

**TELECOMMUNICATIONS SYSTEM
Elementary Schools
Section 16735
[project #]**

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. General Conditions and requirements of Division 1 and Section 16010 apply to work hereunder.
- B. Furnish and install a complete Telephone Communications System, with intercom communication systems interfaces, including all wiring (refer to Section 16745 Structured Cabling) and connections and other materials as shown on Plans and specified herein. It is the intent that a complete operating system be installed and that any power supplies, line cards, control cards, interface cards, programming, or other items required to achieve this end result shall be furnished whether or not such item or items are specified herein or shown on Plans.
- C. Telephone system contractor shall meet with School District telephone personnel and Frontier Communications to coordinate telephone system head end configuration prior to installation of system.

1.02 GENERAL REQUIREMENTS

In order to qualify for installation of the telecommunications system, the Contractor must possess the required license classification, trade certifications, a performance history, experience in the installation and termination of fiber optics cable systems, and proof of time in business.

- A. License Classification: Contractor must possess a valid C-7 California State Contractor's License. This license must have been issued two years prior to the date of this bid. No other license classification is acceptable.
- B. BICSI Certifications: Contractor will use personnel certified by the trade organization BICSI. The vendor must have a Registered Communications Distribution Designer (RCDD®) on staff that will be ultimately responsible for this project. The RCDD must have sufficient experience in this type project as to be able to lend adequate technical support to the field forces during installation, during the warranty period, and during any extended warranty periods or maintenance contracts. The vendor must attach a resume of the responsible RCDD to the vendor's submittal for evaluation. Should the RCDD assigned to this project change during the installation, the new RCDD assigned must also submit a resume for review by the District. The vendor must also have BICSI registered installers and technicians on staff and assign them to this project. The project shall be staffed at all times by installers and technicians, who, in the role of lead craftsperson, will be able to provide leadership and technical resources for the remaining crafts persons on the project. A minimum of 30 percent of personnel shall be BICSI registered telecommunications installers.
- C. Performance History: Contractor must have successfully performed at least three projects of similar scope, within two years of the date of this bid. 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,

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address, and telephone number of a project contact.

- D. **Fiber Optics Experience:** Contractor must be able to prove to the satisfaction of Owner that they have had significant experience in the installation of fiber optics cable systems. Installation must include installation of fiber optics cable, fiber termination, a knowledge of interconnect equipment, and a thorough knowledge of testing procedures. Contractor must provide a minimum of three (3) references supporting its claim of experience for similar projects within the two years prior to this bid. Documentation must be included with the bid documents submitted.
- E. **Time in Business:** Contractor must have been in business, and in the business of installing telecommunications systems, continuously, for a period of at least three years, prior to the date of this bid. Contractor must submit at least one project reference for each of the three years prior to the date of this bid. The Contractor must also maintain a full time staff at an established business location having appropriate parts and service facilities and the ability to provide a one-hour response time to Elk Grove Unified School District. Any Contractor **unable** to meet these requirements will not be considered as an acceptable contractor for this project.
- F. **System Requirements:** All of various equipment components to be complete with all appurtenant accessories required to provide specified facilities and perform specified functions throughout presently planned construction and space; and provisions for expanding system to provide same facilities, and perform same functions in all future planned construction, including space and mountings in racks and on terminal backboards.
- G. **Instructions and Manuals:**
1. Equipment supplier of systems to demonstrate operation of system to satisfaction of Owner and furnish Owner three wiring schematics for all items of equipment, installation instructions, and details of all routine maintenance and servicing which must be given system by Owner. Refer to paragraphs related to Manuals in Section 16010.

Manuals to be provided in substantial fiberboard covers, with title page, list of contents and conspicuous label on cover and shall be delivered to District. Submit copy to Architect for approval before delivering to Owner.
 2. Supplier shall demonstrate operation of systems and provide a minimum of 16 hours of instruction. Coordinate times of instruction with Owner, at Owner's convenience.
- H. **Submittals:** Furnish catalog data, shop drawings, one-line diagrams, and scaled plan drawings. Building plans shall be 1/8"=1'-0", and site plans shall be no smaller than 1"=40'. Provide two cross reference lists: (1) items of equipment with specified system function each item provides, and (2) specified system function with item of equipment which performs that function. Contractor shall also submit name of firms he proposes to do work under this Section, addresses, phone numbers, and name of firm's contact, for approval. Such firms shall

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be factory authorized representatives of the equipment specified, who shall furnish all equipment, make all connections to same, and place the systems in operation. Such firms shall have offices and service departments within a 50 mile radius of project and shall have been in business of this type for at least five years. **Submittal shall be provided by the firm performing the work.** Also, refer to requirement for shop drawings, substitutions, materials, and submittals in Section 16010, Electrical. The Architect's representative will make two submittal reviews. Subsequent reviews will be charged to the Contractor. A rejection of a submittal or review of a partially presented submittal constitutes one submittal review.

- I. Record Drawings: Refer to General Conditions. Final Inspection will not be made until drawings are received and approved. Record Drawings shall include "As-Built" one-line and wiring diagrams, with terminations identified, wire color coding schedule, pullbox locations, and conduit routing plans.

- J. Guarantee:
 - 1. One firm to assume full responsibility for performance on all work of this section. Guarantee all equipment against defects in material and workmanship for one (1) year, and provide on-the-premises service during normal working hours for three years, at no cost to purchaser if trouble is not caused by misuse, abuse, or accident, or at current labor rates if so caused. Provide manufacturer's written guarantee for equipment and parts to Owner.
 - 2. Service shall normally be available within 24 hours from service department of authorized distributor of manufacturer by factory-trained servicemen.
 - 3. On-the-premises service at other than normal working hours to also be available, but labor charges for such calls to be paid by purchaser at current labor rates.

PART 2 - DETAIL REQUIREMENTS AND PRODUCTS

2.01 SYSTEM FUNCTIONS AND OPERATIONS

- A. Provide a Norstar-Plus Modular ICS System with Norstar-CallPilot 150 - 4 port model, at the current software release level with all accessories to make a complete and operational system of 100 voice mailboxes. No substitutions will be considered per Owner's requirement for District wide compatibility.

- B. The System shall be purchased from and installed by a Nortel Authorized dealer. Vendor must provide a letter from Nortel stating they are an authorized dealer. Installer must be a Certified Nortel Technician. Vendor must provide a Nortel Networks Support Commitment Letter before the system will be accepted by Owner.

- C. The telephone system shall include the following functions as a minimum:

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1. Answer Buttons
2. Accidental Disconnect
3. Autodial Keys
4. Automatic Line Selection
5. Automatic Set Relocation
6. Auxiliary Ringing
7. Background Music
8. Button Inquiry
9. Call Duration Timer
10. Call Forward All Calls
11. Call Forward Override
12. Call Identification
13. Direct Dial Set
14. Direct Station Select Buttons
15. Conference (three-party including consultation)
16. Delayed Ring Transfer to Prime
17. Dial Intercom
18. Dial - 0 Set
19. Dialing Mode for Lines
20. Distinctive Ringing at Set
21. Do Not Disturb
22. Emergency Transfer
23. External Line Access
24. Feature Access Key
25. Flexible Numbering Plan
26. Hands-free Answerback
27. Hold
 - a. Automatic Exclusive Hold
 - b. Exclusive Hold
 - c. Held Line Reminder
28. Language Choice
29. Last Number Redial
30. Line Pool(s)
31. Listen On Hold
32. Line Profile
33. Line Selection (Manual and Preselection)
34. Messages (Send, Waiting/Reply)
35. On Hold Treatment (Music/Silence)
36. Multiple Line Appearances
37. On Hook Dialing
38. Paging - External and Internal
39. Pre-Selection/Call Screening
40. Prime Line
41. Prime Set
42. Privacy Control
43. Privacy on Lines

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44. Pulse to Tone Conversion
 45. Remote Access features
 46. Ring Again (Internal)
 47. Ringing Line Preference
 48. Speed Dial -Set and System
 49. Time/Date Display
 50. Transfer via Conference
 51. Transfer via Hold
 52. Voice Call (Manual, Automatic)
 53. Voice Mail
- C. Central Switching Exchange (CSE): Shall be microprocessor controlled, boards and PAM (Pulse Amplitude Modulation) for internal speech transmission. The equipment must be capable of being configured for use with telephone company equipment that accepts dial pulse or DTMF (Dual Tone Multi Frequency) dialing. The system shall contain all circuit boards and components as required to meet the system requirements as detailed and outlined herein. Any system that is not capable of at least 272 simultaneous conversations shall be considered unacceptable.
- D. The CSE shall be a fully non-blocking system to allow simultaneous telephone handset to telephone handset communication paths as required. Through the use of expansion modules, the system capacity may be easily expanded to accommodate future requirements. Systems that are not capable of at least 272 communication paths will not be acceptable.
1. The CSE shall provide direct dialing, private two-way telephone communications between all telephones that have DTMF tone dial pads as shown on plans.
- E. The system shall have complete interconnect capabilities to the local telephone company central office lines. To accomplish this, the system must be registered with the FCC and have a registered ringer equivalence number.
- It shall also be capable of being interconnected to a PBX. It shall be possible to transfer any interconnected circuit to any station in the system. Access to outside lines may be limited to certain authorized telephones via software programming.
- F. Trunks:
1. Provide for the direct connection of outside trunks. Systems that require the use of line amplifiers will be unacceptable. Initially the system shall be equipped and wired for 18 copper trunks.
 2. The system shall be capable of operating with ground start and loop start trunks for existing and future capability with utility services, ~~and be capable of E&M 2-wire and 4-wire tie-line interface to other schools in the District.~~
- G. The system shall provide all standard telephone company signaling to interface with other

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special services such as off-premises extensions, watts, and centrex.

- H. Restrictions:
1. The system shall offer full flexibility of software restrictions to station lines for external calling capabilities. The restrictions shall be by station, by long distance allow/disallow or by dialed number, area code, and/or exchange.
 2. Software updates to the program may be accomplished via the intercom system ACS, or at a remote location; i.e., the local service facility or the factory.
- I. Direct In Telephone Line (DIL): Provide connections of telephone trunks to the system. This will directly ring a designated phone without the assistance of an operator, as used for private line service. Calls may be routed to the attendant if not answered in a predetermined time.
- J. Direct Inward System Access (DISA): The system shall directly access all system capabilities from a remote location via a dedicated trunk. Only authorized individuals may use this feature by dialing this trunk and then dialing the system function.
- K. Standby Power: The system shall be equipped with a Liebert GXT 2U 1500VA UPS with 3 year extended warranty to maintain the system in full operation during power outages. The batteries shall operate the system for a minimum of four hours. The system shall also be equipped with a web card for remote access to monitor the UPS and batteries.
- L. Diagnostics: Diagnostics shall be provided to simplify maintenance of the communications system. Provide modem connection via telephone line for factory troubleshooting assistance. Systems that cannot perform on-line diagnostics without taking the system out of user operation will be unacceptable.
- M. Shall be capable of interfacing with a Media Retrieval Control System (media retrieval system is future).
- N. Provide for Internal Computer Networking such that on-site computers may access and communicate with computers at off-site locations.
- O. Station Message Detail Record (SMDR): Provides a record of incoming and outgoing calls handled by the system. Extension number, trunk, date, time duration, account code record calls sequentially, and number dialed. Provide serial printer dedicated to SMDR.
- P. Music: The system shall be equipped with two music input jacks per cabinet. Input shall be from second program channel of intercom system. Provide interconnections required between cabinets.
- Q. System shall be capable of CTI and BRI applications with the following functions as a minimum:

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1. Screen Pops
 2. Intelligent Routing
 3. Voice and Data Call Association
 4. Data Transport
 5. Coordinated Call Monitoring
- R. Intercommunications Interface: The telephone system shall be connected to operate in conjunction with the school's paging and class change time tone generation systems. Provide access to the paging system to perform all page, zone page, and communication access to individual classroom speakers. Provide all required components for interconnection into intercom system.
- S. System shall incorporate the Norstar Applications **Module** capable of supporting 32 voice channels, driving multiple integrated applications such as voice mail, fax messaging, desktop messaging, Digital Networking, and Automatic Call Distribution.

2.02 MATERIALS AND EQUIPMENT

- A. To fulfill the above requirements, the following shall be provided:
1. Nortel Norstar-Plus Modular ICS, dual cabinet system with master and slave concentrators and interconnect cable assemblies with 4 port voice mail **w/ the latest release of software.**
 - a. Provide minimum two 16-slot cabinets with system controller cards, common service cards with piggy-backed memory boards, power supplies, and 9600 baud modem.
 - b. System shall be equipped and wired for 272 ports. The voice mail module shall be equipped with a voice mailbox for every classroom and workstation on site.
 - c. Provide analog and digital line cards, SLP baby boards, trunk baby boards, ICLID baby boards, and system 3100 line card.
 - d. Provide Norstar Applications Module capable of supporting 32 voice channels and multiple integrated applications.
- B. Intercommunications Interface: Provide all required components for interconnections into intercom system **in addition to the 18 copper trunks specified in 2.01F.**
- C. Fire, Intrusion Alarm, EMS, and Irrigation Control Systems Connections: Furnish and install jacks and wiring to automatic dialer of each system (2 dedicated Fire, 1 dedicated Intrusion, 1 dedicated EMS, 1 dedicated Irrigation). Connect each jack to a dedicated copper trunk line each. Do not run through phone switch.
- D. Remote Equipment:

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1. Multi-Line Phones:
 - a. All phones in the administration building shall be desk mounted except for the Administration Conference Room, Office Workroom, Staff Workroom, and the Staff Lounge. Those phones shall be wall mounted at 48".
 - b. Shall be Norstar T7316E. Provide one for each voice outlet in the administration building.
 - c. Telephones shall be fully digital, and be equipped for and shall provide hands-free operation.
 - d. All telephone sets are to be Platinum in color.
2. Single-Line Telephones:
 - a. All single-line phones are to be wall mounted at 48". (Leave desk mounts at site for future use.)
 - b. Shall be Norstar T7100. Provide one for each non-administration building voice outlet.
3. All telephones shall be provided with 6' cords with RJ11 connectors to mate with telecommunications outlet.
 - a. All cords are to be Platinum in color.
4. Desk Phone Outlets:
 - a. Modules: Leviton QuickPort snap-in jack modules, 6 conductor jack #5G110-RG5
 - b. Blank Filler: Leviton #41084-BGB.
 - c. Wall Plates: Single gang 6 ports - Leviton QuickPort six-port wall plate #41080-6GP. Provide with one module and five blank fillers.
5. Wall Phone Outlets:
 - a. AT&T 630B4H or equivalent.

PART 3 - EXECUTION

3.01 INSTALLATION REQUIREMENTS

- A. Electrical Contractor shall retain the services of the duly appointed representative as specified

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hereinbefore, who shall furnish all equipment, make all connections to same, and place system in operation. Technician and workman employed shall be particularly skilled in this type of work and certified by the Telephone System Manufacturer. Workmanship on installed systems shall be of professional quality, best commercial practice.

- B. All wiring throughout entire system shall be Category 5E compliant and installed in conformance with standard telephone company practice. Each terminal backboard shall be provided with terminations as follows:
1. Terminal blocks shall be AT&T 110AB1-100FT - Comcode 103 823 845 or AT&T 110AB1-300FT - Comcode 104 049 051.
 2. Provide same quantity of block terminals as phones and modems indicated on plans, plus a minimum of 25% spare.

Submittal shall show elevations of terminal backboards with equipment laid out.

- C. **Wiring Blocks:** Wiring blocks shall be mounted on telephone terminal backboard and oriented as intended by manufacturer. Each device shall be mounted such that its horizontal and vertical dimensions are level. Each device shall be affixed by means of four screws suitable for fastening to the backboard. Screws shall be tightened to the extent that they hold the device snug to the backboard, but not so tight as to distort or damage device. Installation shall be in accordance with manufacturer's instructions and recommendations.
- D. Furnish and install all required interfaces, connections, wiring, and components to other systems and/or devices requiring telephone system interface or service, including, but not limited to:
1. Intrusion Alarm System
 2. Fire Alarm System
 3. Intercom Communications System
 4. Energy Management System
 5. Irrigation Control System
- E. Furnish and install all telephone instruments indicated on plans.
- F. Underground cable shall be OSP Category 5E and meet REA PE89 standard. Both ends shall be sealed to prevent seepage of flooding compound.
- G. All cables shall be run through fanning strip to terminals of terminal blocks. All conductors shall be "punched" down on terminals.

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All cables on backboards or within terminal cabinets shall be bound with plastic cable ties so that cables are in tight contact for their entire length.

- H. All cables entering on to backboard or into terminal cabinet shall be identified with Panduit SSM4S-C or PLF/MA-C marker tie flags. Upon completion of installation, six copies of one-line "as-built" wiring diagram shall be furnished to Architect.
- I. Each cable run on wiring diagram shall be identified with exact wire marker code (numerical or alphabetical) as appears on backboard or in terminal cabinet.
- J. Station locations shall be identified by location and room numbers as furnished by District, and in all ways shall relate as closely as possible to record wiring drawings. Prior to performing final labeling, coordinate label information with District.
- K. No splices shall occur in underground pullboxes. Telephone system wiring shall be continuous, without splices, from backboard to backboard or cabinet and from backboard or cabinet to devices. All interior pullboxes shall be accessible and locations shall be recorded on "As-Built" drawings.

3.02 CONSTRUCTION MEETINGS

- A. The Contractor shall schedule construction meetings at the jobsite as follows:
 - 1. Pre-wire meeting shall occur after raceways are installed and prior to pulling of any wire or cable.
 - 2. Pre-termination meeting shall occur after wire and cable have been installed and prior to termination.
- B. Meetings shall be scheduled by the Contractor on a building by building basis and shall include the Project Inspector, School's Representative, the electrical subcontractor, and the Telephone System subcontractor as a minimum.

3.03 TESTS

- A. After all equipment specified herein has been installed and is in operating condition, performance tests shall be conducted to determine that installation and components comply with these specifications. Contractor shall furnish competent personnel for these tests.
- B. Testing shall be scheduled with the Owner and shall occur after receipt by Architect of Contractor's written certification of completion, record one-line diagram, wiring diagrams, maintenance and operation manuals, and other "As-Built" data required by these specifications. Tests shall be scheduled with School before occupancy occurs.

END OF SECTION