

- A. The following is a list of abbreviations generally used in Divisions 27 & 28:
1. ADA - Americans with Disabilities Act
 2. AHJ - Authority Having Jurisdiction
 3. ANSI - American National Standards Institute
 4. APWA - American Public Works Association
 5. ASTM - American Society for Testing and Materials
 6. CBC - California Building Code
 7. CEC - California Electrical Code
 8. CFC - California Fire Code
 9. FCC - Federal Communications Commission
 10. HVAC - Heating, Ventilating and Air Conditioning
 11. IEC - International Electro-technical Commission
 12. IEEE - Institute of Electrical and Electronics Engineers.
 13. IETA - International Electrical Testing Association
 14. FM - FM Global
 15. NEMA - National Electrical Manufacturers Association
 16. NFPA - National Fire Protection Association
 17. OSHA - Occupational Safety and Health Administration
 18. UL - Underwriters Laboratories Inc.
- B. Provide: To furnish and install, complete and ready for the intended use.
- C. Furnish: Supply and deliver to the project site, ready for unpacking, assembly, and installation.
- D. Install: Includes unloading, unpacking, assembling, erecting, installing, applying, finishing, protecting, cleaning and similar operations at the project site to complete items of work furnished by others.
- E. Following is a list of commonly used terms in Division 27:
1. Active Equipment: Electronic equipment used to develop various WAN and LAN services.
 2. Backbone: Collective term sometimes used to describe the campus and vertical distribution subsystem facilities and media interconnecting service entrances, communications rooms, and communications cabinets.
 3. Bonding: Permanent joining of metallic parts to form an electrically conductive path which will assure electrical continuity and the capacity to safely conduct currents likely to be imposed on it.
 4. Cabinet: Wall-mounted modular enclosure designed to house and protect wall electronic equipment.
 5. Cable Tray: Vertical or horizontal open supports, usually made of aluminum or steel, that are fastened to a building ceiling or wall. Cables are laid in and fastened to the trays. A cable tray is not a raceway.
 6. Campus: Grounds and buildings of a multi-building premises environment.
 7. Channel: The end-to-end transmission path between two points at which application specific equipment is connected; may include one or more links, cross-connect jumper and/or patch cords, and work area station cords. Does not include connection to active equipment.

8. Cross-Connect: Equipment used to terminate and tie together communications circuits.
9. Cross-Connect Jumper: A cluster of twisted-pair conductors without connectors used to establish a circuit by linking two cross-connect termination points.
10. Fiber Optic Distribution Unit (FDU): Cabinet with terminating equipment used to develop fiber optic cross-connect facilities. Also known as LIU.

29. Wiring Block: Punch down terminating equipment used to develop twisted pair cross-connect facilities.

1.04 PRODUCT AVAILABILITY

A. Products with long lead times are to be brought to the attention of the project manager.

1.05 PRODUCT SUBMITTALS

A. See Division 01 Submittals for more requirements

1.06 SUBSTITUTION LIMITATIONS

A. Equivalent product(s) may be considered for substitution for those products specified, however, the equivalent product(s) must be approved, and show demonstrated and documented equivalence to the product(s) specified. Documentation includes but is not limited to product samples, data sheets, and actual test data. The request for product substitution, and supporting documentation, must be submitted, in writing.

B. See Division 01 Substitutions for more requirements

1.07 QUALITY ASSURANCE

A. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.

B. Conform to the latest adopted version of the CBC with amendments by local AHJs.

C. Obtain and pay for electrical permits, plan review, and inspections from local AHJs.

D. Furnish products listed by UL or other testing firm acceptable to AHJ.

E. Conform to requirements of the serving electric, telephone, and cable television utilities.

F. Contractor Qualifications:

1. Minimum of five years' experience in the design, installation, testing, and maintenance of low-voltage systems.
2. Maintain a local service facility which stocks spare devices and/or components for servicing systems.
3. Have performed successful installation and maintenance of at least three projects similar in scope and size. Be able to provide project references for these three projects, including scope of Work, project type, owner/user contact name and telephone number.
4. The contractor selected for this project must be certified by the manufacturer of the products and utilize these components for completion of work.

5. Holds and maintains a valid California C-7 or C-10 State Contractors License and can exhibit validity upon request.
6. A list of test equipment proposed for use in verifying the installed integrity of copper and fiber optic cable systems used.
7. A technical resume of experience for the contractor's Project Manager and on-site installation supervisor who will be assigned to this project.
8. A list of technical product training attended by the contractor's personnel that will install the specified manufacturer system.
9. List of Sub-Contractor(s) who will assist the contractor in the performance of this work.

1.08 SEQUENCING AND SCHEDULING

- A. For the proper execution of the work, cooperate with other trades/crafts and contracts as needed.
- B. To avoid installation conflicts, thoroughly examine the complete set of Contract Documents. Resolve conflicts with Project Manager/Designer prior to installation.
- C. Prior to installation of communications cable to equipment requiring connections, examine the manufacturer's shop drawings, wiring diagrams, product data, and installation instructions. Verify that the electrical characteristics detailed in the Contract Documents are consistent with the electrical characteristics of the actual equipment being installed. When inconsistencies occur request clarification from Project Manager/Designer.

1.09 SHOP DRAWINGS

- A. Shop Drawings: When required by individual Specification Sections, provide shop drawings which include physical characteristics, electrical characteristics, device layout plans, point-to-point wiring diagrams for all connections, and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

1.10 WARRANTY

- A. Provide an extended manufacturer's warranty on the Backbone and Horizontal Communications systems as specified in other sections of Division 27.

2. Show exact routes of cable tray, surface raceway, conduits, and service entrance conduits.
 3. Show the exact location of racks, cabinets, mounting frames and the like.
- C. Operation and Maintenance Documentation: Provide copies of certificates of code authority acceptance, product data, guarantees, warranties, installation guides, maintenance guides and the like.
- D. Inspection and/or testing: Submit testing reports for testing that was performed.

^ PART 2 PRODUCTS

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3. Examine the entire set of Drawings to avoid conflicts with other systems. Determine exact route and installation of communications wiring and equipment with conditions of construction.

3.02 INSTALLATION

- A. Install communications equipment completely as directed by manufacturer's installation instructions. Obtain installation instructions from manufacturer prior to rough-in of the communications equipment, examine the instructions thoroughly. When requirements of the installation instructions conflict with the Contract Documents, request clarification from Project Manager/Designer prior to proceeding with the installation.
- B. Do not install communications equipment in obvious passages, doorways, scuttles, or crawl spaces which would impede or block the passage's intended usage.
- C. Do not install communications equipment in locations where it would obviously be subject to damage during normal usage.

3.03 FIELD QUALITY CONTROL

- A. Tests: Conduct tests of equipment and systems to demonstrate compliance with requirements specified in Division 27 & 28. Refer to individual Specification Sections for required tests. Document tests and include in Closeout Documents.

3.04 CLEANING

- A. Remove dirt and debris caused by the execution of the communications work.
- B. Leave the entire communications system installed under this Contract in a clean, dust-free, and proper working order.
- C. Vacuum clean interiors of new and modified electrical signal and communication equipment enclosures.

END OF SECTION

- C. UL Underwriters Laboratory
- D. California Building Code (CBC)
- E. California Electrical Code (CEC)

1.06 WARRANTY

- A. Refer to Division 01 -- Warranties

PART 2 – PRODUCTS

2.01 All products used on this project shall bear the label and be approved by Underwriters Laboratories unless otherwise approved in writing by District.

2.02 FASTENERS

- A. Mounting hardware and anchors recommended by the manufacturer of any material that shall be mounted to the building or structure.
 - 1. Sheet rock / drywall / wall board: Easy Anchor, toggle bolt, other spread type anchor with load distribution, or approved equal.
 - 2. Concrete / cinder block / solid masonry: Expanding compression type lag, expanding compression type bolt, expanding compression type, all-thread with nuts, or approved equal.
 - 3. Tile / Stucco / hollow masonry: Toggle bolts or approved equal.
 - 4. Wood: Lag screws, wood screws, or approved equal.
 - 5. Metal: Beam clamps, sheet metal screws, self-drilling screws or approved equal.

2.03 HANGERS AND SUPPORT

- A. D-RINGS

- 1. Commercial grade

- B. J-HOOKS

- 1. Commercial grade

2.04 SURFACE RACEWAY

- A. The District has standardized on Wiremold 800, 2300, 5400 and 5500 series for non-metallic surface raceway.

2.05 CONDUITS AND ACCESSORIES

A. CONDUITS

1. See Division 26 for requirements.
2. Conduit for Fire Alarm applications shall be red in color (non-accessible areas are excluded).
3. All new conduits shall be sized accordingly to achieve a 40% maximum fill ratio with initial cables installed.

B. INNERDUCT

1. Orange corrugated HDPE (High Density Polyethylene) Innerduct shall be used for fiber optic cable protection in interior locations.
2. Fabric multi-cell innerduct is approved for underground conduits 2" and larger.

C. FITTINGS:

1. See Division 26 for requirements.
2. Conduit bodies and any sharp bend fittings are strictly prohibited for communication Cat6A and fiber optic cables. Appropriate conduit sweeps are required.

D. PULL LINE

1. Minimum 1/8" diameter, or larger braided line of polypropylene or continuous fiber polyolefin. The minimum breaking strength of 1/8 in. line is 200 lbs.

2.06 BACKBOXES, JUNCTION BOXES AND FLOOR BOXES

- A. Galvanized one-piece or welded pressed steel type. Boxes for fixture shall not be less than 4" square and shall be equipped with fixture stud. Boxes shall be at least 2-1/8" deep, 4" square for 1 or 2 gang devices, with device rings. Boxes mounted in wall or ceiling finished with gypsum board shall be furnished with 5/8" deep device rings. Provide blank cover for all boxes without fixture or device.
- B. Junction boxes, larger than 8", located indoors shall be hinged, NEMA-1 rated.
- C. Junction boxes, larger than 8", located outdoors, or in wet or damp locations shall be hinged, NEMA-3R.
- D. Provide and install tamper-proof screws for all exterior boxes.

- E. Junction boxes used for Fire Alarm systems are to be red in color with red colored cover plates.

2.07 GROUND BOXES

- A. See Division 26 for requirements.
- B. Approved manufactures are Jensen, Christy or approved equal.
- C. All ground boxes shall have metal traffic-rated lids with permanent factory markings of COMM or COMMUNICATIONS.
- D. Minimum size is 17" x 30"

3.03 HANGERS AND SUPPORTS

- A. Install hangers and supports per manufacturer's written instructions.
- B. Hanger spacing shall be 48" or less and within 12" of sleeves and/or junction/back boxes.

3.04 LOW VOLTAGE PATHWAY/RACEWAYS

- A. EMT conduit may be used at following locations (see Division 26 for exact requirements):
 - 1. In dry locations in furred spaces.
 - 2. In partitions other than concrete or solid masonry.
 - 3. In protected exterior locations not exposed to direct weather.
- B. Rigid steel conduit and fittings shall be used for vertical risers and on top of all roofs, overhangs, walkways, canopies, or any other location exposed to direct weather. See Division 26 for exact requirements.
- C. Furnish and install pull lines in all unused (empty) conduits or raceways. All pull lines shall be permanently tagged with identification at both ends.
- D. Install exposed conduit neatly, parallel to or at right angles to structural members. Maintain a minimum of 12 inches of clearance from steam or hot water pipes. All installed strut channel supports should allow for future conduit attachments. The width of strut channel to match the

- G. If conduit is designated for low voltage use, no more than a total of 360 degrees of conduit bend radius will be allowed between pull boxes.
- H. All junction boxes shall be connected to conduits using appropriate connecting hardware (i.e. box connectors).
- I. Clean, prep and paint with white primer all exposed conduit, junction boxes, channel strut, fittings, and accessories.
- J. Before pulling any conductors into an underground PVC conduit (new or existing), the conduit shall be first be proofed by pulling through a mandrel of a diameter $\frac{1}{4}$ in. smaller than the conduit inside dia., followed by a swab of the same diameter as the conduit inside diameter.
- K. Non-metallic raceway to be installed with mechanical fasteners only, do not remove adhesive tape backing.
- K. CAPPING
 - 1. Cap conduits during construction with manufactured seals. Swab out conduits before installing wires.
 - 2. Cap all empty conduits below grade and in pull boxes with manufacturer's caps to prevent entrance of debris, attach pull string to cap.

3.05 J-BOXES

- A. Screws shall be used to attach boxes, and must be accurately placed for finish, independently and securely supported by adequate wood backing or by manufactured adjustable channel type heavy-duty box hangers.

- D. For sound control, separate outlets on opposite sides of walls 16" minimum. Where outlets are less than 16" or in sound rated walls, seal airtight with fire rated sheet putty pads. Fill gap between junction box and wall with acoustical sealant all around perimeter of junction box. Fill conduits larger than 1 1/4" with fire rated putty.
- E. Installation of conduit and outlet boxes in fire-resistive walls, floors, floor-ceiling or roof-ceiling assemblies shall comply with Title 24, Part 2, Section 713.

3.06 UNDERGROUND BOXES

- A. To be installed per Division 26 requirements.
- B. Provisions to be made for supporting cables from the box sides (i.e., j-hooks, d-rings)

3.07 SLEEVES AND CONDUIT PENETRATIONS

- A. Where conduit passes through walls, ceilings, or floors with connection points to junction boxes or raceways mounted to the same wall as the penetration provide a threaded conduit and secured in place with locking rings on both sides. Bend radius requirements shall be maintained where penetrations are made through the back of raceways; junction boxes with adequate depth shall be installed to comply with this requirement.
- B. Where conduit passes through walls, ceilings, or floors with connection points to junction boxes or raceways not mounted to the same wall as the penetration, provide EMT conduit and secured in place with strut channel. Box connectors shall always be used to connect EMT to junction boxes and raceways.
- C. FIRE STOPPING
 - 1. Seal all conduit penetrations through fire rated walls and floors fire and smoke tight in conformance with current CBC and current CEC.
- D. DRAFT STOPPING
 - 1. All non-fire rated walls must be draft stopped and sealed. Submit method to be used for approval by inspector and/or project manager. Mineral wool is one product that may be used.
- E. WEATHER SEALING
 - 1. All exterior penetrations shall be sealed watertight. The contractor shall use silicon rubber caulk or other approved methods and materials. Submit method and material with inspector and/or project manager.

3.08 CLEANING

- A. Clean all work prior to concealing, painting, and acceptance. Performed in stages if directed.
- B. Clean and repair soiled or damaged painted exposed work and match adjoining work before final acceptance.
- C. Remove debris from inside and outside of equipment and enclosures.

3.09 FINAL DOCUMENT SUBMITTALS

- A. See 27 00 00 for more information.

END OF SECTION

SECTION 27 10 00 - STRUCTURED CABLING

PART 1 – GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operable Structured Cabling communications system. The system shall provide highly reliable and high-performance data communication from main distribution frame (MDF) through each intermediate distribution frame (IDF) to end points requiring fiber optics and/or copper cabling and associated equipment.
- B. This section condenses sections 27 11 00 – Communications Equipment Room Fittings, 27 13 00 – Communications Backbone Cabling, 27 15 00 – Communications Horizontal Cabling and 27 16 00 – Communications Connecting Cords into one comprehensive section.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 - 1. Contractor shall furnish and install all required components and accessories as outlined in the

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 27 00 00 – Communications
- C. Section 27 05 00 – Common Work Results for Communication Systems.

1.04 INDUSTRY GUIDELINES AND STANDARDS

- A. California Electrical Code (CEC) – Current adopted version
- B. California Building Code (CBC) – Current adopted version.
- C. ANSI/TIA-568.0-D – Generic Communications Cabling for Customer Premises.
- D. ANSI/TIA-568.1-D – Commercial Building Communications Cabling Standard Part 1: General Requirements.
- E. ANSI/TIA 568-C.2 – Balanced Twisted-Pair Telecommunications Cabling and Components Standards
- F. ANSI/TIA 568.3-D – Optical Fiber Cabling Components Standard
- G. ANSI/TIA-569-D – Commercial Building Standard for Telecommunications Pathways and Spaces.
- J. ANSI/TIA-606-B – Administration Standard for the Commercial Telecommunications Infrastructure.
- K. ANSI/JSTD-607-C – Commercial Building Bonding and Grounding (Earthing) Requirements for Telecommunications.

1.05 QUALIFICATIONS

- A. The contractor shall possess a California C7 or C10 license.
- B. The Contractor or Subcontractor shall have 5 years' documented experience.

1.06 SYSTEM REQUIREMENTS

- A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing data cable plan system.

1.07 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. See section 27 00 00 for requirements.

1.08 SUBMITTALS

- A. See section 27 00 00 for requirements.

1.09 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.
- C. 15-year manufacturer's warranty/certification required for all copper and fiber cable plant installations.

1.10 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

PART 2 – PRODUCTS

2.01 GENERAL

- A. See Appendix A at the end of this document for pre-approved materials.
- B. All products shall be new, unused and without blemishes and shall be of manufacturer's current and standard production.
- C. Contractor shall confirm all equipment part numbers with the Project Manager or District prior to ordering equipment and updating submittals as required.
- D. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. The Contractor shall provide all components needed for complete and satisfactory installation and operation.
- E. Install mounting hardware and anchors as recommended by the Manufacturer of the equipment that requires mounting to the building or structure and adhere to all code requirements. See section 27 05 00 for requirements.
- F. Product Availability

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STRUCTURED CABLING
27 10 00

- a. Shall be installed behind the rack or cabinet if the cabinet is not able to be directly attached to two vertical wall studs.

with a minimum No. 6 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.

3. Bond metallic equipment (including ladder rack) to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.06 WORKMANSHIP

- A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.
- B. The District' Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.
- C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.

3.07 WIRE/CABLE (COPPER/FIBER OPTIC)

- A. Design, layout, size, and plan new cable runs as required.
- B. All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.
- C. Conduit/raceway fill shall not exceed 40 percent of interior cross-sectional area.
- D. Neatly dress and tie (Velcro) all cabling.
- E. UTP cabling shall conform to a 6-foot separation requirement from the main power panel, transformers, switchgear and/or starter motors adjacent to the MDF, IDF and termination locations.
- F. Fiber optic cable shall be installed from the MDF to each IDF.
- G. Orange corrugated HDPE (High Density Polyethylene) Innerduct shall be used for fiber optic cable protection in all interior locations.
- H. Spicing of fiber optic cable shall be done with fusion splices.
- I. When required copper feeders (minimum 4-pair) are to be installed from the MDF to each IDF

- J. Maintain proper bend radius for all cable installations.
- K. Do not exceed cable manufacturer's instructions for installation pull load. Any cable damaged by excessive pull force shall be replaced by the installing contractor.
- L. Modular plug terminated link (MPTL) style wiring is acceptable for CCTV with modified single connector permanent link testing.

3.08 LABELING

- A. MDF/IDF - Identification number in large font on front of cabinet.
- B. MDF, Fiber Optic LIU Ports – IDF number and room number
- C. MDF/IDF, Copper Patch Panel – Panels labeled P1, P2, P3, etc., ports labeled with room number.
- D. LAN Outlet – IDF number, patch panel number, patch panel port number.
- E. Cables to be labeled both ends with unique identifiers and from/to location identifiers. For Copper Cat cable IDF number, patch panel number, patch panel port number and from/to identifier (i.e. room number).
- F. T-bar ceilings shall have device labels attached next to the device for ceiling mounted equipment and at the tile for above ceiling equipment with device type and device ID points/IP address.

3.09 CONDUIT AND RACEWAY INSTALLATION

- A. See Division 26 and section 27 05 00 for requirements.
- B. Conduit bodies and any other sharp bend fittings are strictly prohibited for communications cabling (copper/fiber).
- C. Install proper radius conduit sweeps where required.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify District of your readiness to perform the formal Test & Inspection of the complete system.
- B. Submit the Record Drawings (as-builts) to District for review prior to inspection.

- C. During the formal Test & Inspection (Commissioning) of the system, the Contractor shall have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- D. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.
- E. Notify the District when ready to perform a re-inspection of the installation.

(White)

Cat6A Data Jacks (White)	Ortronics	KT2J6A-88
Cat6A Data Jacks (Green)	Ortronics	KT2J6A-45
Cat6A Data Jacks (Blue)	Ortronics	KT2J6A-36
Cat6A Data Jacks (Yellow)	Ortronics	KT2J6A-44
Cat6A Data Jacks (Black)	Ortronics	KT2J6A-00
Cat6A Data Cable, Reduced Diameter, Riser (White = default)	Berk-Tek	11143100
Cat6A Data Cable, Reduced Diameter, Plenum (White = default)	Berk-Tek	11141651
Cat6A Data Cable, Reduced Diameter, Riser (Blue = CCTV/Access Control)	Berk-Tek	11142398
Cat6A Data Cable, Reduced Diameter, Plenum (Blue = CCTV/Access Control)	Berk-Tek	11141650
Cat6A Data Cable, Reduced Diameter, Indoor/Outdoor (Black)		
Cat6A Patch Cord (Blue)	Quiktron	576-A10-0xx (xx = length)
Cat6A Patch Cord (Green)	Quiktron	576-A20-0xx (xx = length)
Cat6 Patch Cord Slim 1' (Blue)	C2G	01072
Cat6 Patch Cord Slim 1' (Green)	C2G	01160
Fiber Optic LIU 1-RU	Ortronics, Infinium	INFC01U-M4-E
Fiber Optic LIU 2-RU	Ortronics, Infinium	INFC02U-M4-E
Fiber Optic Adapter	Ortronics, Infinium	HDFP-LCD12AC
Fiber Optic LC Field Term Connector	Ortronics	205KAN9GASM
Fiber Optic Fanout Kit	Ortronics	61500858

Fiber Optic Cable Single- Mode OS2, Indoor/Outdoor	Berk-Tek	PDP012AB0707-I/O-C4(YEL)

END OF SECTION

SECTION 27 21 00 - DATA COMMUNICATIONS NETWORK EQUIPMENT

PART I - GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operable data network system. The system shall provide reliable and high-performance data communication throughout the site.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
1. Provide, coordinate, and install all required equipment and accessories as outlined in the design documents for a complete and operable system.
 2. Labor and Materials: The Contractor shall provide and pay for all labor, supervision, materials, accessories, components, equipment, tools, utilities, construction equipment and machinery, transportation, and other facilities and services necessary for the proper execution, operation, and completion of a turn-key system to the District.
 3. Data Communications Network Equipment: Includes, but is not limited to:
 - a. Routers
 - b. Firewalls
 - c. Networking Switches
 - d. Wireless Access Points
 - e. VoIP Phone Equipment
 - f. Uninterruptible Power Supplies (UPS)

1.03 RELATED REQUIREMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 27 00 00 - Communications
- C. Section 27 05 00 - Common Work Results for Communication Systems.
- D. Section 27 10 00 - Structured Cabling

1.04 QUALIFICATIONS

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
2. Subject to compliance with these specifications, products and systems included in this section are to be installed as specified by the manufacturer of the system or engineer approved equal.

2.02 EQUIPMENT

- A. The District's preferred manufacturer for:
 1. Routers - Cisco
 2. Firewalls - Cisco
 3. Networking Switches - Aruba
 4. Wireless Access Points - Aruba
 5. VoIP Phone Equipment – Cisco
 6. UPS – Tripp-Lite and N1C

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, wire, installation, configuration, and testing requirements for a complete and operable Intercom/Public Address/Bell system. This system shall provide the ability to bi-directionally communicate with an individual room, broadcast to defined speaker zone(s) and ring bell tones on a predefined schedule.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 - 1. Labor and Materials: The Contractor shall provide and pay for all labor, supervision, materials, accessories, components, equipment, tools, transportation, and other facilities and services necessary for the proper installation of a turn-key Assistive Listening system to the District.
 - 2. The contractor will coordinate with the District in writing for any needed information (i.e. IP addresses, etc.) 10 business days prior to the date the information is needed.

- I. Existing systems shall remain operable until the new system is accepted and approved by the District or the District's representative.
- J. The Contractor is responsible for user/operator training (maximum 2 hours).
- K. The Contractor shall complete all required project closeout documentation in a timely fashion.

1.03 RELATED REQUIREMENTS

- A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.
- B. Section 27 00 00 - Communications
- C. Section 27 05 00 – Common Work Results for Communication Systems.
- E. Section 27 10 00 – Structured Cabling

1.04 REFERENCES

- A. See section 27 00 00 for requirements.

1.05 DEFINITIONS

- A. See section 27 00 00 for requirements.

1.06 SYSTEM REQUIREMENTS

- A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing intercom system when applicable.

1.07 SUBMITTALS

- A. See section 27 00 00 for requirements.

1.08 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

- A. See section 27 00 00 for requirements.
- B. Shop drawings are required for this section.

1.09 QUALIFICATIONS

- B. Contractor shall be located within 50 miles or less from the project site to support 2-hour response time.
- B. Five (5) years' experience installing Rauland Telecenter equipment.
- C. The contractor shall possess a California a C7 or C10 license.
- D. The Contractor or Subcontractor shall be Rauland Telecenter authorized to provide and install equipment with 5 years documented experience.

1.10 CERTIFICATIONS

- A. Installers shall be manufacturer certified..

1.11 WORKMANSHIP

- A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.
- B. The District's Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.
- C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.
- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.
- F. Contractor shall be responsible for scheduling Subcontractors in a timely fashion.

1.12 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.

1.13 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

2.01 GENERAL

- A. The approved manufacturers for the project are:
1. Control unit and related accessories: Rauland Telecenter U
 2. Speakers: See Appendix A for different installation types

- A. The equipment shall only be installed by Contractors who are qualified and certified by the manufacturer to install and maintain the system.
- B. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience installing educational intercom equipment before the Bid Opening Date.

3.02 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to bidding the job. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for observing and considering those conditions which a Contractor would have observed and considered during a site visit, estimating properly the difficulty and cost of successfully performing the Work or proceeding to perform the Work without additional cost to District.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.03 PREPARATION

- A. The Contractor shall verify materials are readily available prior to submitting product submittals and notify the District's Project Manager of long lead time items.
- B. The Contractor shall order all required parts and equipment only after receipt of approved product submittals from the District's Project Manager.
- C. Submit and receive approval shop drawings prior to work commencement.

3.04 PATHWAY INSTALLATION

- A. See Division 26 and Section 27 05 00 for requirements and more information.
- B. Existing Construction:
 - 1. Refer to design documents.
 - 2. Surface raceway and components shall be Wiremold 2300.

3.05 EQUIPMENT INSTALLATION

- A. Equipment to be wired and installed per manufacturer's instructions.
- B. The Contractor shall coordinate with the District's IT Department if connecting to their network. The Contractor shall provide a spreadsheet of all device MAC addresses indexed by device location to the District IT department to facilitate programming of reserved IP addresses for each device.

- C. Installation shall be in accordance with applicable codes (i.e. NEC, NFPA 72) local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- D. Perform all Work as indicated in the Drawings and Specifications.
- E. All low voltage cables shall be kept away from power circuits.
- F. Contractor shall provide programming and configuration of the Educational Intercom system for full functionality.
- G. Contractor shall maintain a complete, up-to-date backup of the system configuration. Backup shall be maintained throughout programming period until final Acceptance by District. Submit back-ups to District upon Final Acceptance.

3.06 LABELING/SCHEDULES

- A. All labels are to be machine generated black letters on white adhesive label stock that is appropriate for the installation environment (interior/exterior).
- B. Label all standard speaker cables with port ID.
- C. Label all speakers with speaker ID.
- D. Label all IP speakers with MDF/IDF, patch panel and jack numbers.

3.09 CONFIGURATION

- A. All equipment to be fully configured and tested for functionality prior to testing.

3.10 FIELD QUALITY CONTROL AND TESTING

- A. Upon reaching substantial completion, perform a complete test and inspection of the system. If found to be installed and operating properly, notify District of your readiness to perform the formal Test & Inspection of the complete system.
- B. Submit the Record Drawings (as-builts) to District for review prior to inspection.
- C. During the formal Test & Inspection (Commissioning) of the system, have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- D. If corrections are needed, the Contractor will be provided with a Punch-List of all discrepancies. Perform the needed corrections in a timely fashion.

- E. Notify the District when ready to perform a re-inspection of the installation.
- F. District or its representative to provide final sign-off for acceptance.

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END OF APPENDIX
END OF SECTION

SECTION 27 53 13 - CLOCK SYSTEMS

PART I - GENERAL

1.01 SUMMARY

- A. This section specifies equipment, accessories, materials, wire, installation, configuration, and testing requirements for a complete and operable Clock system.

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 1. Labor and Materials: The Contractor shall provide and pay for all labor, supervision, materials, accessories, components, equipment, tools, transportation, and other facilities and services necessary for the proper installation of a turn-key Clock system to the District.
 2. The contractor will coordinate with the District in writing for any needed information (i.e. IP addresses, etc.) 10 business days prior to date the information is needed.
 3. Clock system equipment: Includes, but is not limited to:
 - a. Clocks
 - b. Master Clock or NTP server access
 - c. Wire

1.04 REFERENCES

A. See section 27 00 00 for requirements.

1.05 DEFINITIONS

A. See section 27 00 00 for requirements.

1.06 SYSTEM REQUIREMENTS

A. Any new installations or existing system modifications shall seamlessly integrate into the site's existing Clock system where applicable.

1.07 SUBMITTALS

A. See section 27 00 00 for requirements.

1.08 CONTRACTOR "SHOP DRAWINGS" DESIGN REQUIREMENTS

A. See section 27 00 00 for requirements.

1.09 QUALIFICATIONS

A. Contractor shall be located within 50 miles or less from the project site to support 2-hour response time.

B. Five (5) years' experience installing communications equipment systems.

1.10 CERTIFICATIONS

A. See section 27 00 00 for requirements.

1.11 WORKMANSHIP

A. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship.

B. The District's Project or Construction Manager will have the authority to reject Work which does not conform to the Drawings and Specifications.

C. Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.

- D. Perform Work with persons experienced and qualified to produce workmanship specified.
- E. Maintain quality control over suppliers and Subcontractors.
- F. Contractor shall be responsible for scheduling Subcontractors in a timely fashion.

1.12 WARRANTY

- A. Refer to Division 01 Warranty section.
- B. See section 27 00 00 for additional requirements.

1.13 CLOSEOUT DOCUMENTS

- A. See section 27 00 00 for requirements.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Manufacturers - See Appendix A at the end of this document for pre-approved materials.
- B. All products shall be new, unused and without blemishes and shall be of manufacturer's current and standard production.
- C. Drawings and Specifications indicate major system components, and may not show every component, connector, module, or accessory that may be required to support the operation specified. The Contractor shall provide all components needed for complete and satisfactory installation and operation.
- D. Product Availability
 - 1. The Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.
 - 2. Subject to compliance with these specifications, products and systems included in this section are to be installed as specified by the manufacturer of the system or engineer approved equal.

2.02 EQUIPMENT

- A. See Appendix A at the end of this document for pre-approved materials.
- B. Substitutions require proof of equivalence and prior approval by District and/or its representative before ordering.

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

- A. The equipment shall only be installed by Contractors who are qualified to install and maintain the system.
- B. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience installing electronic clock equipment before the Bid Opening Date.

3.02 EXAMINATION

- A. The Contractor shall be required to visit the installation site(s) prior to bidding the job. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for observing and considering those conditions which a Contractor would have observed and considered during a site visit, estimating properly the difficulty and cost of successfully performing the Work or proceeding to perform the Work without additional cost to District.
- B. The Contractor shall report any discrepancies between the Specifications, Drawings, and Site Examination prior to the Bid Opening Date.

3.03 PREPARATION

- A. The Contractor shall verify materials are readily available prior to submitting product submittals and notify the District's Project Manager of long lead time items.
- B. The Contractor shall order all required parts and equipment only after receipt of approved product submittals from the District's Project Manager.
- C. Submit and receive approval for shop drawings prior to work commencement.

3.04 PATHWAY INSTALLATION

- A. See Division 26 and Section 27 05 00 for requirements and more information.
- B. Existing Construction:
 - 1. Refer to design documents.

3.05 EQUIPMENT INSTALLATION

- A. Equipment to be wired and installed per manufacturer's instructions.

Leaf Engineers
Project No. 230236

Ethel Phillips E.S. Tele-Center Upgrade Project
Sacramento City Unified School District

3.11 AS-BUILT DRAWINGS

A. See section 27 00 00 for requirements.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Clock (IP Sweep)	Sapling	SAP-1BS-xxR-0 (xx=09/9", 12/12", 16/16")
Clock (IP Digital)	Sapling	SBP-31S-254-0W
Protective Cage	National Time or STI	
Digital Messaging Board, Small	Rauland	TCC3011S
Digital Messaging Board, Large	Rauland	TCC3012L

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END OF APPENDIX
END OF SECTION