plate installed.
2. Data CCS patch panel, punch block or connection device with RJ45 connectors installed.
3. Telephone CCS system with IDC and/or RJ45 connectors, cable terminal, and cable management equipment installed.
4. 610 mm (2 foot) section of each copper cable to be used with connectors installed and OEM cable sweep compliance and/or certification tags as specified in Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING, paragraph 2.4.B.

F. Certifications:

1. Submit written certification from the OEM indicating that the proposed supervisor of the installation and the proposed provider of the contract maintenance are authorized representatives of the OEM. Include the individual's exact name and address and OEM credentials in the certification.
2. Submit written certification from the OEM that the wiring and connection diagrams meet National and/or Local (whichever is the more stringent) Life Safety Guidelines, NFPA, NEC, UL, this specification, and JCAHCO requirements and instructions, requirements, recommendations, and guidance set forth by the OEM for the proper performance of the System as described herein. The VA will not approve any submittal without this certification.
3. Preacceptance Certification: This certification shall be made in accordance with the test procedure paragraph 3.2.B.

G. Equipment Manuals: Ten (10) working days prior to the scheduled acceptance test, the Contractor shall deliver four (4) complete sets of commercial operation and maintenance manuals for each item of equipment furnished as part of the System to the RE. The manuals shall detail the theory of operation and shall include narrative descriptions, pictorial illustrations, block and schematic diagrams, and parts list.

H. Record Wiring Diagrams:

1. Fifteen (15) working days prior to the scheduled acceptance test, the Contractor shall deliver four complete sets of the record wiring diagrams of the System to the RE. The diagrams shall show all inputs and outputs of electronic and passive equipment correctly identified according to the markers installed on the interconnecting cables, equipment and room/area locations. The wiring diagrams shall show

- the signal levels of the aural carriers of each audio channel at the input and output of all electronic equipment, at the beginning and end of each distribution line, and at the speakers. The record wiring diagrams shall be provided in hard copy and two compact disk copies properly formatted to match the Facility's current operating version of Computer aided drafting (AUTO CAD) system. The COR shall verify and inform the Contractor of the current version of AutoCAD being used by the Facility.
2. Ten (10) days prior to the start of the intermediate test, provide a typewritten detailed description of the System testing plan that meets this specification's performance standards as indicated in paragraph 2.1.B including illustrations and utilizes the test equipment specified in paragraph 1.5.D. The test plan will need to be evaluated and approved by the COR before intermediate testing begins.
- I. Provide two copies of an OEM developed training videotape presentation (reference paragraph 3.3.B) for evaluation and approval by the RE.
- J. Provide a typewritten document that details the complete record program in memory for all associated station assignments.
- K. Needs Analysis (required for replacement of existing systems): The Contractor shall conduct a needs analysis of the existing Facility with representative's from the IRM and various departments to determine the System's requirements. The analysis shall depict System features and capacities, in addition to specific site requirements. The analysis shall be typewritten and contain the following information as a minimum:
1. The EPBX shall initially provide:

ITEM WIRED	EQUIPPED CAPACITY	WIRED CAPACITY
Main Station Lines:		
Single Line		
Multi Line (Equipped for DID)		
Central Office Trunks:		
Two Way		
DID		
Two-way DRTL		
Foreign Exchange (FX)		

Conference		
Audio Paging Access		
Off-Premise Extensions		
CO Trunk By-Pass		
CRT w/keyboard(s)		
Printer(s)		
Operator Console(s)		
T-1 Access/Equipment		
Maintenance Terminal		

2. Projected Maximum Growth: The Contractor shall identify the projected maximum growth for each item identified in Paragraph 1.5.B.4. as a part of the needs analysis. For this purpose, the following definitions are provided to detail the System's capability:
- a) All software and hardware required to completely equip the EPBX with all items listed under equipped capacity, shall be provided and installed by the contractor 30 days prior to system cut-over.
  - b) Wired Capacity" is to include all wiring and equipment listed under wired capacity, with the exception of line, data, and trunk cards, and shall be provided, installed, and tested 30 days prior to system cutover.
  - c) The EPBX shall be capable of expansion to the projected maximum growth through the use of printed circuit boards and/or modular cabinets that do not require extensive re-wiring and reprogramming.
3. Cable Distribution System: See Specification Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING, for specific cable distribution system requirements. The Contractor is required to formulate a projected cable and TCO count that coincides with the Projected Maximum Growth described herein.
4. Telephone Instruments (Stations): Telephone instruments are an integral component of the System. The Contractor shall indicate each instrument location, type of instrument and class of service as determined by the needs analysis or as shown on the drawings.

## **PART 2 - PRODUCTS**

### **2.1 EQUIPMENT AND MATERIALS**

#### **A. SYSTEM REQUIREMENTS:**

1. The System shall perform the following minimum services that are designed in accordance with and supported by an Original Equipment Manufacturer (OEM), and as specified herein. The System shall provide continuous inter and/or intra-Facility voice service. The System shall be capacity sized so that loss of connectivity to an external telephone system(s) shall not affect the Facility's operation in specific designated emergency operating locations and instruments. The System shall:
  - a. Inter-operate, connect, and function fully with the existing Local (Telephone) Exchange Company (LEC) Network(s), Federal Telephone System (FTS) Inter-city Network(s), Inter-exchange Carriers, and Integrated Services Digital Network (ISDN), at a minimum.
  - b. Contain control and switching equipment that shall be a voice and digital EPBX with attendant console(s). Contain voice mail and automatic attendant functions and continuous intra and/or inter Facility voice service. Additionally, a universal night answering function from Facility designated remote locations shall be provided.
  - c. Direct access to trunk level equipment including audio paging, Industry Standard "T" and/or "DS" carrier protocols, and external protocol converters. Additionally, connections to "T" and/or "DS" access/equipment or Customer Service Units (CSU) that are used in FTS and other trunk applications shall be included in the System design. The Contractor shall provide all T-1 equipment necessary to terminate and make operational the quantity of circuits designated. The CSUs shall be connected to the System's emergency battery power supply. The System shall be fully capable of operating in the Industry Standard "DS" protocol and provide that level of service when required.
  - d. Contain attendant and operator consoles, video monitors with keyboards, and printers to provide employee directory access from the Traffic Management System (TMS). All console positions, video monitors, and keyboards shall have identical capabilities. The



System shall accept a mixture of trunk types at the attendant console and extend calls received via these trunks to station users.

- e. Be capable of interfacing and operating with Direct-Incoming-Dial (DID) service to stations as identified herein. Assignment to DID shall not affect intra-Facility operation. A DID trunk group, which will operate as a separate trunk group from other Central Office (CO) trunks shall be provided as described herein.
- f. Contain the designated number of telephone instruments, where each instrument (also referred to as "station") shall have the ability to direct dial other Facility telephone stations, the public telephone network, tie-lines, and FTS telephone numbers without attendant assistance. Each station shall be dual tone multi-frequency (DTMF) for intra-Facility and external-Facility calling. The term DTMF, as used herein, shall be defined as "a dialing operation (e.g., push-button, digit dialing, or tone dialing, other than rotary/pulse dialing).
  - 1) Standard digital telephone instruments shall be provided to the designated TCOs and as shown on the drawings.
  - 2) "Special hands free" digital telephone instruments shall be provided at designated TCOs and as shown on the drawings.
- g. Receive the specified telephone signals acquired from the LEC and FTS contracted carrier, shall process and distribute them to the designated telephone stations, as determined by Class Of Service and indicated on the drawings.
- h. At a minimum, one TCO(s) shall be provided on each telephone switch room wall and on either side of each door opening, and shall be supplied with an associated (within 305 mm (one foot)) active duplex 120 Volts Alternating Current (VAC) outlet (using a quad receptacle box for the TCO and a separate duplex receptacle box for the AC outlet) and as shown on the drawings.
  - 1) The telephone multipin jack shall be interfaced and connected to the system via 110 or equivalent type punch blocks the switch room and TC. All connections shall support Category 6 level of service requirements.

- 2) The construction of distribution TCOs is found in Specification Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- 3) The appropriate distribution cable termination method is found in Specification Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- 4) The appropriate distribution TC construction is found in Specification Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- i. Perform adjacent channel operation of a minimum of local, long distance, and FTS telephone signals. The System equipment shall be installed and interfaced according to the OEM's schematic diagram for adjacent telephone channel operation. The System shall be provided with testing capability in each equipment rack and have test ports that provide access for each telephone channel without the need to disconnect distribution cables or equipment. Each telephone channel shall be processed as a single channel. A means of monitoring the complete system along with appropriate printout and computer disk archiving of each processed and distributed channel.
2. The System shall be designed to minimize cross talk, background processor noise, inter-modulation, and other signal interference. The EPBX equipment shall be installed and interfaced according to the OEM head-end schematic diagram for adjacent audio channel operation. Each audio input channel shall be processed as a single separate channel and combined into one output channel. Additionally, an audio and visual monitoring panel shall be provided in the telephone switch room to test each converted audio input and distribution channel transmitted and received signal functions as described herein. The System shall continuously electronically or electrically supervise the EPBX's Alternating Current (AC) power input, stand by batteries and charger, and internal Direct Current (DC) power supply primary Voltages and/or Currents; each remote control unit, audio interface unit, from the telephone switch room. A trouble panel shall be provided in the telephone switch room and at the telephone operator room, Security Service Control Console to

check the supervisory signals, signal level, audio sound and visual level, and alert personnel to problems as described herein.

3. Refer to Section 1.3 for initial voice sizing requirements. Also refer to Section 1.3 for initial data sizing requirements.
4. Point Of Local (Telephone) Exchange Company Interface: The Contractor is not responsible for the condition of the telephone signals of the LEC system. If the telephone signals at the LEC interface point do not meet the minimum signal level and quality as stated herein, the Contractor shall notify the COR, in writing, detailing the nature of the deficiencies, and the expected effect on the telephone signals in the new system. The COR will coordinate with the Facility Engineering Officer so the necessary repairs for the identified deficiencies can be accomplished.

B. System Performance:

1. The System shall support and fully operate in the following functional modes, at a minimum:
  - a. Bit Rate Interchange (BRI) Functions.
  - b. ISDN in both Standard and Broad Bandwidths.
  - c. Fiber-optic Distributed Data Interface (FDDI).
  - d. Industry Standard "T" Carrier in single and multiple channels.
  - e. Industry Standard "DS" Carrier in single and multiple channels.
2. System Sensitivity: Satisfactory service shall be provided for at least 3,000 feet (ft) for all voice locations.
3. At a minimum, the System shall meet the following operating parameters:
  - a. EPBX:
    - 1) System speed: 1.0 giga-Bits (gb) per second, minimum
    - 2) Impedance: 600 Ohms, BA1
    - 3) Cross Modulation: -60 deci-Bel (dB)
    - 4) Hum Modulation: -55 dB
    - 5) System data error: 10 to the -10 Bits per second (Bps), minimum
    - 6) Loss: Measured at the frame output with reference Zero (0) deci-Bel measured (dBm) at 1,000 Hertz (Hz) applied to the frame input:
      - a) Trunk to station: 1.5 dB, maximum
      - b) Station to station: 3.0 dB, maximum

- c) Internal switch crosstalk: -60 dB when a signal of  $\pm 10$  dBm, 500-2,500 Hz range is applied to the primary path.
- 7) Idle channel noise: 25 dB relative noise per channel (rnC) or 3.0 dBm @ 0 above (terminated) ground noise, whichever is greater
- 8) Traffic Grade of Service for Voice: The minimum grade of service shall be P-01 with an average traffic load of 7.0 One Hundred Call Seconds (CCS) per station per hour.
- 9) Average CCS per voice station: The average CCS capacity per voice station shall be maintained at 7.0 CCS when the EPBX is expanded up to the projected maximum growth as stated herein.
- b. Voice and Audio Standards:
  - 1) Input and Output Signal Level: 0.0 dBm at 1 kilo Hertz (kHz) test tone modulation level. Each level shall be variable over a 6.0 dB range.
  - 2) Input and Output Impedance: 600 Ohms Balanced (BAL)
  - 3) Input and Output Signals: Terminated on each EPBX Unit
  - 4) Frequency Range: 50 Hertz (Hz) to 3.0 kHz  $\pm 1.0$  %, minimum
  - 5) S/N Ratio: 60 deci-Bell per mili-Volt (dBmV)  $\pm 1.0$  dBmV
  - 6) Cross Modulation: -46 dB
  - 7) Hum Modulation: -55 dB
  - 8) Isolation (control unit to unit): 24 dB, minimum
- c. Control Signal Standards:
  - 1) Input and Output Signal: 0.0 dBmV  $\pm 1.0$  dBmV Level
  - 2) Input and Output Signals Terminated on each EPBX Unit
  - 3) Input and Output Impedance 600 Ohms, BAL
  - 4) Channel Bandwidth:
    - b) Voice: 50 Hz to 3.0 kHz,  $\pm 5.0$ %, minimum
  - 5) S/N Ratio: 60 dBmV  $\pm 1.0$  dBmV
- d. Telephone Outlet (TCO):
  - 1) Isolation (outlet-outlet): 24 dB
  - 2) Impedance: 600 Ohms
  - 3) Signal Level: 0 dBmV  $\pm 0.1$  dBmV
  - 4) System speed: 100 mega-Bits (mb) per second, minimum
  - 5) System data error: 10 to the -6 Bits per second, minimum

C. The following auxiliary systems shall be provided as required by system design

1. The system shall interface and provide a Public Address System (PA) as described in SPECIFICATION SECTION 27 51 16, PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS. Each telephone console shall have direct access to selected zones and all zone(s) paging. The console attendant shall also have "priority access" (or ALL CALL or CODE ONE or BLUE) to all zones. Selected station users shall have access to appropriate zone(s) via sub zone (s), by dialing the proper access. The Telephone Contractor is responsible for providing the required NFPA and UL certified device(s) for the PA to be interfaced to a designated Critical Care Emergency Communications Telephone System. The PA System "Emergency Life/Public Safety Rating" will be upgraded to include "Critical Care" by the connection to the telephone system, therefore the system will be installed to all appropriate Life Safety Code Standards and Instructions. The system shall provide a feature to prevent the PA from being "locked up" by a user placing the system on hold or leaving the receiver "off-hook".

D. General:

1. All equipment to be supplied under this specification shall be new and the current model of a standard product of an OEM of record. An OEM of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied and which:
  - a. Maintains a factory production line for the item submitted.
  - b. Maintains a stock of replacement parts for the item submitted.
  - c. Maintains engineering drawings, specifications, and operating manuals for the items submitted.
  - d. Has published and distributed descriptive literature and equipment specifications on the items of equipment submitted at least 30 days prior to the Invitation for Bid.
2. Specifications of equipment as set forth in this document are minimum requirements, unless otherwise stated, and shall not be construed as limiting the overall quality, quantity, or performance characteristics of items furnished in the System. When the Contractor furnishes an item of equipment for which there is a specification contained herein, the item shall meet or exceed the specification for that item of equipment.

3. Each item of equipment to be provided under this contract must bear the approved UL seal or the seal of the testing laboratory that warrants the equipment has been tested in accordance with, and conforms to the specified standards.
4. All supplies and materials shall be listed, labeled or certified by UL or a nationally recognized testing laboratory where such standards have been established for the supplies, materials or equipment. See paragraph Minimum Requirements Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS and the guidelines listed in paragraph 2.J.2.
5. The Contractor shall provide written verification, to the COR at time of installation, that the type of wire/cable being provided is recommended and approved by the OEM. Cabling shall meet the requirements of U.L., the ANSI/EIA/TIA Wiring Standards and the requirements of NFPA 70 (NEC). The Contractor is responsible for providing the correct protection, cable duct and/or conduit and wiring even though the actual installation may be by another subcontractor.
6. The Telephone Contractor is responsible for interfacing the telephone and PA systems with the System. The Contractor shall utilize interfacing methods that are approved by the OEM and VA. At a minimum, an acceptable interfacing method, requires not only a physical and mechanical connection; but, includes matching of signal, voltage, and processing levels, with regard to signal quality and impedance. Each interface point must adhere to all standards described herein for full separation of the Critical Care, Life Safety, and Emergency systems.
7. The telephone equipment and PA interface equipment shall be the interface points for connection of the PA interface cabling from the telephone switch via the System telephone interface unit. The telephone interface unit and PA interface unit shall be provided by the Telephone Contractor. The Telephone Contractor is not allowed to make any connections to the PA system.
8. Active electronic component equipment shall consist of solid state components, be rated for continuous duty service, and comply with the FCC standards for telephone equipment, systems, and service.

9. All passive distribution equipment shall meet or exceed -80 dB radiation shielding specifications.
10. All interconnecting twisted pair, fiber-optic cables shall be terminated on equipment terminal boards, punch blocks, breakout boxes, splice blocks, and unused equipment ports/taps shall be terminated according to the OEM's instructions for telephone cable systems without adapters. The Contractor shall not leave unused or spare twisted pair wire, fiber-optic cable unterminated, unconnected, loose or unsecured.
11. The System shall utilize microprocessor components for all signaling, programming circuits and functions. Program memory shall be non-volatile or protected from erasure during power outages for a minimum of three days.
12. The System shall provide continuous electrical supervision of all telephone switch cabinet mounted equipment, interconnecting cabling, distribution cable plant, and the UPS back up battery and charger to determine change in status and to assist in trouble shooting System faults.
13. All voltages, except for the primary power to the power supply circuits, shall not exceed 30V AC Root Mean Squared (RMS) or 42V direct current (DC).
14. Color code all distribution wiring to conform to the Telephone Industry standard, ANSI/EIA/TIA, and this document, which ever is the more stringent. At a minimum, all equipment, cable duct and/or conduit, enclosures, wiring, terminals, and cables shall be clearly and permanently labeled according to and using the provided record wiring diagrams, to facilitate installation and maintenance. Reference Specification Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
15. Connect the System's primary input AC power to the Facility's Critical Branch of the Emergency AC Power Distribution System as shown on the Drawings or if not shown on the Drawings consult with the COR regarding a suitable circuit location, prior to bidding.
16. All equipment shall function and operate normally from the furnished power source, and also, during input power fluctuations or loss of power for a minimum of four hours.

17. Plug-in connectors shall be provided to connect all equipment, with the exception of interface points. Base band cable systems shall utilize barrier terminal screw type connectors, at a minimum. Crimp type connectors installed with a ratchet type installation tool are an acceptable alternate as long as the cable dress, pairs, shielding, grounding, connections and labeling are provided the same as the barrier terminal strip connectors. Tape of any type, wire nuts, or solder type connections are unacceptable and will not be approved.
18. All equipment faceplates utilized in the System shall be stainless steel, anodized aluminum, or UL approved cycolac plastic that matches the equipment item where it is installed. All faceplates shall be constructed of the same material throughout the Facility.
19. Noise filters and surge protectors shall be provided for each equipment interface cabinet, switch equipment cabinet, control console, local, and remote active equipment locations to ensure protection from input primary AC power surges and noise glitches are not induced into low voltage circuits.

E. Equipment Functional Characteristics

FUNCTIONS	CHARACTERISTICS
Input Voltage	105 to 130 VAC
POWER LINE FREQUENCY	60 Hz $\pm$ 2.0 Hz
Operating Temperature	0 to 50 degrees (°) Centigrade (C)
Humidity	80 percent (%) minimum rating

## 2.2 EQUIPMENT ITEMS

A. Electronic Private Branch Exchange (EPBX) Equipment

1. The EPBX shall be fully self contained, electronic, digital in operation, and provide, as a minimum, the following functions:
  - a. Intra-Facility station-to-station four digit direct dialing to include those telephone instruments equipped with the DID features.
  - b. Direct-output-dial (DOD) from any unrestricted telephone instrument to any CO trunk or FTS access lines by dialing a pre-designated access code. Also, DOD from any station to tie lines by dialing a pre-designated access code.



- c. Incoming calls from FTS access lines and tie lines shall have the ability to direct dial all EPBX stations without attendant assistance.
- d. Restricted telephone instruments shall have access to outside lines through the operator's console.
- e. Unrestricted telephone instruments shall have access to all features, functions, CO trunks, FTS access lines, tie-lines, toll free 800 numbers, and long distance directory assistance.
- f. A minimum of 40 class-of-service (COS) restrictions shall be provided. These restrictions are to be applied individually or in combination as dictated by individual telephone number service requirements. Technical submittals shall describe the number and type of COS restrictions available.
- g. Provide all station users with the standard feature package listed below. The ability to restrict any of these features on a station by station basis shall be provided:
  - 1) Line Hunt Capability: Sequential and circular line hunting lines shall be assigned to a hunt group and need not be in a numerical sequence. The Contractor shall specify the number of hunt groups available and the capacity of each group.
  - 2) Consultation Hold: Telephone instruments or attendant console shall be able to place an incoming call on hold while making a consulting call, then return to the original call.
  - 3) Call Transfer: Telephone instrument call transfer shall permit a user to transfer an incoming or outgoing CO trunk, FTS, or tie-line call to another EPBX station without attendant assistance.
  - 4) Call Pick-Up: Telephone instruments shall have the capability of answering a ringing, but unanswered call, within a pre-designated group of station lines by dialing a feature code or activating a feature button.
  - 5) Call Forwarding: Call forwarding "follow me" functions, when activated by telephone instruments, shall automatically reroute incoming calls to another selected telephone number. Selected telephone instruments shall have the capability of activating and deactivating this feature at their discretion. "Busy and don't answer" functions, shall automatically reroute

calls to a pre-programmed secondary telephone instrument when a given telephone instrument is busy or does not answer within a prescribed time interval.

- 6) Call Queuing: The EPBX shall allow a telephone instrument encountering a busy trunk, e.g. CO, FTS, FX, and tie-lines, to be automatically connected to the trunk when it becomes available.
- 7) Call back/Ring back: When a telephone or data instrument initiates a call to another internal busy instrument, call back/ring back is activated at the calling instrument by an access code or feature button. When both instruments become idle, the EPBX shall automatically ring the calling instrument and, when answered, rings the called instrument. Activation of this feature shall not prevent the calling instrument from originating or receiving other calls.
- 8) Music on Hold: The Contractor shall provide music on hold to all EPBX station lines, CO trunks, FTS access lines, and tie-lines when placed on hold. The acceptable music sources are compact disc player or audio cassette recorder player. The COR will inform the Contractor of the desired type of unit. Under no circumstances shall an off air AM or FM radio be used for this music.
- 9) Conferencing: A telephone instrument initiated conference (minimum of three parties) which allows stations to conference any combination of telephone instrument, CO, or FTS calls.
- 10) Automatic Number Identification: A facility where the directory number or equipment number of a calling instrument is obtained automatically for use in message accounting.
- 11) Station to Station Call Waiting: Busy telephone instruments shall be allowed to receive a second incoming call from another telephone instrument. The busy instrument, upon receiving a second incoming call shall receive a call waiting tone. The busy instrument shall be able to place the initial call on hold and answer the second call. The instrument shall have the capability of alternating between both calls.
- 12) Station and System Speed Dialing:

- a) System Speed Dialing (not less than 50 numbers) shall be provided to allow designated telephone instruments to originate speed calls to CO, FTS, FX, or tie lines.
  - b) Station Speed Dialing shall be provided to support ten numbers per instrument. The instrument shall have the capability of entering, removing, or changing numbers programmed on their Station Speed dialing list.
- 13) Call Park: A telephone instrument feature will be provided which allows non-preselected internal instruments to access an attendant initiated feature in response to an internal / external paging situation.
- 14) Universal Night Answer Service: Provide a means of night service transfer for answering all incoming calls, which would normally be answered at the console, from locations other than the console. Chimes, with cut-off switches, to announce incoming calls shall be strategically placed at two locations.
- 15) Line Load Control: A pre-programmed attendant controlled feature which, when activated from the console positions, restricts all but selected stations from accessing the FTS and CO trunks during emergency conditions. The activation of line load control shall not affect intra-facility communications, e.g., station to station, access to the Public Address system, audio-page, etc.
- 16) Dual Common Controls: The following are the minimum features required:
- a) Systems offering a stored program technology control feature shall provide a redundant common processing unit with automatic transfer capability.
  - b) Either common control shall be capable of handling the total EPBX traffic load without degradation of service.
  - c) In event of failure of the primary common control, the system shall automatically switch to the redundant unit with no interruption to calls in progress and no loss of program features.
- 17) Line Lock Out:
- a) In the event a telephone instrument handset is not replaced in the telephone instrument cradle, after a pre-determined

- time interval with no dial action, that station line shall be locked out, i.e., not tie up EPBX switch equipment.
- b) Locked out station lines shall have audible tone applied.
  - c) When a locked out telephone instrument handset is restored, the associated station line shall automatically be restored to full service.
- 18) Supervisory Telephone (not Electrical or Electronic) Signaling and Ringing:
- a) Provide dual solid state signal generating devices, or equivalent, which produce standard supervisory signaling, i.e., ringing, dial tone, busy tone, etc. The failure of any one signal generating device shall not affect more than one-third of the installed main station line capacity.
  - b) Dual solid state signal generating devices shall provide automatic transfer to the alternate signal generating device in the event of failure of the primary device.
  - c) All supervisory signaling and ringing shall be equivalent to the telephone industry standard, as follows:
    - (1) Tones shall be provided to indicate the progress of a call through the exchange, i.e. dial tone - to indicate that the switching equipment is ready to receive dial digits and, when required, provide a secondary dial tone for FTS 2000 access; busy tone (60 to 120 IPM) - to indicate that a busy line or trunk has been encountered; audible ring back tone - to indicate to the calling subscriber that the number dialed is being called.
    - (2) All supervisory signaling and ringing devices shall be capable of operating from the emergency DC power source.
- 19) Fusing:
- a) The EPBX shall be equipped with fuses to protect the total telephone system and individual segments of the EPBX so that a problem in one segment may be isolated without damaging the total EPBX.
  - b) Fuses shall be of the alarm indicating type and their rating designated by numerical or color code on fuse panels that are easily visible.
- 20) Equipment Power Supply:

- a) The EPBX shall be equipped with a complete on-line power supply. The system shall consist of AC surge protection, dual load-sharing rectifiers/chargers, batteries, and inverter.
  - b) The power supply shall have a capacity sufficient to support the EPBX including it's projected maximum growth and as required in this specification for interfaced equipment.
  - c) The Contractor shall coordinate with the Local Exchange Company (LEC) to determine CO trunk, FTS access line, and other required interface unit power requirements and provide power to the LEC or Contractor furnished and installed interface units so they will continue to function in event of a commercial AC power failure.
- 21) UPS w/Battery Back-up or Reserve Battery Power Supply:
- a) The reserve battery power supply shall have sufficient capacity to supply the EPBX for four (4) hours including the projected maximum growth and interfaced equipment. The battery power supply shall consist of not less than 24 sealed maintenance-free cells. Dry cell batteries are not acceptable.
  - b) The system shall be capable of adjustable voltage for float or equalizing batteries. A fully redundant system (not including batteries and inverter) shall be provided. Each rectifier or charger shall have the capacity to support the combined load requirements of the EPBX at its maximum growth and all interfaced equipment.
- 22) Alarms and Trouble Indicators: It is acceptable to combine the required electrical and/or electronic supervision functions in these panels provided the supervisory standards are completely met:
- a) The Contractor shall provide and make operational visual and audible alarms, equipped with cut-off switches, indicating AC power failure, rectifier failure, major and minor trouble, temperature/humidity, electrical or electronic supervisory alarms. The Contractor shall be responsible for providing the required sensors for the

environmental alarms. These alarms shall be remotod to the attendant console area and one other location to be as specified herein. These alarms shall be separate and in addition to the major and minor alarms on the attendant consoles.

- b) The alarm panel shall contain small red indicator lamps for each alarm with cut-off switches or one switch for all alarms and a distinctive audible alarm(s). If one cutoff switch is provided for all audible alarms, it shall restore the alarms to the ready status condition for the audible registration of additional alarms.
  - c) The technical submittal shall describe any other EPBX alarms that are remotod and shall describe EPBX alarms/indicators of malfunction(s) that are located on the equipment.
- 23) The EPBX shall be capable of providing four-digit intra-station dialing and the desired functions described herein.
  - 24) Due to the varied trunk group requirements and possible future trunk group requirements, e.g. public address system access, alternate access codes may be proposed. Grouping of similar type trunk group/features, e.g. 5-1 public address system (all call), 5-2 public address system zone 1, etc. is acceptable.
  - 25) The EPBX shall provide emergency numbers accessible by all station users. The numbers shall appear on the console or a multi-line instrument and at least one other designated location. There shall be a distinctive audible and visual signal associated with the emergency number to ensure an immediate response to calls. The console or multi-line instrument shall have the capability of priority answering the emergency number and extending the call as the situation dictates. A modified trunk circuit may be used for this purpose.
  - 26) The EPBX equipment shall have such sensitivity as required to provide satisfactory service up to 3,000 feet for all voice.
- h. The Contractor shall provide a complete set of EPBX electronic modules and/or cards to be used as on-hand operational emergency spare equipment. One each of T-1, DS-\*\*, interface cards etc. is

the minimum required or a compliment as directed by the OEM.  
Additionally, the Contractor shall confer with the COR to determine other spare items that may be required to fully equip the system with emergency repair capabilities that completely adhere to the System Warranty Requirements described herein.

i. Voice Mail Requirements

1) General

- a) The requirement is for an automated call processing capability. The automated attendant shall be connected to the EPBX and configured to answer and route calls received on a predetermined number of central office trunks. The system shall be configured so that, if the called extension is busy or does not answer within a predetermined number of rings, then the caller shall be routed to the person's voice mail box. A complete voice mail system will allow a predetermined number of users to send complete and confidential messages in the users own voice and receive complete and confidential messages in the sender's own voice. The system shall provide 24 hours per day, 7 days per week access. The system shall be integrated into the operation of the EPBX and be compatible with the local telephone company central office.
- b) The system shall provide capacity for the following number of ports (minimum):

	<b>Equipped Capacity</b>	<b>Wired Capacity</b>
Automated Attendant	12	20
Voice Mail	12	20

- 2) The voice mail system shall initially provide for 500 mailboxes and 40 hours of storage with growth to 60 hours of storage.
- 3) Voice Mail Features. The system shall have the following features:
  - a) Access to the system and its features from any instrument anywhere that provides DTMF signaling.

- b) The ability of those leaving a message to review the message and/or edit the message that is being placed in the mailbox.
- c) Privacy/Security through the use of a "PASSWORD".
- d) The ability to send messages to users on the voice mail system in the following manner:
  - (1) To any user on the same voice mail system.
  - (2) To more than one user on the same voice mail system - an ad hoc distribution list determined by the sender at the time of message transmission.
  - (3) To a predetermined distribution list.
  - (4) Broadcast to all users on the same voice mail system.
- e) Verification, With Receipt - The ability of a user to request and receive verification of when a message is actually played through the use of a touch-tone command. The system shall indicate the time and date of when a message is played and place that information in the sender's mailbox.
- f) Envelope Information - The ability of a user to request and receive time and date information of when specific messages were left in the user's mailbox.
- g) Connection to the voice mail system shall be through an EPBX extension number or a seven/ten digit telephone number from the LEC.
- h) Message "PROMPTS" shall be provided for every transaction. Messages shall be provided for "GREETINGS" and "INSTRUCTIONS FOR RECORDING OR EDITING A MESSAGE".
- i) A message waiting tone, lamp, and/or display shall notify the user that messages are in the user's mailbox.
- j) A message shall notify the user, upon accessing the system, of how many messages are in the user mailbox.
- k) The user, upon accessing the system, shall have the following response alternatives:
  - (1) Respond or send a reply to another user on the same voice mail system.
  - (2) Route the message to another user on the same voice mail system.



- (3) Delete the message.
- (4) Save the message.
- l) A "Default Path" shall be provided to allow those callers who do not have touch-tone capability or who need to talk to someone to be routed to an operator or some other predetermined answering position.
- m) The system shall have the ability to fast forward or rewind recorded messages while being reviewed by the user.
- n) The system shall present messages to the user on a "FIFO" basis.
- o) User Administration - As a minimum, the system shall provide management information and statistics in the following categories;
- p) Port Usage - Traffic statistics on each of the different access paths into the system.
- q) Usage of Storage Capacity - Remaining storage capacity at any one time and during peak periods.
- r) Mailbox Usage - Connect time and number of new or saved messages.
- s) The user administration terminal shall allow for "Class Of Service Controls" in the following areas and for the following parameters:

Initial Authorization:
Ability to enable a mailbox.
Record the "Owner's" name.
Set initial Pass Number.
Usage Control:
Length of personal greeting.
Length of messages received.
Number of messages.
Message retention time.
Feature Authorizations - Allowed or Not:
Group List Creation.
Group List Usage.
Broadcast Messages.

B. Voice Traffic Management System (TMS)

1. A complete and self-contained on-site TMS shall be provided that is fully compatible with and compliments the system.
2. The Following Functions Shall Be Provided at a minimum:
  - a. A 300 dots per inch(DPI) letter quality printer, shall be provided for reports generated by the EPBX and/or the maintenance administration terminal.
  - b. The TMS shall be connected to the EPBX emergency battery power supply.
  - c. All screen menus shall be standard and provide access to each category of reports.
  - d. Traffic Accounting and Management Call Detail Recording (CDR) Package shall be provided for all Voice circuits. The TMS shall:
    - 1) Include all necessary hardware, software, and interconnections to the EPBX.
    - 2) Contain a database that shall be stored on non-volatile media. Tape drives are not acceptable.
    - 3) Provide line numbers, physical locations of equipment by building and room number, the department to which a line is assigned, the name of the person(s) assigned to a particular number, the type of equipment, and any comments regarding EPBX features.
    - 4) Support additional input and/or output (I/O) ports for video monitors or other terminals which will allow a passive display of the data base(s) by authorized medical center personnel other than those individuals responsible for data input and conducting studies.
    - 5) Exhibit security that shall be provided by User ID and password to protect the data base(s).
    - 6) Provide separate voice line reports, on demand and predetermined schedule, for automatic printing. As a minimum, the following reports are required:
      - a) Originating trunk traffic by trunk group, expressed in CCS.
      - b) Terminating trunk traffic by trunk group, expressed in CCS.
      - c) All trunks busy, by trunk group, expressed as blocked call count.

- d) All equipment busy, i.e., no dial tone and failure to complete cross-office call because of all equipment busy, expressed in blocked call count.
- e) List of all equipment alarms, error tables, trouble logs, history files, etc.
- e. The following console measurements shall be accomplished for each console:
  - 1) Incoming calls.
  - 2) Calls answered.
- f. Remote video monitors shall be provided in the immediate vicinity of the telephone operators for use as an on-line directory lookup system of VAMC personnel. The Contractor provided monitors shall be compatible with the proposed TMS hardware and software.
- g. All reports shall be in English notation and will not require interpretation of abbreviations or codes by the user.
- h. Sufficient storage on disk shall be provided to prevent a purge of stored data. Call record and facility usage data shall be maintained in the database for a minimum of 30 days. Storage must be capable of accommodating a minimum of 5,000 calls per day.
- i. Samples of all reports generated by the TMS are to be submitted with the technical submittal for evaluation of formats and compliance with information field content.
- j. Normal system traffic data shall be furnished to the appropriate Facility staff within seven days of a Facility request. A complete and comprehensive traffic study, to include the required traffic data with the Contractor's comments and recommendations, will be prepared and submitted to the appropriate Facility staff quarterly. These studies shall be provided at no additional cost to the VA.
- k. Automatic directory service shall generate a telephone directory that includes, name, title, organization, location, extension, and class-of-service. The contractor shall be responsible for loading and maintaining the directory.
- l. A Cable plant management function shall be provided with the following minimum requirements:
  - 1) A list of off-premise cable by circuit number, numbers of pairs for each circuit, and circuit definition.

- 2) Provide a complete cable plant distribution record to identify the location (cable pair) on the MDF, the riser, the size cable, cable pair in-use (main cable feeder and station cable), building and room number of the termination, and the type equipment terminated.
  - 3) Automatically provide when the service order is entered, the cable number and pair assignments.
- m. Equipment inventory list shall be provided containing the following minimum requirements:
- 1) EPBX cabinets, cards (active and spares), batteries, current and surge protectors, rectifiers, all peripheral equipment, i.e. public address etc.
  - 2) Quantity of single and multi-line telephones, speakerphones, dial intercom units, speakers, gongs, loud horns, bells, chimes, recorders, etc.
  - 3) A list of equipment as being used or spare; ordered or received; installed date, warranty date, cost, location, serial number, etc.
- n. Electrical and/or Electronic supervisory alarms and faults reports.
- C. Attendant Console:
1. The attendant console(s) shall be compatible with the local commercial telephone system and shall:
    - a. Be powered from the EPBX's emergency battery power supply.
    - b. Be load sharing to insure that all incoming calls are evenly distributed among all consoles regardless of the traffic load.
    - c. Provide telephone signal (not electrical or electronic) supervision over all calls connected through the console e.g., indication of:
      - 1) Called party answer (revert back to attendant if no answer).
      - 2) Trunk group busy.
      - 3) Station recall to attendant. In the event of an incoming call being placed (in a hold status) prior to a station being dialed after a specified time this call will revert to the attendant.
    - d. Call transfer capability by attendant.

- e. Automatic ring of called station with ring back tone provided to the calling party.
- f. The console shall be designed to allow installation as far as 1,000 feet from the EPBX equipment cabinets, serviced by a 24 gauge cable.
- g. The Attendant Console shall have:
  - 1) The ability to enter any on-going voice call, regardless of whether the call was connected through the console, direct-in-dial, or originated as an intra-station call. A warning tone shall be applied when the attendant enters an on-going voice call.
  - 2) "Call-splitting" ability that will permit the attendant to exclude either the outside or inside party when handling trunk calls.
  - 3) "Camp-on busy" feature, which will allow the attendant to place incoming voice calls on hold until called station number, is available. Tone burst to be applied to the busy line to alert that a call is waiting.
  - 4) When the busy line becomes free, the waiting call shall be automatically connected. If the waiting call is not connected after a pre-determined time, the waiting call shall revert to the attendant.
  - 5) Universal Night Answering Service that shall provide the ability for all incoming calls to be answered from a location other than the console.
  - 6) Attendant headsets consistent with the latest state-of-the-art shall be provided for 10 attendants. The headsets shall be on the ear models, equipped with coiled cord, plug-In case amplifier, and quick disconnect. Indicate in the technical submittal the type of headsets to be provided.
  - 7) One supervisor plug-in handset with a push-to-talk button and a nine-foot cord.
  - 8) Dual tone multi-frequency dialing for attendant completion of all incoming, outgoing, and intra-station calls.
- h. Automated Attendant shall perform the following features:
  - 1) Access from any instrument anywhere that provides DTMF signaling.

- 2) Voice "PROMPTS" shall be provided for every transaction.
- 3) An introductory greeting shall be provided.
- 4) The system shall provide, as the initial option, the ability of the caller to enter the extension of the person being called and connection to that extension or enter zero for connection to the operator.
- 5) For the persons calling who do not have touch-tone capability or wish to talk to an operator, the system shall provide the option of "WAITING ON THE LINE" and having an operator assist the caller. As a minimum at least one port on the system shall provide support for rotary dial service.
- 6) The system shall have the capability of providing the caller with a directory and sub-directories of telephone numbers and the ability to enter the desired extension at any time while listening to the directory.

D. Equipment Cabinet with Internal Mounting Rails:

1. The equipment cabinet shall be lockable, heavy gauge steel with baked on paint finish. It shall be floor or wall mounted with knock-out holes for cable entrance and conduit connection, provided with ventilation ports and quiet fan with non disposable air filter for equipment cooling. The COR shall be provided with a minimum of two keys for each lock when the System is accepted.
2. A minimum of one cabinet shall be provided with blank rack space, for additional equipment. Blank panels shall be installed to cover any open or unused rack space. Two 120 VAC power strips connected to surge protectors, cooling fan with non-disposable air filter, and conduit or cable duct interface to adjacent cabinet(s) shall be a part of this cabinet.
3. Blank panels shall be color matched to the cabinet, 3.175 mm (1/8") aluminum with vertical dimensions in increments of 30 mm (1.75") with mounting holes spaced to correspond to EIA 480 mm (19") dimensions. Single standard size blank panels shall be used to fill unused panel or rack spaces in lieu of numerous 30 mm (1.75") types. One blank 30 mm (1.75") high blank panel shall be installed between each item of equipment.
4. AC power outlet strip(s):

- a. A strip shall be provided with an outlet for each item of equipment and a minimum of four spare AC power outlets. Each strip shall be mounted inside and at the rear of each equipment cabinet. It shall contain "U" ground AC outlets for distributing AC power to the installed electronic equipment. The strip shall be self-contained in a metal enclosure with a maximum of 1.8 meters (6 feet) connecting wire with three prong plug.
  - b. Technical Characteristics:  
Power capacity: 20 AMP, 120 VAC continuous duty  
Wire gauge: Three conductor, #12 AWG copper
5. Cabinet AC Power Line Surge Protector and Filter:
- a. Each cabinet containing active electronic equipment shall be equipped with a AC Surge Protector and Filter. The Protector and Filter shall be housed in one single enclosure. The Protector and Filter shall provide instantaneous regulation of the AC input voltage and isolate and filter any noise present on the AC input line. It shall be cabinet mounted and the cabinet AC power strip (maximum of two strips) may be connected to it.
  - b. Technical Characteristics:

Input Voltage range	120 VAC $\pm$ 15%
Power capacity	20 AMP, 120 VAC
Voltage output regulation	$\pm$ 3.0%
Circuit breaker	15 AMP, may be self contain
Noise filtering	Greater than 45 dB
AC outlets	Four duplex grounded types, minimum
Response time	5.0 NS
Surge suppression	10,000 AMPS
Noise suppression:	
Common	-40 dB
Differential	-45 dB

- c. Main AC input line: The main AC circuit supplying power to the system shall be the Facility's Critical AC Branch of the Emergency Distribution System:

- 1) The EPBX shall be equipped with AC voltage and current surge protectors to prevent damage to the EPBX and rectifiers from power line induced voltage spikes, surges, lightning, etc.
- 2) Specific requirements for current and surge protection shall include:
  - a) Five nS response time to the transient.
  - b) Voltage protection threshold, line to neutral, starts at no more than 220 V peak. The transient voltage shall not exceed 300 volts peak. Vendor shall furnish documentation on peak clamping voltage as a function of transient AMP.
  - c) Peak power dissipation 35 Joules per phase (minimum), as measured for 1 millisecond at sub branch panels, 100 Joules per phase at branch panels and 300 joules per phase at service entrance panels. Vendor shall furnish an explanation of how the ratings were measured or empirically derived.
  - d) Surge protector must not short circuit the AC power line at any time:
    - (1) The primary surge protection components must be silicon semiconductors. Secondary stages, if used, may include other types of devices.
    - (2) Surge protectors shall incorporate a visual device which indicates whether the surge suppression component(s) is (are) functioning.
    - (3) Surge protection devices shall be UL listed.
    - (4) Voltage and current surge protectors shall be provided on all ancillary equipment provided by the Contractor, not powered from the EPBX primary power supply and emergency battery, e.g., electronic telephones, service units, custom telephones, speaker phones, modems, data terminal interface, etc.
  - e) Power dissipation 12,000 W for 1 mS (or 12 Joules).
  - f) Voltage protection threshold starts at not more than 110 VAC.
  - g) Surge protectors must not short-circuit the A/C line at any time.



h) Surge protectors shall be self contained, plug in type for 110/120 VAC, 15 AMP, duplex receptacle.

E. Environmental Cabinet (If Selected)

1. The Contractor shall provide this enclosure in lieu of a standard equipment cabinet identified in Paragraph 2.3.A to meet system design in hostile TC locations as identified on the drawings. The enclosure shall fully sustain the installed, including electronic, equipment in the same manner as the standard cabinet identified in Paragraph 2.3.A. Additionally, the enclosure shall fully support all installed equipment as if they were in a stand alone air handling area regardless of the local area's air handling capabilities. The enclosure shall be a fully OEM assembled unit. If more than two enclosures are required in any system location, those enclosures shall be OEM assembled for consolidating or combining two or more enclosures in a single unit to meet system space and equipment handling designs.

2. Technical Characteristics:

Environmental control	Automatic, heating and/or cooling, as required
TEMPERATURE CONDITIONS (RATED AT 1,300 W OF INSTALL EQUIPMENT HEAT GENERATION)	
Internal Range	Maintains 80° to 105° of internal heat conditions, maximum
External Range	100° $\pm$ 25°, maximum
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
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/or bottom, fully sealed
Input power	2 ea. minimum 120 VAC @ 20A, maximum, independent circuit, conduit for fixed or armored cable for moveable installations

Dimensions	
Height	1980 mm (78"), maximum
Width	635 mm (25"), maximum
Depth	965 mm (38"), maximum
Front panel opening	480 mm (19"), w/ EIA mounting hole spacing

F. Distribution or System Interface Cabinet:

1. The cabinet shall be constructed of heavy 16 gauge cold rolled steel, have top and side panels and hinged front and rear (front door only if wall mounted) doors. It shall have baked-on iron phosphate primer and baked enamel paint finish in a color to be selected by the using Facility Service Chief or COR, contain integral and adjustable predrilled rack mounting rails or frame that allows front panel equipment mounting and access. When all equipment, doors and panels are installed, snap-in-place chrome trim strip covers are required to be installed that will cover all front panel screw fasteners. It shall be equipped in the same manner as the equipment cabinet.
2. Technical Characteristics:

Overall height	2180 MM (85 7/8"), MAXIMUM
Overall depth	650 mm (25 1/2"), maximum
Overall width	535 mm (21 1/16"), maximum
Equipment vertical	1960 mm (77 1/8"), maximum
Mounting space	
Front panel horizontal	484 mm (19 1/16"), maximum width

G. Stand Alone Equipment Rack:

1. The rack shall be constructed of heavy 16 gauge cold rolled steel and have fully adjustable equipment front mounting rails that allows front panel equipment mounting and access. It shall have baked-on iron phosphate primer and baked enamel paint finish in a color to be selected by the using Facility Service Chief or RE. It shall be floor or wall mounted or mounted on casters as directed by the RE.
2. Technical Characteristics:

Overall Height	2180 MM (85 7/8"), MAXIMUM
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Overall Depth	650 mm (25 1/2"), maximum
Overall Width	535 mm (21 1/16"), maximum
Front Panel Opening	484 mm (19 1/16"), EIA horizontal width
Hole Spacing	per EIA

H. Cross-Connection System (CCS) Equipment - Breakout, Termination

Connector (or Bulkhead), and Patch Panels, and Connection Assemblies

1. The connector panel(s) shall be made of flat smooth 1/8 inch thick solid aluminum, custom designed, fitted and installed in the cabinet. Bulkhead equipment connectors shall be mounted on the panel to enable all cabinet equipment's signal, control, and coaxial cables to be connected through the panel. Each panel shall be color matched to the cabinet installed.

a. Voice (or Telephone)

- 1) The CCS for voice or telephone service will be Industry Standard 110 type punch blocks. This represents the minimum requirement for voice or telephone, and control wiring in lieu of patch panels, each being certified for category six service. IDC punch blocks (with internal RJ45 jacks) are acceptable for use in all CCS and shall be specifically designed for category six telecommunications service suitable for the size and type of UTP cable used as described herein. As a minimum punch block strips shall be secured to an OEM designed physical anchoring unit located on a wall in the MTC, IMTC, and TC. However, console, cabinet, rail, panel, etc. mounting is allowed at the OEM recommendation and as approved by the RE. Punch blocks shall not be used for Class II or 120 VAC power wiring.

2) Technical Characteristics:

Number of horizontal rows	100, minimum
Number of terminals per row	4, minimum
Terminal protector	required for each used or unused terminal
Insulation splicing	required between each row of terminals

b. Fiber optic:

- 1) Product reference of a Government Approved (US State Department) type is Telewire, PUP-17 with prepunched chassis mounting holes arranged in two horizontal rows. This panel may be used for fiber optic, audio, control cable, and Class II Low Voltage Wiring installations when provided with the proper connectors. This panel IS NOT allowed to be used for 120 VAC power connections.
- 2) Technical Characteristics:

Size	
Height	Two RUs, 89 mm (3.5") minimum
Width	484 mm (19 1/16"), EIA minimum
Number of connections	12 pairs, minimum
Connectors	
Audio Service	Use RCA 6.35 mm (1/4") Phono, XL or Barrier Strips, surface mounted with spade lugs (punch block or wire wrap type strips are acceptable alternates for barrier strips as long as system design is maintained )
Control Signal Service	Barrier strips surface mounted with spade lugs (punch block or wire wrap type strips are acceptable alternates for barrier strips as long as system design is maintained )
Low voltage power (class II)	Barrier strips with spade lugs and clear full length plastic cover, surfaced mounted
FIBER OPTIC	"ST" STAINLESS STEEL, FEMALE

c. Mounting Strips and Blocks:

- 1) Barrier Strips:
  - a) Barrier strips are approved for AC power, data, voice, and control cable or wires. Barrier strips shall accommodate the size and type of audio spade (or fork type) lugs used with insulating and separating strips between the terminals for securing separate wires in a neat and orderly fashion. Each cable or wire end shall be provided with an audio spade lug, which is connected to an individual screw terminal on the barrier strip. The barrier strips shall be

surface secured to a console, cabinet, rail, panel, etc.  
120 VAC power wires shall not be connected to signal  
barrier strips.

b) Technical Characteristics:

Terminal size	6-32, minimum
Terminal Count	ANY COMBINATION
Wire size	20 AWG, minimum
Voltage handling	100 V, minimum
Protective connector cover	Required for Class II and 120 VAC power connections

- 2) Solderless Connectors. The connectors (or fork connectors) shall be crimp-on insulated lug to fit a 6-32 minimum screw terminal. The fork connector shall be installed using a standard lug-crimping tool.
- 3) Punch Blocks. Industry Standard 110 type punch blocks are approved for voice and control wiring at a minimum. Punch blocks shall be specifically designed for the size and type of wire used. Punch block strips shall be secured to a console, cabinet, rail, panel, etc. Punch blocks shall not be used for Class II or 120 VAC power wiring.
- 4) Wire Wrap Strips. Wire wrap strips (minimum of 0.065" wire wrap) are approved for voice and control wiring and shall meet Industry Standards. Wire wrap strips shall be secured to a cabinet, rail, panel, etc. Wire wrap strips shall not be used for Class II or 120 VAC power wiring.

I. Wire Management System and Equipment:

1. Wire Management System. The system(s) shall be provided as the management center of the respective cable system, CCS, and TC it is incorporated. It shall perform as a platform to house peripheral equipment in a standard relay rack or equipment cabinet. It shall be arranged in a manner as to provide convenient access to all installed management and other equipment. All cables and connections shall be at the rear of each system interface to IDC and/or patch panels, punch blocks, wire wrap strips, and/or barrier strip.

2. Wire Management Equipment. The wire management equipment shall be the focal point of each wire management system. It shall provide an orderly interface between outside and inside wires and cables (where used), distribution and interface wires and cables, interconnection wires and cables and associated equipment, jumper cables, and provide a uniform connection media for all System fire retardant wires and cables and other subsystems. It shall be fully compatible and interface to each cable tray, duct, wireway, or conduit used in the system. All interconnection or distribution wires and cables shall enter the system at the top (or from a wireway in the floor) via a overhead protection system and be uniformly routed down either side (or both at the same time) of the frame in side protection system then laterally via a anchoring or routing shelf for termination on the rear of each respective terminating assembly. Each system shall be custom configured to meet the System design and user needs.

J. Telephone Instruments:

1. Telephone instruments (or station equipment) that are initially installed shall be configured as indicated herein. Final location of some station equipment shall be coordinated with designated VA official prior to installation.
2. All telephone instruments shall be equipped with the inductive capability to radiate a magnetic field required to activate the hearing aid telecoil and to provide personnel, who use hearing aids, access to all telephones within the Facility.
3. Station equipment shall consist of standard single line instruments, patient bedside instruments, and multi-line digital electronic telephone instruments with digital display, of the latest state-of-the-art design.
4. All telephone instruments except patient bedside phones, shall be equipped with a flash button (or equivalent feature button) with pre-determined timing feature to initiate consultation hold and other features normally initiated by operation of the hook-switch. Flash button shall be distinct from the hook-switch.
5. All telephone instruments, except patient bedside phones, shall be equipped with a laminated faceplate listing the most common user features and their appropriate access codes. The faceplates may be

- an integral part of the instrument housing or may be an adhesive backed decal that shall be applied over the tone pad area of the housing at the time of telephone set installation.
6. Station instruments shall be feature compatible and have transmission characteristics which are compatible with the proposed System.
7. Telephone instrument signaling shall be by means of standard adjustable, buzzers, chimes, or electronic tone, unless otherwise specified.
- a. Single Line:
- 1) Single line instruments may be electronic or 2500-type analog phones.
  - 2) Single line instruments used must be capable of supporting bridged cabling to allow a single phone number on multiple instruments without using multiple switch ports.
  - 3) Single line instruments must be capable of supporting auxiliary equipment, such as amplified hand sets; external chimes, light, or bells; and other similar equipment without using multiple switch ports.
- b. Multi-Line, Digital and Electronic:
- 1) The instruments shall be equipped with a digital read-out display and shall have no less than 14 programmable (lines or features) buttons.
  - 2) The instruments shall employ only one adjustable ringer, bell, buzzer, chime or electronic tone to announce calls. The signaling device shall detect an incoming call to the multi-button instrument and provide an audible signal only on designated lines.
  - 3) Each instrument shall be equipped with lights to identify the called line and remain illuminated for the duration of the call.
  - 4) Telephone intercom systems shall normally be associated with these instruments.
  - 5) The equipment associated with intercom systems may require special features such as built in microphone and speaker. Telephone Intercom Systems shall be required to provide secretaries with a means of announcing calls to offices with

extensions or pickups on the System. The provision of intercom systems shall be identified during the data base survey required as described herein. Any required intercom systems shall be provided and installed by the contractor.

- 6) This equipment must be capable of supporting auxiliary equipment, such as amplified handsets; external chimes, light, or bells; and other similar equipment. The use of analog switch ports to provide ringing voltage, if required, is acceptable and these switch ports shall be included in the Equipped Capacity as described herein.
- 7) Hot Line Telephones shall provided between two identified points and as shown on the drawings. These hot lines shall be equipped with two-way automatic ring and cut-off controlled by the telephone hook-switch, i.e. when near-end hand set is removed from the hook switch, the far-end telephone shall ring until the hand set is removed from the hook-switch.
- 8) Hands Free telephone stations shall be required. In this configuration, a speaker shall be used as both transmitter and receiver to answer or initiate a call. These facilities will normally be used as a hot line between two points. Requirements for hands-free operated facilities shall be identified on the drawings.

c. Patient Bedside:

- 1) Patient bedside instruments shall be maintenance free, sanitized packet, and capable of supporting table top, side-rail, top bed-rail, or wall mounting. Each phone should have a self-contained line cord of not less than 15 feet.
- 2) At the discretion of the facility, patient bedside instruments may be discarded, cleaned for reuse, or given to the patient, as appropriate. The anticipated cost per instrument should not exceed \$10.00.

K. Lightning Protection System. Each protection system shall be provided, in its entirety, totally and externally to the building. The use of internal electrical wiring for lightning grounding systems is not acceptable and will not be approved. Provide 5% spare protectors.

1. EPBX. The EPBX, cabinets, racks, wire management systems, cable shields, etc. shall be grounded with cooper wire run external to the



building and connected to the earth ground. If these items are installed in an area not protected by lightning protection system, the Contractor shall immediately notify the COR in writing of the lightning strike hazard and make the appropriate contractual updates to accommodate this system.

2. Telephone, Data, Audio, and/or Coaxial Cable Lightning Protector:

- a. The protector shall be an in-line device equipped with screw type connectors to match the coaxial and/or STP or UTP cable specified. It shall be located at each building entrance where each cable enters a building from the outside and grounded with stranded copper wire run external to the building connected to the earth ground. It shall be able to shunt high current surges to earth ground protecting the System's signal receiving equipment. The protector shall have a minimal effect on the quality of the signal being received or transmitted. It shall be made of non-corrosive metal and waterproof. Refer to EPBX technical data for additional required specifications.

b. Technical Characteristics:

Peak Pulse Power	1500 W @ 77° F
Protection Device	Gas Tube or as required by OEM
Dissipation	1.0 Mili Seconds (MS)
Response Time	5.0 nS
Connectors	As Specified
Ground Wire	#6 AWG Stranded Copper, minimum, or as required by the OEM, and/or VA

L. Audio Monitor Panel:

1. The panel shall be EIA/TIA standard for 480 mm (19") cabinet mounting. It shall be provided in the upper portion of the EPBX equipment cabinet. This unit may be combined in the EPBX Annunciating System and/or Electrical Supervision Panel in order to achieve the minimum electrical supervision requirements of the System. Refer to EPBX technical data for additional required specifications. Provide one spare panel.

2. Technical Characteristics:

Monitor speaker	A permanent magnet, 76 mm (3 inch) minimum diameter, and a monitor volume control
Audiometer	Easy to read volume unit (vu) or similar meter with illuminated scale and meter calibrating control.
Channel selector switch	Six positions (Off, 1, 2, 3, 4, and Spare) which shall connect the monitor speaker and VU meter to the selected audio channel.

M. Electrical Supervision Panel:

1. An electrical supervision panel shall be provided in the EPBX cabinet and Telephone Operator locations and as designated on the contract drawings. The panel shall be compatible the EPBX Trouble Annunciation Panel and Audio Monitor Panel to generate electrical and/or electronic supervising signals to continuously monitor the operating condition for the system EPBX, CSU, telephone instruments and interconnecting cable trunks. The panel shall generate an audible and visual signal when the system's supervising system detects an EPBX, CSU, or trunk line is malfunctioning. Refer to EPBX technical data for additional required specifications. Provide one spare panel.

2. Technical Characteristics:

Silence button or switch	Shall silence the audible signal. However, the visual signal will continue until the supervisory circuit indicates the fault is corrected.
Visual enunciators	Visually show the amplifier and/or trunk-line unit or supervisory circuit is in fault condition.

**2.3 DISTRIBUTION EQUIPMENT AND SYSTEMS**

The System shall be provided with a complete cable backbone and building distribution system consisting of copper, fiber optic, and other specified cable and connectors, signal closets, cross connection or terminating systems, telecommunication outlets and interface points as identified in Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING and with technical instructions and approval from the RE.

## **2.4 INSTALLATION KIT**

The kit provided shall include, at a minimum, all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. The Contractor shall turn over all unused and partially opened installation kit boxes, coaxial, fiber-optic and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls and physical installation hardware to the RE. At a minimum, the following installation sub-kits are required:

### **A. System Grounding:**

1. The grounding kit shall include all cable and installation hardware required. All EPBX equipment shall be connected to earth ground via internal building wiring, according to the NEC.
2. This includes, but is not limited to:
  - a. Voice Cable Shields
  - b. Control Cable Shields
  - c. Cable Trays
  - d. Equipment Racks
  - e. Equipment Cabinets
  - f. Conduits
  - g. Cable Duct
  - h. Cable Trays
  - i. Power Panels
  - j. Connector Panels
  - k. Grounding Blocks

### **B. Wire and Cable.** The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.

### **C. Conduit, Cable Duct and Cable Tray.** The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat

and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.

- D. Equipment Interface. The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the System with the identified sub-system(s) according to the OEM requirements and this document.
- E. Labels. The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to completely and correctly label each subsystem according to the OEM requirements, record wiring diagrams, and this document.
- F. Documentation. The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to completely and correctly provide the System documentation as required by this document and explained herein.

## **2.5 AUXILIARY SYSTEMS**

- A. The EPBX shall be interfaced to the Public Address System identified in Section 27 51 16, PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS and with technical instructions from the RE. The console attendants shall have direct access to selected zones and all zone(s) paging. The attendant shall also have "priority access" to all zones. Selected station users shall have access to appropriate zone(s), by dialing the proper access. The contractor is responsible for providing and installing the required interface device(s) to the PA. The EPBX shall provide a feature to prevent the PA from being "locked up" by a user placing the system on hold or leaving the receiver "off-hook".

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. 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 model and serial identification numbers. The COR may inventory the EPBX equipment at the time of delivery and reject items that do not conform to this requirement.
  - 2. Storage and Handling: Store and protect equipment in a manner which will preclude damage as directed by the RE.
- B. System Installation:

1. After the contract's been awarded, and within the time period specified in the contract, the Contractor shall deliver the total System in a manner that fully complies with the requirements of this specification. The Contractor shall make no substitutions or changes in the System without written approval from the COR and PM.
2. The Contractor shall install all equipment and systems in a manner that complies with accepted industry standards of good practice, 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.
3. The Contractor shall install suitable filters, traps, directional couplers, splitters, telephone outlets, and pads for minimizing interference and for balancing the amplifiers and distribution system(s). Items used for balancing and minimizing interference shall be able to pass telephone signals in the frequency bands selected, in the directions specified, with low loss, and high isolation and with minimum delay of specified frequencies and signals. The Contractor shall provide all equipment necessary to meet the requirements of paragraph 2.1.C and the System performance standards.
4. All passive equipment shall be connected according to the OEM's specifications to insure correct termination, isolation, impedance match and signal level balance at each telephone outlet.
5. All lines shall be terminated in a suitable manner to facilitate future expansion of the System.
6. All vertical and horizontal copper and fiber optic, *and coaxial* lines shall be terminated so shall require modifications of the system EPBX or signal closet equipment only.
7. Terminating resistors or devices shall be used to terminate all unused branches, outlets, equipment ports of the system, and shall be devices designed for the purpose of terminating fiber optic or twisted pair , and coaxial cables carrying telephone and analog video signals in telephone, and analog systems.
8. Equipment installed outdoors shall be weatherproof or installed in weatherproof enclosures with hinged doors and locks. Provide a minimum of two keys for each lock.

9. Equipment installed indoors shall be installed in metal cabinets with hinged doors and locks. Provide a minimum of two keys for each lock.

C. Equipment Assembly:

1. Cabinets:

- a. Each enclosure shall be: Floor or wall mounted with standard knockout holes for conduit connection or cable entrance; provide for ventilation of the equipment; have front and rear locking doors (except, wall mounted cabinets that require only a front locking door); power outlet strip(s), bulkhead connector and patch panel(s).
- b. Each enclosure shall be equipped with a quiet fan and nondisposable air filter.
- c. Enclosures and stand alone racks shall be installed plumb and square. Each shall be permanently attached to the building structure and be held firmly in place as approved by the RE.
- d. Rack mounted equipment shall be installed on the enclosure's equipment adjustable mounting racks with equipment normally requiring adjustment or observation mounted so operational adjustment(s) can be conveniently made. Heavy equipment shall be mounted with rack slides or rails allowing servicing from the front of the enclosure. Heavy equipment shall not depend only upon front panel mounting screws for support. Equipment shall be provided with sufficient cable slack to permit servicing by removal of the installed equipment from the front of the enclosure. A color matched blank panel (spacer) of 44 mm (1.75 inches) high, shall be installed between each piece of equipment (active or passive) to insure adequate air circulation. The enclosure shall be designed for efficient equipment cooling and air ventilation.
- e. Provide 380 mm (15 inches) of front vertical space opening for additional equipment. Install color matched blank panels to cover any unused enclosure openings.
- f. Signal connector, patch, and bulkhead panels (i.e. PA, telephone, control, etc.) shall be connected so that outputs from each source, device or system component shall enter the panel at the top row of jacks, beginning left to right as viewed from the

front. These will be called "inputs". Each connection to a load, device or system component shall exit the panel at the bottom row of jacks, beginning left to right as viewed from the front. These will be called "outputs".

- 1) Equipment located indoors shall be installed in metal racks or enclosures with hinged doors and be accessible for maintenance without interference to other nearby equipment.
- 2) Cables shall enter the equipment racks or enclosures in a manner that allows all doors or access panels to open and close without disturbing or damaging the cables.
- 3) All distribution hardware shall be securely mounted in a manner that allows access to the connections for testing and provides sufficient room for the doors or access panels to open and close without disturbing the cables.

2. Installation of the EPBX:

a. General:

- 1) The EPBX installation shall comply with all laws, codes and standard industry practices applying to interconnected telephone installations in effect.
- 2) In the absence of specifications regarding installation details, standard industry practices shall prevail and first quality material and workmanship shall be provided.
- 3) All material, provided by the Contractor, shall be new and thoroughly tested. The installation shall be carried out in a professional manner.
- 4) Installation of all equipment shall be fully coordinated with the COR and the Facility staff. No area shall be left without minimal telephone service as described herein.
- 5) The Contractor shall provide a triplex outlet with modular jacks with stainless steel cover plate for each telephone outlet as shown on the drawings. The Contractor shall provide the appropriate modular jack (single or triplex) with appropriate cover plate for each 'OUTLET' location identified and verified on the drawings.
- 6) The Contractor shall install all patient and wall telephone instruments on a single modular jack designed for wall telephone instruments and patient wall or PBPV installations.

- 7) All permanent telephone cables and wires shall be installed in conduit or an enclosed duct system or be of the type approved for installation, as determined by VA requirements, without conduit or enclosed duct system. Cable and wire not installed in conduit or an enclosed duct system must be installed in cable tray or mechanically supported and separated from other signal cable systems as described herein.
  - 8) Where cable and wire penetrate through fire/smoke partitions, firewalls, or floors, the Contractor shall provide fire/smoke stopping around the outside of any installed conduit/cable tray. The Contractor shall provide and install fire stopping material, type approved by the COR, inside the provided conduit/cable tray after installation is complete.
- b. The Contractor shall:
- 1) Install the equipment in accordance with the specifications for the EPBX as specified and recommended by the OEM.
  - 2) Provide a full time on-site Project Manager effective with VA issuance of the notice to proceed. The Project Manager shall be responsible to fully coordinate and supervise all contractor/sub-contractor personnel in all phases of the installation, training, inspection, cutover, and final acceptance of the System. The Project Manager shall be provided a complete copy of these specifications to include all amendments prior to start of installation of the telephone system.
  - 3) Coordinate and conduct the EPBX data base survey with the COR and a member of the IRM. The Contractor is responsible for identifying all programming of features, classes of service, and equipment to be installed by type and physical location as specified in this document and all attachments thereto. After the survey is completed, a complete list of equipment shall be provided to the COR for approval prior to start of installation.
  - 4) Be responsible for the removal and replacement of damaged ceiling tiles during installation and maintenance service of the cable and wire distribution system. The Contractor shall be responsible for restoring immediate areas (that are



approximately one meter (three feet) in diameter) that were damaged during the system installation and maintenance service.

- 5) Run all cross connects to established circuits during installation and maintenance service for the contract life.
- 6) Remove, on a daily basis, all debris and scrap generated in the conduct of work.
- 7) Provide the COR, for review, coordination, and approval a Proof of Performance Test Plan 90 days prior to cut-over of the EPBX. The plan shall be used for testing and acceptance of the system. It shall include sufficient tests to demonstrate the Systems capabilities of providing the services outlined in this document. Test equipment required for demonstration shall be Contractor provided and approved by the RE. A list of test equipment required shall be included with the acceptance test plan. Test equipment shall have undergone calibration certification within six months of system cut-over.
- 8) Provide Contractor personnel (switch technicians, installers, trainers, and the project manager, etc.) on premise for seven consecutive days after cutover to clear any malfunctions which may develop, to assign/reassign any software features/COS, and conduct any additional training as required.
- 9) Insure that the project manager and sufficient skilled personnel remain on premise until all items on the punch list, developed during inspection, cut-over, and acceptance testing of the system are completed, inspected, and accepted by the RE.
- 10) Be responsible for any and all coordination with the LEC relative to interface with the commercial telephone system. The Contractor shall also be responsible for the removal of all voice and/or data equipment and cabling abandoned by the LEC, VA, or other organizations and not retained for exclusive use by VA as a result of this installation
- 11) Connect all telephone equipment located in the equipment room to a common provided ground buss. The common system ground shall be located in all telephone closets and the EPBX switch room.

- 12) Provide EPBX ground between EPBX and all interfaced systems such as PA system equipment chassis, etc.
- 13) Ensure that other dedicated telecommunications systems applications within the Facility (i.e., pay stations, electro-writing equipment, facsimile etc.) that require space within switch room/telephone closets, conduits, and cable pair are accommodated. Coordination between applicable parties will be necessary to ensure accommodation of these systems. It shall be the responsibility of the bidders to determine the requirements and include them in their proposal.
- 14) All portions of the System installation shall conform to local building and fire codes.
- 15) The Contractor shall not use gasoline, benzene, alcohol, naphtha, carbon tetrachloride, or turpentine for cleaning any part of the equipment. Flammable materials shall be kept in suitable places outside the building. OSHA safety standards and local Facility safety standards shall prevail.

D. Conduit, Cables And Wiring, Cable Tray, Raceways, Signal Ducts, Etc.

1. General:

- a. The Contractor shall employ the latest installation practices and materials.
- b. All cables shall be installed in conduit and/or signal ducts. Conduits shall be installed in accordance with Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS and Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- c. Ensure that Telephone and PA Systems (as identified by NEC Section 517) are completely separated and protected from all other systems.

**3.2 PROOF OF PERFORMANCE TESTS**

A. Interim Inspection:

1. An interim inspection of the installed equipment will be conducted in the presence of the COR prior to the proof of performance testing. This inspection shall verify that the equipment provided, adheres to the installation requirements of this document.
2. The Contractor shall have 50% of the system equipment installed to include, but not be limited to: EPBX, interface, origination and

- junction enclosures powered with the permanent AC wiring, outlets, conduit and cables, before the interim inspection can take place.
3. The Contractor shall notify the COR, in writing, of the estimated date the Contractor expects to be ready for the interim inspection, at least 7 working days before the requested inspection date.
  4. Results of the interim inspection shall be provided to the COR and PM. If major or multiple deficiencies are discovered, a second interim inspection may be required before permitting the Contractor to continue with the System installation.
  5. The COR in conjunction with PE shall determine if an additional inspection is required, or if the Contractor will be allowed to proceed with the installation. In either case, re-inspection of deficiencies noted during the interim inspection(s), will be part of the proof of performance test. The interim inspection shall not affect the Systems' completion date. The COR shall ensure all test documents will become a part of the Systems record wiring diagrams.
- B. Pretesting. Upon completing the installation of the System, the Contractor shall align and balance the system. The Contractor shall pretest the entire system.
- C. Pretesting Procedure. During the System pretest, the Contractor shall verify (utilizing the approved spectrum analyzer and test equipment) that the System is fully operational and meets all the System performance requirements of this document. The Contractor shall measure and record the aural carrier levels of each system telephone, at each of the following points in the system:
1. Local Exchange Company (LEC) Inputs.
  2. EPBX inputs and outputs;
  3. MDU, BIU, amplifiers, channel processor and converter inputs and outputs.
  4. PBX output S/NR for each telephone.
  5. Signal Level at each interface point to the distribution system, the last outlet on each trunk line plus all outlets installed as part of this contract.
  6. Four copies of the recorded system pretest measurements shall be submitted, along with the pretest certification, to the RE. The COR shall forward three copies of the pretest documents and a copy of the certification to the PM.

D. Pretesting Certification. After pretesting the System, the Contractor shall notify the COR, in writing, that the system is ready for proof of performance testing in the presence of a Government Representative, and that it meets all requirements stated in this document. The Contractor as described herein shall accomplish submission of this notification of system readiness no later than twenty (20) working days prior to the beginning of the scheduled Government proof of performance test.

Failure of the Contractor to comply with these pretest requirements, shall be grounds for automatically canceling the scheduled acceptance test.

E. Acceptance Test

1. After the System has been pretested and the Contractor has submitted the pretest results and certification to the COR, the Contractor shall schedule an acceptance test date and give the COR 30 days written notice prior to the date the acceptance test is expected to begin. The System shall be tested in the presence of a Government Representative and an OEM certified representative. The System shall be tested utilizing the approved test equipment to certify proof of performance. The test shall verify that the total System meets all the requirements of this document under operating conditions, and complies with all system performance standards listed herein. The notification of acceptance test shall include the expected length (in time) of the test.

2. The acceptance test shall be performed on a "go-no-go" basis. Only those operator adjustments required to show proof of performance shall be allowed. The test shall demonstrate and verify that the installed System does comply with all the operational requirements of this specification under operating conditions. The System shall be rated as either acceptable or unacceptable at the conclusion of the test. Failure of any part of the System that precludes completion of the system testing, and which cannot be repaired within four (4) hours, shall be cause for terminating the acceptance test of the System. Repeated failures that result in a cumulative time of eight (8) hours to effect repairs, shall cause the entire System to be declared unacceptable. Retesting of the entire System shall be rescheduled at the convenience of the Government.

F. Acceptance Test Procedure:

1. Mechanical and Physical Inspection:

- a. The Government Representative will tour all major areas where the System and all sub-systems are located to ensure they are completely and properly installed in place and are operationally ready for proof of performance acceptance testing. A system inventory including available spare parts will be taken at this time. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.
- b. The System diagrams, record drawings, equipment manuals, AutoCAD Disks, intermediate and pretest results shall be formally inventoried and reviewed.
- c. Failure of the System to meet the installation requirements of this specification shall be grounds for terminating all testing.

2. Subsystem Operational Test:

- a. After the Mechanical and Physical Inspection, the Contractor shall perform an operational test of each sub-system to verify that all equipment is properly connected, interfaced and is functionally operational to meet the requirements of this document. If any sub-system is not functionally ready, that sub-system shall be declared unacceptable and all testing shall be terminated. At this point, the Contractor shall be permitted one hour to correct the deficiencies.
- b. It may be mutually agreed upon, at this time, to wait one hour or to commence testing of the next sub-system.
- c. Repeated failures of sub-system testing or total system testing, which results in a cumulative time of four hours to effect repairs, shall be grounds for declaring the entire system unacceptable and all testing to be terminated. Retesting shall be rescheduled at the convenience of the Government.

3. Sub-system Performance Test: After the operational test, each sub-system shall be checked to verify that all performance requirements and standards are met. The performance requirements shall be verified using the necessary test equipment. A spectrum analyzer, signal level meter and BERT shall be used to verify there are no visible signal distortions, such as intermodulation, beats, etc. appearing on any received or generated telephone.

4. Total System Test: The testing shall proceed until the System and sub-systems have been operationally and functionally tested and accepted. The total System tests shall verify that the requirements have been met for all system signals as described herein.
  - a. LEC Point of Demarcation: The System output(s) shall be checked to verify that all performance requirements are met.
  - b. EPBX: This test shall be conducted within 30 days following successful pretesting of the EPBX. In addition to compliance with the technical characteristics and quantities of equipment specified herein, the Final Acceptance Test shall contain the provision that 30 continuous days of uninterrupted telephone service, must be completed prior to the Contractor being deemed to be in compliance with the contract.
    - 1) For the purpose of final acceptance, the telephone service shall be considered interrupted when the failure of any Contractor provided telephone equipment including batteries, results in an interruption of service. This includes a failure of more than 20% of any trunk group, 15% of any number group (15 or more stations), operator console, or telephone service to any area determined to be critical by the Facility Director. Response time to restore service shall have no bearing upon the term "interrupted service".
    - 2) To facilitate the EPBX Acceptance Test and to allow familiarization and training of VA employees, the Contractor shall activate the EPBX, including the operator consoles, stations, and equipment a minimum of 30 days prior to the acceptance test date. All installed equipment and circuits shall be fully tested prior to the acceptance by VA. During this "burn-in" period, the Contractor shall de-bug the EPBX. The Contractor shall make the EPBX available for in-house communications and demonstrate to the Facility staff the required features. The VA and Contractor will make certain trunks // and tie line circuits // are available to the EPBX during this "burn-in" period for testing.
5. Individual Item Test: The Government Representative may select individual items of equipment for detailed proof-of-performance

testing. The item(s) selected shall meet or exceed the minimum requirements of the specification.

6. Interface Cable Sub-system: To ensure that the System meets all performance requirements, a minimum of 75% of the System outlets and interface points shall be checked. Additionally, each sub-system interface, junction, and connection point or location will be checked. Each distribution active and passive item of equipment, signal input(s) and output(s) will be tested.
7. Distribution Cable Plant Sub-system: For specific distribution testing instructions refer to Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.

G. Test Conclusion:

1. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the RE. Any retesting to comply with these specifications will be done at the Contractor's expense.
2. If the System is declared unacceptable without conditions, all rescheduled retest expenses will be born by the Contractor as described herein.

### 3.3 TRAINING

- A. Furnish the services of an OEM trained and certified engineer or technician for two eight-hour classes to instruct designated Facility maintenance personnel. Instruction shall include cross connection, corrective, and preventive maintenance of the telephone system and equipment.
- B. Also, furnish the services of an OEM trained and certified engineer or technician, familiar with the functions and operation of the System and equipment, for two eight-hour periods to train designated Facility IRM personnel. Instructions shall be provided for staff personnel in each area where the System is installed under this contract. When multiple areas are involved, classes will be grouped. Periods of training shall be coordinated with the RE. The COR shall coordinate with the Facility to ensure all shifts receive the required training. Each session shall include instructions utilizing "hands-on" operation and functions of the system.

- C. Before the System can be accepted by VA, this training must be accomplished. Training will be scheduled at the convenience of the Facilities Contracting Officer and Chief of Engineering Service.

### **3.4 WARRANTY**

- A. Comply with FAR 52.246-21, except that warranty shall be as follows:
- B. Contractor's Responsibility: The Contractor shall warranty that all installed material and equipment will be free from defects, workmanship, and will remain so for a period of one year from date of final acceptance of the System by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or the Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed under this document conforms to its OEM published specifications.
- C. The Contractor shall provide a written commitment from the System equipment OEM to supply parts and on-site engineering support services for the one year warranty service (materials and labor) in the event of default or unsatisfactory service by the Contractor.
1. The OEM certification shall describe, in the event of default or unsatisfactory service by the Contractor, the OEM or an authorized distributor shall fully support the contract (initial installation, warranty service for the one year warranty period of the contract).
  2. The System equipment OEM's signatory of the certified written commitment must be of an individual who has the full authority to obligate the OEM to this commitment. Names, corporate addresses, and telephone numbers of the individuals who have this authority shall be provided as a part of the commitment.
- D. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM's central emergency assistance maintenance center and request remote diagnostic testing and assistance in resolving technical problems at any time, 365 days a year. The Contractor via a business telephone line at no additional cost shall provide this contact capability to VA. Each Contractor maintenance and supervisor individual shall be fully qualified by the OEM and provide the COR and Facility Contracting Officer with copies of current and qualified OEM training certificates.



E. Additionally, defining the FAR's warranty outlines concerning this System, the Contractor shall accomplish the following minimum requirements during the one year warranty period:

1. Response Time During the One Year Warranty Period:

- a. The Contractor shall respond on-site, during the standard workweek, to a routine trouble call within 24 hours of its report. A routine trouble is considered a trouble that causes a sub-system to be inoperable.
- b. The Contractor shall respond on-site to an emergency trouble call within four hours of its report. An emergency trouble is considered a trouble that causes a System to be inoperable at anytime.
  - 1) An emergency trouble call shall be deemed appropriate when a failure involves more than 20 voice circuits.
  - 2) In addition, the failure of a common control unit, power supply, signal generating device or attendant console shall also be deemed as an emergency maintenance call.
- c. The Contractor shall respond on-site to a catastrophic trouble call within two hours of its report. A catastrophic trouble call is considered an EPBX failure.
  - 1) If an EPBX failure cannot be corrected within six hours, the Contractor shall be responsible for providing an alternate CPU equipped for a minimum of 100 main station lines, 10 CO trunks, 10 FTS access lines and two operator's console.
  - 2) This alternate system shall be operational within 12 hours (time to commence at the end of the six-hour trouble shooting period) and shall provide emergency service to critical areas as determined by the VAMC Director.
  - 3) The alternate system shall be a programmable system and a pre-written program tape shall be provided to the VAMC Contracting Officer prior to cut-over of the main telephone system.
- d. Failures affecting operation of critical emergency health care facilities (i.e., cardiac arrest teams, intensive care units, etc.) shall also be deemed as a catastrophic trouble call if so determined by the Facility Director. The Facility Contracting Officer shall notify the Contractor of this type of trouble call at the direction of the Facility Director.

- e. The Contractor shall respond on-site to installation of station or equipment requests or service within:
    - 1) Eight hours for emergency installations designated by the Facility Contracting Officer, and
    - 2) Three working days for routine installations designated by the Facility Contracting Officer.
  - f. A standard workweek is considered 8:00 A.M. to 5:00 P.M., Monday through Friday exclusive of Federal Holidays. If any trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the System or sub-system to full operational capability, as described herein, until repairs are completed.
  - g. The COR and/or Facility Contracting Officer are the Contractor's reporting and contact officials for System trouble calls, during the warranty period.
2. Required On-Site Visits During The Warranty Period
- a. The Contractor shall visit, on-site, for a minimum of eight hours, once every twelve (12) weeks, during the warranty period, to perform system preventive maintenance, equipment cleaning and operational adjustments to maintain the System according the descriptions identified in this document.
    - 1) The Contractor shall arrange all Facility visits with the COR or Facility Contracting Officer prior to performing the required maintenance visits.
    - 2) Preventive maintenance shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy times agreed to by the COR or Facility Contracting Officer and Contractor.
    - 3) The preventive maintenance schedule shall be provided to and approved by the COR and Facility Contracting Officer.
    - 4) Provide on-site a stock of replacement spare parts and equipment, plus test equipment, as specified herein, ensuring they meet the OEM's minimum recommended spare parts stock sizing requirements for this specific system.
  - b. The Contractor shall provide the Facility Contracting Officer a type written report itemizing each deficiency found and the corrective action performed during each required visit or

official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:

- 1) The Contractor shall provide a monthly summary of all equipment and sub-systems serviced during this warranty period to the COR or Facility Contracting Officer by the fifth working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.
- 2) The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the System. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future. The COR or Facility Contracting Officer shall convey to the Facility Engineering Officer, two (2) copies of actual reports for evaluation.
- 3) The COR or Facility Contracting Officer shall ensure a copy of these reports is entered into the System's official acquisition documents.
- 4) The Facility Chief Engineer shall ensure a copy of these reports is entered into the System's official technical record documents.

3. Government Furnished Equipment (GFE). GFE that was accepted by the Contractor and interfaced and installed in this System shall become part of this System and included in the Warranty requirements.

F. Work Not Included: Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, contractor, or owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the COR or Facility Contracting Officer in writing upon discovery of these incidents. The COR or Facility Contracting

JLM Memorial Veterans Hospital  
Improve 5D Dialysis Functional Deficiencies  
Construction Document Submission

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officer will investigate all reported incidents and render findings  
concerning any Contractor's responsibility.

- - E N D - -

**SECTION 27 41 31**  
**MASTER ANTENNA TELEVISION EQUIPMENT AND SYSTEMS**

**PART 1 - GENERAL**

**1.1 SECTION SUMMARY**

- A. Work covered by this document includes design, engineering, labor, material, products, warranty, training and services for, and incidental to the complete installation of new and fully operating NFPA listed Master Antenna Television (TV) equipment and systems as detailed herein.
- B. Work shall be complete, complete, labeled, VA Central Office (VACO) tested and certified and ready for operation

**1.2 RELATED SECTIONS**

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 Volts and Below).
- C. Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS.
- D. Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS.
- E. Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS.
- F. Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING.
- G. Section 27 52 23, NURSE CALL/CODE BLUE EQUIPMENT AND SYSTEMS.

**1.3 DEFINITIONS**

- A. Provide: Design, engineer, furnish, install, connect complete, test, certify and warranty.
- B. Work: Materials furnished and completely installed.
- C. Review of contract drawings: A service by the engineer to reduce the possibility of materials being ordered which do not comply with contract documents. The engineer's review shall not relieve the Contractor of responsibility for dimensions or compliance with the contract documents. The reviewer's failure to detect an error does not constitute permission for the Contractor to proceed in error.
- D. Headquarters Technical Review, for National/VA communications and security, codes, frequency licensing, standards, guidelines compliance:
  - Office of Telecommunications
  - Special Communications Team (0050P2B)
  - 1335 East West Highway - 3rd Floor
  - Silver Spring, Maryland 20910
  - (O) 301-734-0350, (F) 301-734-0360

E. Engineer: BES Design/Build, LLC

766 Middle Street  
Fairhope, AL 36532  
PH: 251-990-5778

F. Owner: Tony Thurman PH: 501-257-1196

G. General Contractor (GC): BES Design/Build, LLC

H. Contractor: Radio Contractor; you; successful bidder

#### **1.4 REFERENCES**

A. The installation shall comply fully with all governing authorities, laws and ordinances, regulations, codes and standards, including, but not limited to:

1. United States Federal Law/Codes:

a. Departments of:

1) CFR, Title 15 - Department of Commerce, Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the:

a) Chapter II, National Institute of Standards Technology (NIST - formerly the National Bureau of Standards). Under Section 5131 of the Information Technology Management Reform Act of 1996 and the Federal Information Security Management Act of 2002 (Public Law 107-347), NIST develops - Federal Information Processing Standards Publication (FIPS) 140-2-Security Requirements for Cryptographic Modules.

b) Chapter XXIII, National Telecommunications and Information Administration (NTIA - aka 'Red Book') Chapter 7.8/9 Federal communications Commission (FCC) Title 47 (CFR), Part 15, Radio Frequency Restriction of Use and Compliance in "Safety of Life" Functions and Locations.

2) CFR, Title 29, Department of Labor, Chapter XVII - Occupational Safety and Health Administration (OSHA), Part 1910 - Occupational Safety and Health Standard:

a) Subpart 7 - Definition and requirements for a National Recognized Testing Laboratory (NRTL - 15 Laboratory's, for complete list, contact

[http://www.osha.gov/dts/otpc/nrtl/faq\\_nrtl.html](http://www.osha.gov/dts/otpc/nrtl/faq_nrtl.html))

(1) Underwriter's Laboratories (UL):

65	Standard for Wired Cabinets.
468	Standard for Grounding and Bonding Equipment.
1449	Standard for Transient Voltage Surge Suppressors.
1069	Hospital Signaling and Nurse Call Equipment.
60950-1/2	Information Technology Equipment - Safety.

(2) Canadian Standards Association (CSA): same tests as for UL.

(3) Communications Certifications Laboratory (CCL): same tests as for UL.

(4) Intertek Testing Services NA, Inc. (ITSNA formerly Edison Testing Laboratory [ETL]): same tests as for UL.

b) Subpart 35, Compliance with NFPA 101 - Life Safety Code.

c) Subpart 36, Design and construction requirements for exit routes.

d) Subpart 268, Telecommunications.

e) Subpart 305, Wiring methods, components, and equipment for general use.

3) Public Law No. 100-527, Department of Veterans Affairs:

a) Office of Telecommunications: Handbook 6100 - Telecommunications.

b) Office of Cyber and Information Security (OCIS):

(1) Handbook 6500 - Information Security Program.

(2) Wireless and Handheld Device Security Guideline Version 3.2, August 15, 2005.

c) Spectrum Management FCC and NTIA Radio Frequency Compliance and Licensing Program.

d) Office of Cyber and Information Security (OCIS):

(1) Handbook 6500 - Information Security Program.

(2) Wireless and Handheld Device Security Guideline Version 3.2, August 15, 2005.

- 4) Title 42, CFC, Department of Health, Chapter IV Health and Human Services, Subpart 1395(a) (b) Joint Commission on Accreditation of Healthcare Organizations (JCAHO) "a hospital that meets JCAHO accreditation is deemed to meet the Medicare conditions of Participation by meeting Federal Directives:" All guidelines for Life, Personal and Public Safety; and, Essential and Emergency Communications.
- 5) CFR, Title 47 - Telecommunications, in addition to FCC: Part 15 - Restrictions of use for Part 15 listed Radio Equipment in Safety of Life/Emergency Functions/Equipment/Locations (also see CFR, Title 15 - Department of Commerce, Chapter XXIII - NTIA) :

Part 73	Radio Broadcast Service,
Part 90	Rules and Regulations, Appendix C.
Form 854	Antenna Structure Registration.

- 6) Public Law 89-670, Department of Transportation, CFR-49, Part 1, Subpart C - Federal Aviation Administration (FAA):
- a) Standards AC 110/460-ID and AC 707/460-2E - Advisory Circulars for Constructions of Antenna Towers.
- b) Forms 7450 and 7460-2 - Antenna Construction Registration.

2. National Codes:

- a. American Institute of Architects (AIA): Guidelines for Healthcare Facilities.
- b. American National Standards Institute/Electronic Industries Association/Telecommunications Industry Association (ANSI/EIA/TIA) :

568-B	Commercial Building Telecommunications Wiring Standards:
569	Commercial Building Standard for Telecommunications Pathways and Spaces.
606	Administration Standard for the Telecommunications Infrastructure of Communications Buildings.
607	Commercial Building Grounding and Bonding



	Requirements for Telecommunications.
REC 127-49	Power Supplies.
RS 27	Tools, Crimping, Solderless Wiring Devices, Recommended Procedures for User Certification.

c. Institute of Electrical and Electronics Engineers (IEEE):

SO/TR 21730:2007	Use of mobile wireless communication and computing technology in healthcare facilities - Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices.
0739- 5175/08/\$25. 00©2008IEEE	Medical Grade - Mission Critical - Wireless Networks.
C62.41	Surge Voltages in Low-Voltage AC Power Circuits.

d. American Society of Mechanical Engineers (ASME):

- 1) Standard 17.4, Guide for Emergency Personnel.
- 2) Standard 17.5, Elevator and Escalator Equipment (prohibition  
of installing non-elevator equipment in Elevator Equipment  
Room/Mechanical Penthouse).

e. NFPA:

70	National Electrical Code (current date of issue) - Articles 517, 645 and 800.
75	Standard for Protection of Electronic Computer Data- Processing Equipment.
77	Recommended Practice on Static Electricity.
99	Healthcare Facilities.
101	Life Safety Code.

3. State Hospital Code(s).

4. Local Codes.

**1.5 QUALIFICATIONS**

- A. The OEM shall have had experience with three or more installations of  
systems of comparable size and complexity about type and design as

specified herein. Each of these installations shall have performed satisfactorily for at least 1 year after final acceptance by the user. Include the names, locations and point of contact for these installations as a part of the submittal.

- B. The Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of 3 years. The Contractor shall be authorized by the OEM to pass thru the OEM's warranty of the installed equipment to VA. In addition, the OEM and Contractor shall accept complete responsibility for the design, installation, certification, operation, and physical support for the system. This documentation, along with the System Contractor and OEM certifications must be provided in writing as part of the Contractor's Technical submittal.
- C. The Contractor's Communications Technicians assigned to the system shall be fully trained, qualified, and certified by the OEM on the engineering, installation, operation, and testing of the system. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the COR before being allowed to commence work on the system.
- D. Applicable national, state and local licenses.
- E. Certificate of successful completion of OEM's installation/training school for installing technicians of the equipment being proposed.

#### **1.6 CODES AND PERMITS**

- A. Provide all necessary permits and schedule all inspections as identified in the contract's milestone chart, so that the system is proof of performance tested and ready for operation on a date directed by the Owner.
- B. The contractor is responsible to adhere to all codes described herein and associated contractual, state and local codes.

#### **1.7 SCHEDULING**

- A. After the award of contract, the Contractor shall prepare a detailed schedule (aka milestone chart) using "Microsoft Project" software or equivalent. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships. It will also detail manpower usage throughout the project.

- B. It is the responsibility of the Contractor to coordinate all work with the other trades for scheduling, rough-in, and finishing all work specified. The owner will not be liable for any additional costs due to missed dates or poor coordination of the supplying contractor with other trades.

#### **1.8 REVIEW OF CONTRACT DRAWINGS AND EQUIPMENT DATA SUBMITTALS**

- A. Submit at one time within 10 days of contract awarding, drawings and product data on all proposed equipment and system. Check for compliance with contract documents and certify compliance with Contractor's "APPROVED" stamp and signature.
- B. Support all submittals with descriptive materials, i.e., catalog sheets, product data sheets, diagrams, and charts published by the manufacturer. These materials shall show conformance to specification and drawing requirements.
- C. Where multiple products are listed on a single cut-sheet, circle or highlight the one that you propose to use. Provide a complete and thorough equipment list of equipment expected to be installed in the system, with spares, as a part of the submittal. Special Communications (TVE-0050P3B - herein after referred to as [0050P3B]) will not review any submittal that does not have this list.
- D. Provide 4 copies to the PM for technical review. The PM will provide a copy to the offices identified in Paragraph 1.3.C and D, at a minimum for compliance review as described herein where each responsible individual(s) should respond to the PM within 10 days of receipt of their acceptance or rejection of the submittal(s).
- E. Head End and each interface distribution cabinet layout drawing, as they are to be installed.
- F. Equipment technical literature detailing the electrical and technical characteristics of each item of equipment to be furnished.
- H. Engineering drawings of the system, showing calculated signal levels at the Head End input and output, each input and output distribution point, and signal level at each telecommunications outlet.
- I. Antenna Signal Survey:
1. The Contractor shall submit a computerized signal survey for the system radiated and receive RF signals. The survey(s) shall be made by a recognized industry source that is derived mathematically from

- fixed information and projects an approximation of the signal levels that can be expected at the actual site using a given antenna.
2. The signal survey can usually be obtained from the OEM for the radio equipment at no charge. An on-site survey, using actual transmitting and receiving equipment of the type the Contractor has specified, is an acceptable alternate.
  3. The approximate longitude and latitude of the Facility along with the elevation above mean sea level can be obtained from the COR.
  4. The Contractor shall record all findings on a geographic map with the Facility residing in its center and shall outline all coverage locations, radiating in a 360-degree pattern. The primary, secondary, marginal and out of range areas operation shall be depicted by different colors for each frequency of operation.

#### **1.9 PROJECT RECORD DOCUMENTS (AS BUILTS)**

- A. Throughout progress of the work, maintain an accurate record of changes in Contract Documents. Upon completion of Work, transfer recorded changes to a set of Project Record Documents.
- B. The floor plans shall be marked in pen to include the following:
  1. All device locations with labels.
  2. Conduit locations.
  3. Head-end equipment and specific location.
  4. Wiring diagram.
  5. Labeling and administration documentation.
  6. Warranty certificate.
  7. System test results.

#### **1.10 WARRANTY**

- A. The Contractor shall warrant the installation be free from defect in material and workmanship for a period of 1 year from the date of acceptance of the project by the owner. The Contractor shall agree to remedy covered defects within eight (8) hours of notification of major failures or within twenty-four (24) hours of notification for individual station related problems.
- B. Refer to Part 4 for applicable Warranty requirements.

#### **1.11 USE OF THE SITE**

- A. Use of the site shall be at the GC's direction.
- B. Coordinate with the GC for lay-down areas for product storage and administration areas.

- C. Coordinate work with the GC and their sub-contractors.
- D. Access to buildings wherein the work is performed shall be directed by the GC.

#### **1.12 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Store products in original containers.
- C. Coordinate with the GC for product storage. There may be little or no storage space available on site. Plan to potentially store materials off site.
- D. Do not install damaged products. Remove damaged products from the site and replaced with new product at no cost to the Owner.

#### **1.13 PROJECT CLOSEOUT**

- A. Prior to final inspection and acceptance of the work, remove all debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from the project site and thoroughly clean your work area.
- B. Before the project closeout date, the Contractor shall submit:
  - 1. Warranty certificate.
  - 2. Evidence of compliance with requirements of governing authorities such as the Low Voltage Certificate of Inspection.
  - 3. Project record documents.
  - 4. Instruction manuals and software that is a part of the system.
- C. Contractor shall submit written notice that:
  - 1. Contract Documents have been reviewed.
  - 2. Project has been inspected for compliance with contract.
  - 3. Work has been completed in accordance with the contract

### **PART 2 - PRODUCTS AND FUNCTIONAL REQUIREMENTS**

#### **2.1 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS**

- A. Furnish and install a complete and fully operational master antenna TV signal distribution system. Include all amplifiers, power supplies, cables, outlets, attenuators, antennas, and all other parts necessary for the reception and distribution of the off-the-air TV signals.
- B. Coordinate features and select components to form an integrated system. Match components and interconnections for optimum performance of specified functions.

- C. Expansion Capability: Increase number of stations in the future by 25 percent above those indicated without adding any internal or external components or main trunk cable conductors.
- D. Distribute cable channels to all TV outlets to permit simple connection of EIA standard high definition television (HDTV) receivers.
- E. Deliver at all outlets all HDTV monochrome and color television signals without introducing noticeable effect on picture and color fidelity or sound. System picture fidelity shall be equal to that received from the cable company and other modulated channels.
- F. Provide reception quality at each outlet equal to or better than that received in the area with individual antennas. Deliver at all television outlets a minimum +6.0 dBmv (2,000 microvolts across 75 Ohms) and maximum of +20 dBmv (20,000 microvolts) for each channel at each outlet.
- G. Equipment: Modular type using solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- H. Meet all FCC requirements regarding low radiation and/or interference of RF signal(s). The system shall be designed to prevent direct pickup of signals from the building structure.
- I. Weather-Resistant Equipment: Listed and labeled by an OSHA certified National Recognized Testing Laboratory (NRTL - i.e. UL) for duty outdoors or in damp locations.

## **2.2 SYSTEM DESCRIPTION**

- A. The Contractor is responsible for interfacing the telephone and Nurse Call systems with the system.
- B. The Contractor shall continually employ interfacing methods that are approved by the OEM and VA. At a minimum, an acceptable interfacing method requires not only a physical and mechanical connection, but also a matching of signal, voltage, and processing levels with regard to signal quality and impedance. The interface point must adhere to all standards described herein for the full separation of Critical Care and Life Safety systems.
- C. It is not acceptable to utilize the telephone cable system for the control of MATV signals and equipment. The System Contractor shall connect the system ensuring that all NFPA and Underwriters Laboratory, Inc. (UL) Critical Care and Life Safety Circuit and system separation

guidelines are satisfied. The System Contractor is not allowed to make any connections to the Telephone System. The Owner shall arrange for the interconnection between the MATV and Nurses Call Systems with the appropriate responsible parties.

- D. All passive distribution equipment shall meet or exceed -80 dB radiation shielding specifications and be provided with screw type audio connectors.
- E. All trunk, branch, and interconnecting cables and unused equipment ports or taps shall be terminated with proper terminating resistors designed for RF, audio and digital cable systems without adapters.
- F. The system shall utilize microprocessor components for all signaling and programming circuits and functions. System program memory shall be non-volatile or protected from erasure from power outages for a minimum of 30 minutes.
- G. Plug-in connectors shall be provided to connect all equipment, except coaxial cables and RF transmission line interface points. Coaxial cable distribution points and RF transmission lines shall use coaxial cable connections recommended by the cable OEM and approved by the system OEM. Base band cable systems shall utilize barrier terminal screw type connectors, at a minimum. As an alternate, crimp type connectors installed with a ratchet type installation tool are acceptable provided the cable dress, pairs, shielding, grounding, connections and labeling are the same as the barrier terminal strip connectors. Tape of any type, wire nuts or solder type connections are unacceptable and will not be approved.
- H. All equipment faceplates utilized in the system shall be stainless steel, anodized aluminum or UL approved cycolac plastic for the areas where provided.
- I. Noise filters and surge protectors shall be provided for each equipment interface cabinet, Head End cabinet, control console and local and remote ampler locations to insure protection from input primary AC power surges and to ensure noise glitches are not induced into low voltage data circuits.
- J. Audio Level Processing: The use of telephone cable to distribute MATV signals, carrying system or sub-system AC or DC voltage is not acceptable and will not be approved. Additionally, each control location shall be provided with the equipment required to insure the

system can produce its designed audio channel capacity at TV/speaker identified on the contract drawings.

- K. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. Unless otherwise noted in this Part, equipment quantities shall be as indicated on the drawings.

## **2.3 MANUFACTURERS**

- A. The products specified shall be new, FCC and UL Listed, and produced by OEM manufacturer of record. An OEM of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied and which:
1. Maintains a stock of replacement parts for the item submitted,
  2. Maintains engineering drawings, specifications, and operating manuals for the items submitted, and
  3. Has published and distributed descriptive literature and equipment specifications on the items of equipment submitted at least 30 days prior to the Invitation for Bid.
- B. Specifications contained herein as set forth in this document detail the salient operating and performance characteristics of equipment in order for VA to distinguish acceptable items of equipment from unacceptable items of equipment. When an item of equipment is offered or furnished for which there is a specification contained herein, the item of equipment offered or furnished shall meet or exceed the specification for that item of equipment.
- C. The equipment items are the salient requirements of VA to provide an acceptable system described herein.

## **2.4 PRODUCTS**

- A. The system distribution amplifier shall have a frequency range of 49-1,000 MHz and shall accommodate a minimum of 35 HDTV channels of programming. Gain of the preamplifier shall be 32dB, with an output level of 48dBmV for each HDTV channel processed. The preamplifier shall utilize a hybrid push-pull amplifier module. The preamplifier shall provide gain and slope control ranges of 8dB and 9dB, respectively.
- B. Provide one 8-port passive combiner for the combining of all RF signals into one main trunk run for distribution to all building locations. Bandwidth of combiners shall be 0 to 1,000MHz.



C. Provide riser rated coaxial cable with a nominal characteristic impedance of 75 Ohms throughout the entire frequency spectrum utilized in this system. Each reel of cable shall be sweep-tested and return-loss tested over the entire frequency range from 50MHz to 750MHz by the manufacturer. Provide RG-6, RG-11 or appropriate minimum .500" Hardline Coaxial cable as required to achieve the specified signal level. However, all runs over 150' in length shall be RG-11 or .500".

D. Line Splitters:

1. Provide low-radiation line splitters with a flat frequency response from 50MHz to 1,000MHz. Provide units of a hybrid design with a 75-ohm match on input and outputs and a VSWR no greater than 1.4:1.
2. Two way line splitters shall have a signal loss of not more than 3.5dB at each output.
3. Four way line splitters shall have a signal loss of not more than 7.2dB at each output.
4. All unused splitter outputs shall be terminated with 75-Ohm terminations.

E. HDTV Outlets:

1. Provide outlets at each location shown on the plans. Mount in electrical contractor provided 4" square, 2" deep minimum flush electrical boxes as indicated on plans.
2. Provisions shall be incorporated in the network to prevent 60 Hz AC or DC feedback into the distribution lines.
3. Outlets shall be designed to cover a frequency range of 10MHz to 1,000MHz. Insertion loss shall not exceed 1.0 db at any frequency within the designated frequency range for a 17dB isolation network. Outlets shall be back-matched from 10 to 1,000MHz. Outlets shall have one F-type connector on the front and two F-type connectors on the rear.
4. The minimum isolation value between any two outlets shall be 24 db.

F. Television Receivers shall be provided separately by the Owner.

G. Distribution Devices:

1. Distribution Amplifier:
  - a. Description: Broadband CATV quality HDTV distribution amplifier.
  - b. Specifications:

Frequency Range: 49MHz to	Channel Loading: 150.
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1,000MHz.	
Flatness: +/- .75dB.	Gain: 32dB.
Output Level: +40dBmV.	Gain Control Range: 10dB.
Slope Control Range: 8dB.	Plug in equalizers as needed.
Attenuator options as needed.	

2. Splitters:

- a. Description: RF signal splitter.
- b. Specifications:

Frequency Range: 5MHz to 1,000MHz.	Outputs: 2, 3, 4 and 8.
Splitter Loss: less than 12 dB.	RFI Shielding: 120dB.

3. Taps:

- a. Description: Directional Coupler Type Taps.
- b. For use in Telecomm closets or accessible cable trays.
- c. Specifications:
  - 1. Frequency Range: 5MHz to 1,000MHz.
  - 2. Outputs: 2, 4 and 8.
  - 3. Isolation Tap Value: Varies.

4. Wallplate Bulkhead Connector and Terminators:

- a. Description: Wall plates for termination of CATV signals at television sets.
  - 1. Impedance: 75 Ohms.
  - 2. Frequency Band: SUB/VHF/CATV/UHF.

5. "F" Connectors:

- a. Coaxial cable connectors and connector inserts shall be designed to provide maximum performance with the cable to be used. Coaxial cables shall be connectorized with the Head End quality 360 degree F or BNC connectors as applicable, meeting or exceeding standard industry and the cable manufacture's specifications. All drop F-connectors shall be hex type crimp or a "Snap and Seal" type connector. Housing to housing (KS to KS) type or 90-degree type connectors shall be used where specified by the OEM.

6. Terminator:

- a. Description: 75-Ohm terminator.
- b. Specifications:

DC blocking.	Bandwidth: 50MHz-890MHz.
Return Loss: greater than 16dB.	Impedance: 75 Ohm.

7. Trunk Cable:

a. Description: .500 inch, Semi-Rigid Coax, Riser Rated.

b. Specifications:

1. Maximum Attenuation:

2.92 dB/100ft at 700 MHz.	3.78 dB/100ft at 1000 MHz.
Impedance: 75 Ohm	

8. RG6 Cable:

a. Description: CATV RG6 double shielded cable CM Rated

b. Specifications:

1. Attenuation:

1.48 dB/100ft at 50 MHz.	7.45 dB/100ft at 1000 MHz.
Impedance: 75 Ohm	

9. RG11 Cable:

a. Description: CATV RG11 cable CM Rated

b. Specifications:

1. Attenuation:

0.90 dB/100ft at 50 MHz.	5.04 dB/100ft at 1000 MHz.
Impedance: 75 Ohm	

**PART 3 - EXECUTION**

**3.1 PROJECT MANAGEMENT**

- A. Assign a single project manager to this project who will serve as the point of contact for the Owner, the General Contractor, and the Engineer.
- B. The Contractor shall be proactive in scheduling work at the hospital, specifically the Contractor will initiate and maintain discussion with the general contractor regarding the schedule for ceiling cover up and install cables to meet that schedule.

- C. Contact the Office of Telecommunications, Special Communications Team (0050P3B) at (301) 734-0350 to have a VA Certified Telecommunications COTR assigned to the project for telecommunications review, equipment and system approval and co-ordination with VA's Spectrum Management and OCIS Teams.

### **3.2 COORDINATION WITH OTHER TRADES**

- A. Coordinate with the cabling contractor the location of the faceplate and the faceplate opening for the MATV backbox.
- B. Coordinate with the cabling contractor the location of MATV equipment in the Telecommunications Closets.
- C. Before beginning work, verify the location, quantity, size and access for the following:
- Isolated ground AC power circuits provided for systems.
  - Primary, emergency and extra auxiliary AC power generator requirements.
  - Junction boxes, wall boxes, wire troughs, conduit stubs and other related infrastructure for the systems.
  - System components installed by others.
  - Overhead supports and rigging hardware installed by others.
- D. Immediately notify the Owner, General Contractor and Consultant in writing of any discrepancies.

### **3.3 NEEDS ASSESSMENT**

Provide a one-on-one meeting with the particular nursing manager of each unit affected by the installation of the new HDTV MATV system. Review the floor plan drawing, educate the nursing manager with the functions of the equipment that is being provided and gather details specific to the individual units; coverage and priorities of calls; staffing patterns; and other pertinent details that will affect system programming and training.

### **3.4 INSTALLATION**

- A. General:
1. Execute work in accordance with National, State and local codes, regulations and ordinances.
  2. Install work neatly, plumb and square and in a manner consistent with standard industry practice. Carefully protect work from dust, paint and moisture as dictated by site conditions. The Contractor will be fully responsible for protection of his work during the construction phase up until final acceptance by the Owner.

3. Install equipment according to OEM's recommendations. Provide any hardware, adaptors, brackets, rack mount kits or other accessories recommended by OEM for correct assembly and installation.
  4. Secure equipment firmly in place, including receptacles, speakers, equipment racks, system cables, etc:
    - a. All supports, mounts, fasteners, attachments and attachment points shall support their loads with a safety factor of at least 5:1.
    - b. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems.
    - c. Any suspended equipment or associated hardware must be certified by the OEM for overhead suspension.
    - d. The Contractor is responsible for means and methods in the design, fabrication, installation and certification of any supports, mounts, fasteners and attachments.
  5. Locate overhead ceiling-mounted loudspeakers as shown on drawings, with minor changes not to exceed 12 inches in any direction:
    - a. Mount transformers securely to speaker brackets or enclosures using screws. Adjust torsion springs as needed to securely support speaker assembly.
    - b. Speaker back boxes shall be completely filled with fiberglass insulation.
    - c. Seal cone speakers to their enclosures to prevent air passing from one side of the speaker to the other.
  6. Finishes for any exposed work such as plates, racks, panels, speakers, etc. shall be approved by the Architect, Owner and 0050P3B.
  7. Coordinate cover plates with field conditions. Size and install cover plates as necessary to hide joints between back boxes and surrounding wall. Where cover plates are not fitted with connectors, provide grommets in size and quantity required. Do not allow cable to leave or enter boxes without cover plates installed.
- B. Equipment Racks:
1. Fill unused equipment mounting spaces with blank panels or vent panels. Match color to equipment racks.
  2. Provide security covers for all devices not requiring routine operator control.

3. Provide vent panels and cooling fans as required for the operation of equipment within the OEM' specified temperature limits. Provide adequate ventilation space between equipment for cooling. Follow manufacturer's recommendations regarding ventilation space between amplifiers.
  4. Provide insulated connections of the electrical raceway to equipment racks.
  5. Provide continuous raceway and conduit with no more than 40 percent fill between wire troughs and equipment racks for all non-plenum-rated cable. Ensure each system is mechanically separated from each other in the wireway.
- C. Wiring Practice - in addition to the mandatory infrastructure requirements outlined in VA Construction Specification, Section 27 10 00, STRUCTURED COMMUNICATIONS CABLING SYSTEM, the following additional practices shall be adhered to:
1. Comply with requirements for raceways and boxes specified in Division 26, Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
  2. Execute all wiring in strict adherence to the National Electrical Code, applicable local building codes and standard industry practices.
  3. Where raceway is to be EMT (conduit), wiring of differing classifications shall be run in separate conduit. Where raceway is to be an enclosure (rack, tray, wire trough, utility box) wiring of differing classifications, which share the same enclosure, shall be mechanically partitioned and separated by at least 4 inches. Where Wiring of differing classifications must cross, they shall cross perpendicular to one another.
  4. Do not splice wiring anywhere along the entire length of the run. Make sure cables are fully insulated and shielded from each other and from the raceway for the entire length of the run.
  5. Do not pull wire through any enclosure where a change of raceway alignment or direction occurs. Do not bend wires to less than radius recommended by manufacturer.
  6. Replace the entire length of the run of any wire or cable that is damaged or abraided during installation. There are no acceptable methods of repairing damaged or abraided wiring.

7. Use wire pulling lubricants and pulling tensions as recommended by the OEM.
8. Use grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
9. Do not use tape-based or glue-based cable anchors.
10. Ground shields and drain wires as indicated by the drawings.
11. Field wiring entering equipment racks shall be terminated as follows:
  - a. Provide ample service loops at harness break-outs and at plates, panels and equipment. Loops should be sufficient to allow plates, panels and equipment to be removed for service and inspection.
  - b. Line level and speaker level wiring may be terminated inside the equipment rack using specified terminal blocks (see "Products"). Provide 15 percent spare terminals inside each rack. Microphone level wiring may only be terminated at the equipment served.
  - c. If specified terminal blocks are not designed for rack mounting, utilize 3/4 inch plywood or 1/8 inch thick aluminum plates/blank panels as a mounting surface. Do not mount on the bottom of the rack.
  - d. Employ permanent strain relief for any cable with an outside diameter of 1 inch or greater.
12. Use only balanced audio circuits unless noted otherwise
13. Make all connections as follows:
  - a. Make all connections using rosin-core solder or mechanical connectors appropriate to the application.
  - b. For crimp-type connections, use only tools that are specified by the manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs shall be sized to fit the wire gauge. Do not exceed two lugs per terminal.
  - d. Wire nuts, electrical tape or "Scotch Lock" connections are not acceptable for any application.
- D. Cable Installation - In addition to the mandatory infrastructure requirements outlined in VA Construction Specification, Section 27 10 00, STRUCTURED CABLING the following additional practices shall be adhered to:

1. Support cable on maximum 4'-0" centers. Acceptable means of cable support are cable tray, j-hooks, and bridal rings. Velcro wrap cable bundles loosely to the means of support with plenum rated Velcro straps. Plastic tie wraps are not acceptable as a means to bundle cables.
2. Run cables parallel to walls.
3. Install maximum of 10 cables in a single row of J-hooks. Provide necessary rows of J-hooks as required by the number of cables.
4. Do not lay cables on top of light fixtures, ceiling tiles, mechanical equipment, or ductwork. Maintain at least 2'-0" clearance from all shielded electrical apparatus.
5. All cables shall be tested after the total installation is fully complete. All test results are to be documented. All cables shall pass acceptable test requirements and levels. Contractor shall remedy any cabling problems or defects in order to pass or comply with testing. This includes the re-pull of new cable as required at no additional cost to the Owner.
6. Ends of cables shall be properly terminated on both ends per industry and OEM's recommendations.
7. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor until you are ready to terminate.
8. Cover the end of the overall jacket with a 1 inch (minimum) length of transparent heat-shrink tubing. Cut unused insulated conductors 2 inches (minimum) past the heat-shrink, fold back over jacket and secure with cable-tie. Cut unused shield/drain wires 2 inches (minimum) past the Heatshrink and serve as indicated below.
9. Cover shield/drain wires with heat-shrink tubing extending back to the overall jacket. Extend tubing 1/4 inch past the end of unused wires, fold back over jacket and secure with cable tie.
10. For each solder-type connection, cover the bare wire and solder connection with heat-shrink tubing.
11. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.



12. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
13. Bundle, lace, and train conductors to terminal points without exceeding OEM's limitations on bending radii. Install lacing bars and distribution spools.
14. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
15. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.

E. Labeling:

1. Clearly, consistently, logically and permanently mark switches, connectors, jacks, relays, receptacles and electronic and other equipment.
2. Engrave and paint fill all receptacle panels using 1/8 inch (minimum) high lettering and contrasting paint.
3. For rack-mounted equipment, use engraved Lamacoid labels with white 1/8 inch (minimum) high lettering on black background. Label the front and back of all rack-mounted equipment.
4. Where multiple pieces of equipment reside in the same rack group, clearly and logically label each indicating to which room, channel, receptacle location, etc. they correspond.
5. Permanently label cables at each end, including intra-rack connections. Labels shall be covered by the same, transparent heat-shrink tubing covering the end of the overall jacket. Alternatively, computer generated labels of the type which include a clear protective wrap may be used.
6. Contractor's name shall appear no more than once on each continuous set of racks. The Contractor's name shall not appear on wall plates or portable equipment.
7. Ensure each OEM supplied equipment has permanently attached/marked the appropriate UL Labels/Marks for the service the equipment is performed. Equipment installed not bearing these UL marks will not be allowed to be part of the system. The Contractor shall bear all costs required to provide replacement equipment with approved UL marks.

### **3.5 PROTECTION OF NETWORK DEVICES**

Contractor shall protect network devices during unpacking and installation by wearing manufacturer approved electrostatic discharge (ESD) wrist straps tied to chassis ground. The wrist strap shall meet OSHA requirements for prevention of electrical shock, should technician encounter high voltage.

### **3.6 CUTTING AND PATCHING**

- A. It shall be the responsibility of the contractor to keep their work area clear of debris and clean area daily at completion of work.
- B. It shall be the responsibility of the contractor to patch and paint any wall or surface that has been disturbed by the execution of this work.
- C. The Contractor shall be responsible for providing any additional cutting, drilling, fitting or patching required that is not indicated as provided by others to complete the Work or to make its parts fit together properly.
- D. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor, the Contractor's consent to cutting or otherwise altering the work.
- E. Where coring of existing (previously installed) concrete is specified or required, including coring indicated under unit prices, the location of such coring shall be clearly identified in the field and the location shall be approved by the Project Manager prior to commencement of coring work.

### **3.7 FIREPROOFING**

- A. Where MATV cables penetrate fire rated walls, floors and ceilings, fireproof the opening.
- B. Provide conduit sleeves (if not already provided by electrical contractor) for cables that penetrate fire rated walls. After the cabling installation is complete, install fire proofing material in and

around all conduit sleeves and openings. Install fire proofing material thoroughly and neatly. Seal all floor and ceiling penetrations.

- C. Use only materials and methods that preserve the integrity of the fire stopping system and its rating.

### **3.8 GROUNDING**

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, commonmode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Division 26, Section 26 05 26, GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS.
- D. Do not use "3rd or 4th" wire internal electrical system conductors for ground.
- E. Do not connect system ground to the building's external lightning protection system.
- F. Do not "mix grounds" of different systems.

## **PART 4 - TESTING/WARRANTY/TRAINING**

### **4.1 SYSTEM CLASSIFICATION**

The HDTV MATV System is FCC and NFPA listed. Therefore, the following testing and guaranty provisions are the minimum to be performed and provided by the contractor and Warranted by the OEM.

### **4.2 PROOF OF PERFORMANCE TESTING**

- A. Intermediate Testing:
  - 1. After completion of 25 - 30 percent of the installation of a head end cabinet(s) and equipment, one wing of HDTV MATV outlets and interconnection to the corresponding Nurse Call (Code Blue) System Patient Head Wall Units and prior to any further work, this portion of the system must be pretested, inspected, and certified. Each item of installed equipment shall be checked to ensure appropriate FCC listing and UL certification labels are affixed, NFPA, Emergency, Safety, and JCAHCO guidelines are followed, and proper installation practices are followed. The intermediate test shall include a full operational test.
  - 2. The inspection and test will be conducted by a factory-certified contractor representative and witnessed by a Government Representative. The results of the inspection will be officially

recorded by a local Government Representative and maintained on file by the COR, until completion of the entire project. The results will be compared to the Acceptance Test results. An identical inspection may be conducted between the 65 - 75percent of the system construction phase, at the direction of the COR.

B. Pretesting:

1. Upon completing installation of the system, the Contractor shall align, balance, and completely pretest the entire system under full operating conditions.
2. Pretesting Procedure:
  - a. During the system pretest the Contractor shall verify (utilizing approved test equipment) that the system is fully operational and meets all the system performance requirements of this standard.
  - b. The Contractor shall pretest and verify that all 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. At a minimum, each of the following locations shall be fully pretested:
    - 1) Antennas.
    - 2) Lightning Grounds.
    - 3) Head End.
    - 4) Local and Remote Control Units/Enunciation Panels.
    - 5) All Networked locations.
    - 6) System interface locations (i.e.PA, Auditorium Audio, etc.).
    - 7) System trouble reporting.
    - 8) UPS operation.
    - 9) Primary and Emergency AC Power Requirements
    - 10) Extra Auxiliary Generator Requirements.
3. The Contractor shall provide 4 copies of the recorded system pretest measurements and the written certification that the system is ready for the formal acceptance test shall be submitted to the COR.

C. Acceptance Test:

1. After the system has been pre-tested and the Contractor has submitted the pretest results and certification to the COR, then the Contractor shall schedule an acceptance test date and give the COR 30 days written notice prior to the date the acceptance test is

expected to begin. The system shall be tested in the presence of a Government Representative and an OEM certified representative. The system shall be tested utilizing the approved test equipment to certify proof of performance and FCC compliance. The test shall verify that the total system meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.

2. The acceptance test shall be performed on a "go-no-go" basis. Only those operator adjustments required to show proof of performance shall be allowed. The test shall demonstrate and verify that the installed system does comply with all requirements of this specification under operating conditions. The system shall be rated as either acceptable or unacceptable at the conclusion of the test. Failure of any part of the system that precludes completion of system testing, and which cannot be repaired in 4 hours, shall be cause for terminating the acceptance test of the system. Repeated failures that result in a cumulative time of 8 hours to affect repairs shall cause the entire system to be declared unacceptable. Retesting of the entire system shall be rescheduled at the convenience of the Government.

D. Acceptance Test Procedure:

1. Physical and Mechanical Inspection:

- a. The VACO Government Representative will tour all major areas where the system is and all sub-systems are completely and properly installed to insure they are operationally ready for proof of performance testing. A system inventory including available spare parts will be taken at this time. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.
- b. The system diagrams, record drawings, equipment manuals, Telecommunications Infrastructure Plant (TIP) Auto CAD Disks, intermediate, and pretest results shall be formally inventoried and reviewed.
- c. Failure of the system to meet the installation requirements of this specification shall be grounds for terminating all testing.

2. Operational Test:

- a. After the Physical and Mechanical Inspection, the antennas, head end terminating and control equipment shall be checked to verify that it meets all performance requirements outlined herein. A spectrum analyzer and sound level meter shall be utilized to accomplish this requirement.
  - b. Following the Antennas and Head End equipment test, the local and remote control unit be connected to the Head End equipment's output test tap to ensure there are no signal distortions such as intermodulation, data noise, popping sounds, erratic system functions, on any function.
  - c. The distribution system shall be checked at each interface, junction, and distribution point, first, middle, and last leg to verify that the HDTV MATV video, audio and control signals meets all system performance standards.
  - d. Each HDTV MATV outlet shall be functionally tested at the same time utilizing the Contractor's approved hospital grade TV receiver and Spectrum Analyzer.
  - e. The red system and volume stepper switches shall be checked to insure proper operation of the pillow speaker, the volume stepper and the red system (if installed).
  - f. Once these tests have been completed, each installed sub-system function shall be tested as a unified, functioning and fully operating system.
  - g. Individual Item Test: The VACO Government Representative will select individual items of equipment for detailed proof of performance testing until 100 percent of the system has been tested and found to meet the contents of this specification. Each item shall meet or exceed the minimum requirements of this document.
3. Test Conclusion:
- a. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the COR. Any retesting to comply with these specifications will be done at the Contractor's expense.

- b. If the system is declared unacceptable without conditions, all rescheduled testing expenses will be borne by the Contractor.
- E. Acceptable Test Equipment:
- 1. The test equipment shall furnished by the Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a minimum:
    - a. Spectrum Analyzer.
    - b. Signal Level Meter.
    - c. Volt-Ohm Meter.
    - d. Sound Pressure Level (SPL) Meter.
    - e. Oscilloscope.
    - f. Pillow Speaker Test Set (Pillow Speaker with appropriate load and cross connections in lieu of the set is acceptable).

#### **4.3 WARRANTY**

- A. Comply with FAR 52.246-21, except that warranty shall be as follows:
- B. Contractor's Responsibility:
  - 1. The Contractor shall warranty that all provided material and equipment will be free from defects, workmanship and will remain so for a period of one year from date of final acceptance of the system by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to OEM published specifications.
  - 2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. This contact capability shall be provided by the Contractor and OEM at no additional cost to the VA.
  - 3. All Contractor maintenance and supervisor personnel shall be fully qualified by the OEM and must provide 2 copies of current and qualified OEM training certificates and OEM certification upon request.

4. Additionally, the Contractor shall accomplish the following minimum requirements during the Warranty Period:

a. Response Time during the Warranty Period:

- 1) The COR (or Facility Contracting Officer if the system has been turned over to the Facility) is the Contractor's only official reporting and contact official for MATV system trouble calls, during the warranty period.
- 2) A standard work week is considered 8:00 A.M. to 5:00 P.M. or as designated by the COR (or Facility Contracting Officer), Monday through Friday exclusive of Federal Holidays.
- 3) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
  - a) A routine trouble call within 1 working day of its report.  
A routine trouble is considered a trouble that causes a pillow speaker or cordset, 1 master IC control station, room station or emergency station to be inoperable.
  - b) Routine trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) shall also be deemed as an emergency trouble call.  
The COR (or Facility Contracting Officer) shall notify the Contractor of this type of trouble call.
  - c) An emergency trouble call within 4 hours of its report. An emergency trouble is considered a trouble that causes a sub-system (ward), distribution point, terminal cabinet, or all call system to be inoperable at anytime.
- 4) If a HDTV MATV component failure cannot be corrected within 6 hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate HDTV MATV equipment. The alternate equipment/system shall be operational within a maximum of 18 hours after the 6 hour trouble shooting time and restore the effected location operation to meet the system performance standards. If any sub-system or major system trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the system or sub-system to full operational capability, as described herein, until repairs are complete.



b. Required On-Site Visits during the Warranty Period:

- 1) The Contractor shall visit, on-site, as necessary, during the warranty period, to perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the system according the descriptions identified in this document.
- 2) The Contractor shall arrange all Facility visits with the COR (or Facility Contracting Officer) prior to performing the required maintenance visits.
- 3) Preventive maintenance shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy time agreed to by the COR (or Facility Contracting Officer) and Contractor.
- 4) The preventive maintenance schedule, functions and reports shall be provided to and approved by the COR (or Facility Contracting Officer).
- 5) The Contractor shall provide the COR (or Facility Contracting Officer) a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:
  - a) The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this warranty period to COR (or Facility Contracting Officer) by the fifth (5th) working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.
  - b) The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the system. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps

taken to rectify the situation and specific recommendations  
to avoid such conditions in the future.

6) The COR (or Facility Contracting Officer) shall convey to the  
Facility Engineering Officer, 2 copies of actual reports for  
evaluation.

a) The COR (or Facility Contracting Officer) shall ensure a  
copy of these reports is entered into the system's official  
acquisition documents.

b) The Facility Chief Engineer shall ensure a copy of these  
reports is entered into the system's official technical  
record documents.

C. Work Not Included: Maintenance and repair service shall not include the  
performance of any work due to improper use; accidents; other vendor,  
contractor, or owner tampering or negligence, for which the Contractor  
is not directly responsible and does not control. The Contractor shall  
immediately notify the COR or Facility Contracting Officer in writing  
upon the discovery of these incidents. The COR or Facility Contracting  
Officer will investigate all reported incidents and render

#### **4.4 TRAINING**

A. Provide thorough training of the owner's engineering and maintenance  
staff.

B. Provide the following minimum training times and durations:

1.24 hours prior to opening

2.24 hours during the opening week

3.24 hours for supervisors and system administrators

- - - E N D - - -

**SECTION 27 51 16**  
**PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS**

**PART 1 - GENERAL**

**1.1 SECTION SUMMARY**

- A. Work covered by this document includes design, engineering, labor, material and products, equipment warranty and system warranty, training and services for, and incidental to, the complete installation of new and fully operating National Fire Protection Association (NFPA) - Life Safety Code 101.3-2 (a) Labeled and (b) Listed Emergency Service Public Address System (PAS) and associated equipment (here-in-after referred to as the System) in approved locations indicated on the contract drawings. These items shall be tested and certified capable of receiving, distributing, interconnecting and supporting PAS communications signals generated local and remotely as detailed herein.
- B. Work shall be complete, Occupational Safety and Health Administration (OSHA), National Recognized Testing Laboratory (NRTL - i.e. Underwriters Laboratory [UL]) Listed and Labeled; and VA Central Office (VACO), Telecommunications Voice Engineering (TVE 0050P3B) tested, certified and ready for operation.
- C. The System shall be delivered free of engineering, manufacturing, installation, and functional defects. It shall be designed, engineered and installed for ease of operation, maintenance, and testing.
- D. The term "provide", as used herein, shall be defined as: designed, engineered, furnished, installed, certified, and tested, by the Contractor.
- E. Specification Order of Precedence: In the event of a conflict between the text of this document and the Project's Contract Drawings outlined and/or cited herein; **THE TEXT OF THIS DOCUMENT TAKES PRECEDENCE.**  
*HOWEVER, NOTHING IN THIS DOCUMENT WILL SUPERSEDE APPLICABLE EMERGENCY LAWS AND REGULATIONS, SPECIFICALLY NATIONAL AND/OR LOCAL LIFE AND PUBLIC SAFETY CODES.* The Local Fire Marshall and/or VA Public Safety Officer are the only authorities that may modify this document's EMERGENCY CODE COMPLIANCE REQUIREMENTS, on a case by case basis, in writing and confirmed by VA's PM, COR, and TVE-0050P3B. The VA PM is the only approving authority for other amendments to this document that may be granted, on a case by case basis, in writhing with technical

concurrencies by VA's COR, TVE-0050P3B and identified Facility Project Personnel.

- F. The Original Equipment Manufacturer (OEM) and Contractor shall ensure that all management, sales, engineering and installation personnel have read and understand the requirements of this specification before the system is designed, engineered, delivered and provided. The Contractor shall furnish a written statement attesting this requirement as a part of the technical submittal that includes each name and certification, including the OEMs.

## 1.2 RELATED SECTIONS

- A. 01 33 23 - Shop Drawings, Product Data and Samples.
- B. 07 84 00 - Firestopping.
- C. 26 05 21 - Low - Voltage Electrical Power Conductors and Cables (600 Volts and Below).
- D. 26 41 00 - Facility Lightning Protection.
- E. 27 05 11 - Requirements for Communications Installations.
- F. 27 05 26 - Grounding and Bonding for Communications Systems.
- G. 27 05 33 - Raceways and Boxes for Communications Systems.
- H. 27 11 00 - Communications Cabling Interface and Equipment Rooms Fittings.
- I. 27 15 00 - Horizontal and Vertical Communications Cabling Equipment and Systems.
- J. 27 31 00 - Voice Communications Switching and Routing Equipment and System.

## 1.3 DEFINITIONS

- A. Provide: Design, engineer, furnish, install, connect complete, test, certify and warranty.
- B. Work: Materials furnished and completely installed.
- C. Review of contract drawings: A service by the engineer to reduce the possibility of materials being ordered which do not comply with contract documents. The engineer's review shall not relieve the Contractor of responsibility for dimensions or compliance with the contract documents. The reviewer's failure to detect an error does not constitute permission for the Contractor to proceed in error.
- D. Headquarters Technical Review, for National and VA communications and security, codes, frequency licensing, standards, guidelines compliance:  
Office of Telecommunications

Special Communications Team (0050P2B)  
1335 East West Highway - 3rd Floor  
Silver Spring, Maryland 20910  
(O) 301-734-0350, (F) 301-734-0360

E. Engineer: BES Design/Build, LLC  
766 Middle Street  
Fairhope, AL 36532

PH: 251-990-5778

F. Owner: Tony Thurman PH: 501-257-1196

G. General Contractor (GC): BES Design/Build, LLC

H. Contractor: Radio Contractor; you; successful bidder

#### **1.4 REFERENCES**

A. The installation shall comply fully with all governing authorities, laws and ordinances, regulations, codes and standards, including, but not limited to:

1. United States Federal Law:

a. Departments of:

1) Commerce, Consolidated Federal Regulations (CFR), Title 15 - Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the:

a) Chapter II, National Institute of Standards Technology (NIST - formerly the National Bureau of Standards). Under Section 5131 of the Information Technology Management Reform Act of 1996 and the Federal Information Security Management Act of 2002 (Public Law 107-347), NIST develops - Federal Information Processing Standards Publication (FIPS) 140-2-Security Requirements for Cryptographic Modules.

b) Chapter XXIII, National Telecommunications and Information Administration (NTIA - aka 'Red Book') Chapter 7.8 / 9; CFR, Title 47 Federal communications Commission (FCC) Part 15, Radio Frequency Restriction of Use and Compliance in "Safety of Life" Functions & Locations

2) FCC - Communications Act of 1934, as amended, CFR, Title 47 - Telecommunications, in addition to Part 15 - Restrictions of use for Part 15 listed Radio Equipment in Safety of Life /

Emergency Functions / Equipment/ Locations (also see CFR,  
Title 15 - Department of Commerce, Chapter XXIII - NTIA):

- a) Part 15 - Restrictions of use for Part 15 listed Radio  
Equipment in Safety of Life / Emergency Functions /  
Equipment/Locations.
  - b) Part 58 - Television Broadcast Service.
  - c) Part 90 - Rules and Regulations, Appendix C.
  - d) Form 854 - Antenna Structure Registration.
- 3) Health, (Public Law 96-88), CFR, Title 42, Chapter IV Health &  
Human Services, CFR, Title 46, Subpart 1395(a) (b) JCAHO "a  
hospital that meets JCAHO accreditation is deemed to meet the  
Medicare conditions of Participation by meeting Federal  
Directives:"
- a) All guidelines for Life, Personal and Public Safety; and,  
Essential and Emergency Communications.
- 4) Labor, CFR, Title 29, Part 1910, Chapter XVII - Occupational  
Safety and Health Administration (OSHA), Occupational Safety  
and Health Standard:
- a) Subpart 7 - Definition and requirements (for a NRTL - 15  
c's, for complete list, contact  
[\(\[http://www.osha.gov/dts/otpca/nrtl/faq\\\_nrtl.html\]\(http://www.osha.gov/dts/otpca/nrtl/faq\_nrtl.html\)\):](http://www.osha.gov/dts/otpca/nrtl/faq_nrtl.html)
- 1) UL:
- a) 44-02 - Standard for Thermoset-Insulated Wires and  
Cables.
  - b) 65 - Standard for Wired Cabinets.
  - c) 83-03 - Standard for Thermoplastic-Insulated Wires  
and Cables.
  - d) 467-01 - Standard for Electrical Grounding and  
Bonding Equipment
  - e) 468 - Standard for Grounding and Bonding Equipment.
  - f) 486A-01 - Standard for Wire Connectors and Soldering  
Lugs for Use with Copper Conductors
  - g) 486C-02 - Standard for Splicing Wire Connectors.
  - h) 486D-02 - Standard for Insulated Wire Connector  
Systems for Underground Use or in Damp or Wet  
Locations.

- i) 486E-00 - Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors.
- j) 493-01 - Standard for Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable.
- k) 514B-02 - Standard for Fittings for Cable and Conduit.
- l) 1069 - Hospital Signaling and Nurse Call Equipment.
- m) 1333 - Vertical (Riser) Fire Rating.
- n) 1449 - Standard for Transient Voltage Surge Suppressors.
- o) 1479-03 - Standard for Fire Tests of Through-Penetration Fire Stops.
- p) 1863 - Standard for Safety, Communications Circuits Accessories.
- q) 2024 - Standard for Optical Fiber Raceways.
- r) 60950-1/2 - Information Technology Equipment - Safety.
- 2) Canadian Standards Association (CSA): same tests as for UL.
- 3) Communications Certifications Laboratory (CCL): same tests as for UL.
- 4) Intertek Testing Services NA, Inc. (ITSNA formerly Edison Testing Laboratory [ETL]): same tests as for UL.
- b) Subpart 35 - Compliance with NFPA 101 - Life Safety Code.
- c) Subpart 36 - Design and construction requirements for exit routes.
- d) Subpart 268 - Telecommunications.
- e) Subpart 305 - Wiring methods, components, and equipment for general use.
- 5) Department of Transportation, CFR, Title 49 (Public Law 89-670), Part 1, Subpart C - Federal Aviation Administration (FAA):
  - a) Standards AC 110/460-ID & AC 707 / 460-2E - Advisory Circulars for Construction of Antenna Towers.
  - b) Forms 7450 and 7460-2 - Antenna Construction Registration.
- 6) Veterans Affairs (Public Law No. 100-527), CFR, Title 38, Volumes I & II:

- a) Office of Telecommunications:
  - 1) Handbook 6100 - Telecommunications.
    - a) Spectrum Management FCC & NTIA Radio Frequency Compliance and Licensing Program.
    - b) Special Communications Proof of Performance Testing, VACO Compliance and Life Safety Certification(s).
- b) Office of Cyber and Information Security (OCIS):
  - 1) Handbook 6500 - Information Security Program.
  - 2) Wireless and Handheld Device Security Guideline Version 3.2, August 15, 2005.
- c) VA's National Center for Patient Safety - Veterans Health Administration Warning System, Failure of Medical Alarm Systems using Paging Technology to Notify Clinical Staff, July 2004.
- d) VA's Center for Engineering Occupational Safety and Health, concurrence with warning identified in VA Directive 7700.
- e) Office of Construction and Facilities Management (CFM):
  - 1) Master Construction Specifications (PG-18-1).
  - 2) Standard Detail and CAD Standards (PG-18-4).
  - 3) Equipment Guide List (PG-18-5).
  - 4) Electrical Design Manual for VA Facilities (PG 18-10), Articles 7 & 8.
  - 5) Minimum Requirements of A/E Submissions (PG 18-15):
    - a) Volume B, Major New Facilities, Major Additions; and Major Renovations, Article VI, Paragraph B.
    - b) Volume C - Minor and NRM Projects, Article III, Paragraph S.
    - c) Volume E - Request for Proposals Design/Build Projects, Article II, Paragraph F.
  - 6) Mission Critical Facilities Design Manual (Final Draft - 2007).
  - 7) Life Safety Protected Design Manual (Final Draft - 2007).
  - 8) Solicitation for Offerors (SFO) for Lease Based Clinics - (05-2009).
- b. Federal Specifications (Fed. Specs.):



- 1) A-A-59544-00 - Cable and Wire, Electrical (Power, Fixed Installation).
2. United States National Codes:
  - a. American Institute of Architects (AIA): Guidelines for Healthcare Facilities.
  - b. American National Standards Institute/Electronic Industries Association/Telecommunications Industry Association (ANSI/EIA/TIA):
    - 1) 568-B - Commercial Building Telecommunications Wiring Standards:
      - a) B-1 - General Requirements.
      - b) B-2 - Balanced twisted-pair cable systems.
      - c) B-3 - Fiber optic cable systems.
    - 2) 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
    - 3) 606 - Administration Standard for the Telecommunications Infrastructure of Communications Buildings.
    - 4) 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications.
    - 5) REC 127-49 - Power Supplies.
    - 6) RS 160-51 - Sound systems.
    - 7) RS 270 - Tools, Crimping, Solderless Wiring Devices, Recommended Procedures for User Certification.
    - 8) SE 101-A49 - Amplifier for Sound Equipment
    - 9) SE 103-49 - Speakers for Sound Equipment
  - c. American Society of Mechanical Engineers (ASME):
    - 1) Standard 17.4 - Guide for Emergency Personnel.
    - 2) Standard 17.5 - Elevator & Escalator Equipment (prohibition of installing non-elevator equipment in Elevator Equipment Room / Mechanical Penthouse).
  - d. American Society of Testing Material (ASTM):
    - 1) D2301-04 - Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape.
  - e. Building Industries Communications Services Installation (BICSI):
    - 1) All standards for smart building wiring, connections and devices for commercial and medical facilities.
    - 2) Structured Building Cable Topologies.

3) In consort with ANSI/EIA/TIA.

f. Institute of Electrical and Electronics Engineers (IEEE):

- 1) SO/TR 21730:2007 - Use of mobile wireless communication and computing technology in healthcare facilities - Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices.
- 2) 0739-5175/08/©2008 IEEE - Medical Grade - Mission Critical - Wireless Networks.
- 3) C62.41 - Surge Voltages in Low-Voltage AC Power Circuits.

g. NFPA:

- 1) 70 - National Electrical Code (current date of issue) - Articles 517, 645 & 800.
- 2) 75 - Standard for Protection of Electronic Computer Data-Processing Equipment.
- 3) 77 - Recommended Practice on Static Electricity.
- 4) 99 - Healthcare Facilities.
- 5) 101 - Life Safety Code.
- 6) 1600 - Disaster Management, Chapter 5.9 - Communications and Warning

3. State Hospital Code(s).

4. Local Town, City and/or County Codes.

5. Accreditation Organization(s):

- a. Joint Commission on Accreditation of Hospitals Organization (JCAHO) - Section VI, Part 3a - Operating Features.

## **1.5 QUALIFICATIONS**

- A. The OEM shall have had experience with three (3) or more installations of systems of comparable size and complexity with regards to type and design as specified herein. Each of these installations shall have performed satisfactorily for at least one (1) year after final acceptance by the user. Include the names, locations and point of contact for these installations as a part of the submittal.
- B. The Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of three (3) years. The Contractor shall be authorized by the OEM to pass thru the OEM's warranty of the installed equipment to VA. In addition, the OEM and Contractor shall accept complete

responsibility for the design, installation, certification, operation, and physical support for the System. This documentation, along with the System Contractor and OEM certifications must be provided in writing as part of the Contractor's Technical submittal.

- C. The Contractor's Communications Technicians assigned to the System shall be fully trained, qualified, and certified by the OEM on the engineering, installation, operation, and testing of the System. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the COR before being allowed to commence work on the System.
- D. The Contractor shall display all applicable national, state and local licenses.
- E. The Contractor shall submit copy (s) of Certificate of successful completion of OEM's installation/training school for installing technicians of the System's PA equipment being proposed.

#### **1.6 CODES AND PERMITS**

- A. Provide all necessary permits and schedule all inspections as identified in the contract's milestone chart, so that the system is proof of performance tested and ready for operation on a date directed by the Owner.
- B. The contractor is responsible to adhere to all codes described herein and associated contractual, state and local codes.
- C. The Contractor shall display all applicable national, state and local licenses and permits.

#### **1.7 SCHEDULING**

- A. After the award of contract, the Contractor shall prepare a detailed schedule (aka milestone chart) using "Microsoft Project" software or equivalent. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships. It will also detail manpower usage throughout the project.
- B. It is the responsibility of the Contractor to coordinate all work with the other trades for scheduling, rough-in, and finishing all work specified. The owner will not be liable for any additional costs due to missed dates or poor coordination of the supplying contractor with other trades.

#### **1.8 REVIEW OF CONTRACT DRAWINGS AND EQUIPMENT DATA SUBMITTALS**

- A. Submit at one time within 10 days of contract awarding, drawings and product data on all proposed equipment and system. Check for compliance with contract documents and certify compliance with Contractor's "APPROVED" stamp and signature.
- B. Support all submittals with descriptive materials, i.e., catalog sheets, product data sheets, diagrams, and charts published by the manufacturer. These materials shall show conformance to specification and drawing requirements.
- C. Where multiple products are listed on a single cut-sheet, circle or highlight the one that you propose to use. Provide a complete and thorough equipment list of equipment expected to be installed in the system, with spares, as a part of the submittal. Special Communications (TVE-0050P3B) will not review any submittal that does not have this list.
- D. Provide four (4) copies to the PM for technical review. The PM will provide a copy to the offices identified in Paragraph 1.3.C & D, at a minimum for compliance review as described herein where each responsible individual(s) shall respond to the PM within 10 days of receipt of their acceptance or rejection of the submittal(s).
- E. Provide interconnection methods, conduit (where not already installed), junction boxes (J-Boxes), cable, interface fixtures and equipment lists for the: ENR(s) ( aka DMARC), TER, TCR, MCR, MCOR, PCR, ECR, Stacked Telecommunications Rooms (STR), Nurses Stations (NS), Head End Room (HER), Head End Cabinet (HEC), Head End Interface Cabinet (HEIC) and approved TCO locations Telecommunications Infrastructure Plant (TIP) interface distribution layout drawing, as they are to be installed and interconnected to teach other (REFER TO APPENDIX B - SUGGESTED TELECOMMUNICAITONS ONE LINE TOPOLOGY pull-out drawing).
- F. Headend and each interface distribution cabinet layout drawing, as they are expected to be installed.
- G. Equipment OEM technical literature detailing the electrical and technical characteristics of each item of equipment to be furnished.
- H. Engineering drawings of the System, showing calculated of expected signal levels at the headend input and output, each input and output distribution point, and signal level at each telecommunications outlet.
- I. Surveys Required as a Part of The Technical Submittal:

1. The Contractor shall provide the following System survey(s) that depict various system features and capacities required in addition to the on-site survey requirements described herein. Each survey shall be in writing and contain the following information (the formats are suggestions and may be used for the initial Technical Submittal Survey requirements), as a minimum:
  - a. PA Cable System Design Plan:
    - 1) An OEM and contractor designed functioning PA System cable plan to populate the entire TIP empty conduit/pathway distribution systems provided as a part of Specification 27 11 00 shall be provided as a part of the technical proposal. A specific functioning PA: cable, interfaces, J-boxes and back boxes shall coincide with the total growth items as described herein. It is the Contractor's responsibility to provide the Systems' entire PA cable and accessory requirements and engineer a functioning PA distribution system and equipment requirement plan of the following paragraph(s), at a minimum:
    - 2) The required PA Equipment Locations:

<u>EQUIPPED ITEM</u>	<u>CAPACITY</u>	<u>GROWTH</u>
Master Control Stations		
Signal Equipment Room		
Zone Amplifiers		
<b>Dialysis (Zone 5)</b>		
Supervisory Panel(s)		
Trouble Panel(s)		
Locations		
Speakers		
Overhead		
Locations		
Other		

- 3) The required PA Cable Plant/Connections:

The Contractor shall clearly and fully indicate this category for each item identified herein as a part of the technical submittal. For this purpose, the following definitions and sample connections are provided to detail the system's capability:

<u>EQUIPPED ITEM</u>	<u>CAPACITY</u>	<u>GROWTH</u>
Essential Electrical Power Panel(s)		
Other		
Cable Plant		
Supply to Locations Identified herein		
Speaker Locations		
Other		
Maintenance/Program Console		
Location(s)		
Other		
LAN (Local Facility) Access/Equipment/Location (when pre-approved by TVE-0050P3B)		

#### 1.9 PROJECT RECORD DOCUMENTS (AS BUILTS)

- A. Throughout progress of the Work, maintain an accurate record of changes in Contract Documents. Upon completion of Work, transfer recorded changes to a set of Project Record Documents.
- B. The floor plans shall be marked in pen to include the following:
  1. All device locations with UL labels affixed.
  2. Conduit locations.
  3. Head-end equipment and specific location.
  4. Each interface and equipment specific location.
  5. Facility Entrance (aka DEMARC) Room(s) interface equipment and location(s).
  6. Telephone Equipment Room (TER) interface equipment and specific location.
  7. Main Computer Room (MCR) interface equipment and specific location.
  8. Police Control Room (PCR) interface equipment and specific location.
  9. Engineering Control Room (ECR) interface equipment and specific location
  10. Telecommunication Outlet (s -TCO) equipment and specific location
  11. TIP Wiring diagram(s).
  12. Warranty certificate.
  13. System test results.
  14. System Completion Document(s) or MOU.

#### **1.10 WARRANTIES / GUARANTY**

- A. The Contractor shall warrant the installation to be free from defect in material and workmanship for a period of two (2) years from the date of acceptance of the project by the owner. The Contractor shall agree to remedy covered defects within four (4) hours of notification of major failures or within twenty-four (24) hours of notification for individual station related problems.
- B. The Contractor shall agree to grantee the system according to the guidelines outlined in Article 4 herein.

#### **1.11 USE OF THE SITE**

- A. Use of the site shall be at the GC's direction.
- B. Coordinate with the GC for lay-down areas for product storage and administration areas.
- C. Coordinate work with the GC and their sub-contractors.
- D. Access to buildings wherein the work is performed shall be directed by the GC.

#### **1.12 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Store products in original containers.
- C. Coordinate with the GC for product storage. There may be little or no storage space available on site. Plan to potentially store materials off site.
- D. Do not install damaged products. Remove damaged products from the site and replaced with new product at no cost to the Owner.

#### **1.13 PROJECT CLOSE-OUT**

- A. Prior to final inspection and acceptance of the work, remove all debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from the project site and thoroughly clean your work area.
- B. Before the project closeout date, the Contractor shall submit:
  - 1. Warranty certificate.
  - 2. Evidence of compliance with requirements of governing authorities such as the Low Voltage Certificate of Inspection.
  - 3. Project record documents.
  - 4. Instruction manuals and software that is a part of the system.
- C. Contractor shall submit written notice that:

1. Contract Documents have been reviewed.
2. Project has been inspected for compliance with contract.
3. Work has been completed in accordance with the contract.

## **PART 2 - PRODUCTS / FUNCTIONAL REQUIREMENTS**

### **2.0 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS**

- A. Furnish and install a complete and fully functional and operable Nurse Call System for each location shown on the contract drawings and TCOs WHOSE EMPTY CONDUIT SYSTEM WAS PROVIDED AS A PART OF SPECIFICATION 27 11 00.
- B. Coordinate features and select interface components to form an integrated PA system. Match components and interconnections between the systems for optimum performance of specified functions.
- C. Expansion Capability: The PA equipment interfaces and cables shall be able to increase number of enunciation points in the future by a minimum of 50 percent (%) above those indicated without adding any internal or external components or main trunk cable conductors.
- D. Equipment: Active electronic type shall use solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied between 110 to 130 VAC, 60 Hz.
- E. Meet all FCC requirements regarding low radiation and/or interference of RF signal(s). The system shall be designed to prevent direct pickup of signals from within and outside the building structure.
- F. Weather/Water Proof Equipment: Listed and labeled by an OSHA certified National Recognized Testing Laboratory (NRTL - i.e. UL) for duty outdoors or in damp locations.
- G. Deliver a fully functioning and operable PA in the specific locations shown on the drawings.

### **2.1 SYSTEM DESCRIPTION**

- A. Furnish and install a complete and fully functional and operable HF Radio System. Provide additional require conduit(s) according to Specification 27 11 00.
- B. The Contractor is responsible for interfacing the [MATV](#), [Patient Bed Service Walls](#), and [SSC Room](#) systems with the System and shall be the interface points for connection of the radio interface cabling from the interface unit(s). The interface unit(s) shall be provided by the Contractor.



- C. The Contractor shall continually employ interfacing methods that are approved by the OEM and VA. At a minimum, an acceptable interfacing method requires not only a physical and mechanical connection, but also a matching of signal, voltage, and processing levels with regard to signal quality and impedance. The total PA system shall be configured and installed so that the combination of equipment actually employed does not produce any undesirable visual or aural effects such as signal distortions, noise pulses, glitches, hum, transients, images, etc. The interface points must adhere to all standards described herein for the full separation of Critical Care and Life Safety systems.
- D. It is not acceptable to utilize the telephone cable system for the control of radio signals and equipment. The System Contractor shall connect the Telephone System Remote Control System to the Radio System Paging Control Unit ensuring that all NFPA and UL Critical Care and Life Safety Circuit and System separation guidelines are satisfied. The System Contractor is not allowed to make any connections to the Telephone System. The Owner shall arrange for the interconnection between the PA and Telephone Systems with the appropriate responsible parties.
- E. System hardware shall consist of a *standalone (separate)* PA communications network comprised of amplifiers, mixers, speakers, volume controls, test sets, telephone private branch exchange (PBX) interface equipment, equipment cabinets/racks, wiring and other options such as, sub zoning in addition to "all call" functions, computer interfaces, printer interfaces and wireless network interfaces, (when specifically approved by 0050P3B and VA Headquarters Spectrum Management 0050P2B - herein after referred to as 0050P2B) as shown on drawings. All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, shall be supplied and installed to provide a complete and operating nurse/patient communications network.
- F. Systems firmware shall be the product of a reputable firmware OEM of record with a proven history of product reliability and sole control over all source code. Manufacturer shall provide, free of charge, product firmware/software upgrades for a period of two (2) years from date of acceptance by VA for any product feature enhancements. System configuration programming changes shall not require any exchange of

parts and shall be capable of being executed remotely via a modem connection (when specifically approved first by 0050P3B).

- G. The System shall utilize microprocessor components for all signaling and programming circuits and functions. Self contained or on board system program memory shall be non-volatile and protected from erasure from power outages for a minimum of 24 hours.
- H. Provide a backup battery or a UPS for the System (including each distribution cabinet/point, CRT, LCD and Monitor) to allow normal operation and function (as if there was no AC power failure) in the event of an AC power failure or during input power fluctuations for a minimum of two (2) Hours.
- I. The System is defined as Emergency Service and the Code Blue functions is defined as Life Safety/Support by NFPA (re Part 1.1.A) and so evaluated by JCAHCO. Therefore, the system shall have a minimum of two (2) additional remote enunciation points in order to satisfy NFPA's Life Safety Code 101 where each enunciation point shall fully function independent of the Facility's PBX.
  - 1. These two (2) additional remote locations shall be fully manned:
    - a. 24/7/365 for certified Hospital Clinics.
    - b. As long as other identified VA Medical / Servicing Facilities are open for servicing patients.
    - c. The minimum remote enunciation locations shall be:
      - 1) The Telephone / PBX Operator Room.
      - 2) The Police Control / Operations Room.
      - 3) Other location(s) that is specifically approved by VA Headquarters TVE - 0050P3B DURING THE PROJECT DEVELOPMENT STAGES AND PRIOR TO EQUIPMENT PURCHASE.
    - d. One (1) global (aka "all call") hard wired zone shall be provided that connects to every system speaker.
    - e. There shall be hard-wired sub-zones designated as follows:
      - 1) Department A.
      - 2) Department B.
      - 3) Department C.
      - 4) Department D.
      - 5) Department E.
      - 6) Each zone shall be capable of be programmed.
      - 7) The System shall have a minimum of three (3), unused zones.

2. The System shall allow voice pages to be made within a single zone, across programmed multiple zones or a global page (all zones) by using preset codes entered into the keypad of any telephone instrument attached to the PBX.
- J. The System shall interface with the Facility's existing PAS so that a global page (aka "all call" page) is communicated to the existing PAS and the new System of this project. Arrangements for interconnection of the System and the telephone system(s) shall be coordinated with the owner and the PBX provider.
- K. The system shall be designed to provide continuous electrical supervision of the complete and entire system (i.e. light bulbs, wires, contact switch connections, master control stations, wall stations, circuit boards, data, audio, and communication busses, main and UPS power, etc.). All alarm initiating and signaling circuits shall be supervised for open circuits, short circuits, and system grounds. Main and UPS power circuits shall be supervised for a change in state (i.e. primary to backup, low battery, UPS on line, etc.). When an open, short or ground occurs in any system circuit, an audible and visual fault alarm signal shall be initiated at the main supervisory panel, nurse control station and all remote amplifier locations.
- L. When the System is approved to connect to a separate communications system (i.e. LAN, WAN, Telephone, Nurse Call, radio raging, wireless systems, etc) the connection point shall be at one location and shall meet the following minimum requirements for each hard wired connection (note each wireless system connection MUST BE APPROVED PRIOR TO CONTRACT BID BY VA HEADQUARTERS 0050P3B AND 0050P2B):
  1. UL 60950-1/2.
  2. FIPS 142.
  3. FCC Part 15 Listed Radio Equipment is not allowed.
- M. All passive distribution equipment shall meet or exceed -80 dB radiation shielding (aka RFI) shielding specifications and be provided with screw type audio connectors.
- N. All equipment face plates utilized in the system shall be stainless steel, anodized aluminum or UL approved cyclac plastic for the areas where provided.

- O. All trunk, branch, and interconnecting cables and unused equipment ports or taps shall be terminated with proper terminating resistors designed for RF, audio and digital cable systems without adapters.
- P. Noise filters and surge protectors shall be provided for each equipment interface cabinet, control console and local and remote amplifier locations to insure protection from input primary AC power surges and to insure noise glitches are not induced into low voltage data circuits.
- Q. Plug-in connectors shall be provided to connect all equipment, except coaxial cables and RF transmission line interface points. Coaxial cable distribution points and RF transmission lines shall use coaxial cable connections recommended by the cable OEM and approved by the system OEM. Base band cable systems shall utilize barrier terminal screw type connectors, at a minimum. As an alternate, crimp type connectors installed with a ratchet type installation tool are acceptable provided the cable dress, pairs, shielding, grounding, connections and labeling are the same as the barrier terminal strip connectors. Tape of any type, wire nuts or solder type connections are unacceptable and will not be approved.
- R. Audio Level Processing: The control equipment shall consist of audio mixer(s), volume limiter(s) and/or compressor(s), and power amplifier(s) to process, adjust, equalize, isolate, filter, and amplify each audio channel for each sub-zone in the system and distribute them into the System's RF interfacing distribution trunks and amplification circuits. It is acceptable to use identified Telephone System cable pairs designated for Two-Way Radio interface and control use or identified as spare telephone cable pairs by the Facility's Telephone System Contractor. The use of telephone cable to distribute RF signals, carrying system or sub-system AC or DC voltage is not acceptable and will not be approved. Additionally, each control location shall be provided with the equipment required to insure the system can produce its designed audio channel capacity at each speaker identified on the contract drawings. The Contractor shall provide: a spare set of telephone paging modules as recommended by the OEM (as a minimum provide one spare module for each installed module); one spare audio power amplifier, one spare audio mixer, one spare audio volume limiter

and/or compressor, and one spare audio automatic gain adjusting device, and minimum RF equipment recommended by the OEM.

- S. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. Unless otherwise noted in this Part, equipment quantities shall be as indicated on the drawings.

## **2.2 SYSTEM PERFORMANCE:**

- A. At a minimum, each distribution, interconnection, interface, terminating point and TCO shall be capable of supporting the Facility's PA system voice and data service as follows:
1. Shall be compliant with and not degrade the operating parameters of the Public Switched Telephone Network (PSTN) and the Federal Telecommunications System (FTS) at each PSTN and FTS interface, interconnection and terminating locations in the TERs.
  2. Audio Input: The signal level of each audio input channel at each input point shall be a MINIMUM of zero decibels measured (dBm), +0.10 dBm across 150 Ohms, balanced.
  3. Audio Output: The audio signal level at each speaker shall be a MINIMUM of +0.25 Watt (W) and a maximum of +20 W, 600 Ohms balanced impedance, on a 70.7 V audio distribution line Contractor to determine and set each speaker's proper audio signal level (top) based on speaker location and the ambient noise level in speaker coverage area.
  4. The system shall meet the following MINIMUM parameters at each speaker:
    - a. Cross Modulation: -46 dB
    - b. Hum Modulation: -55 dB
    - c. Isolation (outlet-outlet): 24 dB
    - d. Impedance:
      - 1) Distribution: 600 Ohm balanced @ 70.7 V audio line level.
      - 2) Speaker: Selectable, as required.
    - e. Audio Gain: 10 dB minimum @ mid-range measured with a sound pressure level meter (SPL)
    - f. Signal to noise (S/N) ratio: 35 dB, minimum
- B. Audio Level Processing: The head-end equipment shall consist of audio mixer(s), volume limiter(s) and/or compressor(s), and power amplifier(s) to process, adjust, equalize, isolate, filter, and amplify

each audio channel for each zone or sub-zone in the system and distribute them into the system's distribution trunks. It is acceptable to use identified telephone system cable pairs designated for PA use or identified as spare telephone cable pairs by the Facility's Telephone System Contractor.

1. THE USE OF TELEPHONE CABLE TO DISTRIBUTE PA SIGNALS CARRYING AC OR DC VOLTAGE IS NOT ACCEPTABLE AND WILL NOT BE APPROVED.
2. Additionally, each remote location shall be provided with the equipment required to ensure the system supervision and designed audio channel capacity at each speaker identified on the contract drawings.

### **2.3 MANUFACTURERS**

- A. The products specified shall be new, FCC and UL Listed, labeled and produced by OEM of record. An OEM of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied and which:
  1. Maintains a stock of replacement parts for the item submitted,
  2. Maintains engineering drawings, specifications, and operating manuals for the items submitted, and
  3. Has published and distributed descriptive literature and equipment specifications on the items of equipment submitted at least 30 days prior to the Invitation for Bid (IFB).
- B. Specifications contained herein as set forth in this document detail the salient operating and performance characteristics of equipment in order for VA to distinguish acceptable items of equipment from unacceptable items of equipment. When an item of equipment is offered or furnished for which there is a specification contained herein, the item of equipment offered or furnished shall meet or exceed the specification for that item of equipment.
- C. Equipment Standards and Testing:
  1. The System has been defined herein as connected to systems identified as an Emergency performing Public Safety Support Functions. Therefore, at a minimum, the system shall conform to all aforementioned National and/or Local Public and Life Safety Codes (which ever are the more stringent), NFPA, NEC, this specification, JCAHCO Life Safety Accreditation requirements, and the OEM recommendations, instructions, and guidelines.

2. All supplies and materials shall be listed, labeled or certified by UL or a nationally recognized testing laboratory (NRTL) where such standards have been established for the supplies, materials or equipment.
3. The provided equipment required by the System design and approved technical submittal must conform with each UL standard in effect for the equipment, as of the date of the technical submittal (or the date when the COR approved system equipment necessary to be replaced) was technically reviewed and approved by VA. Where a UL standard is in existence for equipment to be used in completion of this contract, the equipment must bear the approved UL seal.
4. Each item of electronic equipment to be provided under this contract must bear the approved UL seal or the seal of the testing laboratory that warrants the equipment has been tested in accordance with, and conforms to the specified standards. The placement of the UL Seal shall be a permanent part of the electronic equipment that is not capable of being transportable from one equipment item to another.

## 2.4 PRODUCTS

### A. General.

1. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. The equipment quantities provided herein shall be as indicated on the drawings with the exception of the indicated spare equipment.
2. Each cabinet shall be provided with internal and external items to maintain a neat and orderly system of equipment, wire, cable and conduit connections and routing.
3. Contractor Furnished Equipment List (CFEs):
  - a. The Contractor is required to provide a list of the CFE equipment to be furnished. The quantity, make and model number of each item is required. Select the required equipment items quantities that will satisfy the needs of the system as described herein and with the OEM's concurrence applied to the list(s), in writing.
  - b. The following equipment items are the minimum requirements of VA to provide an acceptable system described herein:

<u>Item</u>	<u>Quantity</u>	<u>Unit</u>
1. As required	Interface Panel(s)	

1.a	As required	Electrical Supervision
		Trouble Enunciator
1.a.1.	As required	Equipment Back Box(s)
1.a.2.	As required	Telephone Access Equipment
1.a.3.	As required	Radio Paging Access Equipment
1.a.3.a.	As required	Radio Pager Equipment
1.a.4.	As required	Wireless Access Equipment
1.a.5.	As required	Personal Communicator
		Equipment
2.	As required	Lightning Arrestor
3.	As required	Head End Equipment Locations
3.a	As required	Cabinet(s)
3.a.1.	As required	AC Power Conditioner & Filter
3.a.2.	As required	AC Power Strip
3.a.3.	As required	UPS
3.a.3.a	As required	Main Power Amplifiers
3.a.3.b	As required	Remote Power Amplifiers
3.a.3.c	As required	Distributed Amplifiers (When
		Approved)
3.a.4.	As required	Interconnecting wire Cable(s)
3.a.4.a	As required	Wire Cable Connector(s)
3.a.4.b	As required	Wire Cable Terminator(s)
3.a.4.c	As required	Wire Management System
3.b.	As required	Head End Function(s)
4.	As required	Distribution System(s)
4.a	As required	Equipment Back Box(s)
4.a.1.	As required	Speakers
4.a.1.a	As required	Overhead
4.a.1.b	As required	Horn
4.a.1.c	As required	Outside
4.a.1.d	As required	Speaker w/ Microphone
5.	2 (MIN)	Remote Station(s)
5.a.	As required	Spare Items
6.	As required	Mental Health Unit
6.a.	As required	Interface Panel(s)
6.b.	As required	Electrical Supervision
		Trouble Enunciator
6.c.	As required	Equipment Back Box(s)
6.d.	As required	Telephone Access Equipment
6.e.	As required	Radio Paging Access Equipment
6.e.1.	As required	Radio Pager Equipment
6.f.	As required	Wireless Access Equipment
6.g.	As required	Personal Communicator
		Equipment
6.h.	As required	Lightning Arrestor
6.i.	As required	Head End Equipment
		Location(s)
6.i.1.	As required	Cabinets
6.i.2.	As required	AC Power Conditioner & Filter
6.i.3.	As required	AC Power Strip
6.i.4.	As required	UPS
6.i.5.	As required	Main Power Amplifiers
6.j.	As required	Remote Power Amplifiers
6.k.	As required	Distributed Amplifiers (When
		Approved)
6.l.	As required	Interconnecting Wire Cable(s)



6.1.1.	As required	Wire Cable Connector(s)
6.1.2.	As required	Wire Cable Terminator(s)
6.1.3.	As required	Wire Management System
6.m.	As required	Head End Function(s)
6.n.	As required	Distribution System(s)
6.n.1	As required	Equipment Back Box(S)
6.n.2	As required	Speakers
6.n.2(a)	As required	Overhead
6.n.2(b)	As required	Horn
6.n.2(c)	As required	Outside
6.n.2(d)	As required	Speaker w/ Microphone
6.o	2 (MIN)	Remote Station(s)
6.p.	As required	Spare Items

B. ENT (aka DEMARC) Room(s):

Refer to CFM Physical Security Manual (07-2007) for VA Facilities, Chapters 9.3 & 1) and PG 18-10, EDM, Chapters 7- Table 7-1, 8 & Appendix B, Telecommunications One Line Topology for specific Room and TIP Connection Requirements.

C. TER, TCR, TR, SCC, PCR, STR, HER Rooms and Equipment:

Refer to CFM Physical Security Manual (07-2007) for VA Facilities, Chapters 9.3 & 1) and PG 18-10, EDM, Chapters 7- Table 7-1, 8 & Appendix B, Telecommunications One Line Topology for specific Room and TIP Connection Requirements.

1. Interface Equipment:

a. TER:

1) Paging adaptor:

- a) The Contractor shall coordinate the installation of the paging adapter(s) designed for use with the Facility's telephone system with the Facility Telephone Contractor or local telephone company.
- b) The Contractor shall provide and install a paging adapter(s) for each zone and sub zone. The paging adapter(s) shall be accessible by dialing a telephone number provided by the Facility's Telephone Contractor. The Paging Adapter shall:
  - 1) Monitor each audio input and output on the unit.
  - 2) Be provided with an electrical supervision panel to provide both audio and visual trouble alarms.
  - 3) Be provided as part of the head end equipment and shall be located in the Telephone Switch Room

- 4) Be provided with Executive (aka emergency) Paging Override of all routine paging calls in progress or being accessed to allow system "all call" (aka global) and radio paging calls designated as (Code One Blue) functions.
  - 5) Be capable of internal time out capability.
  - 6) Function completely with the interface module.
  - 7) Provide one spare adapter.
- c) Time Out Device: A time out device/capability shall be provided to prevent system "hang-up" due to an off-hook telephone. The device shall be able to be preset from 30 seconds to two (2) minutes. Its function shall not interfere with or override the required "all call" (aka global) operational capability.
- 1) Central Processor Module:
  - 2) Controls system operations and holds all programmed parameters.
  - 3) Data link connection to additional CPU modules.
- d) Power Module: Provides 12V DC @ 800mA to Central Processor Module.
- e) Minimum three (3) Zone Module:
- 1) Provides a minimum of three (3) paging zone outputs at 70V audio sound level.
  - 2) Background Music inhibit switch for each zone.
- 2) Audio Monitor Panel:
- a) The panel shall be EIA/TIA standard for 483 mm (19") cabinet mounting.
  - b) It shall be provided in the upper portion of the head-end equipment cabinet.
  - c) Provide one (1) spare panel.
- 3) Trouble Annunciator Panel:
- a) A trouble annunciator panel shall be provided in the head-end cabinet, and at locations as designated on the contract drawings. The panel(s) shall be compatible with or generate electrical and/or electronic supervising signals to continuously monitor the operating condition for the System head-end audio power amplifier(s), remote power

amplifier(s), microphone consoles and interconnecting trunks. The panels shall generate an audible and visual signal when the System's supervising system detects an amplifier or trunk-line is malfunctioning.

b) Provide one (1) spare panel.

4) Head-End Equipment

a) Provide all required power supplies, communications hubs, network switches, intelligent controllers and other devices necessary to form a complete system listed herein. Head-end components may be rack mounted or wall mounted in a metal enclosure.

b) Provide the head end equipment in the closed telecommunications closet where the PA system is installed to include the minimum equipment listed herein.

c) Provide minimum of 30 minute battery back-up to system components.

5) Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions

a) Vertical Equipment Rack, Wall Mounted (to be included inside of the Equipment Cabinet):

b) 74" (48RU) rack space, Welded Steel construction, Minimum 20" usable depth, Adjustable front mounting rails.

1) Install the following products in rack provided by same manufacturer or as specified:

2) Security screws w/ nylon isolation bushings.

3) Textured blank panels.

4) Custom mounts for components without rack mount kits.

5) Security covers.

6) Copper Bus Bar.

7) Power Sequencer rack mounted power conditioner and (provide as needed) delayed sequencer(s) with two (2) inswitched outlets each and contact closure control inputs.

8) Rack mounting: Provide rack mount kit.

6) Amplifier Equipment:

a) Paging (aka zone):

- 1) Inputs for 600-ohm balanced telephone line, LO-Z balanced microphone, and background music.
- 2) Input Sensitivity: Compatible with master stations and central equipment so amplifier delivers full rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on master stations speaker microphones, or handset transmitters
- 3) Automatic Level Control (ALC) for pages, adjustable background music muting level during page, wall or rack mountable.
- 4) 16-ohm, 25V, 25V center tapped (CT), and 70V outputs. Amplifier quantity and size (output power) as needed. Continuous amplifier power rating shall exceed loudspeaker load on amplifier by at least 25%.
- 5) Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
- 6) Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to quantity of stations connected in all-call mode of operation.
- 7) Minimum Signal-to-Noise Ratio: 45 dB, at rated output.
- 8) Frequency Response: Within plus or minus 3 dB from 70 to 12,000 Hz.

b) Output Regulation: Maintains output level within 2 dB from full to no load.

c) Amplifier Protection: Prevents damage from shorted or open output.

d) Be provided with electronic supervision function(s).

e) Provide one spare amplifier.

b. TCR:

1) Microphone Paging Console:

- a) A console shall be provided in the TCR and PCR's as shown on the drawings.

- b) The console shall contain visual enunciators for each connection to the telephone system's Public Address Paging Adapter. The visual enunciators shall display all the System connections to the telephone system being used.
- c) The console shall be fully independent of the Facility's telephone system so if the telephone system has a catastrophic failure (aka partial, multiple or total system failure) the microphone console will function normally as if the Facility's telephone system was operating normally. The restoration of the Facility's telephone system shall not affect the System.
- d) Each microphone console shall:
  - 1) Be Mounted: Flush unless otherwise indicated, and suitable for mounting conditions indicated.
  - 2) Have a Faceplate: Stainless steel or anodized aluminum with tamperproof mounting screws.
  - 3) Have a system interface Back Box: Minimum Two-gang galvanized steel with 2-1/2 inch minimum depth.
  - 4) Have an Internal Speaker: 3 inches, 2.3 oz. minimum; permanent magnet.
  - 5) Have a Call Switch: Mount on faceplate. Permits calls to The system.
  - 6) When approved - in lieu of a standalone microphone, provide a Handset with Hook Switch: Have a Handset with Hook Switch: Telephone type with 24-inch-long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
  - 7) Be provided with an electrical supervision panel to provide both audio and visual trouble alarms to the Nurse Call /Code Blue electrical supervision system.
  - 8) Be capable of internal time out capability.
  - 0) Be completely compatible with the Telephone Interface unit(s)
- 2) Electrical Supervision Trouble Annunciator Panel:
  - a) The Electrical Supervision Trouble Annunciation Panel shall be located in the TCR and PCR's SCC.

- b) The panel(s) shall be compatible with the generated electrical and/or electronic supervising signals to continuously monitor the operating condition for the PA system head-end processing equipment, local/remote control consoles, audio power amplifier(s), UPS, power supplies, dome lights and interconnecting trunks. The panels shall generate an audible and visual signal when the System's supervising system detects a system trouble or trunk-line is malfunctioning.
- c) TRs: Locate the PA floor distribution equipment within each TR as required by system design and OEM direction. Provide secured and lockable cabinet/rack(s) as required.
  - 1) General Equipment: Provide all required power supplies, communications hubs, network switches, intelligent controllers and other devices necessary to form a complete system listed herein. Equipment components may be rack mounted or wall mounted in a metal enclosure.
- 2) Amplifiers:
  - a) Panging Amplifier Equipment:
  - b) Refer to the Amplifier characteristics described herein Paragraph 2.4.G.f.
  - c) Provide one (1) spare amplifier in addition to the spare Head End Amplifier.
- 3) Distributed Amplifier:
  - a) Provide the type and number of the amplifier(S) required to meet the system design. Provide this unit as complete and separate technical submittal during the IFB review portion of the project.
  - b) Provide one spare amplifier for each 20% (or portion thereof) of amplifiers used in the system.
- 4) Provide the equipment in the nearest TER where the System is installed to include the minimum equipment listed herein.
- 5) Provide minimum of 30 minute battery (UPS) back-up to system components.
- 6) Equipment Cabinet: Comply with cabinet requirements as aforementioned.

7) Trouble Annunciator Panel: Comply with the panel characteristics identified herein.

d. SCC, PCR, STR, HER: Refer to PG-18-10, Article 7 for specific required equipment and use minimum aforementioned specifications for population.

D. TIP DISTRIBUTION SYSTEM:

1. System Speakers:

a. Ceiling Cone

Type:

- 1) Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
- 2) Frequency Response: Within plus or minus 3 dB from 70 to 15,000 Hz.
- 3) Minimum Dispersion Angle: 100 degrees.
- 4) Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.
- 5) Enclosures: Steel housings or back boxes, acoustically dampened, with front face of at least 0.0478-inch steel and whole assembly rust proofed and factory primed; complete with mounting assembly and suitable for surface ceiling, flush ceiling, pendant or wall mounting; with relief of back pressure.
- 6) Baffle: For flush speakers, minimum thickness of 0.032-inch aluminum with textured white finish. Completely fill the baffle with fiberglass.
- 7) Vandal-Proof, High-Strength Baffle: For flush-mounted speakers, self-aging cast aluminum with tensile strength of 44,000 psi, 0.025-inch minimum thickness; countersunk heat-treated alloy mounting screws; and textured white epoxy finish.
- 8) Size: 8 inches with 1-inch voice coil and minimum 5-oz. ceramic magnet.
- 9) Have a minimum of two (2) safety wires installed to a solid surface or use a flexible conduit from ceiling / wall back box to the speaker back box.
- 10) The speakers and mounting shall be self contained and wall mounted with flush back box at a minimum of 10 meter intervals

and shall match (or contrast with, at the direction of the RE)  
the color of the adjacent surfaces.

- 11) Provide one spare speaker, mount, and back box for each 50 speakers or portion thereof.

b. Wall Mounted Horn Type:

- 1) Each horn speaker shall be provided with a means of adjusting the output level over the rated horn speaker range to an appropriate audio level in the area installed.
- 2) Provide horn speakers in equipment rooms, mechanical room, supply warehouse areas, loading dock, entrance and exit areas, and at other areas as indicated on the drawings.
- 3) Speakers shall be all-metal, weatherproof construction; complete with universal mounting brackets.
- 4) Frequency Response: Within plus or minus 3 dB from 275 to 14,000 Hz.
- 5) Minimum Power Rating of Driver: 15 W, continuous.
- 6) Minimum Dispersion Angle: 110 degrees.
- 7) Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.
- 8) Provide one spare speaker, mount, and back box for each 20 speakers or portion thereof.

c. System Cables: In addition to the TIP provided under Specification Section 27 15 00 - TIP Horizontal and Vertical Communications Cabling, provide the following additional TIP installation and testing requirements, provide the following minimum System TIP cables & interconnections:

- 1) Line Level Audio and Microphone Cable:
  - a) Line level audio and microphone cable for inside racks and conduit.
  - b) Shielded, twisted pair Minimum 22 American Wire Gauge (AWG), stranded conductors and 24 AWG drain wire with overall jacket.
- 2) Speaker Level (Audio 70.7Volt [V]) Cable, Riser Rated:
  - a) For use with 70.7 V audio speaker circuits.
  - b) 18 AWG stranded pair, minimum.
  - c) UL-1333 listed.
- 3) Speaker Level Audio Cable, Plenum Rated (70.7V):



- a) For use with 70.7 V audio speaker circuits.
  - b) 18 AWG stranded pair, minimum.
  - 4) All cabling shall be riser plenum rated.
  - 5) Provide one (1) spare 1,000 foot roll of approved System (not microphone) cable only.
2. Raceways, Back Boxes and conduit:
- a. Raceways:
    - 1) In addition to the Raceways, Equipment Room Fittings provided under Specification Sections 27 15 00 TIP Communication Room Fittings and 27 15 00 - TIP Communications Horizontal and Vertical Cabling, provide the following additional TIP raceway and fittings:
    - 2) Each raceway that is open top, shall be: UL certified for telecommunications systems, partitioned with metal partitions in order to comply with NEC Parts 517 & 800 to "mechanically separate telecommunications systems of different service, protect the installed cables from falling out when vertically mounted and allow junction boxes to be attached to the side to interface "drop" type conduit cable feeds.
    - 3) Intercommunication System cable infrastructure: EMT or in J-hooks above accessible ceilings, 24 inches on center.
    - 4) Junction boxes shall be not less than 2-1/2 inches deep and 6 inches wide by 6 inches long.
    - 5) Flexible metal conduit is prohibited unless specifically approved by 0050P3B.
  - b. System Conduit:
    - 1) The PA system is NFPA listed as Emergency / Public Safety Communication System which requires the entire system to be installed in a separate conduit system.
    - 2) The use of centralized mechanically partitioned wireways may be used to augment main distribution conduit on a case by case basis when specifically approved by VA Headquarters (0050P3B).
    - 3) Conduit Sleeves:
      - a) The AE has made a good effort to identify where conduit sleeves through full-height and fire rated walls on the drawings, and has instructed the electrician to provide the sleeves as shown on the drawings.

b) While the sleeves shown on the drawings will be provided by others, the contractor is responsible for installing conduit sleeves and fire-proofing where necessary. It is often the case, that due to field conditions, the nurse-call cable may have to be installed through an alternate route. Any conduit sleeves required due to field conditions or those omitted by the engineer shall be provided by the cabling contractor.

3. Device Back Boxes:

- a. Furnish to the electrical contractor all back boxes required for the PA system devices.
- b. The electrical contractor shall install the back boxes as well as the system conduit. Coordinate the delivery of the back boxes with the construction schedule.

4. Telecommunication Outlets (TCO): Populate each TCO that is required to perform system operations in the locations that were provided and cabled as a part of Specifications Sections 27 11 00 and 27 15 00. Provide additional TCO equipment, interfaces and connections as required by System design. Provide secured pathway(s) and TCOs as required.

5. UPS:

- a. Provide a backup battery or a UPS for the System to allow normal operation and function (as if there was no AC power failure) in the event of an AC power failure or during input power fluctuations for a minimum of four (4) hours.
- b. As an alternate solution, the telephone system UPS may be utilized to meet this requirement at the headend location, as long as this function is specifically approved by the Telephone Contractor and the COR.
- c. The PA Contractor shall not make any attachments or connection to the telephone system until specifically directed to do so, in writing, by the COR.
- d. Provide UPS for all active system components including but not limited to:
  - 1) System Amplifiers.
  - 2) Microphone Consoles.
  - 3) Telephone Interface Units.

4) TER, TR & Headend Equipment Rack(s).

E. Patient Bedside Prefabricated Units (PBPUs):

1. Where PBPUs exist in the Facility; the Contractor shall identify the "gang box" location on the PBPUs designated for installation of the telephone jack. This location shall here-in-after be identified as the unit's TCO. The Contractor shall be responsible for obtaining written approval and specific instructions from the PBPUs OEM regarding the necessary disassembly and reassembly of each PBPUs to the extent necessary to pull wire from above the TIP ceiling junction box to the PBPUs reserved gang box for the unit's TCO. A Contractor provided stainless steel cover plate approved for use by the PBPUs OEM and Facility IRM Chief shall finish out the jack installation.
2. Under no circumstances shall the Contractor proceed with the PBPUs installations without the written approval of the PBPUs OEM and the specific instructions regarding the attachment to or modifying of the PBPUs. The COR shall be available to assist the Contractor in obtaining approvals and instructions in a timely manner as related to the project's time constraints.
3. It is the responsibility of the Contractor to maintain the UL integrity of each PBPUs. If the Contractor violates that integrity, it shall be the responsibility of the Contractor to obtain on site UL re-certification of the violated PBPUs at the direction of the COR and at the Contractor's expense.

F. Installation Kit:

1. General: The kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. Turn over to the COR all unused and partially opened installation kit boxes, coaxial, fiberoptic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation

hardware. The following are the minimum required installation sub-kits:

2. System Grounding:
  - a. The grounding kit shall include all cable and installation hardware required. All radio equipment shall be connected to earth ground via internal building wiring, according to the NEC.
  - b. This includes, but is not limited to:
    - 1) Coaxial Cable Shields.
    - 2) Control Cable Shields.
    - 3) Data Cable Shields.
    - 4) Equipment Racks.
    - 5) Equipment Cabinets.
    - 6) Conduits.
    - 7) Duct.
    - 8) Cable Trays.
    - 9) Power Panels.
    - 10) Connector Panels.
    - 11) Grounding Blocks.
3. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tabbing, hangers, clamps, etc., required to accomplish a neat and secure installation.
4. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
5. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
6. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.
7. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to completely and

correctly label each subsystem according to the OEM requirements, as-installed drawings, and this document.

8. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to completely and correctly provide the system documentation as required by this document and explained herein.

### **PART 3 - EXECUTION**

#### **3.1 PROJECT MANAGEMENT**

- A. Assign a single project manager to this project who will serve as the point of contact for the Owner, the General Contractor, and the Engineer.
- B. The Contractor shall be proactive in scheduling work at the hospital, specifically the Contractor will initiate and maintain discussion with the general contractor regarding the schedule for ceiling cover up and install cables to meet that schedule.
- C. Contact the Office of Telecommunications, Special Communications Team (0050P3B) at (301) 734-0350 to have a VA Certified Telecommunications COTR assigned to the project for telecommunications review, equipment and system approval and co-ordination with VA's Spectrum Management and OCIS Teams.

#### **3.2 COORDINATION WITH OTHER TRADES**

- A. Coordinate with the cabling contractor the location of the PA system faceplate and the faceplate opening for the PA system back boxes.
- B. Coordinate with the cabling contractor the location of TIP equipment in the TER, TCR, PA, PCR, SCC, ECR, STRs, NSs, HER and TCOs in order to connect to the TIP cable network that was installed as a part of Section Specification 27 11 00. Contact the COR immediately, in writing, if additional location(s) are discovered to be activated that was not previously provided.
- C. Before beginning work, verify the location, quantity, size and access for the following:
  1. Isolated ground AC power circuits provided for systems.
  2. Junction boxes, wall boxes, wire troughs, conduit stubs and other related infrastructure for the systems.
  3. System components installed by others.
  4. Overhead supports and rigging hardware installed by others.

- D. Immediately notify the Owner, GC and Consultant(s) in writing of any discrepancies

### **3.3 NEEDS ASSESSMENT**

Provide a one-on-one meeting with the particular manager of each unit affected by the installation of the new PA system. Review the floor plan drawing, educate the nursing manager with the functions of the equipment that is being provided and gather details specific to the individual units; coverage and priorities of calls; staffing patterns; and other pertinent details that will affect system programming and training.

### **3.4 INSTALLATION**

#### **A. General**

1. Execute work in accordance with National, State and local codes, regulations and ordinances.
2. Install work neatly, plumb and square and in a manner consistent with standard industry practice. Carefully protect work from dust, paint and moisture as dictated by site conditions. The Contractor will be fully responsible for protection of his work during the construction phase up until final acceptance by the Owner.
3. Install equipment according to OEM's recommendations. Provide any hardware, adaptors, brackets, rack mount kits or other accessories recommended by OEM for correct assembly and installation.
4. Secure equipment firmly in place, including receptacles, speakers, equipment racks, system cables, etc.
  - a. All supports, mounts, fasteners, attachments and attachment points shall support their loads with a safety factor of at least 5:1.
  - b. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems.
  - c. Any suspended equipment or associated hardware must be certified by the OEM for overhead suspension.
  - d. The Contractor is responsible for means and methods in the design, fabrication, installation and certification of any supports, mounts, fasteners and attachments.
5. Locate overhead ceiling-mounted loudspeakers as shown on drawings, with minor changes not to exceed 12" in any direction.

- a. Mount transformers securely to speaker brackets or enclosures using screws. Adjust torsion springs as needed to securely support speaker assembly.
  - b. Speaker back boxes shall be completely filled with fiberglass insulation.
  - c. Seal cone speakers to their enclosures to prevent air passing from one side of the speaker to the other.
6. Finishes for any exposed work such as plates, racks, panels, speakers, etc. shall be approved by the Architect, Owner and 0050P3B.
7. Coordinate cover plates with field conditions. Size and install cover plates as necessary to hide joints between back boxes and surrounding wall. Where cover plates are not fitted with connectors, provide grommets in size and quantity required. Do not allow cable to leave or enter boxes without cover plates installed.
8. Active electronic component equipment shall consist of solid state components, be rated for continuous duty service, comply with the requirements of FCC standards for telephone and data equipment, systems, and service.
9. Color code all distribution wiring to conform to the PA Industry Standard, EIA/TIA, and this document, whichever is the more stringent. At a minimum, all equipment, cable duct and/or conduit, enclosures, wiring, terminals, and cables shall be clearly and permanently labeled according to and using the provided record drawings, to facilitate installation and maintenance.
10. Connect the System's primary input AC power to the Facility's Critical Branch of the Emergency AC power distribution system as shown on the plans or if not shown on the plans consult with COR regarding a suitable circuit location prior to bidding.
11. Product Delivery, Storage and Handling:
  - a. 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 COR may inventory the cable, patch panels, and related equipment.

- b. Storage and Handling: Store and protect equipment in a manner, which will preclude damage as directed by the COR.
- 12. Where TCOs are installed adjacent to each other, install one outlet for each instrument.
- 13. Equipment installed outdoors shall be weatherproof or installed in weatherproof enclosures with hinged doors and locks with two keys.
- B. Equipment Racks:
  - 1. Fill unused equipment mounting spaces with blank panels or vent panels. Match color to equipment racks.
  - 2. Provide security covers for all devices not requiring routine operator control.
  - 3. Provide vent panels and cooling fans as required for the operation of equipment within the OEM' specified temperature limits. Provide adequate ventilation space between equipment for cooling. Follow manufacturer's recommendations regarding ventilation space between amplifiers.
  - 4. Provide insulated connections of the electrical raceway to equipment racks.
  - 5. Provide continuous raceway/conduit with no more than 40% fill between wire troughs and equipment racks for all non-plenum-rated cable. Ensure each system is mechanically separated from each other in the wireway.
  - 6. Ensure a minimum of 36 inches around each cabinet and/or rack to comply with OSHA Safety Standards. Cabinets and/or Racks installed side by side - the 36" rule applies to around the entire assembly
- C. Distribution Frames.
  - 1. A new stand-alone (i.e., self supporting, free standing) PA rack/frame may be provided in each TR to interconnect the PA, TER, TCR, PCR, SCC, STRs & ECRs. Rack/frames shall be wired in accordance with industry standards and shall employ "latest state-of-the-art" modular cross-connect devices. The PA riser cable shall be sized to satisfy all voice/digital requirements plus not less than 50% spare (growth) capacity in each TR which includes a fiber optic backbone.
  - 2. The frames/racks shall be connected to the TER/MCR system ground.
- D. Wiring Practice - in addition to the MANDATORY infrastructure requirements outlined in VA Construction Specifications 27 10 00 - TIP Structured Communications Cabling, 27 11 00 - TIP Communications Rooms



Fittings and 27 15 00 - TIP Horizontal and Vertical Communicators  
Cabling, the following additional practices shall be adhered too:

1. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
2. Execute all wiring in strict adherence to the National Electrical Code, applicable local building codes and standard industry practices.
3. Wiring shall be classified according to the following low voltage signal types:
  - a. Balanced microphone level audio (below -20dBm) or Balanced line level audio (-20dBm to +30dBm)
  - b. 70V audio speaker level audio.
  - c. Low voltage DC control or power (less than 48VDC)
4. Where raceway is to be EMT (conduit), wiring of differing classifications shall be run in separate conduit. Where raceway is to be an enclosure (rack, tray, wire trough, utility box) wiring of differing classifications which share the same enclosure shall be mechanically partitioned and separated by at least four (4) inches. Where Wiring of differing classifications must cross, they shall cross perpendicular to one another.
5. Do not splice wiring anywhere along the entire length of the run. Make sure cables are fully insulated and shielded from each other and from the raceway for the entire length of the run.
6. Do not pull wire through any enclosure where a change of raceway alignment or direction occurs. Do not bend wires to less than radius recommended by manufacturer.
7. Replace the entire length of the run of any wire or cable that is damaged or abraided during installation. There are no acceptable methods of repairing damaged or abraided wiring.
8. Use wire pulling lubricants and pulling tensions as recommended by the OEM.
9. Use grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
10. Do not use tape-based or glue-based cable anchors.
11. Ground shields and drain wires to the Facility's signal ground system as indicated by the drawings.

12. Field wiring entering equipment racks shall be terminated as follows:
- a. Provide ample service loops at harness break-outs and at plates, panels and equipment. Loops should be sufficient to allow plates, panels and equipment to be removed for service and inspection.
  - b. Line level and speaker level wiring may be terminated inside the equipment rack using specified terminal blocks (see "Products.") Provide 15% spare terminals inside each rack. Microphone level wiring may only be terminated at the equipment served.
  - c. If specified terminal blocks are not designed for rack mounting, utilize  $\frac{3}{4}$ " plywood or  $\frac{1}{8}$ " thick aluminum plates/blank panels as a mounting surface. Do not mount on the bottom of the rack.
  - d. Employ permanent strain relief for any cable with an outside diameter of 1" or greater.
13. Use only balanced audio circuits unless noted otherwise
14. Make all connections as follows:
- a. Make all connections using rosin-core solder or mechanical connectors appropriate to the application.
  - b. For crimp-type connections, use only tools that are specified by the manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs shall be sized to fit the wire gauge. Do not exceed two lugs per terminal.
  - d. Wire nuts, electrical tape or "Scotch Lock" connections are not acceptable for any application.
15. Make all connections as follows:
- a. Make all connections using rosin-core solder or mechanical connectors appropriate to the application.
  - b. For crimp-type connections, use only tools that are specified by the manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs shall be sized to fit the wire gauge. Do not exceed two lugs per terminal.
  - d. Wire nuts, electrical tape or "Scotch Lock" connections are not acceptable for any application.
16. Noise filters and surge protectors shall be provided for each equipment interface cabinet, switch equipment cabinet, control

- console, local, and remote active equipment locations to ensure protection from input primary AC power surges and noise glitches are not induced into low Voltage data circuits.
17. Wires or cables previously approved to be installed outside of conduit, cable trays, wireways, cable duct, etc:
- a. Only when specifically authorized as described herein, will wires or cables be identified and approved to be installed outside of conduit. The wire or cable runs shall be UL rated plenum and OEM certified for use in air plenums.
  - b. Wires and cables shall be hidden, protected, fastened and tied at 600 mm (24 in.) intervals, maximum, as described herein to building structure.
  - c. Closer wire or cable fastening intervals may be required to prevent sagging, maintain clearance above suspended ceilings, remove unsightly wiring and cabling from view and discourage tampering and vandalism. Wire or cable runs, not provided in conduit, that penetrate outside building walls, supporting walls, and two hour fire barriers shall be sleeved and sealed with an approved fire retardant sealant.
  - d. Wire or cable runs to system components installed in walls (i.e.: volume attenuators, circuit controllers, signal, or data outlets, etc.) may, when specifically authorized by the COR, be fished through hollow spaces in walls and shall be certified for use in air plenum areas.
  - e. Completely test all of the cables after installation and replace any defective cables.
  - f. Wires or cables that are installed outside of buildings shall be in conduit, secured to solid building structures. If specifically approved, on a case by case basis, to be run outside of conduit, the wires or cables shall be installed, as described herein. The bundled wires or cables must: Be tied at not less than 460 mm (18 in.) intervals to a solid building structure; have ultra violet protection and be totally waterproof (including all connections). The laying of wires or cables directly on roof tops, ladders, drooping down walls, walkways, floors, etc. is not allowed and will not be approved.

E. Cable Installation - In addition to the *MANDATORY* infrastructure requirements outlined in VA Construction Specifications 27 10 00 - Structured TIP Communications Cabling, 27 11 00 - TIP Communications Rooms and Fittings and 27 15 00 - TIP Communications Horizontal and Vertical Cabling and the following additional practices shall be adhered too:

1. Support cable on maximum 2'-0" centers. Acceptable means of cable support are cable tray, j-hooks, and bridal rings. Velcro wrap cable bundles loosely to the means of support with plenum rated Velcro straps. Plastic tie wraps are not acceptable as a means to bundle cables.
2. Run cables parallel to walls.
3. Install maximum of 10 cables in a single row of J-hooks. Provide necessary rows of J-hooks as required by the number of cables.
4. Do not lay cables on top of light fixtures, ceiling tiles, mechanical equipment, or ductwork. Maintain at least 2'-0" clearance from all shielded electrical apparatus.
5. All cables shall be tested after the total installation is fully complete. All test results are to be documented. All cables shall pass acceptable test requirements and levels. Contractor shall remedy any cabling problems or defects in order to pass or comply with testing. This includes the re-pull of new cable as required at no additional cost to the Owner.
6. Ends of cables shall be properly terminated on both ends per industry and OEM's recommendations.
7. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor until you are ready to terminate.
8. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
9. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
10. Bundle, lace, and train conductors to terminal points without exceeding OEM's limitations on bending radii. Install lacing bars and distribution spools.

11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
  12. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
  13. Separation of Wires: (REFER TO RACEWAY INSTALLATION) Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
  14. Serve all cables as follows:
    - a. Cover the end of the overall jacket with a 1" (minimum) length of transparent heat-shrink tubing. Cut unused insulated conductors 2" (minimum) past the heat-shrink, fold back over jacket and secure with cable-tie. Cut unused shield/drain wires 2" (minimum) past the Heatshrink and serve as indicated below.
    - b. Cover shield/drain wires with heat-shrink tubing extending back to the overall jacket. Extend tubing ¼" past the end of unused wires, fold back over jacket and secure with cable tie.
    - c. For each solder-type connection, cover the bare wire and solder connection with heat-shrink tubing.
- F. Labeling: Provide labeling in accordance with ANSI/EIA/TIA-606-A. All lettering for PA circuits shall be stenciled using laser printers.
1. Cable and Wires (Hereinafter referred to as "Cable"): Cables shall be labeled at both ends in accordance with ANSI/EIA/TIA-606-A. Labels shall be permanent in contrasting colors. Cables shall be identified according to the System "Record Wiring Diagrams."
  2. Equipment: System equipment shall be permanently labeled with contrasting plastic laminate or Bakelite material. System equipment shall be labeled on the face of the unit corresponding to its source.
    - a. Clearly, consistently, logically and permanently mark switches, connectors, jacks, relays, receptacles and electronic and other equipment.
    - b. Engrave and paint fill all receptacle panels using 1/8" (minimum) high lettering and contrasting paint.

- c. For rack-mounted equipment, use engraved Lamacoid labels with white 1/8" (minimum) high lettering on black background. Label the front and back of all rack-mounted equipment.
3. Conduit, Cable Duct, and/or Cable Tray: The Contractor shall label all conduit, duct and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum of 3 meters (10 ft.) identifying it as the System. In addition, each enclosure shall be labeled according to this standard.
4. Termination Hardware: The Contractor shall label TCOs and patch panel connections using color coded labels with identifiers in accordance with ANSI/EIA/TIA-606-A and the "Record Wiring Diagrams."
5. Where multiple pieces of equipment reside in the same rack group, clearly and logically label each indicating to which room, channel, receptacle location, etc. they correspond.
6. Permanently label cables at each end, including intra-rack connections. Labels shall be covered by the same, transparent heat-shrink tubing covering the end of the overall jacket. Alternatively, computer generated labels of the type which include a clear protective wrap may be used.
7. Contractor's name shall appear no more than once on each continuous set of racks. The Contractor's name shall not appear on wall plates or portable equipment.
8. Ensure each OEM supplied item of equipment has appropriate UL Labels / Marks for the service the equipment is performed permanently attached / marked. SYSTEM EQUIPMENT INSTALLED NOT BEARING THESE UL MARKS WILL NOT BE ALLOWED TO BE A PART OF THE SYSTEM. THE CONTRACTOR SHALL BEAR ALL COSTS REQUIRED TO PROVIDE REPLACEMENT EQUIPMENT WITH APPROVED UL MARKS.
- G. Conduit and Signal Ducts: When the Contractor and/or OEM determines additional system conduits and/or signal ducts are required in order to meet the system minimum performance standards outlined herein, the contractor shall provide these items as follows:
  1. Conduit:
    - a. The Contractor shall employ the latest installation practices and materials. The Contractor shall provide conduit, junction boxes, connectors, sleeves, weather heads, 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.

- b. All cables shall be installed in separate conduit and/or signal ducts (exception from the separate conduit requirement to allow PA cables to be installed in partitioned cable tray with voice cables may be granted in writing by the COR 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. When "interduct" flexible cable protective systems is specifically authorized to be provided for use in the System, it's installation guidelines and standards shall be as the specified herein, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and the NEC.
  - e. Conduit fill (including GFE approved to be used in the system) 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.
  - f. Ensure that Critical Care PA Systems (as identified by NEC Section 517) are completely separated and protected from all other systems.
2. Signal Duct, Cable Duct, or Cable Tray:
- a. The Contractor shall use GFE signal duct, cable duct, and/or cable tray, when identified and approved by the COR.
  - b. Approved signal and/or cable duct shall be a minimum size of 100 mm x 100 mm (4 in. X 4 in.) inside diameter with removable tops or sides, as appropriate. Protective sleeves, guides or barriers

are required on all sharp corners, openings, anchors, bolts or screw ends, junction, interface and connection points.

- c. Approved cable tray shall be fully covered, mechanically and physically partitioned for multiple electronic circuit use, and be UL certified and labeled for use with telecommunication circuits and/or systems. The COR shall approve width and height dimensions.
- d. All cable junctions and taps shall be accessible. Provide an 8" X 8" X 4" (minimum) junction box attached to the cable duct or raceway for installation of distribution system passive equipment. Ensure all equipment and tap junctions are accessible

### **3.5 PROTECTION OF NETWORK DEVICES**

Contractor shall protect network devices during unpacking and installation by wearing manufacturer approved electrostatic discharge (ESD) wrist straps tied to chassis ground. The wrist strap shall meet OSHA requirements for prevention of electrical shock, should technician come in contact with high voltage.

### **3.6 CUTTING, CLEANING AND PATCHING**

- A. It shall be the responsibility of the contractor to keep their work area clear of debris and clean area daily at completion of work.
- B. It shall be the responsibility of the contractor to patch and paint any wall or surface that has been disturbed by the execution of this work.
- C. The Contractor shall be responsible for providing any additional cutting, drilling, fitting or patching required that is not indicated as provided by others to complete the Work or to make its parts fit together properly.
- D. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor the Contractor's consent to cutting or otherwise altering the Work.



- E. Where coring of existing (previously installed) concrete is specified or required, including coring indicated under unit prices, the location of such coring shall be clearly identified in the field and the location shall be approved by the Project Manager prior to commencement of coring work.

### **3.7 FIREPROOFING**

- A. Where PA wires, cables and conduit penetrate fire rated walls, floors and ceilings, fireproof the opening.
- B. Provide conduit sleeves (if not already provided by electrical contractor) for cables that penetrate fire rated walls and Telecommunications Rooms floors and ceilings. After the cabling installation is complete, install fire proofing material in and around all conduit sleeves and openings. Install fire proofing material thoroughly and neatly. Seal all floor and ceiling penetrations.
- C. Use only materials and methods that preserve the integrity of the fire stopping system and its rating.
- D. Install fireproofing where low voltage cables are installed in the same manholes with high voltage cables; also cover the low voltage cables with arc proof and fireproof tape.
- E. Use approved fireproofing tape of the same type as used for the high voltage cables, and apply the tape in a single layer, one-half lapped or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (one inch) into each duct.
- F. Secure the tape in place by a random wrap of glass cloth tape.

### **3.8 GROUNDING**

- A. Ground PA cable shields and equipment to eliminate shock hazard and to minimize ground loops, commonmode returns, noise pickup, cross talk, and other impairments as specified in CFM Division 27, Section 27 05 26 - Grounding and Bonding for Communications Systems.
- B. Facility Signal Ground Terminal: Locate at main room or area signal ground within the room (i.e. head end and telecommunications rooms) or area(s) and indicate each signal ground location on the drawings.
- C. Extend the signal ground to inside each equipment cabinet and/or rack. Ensure each cabinet and/or rack installed item of equipment is connected to the extended signal ground. Isolate the signal ground from power and major equipment grounding systems.

- D. When required, install grounding electrodes as specified in CFM Division 26, Section 26 05 26 -Grounding and Bonding for Electrical Systems.
- E. Do not use "3<sup>rd</sup> or 4<sup>th</sup>" wire internal electrical system conductors for communications signal ground.
- F. Do not connect the signal ground to the building's external lightning protection system.
- G. Do Not "mix grounds" of different systems.
- H. Insure grounds of different systems are installed as to not violate OSHA Safety and NEC installation requirements for protection of personnel.

#### **PART 4 - TESTING / GUARANTY / TRAINING**

##### **4.0 SYSTEM LISTING**

The PA System is NFPA listed as an "Emergency / Public Safety" Communications system. Where Code Blue signals are transmitted, that listing is elevated to "Life Support/Safety." Therefore, the following testing and guaranty provisions are the minimum to be performed and provided by the contractor and OEM.

##### **4.1 PROOF OF PERFORMANCE TESTING**

- A. Intermediate Testing:
  - 1. After completion of 25 - 30% the installation of a head end cabinet(s) and equipment, one microphone console, local and remote enunciation stations, two (2) zones, two (2) sub zones prior to any further work, this portion of the system must be pretested, inspected, and certified. Each item of installed equipment shall be checked to ensure appropriate UL Listing and Certification Labels are affixed as required by NFPA -Life Safety Code 101-3.2 (a) & (b) and JCHCO evaluation guidelines, and proper installation practices are followed. The intermediate test shall include a full operational test.
  - 2. All inspections and tests shall be conducted by an OEM-certified contractor representative and witnessed by TVE-0050P3B if there is no local Government Representative that processes OEM and VA approved Credentials to inspect and certify the system. The results of the inspection will be officially recorded by the Government Representative and maintained on file by the COR, until completion of the entire project. The results will be compared to the

Acceptance Test results. An identical inspection may be conducted between the 65 - 75% of the system construction phase, at the direction of the COR.

B. Pretesting:

1. Upon completing installation of the PA System, the Contractor shall align, balance, and completely pretest the entire system under full operating conditions.
2. Pretesting Procedure:
  - a. During the System Pretest the Contractor shall verify (utilizing approved test equipment) that the System is fully operational and meets all the System performance requirements of this standard.
  - b. The Contractor shall pretest and verify that all PA 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. At a minimum, each of the following locations shall be fully pretested:
    - 1) Central Control Cabinets.
    - 2) Local Control Stations.
    - 3) Zone Equipment/Systems.
    - 4) Sub-Zone Equipment/Systems.
    - 5) Remote Control Panels.
      - a.) TCR.
      - b.) PCR/SCC.
    - 6) All Networked locations.
    - 7) System interface locations (i.e. TELCO, two way radio, etc.).
    - 8) System trouble reporting.
    - 9) System Electrical Supervision.
    - 10) UPS operation.
    - 11) STRs.
    - 12) NSs
    - 13) TCOs.
3. The Contractor shall provide four (4) copies of the recorded system pretest measurements and the written certification that the System is ready for the formal acceptance test shall be submitted to the COR.

C. Acceptance Test:

1. After the PA System has been pretested and the Contractor has submitted the pretest results and certification to the COR, then the Contractor shall schedule an acceptance test date and give the COR 30 day's written notice prior to the date the acceptance test is expected to begin. The System shall be tested in the presence of TVE 0050P3B and an OEM certified representatives. The System shall be tested utilizing the approved test equipment to certify proof of performance and Emergency / Public Safety compliance. The tests shall verify that the total System meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.
2. The acceptance test shall be performed on a "go-no-go" basis. Only those operator adjustments required to show proof of performance shall be allowed. The test shall demonstrate and verify that the installed System does comply with all requirements of this specification under operating conditions. The System shall be rated as either acceptable or unacceptable at the conclusion of the test. Failure of any part of the System that precludes completion of system testing, and which cannot be repaired in four (4) hours, shall be cause for terminating the acceptance test of the System. Repeated failures that result in a cumulative time of eight (8) hours to affect repairs shall cause the entire System to be declared unacceptable. Retesting of the entire System shall be rescheduled at the convenience of the Government.
3. Retesting of the entire System shall be rescheduled at the convenience of the Government and costs borne by the Contractor at the direction of the SRE.

D. Acceptance Test Procedure:

1. Physical and Mechanical Inspection:
  - a. The TVE 0050P3B Representative will tour all areas where the PA system and all sub-systems are completely and properly installed to insure they are operationally ready for proof of performance testing. A system inventory including available spare parts will be taken at this time. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.

- b. The System diagrams, record drawings, equipment manuals, TIP Auto CAD Disks, intermediate, and pretest results shall be formally inventoried and reviewed.
  - c. Failure of the System to meet the installation requirements of this specification shall be grounds for terminating all testing.
2. Operational Test:
- a. After the Physical and Mechanical Inspection, the system head end equipment shall be checked to verify that it meets all performance requirements outlined herein. A spectrum analyzer and sound level meter may be utilized to accomplish this requirement.
  - b. Following the head end equipment test, each speaker (or on board speaker) shall be inspected to ensure there are no signal distortions such as intermodulation, data noise, popping sounds, erratic system functions, on any function.
  - c. The distribution system shall be checked at each interface, junction, and distribution point, first, middle, and last speaker in each leg to verify the PA distribution system meets all system performance standards.
  - d. If the RED system is a part of the system, each volume stepper switches shall be checked to insure proper operation of the pillow speaker, the volume stepper and the RED system (if installed).
  - e. Additionally, each installed head end equipment, microphone console; amplifier, mixer, distributed speaker/amplifier, monitor speaker, telephone interface, power supply and remote amplifiers shall be checked insuring they meet the requirements of this specification.
  - f. Once these tests have been completed, each installed sub-system function shall be tested as a unified, functioning and fully operating system. The typical functions are: "all call," three sub-zoned, minimum of 15 minutes of UPS operation, electrical supervision, trouble panel, corridor speakers and audio paging.
  - h. Individual Item Test: The TVE 0050P3B Representative will select individual items of equipment for detailed proof of performance testing until 100% of the System has been tested and found to meet the contents of this specification. Each item shall meet or exceed the minimum requirements of this document.

3. Test Conclusion:

- a. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the COR. Any retesting to comply with these specifications will be done at the Contractor's expense.
- b. If the System is declared unacceptable without conditions, all rescheduled testing expenses will be borne by the Contractor.

E. Acceptable Test Equipment: The test equipment shall be furnished by the Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a minimum:

1. Spectrum Analyzer.
2. Signal Level Meter.
3. Volt-Ohm Meter.
4. Sound Pressure Level (SPL) Meter.
5. Oscilloscope.
6. Random Noise Generator.
7. Audio Amplifier with External Speaker.

**4.2 WARRANTY**

A. Comply with FAR 52.246-21, except that warranty shall be as follows:

B. Contractor's Responsibility:

1. The Contractor shall warrant that all provided material and equipment will be free from defects, workmanship and will remain so for a period of two (2) years from date of final acceptance of the System by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to OEM published specifications.
2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. This contact capability

shall be provided by the Contractor and OEM at no additional cost to the VA.

3. All Contractor maintenance and supervisor personnel shall be fully qualified by the OEM and must provide two (2) copies of current and qualified OEM training certificates and OEM certification upon request.

4. Additionally, the Contractor shall accomplish the following minimum requirements during the two year guaranty period:

a. Response Time During the *Two Year Guaranty Period*:

- 1) The COR (or Facility Contracting Officer if the system has been turned over to the Facility) is the Contractor's ONLY OFFICIAL reporting and contact official for nurse call system trouble calls, during the guaranty period.
- 2) A standard work week is considered 8:00 A.M. to 5:00 P.M. or as designated by the COR (or Facility Contracting Officer), Monday through Friday exclusive of Federal Holidays.
- 3) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
  - a) A routine trouble call within one (1) working day of its report. A routine trouble is considered a trouble which causes a power supply; one (1) master System control station, microphone console or amplifier to be inoperable.
  - b) Routine trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) shall also be deemed as an emergency trouble call. The COR (or Facility Contracting Officer) shall notify the Contractor of this type of trouble call.
  - c) An emergency trouble call within four (4) hours of its report. An emergency trouble is considered a trouble which causes a sub-zone, zone, distribution point, terminal cabinet, or all call system to be inoperable at anytime.
- 4) If a PA System component failure cannot be corrected within four (4) hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate System equipment. The alternate equipment/system shall be operational within a maximum of 12 hours after the four (4) hour trouble shooting time and restore the effected location

operation to meet the System performance standards. If any sub-system or major system trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the System or sub-system to full operational capability, as described herein, until repairs are complete.

b. Required On-Site Visits During the Two Year Guaranty Period

- 1) The Contractor shall visit, on-site, for a minimum of eight (8) hours, once every 12 weeks, during the guaranty period, to perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the System according the descriptions identified in this document.
- 2) The Contractor shall arrange all Facility visits with the COR (or Facility Contracting Officer) prior to performing the required maintenance visits.
- 3) Preventive maintenance procedure(s) shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy time agreed to by the COR (or Facility Contracting Officer) and Contractor.
- 4) The preventive maintenance schedule, functions and reports shall be provided to and approved by the COR (or Facility Contracting Officer).
- 5) The Contractor shall provide the COR (or Facility Contracting Officer) a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:
  - a) The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this warranty period to COR (or Facility Contracting Officer) by the fifth (5<sup>th</sup>) working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.



- b) The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the System. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future.
- 6) The COR (or Facility Contracting Officer) shall convey to the Facility Engineering Officer, two (2) copies of actual reports for evaluation.
  - a) The COR (or Facility Contracting Officer) shall ensure a copy of these reports is entered into the System's official acquisition documents.
  - b) The Facility Chief Engineer shall ensure a copy of these reports is entered into the System's official technical record documents.
- C. Work Not Included: Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, contractor, or owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the COR or Facility Contracting Officer in writing upon the discovery of these incidents. The COR or Facility Contracting Officer will investigate all reported incidents and render an official opinion in writing concerning the supplied information.

#### **4.3 TRAINING**

- A. Provide thorough training of all biomed engineering and electronic technical staff assigned to those nursing units receiving new networked nurse/patient communications equipment. This training shall be developed and implemented to address two different types of staff. Floor nurses/staff shall receive training from their perspective, and likewise, unit secretaries (or any person whose specific responsibilities include answering patient calls and dispatching staff) shall receive operational training from their perspective. A separate training room will be set up that allows this type of individualized training utilizing in-service training unit, prior to cut over of the new system.
- B. Provide the following minimum training times and durations:

1. 48 hours prior to opening for BME / Electronic Staff (in 8-hour increments) - split evenly over 3 weeks and day and night shifts. Coordinate schedule with Owner.
2. 32 hours during the opening week for Telephone Staff - both day and night shifts.
3. 24 hours for supervisors and system administrators.

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**SECTION 27 51 23  
INTERCOMMUNICATIONS AND PROGRAM SYSTEMS**

**PART 1 - GENERAL**

**1.1 SECTION SUMMARY**

- A. Work covered by this document includes design, engineering, labor, material, products, guaranty, training and services for, and incidental to, the complete installation of a new and fully operating National Fire Protection Association (NFPA) Listed Emergency/Public Safety Public Address and Mass Notification communication (PA) system as detailed herein.
- B. Work shall be complete, tested, labeled, certified and ready for operation

**1.2 RELATED SECTIONS**

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 Volts and Below)
- C. Section 27 05 26, GROUNDING AND BONDING FOR COMMUNICATIONS SYSTEMS
- D. Section 27 05 11, REQUIREMENTS FOR COMMUNICATIONS INSTALLATIONS
- E. Section 27 15 00, COMMUNICATIONS HORIZONTAL CABLING
- F. Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS

**1.3 DEFINITIONS**

- A. Provide: Design, engineer, furnish, install, connect complete, test, certify and warranty.
- B. Work: Materials furnished and completely installed.
- C. Review of contract drawings: A service by the engineer to reduce the possibility of materials being ordered which do not comply with contract documents. The engineer's review shall not relieve the Contractor of responsibility for dimensions or compliance with the contract documents. The reviewer's failure to detect an error does not constitute permission for the Contractor to proceed in error.
- D. Headquarters Technical Review, for National/VA communications and security, codes, frequency licensing, standards, guidelines compliance:
  - Office of Telecommunications
  - Special Communications Team (0050P2B)
  - 1335 East West Highway - 3rd Floor
  - Silver Spring, Maryland 20910
  - (O) 301-734-0350, (F) 301-734-0360

E. Engineer: BES Design/Build, LLC

766 Middle Street  
Fairhope, AL 36532  
PH: 251-990-5778

F. Owner: Jim Hall PH: 501-257-7153

G. General Contractor (GC): BES Design/Build, LLC

H. Contractor: Radio Contractor; you; successful bidder.

#### **1.4 REFERENCES**

A. The installation shall comply fully with all governing authorities, laws and ordinances, regulations, codes and standards, including, but not limited to:

1. United States Federal Law and Codes:

a. Departments of:

1) CFR, Title 15 - Department of Commerce, Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the:

a) Chapter II, National Institute of Standards Technology (NIST - formerly the National Bureau of Standards). Under Section 5131 of the Information Technology Management Reform Act of 1996 and the Federal Information Security Management Act of 2002 (Public Law 107-347), NIST develops - Federal Information Processing Standards Publication (FIPS) 140-2-Security Requirements for Cryptographic Modules.

b) Chapter XXIII, National Telecommunications and Information Administration (NTIA - aka 'Red Book') Chapter 7.8/9 Federal communications Commission (FCC) Title 47 (CFR), Part 15, Radio Frequency Restriction of Use and Compliance in "Safety of Life" Functions and Locations.

2) CFR, Title 29, Department of Labor, Chapter XVII - Occupational Safety and Health Administration (OSHA), Part 1910 - Occupational Safety and Health Standard:

a) Subpart 7 - Definition and requirements for a National Recognized Testing Laboratory (NRTL - 15 Laboratory's, for complete list, contact

[http://www.osha.gov/dts/otpca/nrtl/faq\\_nrtl.html](http://www.osha.gov/dts/otpca/nrtl/faq_nrtl.html))

(1) Underwriter's Laboratories (UL):

65	Standard for Wired Cabinets.
468	Standard for Grounding and Bonding Equipment.
1449	Standard for Transient Voltage Surge Suppressors.
1069	Hospital Signaling and Nurse Call Equipment.
60950-1/2	Information Technology Equipment - Safety.

(2) Canadian Standards Association (CSA): same tests as for UL.

(3) Communications Certifications Laboratory (CCL): same tests as for UL.

(4) Intertek Testing Services NA, Inc. (ITSNA formerly Edison Testing Laboratory [ETL]): same tests as for UL.

b) Subpart 35, Compliance with NFPA 101 - Life Safety Code.

c) Subpart 36, Design and construction requirements for exit routes.

d) Subpart 268, Telecommunications.

e) Subpart 305, Wiring methods, components, and equipment for general use.

3) Title 42, CFC, Department of Health, Chapter IV Health and Human Services, Subpart 1395(a)(b) Joint Commission on Accreditation of Healthcare Organizations (JCAHO) "a hospital that meets JCAHO accreditation is deemed to meet the Medicare conditions of Participation by meeting Federal Directives:" All guidelines for Life, Personal and Public Safety; and, Essential and Emergency Communications.

4) All guidelines for Life, Personal and Public Safety; and, Essential and Emergency Communications.

5) CFR, Title 47, Telecommunications, FCC: Part 15 - Restrictions of use for Part 15 listed Radio Equipment in Safety of Life/Emergency Functions/Equipment/Locations (also see CFR, Title 15, Department of Commerce, Chapter XXIII - NTIA).

6) Public Law No. 100-527, Department of Veterans Affairs:

- a) Office of Telecommunications:
    - (1) Handbook 6100, Telecommunications.
  - b) Office of Cyber and Information Security (OCIS):
    - (1) Handbook 6500, Information Security Program.
    - (2) Wireless and Handheld Device Security Guideline Version 3.2, August 15, 2005.
  - c) Spectrum Management FCC and NTIA Radio Frequency Compliance and Licensing Program.
2. National Codes:
- a. American Institute of Architects (AIA): Guidelines for Healthcare Facilities.
  - b. American National Standards Institute and Electronic Industries Association/Telecommunications Industry Association (ANSI/EIA/TIA):

568-B	Commercial Building Telecommunications Wiring Standards:
569	Commercial Building Standard for Telecommunications Pathways and Spaces.
606	Administration Standard for the Telecommunications Infrastructure of Communications Buildings.
607	Commercial Building Grounding and Bonding Requirements for Telecommunications.
REC 127-49	Power Supplies.
RS 27	Tools, Crimping, Solderless Wiring Devices, Recommended Procedures for User Certification.

- c. Institute of Electrical and Electronics Engineers (IEEE):

SO/TR 21730:2007	Use of mobile wireless communication and computing technology in healthcare facilities - Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices.
0739- 5175/08/\$25.	Medical Grade - Mission Critical - Wireless Networks.

00©2008IEEE	
C62.41	Surge Voltages in Low-Voltage AC Power Circuits.

d. NFPA:

70	National Electrical Code (current date of issue) - Articles 517, 645 and 800.
75	Standard for Protection of Electronic Computer Data- Processing Equipment.
77	Recommended Practice on Static Electricity.
99	Healthcare Facilities.
101	Life Safety Code.

3. State Hospital Code(s).

4. Local Codes.

#### 1.5 QUALIFICATIONS

- A. The OEM shall have had experience with three or more installations of Public Address Systems of comparable size and complexity with regards to type and design as specified herein. Each of these installations shall have performed satisfactorily for at least 1 year after final acceptance by the user. Include the names, locations and point of contact for these installations as a part of the submittal.
- B. The Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of 3 years. The Contractor shall be authorized by the OEM to pass thru the OEM's warranty of the installed equipment to VA. In addition, the OEM and Contractor shall accept complete responsibility for the design, installation, certification, operation, and physical support for the system. This documentation, along with the system Contractor and OEM certifications must be provided in writing as part of the Contractor's Technical submittal.
- C. The Contractor's Communications Technicians assigned to the system shall be fully trained, qualified, and certified by the OEM on the engineering, installation, operation, and testing of the system. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the COR before being allowed to commence work on the system.

- D. Applicable national, state and local licenses.
- E. Certificate of successful completion of OEM's installation and training school for installing technicians of the equipment being proposed.

#### **1.6 CODES AND PERMITS**

- A. Provide all necessary permits and schedule all inspections as identified in the contract's milestone chart, so that the system is proof of performance tested and ready for operation on a date directed by the Owner.
- B. The Contractor is responsible to adhere to all codes described herein and associated contractual, state and local codes.

#### **1.7 SCHEDULING**

- A. After the award of contract, the Contractor shall prepare a detailed schedule (aka milestone chart) using "Microsoft Project" software or equivalent. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships. It will also detail manpower usage throughout the project.
- B. It is the responsibility of the Contractor to coordinate all work with the other trades for scheduling, rough-in, and finishing all work specified. The owner will not be liable for any additional costs due to missed dates or poor coordination of the supplying contractor with other trades.

#### **1.8 REVIEW OF CONTRACT DRAWINGS AND EQUIPMENT DATA SUBMITTALS**

- A. Submit at one time within 10 days of contract awarding, drawings and product data on all proposed equipment and system. Check for compliance with contract documents and certify compliance with Contractor's "APPROVED" stamp and signature.
- B. Support all submittals with descriptive materials, i.e., catalog sheets, product data sheets, diagrams, and charts published by the manufacturer. These materials shall show conformance to specification and drawing requirements.
- C. Where multiple products are listed on a single cut-sheet, circle or highlight the one that you propose to use. Provide a complete and through equipment list of equipment expected to be installed in the system, with spares, as a part of the submittal. Special Communications



(0050P3B - herein after referred to as 0050P3B) will not review any submittal that does not have this list.

- D. Provide four copies to the PM for technical review. The PM will provide a copy to the offices identified in Paragraph 1.3.C and D, at a minimum for compliance review as described herein where each responsible individual(s) shall respond to the PM within 10 days of receipt of their acceptance or rejection of the submittal(s).

#### **1.9 PROJECT RECORD DOCUMENTS (AS BUILTS)**

- A. Throughout progress of the work, maintain an accurate record of changes in Contract Documents. Upon completion of Work, transfer recorded changes to a set of Project Record Documents.
- B. The floor plans shall be marked in pen to include the following:
1. All device locations with labels.
  2. Conduit locations.
  3. Head-end equipment and specific location.
  4. Wiring diagram.
  5. Labeling and administration documentation.
  6. Warranty certificate.
  7. System test results.

#### **1.10 WARRANTIES AND GUARANTY**

- A. The Contractor shall warrant the installation to be free from defect in material and workmanship for a period of 1 year from the date of acceptance of the project by the owner. The Contractor shall agree to remedy covered defects within 8 hours of notification of major failures or within twenty-four (24) hours of notification for individual station related problems.
- B. Refer to Part 4 for applicable Warranty requirements.

#### **1.11 USE OF THE SITE**

- A. Use of the site shall be at the GC's direction.
- B. Coordinate with the GC for lay-down areas for product storage and administration areas.
- C. Coordinate work with the GC and their sub-contractors.
- D. Access to buildings wherein the work is performed shall be directed by the GC.

#### **1.12 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.

- B. Store products in original containers.
- C. Coordinate with the GC for product storage. There may be little or no storage space available on site. Plan to potentially store materials off site.
- D. Do not install damaged products. Remove damaged products from the site and replaced with new product at no cost to the Owner.

#### **1.13 PROJECT CLOSE-OUT**

- A. Prior to final inspection and acceptance of the work, remove all debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from the project site and thoroughly clean your work area.
- B. Before the project closeout date, the Contractor shall submit:
  - 1. Warranty certificate.
  - 2. Evidence of compliance with requirements of governing authorities such as the Low Voltage Certificate of Inspection.
  - 3. Project record documents.
  - 4. Instruction manuals and software that is a part of the system.
- C. Contractor shall submit written notice that:
  - 1. Contract Documents have been reviewed.
  - 2. Project has been inspected for compliance with contract.
  - 3. Work has been completed in accordance with the contract

### **PART 2 - PRODUCTS AND FUNCTIONAL REQUIREMENTS**

#### **2.1 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS**

- A. Coordinate features and select components to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Expansion Capability: Increase number of stations in the future by 25 percent above those indicated without adding any internal or external components or main trunk cable conductors.
- C. Equipment: Modular type using solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
- D. Weather-Resistant Equipment: Listed and labeled by an OSHA certified National Recognized Testing Laboratory (NRTL - i.e. UL) for duty outdoors or in damp locations.

## **2.2 SYSTEM DESCRIPTION**

- A. The intercom system shall allow voice communication between wall-mounted intercom stations and a desktop (or wall-mounted) master station.
- B. All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, shall be supplied and installed to provide a complete and operating nurse and patient communications network.
- C. Systems firmware shall be the product of a reputable firmware OEM of record with a proven history of product reliability and sole control over all source code. Manufacturer shall provide, free of charge, product firmware and software upgrades for a period of two years from date of acceptance by VA for any product feature enhancements. System configuration programming changes shall not require any exchange of parts and shall be capable of being executed remotely via a modem connection (when specifically approved by 0050P3B).
- D. When the IC system is approved to connect to a separate communications system (i.e. LAN, WAN, Telephone, Nurse Call, radio paging, wireless systems, etc) the connection point shall meet the following minimum requirements for each hard wired connection (note each wireless system connection MUST BE APPROVED PRIOR TO CONTRACT BID BY VA HEADQUARTERS 0050P3B AND 0050P2B):
  - 1. UL 60950-1/2.
  - 2. FIPS 142.
  - 3. FCC Part 15 Listed Radio Equipment is not allowed.
- E. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. Unless otherwise noted in this Part, equipment quantities shall be as indicated on the drawings.

## **2.3 MANUFACTURERS**

- A. The products specified shall be new, UL Listed, and produced by OEM manufacturer of record.
- B. The following equipment items are the salient requirements of VA to provide an acceptable system described herein.

## **2.4 FUNCTIONAL DESCRIPTION OF SWITCHED SYSTEMS**

- A. Manually Switched:
  - 1. Master Station:

- a. Communicating selectively with other master and speaker-microphone stations by actuating selector switches.
  - b. Communicating simultaneously with all other stations by actuating a single all-call switch.
  - c. Communicating with individual stations in privacy.
  - d. Including other master-station connections in a multiple-station conference call.
  - e. Overriding any conversation by a designated master station.
2. Room Speaker-Microphone Station:
- a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
  - b. Communicating hands free.
  - c. Calling master station by actuating call switch.
  - d. Returning a busy signal to indicate that station is already in use.
  - e. Being free of noise and distortion during operation and when in standby mode.
3. Speakers: Free of noise and distortion during operation and when in standby mode.
- B. Microprocessor-Switched:
1. Master Station:
- a. Communicating selectively with other master and speaker-microphone stations by dialing station's number on a 12-digit keypad.
  - b. Communicating simultaneously with all other stations by dialing a designated number on a 12-digit key-pad.
  - c. Communicating with individual stations in privacy.
  - d. Including other master-station connections in a multiple-station conference call.
  - e. Accessing separate paging speakers or groups of paging speakers by dialing designated numbers on a 12-digit keypad.
  - f. Overriding any conversation by a designated master station.
  - g. Displaying selected station.
  - h. Volume Control: Regulates incoming-call volume.

- i. Identifies calling stations and stations in use. LED remains on until call is answered.
- j. Momentary audible tone signal announces incoming calls.
- k. Handset with Hook Switch: Telephone type with 18-inch- long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
- l. Reset Control: Cancels call and resets system for next call.
- m. Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions
- n. Vertical Equipment Rack:
  - 1) 28" (16RU) rack space. Welded Steel construction. Minimum 78" usable depth. Adjustable front mounting rails.
  - 2) Install the following products in rack provided by same manufacturer or as specified:
    - a) Security screws w/ nylon isolation bushings.
    - b) Textured blank panels.
    - c) Custom mounts for components without rack mount kits.
    - d) Security covers.
    - e) Copper Bus Bar.
    - f) Power Sequencer- rack-mounted power conditioner and (provide as-needed) delayed sequencer(s) with (2) unswitched outlets each and contact closure control inputs.
- 2. Room Speaker-Microphone Station:
  - a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
  - b. Communicating hands free.
  - c. Calling master station by actuating call switch.
  - d. Returning a busy signal to indicate that station is already in use.
  - e. Being free of noise and distortion during operation and when in standby mode.

C. Wireless:

1. Radio Paging Equipment and Systems:

- a. The IC system shall have the ability to interface ONLY with VA Certified and Licensed radio paging system (FCC Part 15 listed pagers and transmitters are not allowed for "Safety of Life" functions or installed in those specific areas. VA Headquarters TVE - 0050PB2 and SM - 0050PB2 are the ONLY approving authorities for this function) and must have the following minimum system features:

- 1) Ability to pass-through location information (such as a room number) and call-type as well as other text messages simultaneously to shift supervisor identified staff members
- 2) System shall allow the operator to select staff members by name and pager number and to select a message consisting of a room number and a condition code (aka priority level). Operator may also choose to type in a unique alpha-numeric text message (the text message shall meet or exceed all HIPA and VA OCIS Communications Security Guidelines for the transmission of Patient or Staff Specific information [aka PII] - VA Headquarters TVE - 0050P2B is the approving authority for this function) into the system to be read by the holder of the pager unit.
- 3) While a patient station is connected to the nurse's master station, the system shall allow the operator to automatically page the staff member assigned to that room. An alternate staff member may be selected for paging purposes in place of the primary staff member. The system must allow an alternate staff member to be paged when the primary staff member is unable to respond to patient's needs within a specified period of time. The system must have the ability to assign any bed to any pager or pager group, and to assign an unlimited amount of pagers to any patient bed.
- 4) System shall have the ability to send all code blue calls to staff members by predetermined group (as required) automatically by simply pressing one "Code Blue" button. Pager shall indicate room number of code call, and state "Code Blue" in plain English format on pagers (FCC Part 15 listed pagers are not allowed to be use as "Safety of Life" functions or

those specific locations. VA Headquarters TVE - 0050P2B is the approving authority for this requirement).

2. Personal Wireless Communicator:

- a. The IC system will only be allowed to connect to the personal wireless communications system, pass text data and provide a 2-way communication between the Telephone Interface and the personal wireless communicator as long as it is not a FCC Part 15 listed device(s), meets or exceeds UL 60950-1/2, meets OCIS Guide Lines for FIPS 140-2 certification and the using staff shows an extensive training program along with recertification(s) according to the Facility Emergency Plan concerning HIPA requirements.
- b. VA Headquarters TVE - 0050P3B and SM - 0050P2B are the approving authority for this requirement.

3. Other Wireless Equipment/Systems:

- a. Each proposed wireless system and/or equipment to be connected to or be a part of the IC system, each shall meet the minimum requirements outlines in Paragraph 2.7.A.
- b. Contact TVE - 0050P3B and SM - 0050P2B for specific required pre-approvals (full or conditional) as described herein.

**2.5 SYSTEM CABLES**

- A. Refer to OFM approved Master Construction Specification, SECTION 27 15 00, HORIZONTAL CABLING for specific installation and testing requirements.
- B. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
- C. Insulation: Thermoplastic, not less than 1/32 inch thick.
- D. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.
- E. Minimum Shielding Coverage on Conductors: 60 percent.
- F. All cabling shall be plenum rated.
- G. Provide one spare 1,000 foot roll of approved system (not microphone) cable only.

## **2.6 RACEWAYS**

- A. Intercommunication and Program System Raceways and Boxes: Comply with requirements in Division 26, Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
- B. Each raceway that is open top, shall be: UL certified for telecommunications systems, partitioned with metal partitions in order to comply with NEC Parts 517 and 800 to "mechanically separate telecommunications systems of different service, protect the installed cables from falling out when vertically mounted and allow junction boxes to be attached to the side to interface "drop" type conduit cable feeds.
- C. Intercommunication System Cable Infrastructure: EMT or in J-hooks above accessible ceilings, 24 inches on center.
- D. Junction boxes shall be not less than 2-1/2 inches deep and 6 inches wide by 6 inches long.
- E. Flexible metal conduit is prohibited unless specifically approved by 0050P3B.
- F. Install manufactured conduit sweeps and long-radius elbows whenever possible

## **2.7 SYSTEM CONDUIT**

- A. The nurse call/code blue system is NFPA listed as Emergency/Public Safety Communication System that requires the entire system to be installed in a separate conduit system.
- B. The use of centralized mechanically partitioned wireways may be used to augment main distribution conduit on a case by case basis when specifically approved by VA Headquarters (0050P3B).

## **2.8 CONDUIT SLEEVES**

- A. The Engineer has made a good effort to identify where conduit sleeves through full-height and fire rated walls on the drawings, and has instructed the electrician to provide the sleeves as shown on the drawings.
- B. While the sleeves shown on the drawings will be provided by others, the contractor is responsible for installing conduit sleeves and fire-proofing where necessary. It is often the case, that due to field conditions, the nurse-call cable may have to be installed through an alternate route. Any conduit sleeves required due to field conditions



or those omitted by the engineer shall be provided by the cabling contractor.

## **2.9 DEVICE BACKBOXES**

- A. Furnish to the electrical contractor all backboxes required for the PAS devices.
- B. The electrical contractor shall install the backboxes as well as the system conduit. Coordinate the delivery of the backboxes with the construction schedule.

## **PART 3 - EXECUTION**

### **3.1 PROJECT MANAGEMENT**

- A. Assign a single project manager to this project who will serve as the point of contact for the Owner, the General Contractor, and the Engineer.
- B. The Contractor shall be proactive in scheduling work at the hospital, specifically the Contractor will initiate and maintain discussion with the general contractor regarding the schedule for ceiling cover up and install cables to meet that schedule.
- C. Contact the Office of Telecommunications, Special Communications Team (0050P3B) at (301) 734-0350 to have a VA Certified Telecommunications COTR assigned to the project for telecommunications review, equipment and system approval and co-ordination with VA's Spectrum Management and OCIS Teams.

### **3.2 COORDINATION WITH OTHER TRADES**

- A. Coordinate with the cabling contractor the location of intercom equipment in the Telecommunications Closets.
- B. Before beginning work, verify the location, quantity, size and access for the following:
  - 1. Isolated ground AC power circuits provided for systems.
  - 2. Junction boxes, wall boxes, wire troughs, conduit stubs and other related infrastructure for the systems.
  - 3. System components installed by others.
  - 4. Overhead supports and rigging hardware installed by others.
- C. Immediately notify the Owner, General Contractor and Consultant in writing of any discrepancies.

### **3.3 NEEDS ASSESSMENT**

Provide a one-on-one meeting with the particular nursing manager of each unit affected by the installation of the new nurse call/code blue

system. Review the floor plan drawing, educate the nursing manager with the functions of the equipment that is being provided and gather details specific to the individual units; coverage and priorities of calls; staffing patterns; and other pertinent details that will affect system programming and training

### **3.4 INSTALLATION**

#### **A. General:**

1. Execute work in accordance with National, State and local codes, regulations and ordinances.
2. Install work neatly, plumb and square and in a manner consistent with standard industry practice. Carefully protect work from dust, paint and moisture as dictated by site conditions. The Contractor will be fully responsible for protection of his work during the construction phase up until final acceptance by the Owner.
3. Install equipment according to OEM's recommendations. Provide any hardware, adaptors, brackets, rack mount kits or other accessories recommended by OEM for correct assembly and installation.
4. Secure equipment firmly in place, including receptacles, speakers, equipment racks, system cables, etc.:
  - a. All supports, mounts, fasteners, attachments and attachment points shall support their loads with a safety factor of at least 5:1.
  - b. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems.
  - c. Any suspended equipment or associated hardware must be certified by the OEM for overhead suspension.
  - d. The Contractor is responsible for means and methods in the design, fabrication, installation and certification of any supports, mounts, fasteners and attachments.
5. Finishes for any exposed work such as plates, racks, panels, speakers, etc. shall be approved by the Architect, Owner and 0050P3B.
6. Coordinate cover plates with field conditions. Size and install cover plates as necessary to hide joints between back boxes and surrounding wall. Where cover plates are not fitted with connectors, provide grommeted holes in size and quantity required. Do not allow cable to leave or enter boxes without cover plates installed.

B. Equipment Racks:

1. Fill unused equipment mounting spaces with blank panels or vent panels. Match color to equipment racks.
2. Provide security covers for all devices not requiring routine operator control.
3. Provide vent panels and cooling fans as required for the operation of equipment within the OEM' specified temperature limits. Provide adequate ventilation space between equipment for cooling. Follow manufacturer's recommendations regarding ventilation space between amplifiers.
4. Provide insulated connections of the electrical raceway to equipment racks.
5. Provide continuous raceway/conduit with no more than 40 percent fill between wire troughs and equipment racks for all non-plenum-rated cable. Ensure each system is mechanically separated from each other in the wireway.

C. Wiring Practice: In addition to the mandatory infrastructure requirements outlined in VA Construction Specification, Section 27 15 00, HORIZONTAL CABLING, the following additional practices shall be adhered to:

1. Comply with requirements for raceways and boxes specified in Division 26, Section 27 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
2. Execute all wiring in strict adherence to the National Electrical Code, applicable local building codes and standard industry practices.
3. Where raceway is to be EMT (conduit), wiring of differing classifications shall be run in separate conduit. Where raceway is to be an enclosure (rack, tray, wire trough, utility box) wiring of differing classifications which share the same enclosure shall be mechanically partitioned and separated by at least 4 inches. Where Wiring of differing classifications must cross, they shall cross perpendicular to one another.
4. Do not splice wiring anywhere along the entire length of the run. Make sure cables are fully insulated and shielded from each other and from the raceway for the entire length of the run.

5. Do not pull wire through any enclosure where a change of raceway alignment or direction occurs. Do not bend wires to less than radius recommended by manufacturer.
6. Replace the entire length of the run of any wire or cable that is damaged or abraided during installation. There are no acceptable methods of repairing damaged or abraided wiring.
7. Use wire pulling lubricants and pulling tensions as recommended by the OEM.
8. Use grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
9. Do not use tape-based or glue-based cable anchors.
10. Ground shields and drain wires as indicated by the drawings.
11. Field wiring entering equipment racks shall be terminated as follows:
  - a. Provide ample service loops at harness break-outs and at plates, panels and equipment. Loops should be sufficient to allow plates, panels and equipment to be removed for service and inspection.
  - b. Line level and speaker level wiring may be terminated inside the equipment rack using specified terminal blocks (see "Products.") Provide 15 percent spare terminals inside each rack. Microphone level wiring may only be terminated at the equipment served.
  - c. If specified terminal blocks are not designed for rack mounting, utilize 3/4 inch plywood or 1/8 inch thick aluminum plates/blank panels as a mounting surface. Do not mount on the bottom of the rack.
  - d. Employ permanent strain relief for any cable with an outside diameter of 1 inch or greater.
12. Use only balanced audio circuits unless noted otherwise
13. Make all connections as follows:
  - a. Make all connections using rosin-core solder or mechanical connectors appropriate to the application.
  - b. For crimp-type connections, use only tools that are specified by the manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs shall be sized to fit the wire gauge. Do not exceed two lugs per terminal.

- d. Wire nuts, electrical tape or "Scotch Lock" connections are not acceptable for any application.
- D. Cable Installation - In addition to the mandatory infrastructure requirements outlined in VA Master Construction Specification, Section 27 15 00, HORIZONTAL CABLING, the following additional practices shall be adhered to:
1. Support cable on maximum 4'-0" centers. Acceptable means of cable support are cable tray, j-hooks, and bridal rings. Velcro wrap cable bundles loosely to the means of support with plenum rated Velcro straps. Plastic tie wraps are not acceptable as a means to bundle cables.
  2. Run cables parallel to walls.
  3. Install maximum of 10 cables in a single row of J-hooks. Provide necessary rows of J-hooks as required by the number of cables.
  4. Do not lay cables on top of light fixtures, ceiling tiles, mechanical equipment, or ductwork. Maintain at least 2'-0" clearance from all shielded electrical apparatus.
  5. All cables shall be tested after the total installation is fully complete. All test results are to be documented. All cables shall pass acceptable test requirements and levels. Contractor shall remedy any cabling problems or defects in order to pass or comply with testing. This includes the re-pull of new cable as required at no additional cost to the Owner.
  6. Ends of cables shall be properly terminated on both ends per industry and OEM's recommendations.
  7. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor until you are ready to terminate.
  8. Cover the end of the overall jacket with a 1 inch (minimum) length of transparent heat-shrink tubing. Cut unused insulated conductors 2 inches (minimum) past the heat-shrink, fold back over jacket and secure with cable-tie. Cut unused shield/drain wires 2 inches (minimum) past the Heat-shrink and serve as indicated below.
  9. Cover shield/drain wires with heat-shrink tubing extending back to the overall jacket. Extend tubing 1/4 inch past the end of unused wires, fold back over jacket and secure with cable tie.

10. For each solder-type connection, cover the bare wire and solder connection with heat-shrink tubing.
11. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
12. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
13. Bundle, lace, and train conductors to terminal points without exceeding OEM's limitations on bending radii. Install lacing bars and distribution spools.
14. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
15. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
16. Separation of Wires: (Refer to Raceway Installation) Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
17. Serve all cables as follows:
  - a. Cover the end of the overall jacket with a 1 inch (minimum) length of transparent heat-shrink tubing. Cut unused insulated conductors 2 inches (minimum) past the heat-shrink, fold back over jacket and secure with cable-tie. Cut unused shield/drain wires 2 inches (minimum) past the Heat-shrink and serve as indicated below.
  - b. Cover shield/drain wires with heat-shrink tubing extending back to the overall jacket. Extend tubing 1/4 inch past the end of unused wires, fold back over jacket and secure with cable tie.
  - c. For each solder-type connection, cover the bare wire and solder connection with heat-shrink tubing.

E. Labeling:

1. Clearly, consistently, logically and permanently mark switches, connectors, jacks, relays, receptacles and electronic and other equipment.

2. Engrave and paint fill all receptacle panels using 1/8" (minimum) high lettering and contrasting paint.
3. For rack-mounted equipment, use engraved Lamacoid labels with white 1/8 inch (minimum) high lettering on black background. Label the front and back of all rack-mounted equipment
4. Where multiple pieces of equipment reside in the same rack group, clearly and logically label each indicating to which room, channel, receptacle location, etc. they correspond.
5. Permanently label cables at each end, including intra-rack connections. Labels shall be covered by the same, transparent heat-shrink tubing covering the end of the overall jacket. Alternatively, computer generated labels of the type which include a clear protective wrap may be used.
6. Contractor's name shall appear no more than once on each continuous set of racks. The Contractor's name shall not appear on wall plates or portable equipment.
7. Ensure each OEM supplied equipment has appropriate UL Labels/Marks for the service the equipment is performed permanently attached and marked. Equipment installed not bearing these UL marks will not be allowed to be a part of the PAS System. The Contractor shall bear all costs required to provide replacement equipment with approved UL marks.

### **3.5 PROTECTION OF NETWORK DEVICES**

Contractor shall protect network devices during unpacking and installation by wearing manufacturer approved electrostatic discharge (ESD) wrist straps tied to chassis ground. The wrist strap shall meet OSHA requirements for prevention of electrical shock, should technician come in contact with high voltage.

### **3.6 CUTTING AND PATCHING**

- A. It shall be the responsibility of the contractor to keep their work area clear of debris and clean area daily at completion of work.
- B. It shall be the responsibility of the contractor to patch and paint any wall or surface that has been disturbed by the execution of this work.
- C. The Contractor shall be responsible for providing any additional cutting, drilling, fitting or patching required that is not indicated as provided by others to complete the Work or to make its parts fit together properly.

- D. The Contractor shall not damage or endanger a portion of the work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor the Contractor's consent to cutting or otherwise altering the work.
- E. Where coring of existing (previously installed) concrete is specified or required, including coring indicated under unit prices, the location of such coring shall be clearly identified in the field and the location shall be approved by the Project Manager prior to commencement of coring work.

### **3.7 FIREPROOFING**

- A. Where nurse-call cables penetrate fire rated walls, floors and ceilings, fireproof the opening.
- B. Provide conduit sleeves (if not already provided by electrical contractor) for cables that penetrate fire rated walls. After the cabling installation is complete, install fire proofing material in and around all conduit sleeves and openings. Install fire proofing material thoroughly and neatly. Seal all floor and ceiling penetrations.
- C. Use only materials and methods that preserve the integrity of the fire stopping system and its rating.

### **3.8 GROUNDING**

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, commonmode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Do not use "3rd or 4th" wire internal electrical system conductors for ground.
- E. Do not connect system ground to the building's external lightning protection system.



F. Do not "mix grounds" of different systems.

**PART 4 - TESTING, GUARANTY AND TRAINING**

**4.1 PROOF OF PERFORMANCE TESTING**

A. Acceptance Test:

1. The Contractor shall schedule an acceptance test date and give the COR 30 days written notice prior to the date the acceptance test is expected to begin. The system shall be tested in the presence of a Government Representative and an OEM certified representative. The system shall be tested utilizing the approved test equipment to certify proof of performance and Emergency compliance. The test shall verify that the total system meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.

B. Acceptance Test Procedure:

1. Physical and Mechanical Inspection:

- a. The Government Representative will tour all areas where the system and all sub-systems are completely and properly installed to insure they are operationally ready for proof of performance testing. A system inventory including available spare parts will be taken at this time. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.
- b. The system diagrams, record drawings, equipment manuals, Auto CAD Disks, intermediate, and pretest results shall be formally inventoried and reviewed.
- c. Failure of the system to meet the installation requirements of this specification shall be grounds for terminating all testing.

2. Operational Test:

- a. The Contractor shall demonstrate the full functionality of the system including:
  1. Station to master calls
  2. Station to station calls
  3. Broadcast calls
  4. Location identification of stations at the intercom master station

3. Test Conclusion:

- a. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the COR. Any retesting to comply with these specifications will be done at the Contractor's expense.
- b. If the system is declared unacceptable without conditions, all rescheduled testing expenses will be born by the Contractor.

#### **4.2 WARRANTY**

A. Comply with FAR 52.246-21, except that warranty shall be as follows:

B. Contractor's Responsibility:

1. The Contractor shall warranty that all provided material and equipment will be free from defects, workmanship and will remain so for a period of one year from date of final acceptance of the system by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to OEM published specifications.
2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. This contact capability shall be provided by the Contractor and OEM at no additional cost to the VA.
3. All Contractor maintenance and supervisor personnel shall be fully qualified by the OEM and must provide two copies of current and qualified OEM training certificates and OEM certification upon request.
4. Additionally, the Contractor shall accomplish the following minimum requirements during the two year guaranty period:
  - a. Response Time during the Two Year Guaranty Period:
    - 1) The COR (or Facility Contracting Officer if the system has been turned over to the Facility) is the Contractor's ONLY OFFICIAL reporting and contact official for nurse call system trouble calls, during the guaranty period.

- 2) A standard work week is considered 8:00 A.M. to 5:00 P.M. or as designated by the COR (or Facility Contracting Officer), Monday through Friday exclusive of Federal Holidays.
  - 3) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
    - a) A routine trouble call within 1 working day of its report. A routine trouble is considered a trouble which causes a pillow speaker or cordset, one master IC control station, room station or emergency station to be inoperable.
    - b) Routine trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) shall also be deemed as an emergency trouble call. The COR (or Facility Contracting Officer) shall notify the Contractor of this type of trouble call.
    - c) An emergency trouble call within 4 hours of its report. An emergency trouble is considered a trouble which causes a sub-system (ward), distribution point, terminal cabinet, or all call system to be inoperable at anytime.
  - 4) If a IC component failure cannot be corrected within 4 hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate IC equipment. The alternate equipment/system shall be operational within a maximum of 20 hours after the 4 hour trouble shooting time and restore the effected location operation to meet the system performance standards. If any sub-system or major system trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the system or sub-system to full operational capability, as described herein, until repairs are complete.
- b. Required On-Site Visits during the Two Year Guaranty Period
- 1) The Contractor shall visit, on-site, for a minimum of 8 hours, once every 12 weeks, during the guaranty period, to perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the system according the descriptions identified in this document.

- 2) The Contractor shall arrange all Facility visits with the COR (or Facility Contracting Officer) prior to performing the required maintenance visits.
- 3) Preventive maintenance shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy time agreed to by the COR (or Facility Contracting Officer) and Contractor.
- 4) The preventive maintenance schedule, functions and reports shall be provided to and approved by the COR (or Facility Contracting Officer).
- 5) The Contractor shall provide the COR (or Facility Contracting Officer) a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:
  - a) The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this warranty period to COR (or Facility Contracting Officer) by the fifth (5th) working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.
  - b) The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the system. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future.
- 6) The COR (or Facility Contracting Officer) shall convey to the Facility Engineering Officer, 2 copies of actual reports for evaluation.

- a) The COR (or Facility Contracting Officer) shall ensure a copy of these reports is entered into the system's official acquisition documents.
- b) The Facility Chief Engineer shall ensure a copy of these reports is entered into the system's official technical record documents.

C. Work Not Included:

Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, contractor, or owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the COR or Facility Contracting Officer in writing upon the discovery of these incidents. The COR or Facility Contracting Officer will investigate all reported incidents and render

**4.3 TRAINING**

- A. Provide thorough training of the owner's engineering and maintenance staff.
- B. Provide the following minimum training times and durations:
  - 1. 24 hours prior to opening
  - 2. 24 hours during the opening week
  - 3. 24 hours for supervisors and system administrators

- - - E N D - - -

**SECTION 27 52 23**  
**NURSE CALL AND CODE BLUE SYSTEMS**

**PART 1 - GENERAL**

**1.1 SECTION SUMMARY**

- A. Work covered by this document includes design, engineering, labor, material and products, equipment warranty and system warranty, training and services for, and incidental to, the complete installation of new and fully operating National Fire Protection Association (NFPA) - Life Safety Code 101.3-2 (a) Labeled and (b) Listed, Emergency Service Nurse-Call and/or Life Safety listed Code Blue Communication System and associated equipment (here-in-after referred to as the System) provided in approved locations indicated on the contract drawings. These items shall be tested and certified capable of receiving, distributing, interconnecting and supporting Nurse-Call and/or Code Blue communications signals generated local and remotely as detailed herein.
- B. Work shall be complete, Occupational Safety and Health Administration (OSHA), National Recognized Testing Laboratory (NRTL - i.e. Underwriters Laboratory [UL]) Listed and Labeled; and VA Central Office (VACO), Telecommunications Voice Engineering (TVE 0050P3B) tested, certified and ready for operation.
- C. The System shall be delivered free of engineering, manufacturing, installation, and functional defects. It shall be designed, engineered and installed for ease of operation, maintenance, and testing.
- D. The term "provide", as used herein, shall be defined as: designed, engineered, furnished, installed, certified, tested, and warranty by the Contractor.
- E. Specification Order of Precedence: In the event of a conflict between the text of this document and the Project's Contract Drawings outlined and/or cited herein; THE TEXT OF THIS DOCUMENT TAKES PRECEDENCE.  
*HOWEVER, NOTHING IN THIS DOCUMENT WILL SUPERSEDE APPLICABLE EMERGENCY LAWS AND REGULATIONS, SPECIFICALLY NATIONAL AND/OR LOCAL LIFE AND PUBLIC SAFETY CODES. The Local Fire Marshall and/or VA Public Safety Officer are the only authorities that may modify this document's EMERGENCY CODE COMPLIANCE REQUIREMENTS, on a case by case basis, in writing and confirmed by VA's Project Manager (PM), COR (RE) and TVE-0050P3B. The VA PM is the only approving authority for other amendments to this document that may be granted, on a case by case*

basis, in writhing with technical concurrencies by VA's PM, COR, TVE-0050P3B and identified Facility Project Personnel.

- F. The Original Equipment Manufacturer (OEM) and Contractor shall ensure that all management, sales, engineering and installation personnel have read and understand the requirements of this specification before the system is designed, engineered, delivered and provided. The Contractor shall furnish a written statement stating this requirement as a part of the technical submittal that includes each name and certification, including the OEMs. The Contractor is cautioned to obtain in writing, all approvals for system changes relating to the published contract specifications and drawings, from the PM and/or the COR before proceeding with the change.

## **1.2 RELATED SECTIONS**

- A. 01 33 23 - Shop Drawings, Product Data and Samples.
- B. 07 84 00 - Firestopping.
- C. 26 05 19 - Low - Voltage Electrical Power Conductors and Cables (600 Volts and Below).
- D. 27 05 11 - Requirements for Communications Installations.
- E. 27 05 26 - Grounding and Bonding for Communications Systems.
- F. 27 05 33 - Raceways and Boxes for Communications Systems.
- G. 27 11 00 - TIP Communications Interface and Equipment Rooms Fittings.
- H. 27 15 00 - TIP Communications Horizontal and Vertical Cabling.
- I. 27 51 16 - Public Address & Mass Notification System (PA).
- J. 10 25 13 - Patient Bed Service Walls.

## **1.3 DEFINITION**

- A. Provide: Design, engineer, furnish, install, connect complete, test, certify and warranty.
- B. Work: Materials furnished and completely installed.
- C. Review of contract drawings: A service by the engineer to reduce the possibility of materials being ordered which do not comply with contract documents. The engineer's review shall not relieve the Contractor of responsibility for dimensions or compliance with the contract documents. The reviewer's failure to detect an error does not constitute permission for the Contractor to proceed in error.
- D. Headquarters (aka VACO) Technical Review, for National and VA Communications and Security, Codes, Frequency Licensing Standards, Guidelines and Compliance:

Office of Telecommunications  
Special Communications Team (0050P3B)  
1335 East West Highway - 3rd Floor  
Silver Spring, Maryland 20910,  
(O) 301-734-0350, (F) 301-734-0360

E. Engineer: BES Design/Build, LLC

766 Middle Street  
Fairhope, AL 36532  
PH: 251-990-5778

F. Owner: Tony Thurman PH: 501-257-1196

G. General Contractor (GC): BES Design/Build, LLC

H. Contractor: Systems Contractor; you; successful bidder.

#### **1.4 REFERENCES**

A. The installation shall comply fully with all governing authorities, laws and ordinances, regulations, codes and standards, including, but not limited to:

1. United States Federal Law:

a. Departments of:

1) Commerce, Consolidated Federal Regulations (CFR), Title 15 - Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the:

a) Chapter II, National Institute of Standards Technology (NIST - formerly the National Bureau of Standards). Under Section 5131 of the Information Technology Management Reform Act of 1996 and the Federal Information Security Management Act of 2002 (Public Law 107-347), NIST develops - Federal Information Processing Standards Publication (FIPS) 140-2-Security Requirements for Cryptographic Modules.

b) Chapter XXIII, National Telecommunications and Information Administration (NTIA - aka 'Red Book') Chapter 7.8 / 9; CFR, Title 47 Federal communications Commission (FCC) Part 15, Radio Frequency Restriction of Use and Compliance in "Safety of Life" Functions & Locations.

2) FCC - Communications Act of 1934, as amended, CFR, Title 47 - Telecommunications, in addition to Part 15 - Restrictions of



- use for Part 15 listed Radio Equipment in Safety of Life /  
Emergency Functions / Equipment/ Locations (also see CFR,  
Title 15 - Department of Commerce, Chapter XXIII - NTIA):
- a) Part 15 - Restrictions of use for Part 15 listed Radio  
Equipment in Safety of Life / Emergency Functions /  
Equipment/Locations.
  - b) Part 58 - Television Broadcast Service.
  - c) Part 90 - Rules and Regulations, Appendix C.
- 3) Health, (Public Law 96-88), CFR, Title 42, Chapter IV Health &  
Human Services, CFR, Title 46, Subpart 1395(a)(b) JCAHO "a  
hospital that meets JCAHO accreditation is deemed to meet the  
Medicare conditions of Participation by meeting Federal  
Directives:"
- a) All guidelines for Life, Personal and Public Safety; and,  
Essential and Emergency Communications.
- 4) Labor, CFR, Title 29, Part 1910, Chapter XVII - Occupational  
Safety and Health Administration (OSHA), Occupational Safety  
and Health Standard:
- a) Subpart 7 - Definition and requirements (for a NRTL - 15  
Laboratory's, for complete list, contact  
([http://www.osha.gov/dts/otpc/nrtl/faq\\_nrtl.html](http://www.osha.gov/dts/otpc/nrtl/faq_nrtl.html)):
- 1) UL:
    - a) 44-02 - Standard for Thermoset-Insulated Wires and  
Cables.
    - b) 65 - Standard for Wired Cabinets.
    - c) 83-03 - Standard for Thermoplastic-Insulated Wires  
and Cables.
    - d) 467-01 - Standard for Electrical Grounding and  
Bonding Equipment
    - e) 468 - Standard for Grounding and Bonding Equipment.
    - f) 486A-01 - Standard for Wire Connectors and Soldering  
Lugs for Use with Copper Conductors
    - g) 486C-02 - Standard for Splicing Wire Connectors.
    - h) 486D-02 - Standard for Insulated Wire Connector  
Systems for Underground Use or in Damp or Wet  
Locations.
    - i) 486E-00 - Standard for Equipment Wiring Terminals for

Use with Aluminum and/or Copper Conductors.

- j) 493-01 - Standard for Thermoplastic-Insulated Underground Feeder and Branch Circuit Cable.
- k) 514B-02 - Standard for Fittings for Cable and Conduit.
- l) 1069 - Hospital Signaling and Nurse Call Equipment.
- m) 1449 - Standard for Transient Voltage Surge Suppressors.
- n) 1479-03 - Standard for Fire Tests of Through-Penetration Fire Stops.
- o) 1666 - Standard for Wire/Cable Vertical (Riser) Tray Flame Tests.
- p) 1863 - Standard for Safety, Communications Circuits Accessories.
- q) 2024 - Standard for Optical Fiber Raceways.
- r) 60950-1/2 - Information Technology Equipment - Safety.
- 2) Canadian Standards Association (CSA): same tests as for UL.
- 3) Communications Certifications Laboratory (CCL): same tests as for UL.
- 4) Intertek Testing Services NA, Inc. (ITSNA formerly Edison Testing Laboratory [ETL]): same tests as for UL.
- b) Subpart 35 - Compliance with NFPA 101 - Life Safety Code.
- c) Subpart 36 - Design and construction requirements for exit routes.
- d) Subpart 268 - Telecommunications.
- e) Subpart 305 - Wiring methods, components, and equipment for general use.
- 5) Department of Transportation, CFR, Title 49 (Public Law 89-670), Part 1, Subpart C - Federal Aviation Administration (FAA):
  - a) Standards AC 110/460-ID & AC 707 / 460-2E - Advisory Circulars for Construction of Antenna Towers.
  - b) Forms 7450 and 7460-2 - Antenna Construction Registration.
- 6) Veterans Affairs (Public Law No. 100-527), CFR, Title 38, Volumes I & II:

- a) Office of Telecommunications:
  - 1) Handbook 6100 - Telecommunications.
    - a) Spectrum Management FCC & NTIA Radio Frequency Compliance and Licensing Program.
    - b) Special Communications Proof of Performance Testing, VACO Compliance and Life Safety Certification(s).
- b) Office of Cyber and Information Security (OCIS):
  - 1) Handbook 6500 - Information Security Program.
  - 2) Wireless and Handheld Device Security Guideline Version 3.2, August 15, 2005.
- c) VA's National Center for Patient Safety - Veterans Health Administration Warning System, Failure of Medical Alarm Systems using Paging Technology to Notify Clinical Staff, July 2004.
- d) VA's Center for Engineering Occupational Safety and Health, concurrence with warning identified in VA Directive 7700.
- e) Office of Construction and Facilities Management (CFM):
  - 1) Master Construction Specifications (PG-18-1).
  - 2) Standard Detail and CAD Standards (PG-18-4).
  - 3) Equipment Guide List (PG-18-5).
  - 4) Electrical Design Manual for VA Facilities (PG 18-10), Articles 7 & 8.
  - 5) Minimum Requirements of A/E Submissions (PG 18-15):
    - a) Volume B, Major New Facilities, Major Additions; and Major Renovations, Article VI, Paragraph B.
    - b) Volume C - Minor and NRM Projects, Article III, Paragraph S.
    - c) Volume E - Request for Proposals Design/Build Projects, Article II, Paragraph F.
  - 6) Mission Critical Facilities Design Manual (Final Draft - 2007).
  - 7) Life Safety Protected Design Manual (Final Draft - 2007).
  - 8) Solicitation for Offerors (SFO) for Lease Based Clinics - (05-2009).

b. Federal Specifications (Fed. Specs.):

- 1) A-A-59544-00 - Cable and Wire, Electrical (Power, Fixed Installation).
2. National Codes:
  - a. American Institute of Architects (AIA): Guidelines for Healthcare Facilities.
  - b. American National Standards Institute/Electronic Industries Association/Telecommunications Industry Association (ANSI/EIA/TIA):
    - 1) 568-B - Commercial Building Telecommunications Wiring Standards:
      - a) B-1 - General Requirements.
      - b) B-2 - Balanced twisted-pair cable systems.
      - c) B-3 - Fiber optic cable systems.
    - 2) 569 - Commercial Building Standard for Telecommunications Pathways and Spaces.
    - 3) 606 - Administration Standard for the Telecommunications Infrastructure of Communications Buildings.
    - 4) 607 - Commercial Building Grounding and Bonding Requirements for Telecommunications.
    - 5) REC 127-49 - Power Supplies.
    - 6) RS 270 - Tools, Crimping, Solderless Wiring Devices, Recommended Procedures for User Certification.
  - c. American Society of Mechanical Engineers (ASME):
    - 1) Standard 17.4 - Guide for Emergency Personnel.
    - 2) Standard 17.5 - Elevator & Escalator Equipment (prohibition of installing non-elevator equipment in Elevator Equipment Room / Mechanical Penthouse).
  - d. American Society of Testing Material (ASTM):
    - 1) D2301-04 - Standard Specification for Vinyl Chloride Plastic Pressure Sensitive Electrical Insulating Tape.
  - e. Building Industries Communications Services Installation (BICSI):
    - 1) All standards for smart building wiring, connections and devices for commercial and medical facilities.
    - 2) Structured Building Cable Topologies.
    - 3) In consort with ANSI/EIA/TIA.
  - f. Institute of Electrical and Electronics Engineers (IEEE):

- 1) SO/TR 21730:2007 - Use of mobile wireless communication and computing technology in healthcare facilities - Recommendations for electromagnetic compatibility (management of unintentional electromagnetic interference) with medical devices.
- 2) 0739-5175/08/©2008 IEEE - Medical Grade - Mission Critical - Wireless Networks.
- 3) C62.41 - Surge Voltages in Low-Voltage AC Power Circuits.

g. NFPA:

- 1) 70 - National Electrical Code (current date of issue) - Articles 517, 645 & 800.
- 2) 75 - Standard for Protection of Electronic Computer Data-Processing Equipment.
- 3) 77 - Recommended Practice on Static Electricity.
- 4) 99 - Healthcare Facilities.
- 5) 101 - Life Safety Code.

3. State Hospital Code(s).

4. Local Town, City and/or County Codes.

5. Accreditation Organization(s):

- a. Joint Commission on Accreditation of Hospitals Organization (JCAHO) - Section VI, Part 3a - Operating Features.

## 1.5 QUALIFICATIONS

- A. The OEM shall have had experience with three (3) or more installations of Nurse Call systems of comparable size and interfacing complexity with regards to type and design as specified herein. Each of these installations shall have performed satisfactorily for at least one (1) year after final acceptance by the user. Include the names, locations and point of contact for these installations as a part of the submittal.
- B. The Contractor shall submit certified documentation that they have been an authorized distributor and service organization for the OEM for a minimum of three (3) years. The Contractor shall be authorized by the OEM to pass thru the OEM's warranty of the installed equipment to VA. In addition, the OEM and Contractor shall accept complete responsibility for the design, installation, certification, operation, and physical support for the System. This documentation, along with

the System Contractor and OEM certifications must be provided in writing as part of the Contractor's Technical submittal.

- C. The Contractor's Communications Technicians assigned to the System shall be fully trained, qualified, and certified by the OEM on the engineering, installation, operation, and testing of the System. The Contractor shall provide formal written evidence of current OEM certification(s) for the installer(s) as a part of the submittal or to the COR before being allowed to commence work on the System.
- D. The Contractor shall display all applicable national, state and local licenses.
- E. The Contractor shall submit copy (s) of Certificate of successful completion of OEM's installation/training school for installing technicians of the System's Nurse Call and/or Code Blue equipment being proposed.

#### **1.6 CODES AND PERMITS**

- A. Provide all necessary permits and schedule all inspections as identified in the contract's milestone chart, so that the system is proof of performance tested, certified and approved by VA and ready for operation on a date directed by the Owner.
- B. The contractor is responsible to adhere to all codes described herein and associated contractual, state and local codes.

#### **1.7 SCHEDULING**

- A. After the award of contract, the Contractor shall prepare a detailed schedule (aka milestone chart) using "Microsoft Project" software or equivalent. The Contractor Project Schedule (CPS) shall indicate detailed activities for the projected life of the project. The CPS shall consist of detailed activities and their restraining relationships. It will also detail manpower usage throughout the project.
- B. It is the responsibility of the Contractor to coordinate all work with the other trades for scheduling, rough-in, and finishing all work specified. The owner will not be liable for any additional costs due to missed dates or poor coordination of the supplying contractor with other trades.

**1.8 REVIEW OF CONTRACT DRAWINGS AND EQUIPMENT DATA SUBMITTALS (AKA TECHNICAL SUBMITTAL[S])**

VA will review and rate each received submittal, which follows this requirement, in exactly the same procedure as outlined herein. Partial, add-on, or addenda type alternates will not be accepted or reviewed.

- A. Submit at one time within 10 days of contract awarding, drawings and product data on all proposed equipment and system. Check for compliance with contract documents and certify compliance with Contractor's "APPROVED" stamp and signature.
- B. Support all submittals with descriptive materials, i.e., catalog sheets, product data sheets, diagrams, and charts published by the manufacturer. These materials shall show conformance to specification and drawing requirements.
- C. Where multiple products are listed on a single cut-sheet, circle or highlight the one that you propose to use. Provide a complete and thorough equipment list of equipment expected to be installed in the system, with spares, as a part of the submittal. Special Communications (TVE-0050P3B) will not review any submittal that does not have this list.
- D. Provide four (4) copies to the PM for technical review. The PM will provide a copy to the offices identified in Paragraph 1.3.C & D, at a minimum for compliance review as described herein where each responsible individual(s) shall respond to the PM within 10 days of receipt of their acceptance or rejection of the submittal(s).
- E. Provide interconnection methods, conduit (where not already installed), junction boxes (J-Boxes), cable, interface fixtures and equipment lists for the: ENR(s) ( aka DMARC), TER, TCR, MCR, MCOR, PCR, ECR, Stacked Telecommunications Rooms (STR), Nurses Stations (NS), Head End Room (HER), Head End Cabinet (HEC), Head End Interface Cabinet (HEIC) and approved TCO locations TIP interface distribution layout drawing, as they are to be installed and interconnected to teach other (REFER TO APPENDIX B - SUGGESTED TELECOMMUNICAITONS ONE LINE TOPOLOGY pull-out drawing).
- F. Equipment technical literature detailing the electrical and technical characteristics of each item of equipment to be furnished.
- G. Engineering drawings of the System, showing calculated of expected signal levels at the headend input and output, each input and output distribution point, and signal level at each telecommunications outlet.

H. Surveys Required as a Part of The Technical Submittal:

1. The Contractor shall provide the following System surveys that depict various system features and capacities required in addition to the on-site survey requirements described herein (see *Specification Paragraph 2.4.3*). Each survey shall be in writing and contain the following information (the formats are suggestions and may be used for the initial Technical Submittal Survey requirements), as a minimum:

a. Nurse Call Cable System Design Plan:

- 1) An OEM and contractor designed functioning Nurse Call System cable plan to populate the entire TIP empty conduit/pathway distribution systems provided as a part of Specification 27 11 00 shall be provided as a part of the technical proposal. A specific functioning Nurse Call: cable, interfaces, J-boxes and back boxes shall coincide with the total growth items as described herein. It is the Contractor's responsibility to provide the Systems' entire Nurse Call cable and accessory requirements and engineer a functioning Nurse Call distribution system and equipment requirement plan of the following paragraph(s), at a minimum:

2) The required Nurse Call and/or Code Blue Equipment Locations:

<u>EQUIPPED ITEM</u>	<u>CAPACITY</u>	<u>GROWTH</u>
Master Stations: 5D-136	As Required	
Dome Lights		
Rooms: 5D-155 & 5D-163	As Required	
Corridor: 5D-133, 5D-122 & 5D-144	As Required	
Other: 5D-170	As Required	
Patient Stations		
Single: 5D-100, 5D-131, 5D-132, 5D-133, 5D-134, 5D-155, 5D-163, & 5D-166	As Required	
Isolation: 5D-111, 5D-116, 5D-121, 5D-126, 5D-128, 5D-129, 5D-167, 5D-168, & 5D-169	As Required	
Emergency Stations		
Bath: 5D-102, 5D-103, 5D-119, 5D-120, 5D-157, 5D-161, 5D-164, & 5D-166	As Required	



<u>EQUIPPED ITEM</u>	<u>CAPACITY</u>	<u>GROWTH</u>
Staff Stations: 5D-159, 5D-160, & 5D-165	As Required	
Duty Stations: 5D-159, 5D-160, & 5D-165	As Required	
Code Blue		
Patient Locations: 5D-155 & 5D-163	As Required	
Nurse Stations: 5D-159, 5D-160, & 5D-165	As Required	

#### **1.9 PROJECT RECORD DOCUMENTS (AS BUILTS)**

- A. Throughout progress of the Work, maintain an accurate record of changes in Contract Documents. Upon completion of Work, transfer recorded changes to a set of Project Record Documents.
- B. The floorplans shall be marked in pen to include the following:
  - 1. Each device specific locations with UL labels affixed.
  - 2. Conduit locations.
  - 3. Each interface and equipment specific location.
  - 4. Head-end equipment and specific location.
  - 5. Wiring diagram.
  - 6. Labeling and administration documentation.
  - 7. Warranty certificate.
  - 8. System test results.

#### **1.10 WARRANTIES / GUARANTY**

- A. The Contractor shall warrant the installation to be free from defect in material and workmanship for a period of two (2) years from the date of acceptance of the project by the owner. The Contractor shall agree to remedy covered defects within four (4) hours of notification of major failures or within twenty-four (24) hours of notification for individual station related problems.
- B. The Contractor shall agree to grantee the system according to the guidelines outlined in Article 4 herein.

#### **1.11 USE OF THE SITE**

- A. Use of the site shall be at the GC's direction.
- B. Coordinate with the GC for lay-down areas for product storage and administration areas.
- C. Coordinate work with the GC and their sub-contractors.

- D. Access to buildings wherein the work is performed shall be directed by the GC.

#### **1.12 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft.
- B. Store products in original containers.
- C. Coordinate with the GC for product storage. There may be little or no storage space available on site. Plan to potentially store materials off site.
- D. Do not install damaged products. Remove damaged products from the site and replaced with new product at no cost to the Owner.

#### **1.13 PROJECT CLOSE-OUT**

- A. Prior to final inspection and acceptance of the work, remove all debris, rubbish, waste material, tools, construction equipment, machinery and surplus materials from the project site and thoroughly clean your work area.
- B. Before the project closeout date, the Contractor shall submit:
  - 1. OEM Equipment Warranty Certificates.
  - 2. Evidence of compliance with requirements of governing authorities such as the Low Voltage Certificate of Inspection.
  - 3. Project record documents.
  - 4. Instruction manuals and software that is a part of the system.
  - 5. System Guaranty Certificate.
- C. Contractor shall submit written notice that:
  - 1. Contract Documents have been reviewed.
  - 2. Project has been inspected for compliance with contract.
  - 3. Work has been completed in accordance with the contract.

### **PART 2 - PRODUCTS / FUNCTIONAL REQUIREMENTS**

#### **2.0 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS**

- A. Furnish and install a complete and fully functional and operable Nurse Call System for each location shown on the contract drawings and TCOs **WHOSE EMPTY CONDUIT SYSTEM WAS PROVIDED AS A PART OF SPECIFICATION 27 11 00.**
- B. Coordinate features and select interface components to form an integrated Nurse Call system. Match components and interconnections between the systems for optimum performance of specified functions.

- C. Expansion Capability: The Nurse Call equipment interfaces and cables shall be able to increase number of enunciation points in the future by a minimum of 50 percent (%) above those indicated without adding any internal or external components or main trunk cable conductors.
- D. Equipment: Active electronic type shall use solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied between 110 to 130 VAC, 60 Hz supplied from the Facility's Emergency Electrical Power System.
- E. Meet all FCC requirements regarding equipment listing, low radiation and/or interference of RF signal(s). The system shall be designed to prevent direct pickup of signals from within and outside the building structure.
- F. Weather/Water Proof Equipment: Listed and labeled by an OSHA certified NRTL (i.e. UL) for duty outdoors or in damp locations.

## **2.1 SYSTEM DESCRIPTION**

- A. Furnish and install a complete and fully functional and operable Nurse Call and/or Code Blue System WHOSE EMPTY CONDUIT SYSTEM WAS PROVIDED AS A PART OF SPECIFICATION 27 11 00.
- B. The Contractor is responsible for interfacing the PA, Patient Bed Service Walls, and Telephone systems with the System.
- C. The Contractor shall continually employ interfacing methods that are approved by the OEM and VA. At a minimum, an acceptable interfacing method requires not only a physical and mechanical connection, but also a matching of signal, voltage, and processing levels with regard to signal quality and impedance. The interface point must adhere to all standards described herein for the full separation of Critical Care and Life Safety systems.
- D. The System Contractor shall connect the System ensuring that all NFPA and UL Critical Care and Life Safety Circuit and System separation guidelines are satisfied. The System Contractor is not allowed to make any connections to the Telephone System. VA shall arrange for the interconnection between the PA, Patient Bed Service Walls, and Telephone Systems with the appropriate responsible parties.
- E. System hardware shall consist of a *standalone (separate)* nurse call patient communications network comprised of nurse consoles, control stations, staff and duty stations, room and corridor dome lights,

pillow speakers/call cords, pull cord and/or emergency push button stations, wiring. And, other options such as, *pocket page interfaces*, computer interfaces, printer interfaces, wireless / telephone network interfaces, and nurse locating system interface (when specifically approved first by TVE 0050P3B) and as shown on drawings. All necessary equipment required to meet the intent of these specifications, whether or not enumerated within these specifications, shall be supplied and installed to provide a complete and operating nurse call patient communications network. *It is not acceptable to utilize the telephone cable system for the control and distribution of nurse call (code Blue) signals and equipment.*

- F. System firmware shall be the product of a reputable firmware OEM of record with a proven history of product reliability and sole control over all source code. Manufacturer shall provide, free of charge, product firmware/software upgrades for a period of two (2) years from date of acceptance by VA for any product feature enhancements. System configuration programming changes shall not require any exchange of parts and shall be capable of being executed remotely via a modem connection (when specifically approved first by TVE 0050P3B).
- G. The Nurse Call Head End Equipment shall be located in the existing Telecommunications Room. The Nurse Call / Code Blue System may interface the PA system when specifically approved by VA Headquarters TVE 0050P3B during the project approval process prior to contract bidding.
- H. The System shall utilize microprocessor components for all signaling and programming circuits and functions. Self contained or on board system program memory shall be non-volatile and protected from erasure from power outages for a minimum of 12 hours.
- I. Provide a backup battery or a UPS for the System (including each distribution cabinet/point, CRT and Monitor) to allow normal operation and function (as if there was no AC power failure) in the event of an AC power failure or during input power fluctuations for a minimum of 30 minutes.
- J. The System is defined as Critical Service and the Code Blue functions is defined as Life Safety/Support by NFPA (re Part 1.1.A) and so evaluated by JCAHCO. Therefore, the system shall have a minimum of two (2) additional remote enunciation points in order to satisfy NFPA's

Life Safety Code 101 (the typical secondary locations are Telephone Operators Room, MAS ER Desk, Boiler Plant, etc; AND the primary location is required to be in the SCC Room.

1. These two (2) additional remote locations shall be fully manned:
    - a. 24/7/365 for certified Hospital Clinics.
    - b. As long as other identified VA Medical / Servicing Facilities are open for servicing patients.
    - c. At a minimum, Code Blue Functions shall be provided in all Dialysis Areas.
    - d. The minimum remote enunciation locations shall be:
      - 1) The Telephone / PBX Operator Room.
      - 2) The Police Control / Operations Room.
      - 3) Other location(s) that is specifically approved by VA Headquarters TVE - 0050P3B DURING THE PROJECT DEVELOPMENT STAGES AND PRIOR TO EQUIPMENT PURCHASE.
  2. In addition to the two (2) remote locations afore described, the following locations are the minimum required for additional Nurse Call /Code Blue Annunciation:
    - a. "On Call" Rooms.
    - b. Each Nurse Master Station.
    - c. Each Staff Station.
    - d. Each Duty Station.
  3. The MAXIMUM enunciation time period from placement of the Code Blue Call to enunciation at each remote locations is 10 seconds; and, 15 seconds to the subsequent enunciating media stations (i.e. PA, Radio Paging, Emergency Telephone or Radio Backup, etc.).
- K. Each Code Blue System shall be designed to provide continuous electrical supervision of the complete and entire system (i.e. dome light bulbs [each light will be considered supervised if they use any one or a combination of (UL) approved electrical supervision alternates, as identified in UL-1069, 1992 revision], wires, contact switch connections, circuit boards, data, audio, and communication busses, main and UPS power, etc.). All alarm initiating and signaling circuits shall be supervised for open circuits, short circuits, and system grounds. Main and UPS power circuits shall be supervised for a change in state (i.e. primary to backup, low battery, UPS on line, etc.). When an open, short or ground occurs in any system circuit, an

audible and visual fault alarm signal shall be initiated at the nurse control station and all remote locations.

- L. When the System is approved to connect to a separate communications system (i.e. LAN, WAN, Telephone, Public Address, radio raging, wireless systems, etc) the connection point shall meet the following minimum requirements for each hard wired / wireless connection (note each wireless system connection MUST BE APPROVED PRIOR TO CONTRACT BID BY VA HEADQUARTERS TVE - 0050P3B AND SPECTRUM MANAGEMENT - 0050P2B - hereinafter referred to as SM - 0050P2B):
1. UL 60950-1/2.
  2. FIPS 142.
  3. FCC Part 15 Listed Radio Equipment restriction compliance approved by SM - 0050P2B.
- M. All passive distribution equipment shall meet or exceed -80 dB radiation shielding (aka RFI) shielding specifications and be provided with connectors specified by the OEM.
- N. All equipment face plates utilized in the system shall be stainless steel, anodized aluminum or UL approved cycolac plastic for the areas where provided.
- O. Noise filters and surge protectors shall be provided for each equipment interface cabinet, headend cabinet, control console and local and remote amplifier locations to insure protection from input primary AC power surges and to insure noise glitches are not induced into low voltage data circuits.
- P. Plug-in connectors shall be provided to connect all equipment, except coaxial cables. Coaxial cable distribution points shall use coaxial cable connections recommended by the cable OEM and approved by the system OEM. Base band cable systems shall utilize barrier terminal screw type connectors, at a minimum. As an alternate, crimp type connectors installed with a ratchet type installation tool are acceptable provided the cable dress, pairs, shielding, grounding, connections and labeling are the same as the barrier terminal strip connectors. Tape of any type, wire nuts or solder type connections are unacceptable and will not be approved.
- R. Audio Level Processing: The control equipment shall consist of audio mixer(s), volume limiter(s) and/or compressor(s), and power amplifier(s) to process, adjust, equalize, isolate, filter, and amplify

each audio channel for each sub-zone in the system and distribute them into the System's RF interfacing distribution trunks and amplification circuits. It is acceptable to use identified Telephone System cable pairs designated for Two-Way Radio interface and control use or identified as spare telephone cable pairs by the Facility's Telephone System Contractor. The use of telephone cable to distribute RF signals, carrying system or sub-system AC or DC voltage is not acceptable and will not be approved. Additionally, each control location shall be provided with the equipment required to insure the system can produce its designed audio channel capacity at each speaker identified on the contract drawings. The Contractor shall provide: a spare set of telephone paging modules as recommended by the OEM (as a minimum provide one spare module for each installed module); one spare audio power amplifier, one spare audio mixer, one spare audio volume limiter and/or compressor, and one spare audio automatic gain adjusting device, and minimum RF equipment recommended by the OEM.

S. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. Unless otherwise noted in this Part, equipment quantities shall be as indicated on the drawings.

R. System Performance:

1. At a minimum, each distribution, interconnection, interface, terminating point and TCO shall be capable of supporting the Facility's Nurse Call and/or Code Blue System voice and data service as follows:

a. Shall be compliant with and not degrade the operating parameters of the Public Switched Telephone Network (PSTN) and the Federal Telecommunications System (FTS) at each PSTN and FTS interface (if attachment is permitted by TVE 0050P3B), interconnection and TCO terminating locations detailed on the contract drawings.

b. The System shall provide the following minimum operational functions:

1) Code Blue calls shall be cancelable at the calling station only. The nurse call master station (s) that a managing Code Blue functions shall not have the ability to cancel Code Blue calls.

- 2) Each Code Blue system shall be able to receive audio calls from all bedside stations simultaneously.
  - 3) Calls placed from any Code Blue station shall generate Code Blue emergency type audible and visual signals at each associated nurse control and duty station, respective dome lights and all local and remote annunciator panels. Calls placed from a bedside station shall generate emergency type visual signals at the bedside station and associated dome light(s) in addition to the previous stated stations and panels.
  - 4) Activating the silencing device at any location, while a Code Blue call or system fault is occurring shall mute the audible signals at the alarm location.
    - a) The audible alarm shall regenerate at the end of the selected time-out period until the call or fault is corrected.
    - b) The visual signals shall continue until the call is canceled and/or a fault is corrected. When the fault is corrected, all signals generated by the fault shall automatically cease, returning the System to a standby status.
    - c) Audible signals shall be regenerated in any local or remote annunciator panel that is in the silence mode, in the event an additional Code Blue call is placed in any Code Blue system.
    - d) The additional Code Blue call shall also generate visual signals at all annunciators to identify the location of the call.
2. Each System Nurse Call location shall generate a minimum of distinct calls:
- a. Routine: single flashing dome lights & master station color and audio tone,
  - b. Staff Assist: rapid flashing dome lights & master station color and audio tone,
  - c. Emergency: Red flashing dome lights & master station color and audio tone,



- d. Code Blue (if equipped): Blue flashing dome lights and master station color and audio tone,
- e. Each generated call shall be cancelable at ONLY the originating location,
- f. Staff Locator: Green Flashing dome lights & master station color and audio tone, and

## **2.3 MANUFACTURERS**

- A. The products specified shall be new, FCC and UL Listed, labeled and produced by OEM manufacturer of record. An OEM of record shall be defined as a company whose main occupation is the manufacture for sale of the items of equipment supplied and which:
  - 1. Maintains a stock of replacement parts for the item submitted,
  - 2. Maintains engineering drawings, specifications, and operating manuals for the items submitted, and
  - 3. Has published and distributed descriptive literature and equipment specifications on the items of equipment submitted at least 30 days prior to the Invitation for Bid.
- B. Specifications contained herein as set forth in this document detail the salient operating and performance characteristics of equipment in order for VA to distinguish acceptable items of equipment from unacceptable items of equipment. When an item of equipment is offered or furnished for which there is a specification contained herein, the item of equipment offered or furnished shall meet or exceed the specification for that item of equipment.
- C. Equipment Standards and Testing:
  - 1. The System has been defined herein as connected to systems identified as Critical Service performing various Emergency and Life Support Functions. Therefore, at a minimum, the system shall conform to all aforementioned National and/or Local Life Safety Codes (which ever are the more stringent), NFPA, NEC, this specification, JCAHCO Life Safety Accreditation requirements, and the OEM recommendations, instructions, and guidelines.
  - 2. All supplies and materials shall be listed, labeled or certified by UL or a NRTL where such standards have been established for the supplies, materials or equipment.
  - 3. The provided equipment required by the System design and approved technical submittal must conform with each UL standard in effect for

the equipment, as of the date of the technical submittal (or the date when the COR approved system equipment necessary to be replaced) was technically reviewed and approved by VA. Where a UL standard is in existence for equipment to be used in completion of this contract, the equipment must bear the approved UL seal.

4. Each item of electronic equipment to be provided under this contract must bear the approved UL seal or the seal of the testing laboratory that warrants the equipment has been tested in accordance with, and conforms to the specified standards. The placement of the UL Seal shall be a permanent part of the electronic equipment that is not capable of being transportable from one equipment item to another.

## 2.4 PRODUCTS

### A. General.

1. Contractor is responsible for pricing all accessories and miscellaneous equipment required to form a complete and operating system. The equipment quantities provided herein shall be as indicated on the drawings with the exception of the indicated spare equipment.
2. Contractor Furnished Equipment List (CFEs):
  - a. The Contractor is required to provide a list of the CFE equipment to be furnished. The quantity, make and model number of each item is required. Select the required equipment items quantities that will satisfy the needs of the system as described herein and with the OEM's concurrence applied to the list(s), in writing.

		<u>Item</u>	<u>Quantity</u>	<u>Unit</u>
1.	As required		Master Station(s)	
1.a	As required		Nurse Locator	
1.b	As required		Staff Locator	
2.	As required		Distribution System(s)	
2.a	As required		Staff Station	
2.a.1	As required		Equipment Back Box(s)	
2.b	As required		Duty Station	
2.b.1	As required		Equipment Back Box(s)	
2.c	As required		Code Blue Station	
2.c.1	As required		Equipment Back Box(s)	
2.c.2	2 (MIN)		Remote Station(s)	
2.d	As required		Patient Station(s)	
2.d.1	As required		Equipment Back Box(s)	
2.d.2	As required		Bed Interface(s)	
2.d.3	As required		Pillow Speaker	
2.d.4	As required		Push Button Cordset	
2.d.5	As required		Dummy Plugs	
2.d.6	As required		Bed Integrated Control	
2.d.7	As required		Lighting Interface Module	

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2.d.8	As required	TV Control Interface
2.d.9	As required	TV Control Jack
2.d.10	As required	TV Interconnection Cables
2.d.11	As required	HDTV Coaxial
2.d.12	As required	HDTV/Nurses Call Interface/ Control
2.d.13	As required	Auxiliary Mounting Interface
2.e	As required	Emergency Station(s)
2.e.1	As required	Equipment Back Box(s)
2.e.2	As required	Toilet Emergency Station (waterproof)
2.e.3	As required	Shower Emergency Station (waterproof)
2.e.4	As required	Lavatory Emergency Station (waterproof)
2.f.	As required	Room Dome Light
2.f.1	As required	Equipment Back Box(s)
2.g	As required	Other Dome Light(s)
2.g.1	As required	Equipment Back Box(s)
2.g.2	As required	Corridor Dome Light
2.g.3	As required	Intersectional Dome Light
2.h	As required	System Cable(s)
2.h.1	As required	Coaxial
2.h.2	As required	System Pin
2.h.3	As required	Audio
2.h.4	As required	Control
2.h.5	As required	Video
2.i	As required	System Connector(s)
2.i.1	As required	Coaxial
2.i.2	As required	System Pin
2.i.2	As required	Audio
2.i.3	As required	Control
2.i.4	As required	Video
2.j	As required	Wire Management Required as described herein
3	As required	Dialysis, Units
3.b.	As required	Master Station(s)
3.b.1	As required	Nurse Locator
3.b.2	As required	Staff Locator
3.c	As required	Distribution System(s)
3.c.1	As required	Staff Station
3.c.1.a	As required	Equipment Back Box(s)
3.c.2	As required	Duty Station
3.c.2.a	As required	Equipment Back Box(s)
3.c.3	As required	Patient Station(s)
3.c.3.a	As required	Equipment Back Box(s) \
3.c.4	As required	Emergency Station(s)
3.c.4.a	As required	Equipment Back Box(s)
3.c.4.b	As required	Toilet Emergency Station (waterproof)
3.c.4.c	As required	Shower Emergency Station (waterproof)

3.c.4.d	As required	Lavatory Emergency Station (waterproof)
3.c.5	As required	Room Dome Light
3.c.5.a	As required	Equipment Back Box(s)
3.c.6	As required	Other Dome Light(s)
3.c.6.a	As required	Equipment Back Box(s)
3.c.6.b	As required	Corridor Dome Light
3.c.6.c	As required	Intersectional Dome Light
3.c.7	As required	System Cable(s)
3.c.7.a	As required	Coaxial
3.c.6.b	As required	System Pin
3.c.7.c	As required	Audio
3.c.7.d	As required	Control
3.c.7.e	As required	Video
3.c.8	As required	System Connector(s)
3.c.8.a	As required	Coaxial
3.c.8.b	As required	System Pin
3.c.8.c	As required	Audio
3.c.8.d	As required	Control
3.c.8.e	As required	Video
3.c.9	As required	Wire Management

B. NS Room(s) :

Refer to CFM Physical Security Manual (07-2007) for VA Facilities, Chapters 9.3 & 1) and PG 18-10, EDM, Chapters 7- Table 7-1, 8 & Appendix B, Telecommunications One Line Topology for specific Room and TIP Connection Requirements.

C. TER, SCC, PCR, STR, HER Rooms and Equipment:

Refer to CFM Physical Security Manual (07-2007) for VA Facilities, Chapters 9.3 & 1) and PG 18-10, EDM, Chapters 7- Table 7-1, 8 & Appendix B, Telecommunications One Line Topology for specific Room and TIP Connection Requirements.

D. Telecommunications Room(s) (TR) :

1. Locate the Nurse Call and/or Code Blue floor distribution equipment as required by system design and OEM direction. Provide secured and lockable cabinet/rack(s) as required.
2. Head-End Equipment:
  - a. Provide all required power supplies, communications hubs, network switches, intelligent controllers and other devices necessary to form a complete system. Head-end components may be rack mounted or wall mounted in an enclosed metal enclosure.
  - b. Provide the head end equipment in the closest Telecommunications Room where the System is installed.

- c. Provide the System UPS inside the cabinet or in a separate cabinet adjacent to the head end cabinet that shall maintain a minimum of 30 minute battery back-up to all system components.
  - d. Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions. See Paragraph 2.5.E for the Cabinet's minimum internal items that are in addition to the installed System equipment.
  - e. Vertical Equipment Rack, Wall Mounted (to be included inside of the Equipment Cabinet) containing the following minimum items:
    - 1) 36" (28RU) internal rack space, welded steel construction, minimum 20" usable depth, adjustable front mounting rails.
    - 2) Install the following products in rack provided by same manufacturer or as specified:
      - a) Security screws w/ nylon isolation bushings.
      - b) Textured blank panels.
      - c) Custom mounts for components without rack mount kits.
      - d) Security covers.
      - e) Internal system ground copper buss (may be substituted with a bare #0 AWG copper wire or equivalent size copper mesh strip connected to ONLY THE FACILITY'S SIGNAL GROUNDING SYSTEM.
      - f) Power Sequencer- rack-mounted power conditioner and (provide as-needed) delayed sequencer(s) with (2) unswitched outlets each and contact closure control inputs. Connect the conditioner to one of the dual duplex outlets.
      - g) Two (2) each 120VAC @ 20A dual duplex outlets, connected via conduit to the nearest Electrical Service Panel that is supplied by the Facility's Essential Electrical System.
      - h) One (1) each 120VAC @ 15A Power Distribution Strip(s). Connect each strip to the unstitched outlet on the power conditioner.
3. HL7 Interface:
- a. The system may support downloading and updating of patient data from the hospital admission system (or other database) via the

HL7 standard. The data only has to travel one way, i.e. from the admission system to the nurse-call system.

- b. Coordinate with the Owner the exact fields that will be populated from the admissions system in the nurse-call system.
- c. The Facility's LAN/WAN is not allowed for Nurses Call/Code Blue main wiring / function that must be a "stand alone primary cable infrastructure" as described herein.
- d. Connections to the VA LAN/WAN for functional or operable conditions will be allowed ONLY when the LAN/WAN system has been demonstrated and NFPA (at a minimum by TVE-005OP3B) Certified meeting Life Safety Standards.
- e. Provide one (1) spare HL Interface unit.

F. TIP Cable Systems:

**Connect the system to the TIP system provided as a part of Speciation Section 27 15 00.** Provide additional TIP equipment, interfaces and connections as required by System design. Provide secured pathway(s) and lockable cabinet/rack(s) as required.

G. Interface Equipment:

1. TCR:

a. Code Blue Annunciation Station:

- 1) The Annunciation Station shall be connected to the System via hard wire connection(s) that shall contain all the electrical supervisory tone signals, visual bulbs, read out panel to indicate the location of the Code and system troubles.
- 2) The System shall not be connected to the Telephone system unless specifically APPROVED BY VA HEADQUARTERS (005OP3B) and (005OP2B) PRIOR TO CONTRACT BID.
- 3) The Annunciation Station shall be installed in a location directly viewable and the readout is completely readable from the Public Address Microphone Control Console.
- 4) Provide one (1) spare panel.

b. Electrical Supervision Trouble Annunciator Panel:

- 1) The Electrical Supervision Trouble Annunciation Panel shall be located in the Telephone Operators Room, Police Control Center, and associate Nurses Station(s).
- 2) The panel(s) shall be compatible with the generated electrical and/or electronic supervising signals to continuously monitor

the operating condition for the System head-end processing equipment, master stations, staff stations, patient stations, duty stations, audio power amplifier(s), UPS, power supplies, dome lights and interconnecting trunks. The panels shall generate an audible and visual signal when the System's supervising system detects a system and equipment trouble or trunk-line is malfunctioning.

3) Provide one (1) spare panel.

2. Hospital Bed Interface (s):

- a. Provide a multi-pin receptacle for bed connection.
- b. Connect cable from the multi-pin receptacle to the nurse-call system, so that alarms, such as bed exit, shall be monitored by the nurse-call system.
- c. Connect cable from the multi-pin receptacle to the nurse-call system, so that the bedside control buttons, such as nurse call, and television controls are functional and monitored.
- d. The hospital uses the following beds:
  - 1) Hill Rohm
  - 2) Stryker
  - 3) Other
- e. Provide one (1) spare interface for each ten (10) interfaces installed.

3. Nurse (aka Staff) Locator Interface:

- a. The System must be capable of performing nurse-locator functions.
- b. The System must be capable of performing staff-locator functions
- c. These functions may be combined into one operation.
- d. Provide two (2) spare interfaces.

4. Lighting Interface Module:

- a. Provide an interface module for the pillow speakers to control up to 2 lights. Coordinate with the electrical contractor the exact voltage requirements.
- b. Provide one (1) spare module for each ten (10) modules installed.

5. Pillow Speaker Interfaces:

- a. See functional requirements herein.
- b. Provide (1) pillow speaker for each patient station.
- c. Provide one (1) spare pillow speaker for each twenty (20) speakers installed.

6. TV Remote Control Interface:
  - a. The pillow speaker shall have the following TV control capability:
    - 1) Play the TV audio through the pillow speaker.
    - 2) Change channels up and down.
    - 3) Increase and decrease the volume.
    - 4) TV audio mute.
    - 5) UL Certified for direct patient contact.
  - b. Provide one (1) spare interface for each 20 interfaces installed.
7. TV Control Jack and Wiring:
  - a. Provide connection from the pillow speaker to the TV location.  
Terminate wire on a jack in the TV low voltage faceplate.  
Coordinate faceplate opening with the cabling contractor.  
Coordinate jack type with the TV (typically it is a ¼" jack, but verify prior to installation).
  - b. Provide patch cord from the TV control jack to the TV.
  - c. Provide one (1) spare complete assembly for each twenty (20) assemblies installed.
8. TER
  - a. Paging adaptor (When connections are specifically approved by TVE 0050P3B):
    - 1) The Contractor shall coordinate the installation of the paging adapter(s) designed for use with the Facility's telephone system with the Facility Telephone Contractor or local telephone company.
    - 2) The Contractor shall provide and install a paging adapter(s) for each zone and sub zone. The paging adapter(s) shall be accessible by dialing a telephone number provided by the Facility's Telephone Contractor. The Paging Adapter shall:
      - a) Monitor each audio input and output on the unit.
      - b) Be provided with an electrical supervision panel to provide both audio and visual trouble alarms.
      - c) Be provided as part of the headend equipment and shall be located in the Telephone Switch Room.
      - d) Be provide with Executive Paging Override of all routine paging calls in progress or being accessed to allow system



"all call" (aka global) and radio paging calls designated as Code One Blue) functions.

- e) Be capable of internal time out capability.
- f) Function completely with the interface module.
- g) Provide one spare adapter.

3) Time Out Device:

A time out device/capability shall be provided to prevent system "hang-up" due to an off-hook telephone. The device shall be able to be preset from 30 seconds to two (2) minutes. Its function shall not interfere with or override the required "all call" (aka global) operational capability.//

H. Call Initiation, Annunciation and Response:

1. Light and Tones:

a Calls may be initiated through:

- 1) Patient station.
- 2) Staff station.
- 3) Code Blue station.
- 4) Toilet Emergency Station pull cord / push button.
- 5) Shower Emergency Station pull cord.
- 6) Bed Pillow speaker.
- 7) Bed Push-button cordset.
- 8) Hospital Bed Integrated controls.

b Once a call is initiated, it must be annunciated at the following locations:

- 1) The Corridor, Intersectional and Room dome light associated with the initiating device.
- 2) A local master control station indicating the call location and priority.
- 3) Each duty station.
- 4) Each staff station.
- 5) Each remote location.
- c) All calls must be displayed until they are cleared by the nursing staff ONLY from the initiating device location.

2. Voice:

a Calls may be initiated through:

- 1) Patient station.
- 2) Staff station.
- 3) Code Blue station.

- 4) Toilet Emergency pull cord / push button station.
- 5) Shower Emergency pull cord station.
- 6) Pillow speaker.
- 7) Push-button cordset.
- 8) Integrated bed controls.
- 9) Master Station.

I. Auxiliary Alarm Monitoring:

1. Each patient station must have the ability to connect a separate and isolated auxiliary alarm to it such as an infusion pump or data tracking / recording device (patient life support units ARE NOT allowed to be connected to these units UNLESS APPROVED BY TVE - 0050P3B DURING THE PROJECT DEVELOPMENT PHASE AS DESCRIBED HEREIN. The System must support naming the device that is being monitored as well as display its alarms at the master station and via the room / corridor dome light(s).
2. Provide alarm jacks at each patient station.
3. The above requirements may ONLY be allowed when the system has been approved by VA Headquarters TVE - 0050P3B and TVE - 0050P2B and concurred by the appropriate Medical Service(s) indicates it meets the minimum guidelines and requirements of Paragraph 2.8.A.

J. Patient and Staff Assignment:

1. System may provide for transfer of one or more individual or groups of stations from one master station to another without mechanical switches or additional wiring of the stations. The transfer may be initiated manually by the nurse or automatically at certain times of the day.
2. The Facility's LAN/WAN IS NOT ALLOWED for Nurses Call/Code Blue main wiring which must be a "stand alone primary cable infrastructure." Connections to the VA LAN/WAN will be allowed ONLY when the LAN/WAN system has been demonstrated and certified by TVE - 0050P3B meeting the minimum guidelines and requirements of the Life Safety Code.

K. Reports:

1. The system's generated reports logging all calls, alarms, response time, bed, and staff assignments may be allowed to transmit these reports to a central archiving entity.
2. Reports function shall be limited by passwords and security tier level access, so that only supervisors may access it when desired.

3. Provide instructions to the owner on how to enable/disable the reporting functions.
4. The Facility's LAN/WAN IS NOT ALLOWED for Nurses Call/Code Blue main wiring that must be a "stand alone primary cable infrastructure." Connections to the VA LAN/WAN will be allowed ONLY when the system has been demonstrated and certified by 0050P2B meeting the minimum guidelines and requirements of the Life Safety Code.

L. System/Management Software:

1. Provide and install system/management software on minimum of three (3) owner-provided computers.
  - a. The management software shall at a minimum provide all historical reporting features of the system as well as real-time monitoring of events.
  - b. The system software shall at a minimum provide the system's operating and functioning parameters and script. The OEM shall provide VA with access to the software's script writing and functions.
2. Provide two (2) spare CD's with the software installed and operable.
3. Rights in Data: VA shall have the right to all script and programming language of system management software. If commercial off the shelf (COTS) or a memorandum of understanding (MOU) is required for follow-on maintenance, the Contractor is required to accomplish the COTS Survey document and the COR is required to accomplish the COTS Acquisition document supplied in Part 5 Attachments herein.

M. System Functional Station:

1. Master Control:
  - a. Simple Tone and Light:
    - 1) The visual / aural (tone only) system shall also include a power supply and a visual / aural (tone only) display panel in the respective OPC receptionist / secretary's office and the Day Hospital area and as shown on the drawings. The visual / tone display panel shall generate audible and visual emergency signals to indicate the location of a placed call.
    - 2) The Visual Display Panel shall be a digital readout touch screen to visually announce the location of incoming calls

placed in the System including room and bed number and priority of the call. Identify each calling station with an individual display, including separate displays for each patient sharing a dual bedside station. If a digital readout touch screen standard is not required or approved by the Facility during the project design phase, an alpha - numeric scheme shall be provided that identifies the: ward, room and bed (i.e. Ward 2a, Room 201, Bed A (or 1) shall read 2A201A - or- 2A201-1. Equivalent readouts are acceptable as long as TVE 0050P3B and the Facility approve the readout).

a) Calls placed at emergency stations located in toilets and baths inside bedrooms shall be displayed for the bed closest to the nurse control station. Beds in multi-bed bedrooms shall be identified in a clock-wise pattern upon entering the bedroom.

b) It shall display a minimum of four incoming calls. Additional placed calls shall be stored in order of placement and priority.

3) The visual / aural (tone only) system shall be installed according to the same Procedures, guidelines and standards outlined for a regular Nurse Call System for emergency *NOT CODE BLUE OPERATION*.

4) Speakerphone and handset communication.

5) Provide one (1) spare station for each ten (1) stations installed.

b. Touch Screen:

1) Provide a touch screen master station with 15" minimum monitor size.

2) The master station shall have a full control capability over staff assignment to patients and beds as well as pagers and wireless personal communication devices (when specifically approved by 0050P3B on a case by case basis).

3) Speakerphone and handset communication.

4) Provide one (1) spare station for each ten (1) stations installed.

2. Staff:

a. Light and Tine Only.

- b. Voice Communications Enabled.
  - c. Provide one (1) spare station for each twenty (20) stations installed.
- 3. Duty:
  - a. Light and Tine Only.
  - b. Voice Communications Enabled.
  - c. Provide one (1) spare station for each twenty (20) stations installed.
- 4. Patient:
  - a. Single & Dual:
    - 1) Provide each patient station with the following minimum Feature.
      - a) Call button.
      - b) Call answered button.
      - c) Pillow speaker jack.
      - d) Auxiliary alarm monitoring jack.
      - e) Hospital bed interface jack (when specially approved by TVE - 0050P3B).
    - f) Provide one (1) spare station for each twenty (20) stations installed.
- N. Distribution System: Refer to Specification Sections 27 11 00, Structured TIP Communications Cables; 27 11 00, TIP Communications Interface and Equipment Rooms Fittings and 27 15 00, HORIZONTAL and Vertical TIP Communications Cabling for additional specific TIP wire and cable standards and installation requirements used to install the Facility's TIP network.
  - 1. In addition to the TIP provided under the aforementioned Specification Sections, the contractor shall provide the following additional TIP installation and testing requirements, provide the following minimum additional System TIP requirements, cables & interconnections:
    - a. Each wire and cable used in the System shall be specifically OEM certified by tags on each reel and recommended and approved for installation in the Facility.
    - b. The Contractor shall provide the COR a 610 mm (2 foot) sample of each wire and/or cable actually employed in the System and each

certification tag for approval before continuing with the installation as described herein.

- c. Fiber optic Cables: Refer to Specification Section 27 15 00, Horizontal and Vertical TIP Communications Cabling; Paragraph 2.4.C12.d. Fiber optic Cables - for minimum technical standards and requirements for additional System cables.
  - d. Copper Cables: Refer to Specification Section 27 15 00, Horizontal and Vertical TIP Communications Cabling; Paragraph 2.4.C12.c. Copper Cables - for minimum technical standards and requirements for additional System voice and data cables.
  - e. Line Level Audio and Microphone Cable:
    - 1) Line level audio and microphone cable for inside racks and conduit.
    - 2) Shielded, twisted pair Minimum 22AWG, stranded conductors and 24AWG drain wire with overall jacket.
  - f. Speaker Level Audio (70.7Volt RMS):
    - 1) For use with 70.7V speaker circuits.
    - 2) 18AWG stranded pair, minimum.
  - g. All cabling shall be plenum rated.
  - h. Provide one (1) spare 1,000 foot roll of approved System (not microphone) cable only.
2. Raceways, Back Boxes and conduit:
- a. In addition to the Raceways, Equipment Room Fittings provided under Specification Sections 27 15 00 TIP Communication Room Fittings and 27 15 00 - TIP Communications Horizontal and Vertical Cabling, provide the following additional TIP raceway and fittings:
  - b. Each raceway that is open top, shall be: UL certified for telecommunications systems, partitioned with metal partitions in order to comply with NEC Parts 517 & 800 to "mechanically separate telecommunications systems of different service, protect the installed cables from falling out when vertically mounted and allow junction boxes to be attached to the side to interface "drop" type conduit cable feeds.
  - c. Intercommunication System cable infrastructure: EMT or in J-hooks above accessible ceilings, 24 inches on center.

- d. Junction boxes shall be not less than 2-1/2 inches deep and 6 inches wide by 6 inches long.
- e. Flexible metal conduit is prohibited unless specifically approved by 0050P3B.
- f. System Conduit:
  - 1) The PA system is NFPA listed as Emergency / Public Safety Communication System which requires the entire system to be installed in a separate conduit system.
  - 2) The use of centralized mechanically partitioned wireways may be used to augment main distribution conduit on a case by case basis when specifically approved by VA Headquarters (0050P3B).
  - 3) Conduit Sleeves:
    - a) The AE has made a good effort to identify where conduit sleeves through full-height and fire rated walls on the drawings, and has instructed the electrician to provide the sleeves as shown on the drawings.
    - b) While the sleeves shown on the drawings will be provided by others, the contractor is responsible for installing conduit sleeves and fire-proofing where necessary. It is often the case, that due to field conditions, the nurse-call cable may have to be installed through an alternate route. Any conduit sleeves required due to field conditions or those omitted by the engineer shall be provided by the cabling contractor.
- g. Device Back Boxes:
  - 1) Furnish to the electrical contractor all back boxes required for the PA system devices.
  - 2) The electrical contractor shall install the back boxes as well as the system conduit. Coordinate the delivery of the back boxes with the construction schedule.
- O. Patient Bedside Prefabricated Units (PBPU):
  - 1. Where PBPU's exist in the Facility; the Contractor shall identify the "gang box" location on the PBPU designated for installation of the telephone jack. This location shall here-in-after be identified as the unit's TCO. The Contractor shall be responsible for obtaining written approval and specific instructions from the PBPU OEM regarding the necessary disassembly and reassembly of each PBPU to

the extent necessary to pull wire from above the TIP ceiling junction box to the PBPUs reserved gang box for the unit's TCO. A Contractor provided stainless steel cover plate approved for use by the PBPUs OEM and Facility IRM Chief shall finish out the jack installation.

2. Under no circumstances shall the Contractor proceed with the PBPUs installations without the written approval of the PBPUs OEM and the specific instructions regarding the attachment to or modifying of the PBPUs. The COR shall be available to assist the Contractor in obtaining approvals and instructions in a timely manner as related to the project's time constraints.
3. It is the responsibility of the Contractor to maintain the UL integrity of each PBPUs. If the Contractor violates that integrity, it shall be the responsibility of the Contractor to obtain on site UL re-certification of the violated PBPUs at the direction of the COR and at the Contractor's expense.

P. Installation Kit:

1. General: The kit shall be provided that, at a minimum, includes all connectors and terminals, labeling systems, audio spade lugs, barrier strips, punch blocks or wire wrap terminals, heat shrink tubing, cable ties, solder, hangers, clamps, bolts, conduit, cable duct, and/or cable tray, etc., required to accomplish a neat and secure installation. All wires shall terminate in a spade lug and barrier strip, wire wrap terminal or punch block. Unfinished or unlabeled wire connections shall not be allowed. Turn over to the COR all unused and partially opened installation kit boxes, coaxial, fiberoptic, and twisted pair cable reels, conduit, cable tray, and/or cable duct bundles, wire rolls, physical installation hardware. The following are the minimum required installation sub-kits:
  2. System Grounding:
    - a. The grounding kit shall include all cable and installation hardware required. All radio equipment shall be connected to earth ground via internal building wiring, according to the NEC.
    - b. This includes, but is not limited to:
      - 1) Fiberoptic Optic Cable Armor/External Braid
      - 2) Coaxial Cable Shields.



- 3) Control Cable Shields.
  - 4) Data Cable Shields.
  - 5) Equipment Racks.
  - 6) Equipment Cabinets.
  - 7) Conduits.
  - 8) Cable Duct.
  - 9) Cable Trays.
  - 10) Interduct
  - 11) Power Panels.
  - 12) Connector Panels.
  - 15) Grounding Blocks.
3. Fiberoptic Cable: The fiberoptic cable kit shall include all fiberoptic connectors, cable tying straps, interduct, heat shrink tubing, hangers, clamps, etc. required to accomplish a neat and secure installation.
  4. Coaxial Cable: The coaxial cable kit shall include all coaxial connectors, cable tying straps, heat shrink tubing, hangers, clamps, etc., required to accomplish a neat and secure installation.
  5. Wire and Cable: The wire and cable kit shall include all connectors and terminals, audio spade lugs, barrier straps, punch blocks, wire wrap strips, heat shrink tubing, tie wraps, solder, hangers, clamps, labels etc., required to accomplish a neat and orderly installation.
  6. Conduit, Cable Duct, and Cable Tray: The kit shall include all conduit, duct, trays, junction boxes, back boxes, cover plates, feed through nipples, hangers, clamps, other hardware required to accomplish a neat and secure conduit, cable duct, and/or cable tray installation in accordance with the NEC and this document.
  7. Equipment Interface: The equipment kit shall include any item or quantity of equipment, cable, mounting hardware and materials needed to interface the systems with the identified sub-system(s) according to the OEM requirements and this document.
  8. Labels: The labeling kit shall include any item or quantity of labels, tools, stencils, and materials needed to completely and correctly label each subsystem according to the OEM requirements, as-installed drawings, and this document.
  9. Documentation: The documentation kit shall include any item or quantity of items, computer discs, as installed drawings, equipment, maintenance, and operation manuals, and OEM materials needed to

completely and correctly provide the system documentation as required by this document and explained herein.

Q. DIALYSIS UNITS - provide each unit as follows with TVE 0050P3B reviewed and approved units designed specifically for service and functions in this type of unit (aka brail, audible and like recognition:

1. CODE BLUE - provide a Code Blue System as described herein.

**2. EMERGENCY STATION:**

- a. A push-button emergency station shall be provided in each toilet stall and each shower/bath facility in Psychiatric Units. Shower emergency stations shall be installed inside the shower stall at the shower head end. They shall be installed approximately a minimum of 18 inches from the showerhead itself and at a maximum of 72 inches above the finished floor. Each station inside shower and toilet areas shall be equipped with a rubber gasket between the faceplate and wall or be rated by UL as waterproof. The gasket shall cover and water seal the entire back box opening and not extend beyond the sides of the associated faceplate by  $\frac{1}{4}$ " MAX. If the wall is tile or other uneven type material the gasket and associated faceplate shall be provided to completely seal the opening and uneven material surface.
- b. Fasten each emergency station faceplate to the back-boxes with tamperproof screws.
- c. Pressing the push-button on any emergency station shall generate visual signals in the room & corridor dome light(s) and emergency audible and visual signals at the nurse control station.

**3. PATIENT STATION:**

- a. Provide a patient station with pushbutton, microphone/speaker.
- b. Mount all equipment with tamperproof screws.
- c. Selection of the patient room station at the nurse control station shall permit two-way voice communication within the room and nurse control station, through the patient wall microphone/speaker.
- d. Pressing the push-button on any patient wall station shall generate visual signals in the Room & corridor dome light(s) and routine audible and visual signals at the nurse control station.

- e. The patient wall station shall be equipment with a method (aka separate push-button) to initiate an emergency call in the room and corridor dome lights and nurse call station.
- 4. NURSE CONTROL (aka MASTER) STATION - provide a station as described herein.

### **PART 3 - EXECUTION**

#### **3.1 PROJECT MANAGEMENT**

- A. Assign a single project manager to this project who will serve as the point of contact for the Owner, the General Contractor, and the Engineer.
- B. The Contractor shall be proactive in scheduling work at the hospital, specifically the Contractor will initiate and maintain discussion with the general contractor regarding the schedule for ceiling cover up and install cables to meet that schedule.
- C. Contact the Office of Telecommunications, Special Communications Team (0050P2B) at (301) 734-0350 to have a VA Certified Telecommunications COTR assigned to the project for telecommunications review, equipment and system approval and co-ordination with VA's Spectrum Management and OCIS Teams.

#### **3.2 COORDINATION WITH OTHER TRADES**

- A. Coordinate with the cabling contractor the location of the TV faceplate and the faceplate opening for the nurse call TV control jack.
- B. Coordinate with the cabling contractor the location of TIP equipment in the TER, TCR, PCR, SCC, ECR, STRs, NSs, and TCOs in order to connect to the TIP cable network that was installed as a part of Section Specification 27 11 00. Contact the COR immediately, in writing, if additional location(s) are discovered to be activated that was not previously provided.
- C. Before beginning work, verify the location, quantity, size and access for the following:
  - 1. Isolated ground AC power circuits provided for systems.
  - 2. Primary, emergency and extra auxiliary AC power generator requirements.
  - 3. Junction boxes, wall boxes, wire troughs, conduit stubs and other related infrastructure for the systems.
  - 4. System components installed by others.
  - 5. Overhead supports and rigging hardware installed by others.

- D. Immediately notify the Owner, GC and Consultant(s) in writing of any discrepancies.

### **3.3 NEEDS ASSESSMENT**

Provide a one-on-one meeting with the particular nursing manager of each unit affected by the installation of the new nurse call/code blue system. Review the floor plan drawing, educate the nursing manager with the functions of the equipment that is being provided and gather details specific to the individual units; coverage and priorities of calls; staffing patterns; and other pertinent details that will affect system programming and training.

### **3.4 INSTALLATION**

#### **A. General:**

1. Execute work in accordance with National, State and local codes, regulations and ordinances.
2. Install work neatly, plumb and square and in a manner consistent with standard industry practice. Carefully protect work from dust, paint and moisture as dictated by site conditions. The Contractor will be fully responsible for protection of his work during the construction phase up until final acceptance by the Owner.
3. Install equipment according to OEM's recommendations. Provide any hardware, adaptors, brackets, rack mount kits or other accessories recommended by OEM for correct assembly and installation.
4. Secure equipment firmly in place, including receptacles, speakers, equipment racks, system cables, etc.
  - a. All supports, mounts, fasteners, attachments and attachment points shall support their loads with a safety factor of at least 5:1.
  - b. Do not impose the weight of equipment or fixtures on supports provided for other trades or systems.
  - c. Any suspended equipment or associated hardware must be certified by the OEM for overhead suspension.
  - d. The Contractor is responsible for means and methods in the design, fabrication, installation and certification of any supports, mounts, fasteners and attachments.
5. Finishes for any exposed work such as plates, racks, panels, speakers, etc. shall be approved by the Architect, Owner and TVE 0050P3B.

6. Coordinate cover plates with field conditions. Size and install cover plates as necessary to hide joints between back boxes and surrounding wall. Where cover plates are not fitted with connectors, provide grommets in size and quantity required. Do not allow cable to leave or enter boxes without cover plates installed.
  7. Active electronic component equipment shall consist of solid state components, be rated for continuous duty service, comply with the requirements of FCC standards for telephone and data equipment, systems, and service.
  8. Color code all distribution wiring to conform to the Nurse Call Industry Standard, EIA/TIA, and this document, whichever is the more stringent. At a minimum, all equipment, cable duct and/or conduit, enclosures, wiring, terminals, and cables shall be clearly and permanently labeled according to and using the provided record drawings, to facilitate installation and maintenance.
  9. Connect the System's primary input AC power to the Facility's Critical Branch of the Emergency AC power distribution system as shown on the plans or if not shown on the plans consult with COR regarding a suitable circuit location prior to bidding.
  10. Product Delivery, Storage and Handling:
    - a. 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 COR may inventory the cable, patch panels, and related equipment.
    - b. Storage and Handling: Store and protect equipment in a manner, which will preclude damage as directed by the COR.
  11. Where TCOs are installed adjacent to each other, install one outlet for each instrument.
  12. Equipment installed outdoors shall be weatherproof or installed in weatherproof enclosures with hinged doors and locks with two keys.
- B. Equipment Racks/Cabinets:
1. Fill unused equipment mounting spaces with blank panels or vent panels. Match color to equipment racks/cabinets.

2. Provide security covers for all devices not requiring routine operator control.
3. Provide vent panels and cooling fans as required for the operation of equipment within the OEM' specified temperature limits. Provide adequate ventilation space between equipment for cooling. Follow manufacturer's recommendations regarding ventilation space between amplifiers.
4. Provide insulated connections of the electrical raceway to equipment racks.
5. Provide continuous raceway/conduit with no more than 40% fill between wire troughs and equipment racks/cabinets for all non-plenum-rated cable. Ensure each system is mechanically separated from each other in the wireway.
6. Ensure a minimum of 36 inches around each cabinet and/or rack to comply with OSHA Safety Standards. Cabinets and/or Racks installed side by side - the 36" rule applies to around the entire assembly

C. Distribution Frames.

1. A new stand-alone (i.e., self supporting, free standing) PA rack/frame may be provided in each TR to interconnect the TCR, PCR, SCC, NS, STRs & ECRs. Rack/frames shall be wired in accordance with industry standards and shall employ "latest state-of-the-art" modular cross-connect devices. The PA riser cable shall be sized to satisfy all voice/digital requirements plus not less than 50% spare (growth) capacity in each TR which includes a fiber optic backbone.
2. The frames/racks shall be connected to the TER/MCR system ground.

D. Wiring Practice - in addition to the MANDATORY infrastructure requirements outlined in VA Construction Specifications 27 10 00 - TIP Structured Communications Cabling, 27 11 00 - TIP Communications Rooms Fittings and 27 15 00 - TIP Horizontal and Vertical Communicators Cabling, the following additional practices shall be adhered too:

1. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
2. Execute all wiring in strict adherence to the National Electrical Code, applicable local building codes and standard industry practices.
3. Wiring shall be classified according to the following low voltage signal types:

- a. Balanced microphone level audio (below -20dBm) or Balanced line level audio (-20dBm to +30dBm)
  - b. 70V audio speaker level audio.
  - c. Low voltage DC control or power (less than 48VDC)
4. Where raceway is to be EMT (conduit), wiring of differing classifications shall be run in separate conduit. Where raceway is to be an enclosure (rack, tray, wire trough, utility box) wiring of differing classifications which share the same enclosure shall be mechanically partitioned and separated by at least four (4) inches. Where Wiring of differing classifications must cross, they shall cross perpendicular to one another.
5. Do not splice wiring anywhere along the entire length of the run. Make sure cables are fully insulated and shielded from each other and from the raceway for the entire length of the run.
6. Do not pull wire through any enclosure where a change of raceway alignment or direction occurs. Do not bend wires to less than radius recommended by manufacturer.
7. Replace the entire length of the run of any wire or cable that is damaged or abraided during installation. There are no acceptable methods of repairing damaged or abraided wiring.
8. Use wire pulling lubricants and pulling tensions as recommended by the OEM.
9. Use grommets around cut-outs and knock-outs where conduit or chase nipples are not installed.
10. Do not use tape-based or glue-based cable anchors.
11. Ground shields and drain wires to the Facility's signal ground system as indicated by the drawings.
12. Field wiring entering equipment racks shall be terminated as follows:
  - a. Provide OEM directed service loops at harness break-outs and at plates, panels and equipment. Loops should be sufficient to allow plates, panels and equipment to be removed for service and inspection.
  - b. Line level and speaker level wiring may be terminated inside the equipment rack using specified terminal blocks (see "Products.") Provide 15% spare terminals inside each rack. Microphone level wiring may only be terminated at the equipment served.

- c. If specified terminal blocks are not designed for rack mounting, utilize  $\frac{3}{4}$ " plywood or 1/8" thick aluminum plates/blank panels as a mounting surface. Do not mount on the bottom of the rack.
  - d. Employ permanent strain relief for any cable with an outside diameter of 1" or greater.
- 13. Use only balanced audio circuits unless noted otherwise directed and indicated on the drawings.
- 14. Make all connections as follows:
  - a. Make all connections using rosin-core solder or mechanical connectors appropriate to the application.
  - b. For crimp-type connections, use only tools that are specified by the manufacturer for the application.
  - c. Use only insulated spade lugs on screw terminals. Spade lugs shall be sized to fit the wire gauge. Do not exceed two lugs per terminal.
  - d. Wire nuts, electrical tape or "Scotch Lock" connections are not acceptable for any application.
- 15. Noise filters and surge protectors shall be provided for each equipment interface cabinet, switch equipment cabinet, control console, local, and remote active equipment locations to ensure protection from input primary AC power surges and noise glitches are not induced into low Voltage data circuits.
- 16. Wires or cables previously approved to be installed outside of conduit, cable trays, wireways, cable duct, etc:
  - a Only when specifically authorized as described herein, will wires or cables be identified and approved to be installed outside of conduit. The wire or cable runs shall be UL rated plenum and OEM certified for use in air plenums.
  - b Wires and cables shall be hidden, protected, fastened and tied at 600 mm (24 in.) intervals, maximum, as described herein to building structure.
  - c Closer wire or cable fastening intervals may be required to prevents sagging, maintain clearance above suspended ceilings, remove unsightly wiring and cabling from view and discourage tampering and vandalism. Wire or cable runs, not provided in conduit, that penetrate outside building walls, supporting walls,



and two hour fire barriers shall be sleeved and sealed with an approved fire retardant sealant.

- d Wire or cable runs to system components installed in walls (i.e.: volume attenuators, circuit controllers, signal, or data outlets, etc.) may, when specifically authorized by the COR, be fished through hollow spaces in walls and shall be certified for use in air plenum areas.
- e Completely test all of the cables after installation and replace any defective cables.
- f Wires or cables that are installed outside of buildings shall be in conduit, secured to solid building structures. If specifically approved, on a case by case basis, to be run outside of conduit, the wires or cables shall be installed, as described herein. The bundled wires or cables must: Be tied at not less than 460 mm (18 in.) intervals to a solid building structure; have ultra violet protection and be totally waterproof (including all connections). The laying of wires or cables directly on roof tops, ladders, drooping down walls, walkways, floors, etc. is not allowed and will not be approved.

E. Cable Installation - Cable Installation - In addition to the **MANDATORY** infrastructure requirements outlined in VA Construction Specifications 27 10 00 - Structured TIP Communications Cabling, 27 11 00 - TIP Communications Rooms and Fittings and 27 15 00 - TIP Communications Horizontal and Vertical Cabling and the following additional practices shall be adhered too:

1. Support cable on maximum 2'-0" centers. Acceptable means of cable support are cable tray, j-hooks, and bridal rings. Velcro wrap cable bundles loosely to the means of support with plenum rated Velcro straps. Plastic tie wraps are not acceptable as a means to bundle cables.
2. Run cables parallel to walls.
3. Install maximum of 10 cables in a single row of J-hooks. Provide necessary rows of J-hooks as required by the number of cables.
4. Do not lay cables on top of light fixtures, ceiling tiles, mechanical equipment, or ductwork. Maintain at least 2'-0" clearance from all shielded electrical apparatus.

5. All cables shall be tested after the total installation is fully complete. All test results are to be documented. All cables shall pass acceptable test requirements and levels. Contractor shall remedy any cabling problems or defects in order to pass or comply with testing. This includes the re-pull of new cable as required at no additional cost to the Owner.
6. Ends of cables shall be properly terminated on both ends per industry and OEM's recommendations.
7. Provide proper temporary protection of cable after pulling is complete before final dressing and terminations are complete. Do not leave cable lying on floor. Bundle and tie wrap up off of the floor until you are ready to terminate.
8. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
9. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
10. Bundle, lace, and train conductors to terminal points without exceeding OEM's limitations on bending radii. Install lacing bars and distribution spools.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
12. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
13. Separation of Wires: (REFER TO RACEWAY INSTALLATION) Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
14. Serve all cables as follows:
  - a. Cover the end of the overall jacket with a 1" (minimum) length of transparent heat-shrink tubing. Cut unused insulated conductors 2" (minimum) past the heat-shrink, fold back over jacket and secure with cable-tie. Cut unused shield/drain wires 2" (minimum) past the Heatshrink and serve as indicated below.

- b. Cover shield/drain wires with heat-shrink tubing extending back to the overall jacket. Extend tubing  $\frac{1}{4}$ " past the end of unused wires, fold back over jacket and secure with cable tie.
  - c. For each solder-type connection, cover the bare wire and solder connection with heat-shrink tubing.
- F. Labeling: Provide labeling in accordance with ANSI/EIA/TIA-606-A. All lettering for Nurse Call and/or Code Blue circuits shall be stenciled using laser printers.
- 1. Cable and Wires (Hereinafter referred to as "Cable"): Cables shall be labeled at both ends in accordance with ANSI/EIA/TIA-606-A. Labels shall be permanent in contrasting colors. Cables shall be identified according to the System "Record Wiring Diagrams."
  - 2. Equipment: System equipment shall be permanently labeled with contrasting plastic laminate or Bakelite material. System equipment shall be labeled on the face of the unit corresponding to its source.
    - a. Clearly, consistently, logically and permanently mark switches, connectors, jacks, relays, receptacles and electronic and other equipment.
    - b. Engrave and paint fill all receptacle panels using  $\frac{1}{8}$ " (minimum) high lettering and contrasting paint.
    - c. For rack-mounted equipment, use engraved Lamacoid labels with white  $\frac{1}{8}$ " (minimum) high lettering on black background. Label the front and back of all rack-mounted equipment.
  - 3. Conduit, Cable Duct, and/or Cable Tray: The Contractor shall label all conduit, duct and tray, including utilized GFE, with permanent marking devices or spray painted stenciling a minimum of 3 meters (10 ft.) identifying it as the System. In addition, each enclosure shall be labeled according to this standard.
  - 4. Termination Hardware: The Contractor shall label TCOs and patch panel connections using color coded labels with identifiers in accordance with ANSI/EIA/TIA-606-A and the "Record Wiring Diagrams."
  - 5. Where multiple pieces of equipment reside in the same rack group, clearly and logically label each indicating to which room, channel, receptacle location, etc. they correspond.
  - 6. Permanently label cables at each end, including intra-rack connections. Labels shall be covered by the same, transparent heat-

- shrink tubing covering the end of the overall jacket. Alternatively, computer generated labels of the type which include a clear protective wrap may be used.
7. Contractor's name shall appear no more than once on each continuous set of racks. The Contractor's name shall not appear on wall plates or portable equipment.
  8. Ensure each OEM supplied item of equipment has appropriate UL Labels / Marks for the service the equipment is performed permanently attached / marked to a non-removal board in the unit. EQUIPMENT INSTALLED NOT BEARING THESE UL MARKS WILL NOT BE ALLOWED TO BE A PART OF THE SYSTEM. THE CONTRACTOR SHALL BEAR ALL COSTS REQUIRED TO PROVIDE REPLACEMENT EQUIPMENT WITH APPROVED UL MARKS.
- G. Conduit and Signal Ducts: When the Contractor and/or OEM determines additional system conduits and/or signal ducts are required in order to meet the system minimum performance standards outlined herein, the contractor shall provide these items as follows:
1. Conduit:
    - a. The Contractor shall employ the latest installation practices and materials. The Contractor shall provide conduit, junction boxes, connectors, sleeves, weather heads, 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.
    - b. All cables shall be installed in separate conduit and/or signal ducts (exception from the separate conduit requirement to allow Nurse Call and/or Code Blue cables to be installed in partitioned cable tray with voice cables may be granted in writing by the COR 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. When "interduct" flexible cable protective systems is specifically authorized to be provided for use in the System, it's installation guidelines and standards shall be as the specified herein, Section 27 05 33, RACEWAYS AND BOXES FOR COMMUNICATIONS SYSTEMS, and the NEC.
  - e. Conduit fill (including GFE approved to be used in the system) 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.
  - f. Ensure that Critical Care Nurse Call and/or Code Blue Systems (as identified by NEC Section 517) are completely separated and protected from all other systems.
2. Signal Duct, Cable Duct, or Cable Tray:
- a. The Contractor shall use GFE signal duct, cable duct, and/or cable tray, when identified and approved by the COR.
  - b. Approved signal and/or cable duct shall be a minimum size of 100 mm x 100 mm (4 in. X 4 in.) inside diameter with removable tops or sides, as appropriate. Protective sleeves, guides or barriers are required on all sharp corners, openings, anchors, bolts or screw ends, junction, interface and connection points.
  - c. Approved cable tray shall be fully covered, mechanically and physically partitioned for multiple electronic circuit use, and be UL certified and labeled for use with telecommunication circuits and/or systems. The COR shall approve width and height dimensions.
  - d. All cable junctions and taps shall be accessible. Provide an 8" X 8" X 4" (minimum) junction box attached to the cable duct or raceway for installation of distribution system passive equipment. Ensure all equipment and tap junctions are accessible

### **3.5 PROTECTION OF NETWORK DEVICES**

- A. Contractor shall protect network devices during unpacking and installation by wearing manufacturer approved electrostatic discharge (ESD) wrist straps tied to chassis ground. The wrist strap shall meet

OSHA requirements for prevention of electrical shock, should technician come in contact with high voltage.

### **3.6 CUTTING, CLEANING AND PATCHING**

- A. It shall be the responsibility of the contractor to keep their work area clear of debris and clean area daily at completion of work.
- B. It shall be the responsibility of the contractor to patch and paint any wall or surface that has been disturbed by the execution of this work.
- C. The Contractor shall be responsible for providing any additional cutting, drilling, fitting or patching required that is not indicated as provided by others to complete the Work or to make its parts fit together properly.
- D. The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate Contractor the Contractor's consent to cutting or otherwise altering the Work.
- E. Where coring of existing (previously installed) concrete is specified or required, including coring indicated under unit prices, the location of such coring shall be clearly identified in the field and the location shall be approved by the Project Manager prior to commencement of coring work.

### **3.7 FIREPROOFING**

- A. Where Nurse Call and/or Code Blue wires, cables and conduit penetrate fire rated walls, floors and ceilings, fireproof the opening.
- B. Provide conduit sleeves (if not already provided by electrical contractor) for cables that penetrate fire rated walls and Telecommunications Rooms floors and ceilings. After the cabling installation is complete, install fire proofing material in and around all conduit sleeves and openings. Install fire proofing material thoroughly and neatly. Seal all floor and ceiling penetrations.
- C. Use only materials and methods that preserve the integrity of the fire stopping system and its rating.

- D. Install fireproofing where low voltage cables are installed in the same manholes with high voltage cables; also cover the low voltage cables with arc proof and fireproof tape.
- E. Use approved fireproofing tape of the same type as used for the high voltage cables, and apply the tape in a single layer, one-half lapped or as recommended by the manufacturer. Install the tape with the coated side towards the cable and extend it not less than 25 mm (one inch) into each duct.
- F. Secure the tape in place by a random wrap of glass cloth tape.

### **3.8 GROUNDING**

- A. Ground Nurse Call and/or Code Blue cable shields and equipment to eliminate shock hazard and to minimize ground loops, commonmode returns, noise pickup, cross talk, and other impairments as specified in CFM Division 27, Section 27 05 26 - Grounding and Bonding for Communications Systems.
- B. Facility Signal Ground Terminal: Locate at main room or area signal ground within the room (i.e. head end and telecommunications rooms) or area(s) and indicate each signal ground location on the drawings.
- C. Extend the signal ground to inside each equipment cabinet and/or rack. Ensure each cabinet and/or rack installed item of equipment is connected to the extended signal ground. Isolate the signal ground from power and major equipment grounding systems.
- D. When required, install grounding electrodes as specified in CFM Division 26, Section 26 05 26 -Grounding and Bonding for Electrical Systems.
- E. Do not use "3<sup>rd</sup> or 4<sup>th</sup>" wire internal electrical system conductors for communications signal ground.
- F. Do not connect the signal ground to the building's external lightning protection system.
- G. Do Not "mix grounds" of different systems.
- H. Ensure grounds of different systems are installed as to not violate OSHA Safety and NEC installation requirements for protection of personnel.

## **PART 4 - TESTING / GUARANTY / TRAINING**

### **4.0 SYSTEM LISTING**

The Nurses Call System is NFPA listed as an "Emergency" Communication system. Where Code Blue signals are transmitted, that listing is

elevated to "Life Support/Safety." Therefore, the following testing and guaranty provisions are the minimum to be performed and provided by the contractor and Warranted by the OEM.

#### **4.1 PROOF OF PERFORMANCE TESTING**

##### **A. Intermediate Testing:**

1. After completion of 30 - 40% of the installation of a head end cabinet(s) and interconnection to the corresponding System Patient Head Wall Units and equipment, one master stations, local and remote stations, treatment rooms, and prior to any further work, this portion of the system must be pretested, inspected, and 1certified. Each item of installed equipment shall be checked to ensure appropriate UL Listing and Certification Labels are affixed as required by NFPA -Life Safety Code 101-3.2 (a) & (b), UL Nurse Call Standard 1069 and JCHCO evaluation guidelines, and proper installation practices are followed. The intermediate test shall include a full operational test.
2. All inspections and tests shall be conducted by an OEM-certified contractor representative and witnessed by TVE-0050P3B if there is no local Government Representative that processes OEM and VA approved Credentials to inspect and certify the system. The results of the inspection will be officially recorded by the Government Representative and maintained on file by the COR, until completion of the entire project. The results will be compared to the Acceptance Test results. An identical inspection may be conducted between the 65 - 75% of the system construction phase, at the direction of the COR.

##### **B. Pretesting:**

1. Upon completing installation of the Nurse Call and/or Code Blue System, the Contractor shall align, balance, and completely pretest the entire system under full operating conditions.
2. Pretesting Procedure:
  - a. During the System Pretest the Contractor shall verify (utilizing approved test equipment) that the System is fully operational and meets all the System performance requirements of this standard.
  - b. The Contractor shall pretest and verify that all PSM 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. At a minimum, each of the following locations shall be fully pretested:

- 1) Central Control Cabinets.
  - 2) Nurse Control Stations.
    - a) Master Stations
    - b) Patient Stations
    - c) Staff Stations
    - d) Emergency Stations
    - e) Code Blue Stations
  - 3) Dome Lights.
    - a) Patient Rooms
    - b) Corridors
    - c) Intersectional
  - 4) STRs
  - 5) Local and Remote Enunciation Panels (code blue).
  - 6) Electrical Supervision Panels/Functions/locations.
  - 7) All Networked locations.
  - 8) System interface locations (i.e. wireless, PA, telephone, etc.).
  - 9) System trouble reporting.
  - 10) System electrical supervision.
  - 11) UPS operation.
  - 12) Primary / Emergency AC Power Requirements
  - 13) Extra Auxiliary Generator Requirements.
  - 14) NSs.
3. The Contractor shall provide four (4) copies of the recorded system pretest measurements and the written certification that the System is ready for the formal acceptance test shall be submitted to the COR.

C. Acceptance Test:

1. After the Nurse Call and/or Code Blue System has been pretested and the Contractor has submitted the pretest results and certification to the COR, then the Contractor shall schedule an acceptance test date and give the COR 15 working days written notice prior to the date the acceptance test is expected to begin. The System shall be tested in the presence of a TVE 0050P3B and OEM certified

representatives. The System shall be tested utilizing the approved test equipment to certify proof of performance and Life Safety / Critical Service compliance. The tests shall verify that the total System meets all the requirements of this specification. The notification of the acceptance test shall include the expected length (in time) of the test.

2. The acceptance test shall be performed on a "go-no-go" basis. Only those operator adjustments required to show proof of performance shall be allowed. The test shall demonstrate and verify that the installed System does comply with all requirements of this specification under operating conditions. The System shall be rated as either acceptable or unacceptable at the conclusion of the test. Failure of any part of the System that precludes completion of system testing, and which cannot be repaired in four (4) hours, shall be cause for terminating the acceptance test of the System. Repeated failures that result in a cumulative time of eight (8) hours to affect repairs shall cause the entire System to be declared unacceptable.
3. Retesting of the entire System shall be rescheduled at the convenience of the Government and costs borne by the Contractor at the direction of the SRE.

D. Acceptance Test Procedure:

1. Physical and Mechanical Inspection:
  - a. The TVE 0050P3B Representative will tour all major areas where the Nurse Call and/or Code Blue System and all sub-systems are completely and properly installed to insure they are operationally ready for proof of performance testing. A system inventory including available spare parts will be taken at this time. Each item of installed equipment shall be checked to ensure appropriate UL certification labels are affixed.
  - b. The System diagrams, record drawings, equipment manuals, TIP Auto CAD Disks, intermediate, and pretest results shall be formally inventoried and reviewed.
  - c. Failure of the System to meet the installation requirements of this specification shall be grounds for terminating all testing.
2. Operational Test:

- a. After the Physical and Mechanical Inspection, the central terminating and nurse call master control equipment shall be checked to verify that it meets all performance requirements outlined herein. A spectrum analyzer and sound level meter may be utilized to accomplish this requirement.
- b. Following the central equipment test, a pillow speaker (or on board speaker) shall be connected to the central terminating and nurse call master control equipment's output tap to ensure there are no signal distortions such as intermodulation, data noise, popping sounds, erratic system functions, on any function.
- c. The distribution system shall be checked at each interface, junction, and distribution point, first, middle, and last intersectional, room, and bed dome light in each leg to verify that the nurse call distribution system meets all system performance standards.
- d. Each MATV outlet that is controlled by a nurse call pillow speaker shall be functionally tested at the same time utilizing the Contractor's approved hospital grade HDTV receiver and TV remote control cable.
- e. The RED system and volume stepper switches shall be checked to insure proper operation of the pillow speaker, the volume stepper and the RED system (if installed).
- f. Additionally, each installed emergency, patient, staff, duty, panic station, intersectional, room, and bed dome light, power supply, code one, and remote annunciator panels shall be checked insuring they meet the requirements of this specification.
- g. Once these tests have been completed, each installed sub-system function shall be tested as a unified, functioning and fully operating system. The typical functions are: nurse follower, three levels of emergency signaling (i.e. flashing red emergency, flashing white patient emergency, flashing white or combination lights for staff emergency, separate flashing code blue), minimum of 10 minutes of UPS operation, memory saving, minimum of ten station audio paging, canceling emergency calls at each originating station only, and storage and prioritizing of calls.
- h. Individual Item Test: The TVE 0050P3B Representative will select individual items of equipment for detailed proof of performance

testing until 100% of the System has been tested and found to meet the contents of this specification. Each item shall meet or exceed the minimum requirements of this document.

3. Test Conclusion:

- a. At the conclusion of the Acceptance Test, using the generated punch list (or discrepancy list) the VA and the Contractor shall jointly agree to the results of the test, and reschedule testing on deficiencies and shortages with the COR. Any retesting to comply with these specifications will be done at the Contractor's expense.
- b. If the System is declared unacceptable without conditions, all rescheduled testing expenses will be borne by the Contractor.

E. Acceptable Test Equipment: The test equipment shall furnished by the Contractor shall have a calibration tag of an acceptable calibration service dated not more than 12 months prior to the test. As part of the submittal, a test equipment list shall be furnished that includes the make and model number of the following type of equipment as a minimum:

1. Spectrum Analyzer.
2. Signal Level Meter.
3. Volt-Ohm Meter.
4. Sound Pressure Level (SPL) Meter.
5. Oscilloscope.
6. Pillow Speaker Test Set (Pillow Speaker with appropriate load and cross connections in lieu of the set is acceptable).
7. Patient Push Button Cord Test Set.
8. Patient Bed with connecting multiple conductor cord.

**4.2 WARRANTY**

A. Comply with FAR 52.246-21, except that warranty shall be as follows:

B. Contractor's Responsibility:

1. The Contractor shall warranty that all provided material and equipment will be free from defects, workmanship and will remain so for a period of one year from date of final acceptance of the System by the VA. The Contractor shall provide OEM's equipment warranty documents, to the COR (or Facility Contracting Officer if the Facility has taken possession of the building), that certifies each item of equipment installed conforms to OEM published specifications.

2. The Contractor's maintenance personnel shall have the ability to contact the Contractor and OEM for emergency maintenance and logistic assistance, remote diagnostic testing, and assistance in resolving technical problems at any time. This contact capability shall be provided by the Contractor and OEM at no additional cost to the VA.
3. All Contractor maintenance and supervisor personnel shall be fully qualified by the OEM and must provide two (2) copies of current and qualified OEM training certificates and OEM certification upon request.
4. Additionally, the Contractor shall accomplish the following minimum requirements during the two year guaranty period:
  - a. Response Time during the Two Year Guaranty Period:
    - 1) The COR (or Facility Contracting Officer if the system has been turned over to the Facility) is the Contractor's ONLY OFFICIAL reporting and contact official for nurse call system trouble calls, during the guaranty period.
    - 2) A standard work week is considered 8:00 A.M. to 5:00 P.M. or as designated by the COR (or Facility Contracting Officer), Monday through Friday exclusive of Federal Holidays.
  - 3) The Contractor shall respond and correct on-site trouble calls, during the standard work week to:
    - a) A routine trouble call within one (1) working day of its report. A routine trouble is considered a trouble which causes a pillow speaker or cordset, one (1) master nurse control station, patient station, emergency station, or dome light to be inoperable.
    - b) Routine trouble calls in critical emergency health care facilities (i.e., cardiac arrest, intensive care units, etc.) shall also be deemed as an emergency trouble call. The COR (or Facility Contracting Officer) shall notify the Contractor of this type of trouble call.
    - c) An emergency trouble call within four hours of its report. An emergency trouble is considered a trouble which causes a sub-system (ward), distribution point, terminal cabinet, or code one system to be inoperable at anytime.

- 4) If a Nurse Call and/or Code Blue/ component failure cannot be corrected within four (4) hours (exclusive of the standard work time limits), the Contractor shall be responsible for providing alternate nurse call equipment. The alternate equipment/system shall be operational within a maximum of 20 hours after the four (4) hour trouble shooting time and restore the effected location operation to meet the System performance standards. If any sub-system or major system trouble cannot be corrected within one working day, the Contractor shall furnish and install compatible substitute equipment returning the System or sub-system to full operational capability, as described herein, until repairs are complete.
- b. Required On-Site Visits during the **Two Year** Guaranty Period
- 1) The Contractor shall visit, on-site, for a minimum of eight (8) hours, once every 12 weeks, during the guaranty period, to perform system preventive maintenance, equipment cleaning, and operational adjustments to maintain the System according the descriptions identified in this document.
  - 2) The Contractor shall arrange all Facility visits with the COR (or Facility Contracting Officer) prior to performing the required maintenance visits.
  - 3) Preventive maintenance shall be performed by the Contractor in accordance with the OEM's recommended practice and service intervals during non-busy time agreed to by the COR (or Facility Contracting Officer) and Contractor.
  - 4) The preventive maintenance schedule, functions and reports shall be provided to and approved by the COR (or Facility Contracting Officer).
  - 5) The Contractor shall provide the COR (or Facility Contracting Officer) a type written report itemizing each deficiency found and the corrective action performed during each required visit or official reported trouble call. The Contractor shall provide the COR with sample copies of these reports for review and approval at the beginning of the Acceptance Test. The following reports are the minimum required:

- a) The Contractor shall provide a monthly summary all equipment and sub-systems serviced during this warranty period to COR (or Facility Contracting Officer) by the fifth (5<sup>th</sup>) working day after the end of each month. The report shall clearly and concisely describe the services rendered, parts replaced and repairs performed. The report shall prescribe anticipated future needs of the equipment and systems for preventive and predictive maintenance.
  - b) The Contractor shall maintain a separate log entry for each item of equipment and each sub-system of the System. The log shall list dates and times of all scheduled, routine, and emergency calls. Each emergency call shall be described with details of the nature and causes of emergency steps taken to rectify the situation and specific recommendations to avoid such conditions in the future.
- 6) The COR (or Facility Contracting Officer) shall convey to the Facility Engineering Officer, two (2) copies of actual reports for evaluation.
- a) The COR (or Facility Contracting Officer) shall ensure a copy of these reports is entered into the System's official acquisition documents.
  - b) The Facility Chief Engineer shall ensure a copy of these reports is entered into the System's official technical record documents.

C. Work Not Included: Maintenance and repair service shall not include the performance of any work due to improper use; accidents; other vendor, contractor, or owner tampering or negligence, for which the Contractor is not directly responsible and does not control. The Contractor shall immediately notify the COR or Facility Contracting Officer in writing upon the discovery of these incidents. The COR or Facility Contracting Officer will investigate all reported incidents and render

#### **4.3 TRAINING**

- A. Provide thorough training of all nursing staff assigned to those nursing units receiving new networked nurse/patient communications equipment. This training shall be developed and implemented to address two different types of staff. Floor nurses/staff shall receive training from their perspective, and likewise, unit secretaries (or any person

whose specific responsibilities include answering patient calls and dispatching staff) shall receive operational training from their perspective. A separate training room will be set up that allows this type of individualized training utilizing in-service training unit, prior to cut over of the new system.

B. Provide the following minimum training times and durations:

1. 48 hours prior to opening for nursing staff (in 8-hour increments) - split evenly over 3 weeks and day and night shifts. Coordinate schedule with Owner.
2. 32 hours during the opening week for nursing staff - both day and night shifts.
3. 24 hours for supervisors and system administrators.

**5.0 ATTACHMENTS**

A. The following items are required as a part of the system:

1. COTS Documents:
  - a.



**CHECKLIST FOR SOFTWARE LICENSING AGREEMENTS**  
 (For use in commercial item acquisition [COTS] conforming to – FAR Part 12)

<b>The Government may not be able to accept standard commercial licensing agreement without modification; <u>you must</u> negotiate terms and conditions so it is consistent with the FAR and the VAAR.</b>		
<b>Is the license (check all that apply):</b>	<b>Yes</b>	<b>No</b>
Exclusive		
Non-exclusive		
Perpetual		
Limited term		
If limited term, state the period (months or years):		
If limited term, is there an automatic renewal provision?		
CPU based		
If CPU based, state number of machines and whether simultaneous use is permitted:		
Site license		
If site license, state the site/location:		
Network license		
Other basis (e.g., # of users, # of transactions, etc.) (state specifics)		
Applicable to only the current version (doesn't apply to future versions)		
Software maintenance included at no extra cost		
Allow for office relocation or transfer		
Allow copying for backup or archival purpose		
Allow no cost copy at disaster recovery site		
Restricted on Use: (see note below)		
Restricted on the processing of data by or for user's subsidiaries and affiliates		
Restricted on processing of third party data (or use in service bureau)		
Restricted on network use		
Restricted on site and equipment limitations		
Restricted on number of users (e.g., cannot exceed _____ # of users)		

<b>Terms and Conditions that may need to be negotiated:</b>	<b>Yes</b>	<b>No</b>
Does the license prohibit use of the software outside of the Government? If yes, this needs to be deleted/modified if other Government contractors need access to the software (as GFP) to fulfill obligations of their own contracts.		
Does license state that the software is Year 2000 compliant or include a Year 2000 warranty? If no, must ensure it is compliant per FAR 39 or include a Y2K warranty.		
Does the license state that it provides no warranties or guarantees of any kind? If yes, need to determine whether additional warranty would be in the best interest of the Government.		
Does the license warrant that the software does not contain any code (e.g., virus) that will disable the software, and if such code exists, that Licensor agrees to indemnify the licensee (user) for all damages suffered as a result of such code? If no, need to negotiate for such warranty.		
Does the license allow access to source code? If no, negotiate for access if software will be modified or customized for the Government's needs or if the Government intends to maintain the software itself.		
Does the license require Licensor to deposit source code in escrow account? If no and source code is needed, consider negotiating for this provision, and state what "release conditions" are.		
Does the license allow the Government to hold the rights to customized code and to the data that the software manipulates? If no, negotiate for the rights if the Government (customer) requires them.		
Does the license authorize us to copy user manuals for internal purposes? If no, negotiate for authorization if multiple copies must be made for our internal use or ensure that the vendor supplies adequate number of copies. May also negotiate for updated manuals at periodic intervals, e.g., with each major update.		
Does the license state that licensee modifications to the software void all warranties? If yes, ensure that the vendor still warrants the unmodified portions.		
Does the license include clauses that prohibit needed uses of software, restrict the use of output from the software, or inappropriately burden the operation of the computer facilities? If yes, need to negotiate better terms and conditions.		
Is the dispute clause in the license consistent with FAR 52.233-1, Disputes Clause? If no, then need to modify license to be consistent with FAR.		
Does the default clause in the license allow for the Government to terminate for convenience or for cause, consistent with FAR 52.212-4(l) or FAR 52.212-4(m)? If no, then need to modify license to be consistent with FAR Part 12 (not FAR Part 49).		

b.

<b>SOLICITATION/CONTRACT/ORDER FOR COMMERCIAL ITEMS</b>				1. REQUISITION NUMBER		PAGE 1 OF 7	
OFFEROR TO COMPLETE BLOCKS 12, 17, 23, 24, & 30							
2. CONTRACT NO.		3. AWARD/EFFECTIVE DATE SEE BLOCK 31C		4. ORDER NUMBER		5. SOLICITATION NO.	
7. FOR SOLICITATION INFORMATION		a. NAME			b. TELEPHONE NUMBER (No collect calls)		6. SOLICITATION ISSUE DATE 8. OFFER DUE DATE/ LOCAL TIME
9. ISSUED BY:		CODE		10. THIS ACQUISITION IS <input type="checkbox"/> UNRESTRICTED <input type="checkbox"/> SETASIDE: 100 % FOR <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> HUBZONE SMALL BUSINESS <input type="checkbox"/> 8 (A) NAICS: 541511 SIZE STANDARD:		11. DELIVERY FOR FOB DESTINATION UNLESS BLOCK IS MARKED <input type="checkbox"/> SEE SCHEDULE <input type="checkbox"/> 13a. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 700) 13b. RATING 14. METHOD OF SOLICITATION <input checked="" type="checkbox"/> RFQ <input type="checkbox"/> IFB <input type="checkbox"/> RFP	
15. DELIVER TO		CODE		16. ADMINISTERED BY See #9 above			
17a. CONTRACTOR/ CODE OFFEROR			FACILITY CODE	18a. PAYMENT WILL BE MADE BY UNITED STATES OF AMERICA Department of Veterans Affairs FMS P.O. Box 149971 Austin, TX 78714-8971			
TELEPHONE NO: 703.246-0392				18b. SUBMIT INVOICES TO ADDRESS SHOWN IN BLOCK 18a. UNLESS BLOCK BELOW IS CHECKED <input checked="" type="checkbox"/> SEE ADDENDUM			
<input type="checkbox"/> 17b. CHECK IF REMITTANCE IS DIFFERENT AND PUT SUCH ADDRESS IN OFFER							

JLM Memorial Veterans Hospital  
Improve 5D Dialysis Functional Deficiencies  
Construction Document Submission

Contract No.: VA256-12-D-0332  
Task Order #: VA256-14-J-0987  
October 2014

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTI TY	22. UNI T	23. UNIT PRICE	24. AMOUNT
	See page 2  Use Reverse and/or (Attach Additional Sheets as Necessary)				
25. ACCOUNTING AND APPROPRIATION DATA				26. TOTAL AWARD AMOUNT (For Govt. Use Only)	

☐ 27a. SOLICITATION INCORPORATES BY REFERENCE FAR 52.212-1, 52.212-4. ☐ ARE NOT  
FAR 52.212-3 AND 52.212-5 ARE ATTACHED. ADDENDA ARE ATTACHED.  
☒ 27b. CONTRACT/PURCHASE ORDER INCORPORATES BY REFERENCE FAR 52.212-4, ☒ ARE ☐ ARE NOT  
52.227-14, 52.227-16, and 52.227-19. ADDENDA ATTACHED.

<input checked="" type="checkbox"/> 28. CONTRACTOR IS REQUIRED TO SIGN THIS DOCUMENT AND RETURN <u>1</u> COPIES TO ISSUING OFFICE. CONTRACTOR AGREES TO FURNISH AND DELIVER ALL ITEMS SET FORTH OR OTHERWISE IDENTIFIED ABOVE AND ON ANY ADDITIONAL SHEETS SUBJECT TO THE TERMS AND CONDITIONS SPECIFIED HEREIN.		<input type="checkbox"/> 29. AWARD OF CONTRACT: REF. _____ OFFER DATED _____. YOUR OFFER ON SOLICITATION (BLOCK 5), INCLUDING ANY ADDITIONS OR CHANGES WHICH ARE SET FORTH HEREIN, IS ACCEPTED AS TO ITEMS:	
30A. SIGNATURE OF OFFEROR/CONTRACTOR		31a. UNITED STATES OF AMERICA (SIGNATURE OF CONTRACTING OFFICER)	
30b. NAME AND TITLE OF SIGNER (Type or Print)	30c. DATE SIGNED	31b. NAME OF CONTRACTING OFFICER (Type or Print)  Contracting Officer	31c. DATE SIGNED

AUTHORIZED FOR LOCAL REPRODUCTION  
PREVIOUS EDITION IS NOT  
USABLE

COMPUTER-GENERATED

**STANDARD FORM 1449**  
(REV. 4/2002)  
Prescribed By GSA  
- FAR (48CFR) 53.212

19. ITEM NO.	20. SCHEDULE OF SUPPLIES/SERVICES	21. QUANTI TY	22. UNI T	23. UNIT PRICE	24. AMOUNT
-----------------	--------------------------------------	---------------------	-----------------	----------------------	---------------

This Contract is Firm Fixed Price (FFP). The Contractor is required to provide the software, software license, and software maintenance services for the computer software identified below. Distribution of maintenance copies shall be accomplished by using an appropriate magnetic, electronic or printed media. Software maintenance includes periodic updates, enhancements and corrections to the software, and reasonable technical support, all of which are customarily provided by the Contractor to its customers.

The name of the software is: Word 2008  
License Type: Perpetual or Term?????  
Software Manufacturer: Microsoft

**Governing Law.** Federal law and regulations, including the Federal Acquisition Regulations ("FAR"), shall govern this Contract or Order (Contract/Order). Commercial license agreements may be made a part of this Contract/Order but only if both parties expressly make them an addendum. If the commercial license agreement is not made an addendum, it shall not apply, govern, be a part of or have any effect whatsoever on this Contract/Order; this includes, but is not limited to, any agreement embedded in the computer software (clickwrap) or any agreement that is otherwise delivered with or provided to the Government with the commercial computer software or documentation (shrinkwrap), or any other license agreement otherwise referred to in any document. If a commercial license agreement is made an addendum, only those provisions addressing data rights regarding the Government's use, duplication and disclosure of data (e.g., restricted computer software) are included and made a part of this Contract/Order, and only to the extent that those provisions are not duplicative or inconsistent with Federal law, Federal regulation or the incorporated FAR clauses; those provisions in the commercial license agreement that do not address data rights regarding the Government's use, duplication and disclosure of data shall not be included or made a part of the Contract/Order. Federal law and regulation, including without limitation, the Contract Disputes Act (41 U.S.C. §601-613), the Anti-Deficiency Act (31 U.S.C. §1341 et seq.), the Competition in Contracting Act (41 U.S.C. §251, et seq), the Prompt Payment Act (31 U.S.C. §3901, et seq.) and FAR clauses 52.212-4, 52.227-14, 52.227-19 shall supersede, control and render ineffective any inconsistent, conflicting or duplicative provision in any commercial license agreement. In the event of conflict between this clause and any provision in the Contract/Order or the commercial license agreement or elsewhere, the terms of this clause shall prevail. Claims of patent or copyright infringement brought against the Government as a party shall be defended by the U.S. Department of Justice (DOJ). 28 U.S.C. § 516. At the discretion of DOJ, the Contractor may be allowed reasonable participation in the defense of the litigation. Any additional changes to the Contract/Order must be made by contract modification (Standard Form 30). Nothing in this Contract/Order or any commercial license

1	Microsoft Word 2008 Software License, Part No. 9891-7069. Software may be installed on four separate personal computers and be used by any VA employee or support service contractor. Licenses are perpetual. 12 months of Standard Microsoft Word Software Maintenance and Technical Support Services for the software being acquired under CLIN 1; Part No. 9891-7069.	4	EA	\$10,000.00	\$40,000.00
2		4	EA	\$2,500.00	\$10,000.00
	Total				\$50,000.00

32a. QUANTITY IN COLUMN 21 HAS BEEN  
☐ RECEIVED ☐ INSPECTED ☐ ACCEPTED, AND CONFORMS TO THE CONTRACT,  
EXCEPT AS NOTED:

32b. SIGNATURE OF AUTHORIZED GOVT. REPRESENTATIVE	32c. DATE	32d. PRINTED NAME AND TITLE OF AUTHORIZED GOVERNMENT REPRESENTATIVE
32e. MAILING ADDRESS OF AUTHORIZED GOVERNMENT REPRESENTATIVE		32f. TELEPHONE NO. OF AUTHORIZED GOVERNMENT REPRESENTATIVE

32g. E-MAIL OF AUTHORIZED GOVERNMENT REPRESENTATIVE

33. SHIP NUMBER	34. VOUCHER NUMBER	35. AMOUNT VERIFIED CORRECT FOR	36. PAYMENT <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL	37. CHECK NUMBER
<input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL		38. S/R ACCOUNT NUMBER	39. S/R VOUCHER NUMBER	40. PAID BY

41a. I CERTIFY THIS ACCOUNT IS CORRECT AND PROPER FOR PAYMENT		42a. RECEIVED BY (Print)	
41b. SIGNATURE AND TITLE OF CERTIFYING OFFICER		42b. RECEIVED AT (Location)	
41c. DATE		42c. DATE REC'D (YY/MM/DD)	42d. TOTAL CONTAINERS

STANDARD FORM

1449 (REV. 4/2002) BACK

ADDENDUM A -ADDITIONAL TERMS AND CONDITIONS FOR CONTRACT # **OR**  
ORDER#

**A.1 Federal Acquisition Regulation (FAR) Incorporated by Reference.** The Contractor agrees to comply with the following FAR clauses, which the Contracting Officer has indicated as being incorporated in this Contract/Order by reference, to implement provisions of law or executive orders applicable to acquisitions of this nature, to implement department policy or to clarify the Government's requirement. Copies of clauses in full text will be provided on request. FAR Clauses can be viewed at <http://www.arnet.gov/far/>.

- 1) FAR 52.212-4, Contract Terms and Conditions-Commercial Items (Oct 2003)
- 2) FAR 52.227-14, Rights in Data-General (Dec 2007), Alt III
- 3) FAR 52.227-16, Additional Data Requirements (Jun 1987)
- 4) FAR 52.227-19, Commercial Computer Software License (Dec 2007)

**A.2 Contracting Officer's Authority.** The Contracting Officer is the only person authorized to make or approve any changes in any of the requirements of this Contract, and notwithstanding any provisions contained elsewhere in this Contract/Order, the said authority remains solely within the Contracting Officer. In the event the Contractor makes any changes at the direction of any person other than the Contracting Officer, the changes will be considered to have been made without authority and no adjustment will be made in the contract price to cover any increase in costs incurred as a result thereof.

**A.3 VAAR 852.270-1 Representatives of Contracting Officers (APR 1984).** The Contracting Officer reserves the right to designate representatives to act for him/her in furnishing technical guidance and advice or generally supervise the work to be performed under this Contract/Order. Such designation will be in writing and will define the scope and limitations of the designee's authority. A copy of the designation shall be furnished the Contractor.

**A.4 VAAR 852.270-4 Commercial Advertising (NOV 1984).** The Contractor will not advertise the award of this Contract/Order in his/her commercial advertising in such a manner as to state or imply that the Department of Veterans Affairs endorses a product, project or commercial line of endeavor.

**A.5 VAAR 852.237-70 Contractor Responsibilities (APR 1984)** The Contractor shall obtain all necessary licenses and/or permits required to perform this work. He/she shall take all reasonable precautions necessary to protect persons and property from injury or damage during the performance of the Contract/Order. He/she shall be responsible for any injury to himself/herself, his/her employees, as well as for any damage to personal or public property that occurs during the performance of the Contract/Order that is caused by his/her employees fault or negligence, and shall maintain personal liability and property damage insurance having coverage for a limit as required by the laws of the state where services are performed. Further, it is agreed that any negligence of the Government, its officers, agents, servants and employees, shall not be the responsibility of the Contractor hereunder with the regard to any claims, loss, damage, injury, and liability resulting there from.

**A.6 Indemnification.** The Contractor shall save and hold harmless and indemnify the Government against any and all liability claims, and cost of whatsoever kind and nature for injury to or death of any person or persons and for loss or damage to any Contractor property or property owned by a third party occurring in connection with or in any way incident to or arising out of the occupancy, use service, operation, or performance of work under the terms of the Contract/Order, resulting in whole or in part from the acts or omissions of the Contractor, any subcontractor, or any employee, agent, or representative of the Contractor or subcontractor.

**A.7 Government's Liability.** The Government shall not be liable for any injury to the Contractor's personnel or damage to the Contractor's property

unless such injury or damage is due to negligence on the part of the Government and is recoverable under the Federal Torts Claims Act, or pursuant to other Federal statutory authority.

**A.10 Uniform Computer Information Transaction Act (UCITA).** UCITA is not applicable to the Contract/Order.

**A.11 Software License and Software Maintenance Subscription and Technical Support.**

(1) Definitions.

- (a) Licensee. The term "licensee" shall mean the U.S. Department of Veterans Affairs ("VA") and is synonymous with "Government."
- (b) Licensor. The term "licensor" shall mean the software manufacturer of the computer software being acquired. The term "Contractor" is the company identified in Block 17a on the SF1449. If the Contractor is a reseller and not the Licensor, the Contractor remains responsible for performance under this Contract.
- (c) Software. The term "software" shall mean the licensed computer software product(s) cited in the Schedule of Supplies (Page 2).
- (d) Maintenance. The term "maintenance" is the process of enhancing and optimizing software, as well as remedying defects. It shall include all new fixes, patches, releases, updates, versions and upgrades, as further defined below.
- (e) Technical Support. The term "technical support" refers to the range of services providing assistance for the software via the telephone, email, a website or otherwise.
- (f) Release or Update. The term "release" or "update" are terms that refer to a revision of software that contains defect corrections, minor enhancements or improvements of the software's functionality. This is usually designated by a change in the number to the right of the decimal point (e.g., from Version 5.3 to 5.4). An example of an update is the addition of new hardware.
- (g) Version or Upgrade. The term "version" or "upgrade" are terms that refer to a revision of software that contains new or improved functionality. This is usually designated by a change in the number to the left of the decimal point (e.g., from Version 5.4 to 6).

(2) License. Grant of License and Term.

- (a) See also Addendum B.
- (b) Unless otherwise stated in the Schedule of Supplies/Services, the software license provided to the Government is a perpetual, nonexclusive license to use the software.
- (c) The license authorizes the Government to use the software in processing data for other federal agencies.
- (d) If the licensed software requires a password (or license key) to be operational, it shall be delivered with the software media and have no expiration date.
- (e) If the Government decides to outsource or contract its services, the Government may allow the outsourcer to use the licensed software solely to provide the services on its behalf. The

outsourcer shall be bound by the provisions of this Contract relating to the use of the software.

- (f) If the software is for use in a networked environment, as may be reflected by the number of servers or users described in the Contract/Order, the license grant provided by the Contractor includes the Government's use of the software in such environment.
- (g) Any dispute regarding the license grant or usage limitations shall be resolved in accordance with the Disputes Clause incorporated in FAR 52.212-4(d).
- (h) If the Government purchases additional licenses, the terms and conditions for those additional licenses (including technical support and upgrade subscription) shall be the same as agreed to in this Contract/Order, unless negotiated otherwise by mutual agreement of the parties.
- (i) The licensed software contains critical product functionality that meets the minimum needs of the Government and is the basis for the Government's procurement of the software; consequently, the Contractor agrees that the Government has the right to successor products at no additional cost when functionality is later unbundled from the product licensed herein and bundled into a new or different product, provided the Government is current on maintenance.
- (j) If the Contractor is a reseller for the computer software being acquired under this Contract/Order, it is permissible for the actual software manufacturer (Licensor) to deliver the software directly to the Government.
- (k) All limitations of software usage are expressly stated in the SF 1449 and Addendum A and Addendum B.

(3) Software Maintenance Subscription and Technical Support.

- (a) See also Addendum B.
- (b) Software maintenance and technical support are included at the agreed upon price. However, if additional charges are assessed during the maintenance and technical support period as a result of negotiated changes in the license (e.g., CPU upgrades), the fee shall be by mutual agreement of the parties and any dispute thereof shall be resolved in accordance with the Disputes Clause incorporated herein at FAR 52.212-4(g).
- (c) If the Government desires to continue software maintenance and support beyond the period identified in this Contract/Order, the Government will issue a separate contract or order to renew annual maintenance and technical support. Conversely, if an order or contract to renew software maintenance and technical support is not received, no assumption by the Contractor shall be made that it has been renewed. It shall not be automatically renewed.
- (d) Unless otherwise agreed, for any new additional software that may be licensed, the Contractor shall provide for software maintenance and technical support for the first year of the license at no additional cost.
- (e) Unless otherwise agreed, the Contractor shall provide VA with software maintenance, which includes periodic updates, upgrades, enhancements and corrections to the software, and reasonable technical support, all of which are customarily provided by the



- Contractor to its customers so as to cause the software to perform according to its specifications, documentation or demonstrated claims.
- (f) Any telephone support provided by Contractor shall be at no additional cost.
  - (g) All technical support services will be provided in a timely manner in accordance with the Contractor's customary practice. However, prolonged delay in resolving software problems will be noted in the Government's various past performance records on the Contractor (e.g., [www.ppirs.gov](http://www.ppirs.gov)).
  - (h) If the Government allows the maintenance and/or technical support to lapse and subsequently wishes to reinstate maintenance and technical support, any reinstatement fee charged shall not exceed the amounts that would have been charged if the Government had not allowed it to lapse.

**A.12 Disabling Software Code.** The Government requires delivery of computer software that does not contain any code that will, upon the occurrence or the nonoccurrence of any event, disable the software. Such code includes but is not limited to a computer virus, restrictive key, node lock, time-out or other function, whether implemented by electronic, mechanical, or other means, which limits or hinders the use or access to any computer software based on residency on a specific hardware configuration, frequency of duration of use, or other limiting criteria. If any such code is present, the Contractor agrees to indemnify the Government for all damages suffered as a result of a disabling caused by such code, and the Contractor agrees to remove such code upon the Government's request at no extra cost to the Government. Inability of the Contractor to remove the disabling software code will be considered an inexcusable delay and a material breach of contract, and the Government may exercise its right to terminate for cause. In addition, the Government is permitted to remove the code as it deems appropriate and charge the Contractor for consideration for the time and effort in removing the code.

**A.13 Disaster Recovery Clause.** Government hereby certifies to Contractor that it has a bona fide disaster plan with respect to the computer software programs used in its operations. The Contract/Order authorizes the Government's operation to maintain a second copy of software on tape for use at loading at sites that are not live (e.g. subscription-based disaster recovery services) for the sole purpose of duplicating or mirroring the software environment of the "primary" licenses at the designated licensed site and as described herein. Additionally, use of the software at the contingency sites must not include general access or any processing for program development or production. Contractor shall permit operation and testing of all licensed programs at the contingency sites as designated by the Government without prior approval and at no additional cost to the Government solely for the purpose of maintaining or implementing disaster recovery readiness including continuity of business operations. CPU's, MIPS or MSU's at these contingency sites are excluded from the total CPU's, MIPS or MSU's count included elsewhere in the Contract/Order and are not separately billable. Activation of operations at a contingency site shall be at Government's discretion. Government is authorized to install all software at the contingency sites for testing, problem resolution purposes, and to ensure there will be no operational delays in association with transition of workload from the designated licensed site to the contingency sites. Use of the software at the contingency sites in the event of a disaster shall

continue until such time as normal processing can be resumed at the "primary" site regardless of the duration required. Nothing in the Contract/Order diminishes the Government's rights in accordance with the data rights clause(s). Any license keys, codes, or passwords required by the Contractor in order to use the software at the contingency sites shall be provided to the Government within 10 days of the Government's request.

**A.14 NOTICE OF THE FEDERAL ACCESSIBILITY LAW AFFECTING ALL ELECTRONIC AND INFORMATION TECHNOLOGY PROCUREMENTS (SECTION 508)**

On August 7, 1998, Section 508 of the Rehabilitation Act of 1973 was amended to require that when Federal departments or agencies develop, procure, maintain, or use Electronic and Information Technology, that they shall ensure it allows Federal employees with disabilities to have access to and use of information and data that is comparable to the access to and use of information and data by other Federal employees.

Section 508 required the Architectural and Transportation Barriers Compliance Board (Access Board) to publish standards setting forth a definition of electronic and information technology and the technical and functional criteria for such technology to comply with Section 508. These standards have been developed were published with an effective date of December 21, 2000. Federal departments and agencies must develop all Electronic and Information Technology requirements to comply with the standards found in 36 CFR 1194 . \_\_\_\_ \* in performing this contract. (Fill in Section Number and Title)

**ADDENDUM B - STATEMENT OF WORK FOR CONTRACT # \_\_\_\_\_ or ORDER# \_\_\_\_\_**

**B.1 License.** BROADLY DESCRIBE COMPUTING ENVIRONMENT AND HOW VA INTENDS TO USE THE SOFTWARE, HOW ITS LICENSED, WHAT THE SOFTWARE IS EXPECTED TO DO, ETC. TO GET YOU STARTED: The Department of Veterans Affairs (VA) has a need for the computer software identified on the Schedule of Supplies/Services (page 2) (software media and license) and software support services. The software will be installed **onto multiple servers** at the ITAC in Austin Texas for support/training/staging of the \_\_\_\_\_ Project. These are processor-based licenses that allow for unlimited users utilizing the processor(s). Contractor shall grant the Government the necessary license to accommodate this need. VA may move the software to any other location or hardware at any time.

**B.2 Maintenance.** The Contractor will provide software maintenance services, which includes periodic updates, enhancements and corrections to the software, and reasonable technical support, all of which are customarily provided by the Contractor to its customers so as to cause the software to perform according to its specifications, documentation or demonstrated claims. **Add detailed, specific maintenance and support information here.** The Contractor will distribute maintenance updates or releases by using an appropriate magnetic, electronic, or printed media to the address in Block 15 of page one, but to the attention of **Joe Smith**. Alternatively, the Contractor may offer access to maintenance copies through its website. All maintenance services will be provided in a timely manner in accordance with the Contractor's customary practice. However, prolonged delay in resolving

JLM Memorial Veterans Hospital  
Improve 5D Dialysis Functional Deficiencies  
Construction Document Submission

Contract No.: VA256-12-D-0332  
Task Order #: VA256-14-J-0987  
October 2014

software problems will be noted in the Government's various past performance records on the Contractor (e.g., [www.ppirs.gov](http://www.ppirs.gov)).

## **2. MOU**

**Department of  
Veterans Affairs**

**Memorandum**

- Date:** (Current Date)
- From:** Department of Veterans Affairs  
Office of Telecommunications (005OP)  
Spectrum Management (005OP2H3 – Room 047))  
Telecommunications Voice Engineering (005OP2H2)  
810 Vermont Avenue, NW  
Washington, DC 20420
- Subj:** Memorandum of Understanding (MOU) for Non - VA Licensed Wireless Operations
- To:** Facility Director (00)  
(Address)  
(Address)
1. The following circumstances are the minimum necessary for conditional use of Wireless Equipment / System (s) in VA Owned or Leased Facilities (here-in after referred to as ‘the Facility’). VA Headquarters OI&T’s (005) Spectrum Management (005OP2H3), Telecommunications Voice Engineering, Special Communications (TVE - 005OP2H2) and Office of Cyber Security (OCIS – 0050P2) are the responsible entities insuring conformity of each requirement:
    - a. Each item of equipment or system whose Radio Frequency (RF) equipment is listed under Consolidated Federal Regulations (CFR), Title 47 – Federal Communications Commission (FCC), Part 15, Chapter 7, Use of Non Licensed Devices must be installed and operated in a manner consistent with Part 15’s “Safety of Life” restrictions. This information is re-emphasized in CFR, Title 15 – Department of Commerce, Under the Information Technology Management Reform Act (Public Law 104-106), National Telecommunications Information Administration (NTIA) Manual of Regulations and Procedures for Federal Radio Frequency Management (aka ‘The Red Book’).
    - b. FCC Part 15 listed RF devices ***shall not*** be Installed or used in areas where “Safety of Life” functions / operations are accomplished or where a ‘Code Blue’ enunciation may occur. A list of the minimum areas affected by this statement is provided as Attachment One.
    - c. If external or internal interference is detected and cannot be corrected, ***the FCC Part 15 Listed RF Equipment affected must be turned off until corrections and/or substitutions can be made.*** Contact VA’s Office of Spectrum Management (OSM – 005OP2H3), 202 461-5301 for specific conditional approval(s) concerning this issue.

### 3. Risk Assessment

Department of  
Veterans Affairs

#### Memorandum

**Date:** (current date)

**From:** Director (XXXXXX)  
Address  
Address  
Address

**Subj:** VA Headquarters (VACO) Memorandum of Understanding (MOU) for  
Federal Communications Commission (FCC) Part 15 Listed "Non-Regulated  
Equipment Wireless Operations"

**To:** Department of Veterans Affairs  
Office of Telecommunications (005OP)  
Spectrum Management (005OP2H3)  
Telecommunications Voice Engineering (005OP2H2)  
1335 East West Highway, 3<sup>rd</sup> Floor  
Silver Spring, Maryland 20420

1. We have received the subject VACO MOU (signed copy attached), and are pleased to provide the following information and comments for your review that includes our risks and risk-mitigation factors that prompted our Facility's decision:

a. RISK ASSESSMENT AND MITIGATION:

(1) Background:

(a) (name) VAMC (here-in-after referred to as "the Facility") has used (OEM Mdl Nr©) for over 10 years to allow nurses in the telemetry studio to communicate with nurses at the patients' bedside. This communication medium is a vital patient safety tool that allows for rapid response to the development of a potentially fatal arrhythmia such as ventricular tachycardia. The only information the telemetry technician states on the phone is "bed 109-2 Smith has an alarm for XXXXX." Last four is never communicated. In terms of the pager we have limited the information on the pager to sector, bed number and last name. We must include the last name as occasionally the patients are moved without the knowledge of the telemetry technician, if we were to have a patient mix up the page must contain the last name for safety reasons. Facility Management Services (FMS) has restricted paging access to the telemetry system only. Because pager access is restricted, only an administrator from Technology and Information Management (TIM) or FMS can troubleshoot a pager malfunction.

VAMC (City), (State - ZIP Code), Unregulated FCC Equipment Use, Risk Assessment and Mitigation, Page Two

(b) Because the phones are used 24X7 and have exceeded their life expectancy, many of them have begun to fail which creates a need to purchase newer models that will continue to insure system integrity.

(c) Our Facility has been prevented from purchasing replacement phones because VACO now has updated security and Information Technology (IT) connection controls along with continuing FCC Part 15 restrictions (described in the attached MOU) on devices of which these wireless phones are but one example. These updated security and connection controls are in place to address risks related life safety, information security, personal privacy and IT system integrity. The FCC restrictions continue to warn against the use of "non-regulated radio / wireless based equipment in safety of life locations and functions." Of note, these controls are intended to prevent use of these devices in areas especially where a code-blue announcement might occur, yet our devices have been used in such areas for over 10 years and so far has not prevented a code-blue announcement from happening.

(d) Because the Facility does not have a near-term alternative to the current wireless phones, it now faces a set of competing risks. On the one hand are the risks of privacy, connection and interference or security breach(s) that are behind the controls in place for these devices. On the other hand are risks to patient safety if the current phones were to fail and telemetry nurses would lose the ability to rapidly communicate with nurses at the bedside. Our Facility does have a Life Safety approved Nurses Call / Code Blue hardwired system that is installed in those affected areas as the primary Code Blue Enunciation media.

## (2) SECURITY:

(a) NEC provides a proprietary scrambling algorithm that is applied to handset registration / authentication and all communications. Every time a (OEM Mdl Nr©) user enters a designated area within the systems' coverage; an automatic user authentication process is performed to confirm the device is authorized for service on the system. This information is scrambled using a proprietary coding scheme to prevent duplication. All voice conversations are also scrambled to enhance security.

(b) The (OEM Mdl Nr©) has several built in security features in each of the wireless handsets are administered through the Facility's Telephone Private Branch Exchange (PBX) administration tool; therefore, the PBX Administrator has full control over the (OEM Mdl Nr©) wireless phones, if one gets lost or stolen it can be disabled immediately. Because of this feature you cannot purchase a similar wireless phone and have it work on our network. These phones have a 50 ft radius from the Zone radio frequency (RF) transceiver; they can only be used within the hospital as there is no handoff via other cellular networks.

(c) These items are not NIST FIPS compliant; but based on the aforementioned facts, we feel patient / staff privacy and HIPAA instructions have been and will continue to be met.

(d) Our Facility will work with (OEM) and VACO's Office of Cyber Security (Name and Phone Nr) to secure the appropriate NIST FIPS certifications will allow VA to issue a Official Approvals from the onset in the IT equipment / system procurement process.

VAMC (City), (State - ZIP Code), Unregulated FCC Equipment Use, Risk Assessment and Mitigation, Page Three

(3) RADIO FREQUENCY (RF) INTERFERENCE:

(a) (OEM) engineers provided us with extensive information on the potential for RF along with electromagnetic (EM) interference to medical equipment within our Facility from the (OEM System) Wireless radio transceivers.

1) Field Experience: Since introduction of the (OEM System) Wireless product in 1996, NEC has installed this system at many health care institutions across the spectrum of medical departments. In all this time there have been zero reports of either suspected or actual RF and EM interference. This includes the experience using these devices at Portland VAMC and our continued testing documentation is available for review if requested.

2) Potential interference called Near Field Coupling: In these cases, an EM field emanating from one device may cause another device within its field area to malfunction. Typically the distances for these fields are less than six (6) inches. In attempts to mitigate these sources of interference, standards have been put in place, namely IEC 60601. This standard calls for devices susceptible to interference to provide shielding against fields of up to three (3) Volts per Meter. In contrast, the (OEM System) wireless products are classified under the FCC Part 15 rules as Class B unlicensed devices, and as such must meet very tight restrictions regarding field emissions of a maximum of from 100 to 500 micro (μ) Volts per Meter across the band of RFs from 30 Hz to 18 GHz. Thus, any medical device even marginally meeting the IEC Standard has not had problems with any near field emissions.

3) Potential phenomenon known as Far Field Induced RFI: should be considered when studying RF and EM interference sources. In this case, a part of the device subject to interference (e.g., a wire, probe, or the casing itself) can inadvertently act as a receiving antenna for a signal transmitted from another device within close proximity (within 6 to 18 inches, depending on the source power levels). To realize this type of interference, the source transmitter power must be fairly strong to conduct through the inefficient nature of the unintended antenna of the receiving device, and the material acting as the antenna must be of a shape and length that matches or is a near multiple of the wavelength of the transmitted RF signal. Finally, this unintentional antenna must not have the typical shielding between it and the subject device's electronics, which if

present would prevent such a received signal from causing interference. In the case of the (OEM System) Wireless transmission, which operates between 1,920 MHz and 1,930 MHz, a probe or such piece of any medical device measuring at about six (6) inches would match the wavelength of the RF carrier, and if not properly shielded from the units electronics may indeed conduct the RF energy within. However, even in this case, one must consider the power level at the so-called antenna receiving the signal. The average output of the (OEM Mdl Nr©) handset is approximately 10 mili (m) Watts when in use. This very low power, even further reduced by the distance between any handset in use and the subject receiving equipment, considered along with the high loss of the "antenna", results in a very low probability of actual interference. These facts, along with the standard procedures of your engineering department's efforts to check the medical equipment for such shielding and filtering defects, should mitigate this potential source.

4) Potential interference between intentional radiators operating in the RF band. Known as either in-band or out-of-band interference, these are cases where a transmitter broadcasts a signal of significant power at the other device's receiver to either overload the receiving radio or mix with the subject's transmitted signal to cause an interfered signal to be received. In-band interference

VAMC (City), (State - ZIP Code), Unregulated FCC Equipment Use, Risk Assessment and Mitigation, Page Four

in the Unlicensed PCS band of which the (OEM System) Wireless system operates is prevented by the FCC rules requiring our equipment to monitor the carrier on which a device intends to transmit on before doing so, so as to sense any current use by another device. If such a signal is received during monitoring, we move to another carrier and try again. This protocol has been demonstrated many times within the FCC labs as well as at many industry trade shows where 5 or more vendors with U-PCS devices have operated in booths close to each other without interference. As for out-of-band interference, because of the extremely low power our devices operate with and the very strict out-of-band emission requirements placed upon the U-PCS devices, and the additional factor of a wide separation in the operating frequencies of our system and the typical radio telemetry equipment used in many hospital environments, such interference is very remote and would require extremely close proximity of the two devices.

5) All of our (OEM Mdl Nr©) are FCC listed and has not interfered with other traffic within the same band. We expect the FCC listed (OEM Mdl Nr©) equipment will perform in the same manner.

(b) Our Facility will work with (OEM) and VACO's Spectrum Management (0050P2H3) to find a RF band that can be utilized for this operation that will allow VA to issue a formal and Official Radio Use Permit that will negate the "unregulated equipment use" issues.

(4) CONNECTION TO IT/CABLE NETWORKS:



(a) Each item or system that attaches to a VA IT Network (telephone or data) must be Department of Commerce's National Recognized Testing Laboratory (NRTL) Underwriters Laboratory (UL) 60950-1/2; Information Technology Equipment - Safety listed and bears UL's mark.

1) Paragraph 1.1.1; Equipment Covered by this Standard specifically identifies these systems / networks as one affected system.

2) Paragraph 1.1.2; Additional Requirements further identifies this requirement for electromedical applications with physical connections to the patient be met.

(b) This requirement is paramount since the Facility's Telephone PABX and associated system is listed by the National Fire Protection Association as Critical Service. Additionally, since it carries our Code Blue Radio and Overhead Audio Paging Signals, VA elevates it to Life Safety Service.

(c) Presently the (OEM Mdl Nr©) wireless phones are UL Listed but does not have the aforementioned specific UL certification. Our Facility is working with (The OEM) in this arena to have them meet or exceed this UL requirement. In the meantime we will abide within the confines outlined in the attached MOU for insuring an approved IT Network / System connection is maintained until the appropriate UL certification has been obtained allowing it to be directly connected to our telephone system.

b. The Facility Director after careful review of the attached MOU and consultation with the Facility's CIO, (OEM) engineers, Biomedical and NFPA Engineers, ISO, HIPAA / Privacy Officer, Clinical Staff and JACHAO Officials has decided this risk-benefit analysis strongly favors purchasing replacement (OEM Mdl Nr) phones.

VAMC (City), (State - ZIP Code), Unregulated FCC Equipment Use, Risk Assessment and Mitigation, Page Four

2. Please feel free to contact me concerning the contents of this document.

DIRECTOR's NAME IN CAPS

cc: Office of General Counsel  
Office of Telecommunications (05)  
VA Enterprise Infrastructure Engineering  
Telecommunications Engineering and Design  
Office of Cyber Security

JLM Memorial Veterans Hospital  
Improve 5D Dialysis Functional Deficiencies  
Construction Document Submission

Contract No.: VA256-12-D-0332  
Task Order #: VA256-14-J-0987  
October 2014

Attachment: VACO MOU

- - - E N D - - -

**SECTION 28 31 00**  
**FIRE DETECTION AND ALARM**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section of the specifications includes the furnishing, installation, and connection of the fire alarm equipment to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, and wiring as shown on the drawings and specified. The fire alarm system shall not be combined with other systems such as building automation, energy management, security, etc.
- B. Fire alarm systems shall comply with requirements of the most recent VA FIRE PROTECTION DESIGN MANUAL and NFPA 72 unless variations to NFPA 72 are specifically identified within these contract documents by the following notation: "variation". The design, system layout, document submittal preparation, and supervision of installation and testing shall be provided by a technician that is certified NICET level III or a registered fire protection engineer. The NICET certified technician shall be on site for the supervision and testing of the system. Factory engineers from the equipment manufacturer, thoroughly familiar and knowledgeable with all equipment utilized, shall provide additional technical support at the site as required by the COTR or his authorized representative. Installers shall have a minimum of 2 years experience installing fire alarm systems.
- C. Fire alarm signals:
  - 1. Building shall have an automatic digitized voice fire alarm signal with emergency manual voice override to notify occupants to evacuate.
- D. Alarm signals (by device), supervisory signals (by device) and system trouble signals (by device not reporting) shall be distinctly transmitted to the main fire alarm system control unit located in Building 100.
- E. The main fire alarm control unit shall automatically transmit alarm signals to a listed central station using a digital alarm communicator transmitter in accordance with NFPA 72.

## 1.2 SCOPE

- A. A fully addressable fire alarm system shall be designed and installed in accordance with the specifications and drawings. Device location and wiring runs shown on the drawings are for reference only unless specifically dimensioned. Actual locations shall be in accordance with NFPA 72 and this specification.
- B. All existing fire alarm equipment, wiring, devices and sub-systems that are not shown. are existing to remain.
- C. Basic Performance:
  - 1. Alarm and trouble signals from each building fire alarm control panel shall be digitally encoded by UL listed electronic devices onto a multiplexed communication system.
  - 2. Response time between alarm initiation (contact closure) and recording at the main fire alarm control unit (appearance on alphanumeric read out) shall not exceed 5 seconds.
  - 3. The signaling line circuits (SLC) between building fire alarm control units shall be wired Style 7 in accordance with NFPA 72. Isolation shall be provided so that no more than one building can be lost due to a short circuit fault.
  - 4. Initiating device circuits (IDC) shall be wired Style C in accordance with NFPA 72.
  - 5. Signaling line circuits (SLC) within buildings shall be wired Style 4 in accordance with NFPA 72. Individual signaling line circuits shall be limited to covering 22,500 square feet of floor space or 3 floors whichever is less.
  - 6. Notification appliance circuits (NAC) shall be wired Style Y in accordance with NFPA 72.

## 1.3 RELATED WORK

- A. Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES. Requirements for procedures for submittals.
- B. Section 07 84 00 - FIRESTOPPING. Requirements for fire proofing wall penetrations.
- C. Section 08 71 00 - DOOR HARDWARE. For combination Closer-Holders.

#### **1.4 SUBMITTALS**

A. General: Submit 5 copies in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, and Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.

B. Drawings:

1. Prepare drawings using AutoCAD Release 14 software and include all contractors information. Layering shall be by VA criteria as provided by the Contracting Officer's Technical Representative (COTR). Bid drawing files on AutoCAD will be provided to the Contractor at the pre-construction meeting. The contractor shall be responsible for verifying all critical dimensions shown on the drawings provided by VA.
2. Floor plans: Provide locations of all devices (with device number at each addressable device corresponding to control unit programming), appliances, panels, equipment, junction/terminal cabinets/boxes, risers, electrical power connections, individual circuits and raceway routing, system zoning; number, size, and type of raceways and conductors in each raceway; conduit fill calculations with cross section area percent fill for each type and size of conductor and raceway. Only those devices connected and incorporated into the final system shall be on these floor plans. Do not show any removed devices on the floor plans. Show all interfaces for all fire safety functions.
3. Riser diagrams: Provide, for the entire system, the number, size and type of riser raceways and conductors in each riser raceway and number of each type device per floor and zone. Show door holder interface, elevator control interface, HVAC shutdown interface, fire extinguishing system interface, and all other fire safety interfaces. Show wiring Styles on the riser diagram for all circuits. Provide diagrams both on a per building and campus wide basis.
4. Detailed wiring diagrams: Provide for control panels, modules, power supplies, electrical power connections, auxiliary relays and annunciators showing termination identifications, size and type conductors, circuit boards, LED lamps, indicators, adjustable controls, switches, ribbon connectors, wiring harnesses, terminal

strips and connectors, spare zones/circuits. Diagrams shall be drawn to a scale sufficient to show spatial relationships between components, enclosures and equipment configuration.

5. Two weeks prior to final inspection, the Contractor shall deliver to the COTR 3 sets of as-built drawings and one set of the as-built drawing computer files using AutoCAD 2007 or later. As-built drawings (floor plans) shall show all new and/or existing conduit used for the fire alarm system.

C. Manuals:

1. Submit simultaneously with the shop drawings, companion copies of complete maintenance and operating manuals including technical data sheets for all items used in the system, power requirements, device wiring diagrams, dimensions, and information for ordering replacement parts.
  - a. Wiring diagrams shall have their terminals identified to facilitate installation, operation, expansion and maintenance.
  - b. Wiring diagrams shall indicate internal wiring for each item of equipment and the interconnections between the items of equipment.
  - c. Include complete listing of all software used and installation and operation instructions including the input/output matrix chart.
  - d. Provide a clear and concise description of operation that gives, in detail, the information required to properly operate, inspect, test and maintain the equipment and system. Provide all manufacturer's installation limitations including but not limited to circuit length limitations.
  - e. Complete listing of all digitized voice messages.
  - f. Provide standby battery calculations under normal operating and alarm modes. Battery calculations shall include the magnets for holding the doors open for one minute.
  - g. Include information indicating who will provide emergency service and perform post contract maintenance.
  - h. Provide a replacement parts list with current prices. Include a list of recommended spare parts, tools, and instruments for testing and maintenance purposes.

- i. A computerized preventive maintenance schedule for all equipment. The schedule shall be provided on disk in a computer format acceptable to the VAMC and shall describe the protocol for preventive maintenance of all equipment. The schedule shall include the required times for systematic examination, adjustment and cleaning of all equipment. A print out of the schedule shall also be provided in the manual. Provide the disk in a pocket within the manual.
    - j. Furnish manuals in 3 ring loose-leaf binder or manufacturer's standard binder.
    - k. A print out for all devices proposed on each signaling line circuit with spare capacity indicated.
  2. Two weeks prior to final inspection, deliver 4 copies of the final updated maintenance and operating manual to the COTR.
    - a. The manual shall be updated to include any information necessitated by the maintenance and operating manual approval.
    - b. Complete "As installed" wiring and schematic diagrams shall be included that shows all items of equipment and their interconnecting wiring. Show all final terminal identifications.
    - c. Complete listing of all programming information, including all control events per device including an updated input/output matrix.
    - d. Certificate of Installation as required by NFPA 72 for each building. The certificate shall identify any variations from the National Fire Alarm Code.
    - e. Certificate from equipment manufacturer assuring compliance with all manufacturers installation requirements and satisfactory system operation.
- D. Certifications:
1. Together with the shop drawing submittal, submit the technician's NICET level III fire alarm certification as well as certification from the control unit manufacturer that the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include in the certification the names and addresses of the proposed supervisor of installation and the proposed performer of contract maintenance. Also include the name

and title of the manufacturer's representative who makes the certification.

2. Together with the shop drawing submittal, submit a certification from either the control unit manufacturer or the manufacturer of each component (e.g., smoke detector) that the components being furnished are compatible with the control unit.
3. Together with the shop drawing submittal, submit a certification from the major equipment manufacturer that the wiring and connection diagrams meet this specification, UL and NFPA 72 requirements.

#### **1.5 WARRANTY**

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of one year from the date of acceptance of the entire installation by the Contracting Officer.

#### **1.6 GUARANTY PERIOD SERVICES**

- A. Complete inspection, testing, maintenance and repair service for the fire alarm system shall be provided by a factory trained authorized representative of the manufacturer of the major equipment for a period of 5 years from the date of acceptance of the entire installation by the Contracting Officer.
- B. Contractor shall provide all necessary test equipment, parts and labor to perform required inspection, testing, maintenance and repair.
- C. All inspection, testing, maintenance and permanent records required by NFPA 72, and recommended by the equipment manufacturer shall be provided by the contractor. Work shall include operation of sprinkler system alarm and supervisory devices. It shall include all interfaced equipment including but not limited to elevators, HVAC shutdown, and extinguishing systems.
- D. Maintenance and testing shall be performed in accordance with NFPA 72. A computerized preventive maintenance schedule shall be provided and shall describe the protocol for preventive maintenance of equipment. The schedule shall include a systematic examination, adjustment and cleaning of all equipment.
- E. Non-included Work: Repair service shall not include the performance of any work due to improper use, accidents, or negligence for which the contractor is not responsible.



F. Service and emergency personnel shall report to the Engineering Office or their authorized representative upon arrival at the hospital and again upon the completion of the required work. A copy of the work ticket containing a complete description of the work performed and parts replaced shall be provided to the VA COTR or his authorized representative.

G. Emergency Service:

1. Warranty Period Service: Service other than the preventative maintenance, inspection, and testing required by NFPA 72 shall be considered emergency call-back service and covered under the warranty of the installation during the first year of the warranty period, unless the required service is a result of abuse or misuse by the Government. Written notification shall not be required for emergency warranty period service and the contractor shall respond as outlined in the following sections on Normal and Overtime Emergency Call-Back Service. Warranty period service can be required during normal or overtime emergency call-back service time periods at the discretion of the COTR or his authorized representative.
2. Normal and overtime emergency call-back service shall consist of an on-site response within 2 hours of notification of a system trouble.
3. Normal emergency call-back service times are between the hours of 7:30 a.m. and 4:00 p.m., Monday through Friday, exclusive of federal holidays. Service performed during all other times shall be considered to be overtime emergency call-back service. The cost of all normal emergency call-back service for years 2 through 5 shall be included in the cost of this contract.
4. Overtime emergency call-back service shall be provided for the system when requested by the Government. The cost of the first 40 manhours per year of overtime call-back service during years 2 through 5 of this contract shall be provided under this contract. Payment for overtime emergency call-back service in excess of the 40 man hours per year requirement will be handled through separate purchase orders. The method of calculating overtime emergency call-back hours is based on actual time spent on site and does not include travel time.

H. The contractor shall maintain a log at each fire alarm control unit. The log shall list the date and time of all examinations and trouble

calls, condition of the system, and name of the technician. Each trouble call shall be fully described, including the nature of the trouble, necessary correction performed, and parts replaced.

### **1.7 APPLICABLE PUBLICATIONS**

- A. The publications listed below (including amendments, addenda, revisions, supplements and errata) form a part of this specification to the extent referenced. The publications are referenced in text by the basic designation only and the latest editions of these publications shall be applicable.
- B. National Fire Protection Association (NFPA):
  - NFPA 13 .....Standard for the Installation of Sprinkler Systems, 2010 edition
  - NFPA 14 .....Standard for the Installation of Standpipes and Hose Systems, 2010 edition
  - NFPA 20 .....Standard for the Installation of Stationary Pumps for Fire Protection, 2010 edition
  - NFPA 70.....National Electrical Code (NEC), 2010 edition
  - NFPA 72.....National Fire Alarm Code, 2010 edition
  - NFPA 90A.....Standard for the Installation of Air Conditioning and Ventilating Systems, 2009 edition
  - NFPA 101.....Life Safety Code, 2009 edition
- C. Underwriters Laboratories, Inc. (UL): Fire Protection Equipment Directory
- D. Factory Mutual Research Corp (FM): Approval Guide, 2007-2011
- E. American National Standards Institute (ANSI):
  - S3.41.....Audible Emergency Evacuation Signal, 1990 edition, reaffirmed 2008
- F. International Code Council, International Building Code (IBC), 2009 edition

## **PART 2 - PRODUCTS**

### **2.1 EQUIPMENT AND MATERIALS, GENERAL**

- A. All equipment and components shall be new and the manufacturer's current model. All equipment shall be tested and listed by Underwriters Laboratories, Inc. or Factory Mutual Research Corporation for use as part of a fire alarm system. The authorized representative of the manufacturer of the major equipment shall certify that the installation

complies with all manufacturers' requirements and that satisfactory total system operation has been achieved.

## **2.2 CONDUIT, BOXES, AND WIRE**

### **A. Conduit:**

1. All new conduits shall be installed in accordance with NFPA 70.
2. Conduit fill shall not exceed 40 percent of interior cross sectional area.
3. All new conduits shall be 3/4 inch (19 mm) minimum.

### **B. Wire:**

1. Wiring shall be in accordance with NEC article 760, and as recommended by the manufacturer of the fire alarm system. All wires shall be color coded. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG for initiating device circuits and 14 AWG for notification device circuits.
2. Addressable circuits and wiring used for the multiplex communication loop shall be twisted and shielded unless specifically excepted by the fire alarm equipment manufacturer in writing.
3. Any fire alarm system wiring that extends outside of a building shall have additional power surge protection to protect equipment from physical damage and false signals due to lightning, voltage and current induced transients. Protection devices shall be shown on the submittal drawings and shall be UL listed or in accordance with written manufacturer's requirements.
4. All wire or cable used in underground conduits including those in concrete shall be listed for wet locations.

### **C. Terminal Boxes, Junction Boxes, and Cabinets:**

1. Shall be galvanized steel in accordance with UL requirements.
2. All boxes shall be sized and installed in accordance with NFPA 70.
3. covers shall be repainted red in accordance with Section 09 91 00, PAINTING and shall be identified with white markings as "FA" for junction boxes and as "FIRE ALARM SYSTEM" for cabinets and terminal boxes. Lettering shall be a minimum of 3/4 inch high.
4. Terminal boxes and cabinets shall have a volume 50 percent greater than required by the NFPA 70. Minimum sized wire shall be considered as 14 AWG for calculation purposes.

5. Terminal boxes and cabinets shall have identified pressure type terminal strips and shall be located at the base of each riser. Terminal strips shall be labeled as specified or as approved by the COTR.

## **2.3 ALARM NOTIFICATION APPLIANCES**

### **A. Speakers:**

1. Shall operate on either 25 VRMS or 70.7 VRMS with field selectable output taps from 0.5 to 2.0W and originally installed at the 1/2 watt tap. Speakers shall provide a minimum sound output of 80 dBA at 10 feet with the 1/2 watt tap.
2. Frequency response shall be a minimum of 400 HZ to 4,000 HZ.
3. Four inches or 8 inches cone type speakers ceiling mounted with white colored baffles in areas with suspended ceilings and wall mounted in areas without ceilings.

### **B. Strobes:**

1. Xenon flash tube type minimum 15 candela in toilet rooms and 75 candela in all other areas with a flash rate of 1 HZ. Strobes shall be synchronized where required by the National Fire Alarm Code (NFPA 72).
2. Backplate shall be red with 1/2 inch) permanent red letters. Lettering to read "Fire", be oriented on the wall or ceiling properly, and be visible from all viewing directions.
3. Each strobe circuit shall have a minimum of 20 percent spare capacity.
4. Strobes may be combined with the audible notification appliances specified herein.

### **C. Fire Alarm Horns:**

1. Shall be electric, utilizing solid state electronic technology operating on a nominal 24 VDC.
2. Shall be a minimum nominal rating of 80 dBA at 10 feet.
3. Mount on removable adapter plates on conduit boxes.
4. Horns located outdoors shall be of weatherproof type with metal housing and protective grille.
5. Each horn circuit shall have a minimum of 20 percent spare capacity.

## **2.4 ALARM INITIATING DEVICES**

### **A. Manual Fire Alarm Stations:**

1. Shall be non-breakglass, address reporting type.

2. Station front shall be constructed of a durable material such as cast or extruded metal or high impact plastic. Stations shall be semi-flush type.
3. Stations shall be of single action pull down type with suitable operating instructions provided on front in raised or depressed letters, and clearly labeled "FIRE."
4. Operating handles shall be constructed of a durable material. On operation, the lever shall lock in alarm position and remain so until reset. A key shall be required to gain front access for resetting, or conducting tests and drills.
5. Unless otherwise specified, all exposed parts shall be red in color and have a smooth, hard, durable finish.

## **2.5 SUPERVISORY DEVICES**

can be observed and operated from a normal standing position.

### **A. Sprinkler and Standpipe System Supervisory Switches:**

1. Each sprinkler system water supply control valve, riser valve or zone control valve, and each standpipe system riser control valve shall be equipped with a supervisory switch. Standpipe hose valves, and test and drain valves shall not be equipped with supervisory switches.
2. PIV (post indicator valve) or main gate valve shall be equipped with a supervisory switch.
3. Valve supervisory switches shall be connected to the fire alarm system by way of address reporting interface device.
4. The mechanism shall be contained in a weatherproof die-cast aluminum housing that shall provide a 3/4 inch tapped conduit entrance and incorporate the necessary facilities for attachment to the valves.
5. The entire installed assembly shall be tamper-proof and arranged to cause a switch operation if the housing cover is removed or if the unit is removed from its mounting.
6. Where dry-pipe sprinkler systems are installed, high and low air pressure switches shall be provided and monitored by way of an address reporting interface devices.

## **2.6 SPARE AND REPLACEMENT PARTS**

### **A. Provide spare and replacement parts as follows:**

1. Manual pull stations - 5
  2. Fire alarm strobes - 5
  3. Fire alarm speakers - 5
  4. Fire alarm SLC cable (same as installed) - 500 feet
- B. Spare and replacement parts shall be in original packaging and submitted to the COTR.
- C. Provide to the VA, all hardware, software, programming tools, license and documentation necessary to permanently modify the fire alarm system on site. The minimum level of modification includes addition and deletion of devices, circuits, zones and changes to system description, system operation, and digitized evacuation and instructional messages.

## **2.7 INSTRUCTION CHART:**

Provide typewritten instruction card mounted behind a Lexan plastic or glass cover in a stainless steel or aluminum frame with a backplate. Install the frame in a conspicuous location observable from each control unit where operations are performed. The card shall show those steps to be taken by an operator when a signal is received under all conditions, normal, alarm, supervisory, and trouble. Provide an additional copy with the binder for the input output matrix for the sequence of operation. The instructions shall be approved by the COTR before being posted.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION:**

- A. Installation shall be in accordance with NFPA 70, 72, 90A, and 101 as shown on the drawings, and as recommended by the major equipment manufacturer. Fire alarm wiring shall be installed in conduit. All penetrations of smoke and fire barriers shall be protected as required by Section 07 84 00, FIRESTOPPING.
- B. All conduits, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas.
- C. All new and reused exposed conduits shall be painted in accordance with Section 09 91 00, PAINTING to match surrounding finished areas and red in unfinished areas.
- D. All fire detection and alarm system devices, control units and remote annunciators shall be flush mounted when located in finished areas and

may be surface mounted when located in unfinished areas. Exact locations are to be approved by the COTR.

- G. Speakers shall be ceiling mounted and fully recessed in areas with suspended ceilings. Speakers shall be wall mounted and recessed in finished areas without suspended ceilings. Speakers may be surface mounted in unfinished areas.
- H. Strobes shall be flush wall mounted with the bottom of the unit located 80 inches above the floor or 6 inches below ceiling, whichever is lower. Locate and mount to maintain a minimum 36 inches clearance from side obstructions.
- I. Manual pull stations shall be installed not less than 42 inches or more than 48 inches from finished floor to bottom of device and within 60 inches of a stairway or an exit door.

### **3.2 TYPICAL OPERATION**

- A. Activation of any manual pull station, water flow or pressure switch, heat detector, kitchen hood suppression system, gaseous suppression system, or smoke detector shall cause the following operations to occur:
  - 1. Operate the emergency voice communication system in. For sprinkler protected buildings, flash strobes continuously only in the zone of alarm. For buildings without sprinkler protection throughout, flash strobes continuously only on the floor of alarm.
  - 2. Continuously sound a temporal pattern general alarm and flash all strobes in the building in alarm until reset at the local fire alarm control unit in Building.
  - 3. Transmit a separate alarm signal, via the main fire alarm control unit to the fire department.
  - 4. Unlock the electrically locked exit doors within the zone of alarm.
- B. Operation of any sprinkler or standpipe system valve supervisory switch, high/low air pressure switch, or fire pump alarm switch shall cause a system supervisory condition.
- C. Alarm verification shall not be used for smoke detectors installed for the purpose of early warning.

### **3.3 TESTS**

- A. Provide the service of a NICET level III, competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the

adjustments and tests for the system. Make all adjustments and tests in the presence of the COTR.

- B. When the systems have been completed and prior to the scheduling of the final inspection, furnish testing equipment and perform the following tests in the presence of the COTR. When any defects are detected, make repairs or install replacement components, and repeat the tests until such time that the complete fire alarm systems meets all contract requirements. After the system has passed the initial test and been approved by the COTR, the contractor may request a final inspection.
1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
  2. Test the insulation on all installed cable and wiring by standard methods as recommended by the equipment manufacturer.
  3. Run water through all flow switches. Check time delay on water flow switches. Submit a report listing all water flow switch operations and their retard time in seconds.
  4. Open each alarm initiating and notification circuit to see if trouble signal actuates.
  5. Ground each alarm initiation and notification circuit and verify response of trouble signals.

### **3.4 FINAL INSPECTION AND ACCEPTANCE**

- A. Prior to final acceptance a minimum 30 day "burn-in" period shall be provided. The purpose shall be to allow equipment to stabilize and potential installation and software problems and equipment malfunctions to be identified and corrected. During this diagnostic period, all system operations and malfunctions shall be recorded. Final acceptance will be made upon successful completion of the "burn-in" period and where the last 14 days is without a system or equipment malfunction.
- B. At the final inspection a factory trained representative of the manufacturer of the major equipment shall repeat the tests in Article 3.3 TESTS and those required by NFPA 72. In addition the representative shall demonstrate that the systems function properly in every respect. The demonstration shall be made in the presence of a VA representative.

### **3.5 INSTRUCTION**

- A. The manufacturer's authorized representative shall provide instruction and training to the VA as follows:



1. Six 1-hour sessions to engineering staff, security police and central attendant personnel for simple operation of the system. Two sessions at the start of installation, 2 sessions at the completion of installation and 2 sessions 3 months after the completion of installation.
  2. Four 2-hour sessions to engineering staff for detailed operation of the system. Two sessions at the completion of installation and 2 sessions 3 months after the completion of installation.
  3. Three 8-hour sessions to electrical technicians for maintaining, programming, modifying, and repairing the system at the completion of installation and one 8-hour refresher session 3 months after the completion of installation.
- B. The Contractor and/or the Systems Manufacturer's representative shall provide a typewritten "Sequence of Operation" including a trouble shooting guide of the entire system for submittal to the VA. The sequence of operation will be shown for each input in the system in a matrix format and provided in a loose leaf binder. When reading the sequence of operation, the reader will be able to quickly and easily determine what output will occur upon activation of any input in the system. The INPUT/OUTPUT matrix format shall be as shown in Appendix A to NFPA 72.
- C. Furnish the services of a competent instructor for instructing personnel in the programming requirements necessary for system expansion. Such programming shall include addition or deletion of devices, zones, indicating circuits and printer/display text.

- - END - -

# **Asbestos-Containing Building Materials Survey Report**

**Of**

## **John L. McCellan Memorial Hospital (Building# 1 SO/JLM)**

**4300 West 7th Street, Little Rock, Arkansas 72114**



**Prepared For:  
Central Arkansas Veterans Affairs Healthcare System  
2200 Fort Roots Drive,  
North Little Rock, Arkansas 72114**

**Asbestos Inspection Performed By:**

*Tehsin Aurangabadwala*

---

Tehsin Aurangabadwala, Asbestos Inspector  
Arkansas Asbestos Inspector License # 015691  
BES Design/Build, LLC Arkansas Consultant License # 000566  
KCI Technologies, Inc. Arkansas Consultant License # 000565

Report Date: May 19, 2014



## **Executive Summary**

BES Design/Build, LLC (BES) was retained by the Central Arkansas Veterans Affairs Healthcare System (CAVAHS) to conduct an Asbestos-Containing Building Materials Survey at the John L. McCellan Memorial Hospital (Building# 1 SO/JLM) located at 4300 West 7th Street, North Little Rock, Arkansas 72114.

The presence of asbestos (greater than 1% and trace) was detected in five (5) homogeneous materials of the identified suspected Asbestos-Containing Building Materials (ACBM). The following list summarizes the homogenous materials found or assumed to be ACBM. For a detailed listing of ACBM results and locations, please refer to Section 6.

- 12" Floor tile – light brown marbled
- 12" Floor tile – orange marbled
- Floor tile mastic – black
- Duct seam sealant – grey and greenish yellow
- Fire doors (assumed to contain asbestos)
- Laboratory fume hoods (transite) (assumed to contain asbestos)
- Laboratory tabletops - black (assumed to contain asbestos)
- Laboratory sinks (assumed to contain asbestos)

### **Recommended Response Actions:**

All the identified ACBM and assumed ACBM were in good condition at the time of survey. No additional action is currently required.

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Appendix D:	Asbestos Certificate of Analysis
Appendix E:	Site Photographs
Appendix F:	Inventory of Asbestos-Containing Building Materials

## 1.0 Introduction

BES Design/Build, LLC (BES) was retained by the Central Arkansas Veterans Affairs Healthcare System (CAVAHS) to conduct an Asbestos-Containing Building Materials Survey at the John L. McCellan Memorial Hospital (Building# 1 SO/JLM) located at Fort Roots in North Little Rock, Arkansas 72114.

The scope of work included:

- 1) Visual identification and physical assessment of suspect ACBM;
- 2) Bulk sampling and analysis of suspect ACBM;
- 3) Room-by-room inventory and quantification of ACBM;
- 4) Preparation of drawings denoting sampling location and identifying ACBM presence;
- 5) Labeling and posting signs denoting certain ACBM and
- 6) Generation of this report documenting the findings.

## 2.0 Relevant Asbestos Regulations and Acronyms

### Asbestos Regulations

- 1) 40 CFR 763: Environmental Protection Agency (EPA); Code of Federal Regulation (CFR); Part 763 – Asbestos; Appendix E Sub Part E – Hazard Emergency Response Act (AHERA) Regulation
- 2) 29 CFR -1926.1101: Occupational Safety and Health Administration (OSHA), Code of Federal Regulation (CFR); Asbestos Standard for the Construction Industry
- 3) Arkansas Pollution Control and Ecology Commission, Regulation No. 21 Arkansas Asbestos Abatement Regulation
- 4) VA Asbestos Management Protocol: Department of Veterans Affairs, Veterans Health Administration (VHA), Asbestos Management Program (VHA Directive #2010-036)

### Lists of Acronyms

ACBM	Asbestos-Containing Building Materials
ADEQ	Arkansas Department of Environmental Quality
BES	BES Design/Build, LLC
C	Chrysotile Asbestos
CAVAHS	Central Arkansas Veterans Affairs Healthcare System
EA	Each
Homo	Homogeneous Material
LF	Linear Foot or Linear Feet
NAD	No Asbestos Detected
NESHAP	National Emission Standards for Hazardous Air Pollutants
NVLAP	National Voluntary Laboratory Accreditation Program
N/A	Not Applicable
O&M	Operation and Maintenance
PLM	Polarized Light Microscopy
PS	Positive Stop
SF	Square Foot or Square Feet
TEM	Transmission Electron Microscopy
TSI	Thermal System Insulation
TR	Trace

### 3.0 Accreditation Credentials

#### Company, Staff and Laboratory Credentials

##### Asbestos Abatement Consultant

BES Design/Build, LLC

License/Certification # 000566

Expiration Date: 10/22/2014

KCI Technologies, Inc.

License/Certification # 000565

Expiration Date: 10/18/2014

##### Inspector

Tehsin Aurangabadwala

ADEQ License # 015691

Expiration Date: 01/31/2015

##### Laboratory

Sanair Technologies Laboratory, Inc.

NVLAP Lab Code: 200870-0

Expiration Date: 3/31/2015

The copies of the accreditation certificates and licenses are included in Appendix A.

### 4.0 Site Description

Building John L. McCellan Memorial Hospital (Building# 1 SO/JLM) is a 785,600 square foot facility, consisting of eight floors with Penthouses on the ninth floor. Floor plans are included in Appendix B. At the time of the survey the following areas were not accessible: none

### 5.0 Asbestos-Containing Materials (ACBMs) Survey Methodology

BES's accredited asbestos inspector, Tehsin Aurangabadwala conducted the ACBM survey of the subject building between January and February 2014. The scope of work included a visual evaluation of potential ACBMs and the collection of bulk samples of these materials. The following sections describe the methodology used during the asbestos inspection.

#### 5.1 Visual Inspection and Assessment of Asbestos Containing Materials

A visual inspection of the friable and non-friable known or assumed asbestos containing building materials (ACBM) for the subject site was performed. BES located and listed all homogenous areas of material that are suspected to contain asbestos. The materials suspected of containing asbestos were categorized as one of the following three types:

- Thermal System Insulations (TSI): The building materials applied to pipes, fittings, boilers, breeching, tanks, ducts, or other interior structural components to prevent heat loss or gain such as insulation wrapped on ducts or pipes.
- Surfacing Materials: The building materials that are sprayed-on, troweled-on, or otherwise applied to surfaces such as ceiling plaster or sprayed-on fireproofing.
- Miscellaneous Materials: The building materials on structural components that do not include surfacing material or TSI such as floor tiles or ceiling tiles.

A physical assessment of the suspect material was performed and the suspect material was placed in one of the three categories based on visual inspection.

- Good (No Damage): These are the materials which are intact and in good condition.
- Fair (Damaged): These materials correspond to the damaged categories in the 40 CFR 763.88 AHERA Rule.

- Poor (Significantly Damaged): These materials correspond to the significantly damaged categories in the 40 CFR 763.88 AHERA Rule.

## 5.2 Methodology of Sampling and Analysis

### Bulk Sampling Protocol

For each suspect homogeneous material, bulk samples were collected for analysis in general accordance with 40 CFR 763.86 as listed in Table 5.2.1

Table 5.2.1: Bulk Sampling Protocol		
Type	Quantity of Material	Number of Samples
Surfacing Material	< 1,000 ft <sup>2</sup>	3
	>1,000 ft <sup>2</sup> ≤ 5,000 ft <sup>2</sup>	5
	<5,000 ft <sup>2</sup>	7
Thermal System Insulation (TSI)	Each Homogenous System	3
	Per homogeneous patched area <6 ft <sup>2</sup>	1
Miscellaneous Material (Friable / Non Friable)	Per homogenous area	1

The following suspect building materials were not included in the survey: ceramic tile grout / mastic, chalkboard / tack board mastic, fire curtains, interior mechanical and electrical equipment materials (gaskets, lining, insulating rope, packing), paint, pipe gaskets, roofing materials, sub-flooring, lightweight concrete, tarpaper moisture barrier, terrazzo, tectum board, vibration damper / vibration collars on ducts and air handling units, brake shoes, vinyl cove base and window caulking and glazing. These materials should either be properly inspected by an ADEQ licensed asbestos inspector or treated as ACBM prior to any disturbance of these materials.

### Assumed Asbestos Containing Materials

For the purpose of this report, certain building materials were assumed to contain asbestos due to limited accessibility, avoidance of damage to equipment, or warranty concerns. These materials should either be properly tested or treated as ACBM prior to demolition or renovation of these materials. The following suspect building materials were assumed to contain asbestos:

- Fire doors,
- Laboratory table tops and sinks and
- Fume hoods

### Bulk Sample Collection Method

Bulk samples of the suspect ACBMs were collected using appropriate hand tools that were driven through the suspect material to the substrate in order to obtain a sample containing all discrete layers after misting the sampling area with amended water. The samples were then placed in re-sealable plastic bags and assigned unique identifiers that were recorded on the bags and on the bulk survey sampling sheets. Sampling tools were cleaned with wet wipes after each sample was collected to minimize contamination. The sampled location was encapsulated / sealed immediately after sample was collected and the sampled area was cleaned using HEPA vacuum.

Many surveyed areas had carpeting. BES inspected the sub-surfaces under the carpet at the perimeter of the rooms due to limited access. Carpet was gently lifted in a corner to reveal the adhesive. All viewed sub-flooring below the carpet was inspected with a hammer and a chisel. Concrete was found below some

of the carpet. Suspect vinyl flooring materials and suspect mastics were found below some of the carpet. In these areas, BES extracted samples of the floor tile and the mastic for laboratory analysis. If future carpet removal occurs in any carpeted area and sub-flooring is found (other than concrete or previously sampled material included in this report), then these materials should be assumed to contain asbestos, unless laboratory analysis verifies that the suspect material is non-ACBM.

The suspect asbestos bulk samples collected by BES's building inspector were submitted, along with a chain-of-custody form to a NVLAP accredited laboratory to be analyzed by Polarized Light Microscopy (PLM) - EPA 600/R-93/116 method.

**Positive Stop Procedures for PLM analysis**

In accordance with U.S. EPA guidelines, samples are categorized into "homogeneous groups" by material type. The number of samples to be taken for each group is dictated by the type and quantity of the material. All samples within the homogeneous group must be less than 1% asbestos in order to classify the material as "non-asbestos." Conversely, the positive result of any one (1) sample dictates that the homogeneous group be classified as ACBM. Thus, when the individual samples of each homogeneous group are analyzed, the laboratory will discontinue analysis when asbestos has been identified in one (1) of the samples. These subsequent samples, which have not yet been analyzed, are reported as PS ("Positive Stop") and the homogeneous material is classified as an ACBM.

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## 6.0 Inspection Findings

The US Environmental Protection Agency (EPA) defines an asbestos-containing material as "any material containing greater than one percent asbestos as determined using the method specified in appendix A, subpart F, 40 CFR part 763, Section 1, PLM." For the purposes of this investigation, all materials with any detectable asbestos fibers were classified as asbestos-containing materials.

### 6.1 Bulk Sampling

A total of two hundred and seventy-nine (279) bulk samples were collected from the John L. McCellan Memorial Hospital (Building# 1 SO/JLM). Sampling locations are depicted on floor plans included as Appendix B. The results of the analysis of the bulk samples are summarized in Table 6.1.2. The asbestos certificates of analysis are included in Appendix D of this report.

<b>Sample Number</b>	<b>Homo. ID</b>	<b>Material Description</b>	<b>Sample Location</b>	<b>Result</b>
JLM-1	FT1	12" Floor Tile - Light Brown Marbled	C71-JLM Corridor	2%C
JLM-2	M1	Mastic - Black	Beneath JLM-1	NAD
JLM-3	FT2	12" Floor Tile - Blue Marbled	C72-JLM Corridor	NAD
JLM-4	FT3	12" Floor Tile - Brown Multicolored speck	C72-JLM Corridor	NAD
JLM-5	FT4	12" Floor Tile - Orange Marbled	C72-JLM Corridor	2%C
JLM-6	FT5	12" Floor Tile - Offwhite with Brown Speck	7A-134	NAD
JLM-7	M2	Mastic – Yellow (floor tile)	Beneath JLM-6	NAD
JLM-8	FT6	12" Floor Tile - Offwhite	Beneath JLM-6	NAD
JLM-9	M1	Mastic – Black (floor tile)	Beneath JLM-8	2%C
JLM-10	FT7	12" Floor Tile - Tan Marbled	7A-138	NAD
JLM-11	M2	Mastic Yellow (floor tile)	Beneath JLM-10	NAD
JLM-12	M3	Mastic - Yellow (carpet)	7A-126	NAD
JLM-13	M4	Mastic - Brown (covebase)	7A-126	NAD
JLM-14	FT8	12" Floor Tile - Green with White Streak	C79-JLM Corridor	NAD
JLM-15	FT9	12" Floor Tile - Cocoa Brown Marbled	C79-JLM Corridor	NAD
JLM-16	FT10	12" Floor Tile - Offwhite with Tan-Grey Marble	7A-120	NAD
JLM-17	M3	Mastic – Yellow (carpet)	C76-JLM, Corridor	NAD
JLM-18	FT11	12" Floor Tile – Dark Red	7A-145	NAD
JLM-19	FT12	12" Floor Tile – Brown Marble	7A-145	NAD
JLM-20	TM1	Troweled Material – White	Level 9 Penthouse On Tank	NAD
JLM-21	TM1	Troweled Material – White	Level 9 Penthouse On Tank	NAD
JLM-22	TM1	Sealant – White	Level 9 Penthouse On Tank	NAD
JLM-23	EC1	Endcap Material – White	Level 9 Penthouse	NAD
JLM-24	EC1	Endcap Material – White	Level 9 Penthouse	NAD
JLM-25	EC1	Endcap Material – White	Level 9 Penthouse	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-26	DW1	Drywall	Level 9 Penthouse	NAD
JLM-27	JC1	Joint Compound	Level 9 Penthouse	NAD
JLM-28	JC1	Joint Compound	7A-136	NAD
JLM-29	CT1	2x4 Ceiling Tile – Small Fissure with pinhole	C721-JLM	NAD
JLM-30	DW1	Drywall	C711-JLM	NAD
JLM-31	JC1	Joint Compound	C711-JLM	NAD
JLM-32	FP1	Spray-on Fireproofing – Brown	C72-JLM Corridor on beams	NAD
JLM-33	FP1	Spray-on Fireproofing – Brown	C72-JLM Corridor on walls	NAD
JLM-34	CT2	2X4 Ceiling Tile – Small Wormhole with Pinhole	C75-JLM Corridor	NAD
JLM-35	FS1	Firestop – Red	C79-JLM Corridor	NAD
JLM-36	M3	Mastic – Yellow (carpet)	7C146	NAD
JLM-37	FT6	12" Floor Tile – offwhite	7C146	NAD
JLM-38	DM1	Duct Seam Sealant – Grey	C726-JLM by 7C137	2%C
JLM-39	T1	Troweled Material – Black	7C-125	NAD
JLM-40	CT3	2x2 Ceiling Tile –Small Fissure with Pinholes	C715 by Stairs 3	NAD
JLM-41	FS1	Firestop – Red	C730 by 7D113	NAD
JLM-42	CT4	2x2 Ceiling Tile -Deep Fissure with Pinholes	7D-120 - Library	NAD
JLM-43	FT13	12" Floor Tile - Grey w/dark Grey Specks	7D-121	NAD
JLM-44	FT14	12" Floor Tile - White w/ Black Specks	7D-121	NAD
JLM-45	M2	Mastic – Yellow	7D-121 beneath JLM-43/44	NAD
JLM-46	T2	Troweled Material – Grey	7D136	NAD
JLM-47	FT15	12" Floor Tile – Grey Marbled	7E-C734 Corridor	NAD
JLM-48	FT16	12" Floor Tile – Light Grey Marbled	7E-100	NAD
JLM-49	M2	Mastic – Yellow	Beneath JLM-48	NAD
JLM-50	LC1	Leveling Compound – Grey	7E-100	NAD
JLM-51	FP2	Spray-on Fireproofing – Grey	7E-117	NAD
JLM-52	LC1	Leveling Compound – Grey	7E-117	NAD
JLM-53	FT17	12" Floor Tile – Beige	7E-117	NAD
JLM-54	FP2	Spray-on Fireproofing – grey	C737 Corridor	NAD
JLM-55	CT5	2x4 Ceiling Tile – Long Wormhole w/ Pinholes	C737 Corridor	NAD
JLM-56	CT6	2x4 Ceiling Tile – Dense Pinhole and Fissure	C62 Corridor	NAD
JLM-57	FP1	Spray-on Fireproofing – Brown	C62 Corridor	NAD
JLM-58	CT7	2x2 Ceiling Tile – Dense Pinhole and Fissure	C62 Corridor	NAD
JLM-59	M5	Mastic – Brown (covebase)	6A-123	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-60	M3	Mastic – Yellow (carpet)	6A-117	NAD
JLM-61	FT19	12" Floor Tile – offwhite with pink spots	C621-Corridor by Nurses Station	NAD
JLM-62	DM2	Duct Seam Sealant – Greenish Yellow	C619 Corridor by 6C-144	NAD
JLM-63	JC1	Joint Compound	C619 Corridor by 6C-144	NAD
JLM-64	CT7	2X2 Ceiling Tile – Pinholes	6C-147	NAD
JLM-65	FT18	12" Floor Tile – Green Marbled	C621A Corridor by Storage Room	NAD
JLM-66	T1	Troweled Material – Black	6B-140 (sink)	NAD
JLM-67	T3	Troweled Material – Offwhite	6B-110 (sink)	NAD
JLM-68	T3	Troweled Material – Offwhite	6B-109 (sink)	NAD
JLM-69	T3	Troweled Material – Offwhite	6B-109 (sink)	NAD
JLM-70	M3	Mastic - Yellow (carpet)	6B-110	NAD
JLM-71	FT5	12" Floor Tile – Offwhite with Brown Speck	6B-109	NAD
JLM-72	M2	Mastic – Yellow	Beneath JLM-71	NAD
JLM-73	FT6	12" Floor Tile – Offwhite (second layer)	Beneath JLM-71	NAD
JLM-74	MI	Mastic – Black	Beneath JLM-73	3%C
JLM-75	FP1	Spray-on Fireproofing – Brown	C631 Corridor by 6D-132	NAD
JLM-76	DW1	Drywall	C626 Corridor by 6D-107	NAD
JLM-77	JC1	Joint Compound	C626 Corridor by 6D-107	NAD
JLM-78	PS1	Plaster –Skim	6D-161	NAD
JLM-79	PS1	Plaster – Skim	6D-161	NAD
JLM-80	PS1	Plaster – Skim	6D-161	NAD
JLM-81	FT20	12" Floor Tile – Light Orange Marbled	C636 Corridor by 6E-117	NAD
JLM-82	FT7	12" Floor Tile – Tan Marbled	C636 Corridor by 6E-117	NAD
JLM-83	M3	Mastic – Yellow (carpet)	6E-126	NAD
JLM-84	FT6	12" Floor Tile – Offwhite (second layer)	6E-126 Beneath Carpet	NAD
JLM-85	M1	Mastic – Black	Beneath JLM-84	PS
JLM-86	FT21	Vinyl – Dark Brown wood design	6E-146	NAD
JLM-87	FT22	Vinyl – Light Brown wood design	6E-146	NAD
JLM-88	M5	Mastic – Offwhite (floor tile)	Beneath JLM-86/87	NAD
JLM-89	T2	Troweled Material – Grey	6E-137 (sink)	NAD
JLM-90	FT23	12" Floor Tile – Dark Brown	5A-102	NAD
JLM-91	FP1	Spray-on Fireproofing – Brown	C52 Corridor by 5A-133	NAD
JLM-92	FT24	12" Floor Tile – Pale Blue Marble	5A-135	NAD
JLM-93	M6	Mastic-Yellow (Covebase)	5A-102	NAD
JLM-94	FT25	12" Floor Tile – White with Pink Blue Specks	5C-125	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-95	CT8	2x2 Ceiling tile –Nno Design Sheetrock Type	5C-125	NAD
JLM-96	T1	Troweled Material – Black	5C-133	NAD
JLM-97	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	C526 Corridor by 5C-127	NAD
JLM-98	M1	Mastic – Black (floor tile)	Beneath JLM-97	3%C
JLM-99	FT26	12" Floor Tile – Grey with Green Brown Specks	C511 Corridor by 5B-102	NAD
JLM-100	M3	Mastic – Yellow (carpet)	5B-112	NAD
JLM-101	M2	Mastic – Yellow (floor tile)	5B-112 Beneath Fistr Floor Tile under carpet	NAD
JLM-102	FP2	Spray-on Fireproofing – Grey	On Beam in Chase - Access Panel by 7E-112	NAD
JLM-103	FP2	Spray-on Fireproofing – Grey	On Beam in Chase - Access Panel by 7E-112	NAD
JLM-104	FP2	Spray-on Fireproofing – Grey	On Beam in Chase - Access Panel by 7E-112	NAD
JLM-105	DW1	Drywall	5A-112	NAD
JLM-106	FP1	Spray-on Fireproofing – Brown	C516 Corridor by 5B-128	NAD
JLM-107	FP1	Spray-on Fireproofing – Brown	C516 Corridor by 5B-128	NAD
JLM-108	FT27	Vinyl Flooring – Tan	5B-129	NAD
JLM-109	M7	Mastic – Yellow (Glue)	Beneath JLM-108	NAD
JLM-110	FS2	Firestop – White	Stair 3 -S53 by 5B-126	NAD
JLM-111	FT1	12" Floor Tile – Light Brown Marbled	5D-122	PS
JLM-112	M1	Mastic – Black (floor tile)	Beneath JLM-111	3%C
JLM-113	M4	Mastic – Brown (covebase)	5D-122	NAD
JLM-114	CT2	2X4 Ceiling Tile – Small Wormhole with Pinhole	C528 Corridor by 5D-103	NAD
JLM-115	CT5	2x4 Ceiling Tile – Long wWormhole with Pinholes	C528 Corridor by 5D-103	NAD
JLM-116	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	5D-114	NAD
JLM-117	M1	Mastic – Black	5D-114	3%C
JLM-118	FT28	12" Floor tile – Offwhite with Tan-Yellow Marble	5E-153	NAD
JLM-119	M1	Mastic – Black (floor tile)	Beneath JLM-118	2%C
JLM-120	FT29	12" Floor Tile – Chocolate Brown Marble	5E-152	NAD
JLM-121	M2	Mastic – Yellow (floor tile)	Beneath JLM-120	NAD
JLM-122	M6	Mastic – Yellow (Covebase)	C538 Corridor by 5E-117	NAD
JLM-123	PS1	Plaster –Skim	C538 Corridor by 5E-128	NAD
JLM-124	PS2	Plaster – Brown	C535 Corridor By Nurses Work Station	NAD
JLM-125	PS2	Plaster – Brown	C535 Corridor By Nurses Work Station	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-126	PS2	Plaster – Brown	C535 Corridor By Nurses Work Station	NAD
JLM-127	PS1	Plaster – Skim	C535 Corridor By Nurses Work Station	NAD
JLM-128	DW1	Drywall	5E-157	NAD
JLM-129	FP2	Spray-on Fireproofing – Grey	5E-109 Chase	NAD
JLM-130	FP2	Spray-on Fireproofing – Grey	C401-JLM Corridor by 4A-137	NAD
JLM-131	FP2	Spray-on Fireproofing – Grey	C48-JLM Corridor by 4A-117	NAD
JLM-132	CT3	2x2 Ceiling Tile – Small Fissure with Pinholes	C48-JLM Corridor by 4A-117	NAD
JLM-133	DW1	Drywall	C48-JLM Corridor by 4A-117	NAD
JLM-134	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	4A-104	NAD
JLM-135	M1	Mastic – Black (floor tile)	4A-104	2%C
JLM-136	FT1	12" Floor Tile – Light Brown Marbled	C43 Corridor by 4A-104	PS
JLM-137	PS1	Plaster – Skim	4B-157	NAD
JLM-138	FT19	12" Floor Tile – Offwhite with Pink Spots	4B-152	NAD
JLM-139	CT7	2X2 Ceiling Tile – Pinholes	C416 Corridor by 4B-146	NAD
JLM-140	FP2	Spray-on Fireproofing – Grey	C416 Corridor by 4B-146	NAD
JLM-141	CT8	2x2 Ceiling tile – No Design Sheetrock Type	4B-125	NAD
JLM-142	CT3	2x2 Ceiling Tile – Small Fissure with Pinholes	4C-144	NAD
JLM-143	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	Corridor by 4D-101	NAD
JLM-144	M1	Mastic – Black	Beneath JLM-143	2%C
JLM-145	T2	Troweled Material – Grey	C426 Kitchen	NAD
JLM-146	FT28	12" Floor Tile - Offwhite with Tan-Yellow Marble	C438 By Stair 4-S44	NAD
JLM-147	M2	Mastic – Yellow	Beneath JLM-146	NAD
JLM-148	FP1	Spray-on Fireproofing – Brown	3rd Floor Mech Room POD A	NAD
JLM-149	E1	Endcap Material – White	3rd Floor Mech Room POD A	NAD
JLM-150	FP2	Spray-on Fireproofing – Grey	3rd Floor Mech Room POD A	NAD
JLM-151	DW1	Drywall	3rd Floor Mech Room POD C by RF2	NAD
JLM-152	JC1	Joint Compound	3rd Floor Mech Room POD C by RF2	NAD
JLM-153	E1	Endcap Material – White	3rd Floor Mech Room POD C by AC44	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-154	DM2	Duct Seam Sealant – Greenish Yellow	3rd Floor Mech Room POD C by RF1	4%C
JLM-155	DM1	Duct Seam Sealant – Grey	3rd Floor Mech Room POD C on EF221 by RF10	NAD
JLM-156	DM1	Duct Seam Sealant – Grey	3rd Floor Mech Room POD D on EF28 by AC3	NAD
JLM-157	E1	Endcap Material – White	3rd Floor Mech Room POD D by AC3	NAD
JLM-158	FP2	Spray-on Fireproofing - rey	3rd Floor Mech Room POD D by AC12	NAD
JLM-159	FP1	Spray-on Fireproofing – Brown	3rd Floor Mech Room POD A by 3A-105	NAD
JLM-160	DM2	Duct Seam Sealant – Greenish Yellow	3rd Floor Mech Room POD E on EF7	PS
JLM-161	PI1	Pipe Insulation – White	3rd Floor Mech Room POD E on HE1	NAD
JLM-162	PI1	Pipe Insulation – White	3rd Floor Mech Room POD E on HE2	NAD
JLM-163	PI1	Pipe Insulation – White	3rd Floor Mech Room POD E on HE2	NAD
JLM-164	PW1	Pipe Wrap – Cloth	3rd Floor Mech Room POD E on HE1	NAD
JLM-165	PW1	Pipe Wrap – Cloth	3rd Floor Mech Room POD E on HE2	NAD
JLM-166	PW1	Pipe Wrap – Cloth	3rd Floor Mech Room POD E on HE2	NAD
JLM-167	CT6	2x4 Ceiling Tile – Dense pinhole and Fissure	3A-105	NAD
JLM-168	JC1	Joint Compound	3rd Floor Mech Room POD B	NAD
JLM-169	FT12	12" Floor Tile – Brown Marble	C225 Corridor by 2C110A	NAD
JLM-170	M2	Mastic – Yellow (floor tile)	Beneath JLM-169	NAD
JLM-171	FT12	12" Floor Tile – Brown Marble	C226 Corridor by double doors	NAD
JLM-172	M1	Mastic – Black (floor tile)	Beneath JLM-171	3%C
JLM-173	FT30	12" Floor Tile – Yellow Grey Marbled	2F-103	NAD
JLM-174	M2	Mastic – Yellow (floor tile)	Beneath JLM-173	NAD
JLM-175	M8	Mastic – Offwhite (Covebase)	2F-103	NAD
JLM-176	CT1	2x4 Ceiling Tile – Small Fissure with Pinhole	2B-181	NAD
JLM-177	FS2	Firestop – White	S23 (Stair 3 by C220 - 2nd Floor)	NAD
JLM-178	CT4	2x2 Ceiling Tile – Deep Fissure with Pinholes	2B-107	NAD
JLM-179	FT31	Flooring – Vinyl Sheets	2E-170	NAD
JLM-180	M9	Mastic – Yellow (GlueType)	Beneath JLM-179	NAD
JLM-181	M3	Mastic – Yellow (carpet)	2C-161	NAD



**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-182	FT6	Floor Tile – Off white (Second Layer)	Beneath Carpet in 2C-161	NAD
JLM-183	M1	Mastic – Black	Beneath JLM -182	PS
JLM-184	DW1	Drywall	C246 Corridor by 2E-114	NAD
JLM-185	JC1	Joint Compound	C246 Corridor by 2E-114	NAD
JLM-186	FT12	12" Floor Tile – Brown Marble	C247 Corridor by 2E-127	NAD
JLM-187	M1	Mastic – Black (floor tile)	Beneath JLM-186	PS
JLM-188	M3	Mastic - Yellow (carpet)	1D-153	NAD
JLM-189	FT32	12" Floor Tile – Yellow Marbled	1D-146C	NAD
JLM-190	FT33	12" Floor Tile – Mauve Marbled	1D-146C	NAD
JLM-191	FT34	12" Floor Tile – Light Grey with Dark Grey Specks	1D-173	NAD
JLM-192	FT35	12" Floor Tile – White with Grey Specks	1D-173	NAD
JLM-193	FT36	12" Floor Tile – Black with White Specks	1E-165	NAD
JLM-194	FT39	12" Floor Tile – Light Pink with White Speck	C153 Corridor by 1C-151C	NAD
JLM-195	FT40	12" Floor Tile – Sea Blue with Blue Specks	C153 Corridor by 1C-151C	NAD
JLM-196	JC1	Joint Compound	C152 by 1C-196	NAD
JLM-197	CT10	2x4 Ceiling Tile – Popcorn Design, Sheetrock tType	1C-210	NAD
JLM-198	CT10	2x4 Ceiling Tile - Popcorn Design, Sheetrock Type	1C-210	NAD
JLM-199	FS3	Firestop – Brown	1C-210	NAD
JLM-200	FS3	Firestop – Brown	1C-210	NAD
JLM-201	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	1C-210	NAD
JLM-202	M1	Mastic – Black (floor tile)	1C-210	PS
JLM-203	FT16	12" Floor Tile – Light Grey Marbled	1C-112A	NAD
JLM-204	FT20	12" Floor Tile – Light Orange Marbled	Beneath JLM-203	NAD
JLM-205	M2	Mastic – Yellow (floor tile)	Beneath JLM-203	NAD
JLM-206	T3	Troweled Material – Offwhite	1C-119	NAD
JLM-207	FT41	12" Floor Tile – Light Brown with Grey White Specks	C129 Corridor by 1B103	NAD
JLM-208	M2	Mastic – Yellow (floor tile)	Beneath JLM-207	NAD
JLM-209	FT41	12" Floor Tile – Light Brown with Grey White Specks	1B-134	NAD
JLM-210	M2	Mastic – Yellow (floor tile)	Beneath JLM-209	NAD
JLM-211	CT09	2x2 Ceiling Tile – Layer Design	C114	NAD
JLM-212	CT09	2x2 Ceiling Tile – Layer Design	C113	NAD
JLM-213	FT37	18" Vinly Flooring – Orange Grey	C11	NAD
JLM-214	M10	Glue – Clear	Beneath JLM-213	NAD

**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-215	FT10	12" Floor Tile - Offwhite with Tan-Grey Marble	Beneath JLM-213	NAD
JLM-216	M2	Mastic – Yellow (floor tile)	Beneath JLM-215	NAD
JLM-217	FT6	12" Floor Tile – Offwhite	Beneath JLM-215	NAD
JLM-218	M2	Mastic – Yellow (floor tile)	Beneath JLM-217	NAD
JLM-219	FT42	12" Floor Tile – Dark Blue	1B-157A Vending Area	NAD
JLM-220	FT11	12" Floor Tile – Dark Red	1B-157A Vending Area	NAD
JLM-221	FT05	12" Floor Tile – Offwhite with Brown speck	1B-157A Vending Area	NAD
JLM-222	M1	Mastic – Black (floor tile)	Beneath JLM-221	PS
JLM-223	FT30	12" Floor Tile – Yellow Grey Marbled	C192 Corridor by 1B157A Vending	NAD
JLM-224	FT43	Vinyl Flooring – Grey	S110 -Stairs 10	NAD
JLM-225	M11	Mastic – Offwhite	Beneath JLM-224	NAD
JLM-226	FT15	12" Floor Tile – Grey Marbled	C193 Corridor by 1F101	NAD
JLM-227	FT38	18" Vinyl Flooring – Green Grey	C112 West Atrium by 1A101	NAD
JLM-228	FT12	12" Floor Tile – Brown Marble	CG1 Public Elevator Lobby by P-1	NAD
JLM-229	M1	Mastic – Black (floor tile)	Beneath JLM-228	PS
JLM-230	FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	Corridor by GE104	NAD
JLM-231	FT44	Linoleum - White with Blue Spots	GB-112	NAD
JLM-232	M5	Mastic – Offwhite (floor tile)	Beneath - JLM-231	NAD
JLM-233	FT10	12" Floor Tile - Offwhite with Tan-Grey Marble	GB112 beneath JLM-231	NAD
JLM-234	M1	Mastic – Black	Beneath JLM-233	PS
JLM-235	T4	Troweled Material - Tan Paint on Black Material	GB-112	NAD
JLM-236	M4	Mastic – Brown (covebase)	GC-102	NAD
JLM-237	T5	Trowelled Material – Black Padding Type	GC-118	NAD
JLM-238	FT1	12" Floor Tile – Light Brown Marbled	GB-188	NAD
JLM-239	PS1	Plaster – Skim	GB-176	NAD
JLM-240	PS2	Plaster – Brown	GB-176	NAD
JLM-241	FT45	12" Floor Tile – Light Tan Marbled	GF-127	NAD
JLM-242	CT11	2x2 Ceiling Tile – Long Worm and Pinhole	CG46 Corridor by GF128	NAD
JLM-243	CT11	2x2 Ceiling Tile - Long Worm and Pinhole	CG44 Corridor by GF101	NAD
JLM-244	M3	Mastic – Yellow (carpet)	GF-134	NAD
JLM-245	M2	Mastic – Yellow V	Beneath FT45 - CG42 by GF121	NAD
JLM-246	M6	Mastic – Yellow (Covebase)	CG42 by GF121	NAD



**Table 6.1.2: Suspect Asbestos Bulk Sample Log**

Sample Number	Homo. ID	Material Description	Sample Location	Result
JLM-247	P1	Plaster – Skim	GC-127 wall	NAD
JLM-248	P1	Plaster – Skim	GC-127 wall	NAD
JLM-249	P1	Plaster – Skim	GC-127 wall	NAD
JLM-250	P1	Plaster – Skim	GC-127 ceiling	NAD
JLM-251	P2	Plaster – Brown	GC-127 wall	NAD
JLM-252	P2	Plaster – Brown	GC-127 wall	NAD
JLM-253	P2	Plaster – Brown	GC-127 wall	NAD
JLM-254	P2	Plaster – Brown	GC-127 ceiling	NAD
JLM-255	DT1	Cloth Tape on Duct – White	GC-128 on HEPA unit	NAD
JLM-256	DT1	Cloth Tape on Duct – White	GC-128 on HEPA unit	NAD
JLM-257	DT1	Cloth Tape on Duct – White	GC-128 on HEPA unit	NAD
JLM-258	CT12	2x4 Ceiling Tile – No Design Sheetrock Type	GE-113	NAD
JLM-259	CT12	2x4 Ceiling Tile – No Design Sheetrock Type	GE-113	NAD
JLM-260	E1	Endcap Material – White	GE-115 by High Pressure Tank1	NAD
JLM-261	E1	Endcap Material – White	GE115 (HWS)	NAD
JLM-262	E1	Endcap Material – White	GE115 (by HW Tank)	NAD
JLM-263	DI1	Door Insulation – Brown Paper	GE115	NAD
JLM-264	TW1	Troweled Material on Pipe Wrap – White	Boiler Room- Mezzanine	NAD
JLM-265	TW1	Troweled Material on Pipe Wrap – White	Boiler Room- Mezzanine	NAD
JLM-266	TW1	Troweled Material on Pipe Wrap – White	Boiler Room- Mezzanine	NAD
JLM-267	MD1	Mudded Material on Pipe – Tan	Boiler Room- Mezzanine	NAD
JLM-268	MD1	Mudded Material on Pipe – Tan	Boiler Room- Mezzanine	NAD
JLM-269	MD1	Mudded Material on Pipe – Tan	Boiler Room- Mezzanine	NAD
JLM-270	TI2	Tank Insulation – Whitish Grey (mudded)	Boiler Room- Mezzanine	NAD
JLM-271	TI2	Tank Insulation – Whitish Grey (mudded)	Boiler Room- Mezzanine	NAD
JLM-272	TI2	Tank Insulation – Whitish Grey (mudded)	Boiler Room- Mezzanine	NAD
JLM-273	TM2	Troweled Material on Duct Wrap – White	Boiler Room- Mezzanine	NAD
JLM-274	TM2	Troweled Material on Duct Wrap – White	Boiler Room- Mezzanine	NAD
JLM-275	TM2	Troweled Material on Duct Wrap – White	Boiler Room- Mezzanine	NAD
JLM-276	TI3	Tank Insulation – White (Lagging type)	GD-134	NAD
JLM-277	TI3	Tank Insulation – White (Lagging type)	GD-134	NAD
JLM-278	TI3	Tank Insulation – White (Lagging type)	GD-134	NAD
JLM-279	DI1	Door Insulation – Brown Paper	GE115	NAD
<b>Notes:</b> NAD – No Asbestos Detected      TR – Trace      C – Chrysotile Asbestos				

## 6.2 Homogenous Material Summary

Summary of suspect ACBM identified during BES' s survey at the subject site is provided in Table 6.2.3

Table 6.2.3: Homogenous Materials Summary						
Homo. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
CT01	2x4 Ceiling Tile – Small Fissure with Pinhole	N/A	JLM-29, JLM-176	NAD	F	N/A
CT02	2X4 Ceiling Tile – Small Wormhole with Pinhole	N/A	JLM-34, JLM-114	NAD	F	N/A
CT03	2x2 Ceiling Tile – Small Fissure with Pinholes	N/A	JLM-40, JLM-132, JLM-142	NAD	F	N/A
CT04	2x2 Ceiling Tile – Deep Fissure with Pinholes	N/A	JLM-42, JLM-178	NAD	F	N/A
CT05	2x4 Ceiling Tile – Long Wormhole with Pinholes	N/A	JLM-55, JLM-115	NAD	F	N/A
CT06	2x4 Ceiling Tile – Dense Pinhole and Fissure	N/A	JLM-56, JLM-167	NAD	F	N/A
CT07	2x2 Ceiling Tile – Dense Pinhole and Fissure	N/A	JLM-58, JLM-64, JLM-139	NAD	F	N/A
CT08	2x2 Ceiling Tile – No Design Sheetrock Type	N/A	JLM-95, JLM-141	NAD	F	N/A
CT09	2x2 Ceiling Tile – Layer Design	N/A	JLM-211, JLM-212	NAD	F	N/A
CT10	2x4 Ceiling Tile – Popcorn Design, Sheetrock Type	N/A	JLM-197, JLM-198	NAD	F	N/A
CT11	2x2 Ceiling Tile - Long Worm and Pinhole	N/A	JLM-242, JLM-243	NAD	F	N/A
CT12	2x4 Ceiling Tile – No Design Sheetrock Type	N/A	JLM-258, JLM-259	NAD	F	N/A
DI1	Door Insulation – Brown Paper	N/A	JLM-263, JLM-279	NAD	NF	N/A
DM	Duct Seam Sealant – Grey and/or Greenish Yellow	On Mechanical Systems located Throughout the Building	JLM-38, JLM-155, JLM-156, JLM-62, JLM-154, JLM-160	2%-4% C	NF	53,525 LF of Duct
DT1	Cloth Tape on Duct – White	N/A	JLM-255, JLM-256,	NAD	NF	N/A

**Table 6.2.3: Homogenous Materials Summary**

Hom. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
			JLM-257			
DW1	Drywall	N/A	JLM-26, JLM-30, JLM-76, JLM-105, JLM-128, JLM-133, JLM-151, JLM-184	NAD	F	N/A
E1	Endcap Material – White	N/A	JLM-23, JLM-24, JLM-25, JLM-149, JLM-153, JLM-157, JLM-260, JLM-261, JLM-262	NAD	F	N/A
FD	Fire Doors	N/A	Not Sampled	Assumed	NF	300 EA
FP1	Spray-on Fireproofing – Brown	N/A	JLM-32, JLM-33, JLM-57, JLM-75, JLM-91, JLM-106, JLM-107, JLM-148, JLM-159	NAD	F	N/A
FP2	Spray-on Fireproofing – Grey	N/A	JLM-51, JLM-54, JLM-102, JLM-103, JLM-104, JLM-129, JLM-130, JLM-131, JLM-140, JLM-150, JLM-158	NAD	F	N/A
FS1	Firestop – Red	N/A	JLM-35, JLM-41	NAD	NF	N/A
FS2	Firestop – White	N/A	JLM-110, JLM-177	NAD	NF	N/A
FS3	Firestop – Brown	N/A	JLM-199, JLM-200	NAD	NF	N/A
FT01	12" Floor Tile – Light Brown Marbled	On 4th, 5th, 6th and 7th Floors	JLM-1, JLM-111, JLM-136, JLM-238	2% C	NF	36,680 SF
FT02	12" Floor Tile – Blue Marbled	N/A	JLM-3	NAD	NF	N/A
FT03	12" Floor Tile – Brown Multicolored Speck	N/A	JLM-4	NAD	NF	N/A
FT04	12" Floor Tile – Orange Marbled	On 4th, 5th, 6th and 7th Floors	JLM-5	2% C	NF	1,400 SF
FT05	12" Floor Tile – Offwhite with Brown Speck	N/A	JLM-6, JLM-71, JLM-221	NAD	NF	N/A

**Table 6.2.3: Homogenous Materials Summary**

Hom. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
FT06	12" Floor Tile – Offwhite	N/A	JLM-8, JLM-37, JLM-73, JLM-84, JLM-182, JLM-217	NAD	NF	N/A
FT07	12" Floor Tile – Tan Marbled	N/A	JLM-10, JLM-82	NAD	NF	N/A
FT08	12" Floor Tile – Green with White Streak	N/A	JLM-14	NAD	NF	N/A
FT09	12" Floor Tile – Cocoa Brown Marbled	N/A	JLM-15	NAD	NF	N/A
FT10	12" Floor Tile – Offwhite with Tan-Grey Marble	N/A	JLM-16, JLM-97, JLM-116, JLM-134, JLM-143, JLM-201, JLM-215, JLM-230, JLM-233	NAD	NF	N/A
FT11	12" Floor Tile – Dark Red	N/A	JLM-18, JLM-220	NAD	NF	N/A
FT12	12" Floor Tile – Brown Marble	N/A	JLM-19, JLM-169, JLM-171, JLM-186, JLM-228	NAD	NF	N/A
FT13	12" Floor Tile – Grey w/ Dark Grey Specks	N/A	JLM-43	NAD	NF	N/A
FT14	12" Floor Tile – White w / Black Specks	N/A	JLM-44	NAD	NF	N/A
FT15	12" Floor Tile – Grey Marbled	N/A	JLM-47, JLM-226	NAD	NF	N/A
FT16	12" Floor Tile – Light Grey Marbled	N/A	JLM-48, JLM-203	NAD	NF	N/A
FT17	12" Floor Tile – Beige	N/A	JLM-53	NAD	NF	N/A
FT18	12" Floor Tile – Green Marbled	N/A	JLM-65	NAD	NF	N/A
FT19	12" Floor Tile – Offwhite w/ Pink Spots	N/A	JLM-61, JLM-138	NAD	NF	N/A
FT20	12" Floor Tile – Light Orange Marbled	N/A	JLM-81, JLM-204	NAD	NF	N/A
FT21	Vinyl – Dark Brown Wood Design	N/A	JLM-86	NAD	NF	N/A
FT22	Vinyl – Light Brown Wood Design	N/A	JLM-87	NAD	NF	N/A
FT23	12" Floor Tile – Dark Brown	N/A	JLM-90	NAD	NF	N/A
FT24	12" Floor Tile – Pale Blue Marble	N/A	JLM-92	NAD	NF	N/A
FT25	12" Floor Tile – White with Pink Blue Specks	N/A	JLM-94	NAD	NF	N/A

Table 6.2.3: Homogenous Materials Summary						
Hom. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
FT26	12" Floor Tile – Grey with Green Brown Specks	N/A	JLM-99	NAD	NF	N/A
FT27	Vinyl Flooring – Tan	N/A	JLM-108	NAD	NF	N/A
FT28	12" Floor tile – Offwhite with Tan-Yellow Marble	N/A	JLM-118, JLM-146	NAD	NF	N/A
FT29	12" Floor Tile – Chocolate Brown Marble	N/A	JLM-120	NAD	NF	N/A
FT30	12" Floor Tile – Yellow Grey Marbled	N/A	JLM-173, JLM-223	NAD	NF	N/A
FT31	Flooring – Vinyl Sheets	N/A	JLM-179	NAD	NF	N/A
FT32	12" Floor Tile – Yellow Marbled	N/A	JLM-189	NAD	NF	N/A
FT33	12" Floor Tile – Mauve Marbled	N/A	JLM-190	NAD	NF	N/A
FT34	12" Floor Tile – Light Grey with Dark Grey Specks	N/A	JLM-191	NAD	NF	N/A
FT35	12" Floor Tile – White with Grey Specks	N/A	JLM-192	NAD	NF	N/A
FT36	12" Floor Tile – Black with White Specks	N/A	JLM-193	NAD	NF	N/A
FT37	18" Vinyl Flooring – Orange Grey	N/A	JLM-213	NAD	NF	N/A
FT38	18" Vinyl Flooring – Green Grey	N/A	JLM-227	NAD	NF	N/A
FT39	12" Floor Tile – Light Pink with White Specks	N/A	JLM-194	NAD	NF	N/A
FT40	12" Floor Tile – Sea Blue with Blue Specks	N/A	JLM-195	NAD	NF	N/A
FT41	12" Floor Tile – Light Brown with Grey White Specks	N/A	JLM-207, JLM-209	NAD	NF	N/A
FT42	12" Floor Tile – Dark Blue	N/A	JLM-219	NAD	NF	N/A
FT43	Vinyl Flooring – Grey	N/A	JLM-224	NAD	NF	N/A
FT44	Linoleum – White with Blue Spots	N/A	JLM-231	NAD	NF	N/A
FT45	12" Floor Tile – Light Tan Marbled	N/A	JLM-241	NAD	NF	N/A

**Table 6.2.3: Homogenous Materials Summary**

Hom. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
JC1	Joint Compound	N/A	JLM-27, JLM-28, JLM-31, JLM-63, JLM-77, JLM-152, JLM-168, JLM-185, JLM-196	NAD	F	N/A
LC1	Leveling Compound – Grey	N/A	JLM-50, JLM-52	NAD	F	N/A
LFH	Laboratory Fume Hoods – Transit	Ground and 2nd Floor	Not Sampled	Assumed	F	37 EA
LS	Laboratory Sinks – Black	Ground, 2nd and 5th Floor	Not Sampled	Assumed	NF	91 EA
LT	Laboratory Tabletops – Black	Ground, 1st, 2nd and 5th Floor	Not Sampled	Assumed	NF	280 EA
M01	Mastic – Black (Beneath Floor Tiles)	Throughout the Building	JLM-2, JLM-9, JLM-74, JLM-85, JLM-98, JLM-112, JLM-117, JLM-119, JLM-135, JLM-144, JLM-172, JLM-183, JLM-187, JLM-202, JLM-222, JLM-229, JLM-234	2% - 3% C	NF	391,950 SF
M02	Mastic – Yellow (Beneath Floor Tiles)	N/A	JLM-7, JLM-11, JLM-45, JLM-49, JLM-72, JLM-101, JLM-121, JLM-147, JLM-170, JLM-174, JLM-205, JLM-208, JLM-210, JLM-216, JLM-218, JLM-245	NAD	NF	N/A
M03	Mastic – Yellow (Beneath Carpet)	N/A	JLM-12, JLM-17, JLM-36, JLM-60, JLM-70, JLM-83, JLM-100, JLM-181, JLM-188, JLM-244	NAD	NF	N/A
M04	Mastic – Brown (Behind Covebase)	N/A	JLM-13, JLM-59, JLM-113, JLM-236	NAD	NF	N/A
M05	Mastic – Offwhite (Beneath Wood Designed Vinyl Flooring)	N/A	JLM-88, JLM-232	NAD	NF	N/A
M06	Mastic – Yellow (Behind Covebase)	N/A	JLM-93, JLM-122, JLM-246	NAD	NF	N/A

**Table 6.2.3: Homogenous Materials Summary**

Homo. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
M07	Mastic – Yellow (Glue)	N/A	JLM-109	NAD	NF	N/A
M08	Mastic – Offwhite (Behind Covebase)	N/A	JLM-175	NAD	NF	N/A
M09	Mastic – Yellow (Glue) Beneath Vinyl Sheet Flooring	N/A	JLM-180	NAD	NF	N/A
M10	Glue – Clear (Beneath 18" Vinyl Flooring)	N/A	JLM-214	NAD	NF	N/A
M11	Mastic – Offwhite (Beneath Stair Vinyl)	N/A	JLM-225	NAD	NF	N/A
MD1	Mudded Material on Pipe – Tan	N/A	JLM-267, JLM-268, JLM-269	NAD	F	N/A
P1	Plaster –Skim	N/A	JLM-78, JLM-79, JLM-80, JLM-123, JLM-127, JLM-137, JLM-239, JLM-247, JLM-248, JLM-249, JLM-250,	NAD	F	N/A
P2	Plaster – Brown	N/A	JLM-124, JLM-125, JLM-126, JLM-240, JLM-251, JLM-252, JLM-253, JLM-254	NAD	F	N/A
PI1	Pipe Insulation – White	N/A	JLM-161, JLM-162, JLM-163	NAD	F	N/A
PW1	Pipe Wrap – Cloth	N/A	JLM-164, JLM-165, JLM-166	NAD	NF	N/A
T1	Troweled Material – Black (Beneath Metal Sink)	N/A	JLM-39, JLM-66, JLM-96	NAD	NF	N/A
T2	Troweled Material – Grey (Beneath Metal Sink)	N/A	JLM-46, JLM-89, JLM-145	NAD	NF	N/A
T3	Troweled Material – Offwhite (Beneath Metal Sink)	N/A	JLM-67, JLM-68, JLM-69, JLM-206	NAD	NF	N/A
T4	Troweled Material - Tan Paint on Black material (Beneath Metal Sink)	Ground Floor Pod B (GB-112)	JLM-235	NAD	NF	N/A
T5	Trowelled Material – Black Padding type (Beneath Metal Sink)	Ground Floor Pod C (GC-118)	JLM-237	NAD	NF	N/A
TI2	Tank Insulation – Whitish Grey	Boiler Room	JLM-270, JLM-271,	NAD	F	N/A

Table 6.2.3: Homogenous Materials Summary						
Homo. ID	Material Description	Material Location	Sample Numbers	Sample Results	Friability	Estimated Quantity
	(Mudded)		JLM-272			
TI3	Tank Insulation – White (Lagging type)	GD134	JLM-276, JLM-277, JLM-278	NAD	F	N/A
TM1	Troweled Material – White (On Paper Wrap Covering Fiberglass Insulation on Tanks and Ductwork)	Boiler and Mechanical Rooms on Ground and 3rd Floor	JLM-20, JLM-21, JLM-22, JLM-273, JLM-274, JLM-275	NAD	F	N/A
TW1	Troweled Material – White (on Pipe Wrap)	Boiler and Mechanical Rooms on Ground and 3rd Floor	JLM-264, JLM-265, JLM-266	NAD	F	N/A
Notes: NAD – No asbestos detected      TR – Trace      C – Chrysotile Asbestos F – Friable      NF – Non Friable SF – Square feet      LF – Linear feet      EA – Each						

Floor plans depicting location of ACBM are included in Appendix C. Photographs of homogenous materials are included in Appendix E. A detailed room-by-room inventory of ACBM is included in Appendix F.



## Additional Clarification on ACBMs

Clarification needs to be made concerning the methods and the underlying rationale used to determine the quantity and location of certain ACBMs. The following are descriptions of materials determined to be asbestos containing materials:

- FT01: 12" Floor tile (light brown marbled) was observed to be in good condition, located in corridors on the 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> floors. This floor tile was present in Pod A corridors and interior corridors of Pods B, C, D and E by the Kitchen on the 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> floors. This floor tile was observed to be used as a design (checker pattern) along with non-ACM floor tiles located in periphery corridors of Pods B, C, D and E on the 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> floors.
- FT04: 12" Floor tile (orange marbled) was observed in good condition, located on corridors on the 4<sup>th</sup>, 5<sup>th</sup>, 6<sup>th</sup> and 7<sup>th</sup> floors. This floor tile was observed to be used as a design (checker pattern) along with 12" light brown marbled floor tile or other non-ACM floor tiles.
- M01: Floor tile mastic (black) was observed to be in good condition, located beneath floor tiles throughout the building.
- DM: Duct seam sealant (grey and greenish yellow) was observed to be in good condition located on mechanical systems above the ceiling tiles throughout the building and on 3<sup>rd</sup> floor.
- FD: Fire doors (approximately 300) located throughout the building, have been assumed to contain asbestos.
- LFH: Laboratory fume hoods (transite) located on ground and 2<sup>nd</sup> floor have been assumed to contain asbestos.
- LT: Laboratory tabletops (black) located on ground, 1<sup>st</sup> and 5<sup>nd</sup> floor have been assumed to contain asbestos.
- LS: Laboratory sinks (black) located on ground and 5<sup>nd</sup> floor have been assumed to contain asbestos.

## 7.0 Recommended Response Actions

BES assigned a response action for each homogenous material based on the evaluation of the information derived by the visual inspection, physical assessment and response action as shown in Table 7.0.1

Table 7.0.4: Recommended Response Actions Protocol	
Physical Assessment Categories	Response Action
Good - No Damage	O&M
Fair - Damaged and/or Potential for Damage	Evacuate or isolate area if needed. Remove, enclose, encapsulate or repair to correct damage. Take steps to reduce potential for disturbance. O&M
Poor - Significantly Damaged	Evacuate or isolate area if needed. Remove ACM. Repair TSI if feasible and safe. Operation and Maintenance (O&M)

All the identified ACM and assumed ACM were in good condition at the time of survey. No additional action is currently required.

The recommended response actions are included in Appendix F.

## 8.0 Disclaimer

This report has been prepared by BES Design/Build, LLC. exclusively for our Client and their Authorized Representatives. The findings and recommendations presented are based upon discussions with the Client of the present conditions, and may not necessarily indicate future conditions.

Prior to renovation or demolition, BES recommends that this report be consulted to determine if asbestos-containing materials will be disturbed or removed. Further investigation may be warranted to determine precise quantities of asbestos-containing materials that will be affected by proposed renovations.

BES implies no warranty to the accuracy of information provided them by the Client or outside agents and transmitted herein. The locations and conditions of hazardous materials included in the report are based on the site observations performed during the survey.

## **Appendix A:**

### **Accreditations**



State of Arkansas  
Department of  
Environmental Quality



**BES DESIGN/BUILD, LLC**

is a licensed

**Asbestos Abatement Consultant**

*having qualified as required by law in accordance with the regulations adopted by the Arkansas Pollution Control and Ecology Commission's Regulation 21 pursuant to Arkansas Code Annotated §20-27-1001 et seq., relative to abatement of asbestos-containing material within the state of Arkansas.*

License Number: 000566

Issue Date: 2013 December 10

Expire Date: 2014 October 22

*Jessie Mark*  
ADEQ Director





# State of Arkansas Department of Environmental Quality

## KCI TECHNOLOGIES, INC.

is a licensed

### Asbestos Abatement Consultant

*having qualified as required by law in accordance with the regulations adopted by the Arkansas Pollution Control and Ecology Commission's Regulation 21 pursuant to Arkansas Code Annotated §20-27-1001 et seq., relative to abatement of asbestos-containing material within the state of Arkansas.*

License Number: 000565

Issue Date: 2013 October 18

Expire Date: 2014 October 18

*Jessie Markie*  
ADEQ Director



# State of Arkansas Department of Environmental Quality

**015691      TEHSIN AURANGABADWALA**

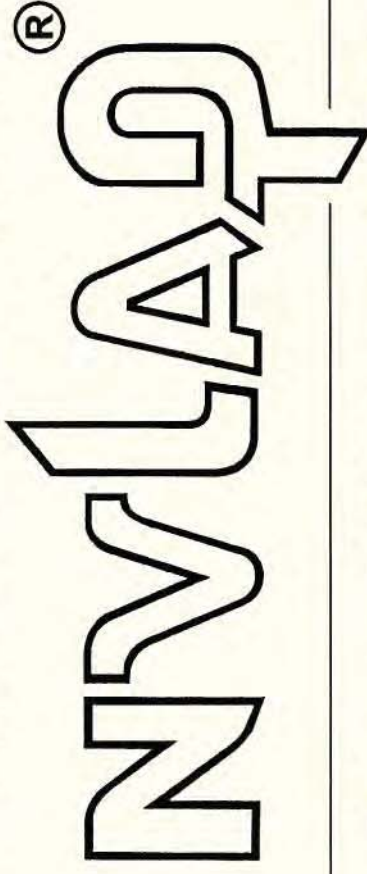
*having satisfied the requirements necessary to meet the provisions of AHERA/ASHARA under TSCA Title II  
and the Arkansas Pollution Control and Ecology Commission's Regulation 21 and is hereby certified in the  
State of Arkansas in the discipline(s) of Asbestos*

**Inspector   1/31/2015**

**Issue Date: 10-Jan-2014**

  
ADEQ Director

United States Department of Commerce  
National Institute of Standards and Technology



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## Certificate of Accreditation to ISO/IEC 17025:2005

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NVLAP LAB CODE: 200870-0

**SanAir Technologies Laboratory, Inc.**  
Powhatan, VA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:

### **BULK ASBESTOS FIBER ANALYSIS**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué dated January 2009).



2014-04-01 through 2015-03-31

Effective dates

A handwritten signature in black ink, appearing to read "Michael D. Mello".

*For the National Institute of Standards and Technology*