SECTION 27 52 23
NURSE CALL AND CODE BLUE SYSTEMS

PART 1 - GENERAL

1.1 SECTION SUMMARY

A. This Section includes the provision of the Hill-Rom Navicare nurse call system for extension of the existing facility Hill-Rom Navicare system into the project areas.

B. The performance specification provides the minimum requirements for a supervised audio-visual Voice over IP-based (VoIP) Nurse Call System. The System shall include, but not be limited to all equipment, materials, labor, documentation, and services necessary to furnish and install a complete, operational Voice over IP-based Nurse Call System. The System shall comply in all respects with all pertinent codes, rules, regulations, and laws of the hospital authority and local jurisdiction. The System shall comply in all respects with the requirements of the specifications, manufacturer's recommendations and Underwriters Laboratories Inc. (UL) Listings.

C. Each System shall be capable of supporting in excess of 1000 Patient Stations. The System shall support a single integrated platform for:

1. Wireless communications system(s)
2. Reporting Database
3. ADT Integration
4. Wireless Locating
5. Electronic Whiteboard
6. Supplemental PC application
7. Patient/Staff Assignments

D. Upon completion of this work, the Owner shall be provided with complete information and drawings describing and depicting the entire Systems(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the System(s) at a future date, and complete documentation of System certification.

E. Work shall be complete, in accordance with 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 005OP3B) tested, certified and ready for operation.

F. 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.
G. The term “provide”, as used herein, shall be defined as: designed, engineered, furnished, installed, certified, tested, and warranty by the Contractor.

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. 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 10 00 – Structured Communications Systems Cabling.
H. 27 15 00 – Communications Horizontal and Vertical Cabling.

1.3 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.

1.4 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.

1.5 SUBMITTALS

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. The-Nurse call equipment supplier (Hill-Rom) will provide product data for each component, including detailed manufacturer's specifications.

C. The Nurse Call equipment supplier (Hill-Rom) will provide shop drawings detailing the system including, but not limited to, the following:

1. A single-line block diagram showing cabling interconnection of all components for this specific system.
2. CAD drawing of the floor/floors that the owner furnished Nurse Communications Module will be installed.

D. The Contractor will provide coordination drawings detailing system components that must fit, match, and line up with provisions made in equipment supplied under other Sections of the Specifications or under other contracts, including the following:

1. Patient head-wall.
2. Patient beds with built-in nurse call features.

E. The equipment supplier (Hill-Rom) will provide wiring diagrams detailing wiring for power, signal, and control systems and differentiating clearly between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance.

F. Report of field tests and observations, including an as-built package of final adjustments certified by installer.

G. The Contractor shall provide maintenance data for system to include in the operation and maintenance manual specified in Division 1.

1.6 QUALITY ASSURANCE

A. Listing and Labeling: Provide conduit, box and cable tray system components as specified in accordance with Section 270533 and as indicated herein.

1.7 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.

1.8 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.

1.9 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.

1.10 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.

1.11 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.

1.12 WORK SEQUENCES

A. The contractor will coordinate with space provided, including wiring paths and maintenance access.

PART 2 – PRODUCTS / FUNCTIONAL REQUIREMENTS

2.1 GENERAL

A. The system shall be network-based and incorporate decentralized, distributed intelligence architecture. The System shall allow both data and voice to be distributed over a common network infrastructure, which is consistent with the communication industry. The System shall provide a means of interoperability with 3rd party wired and wireless network devices within the facility, including PCs, PDA's, phones, databases, pagers, etc.

B. The System shall consist of (include):
   1. Staff Consoles and Annunciator Panels with color touch screen LCD panels.
   2. Power over Ethernet (PoE) Switches
   3. Room Control Boards (RCB)

4. Standard Room Stations
5. Single-Gang Push/Pull Type Peripheral Devices
6. Auxiliary Input Stations with 1/4" input receptacle(s)
7. Icon-based LED Corridor Lights
8. Bed Interface Device consisting of pillow speaker, bed and auxiliary input
9. Interface with VoIP Server
10. Configuration Software

2.2 MANUFACTURER

A. Hill-Rom

B All equipment and components will be the Manufacturer's current model. The materials appliances, equipment, and devices shall be tested and listed by a nationally recognized approval agency for use as part of a Nurse Call System. The Manufacturer's representative shall be responsible for the satisfactory installation of the complete System as well as extension of existing system.

C. The manufacturer's representative shall provide equipment and components, which comply with the requirements of these specifications. Equipment or components, which do not provide the performance and features required by these specifications, are not acceptable, regardless of manufacturer.

D. All System components shall be the catalogued products of a single Supplier. All products shall be listed by the Manufacturer for their intended purpose.

E. All connected field electronics shall be both designed and manufactured by the same company, and shall be tested to ensure that a fully functioning System is designed and installed. The VoIP-based Nurse Call System shall utilize Ethernet topology, switches, and devices. These devices shall make up a UL 1069 Listed nurse call LAN/WAN.

2.3 SYSTEM

A. It should be possible to configure the System using a modular, flexible GUI application that provides the system administrator the ability to manage, (add, delete, modify) and diagnose information within the nurse call network.

B. System cable plan should be of standard Ethernet topology utilizing dedicated CAT6 home runs to each location. Systems requiring separate cabling for power shall not be accepted.
C. System shall have the ability to create custom tones for each call type.
D. Head end equipment/controller equipment shall be standard 19" rack mountable.
E. All patient stations and staff consoles shall have antimicrobial additives in the plastics to prevent degradation due to bacterial residue.
F. System shall allow for each patient room to have a dedicated audio line to prevent line busy indication when calling back into patient locations.
G. Nurse call system should conform to FDA Class II exempt medical device standards.

2.4 INTEGRATIONS

A. The system shall be capable of integrating with:
   1. Ascom wireless telephones
   2. Any brand of pocket paging system
   3. Nurse Call data and reporting software
   4. Staff locating systems, wireless call cords, CCTB switching controls, and door access controls
   5. Patient-to-staff assignments, wandering patient alarm systems, bed exit and/or fall prevention alarm systems, and patient equipment calls
   6. PC monitors, and large screen monitors such as Flat Panel LCD or Plasma display
   7. The System shall be capable of Hill-Rom and/or Stryker bed side-rail communication compatibility including visual and audible annunciation of a disconnected bed.

2.5 STAFF CONSOLES

A. The staff console provides a central point to monitor and respond to nurse calls. It shall be able to visually and audibly annunciate nurse calls as well as provide full duplex voice capability to answer these

calls. Staff consoles should include a handset for private communication but shall support speaker phone for monitoring events.

B. The staff console has a small footprint that can be desk mounted or wall mounted.

C. The staff console must be able to monitor single, multiple or all nursing units based on OWNER configuration. The Staff Console displays incoming calls from stations and connected healthcare equipment, and provides a means for the user to prioritize and respond to selected events. As an audio device, it provides audible signaling functions and facilitates two-way full duplex staff/patient and staff/staff communications.

D. Staff Consoles shall have the ability to adjust talk and listen volume levels via easy-to-use controls. These settings shall be adjustable on a room-by-room basis.

E. The Staff Console shall provide visual identification of the calling station(s) by room number, bed identification, priority, station type or call type. The Staff Console audible annunciation shall indicate priority level. Incoming calls shall be displayed on the color display in the colors assigned to their specific priority levels.

F. The Staff Console shall be IP-based, utilizing Voice over IP technology.

G. The Staff Console shall have a 10" color LCD touch screen.

H. The touch screen shall utilize programmable soft keys as opposed to a mechanical dial/touchpad.

I. Staff Console display shall provide an adjustable tilt mechanism for viewing clarity.

J. Intercom audio between the Staff Console and any station in the System shall be full duplex.

K. The Staff Console shall connect to the nurse call network utilizing CAT6 cable and powered Ethernet. No separate power supply or wiring shall be used.

L. The call pending screen on the Staff Console shall allow up to six calls to be visible at a time and provide a simple scrolling function to view additional calls when more than six pending calls are present.

M. The Staff Console shall allow the user to select what call to answer from the pending calls list.

N. The Staff Console shall be able to call other Staff Consoles on the same network. Staff Console to Staff Console audio shall be full VoIP, full duplex.
   1. The Staff Console shall be a self-contained unit.
O. Staff Console shall provide patient data without the use of a separate PC.
P. Staff Console shall receive power from the CAT6 cable supplying data. It shall not require a separate power supply or external transformer.
Q. All components used shall be RoHS (Reduction of Hazardous Substances) compliant.
R. Staff Console shall show location of active staff members and communicate with them in a single click.
S. Staff Console primary screen shall indicate incoming calls and staff location information simultaneously.

2.6 AUDIO (PATIENT/STAFF) STATIONS:

A. Patient Stations are a primary point of two-way communication between patients and staff. Equipped with two call buttons and a cancel button, they offer users an easy-to-operate means of placing calls on the patient-staff communications system. With two built-in speakers and a separate microphone, these devices also provide staff with the means of opening a full-duplex channel of audio communications with patients. On-board LEDs provide operational feed back as well as status indication.
B. Any Audio station may be configured to act as a patient station or a staff station. Staff/Duty stations have all the functionality of an Audio Station with the exception of a Code Lever.

2.7 STANDARD AUDIO STATIONS

A. Standard Audio Stations shall mount in a 3-gang back box.
B. Standard Audio Stations shall have a separate Code Blue Lever to actuate a code blue call in order to prevent false calls.
C. Standard Audio Stations shall have two speakers to provide clear audio throughout the patient room.
D. Standard Audio Stations shall have separate microphone to support full-duplex conversation.

E. Standard Audio Stations shall have anti-microbial additives embedded in the plastic to prevent breakdown due to bacterial residue.
F. Standard Audio Stations shall provide a cleaning mode to allow staff to clean station surfaces without accidental placement of calls. Activating cleaning mode shall temporarily disable the front panel buttons for a configurable period of time.
G. Standard Audio Stations shall have a status LED to indicate call and communication status.
H. Standard Audio Stations shall be hot swappable and not require system shutdown or removal of power prior to replacement.
I. Talk/Listen volume levels for each Patient Station shall be adjustable on a station-by-station basis.
J. All Standard Audio Stations shall be supervised.

2.8 REMOTE CALL STATIONS

A. Remote Call Stations shall be furnished as specified. These devices are placed in ancillary areas accessible by staff as indicated by local building codes.
B. Each location shall be capable of supporting more than six remote stations.
C. Remote Call Stations only place calls, and do not send or receive audio.
D. The Remote Call Stations shall have a call lever button, a red call placed LED, and an optional call cancel button.
E. Where indicated, Remote Call Stations shall provide a cord attached to the lever to allow a patient who has fallen to pull the cord to activate a call.
F. Remote Call Stations connect to a room I/O board via an 8-conductor Cat 5 UTP cable, which carries device data using supervised wire-per function.
G. Remote Call Stations are supervised by the system to alert staff in the event of a cable or switch failure.

2.9 LAVATORY CALL STATIONS

A. Lavatory Call Stations are initiating devices that provide patient room call for assistance indication to the patient-staff communications system. When a Lavatory Station is activated, visual indication of the

call displays at the dome light associated with the patient room, and an appropriate call indication registers on the staff console, as well as on any installed annunciators.

B. Lavatory stations are call devices only, and do not send or receive audio.

C. The lavatory stations have a nurse call lever, a call placed LED< and a call cancel button.

D. A cord attached to the lavatory station lever lets a patient who has fallen place an emergency call using the cord.

E. Stations connect to the assigned room box via a category 6 UTP cable and RJ45 connector.

F. The assigned staff console(s) and dome light will indicate the alarm condition.

2.10 SHOWER CALL STATIONS

A. Shower Call Stations are initiating devices that provide patient room call for assistance indication to the patient-staff communications system. When a Shower Call Station is activated, visual indication of the call displays at the dome light associated with the patient room, and an appropriate call indication registers on the staff console, as well as on any installed annunciators.

B. Shower Call Stations are call devices only and do not send or receive audio.

C. Shower Call Stations mount on the wall inside the shower.

D. Shower Call Stations are protected from water via a gasket.

E. Shower Calls Stations have a nurse call lever and a call placed LED.

F. A cord attached to the Shower Call Station lever lets a patient who has fallen pull the lever using the cord.

G. Shower Call Stations connect to the assigned room box via a category 6 UTP cable and RJ45 connector.

H. The assigned staff console(s) and dome light will indicate the alarm condition.

2.11 CORRIDOR (DOME/ZONE) LIGHTS

A. Corridor (dome) and zone lights shall provide clear, visual annunciation of events. Corridor Lights help speed response time and increase caregiver efficiency by clearly indicating the status of the

corresponding location. These devices are installed in corridors and outside patient rooms to provide staff with a visual cue as to the origin of a call placed on the system.

B. Corridor Lights shall use LED (Light Emitting Diode) technology.

C. Corridor Lights shall be capable of mounting in a 1-gang back box.

D. Corridor Lights shall have eight separate, distinguishable sections to indicate multiple, simultaneous events.

E. Each Corridor Light section shall be capable of indicating at least six colors.

F. Each call types shall be able to be programmed to indicate a specific dome light section(s), color(s) and flash rate.

G. Corridor Lights shall be configurable via programming to allow multiple sections of a single light to illuminate and/or flash the same color for higher priority calls.

H. Corridor Lights shall be able to match any existing Corridor Light schemes via programming. Corridor Lights shall allow for configurable overlays to be used clearly distinguish calls or presence information. For example: a flashing "N" would indicate a nurse is needed.

2.12 ROOM CONTROL BOARDS

A. The Room Control Board shall be mounted above the corridor ceiling or next to the corridor (dome) light outside the patient room. The room board connects to the PoE switch with a Category 6 UTP cable (home run).

B. The Room Control Board is a junction point for all room devices.

C. Two audio stations can connect to a Room control Board as well as the remote locator receiver(s) dome light, toilet switch, shower switch, zone light, system alarm interface.

D. The Room Control Board is powered by the home run cable connected to the Power over Ethernet switch. LEDs on the room board indicate power and status.

E. All connections to the room devices have LEDs to indicate if the communication channels are active.

2.13 POWER OVER ETHERNET (POE) SWITCHES

A. PoE Switches provide system power to all devices and interconnectivity with the rest of the system. The PoE switches are part of the nurse call system UL 1069 listed equipment.

B. PoE Switches shall have 24 ports with a maximum power output of 360 watts.

C. PoE Switches shall mount in a standard 19" network rack and shall be 1RMU high.

D. PoE Switches connect to Room Control Boards, Staff Consoles, Annunciators, and other PoE Switches.

E. PoE Switches shall follow standard Ethernet deployment standards.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install equipment to comply with manufacturer's written instructions.

B. Wiring Method: Install wiring in compliance with ANSI/TIA-569 Commercial Building Standards Telecom Pathways and Spaces.

C. Terminations: Terminate cabling in back boxes with 8 pin I wire RJ45 connectors.

D. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams. Label stations, controls, and indication using approved consistent nomenclature.

3.2 COORDINATION WITH OTHER TRADES

A. 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.

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

3.3 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 005OP3B.
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.
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' 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. Equipment installed outdoors shall be weatherproof or installed in weatherproof enclosures with hinged doors and locks with two keys.

B. Wiring Practice - in addition to the MANDATORY infrastructure requirements outlined in VA Construction Specifications 27 10 00 – Structured Communications Cabling, 27 15 00 – Horizontal 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 ¾” 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.

e. Provide all patch cables and interface cables needed to complete system.

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 Cabling, 27 15 00 – Horizontal 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 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 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 for the service the equipment is performed permanently attached 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 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

3.4 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.

3.5 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.

3.6 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 "3rd or 4th" 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.

3.7 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Provide services of a factory-authorized service representative to supervise the field assembly and connection of components and the testing and adjusting of the system by the Contractor.

B. Test Procedure

1. Schedule tests a minimum of 7 days in advance of performance tests.
2. Report: Submit an as-built package with all test results and drawings.
3. Manufacturer shall effectively coordinate the installation process. This would include but not be limited to inventory of parts, reviewing correct placement of cables, correct mounting of

devices, and monitoring the installing contractor's compliance with the installation schedule.

4. Troubleshoot and make corrections to the communications equipment.
5. Edit computer files to customize the system within the capabilities of the software sent to the site.
6. Coordinate the service of in hospital assigned maintenance.
7. Coordinate the proposed interfaces as outlined in the proposal. (MIS systems, code blue alarms, and special engineering interfaces as outlined in this document.)
8. Communicate the installation requirements to the installing contractors.
9. The Contractor shall furnish all labor, specialties, instruments, equipment, etc., required for the tests and installation.
10. All tests shall be conducted before any equipment is connected that would be subject to damage from the test.
11. The Contractor shall notify the owner at least one day prior to the actual test.
12. Results of the tests shall show that the equipment and wiring shall meet the requirements of this specification.

C. Contractor Shall Test:

1. That all power and control circuits are continuous and free from short circuits.
2. That all circuits are free from unspecified grounds and grounded where specified.
3. That all circuits are properly connected in accordance with the applicable wiring diagrams.
4. That all circuits are operable, which demonstration shall include functioning of each control not less than five (5) times.
5. Re-testing: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards. Provide a written record of all retest results.
6. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

3.8 CLEANING

A. Prior to final acceptance, clean system components and protect from damage and deterioration.

3.9 DEMONSTRATION AND TRAINING

A. Demonstration and Training: Contractor will arrange for all instructions. Allow for 4 full day workshops with staff for programming and workflow integrations.

B. Provide thorough training of all nursing staff assigned to project 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. **16** hours prior to opening for nursing staff (in 4-hour increments) – split evenly over 3 weeks and day and night shifts. Coordinate schedule with Owner.
2. **8** hours during the opening week for nursing staff – split evenly over day and night shifts.
3. **4** hours for supervisors and system administrators.

3.10 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 procession 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^{th}) 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

- - - E N D - - -