**SECTION 27 51 23.70**

**HEALTHCARE COMMUNICATIONS TONE VISUAL NURSE CALL SYSTEM**

1. GENERAL
	1. SUMMARY:
		1. Section Includes:
			1. Furnish and Install a complete and operable Tone Visual Nurse Call Communication System as shown on the drawings and herein after described. The system shall be capable of high quality, reliable, and satisfactory operation as herein described.
			2. The system shall have the ability to integrate with a Pocket Paging and or Computer Report Management System.
			3. Furnish and Install all required Data Network Interfaces, Personal Computers, Software, and Associated Accessories required for a complete and operable system as herein described.
			4. One complete and operable system shall be provided and defined as all conduit, raceways, cables, back boxes, contacts, software, etc. to achieve a complete and functional system. Also included are all power supplies, hardware, and interfaces to equipment supplied by others. Documents do not show or list every item to be provided. When an item not shown or listed is clearly necessary for proper installation and operation of the equipment and systems, provide, install, and test/certify, the item at no increase in contract price.
		2. RELATED SECTIONS:
			1. Drawings and General Provisions of Contract including General and Supplemental Conditions and Division 1 Specification Section, apply to the work of this Section.
			2. Section 27 05 00 – Common Work Results for Communications Systems.
	2. SYSTEM DESCRIPTION:
		1. Furnish and install a Tone Visual Nurse Call Communication System. The system shall be capable of high quality, reliable and satisfactory operation as hereinafter described. The system shall have the ability to integrate with a Pocket Paging and or Computer Report Management System.
		2. One (1) complete and independent system shall be provided and defined as all conduit, raceways, cables, back boxes contacts, software, etc, to achieve a complete and functional system. Also included are all required power supplies, battery backup, phone line monitoring, and interfaces to equipment furnished by others. Documents do not show or list every item to be provided. When an item not sown or listed is clearly necessary for proper installation and operation of the equipment and systems, provide, install and test/certify the item at no increase in contract price.
		3. Components of the system shall be:
			1. The Tone Visual Nurse Call Communication System shall be of one manufacture regarding software, Power Supplies, Control Modules, Room and Bath Call Stations, Annunciators and Digital Interface devices.
			2. All components required for a complete and operable system as described shall be included whether or not specifically described here in.
			3. Wiring will be in accordance with the manufacture of the Tone Visual Nurse Call Communication System.
			4. Provide all software, hardware, and system programming for complete and functional system.
			5. Provided installation, testing, adjustment, and initial programming for all equipment. Include written documentation and instructions for system as installed.
			6. The contractor shall be responsible for fully implementing the functions described in the Specifications and shown on the Drawings. The Contractor shall possess all applicable Contractor’s licenses.
			7. Provided training to the Owner in the operation, adjustment, servicing and repair of the systems
			8. Connect all systems and equipment to emergency generator power.
			9. Co-ordinate all telephone and telecom connections, network connections, programming and requirements with building Owner’s representative.
	3. REFERENCES
		1. Published Codes, Standards, Tests, or Recommended Standards of the Trade, Industry, or Government Organizations apply to these sections include but are not limited to:
			1. NFPA - National Fire Protection Association
			2. NEC- National Electrical Code - NFPA 70
			3. UL - Underwriter’s Laboratories, Inc.
			4. ADA – Americans with Disabilities Act
			5. EIA – Electronic Industry Association
			6. NEMA – National Electrical Manufacturers Association
			7. NSCA – Nation Systems Contractors Association – Best Practices
			8. ASCII – American Standard Code for Information Interchange
			9. ASTM - American Society for Testing and Materials
	4. QUALITY ASSURANCE
		1. Qualifications:
			1. The systems shall be the product of a manufacturer or an agency experienced in such work. The authorized representative of the manufacturer or aforementioned agency shall make the installation and connections of all equipment and test of the operation of the system.
			2. All items of a given type shall be the product of the same manufacturer.
			3. All items shall be of the latest technology, no discontinued models or products are acceptable.
			4. Installers shall have a minimum of 5 years experience in the installation of similar systems on at least 10 projects of similar scope.
			5. The Manufacturer or the Authorized Representative shall provide proof that within 60 miles of the project they maintain:
				1. A full complement of parts to support the installation.
				2. Offer service by fully trained and qualified technicians during normal working hours.
				3. Will supply parts and service without delay and at a reasonable cost.
		2. Substitutions:
			1. All materials and equipment shall conform to these specifications. No substitute materials may be used unless previously accepted in writing by the Architect.
		3. Regulatory Requirements:
			1. Comply with NEC as applicable to construction and installation of system components and wiring.
			2. Conform to NFPA 70
			3. Conform to HIPAA regulations relating to paging and public address systems.
			4. Systems must be inspected and receive accreditation from all agencies such as OSHPOD and JCAHO if mandated by the owner. Suppliers of all systems must include all documentation and staff to support the owner during these inspections and certifications.
		4. SUBMITTALS
			1. Refer to Section General Conditions and Related Sections for full details of submittal requirements.
			2. Provide full service contact information including company name, address, contact name, and phone number of authorized representative. Provide written proof from the Manufacturer of major system components affirming that the representative is duly authorized and trained to supply, support, and service the equipment.
			3. Provide a complete list of all equipment to be furnished.
			4. Provide Product Data: For each equipment component shown on the riser and or wiring diagram.
			5. Provide complete written sequence of operation for all factions of all systems.
			6. Provide dimensioned detail drawings of all special assemblies including custom panels, mounting assemblies, and location.
			7. Provide System Riser Diagram including:
				1. Annunciator / Master Stations
				2. Corridor Lights
				3. Zone Lights
				4. Patient Stations
				5. Pull Stations
				6. Data Collection Modules
				7. Data Interface Modules
				8. Personal Computers
				9. Power Supplies
			8. Provide Wiring Details of all connections between all systems components.
			9. Manufacturer Instructions: Provide manufacturer’s written installation instructions.
			10. Proposed training program, including name and qualification of trainer(s), schedule of training, curricula, and written training materials.
			11. Closeout Submittals
				1. Refer to Section General Conditions and Related Sections for full details of closeout requirements
				2. As-Built Drawings indicating actual location and connection of components.
				3. Operation and maintenance manuals for each system and equipment component.
				4. Executed warranty documentation.
			12. DELIVERY, STORAGE AND HANDLING
				1. Refer to Section General Conditions and Related Sections for full details.
				2. Deliver materials and components in manufacturer’s original, unopened, undamaged containers with identification labels intact.
				3. Store materials as recommended by manufacturer.
				4. During construction all products must be protected from dust, dirt, and construction foreign matter including dents, bumps, and scratches.
	5. WARRANTY
		1. Refer to Section General Conditions and Related Sections for full details.
		2. The installing manufacturer’s representative shall guarantee all labor, parts, and installation for a period of 1 year from substantial completion or first beneficial use of the system.
		3. Provide manufacturer 3-year warranty for the intercommunication and program system.
		4. Upon written notification of unacceptable work or warrantee request the installing manufacturer’s representative shall provide qualified technicians and parts within 24 hours of notification.
2. PRODUCTS
	1. MANUFACTURERS
		1. The following manufacturers are known to provide products that meet or exceed these specifications.
			1. Tech Works, Henderson, Nevada, 800-813-1080, [www.TechWorks-USA.com](http://www.TechWorks-USA.com)
			2. No known equal.
	2. TONE VISUAL NURSE CALL SYSTEM
		1. System Description:
			1. The Tone Visual Nurse Call Communication System shall be a distributed processing intelligent network consisting of a combination of Intelligent Control Modules, Annunciator Panels, and Digital Interface Modules to easily identify emergencies, functions, or staff. Dome Lights outside of each room or space shall act as a signal collection hub from call stations at a bed or in a space as indicated on the plans. Events from a Dome Light shall be sent to a system Control Module where the information is converted to a digital signal for transmission to other digital communication devices like annunciators or digital interface modules for sharing information with other systems or products. The system shall be expandable up to 256 Dome Lights on a single system each representing a room or space.
			2. The system shall use RS485 digital communication between intelligent devices. Any Dome Light status change shall be reflected in the Annunciator lights and annunciated by a tone. Any Annunciator, Control Module, or Zone Lights with the same address setting shall be totally interactive. This interaction shall allow multi-point control for tailoring a system to meet special needs.
			3. Integrated Management and Reporting System (IMR) shall be included to provide facility users with a Patient or Room Status tracking system and priority call indication. The IMR shall be a single hardware and software solution with a Linux computer built into the hardware. Each IMR includes 2 USB 2.0 ports for serial interface, 1 TCP/IP network interface, and VGA and Line Level Audio outputs so that the unit can connect directly to a Video Monitor with Speakers. No additional Servers shall be required. The IMR must be Windows 10 Compatible. The IMR system acts as a web based server to display the system activity on any product able to display a web browser. Through password protection users can access and print management reports to monitor productivity and patient activity. Other types of messaging such as Pocket Paging, or SMS Text Messaging shall also be available through this system on a point by point basis. Colors can have an associated WAV file to produce a sound associated with each color.
			4. All user interface shall employ moisture and electrostatic resistance to provide reliable yet friendly operation.
			5. Wiring for the Tone Visual Nurse Call Communication System shall consist of CAT5 computer cable from each Dome Light to the Control Module for that area. From the control modules to any Annunciator or other digital interface device shall be two twisted pair network wiring from one device to the next. Size and type of wire shall be as recommended by the manufacturer of the system.
			6. The Tone Visual Nurse Call Communication System shall be Tech Works NC-Series.
		2. EQUIPMENT
			1. The Nurse Call System Annunciator shall be a standard four gang electrical box mounting device constructed of ABS plastic with a water resistant Lexan face plate. A minimum of four columns of four lights shall be provided to allow output from the system. An electronic tone shall sound each time a light changes status. The tone must have an installer removable jumper to permanently disable the electronic tone if so desired. The Annunciator shall be an addressable intelligent electronic device requiring no more than 264 mA at 24 Volts DC for full operation. The Annunciator shall employ EIA standard RS485 digital communication. The system shall operate on two twisted pair parallel wiring. Systems requiring more than two twisted pairs from one station to the next for full operation shall not be considered under this specification.

The Nurse Call Annunciator panel shall be Tech Works Model NC-AN-16-T or NC-AN-32-T

* + - 1. The Nurse Call central Control Modules shall be modular, addressable units capable of powering and monitoring up to 16 patient room dome lights each. Control Modules shall be addressable digital network communication units capable of monitoring up to 16 rooms with room signal wire supervision, and communicating the room status on 16 unique digital network addresses, over a two twisted pair network to addressable annunciator and reporting devices. Any system not capable of monitoring, supervising the signal wires and reporting the status of 256 rooms over two twisted pair network will not be acceptable under this specification. The control Module shall operate from a UL Listed 24VDC Power Supply.

The Nurse Call central Control Modules shall be Tech Works Model NC-CM-16.

* + - 1. The Nurse Call System Single Color Dome lights shall be LED type with super bright light output and wide viewing angle. Dome Lights shall be supervised for proper Operation. Two call station inputs shall provide signaling of both Normal and Emergency Call from each room. Optional audio Tone shall be available at each Dome Light as shown on the plans. In the event of system failure the Dome Lights shall be capable of standing on their own and continuing to function on a local basis even if the central equipment and annunciation systems fail.

The Nurse Call System Single Color Dome Lights shall be Tech Works Model NC-DL-12-RSCT.

* + - 1. The Nurse Call System Single Color Code Blue Dome lights shall be LED type with super bright light output and wide viewing angle. Dome Lights shall be supervised for proper Operation. Two call station inputs shall provide signaling of both Normal and Emergency Call from each room. Optional audio Tone shall be available at each Dome Light as shown on the plans. In the event of system failure the Dome Lights shall be capable of standing on their own and continuing to function on a local basis even if the central equipment and annunciation systems fail.

The Nurse Call System Single Color Dome Lights shall be Tech Works Model NC-DL-12-BC.

* + - 1. The Nurse Call System Dual Color Dome lights shall be LED type with super bright light output and wide viewing angle. Dome Lights shall be supervised for proper Operation. Two call station inputs shall provide signaling of both Normal and Emergency Call from each room. In the event of system failure the Dome Lights shall be capable of standing on their own and continuing to function on a local basis even if the central equipment and annunciation systems fail.

The Nurse Call System Dual Color Dome Lights shall be Tech Works Model NC-DL-22-RW

* + - 1. The Nurse Call System Dual Color Code Blue Dome lights shall be LED type with super bright light output and wide viewing angle. Dome Lights shall be supervised for proper Operation. Two call station inputs shall provide signaling of both Normal and Emergency Call from each room. In the event of system failure the Dome Lights shall be capable of standing on their own and continuing to function on a local basis even if the central equipment and annunciation systems fail.

The Nurse Call System Dual Color Dome Lights shall be Tech Works Model NC-DL-22-BW

* + - 1. The Nurse Call System Patient Bed Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A large push for Help button shall be included with a ¼: phone Jack for a call cord to provide both local and remote push for help operation. A distinctive Cancel button shall be provided to reset the station. A call confirmation light shall be included to indicate that a call has been placed. The patient station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Patient Bed Station shall be Tech Works Model NC-PBS

* + - 1. The Light Signaling System Call Cord shall be a standard normally open contact device constructed of thermoplastic and shall include a 1/4 inch phone plug for quick connect to wall mounted Stations. The Push Button shall be a momentary non-locking assembly in a 2.375" long by 1.0" wide housing. The cord assembly shall be 0.25" in diameter with a plastic jacket and measure at least 7 feet in length. The device shall include a molded right angle 1/4 inch phone plug for connection to the signaling system and a security clip for attachment to patient furniture.

The Light Signaling System Room Status Call Cord shall be Tech Works Model PBC-7

* + - 1. The Nurse Call System Emergency Pull Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A large push for Help button shall be included with a durable nylon cord to provide both push and pull for help operation. A distinctive Cancel button shall be provided to reset the station. A call confirmation light shall be included to indicate that a call has been placed. The pull station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Emergency Pull Station shall be Tech Works Model NC-EPS.

* + - 1. The Nurse Call System Staff Assistance Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A large Help button shall be included to place a Staff Needs Assistance Call to the System. A distinctive Cancel button shall be provided to reset the station. A call confirmation light shall be included to indicate that a call has been placed. The staff station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Staff Assist Station shall be Tech Works Model NC-SAS

* + - 1. The Nurse Call System Code Blue Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A large CODE push button will let the system know that Help is needed in the room. A distinctive Cancel button shall be provided to reset the station. A call confirmation light shall be included to indicate that a call has been placed. The Code Blue station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Staff Presence Station shall be Tech Works Model NC-CBS

* + - 1. The Nurse Call System Code Blue with Staff Assist Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A large CODE push button will let the system know that Help is needed in the room. A separate Staff button shall be included to place a Staff Needs Assistance Call to the System. A distinctive Cancel button shall be provided to reset the station. A call confirmation light shall be included to indicate that a call has been placed. The staff station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Code Blue with Staff Assist Station shall be Tech Works Model NC-CBAS

* + - 1. The Nurse Call System Staff Duty Station shall be a standard one gang electrical box mounting device constructed of ABS plastic. A Tone unit shall sound whenever the Nurse call System is active. A distinctive Silence button shall be provided to allow staff to quiet the station. A call Alert light shall be included to indicate that a call is Active on the system. The duty station shall be a passive electronic device requiring no more than 3 mA at 15 Volts DC for full operation.

The Nurse Call System Staff Duty Station shall be Tech Works Model NC-SDS

* + - 1. The Integrated Management and Reporting System (IMR) shall be a Linux based Status-Server that logs and displays Patient or Room Status. Any device with access to the IMR network, shall have password controlled access to view the graphics and system status from anywhere at any time. The IMR shall include the ability to send messaging such as Pocket Paging, or SMS Text Messaging to other devices on a point by point basis. Each point in the associated system shall be labeled according to the function or use of the associated point on the system.

The Integrated Management and Reporting System shall be Tech Works IMR.

* + - 1. The Nurse Call System shall be supplied with a 24-Volt Direct Current power supply capable of powering all devices, as shown on plans, simultaneously with a minimum of 25% reserve power. The power supply shall have isolated ground from DC power common and be UL/CSA Listed for use with alarm and signaling systems. A surface mounting metal bracket shall be included to house the power supply. This unit shall operate from an input of 100 to 240 Volts AC and supply a minimum of 3.75 Amps at 24-Volts DC.

The Power Supply shall be Tech Works Model PS-2437B

* 1. ACCESSORIES
		1. Wire and Cable
			1. System Network Wire shall be 18 AWG stranded twisted two pair cable with overall jacket. Wire twist shall be industry standard audio twist per foot or greater. Jacket material shall be compliant with NFPA and NEC codes for the type of location in which the cable is installed.
			2. All Station wire and Patch Cords shall be CAT6 type standard network patch cords.
			3. All Adapters, Plugs, and connectors shall be included as required.
		2. Cable Management
			1. Cable management shall be as shown on the plans.
			2. Where not shown on the plans wire shall be open run through concealed spaces and dressed using tie-wraps and screw mount tie-wrap holders on all exposed open runs.
			3. In all cases wire routing and cable management shall be compliant with NEC and all Codes, Standards, and Best Practices applicable.
1. EXECUTION
	1. INSTALLATION
		1. The Contractor shall furnish and install all interconnected cable, equipment, miscellaneous parts and accessories to make a complete and fully operational system as described herein and as shown on the drawings.
		2. All cables shall be sized in accordance with manufactures recommended cabling requirements. All cable and wire shall be air plenum rated even if installed in conduit.
		3. Equipment shall be installed and wired in accordance with accepted engineering and installation practices. Only the highest degree of workmanship will be accepted. Install in accordance with Electronic Systems Technician (EST) practices.
		4. All cables shall be run continuously and no splicing may be made in any cable run.
		5. Cable and wiring routed through inaccessible spaces or spaces where there is risk of damage to conductors shall be installed in conduit or raceways supplied by other sections of this specification.
		6. All cable and wiring shall be run concealed in ceiling spaces or surface raceways, except for in wiring closets such as the Main Distribution Frame (MDF).
		7. All cable and wiring shall be securely fastened to the permanent building structure. Cable and wire not installed in raceway shall be supported at regular intervals appropriate to the cable and wire size. Cable and wiring shall not lay loose on ceiling tiles or grids and shall not be suspended from or attached to existing conduit.
		8. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer have published torque tightening values for equipment connectors. Where manufacturer’s torque requirements are not indicated, tighten connectors and terminals to comply with tightening torque per NEC specification.
		9. The following circuit types shall be installed in their own conduits:
			1. Microphone and control lines
			2. Control lines
			3. AC power lines
		10. Provide a #6 AWG insulated copper ground wire from the main equipment to the building main ground bus.
		11. Install in accordance with NFPA 70 and manufacturer recommended installation procedures.
	2. FIELD QUALITY CONTROL
		1. CLEANING
			1. Clean all devices, cabinets, and housings as recommended by electronic industry manufacturer.
			2. Labeling
				1. All wiring and connections must be clearly labeled using industry standard permanent marking devices. Contractor shall identify and tag all cables with permanent type markers to denote locations served.
				2. All user interfaces must be clearly and permanently labeled for their intended use. All front panel controls used in the normal operation of the system shall be clearly labeled using plastic laminate engraved labels or approved equal. Labels shall be firmly affixed to the panel or device. Dymo or Kroy tape adhesive backed lettering is not acceptable. Each major system component shall be labeled as to function and area served.
			3. Site Tests/Inspection
				1. Post Occupancy testing: Test inputs and outputs of all devices to verify compliance with functionality of designed system.
				2. Verify installed cable is free of opens grounds and shorts.
				3. Verify ventilation for equipment is adequate for installed units.
	3. DEMONSTRATION
		1. Provide instruction to the Owner or their appointed representative related to operation, maintenance and programming of all systems Training sessions shall be on-site, limited to 15 people maximum in any one session. Sessions shall last approximately one (1) hours each. In addition, Contractor shall provide a minimum of four (4) hours training for system administrator.
		2. Follow-up training must be provided on all systems, one (1) week after cutover.
		3. Provide demonstration and training by a staff member/trainer who is certified by the system manufacturer to provide training.
	4. FINAL CHECKOUT AND ACCEPTANCE:
		1. The Contractor shall verify that the system is complete and fully operational before requesting final approval and before scheduling system demonstration.
		2. This Contractor shall be available to demonstrate the operation and use of the system to the Architect/Engineer and to the Owner’s representatives.
		3. At the time of the demonstration, this Contractor shall furnish to the Owner one (1) complete record manuals.
		4. Substantial Completion of the system will start the warranty period for both material and labor.
	5. SYSTEM GUARANTEE:
		1. The Contractor shall provide the following regarding warranties and guarantees.
			1. Extend the manufactures warranty to the owner. The owner understands that manufactures warranties will vary from manufacture to manufacture.
			2. Provide one year of free maintenance on the system from date of substantial completion and the owner’s first beneficial use of the system.
2. END OF SECTION