PART 1 – GENERAL

1.01 General

A. Basic specialty systems requirements are specifically applicable to Division 27 00 00 Sections, in addition to Division 01—General Requirements, General Conditions and Supplementary General Conditions.

B. All conduit, raceways, cable trays, boxes, etc., shall be installed as per the applicable Division 26 specifications, National Electrical Code (NFPA 70), and the Florida Building Code, Department of Education (DoE) of the State of Florida, State Requirements for Educational Facilities (SREF), and to other pertinent codes made a part of such code by reference.

C. It is the intention of these specifications and drawings to call for finished work, tested, and ready for operation. Wherever the word "provide" is used, it shall mean "furnish and install complete and ready for use." This Contractor shall make sure that installed equipment does not leave any exposed wiring or leave terminal strips uncovered.

D. Minor details not usually shown or specified, but necessary for the proper installation and operation, shall be included in the work, the same as if herein specified or shown.

E. The term “Basis of Design” (if used in this document) shall be understood to mean a particular manufacturer’s equipment (as scheduled specifically on the drawings or specifications). The Basis of Design has been used as the basis by the Design Engineer to establish physical dimensions, quality, and performance required, in addition to providing a basis for interaction with other ancillary components and/or other trades. Any manufacturer’s equipment (including any manufacturer identified as “Basis of Design”) shall require written approval via Addendum prior to bid.

F. Division 27 Contractor firm must possess a valid state Contractor's License. This license must have been issued two years prior of the date of this bid. No other license classification is acceptable.

G. The Division 27 Contractor firm must have successfully performed at least three projects of similar scope, within the two years of the date of this bid in the local area. If requested; proof of performance shall be in the form of reference sheets which shall include a brief description of the project, the beginning and ending contract price; the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.

1.02 Related Sections

A. 26 05 33.13 Conduit and Raceways

B. 26 05 33.16 Boxes

C. 26 05 33.23 Surface Raceways

D. 26 05 36 Cable Trays

E. 26 05 39 Electrical In-Floor Duct System

F. 26 05 45 Prefabricated In-Ground Pull Boxes

G. 26 43 13 Surge Protectors for Data and Electronic Equipment

H. 27 10 00 Structured Cabling

I. 27 41 16.51 Cabling for Classroom Projector Systems

J. 27 51 13 Unified Communication System

1.03 Regulatory Requirements

A. Applicable Standards

Certain standard materials and installation requirements are described by reference to standard specifications. These standards are as follows:

1. TIA/EIA‑568-C.0 Generic Telecommunications Cabling for Customer Premises.
2. TIA/EIA‑568-C.1 Commercial Building Telecommunications Cabling Systems

Standard

1. TIA/EIA‑568-C.2 Balanced Twisted Pair Telecommunications Cabling Systems

Standard

1. TIA/EIA‑568-C.3 Optical Fiber Telecommunications Cabling Systems Standard.
2. TIA/EIA‑569-B (-C) Telecommunications Pathways and Spaces.
3. TIA/EIA‑598‑B Optical Fiber Cable Color Coding 2001.
4. IEEE 802.3ab Specification for Gigabit Ethernet over UTP cable.
5. IEEE 802.3z Specification for Gigabit Ethernet over fiber optic cable.
6. EIA/TIA‑606-B Administration Standard for Commercial Telecommunications

Infrastructure

1. NEC National Electrical Code
2. BICSI Building Industry Consulting Service International

For additional standards and requirements see other sections of the specifications.

Whenever a reference is made to a standard, installation and materials shall comply with the latest published edition at the time project is bid unless otherwise specified herein.

1.04 Scope of Work – Division 27 Contractor

A. Provide an integrated communications system (ICS) to include the following sub-systems:

1. Zoned Paging System (Contractor Furnished, Contractor Installed)

2. LAN Equipment (Owner Furnished, Owner Installed)

3. Patch Cables (Contractor Furnished, Contractor Installed)

4. Telephone System Equipment (Owner Furnished, Contractor Installed)

5. UPS Equipment (Owner Furnished, Contractor Installed) – Contractor to provide District with power calculations for each MDF and IDF so proper sized UPS’s can be provided by the District and installed by the Contractor.

6. Coordination between school based personnel, District personnel, and Engineer to determine how many ports are to be activated and how many switches are required.

7. Training for all systems.

8. Fire alarm communications.

9. Proper grounding of all low voltage systems.

10. Communication with the elevator.

11. Communication with the Area of Rescue Assistance Communication System.

B. This contractor shall test each of the above sub-systems and the interfaces (i.e., software and hardware) to meet the interactive requirements of each sub-system as described within these specifications.

C. This contractor shall utilize a backbone cabling and horizontal cabling plant provided by others unless specifically included within this bid. Copies of all prints may be requested from the Construction Manager. This contractor shall provide any cabling plant or other hardware requirements needed to provide a complete and working system. This Contractor is responsible for providing and installing the equipment and connections for an integrated and operational communications system.

1.05 Cooperation with Other Trades

A. Furnish to the PA/E, in writing, any information necessary to permit the work of all trades to be installed satisfactorily and with the least possible interference or delay.

B. When work installed under this Division will be in close proximity to, or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment.

C. Furnish to other trades, as required, all necessary templates, patterns, setting plans, and shop details for the proper installation of work and for the purpose of coordinating adjacent work.

1.06 Safety

The Division 27 Contractor shall comply with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.333), Title 29—Labor, Chapter XIII, Bureau of Standards, Department of Labor, Part 1518—Safety and Health Regulations for Construction; and that the housekeeping and equipment be maintained in such a manner that they comply with the Florida Industrial Commission Safety Code and Regulations of the Federal Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA), wherein it states that the Contractor shall not require any laborer or mechanic employed in the performance of the contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety.

1.07 Supervision

The Division 27 Contractor shall provide a competent, experienced, full time superintendent who is acceptable to the PA/E and Owner, and who is authorized to make decisions on behalf of the Division 27 Contractor.

1.08 Equipment Identification (Administration)

A. For purposes of this specification, CER (Central Equipment Room) shall mean the same as MDF (Main Distribution Frame) or MXC or MC (Main Cross-Connect). For purposes of this specification, Communication Closet (CC) shall mean the same as IDF (Intermediate Distribution Frame) or IXC or IC (Intermediate Cross-Connect).

B. The Division 27 Contractor shall submit for Owner review an administration plan for each system installed. The Division 27 Contractor shall label all outlets following the detailed shop drawing design, using permanent/legible typed or machine engraved labels approved by the Owner. Terminals in the IDFs and MDF shall be labeled by this Division 27 Contractor using designation strips designed for 110 hardware or applicable to terminal hardware. All copper/fiber terminals for riser cables in the IDF shall correspond to terminal numbering in the MDF and vice versa.

C. Labels (on the IDF station terminal blocks) shall be numerically sequenced. Outlets shall be labeled to match the labels on the corresponding terminal block position. Labels shall include a room number component and a sequential extension.

D. A floor plan clearly labeled with all labeling schemes shall be included in the as-built plans. All labels shall correspond to as-built and to final test reports.

1.09 Wiring Diagrams

The Division 27 Contractor shall furnish, for use under Division 26, all wiring diagrams as may be required for the installation of the wiring to insure proper coordination, operation, and control of the equipment provided under this Division.

1.10 Material and Workmanship

A. All materials and apparatus required for the work, except as specifically specified otherwise, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the Engineer shall be furnished. Refer to substitutions in this Section.

B. Unless otherwise specifically indicated on the plans or specifications, all equipment and materials shall be installed with the approval of the PA/E in accordance with the recommendations of the Manufacturer. This includes the performance of such tests as the Manufacturer recommends.

1.11 Removals, Relocations, Reconnections, and Restorations

A. If applicable, demolition of existing equipment, etc., shall be done as indicated on the Drawings. Existing piping and/or equipment to be removed shall be offered to the Owner. If the Owner wishes to utilize the existing equipment elsewhere, this Division 27 Contractor shall move the equipment to a site designated by the Owner. All material to be removed shall be discarded by the Division 27 Contractor and they shall not be used again.

B. All demolition work shall be coordinated with the Owner. Demolition and reconnections requiring shutdown of existing systems shall be scheduled with the Owner/Engineer. If shutdown can only be accommodated on the weekend, or after normal working hours, such work shall be done at no additional cost to the Owner.

C. Location, capacity, size, etc. of existing equipment, piping, etc., was obtained from field survey and as-built drawings. Verify all conditions at site prior to commencing with work. Notify Engineer of any discrepancies prior to starting work or ordering material.

D. Survey existing facilities and utilities as necessary to identify any elements that might interface with systems provided under this Division.

E. Temporarily store all items to be relocated, if required. The Division 27 Contractor shall be responsible for safe storage of all such items and shall replace any items lost or damaged during storage removal or reinstallation.

F. For phased projects, the Division 27 Contractor is required to keep all existing District voice, data, networking, clock, bells and paging systems operational until the new system is accepted.

PART 2 – PRODUCTS

SEE DIVISIONS 27 AND 28 SPECIFICATIONS

PART 3 – EXECUTION AND SCHEDULING

3.01 General

A. Installation shall be performed only by experienced installers who are familiar with the project requirements.

B. All equipment and materials are to be installed in accordance with all applicable standards of the National Electric Code and any other applicable codes including local municipality codes, safety codes, and ordinances.

C. Contractor shall coordinate all work with other trades to avoid conflicts and delays in construction schedule. Contractor shall take whatever steps necessary to meet the construction schedule, including, but not limited to, expediting the delivery of materials and/or providing additional labor at no charge to the Owner.

D. Contractor shall coordinate with the Electrical Contractor for the connection of power and ground wiring to the system and all wiring installed by the Electrical Contractor.

E. Contractor shall verify with the Electrical Contractor that the grounding and bonding of all systems is correct as per plans and specifications.

3.02 Installation

A. Contractor shall set up a preconstruction meeting with school based personnel, District personnel, Contractor or Construction Manager, Engineer, and the Division 26 and 27 contractors prior to work starting.

B. All equipment shall be plumb and square. The Contractor shall take such precautions as are necessary to prevent and protect against electromagnetic and electrostatic hum, to supply adequate ventilation and to install the equipment as to provide reasonable safety for the operator.

C. Pre-wire racks and any other possible equipment before delivery to the job site.

D. Identify all wires and cables at every termination and connection point with the specified cable marker. The cable marker shall be Brady or equal. No handwritten labels will be accepted.

E. All control panels, patch bays, controls, connectors, switches, and etc. (except those on the equipment that are properly identified by the manufacturer) shall be suitably identified by engraved panels or plates or metal-photo panels or plates as approved by the Engineer.

3.03 Testing

A. This Contractor shall review the cabling plant provided by others prior to beginning installation. Send a report of any non-complying wiring to the Engineer clearly identifying deficiencies that might render systems provided in this specification to be non-functional. Testing shall incorporate a Cable Analyzer for Copper and OTDR Optical Time-Domain Reflectometer for Fiber.

B. Provide initial testing and final proof of performance testing of the completed system. Make all necessary adjustments, replacement, and additions to the system so that the specified performance criteria are met.

C. The Contractor shall conduct preliminary system performance testing and preliminary equalization of the completed systems.

D. Check all system inputs for proper operation.

E. Adjust and balance all equipment, as required, for optimum signal to noise ratio.

F. Adjust the control for each line input for adequate gain before feedback and freedom from hum, buzzes, rattles, and RF interference.

G. The Contractor shall notify the Engineer when the system is ready for final inspection, equalization, and adjustment. The Contractor, Manufacturer, and Engineer will do final adjustments and equalization.

H. During the Substantial Completion walkthrough, the network shall be tested for compliance with operation criteria by its ability to access the Internet.

3.04 General

A. It is the intent that one week prior to substantial completion, this ICS “Integrated Communication System” will be tested and operational. This effort shall include the data and voice systems. Deliverables are to be coordinated to meet this intent.

3.05 Area of Rescue Assistance/ Area of Refuge

A. It shall be the responsibility of this Division 27 Contractor to verify successful testing of the CAT6 cable for the Area of Rescue Assistance Communication System. This Contractor shall verify that the low voltage transformer and 18-2 wire is installed and operational and that conduit is installed per the Design Documents. This Contractor shall then install the owner provided end point equipment. When the MDF/IDF is operational, this contractor shall notify the owner in writing, that the entire infrastructure is ready for the owner to configure and test the equipment.

3.06 LAN System

A. Following is the installation schedule:

1. Three (3) months prior to substantial completion or earlier:

a. The Contractor shall provide the District the number of PoE ports serviced by the MDF or an IDF that will be required to support the following equipment:

* IP Speakers (bear in mind some speakers are master/slave configuration that only requires one (1) port)
* Telephone Devices – Provide the number of both wall and desk phones in the area.
* Message Boards/ Digital Displays

2. The number of data ports required to supply each CO “Communication Outlet” using the following guidelines:

* If the CO has one port/drop, then it is to be patched and counted
* If the CO has two ports/drops, then both are to be patched and counted.
* If the CO has three or four ports/drops then, unless otherwise noted, only two ports/drops should be patched and counted.
* If the CO has five or more ports/drops then, unless otherwise noted, all ports/drops should be patched and counted.

3.07 Telephone System Schedule

A. All testing of the infrastructure cabling shall be complete and accepted prior to the installation of the telephone system equipment.

B. Following is the installation schedule:

1. Three (3) months prior to substantial completion or earlier.

a. The Contractor shall meet with the Principal and Engineer to mark telephone locations on documents. The Contractor shall review the room designations for clarity and ensure the FISH building/room numbers are accurate for proper labeling including the Principal's office, the Assistant Principal's office, Secretary's office, and the Bookkeeper's office. The telephone system must accommodate the Energy Management System (EMS) line, the before/after school program line, the elevator line (if applicable.

b. The Contractor shall provide the District the number of phones per IDF within each building and per type (wall/desk).

2. Two (2) weeks prior to substantial completion:

a. The owner supplied directory template shall be completed and returned to the owner. This requires working directly with the school staff to determine the location of each administrative staff member. The fields/columns necessary are user id, last name, first name, position, building and room number. Building and room number shall be in FISH format (Bxx Rxxx).

3. One (1) week prior to substantial completion:

a. Phone equipment will be delivered to the site for installation by the Contractor. Each box with a phone will be labeled with the building and room number for its location. Upon completion of the installation, the Contractor shall call from every room by dialing ‘0’ and verify the caller ID is correct in relation to its physical FISH location. Any exceptions that cannot be remedied by the Contractor shall be reported to the Construction Manager so that District staff can address the issue.

C. Training on the telephone system to be provided by District staff.

3.08 Paging System Schedule

A. Three (3) months prior to substantial completion or earlier:

1. The contractor is responsible for ordering and the installation of all IP Paging equipment as per these specifications.

B. Two (2) weeks prior to substantial completion:

1. The installation of IP Paging equipment including Zone controller shall be complete enough to supply the locations of the devices. The Contractor shall provide all MAC addresses of the installed equipment by location by utilizing the locations FISH number so the District can complete configuration of the system. After configuration, the District will supply the Contractor with the dial codes necessary for completion of testing of the system. Testing shall include, but not be limited to, testing all individual speakers and zone controllers for function and volume level.

2. Each panic button shall also be tested via the press and release (one second) of each button with the verification of the caller ID displayed in the office with the correct building and room number. The hold three (3) seconds to call Schools Police shall also be tested for each room with the verification of caller ID with building and room number.

3. Training on the IP Paging system to be provided by District staff.

3.09 UPS Equipment Schedule

A. Three (3) months prior to substantial completion or earlier:

1. The contractor is responsible for providing the district the load calculations of all equipment in the racks in each MDF or IDF so the proper size UPS can be ordered.

2. The district will configure and deliver the UPS equipment to the contractor with each device labeled as to its location of installation. The Contractor will then install all UPS equipment.

**END OF SECTION**