SECTION 27 00 00
COMMUNICATIONS BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section specifies the common administration basic requirements and common methods for all low voltage systems installation work included under Division 27 and 28 and where those requirements differ from the requirements of this section, the more stringent shall govern.

1.02 STANDARDS, REGULATIONS, AND CODES REFERENCES

A. The following Standards, Regulations and Codes apply to work specified in the Contract Documents.
   1. Applicable State and Local Codes.
   2. California Building Code and California Electrical Code, Current Editions.
   3. BICSI TDMM (Telecommunications Distribution Methods Manual), 11th Edition 2006.
   4. ANSI/TIA/EIA-568-B.1. Commercial Building Telecommunications Cabling Standard,
   5. ANSI/TIA/EIA-568-B.1-2. Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements, Addendum 2, Grounding and Bonding Specifications for Screened Balanced Twisted-Pair Horizontal Cabling.
   6. ANSI/TIA/EIA-568-B.1-3. Commercial Building Telecommunications Cabling Standard.
   7. ANSI/TIA/EIA-568-B.1-4. Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements, Addendum 4, Recognition of Category 6 and Category Cat 6A and 50 nm Laser-Optimized 50/125 um Multimode Optical Fiber Cabling.
   8. ANSI/TIA/EIA-568-B.1-2. Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components.
   9. ANSI/TIA/EIA-568-B.2-1. Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, Addendum 1,Transmission Performance Specifications for 4-Pair 100 Ohm Category 6 Cabling.
   10. ANSI/TIA/EIA-568-B.2-10 (draft 2.0). Commercial Building Telecommunications Cabling Standard, Part 2: Balanced Twisted-Pair Cabling Components, Addendum 10, Transmission Performance Specifications for 4-Pair 100 Ohm Augmented Category 6 Cabling.
   11. ANSI/TIA/EIA-568-B3.3 Optical Fiber Cabling Components Standard.
   12. TIA-569-B. Commercial Building Standard for Telecommunications Pathways and Spaces.
   13. ANSI/TIA/EIA-606-A. Administration Standard for Commercial Telecommunications Infrastructure.
   14. ANSI/TIA/EIA-607-A. Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
   15. TIA/EIA TSB-67 Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.

1.03 DEFINITIONS

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.
11. Grounding: a conducting connection to earth, or to some conducting body that serves in place of earth.
12. Hinged Cover Enclosure: Wall-mounted box with a hinged cover that is used to house and protect electrical devices.
13. Horizontal: Pathway facilities and media connecting communications rooms to Telecommunications Outlets.
14. Intermediate Distribution Frame (IDF): Data networking equipment rack and/or location that serves individual buildings. Downstream from MDF.
15. Jack: Receptacle used in conjunction with a plug to make electrical contact between communications circuits, e.g., eight-position/eight-contact modular jacks.
16. Link: A transmission path between two points, not including terminal equipment, work area cables, and equipment cables; one continuous section of conductors or fiber, including the connecting hardware at each end.
17. Local Area Network (LAN): Data transmission facility connecting several communicating devices, e.g., serial data, Ethernet, token ring, etc. Typically, the network is limited to a single site.
18. Main Distribution Frame (MDF): Initial (main) data network equipment rack and/or location. Only one MDF occurs per site and may serve many downstream IDFs.
19. Media: Twisted-pair, coaxial, and fiber optic cable or cables used to provide signal transmission paths.
20. Minimum Point of Entry (MPOE): The location where the service provider hands off connection and responsibility for service to on premise customer owned equipment.
21. Modular plug: For Cat6A an eight-position end-of-wire electrical connector.
22. Passive Equipment: Non-electronic hardware and apparatus, e.g., equipment racks, cable trays, electrical protection, wiring blocks, FDUs, etc.
23. Patch Cord: A length of wire or fiber cable with connectors on one or both ends used to join communications circuits at a cross-connect.
24. Patch Panel: System of terminal blocks or connectors used with patch cords that facilitate the administration of cross-connect fields.
25. Pathway: Facility for the placement of communications cable. A pathway facility can be composed of several components including conduit, wireway, cable tray, surface raceway, underfloor systems, raised floor, ceiling support wires, etc.
26. Protectors: Electrical protection devices used to limit foreign voltages on metallic communications circuits.
27. Raceway: An enclosed channel designed expressly for holding wires or cables; may either conductive metal or insulating plastic. The term includes conduit, tubing, wireway, underfloor raceway, and surface raceway; does not include cable tray.

28. Racks: An open or enclosed, freestanding, floor-mounted structure, typically made of aluminum or steel, used to mount equipment; usually referred to as an equipment rack.
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 tradecrafts 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.

1.11 CLOSE OUT DOCUMENTS

A. Final coordination drawings, with as-built information added, are to be submitted as record drawings at completion of project.

B. Record Drawings:

1. Show changes and deviations from the Construction Drawings. Include written Addendum and change order items.
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

2.01 MANUFACTURERS

A. Provide like items from one manufacturer, such as wire/cable, jacks, modular plugs, patch panels, equipment connection cords, wall plates, and the like. See individual sections for detailed information.

2.02 MATERIALS

A. Provide new electrical materials of the type and quality detailed, listed by UL, bearing their label wherever standards have been established. Indicated brand names and catalog numbers are used to establish standards of performance and quality.

B. Provide material and equipment that is acceptable to AHJ as suitable for the use indicated. For example, provide plenum rated cable in ceilings that are utilized as air return plenums.

C. Include special features, finishes, accessories, and other requirements as described in the Contract Documents regardless of the item's listed catalog number.

D. Provide incidentals not specifically mentioned herein or noted on Drawings, but needed to complete the system, in a safe and satisfactory working condition.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Construction Documents:

1. Drawings are diagrammatic with symbols representing communications equipment, outlets, and wiring.

2. Electrical symbols indicating wiring and equipment shown in the Contract Documents are included in the Contract unless specifically noted otherwise.
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

SECTION 27 05 00
COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. This section specifies the basic materials and methods for all low voltage pathways installation work included under Division 27 and 28 and where those requirements differ from the requirements of this section, the more stringent shall govern.

B. This section adds refinements to Division 26 that apply to Communications and extra-low-voltage systems.

1.02 SCOPE

A. Materials and/or methods for the following.

1. Communication services
2. Grounding
3. Fasteners
4. Hangers and supports
5. Conduits/Backboxes/Raceways
6. Underground
7. Sleeves and penetrations

1.03 SUBMITTALS

A. Submittals shall be done in accordance with District submittal procedures, see Division 01 Submittals for requirements.

1.04 RELATED REQUIREMENTS

A. The General Conditions, Supplementary Conditions and Division 1 are fully applicable to this Section, as if repeated herein.

C. 27 00 00 – Communications Basic Requirements

1.05 REFERENCES

A. ANSI American Nation Standards Institute

B. NFPA 70 – National Electrical Code

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 Polythylene) 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”

2.08 PENETRATION SEALING

A. Firestopping: Provide UL Listed Firestopping materials for all penetrations through rated assemblies (walls / floors).

B. Draft stopping: Foam sealant for use around conduit penetrations (in non-rated assemblies) to prevent passage of air, smoke, and/or toxic gas.

C. Weatherproofing: Weatherproof sealant for use around conduit penetrations in exterior walls to prevent the intrusion of water.

2.09 GROUNDING BUS BAR

A. Copper bus bar 2”x10”x1/4” minimum size with stand-off brackets and insulators, pre-drilled and threaded mounting holes (hole qty. 12 or greater) for equipment grounding lug attachment.

PART 3 - EXECUTION

3.01 COMMUNICATION SERVICES

A. Install underground boxes, conduits, and terminal cabinets per service provider requirements.

3.02 GROUNDING

A. Ground fittings shall be UL approved for each application and installed and/or connected to system in accordance with current CEC Code requirements.

B. See Division 26 for additional requirements.

C. Install grounding bus bar per manufacturer’s instructions and to be in each MDF and IDF.

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 width of the closest attached junction box. See design document details for attachment requirements.

E. Supports: Support conduit with two-hole straps or strut channel where shown in design documents and/or specified. Coordinate supports with architectural details. Secure to wood structure by means of bolts or lag screws, to metal by means of shallow self-tapping screws, to concrete by means of insert or expansion bolts, to brickwork by means of expansion bolts, and to hollow masonry or stucco by means of toggle bolts.

F. Spacing for all EMT and rigid steel conduit supports shall be as follows unless otherwise specified in design documents details:

   1. Surface conduit spacing and supports and unless otherwise specified or shown on drawing details:

      a. EMT – Size 3/4” to 2” – 4’ maximum spacing (3 each supports per 10’ conduit length) and 12” from each end of conduit at coupling, connector or 90-degree bend.

      b. Rigid steel – Size 3/4” to 2” – 4’ maximum spacing (3 each supports per 10’ conduit length) and 12” from each end of conduit at coupling, connector or 90-degree bend.

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 ¼ 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.

1. Boxes shall be attached to metal studs with metal box hangers.

2. Boxes installed in masonry tile or concrete block construction shall be secured with auxiliary plates, bars or clips and be grouted in place.

B. Locate outlets at the following heights unless otherwise noted on Drawings, Specifications, current CBC or as required to meet ADA handicap requirements.

1. Data Outlets: Same height as electrical outlets

2. Telephone Wall Outlets: Above counter/backsplash height or at electrical switch height.

C. Boxes shall be placed within 18” of electrical outlets.

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

DISTRICT DESIGN STANDARDS

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 design documents for a complete and operable turn-key system.
2. Quality workmanship is a high priority for the District and the Contractor shall be held to a high-level of professional workmanship. Contractors unfamiliar with the District's standards shall familiarize themselves with the standards and requirements prior to beginning work
3. The Contractor shall furnish and install all required fire-treated ¾" (three quarter inch) plywood for the MDF and all IDF locations.
4. The Contractor shall furnish and install a ground bus bar at the MDF and IDF rooms.
5. The Contractor shall furnish and install all required racks and cabinets.
6. The Contractor shall furnish, install, and configure uninterruptable power supply(ies) (UPS) for the MDF and/or IDF racks.
7. The Contractor shall furnish and install all newly required conduit/raceway.
8. The Contractor shall furnish and install all wire/cable (copper/fiber optic) as required.
9. The Contractor shall terminate all strands of fiber at each fiber enclosure.
10. The Contractor shall furnish and install termination all end-point equipment (patch panels, jacks, wallplates, enclosures, etc.).
11. The Contractor shall furnish and install all patch cords (copper/fiber).
12. The Contractor shall test and certify installed cable plant.

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.

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

1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Contract Time.

2.02 MANUFACTURERS AND PRODUCTS

A. See Appendix A at the end of this document for pre-approved materials.

B. Substitutions require proof of equivalence and approval by District and/or its representative.

2.03 COPPER/FIBER OPTIC CABLES AND COMPONENTS

A. All copper cables and components shall be Cat6A rated.
   1. Cable to be reduced diameter.
   2. Jacks to be keystone style.

B. Patch cords system/color:
   1. Data = Blue color
   2. AP = Green color
   3. CCTV = Blue color
   4. Clock/Intercom = Yellow color
   5. Access Control = Black color

C. Data jacks system/color:
   1. Data = White color
   2. AP = Green color
   3. CCTV = Blue color
   4. Clock/Intercom = Yellow color
   5. Access Control = Black color

D. All fiber optic cables and components shall be single single-mode OS2 rated.

E. Fiber optic cable terminations shall be LC-Duplex style.

PART 3 – EXECUTION

3.01 ACCEPTABLE INSTALLERS

A. The components making up the equipment room and enclosures shall only be installed by Contractors who are qualified to install, service and maintain the system.

B. Cable terminations (copper or fiber) shall be installed by manufacturer certified technicians.

C. The Contractor (or subcontractor listed at time of bid) must have at least five (5) years' experience before the Bid Opening Date.

3.02 EXAMINATION

A. The Contractor shall be required to visit the installation site(s) prior to job bidding. The Contractor acknowledges that the failure to visit the site(s) will not relieve the Contractor of the responsibility for accurate bidding and performance of the Work.

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 order all required parts and equipment upon receipt of approved product submittals.

B. The Contractor shall verify the availability of power where required.

3.04 SHOP DRAWINGS

A. The Contractor shall create "Shop Drawings" per section 27 00 00 for this section.

B. Submit drawings for review and approval by the Project Manager.

3.05 INSTALLATION

A. ENTRANCE FACILITIES

1. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and housing when so directed by service provider.

2. Install underground or aerial pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.

B. UNDERGROUND ENTRANCE PATHWAY

1. Install underground entrance pathway complying with Division 26.

C. EQUIPMENT RACKS, CABINETS, ENCLOSURES AND ACCESSORIES

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

b. Backboards shall be made of fire retardant or treated materials, squarely cut, and with sanded edges
c. Backboards shall be a minimum ¾" thick and large enough to secure it to two vertical wall studs.
d. The "FIRE RATED" stamp shall be visible.
e. Backboards shall be fastened with ¼" lag bolt and washer, non-recessed, with maximum spacing of 18" into 2 vertical studs.

2. All data & voice communications racks and cabinets shall be anchored in accordance with manufacturer's specifications, project specifications and/or drawn details, to walls and floors and grounded to building ground grid (not to water pipes etc.).

3. Securely mount equipment cabinet and racks to the building structure. A proper quantity of support fasteners shall be utilized. Typically lag bolts for wood installations, wedge anchors for concrete flooring. Submit data sheets for mounting fasteners for approval before installation. Mount equipment per DSA approved drawings/details.

4. Equipment cabinet mounted on or against walls will have 3-foot clearance in front of deepest component and accessible to rear for service.

5. MDF and all IDFs shall have at least one dedicated 120VAC quad-receptacle each.

6. Patch Panels: Mount patch panels into the cabinet/rack. Match manufacturer of existing install or if new construction, see Appendix A.

7. Cable Management: Secure the cable bundle(s) to the rack strain relief and cable management behind the patch panels and cross connect block panels. Install horizontal cable management panels and brackets for routing and management of patch cables. Maintain TIA/EIA and BICSI standards on bundling, supporting and bend radius.

8. Surge Protected Outlet Strips: Required in MDF rack. Mount surge protected outlet strips per Manufacturer's directions. Refer to details on the Drawings for mounting location.

9. Furnish and install UPS in bottom of MDF/IDF rack.

D. MDF/IDF GROUNDING

1. Refer to Section 27 05 00 Grounding for more requirements.

2. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar 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 Polythylene) 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.

F. Provide 15-year manufacturer's warranty/certification documentation for all copper and fiber cable plant installations.

3.11 CLOSEOUT DOCUMENTS

A. See section 27 00 00 for requirements.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Rack Cabinet 7'	**DAMAC**	**CS84EDB1BSS3**
Wall Mount Cabinet 48"	**DAMAC**	**WSR48ABP1VVV-3GP**
20 AMP Power Strip	**DAMAC**	**P0828GM201**
19" Rack Mount Ground Bar	**DAMAC**	**ARGB019**
Concrete Floor Rack Kit	**DAMAC**	**ARRFCK-58**
Fan Kit Enclosure	**DAMAC**	**ATFK2**
Grounding Strap Kit	**DAMAC**	**PLA12GK**
12" Ladder Rack 10'	**DAMAC**	**PLR1210-3**
Ladder Rack Wall Angle Support 12"	**DAMAC**	**PLBA12-3**
Ladder Rack Junction Plate	**DAMAC**	**PLB12RS-3**
Ladder Rack Protective End Caps	**DAMAC**	**PLAEC**
Patch Panel 48-port 2-RU (Black)	**Ortronics**	**KSU48**
Faceplate, 2-port (Ivory)	**Ortronics**	**KSFP2-99**
Faceplate, 4-port (Ivory)	**Ortronics**	**KSFP4-99**
Surface Mount, 2-port (White)	**Ortronics**	**KSSMB2**
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	**Superior Essex**	**W4012J101**
Fiber Optic Cable Single-Mode OS2, Indoor/Outdoor	**Berk-Tek**	**PDP012AB0707-I/O-C4(YEL)**

END OF SECTION

REVISION SUMMARY

SECTION 27 51 23.50
EDUCATIONAL INTERCOM 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 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.

B. The District has standardized on Rauland Telecenter U equipment and the installing Contractor shall be Rauland Telecenter authorized.

C. For existing construction – provide and install all components and accessories to modify the existing system while maintaining code compliance and to seamlessly integrate the new components into the existing campus' system. Prior to beginning any work, the Contractor is responsible for identifying any existing system errors or faults and bring these issues to the attention of the District Project Manager.

D. The Contractor shall be responsible for programming the Rauland Telecenter Intercom System.

E. The Contractor shall coordinate with site staff for Bell schedule programming requirements.

F. The Contractor shall review the proposed final system programming, functionality and expectations with the project manager, Architect/Engineer/Designer and District prior to final programming.

G. After completion of the installation and pretest of the system a satisfactory final test of the entire system shall be made in the presence of the inspector of record (IOR) and District or the District's representative.

H. The Contractor shall adjust any speaker levels to the appropriate level as determined in system testing.

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.

PART 2 – PRODUCTS

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
   3. Wire, cable, and accessories: See Appendix A.

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 it's representative before ordering.

C. Main system components:
   1. Rauland Telecenter U IP Campus Controller and software
   2. Rauland Telecenter U Auxilliary Input/Output Module
   3. Rauland Telecenter U 24-port Gateway
   4. Rauland Telecenter U IP Classroom Module
   5. Rauland Telecenter U Administrative Console
   6. Rauland Telecenter U Program Line Input Module

PART 3 - EXECUTION

3.01 ACCEPTABLE INSTALLERS

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 sing-off for acceptance.

3.11 AS-BUILT DRAWINGS

A. See section 27 00 00 for requirements.

B. As-built riser diagram showing all access control components for site.

3.12 TRAINING

A. For new systems provide 8-hrs end-user training.

B. For existing system upgrades provide 2-hrs end-user training.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
IP Campus Controller and software/licenses	**Rauland Telecenter U**	**TCC2000**
Administrative Console	**Rauland Telecenter U**	**TCC2045**
Auxiliary Input/Output Module	**Rauland Telecenter U**	**TCC2033**
Universal Rack Mounting Kit	**Rauland Telecenter U**	**TCC2099**
Program Line Input Module	**Rauland Telecenter U**	**TCC2055**
24-port Gateway	**Rauland Telecenter U**	**TCC2024**
Zone page amplifier (25V, 14W/35W)	**Rauland Telecenter U**	**Amplifier: TCC3022** **Power Supply (over 14W): TCC3022PS**
IP Classroom Module	**Rauland Telecenter U**	**TCC2011A**
Zone Page Module (used with external audio amplifier)	**Rauland Telecenter U**	**TCC2022**
Audio Power Amplifier (25V, 2x160W)	**Powersoft**	**MEZZO 322A**
Clock/Speaker surface combo (for use with message boards)	**Rauland**	- **Speaker ACC1480 (USO880 w/ RJ-45)** - **Backbox ACC3011SBB** - **Baffle ACC3011S** - **Message Board TCC3011S** **Add: IP Classroom module**
Exterior Speaker Enclosure (for use with all exterior speakers and paging horns)	**Rauland**	**Backbox: ACC1113** **Baffle: ACC1012**
Paging Horn, Exterior (25V) with Vandal Resistant Grille	**Lowell**	**Speaker/Grille: VRG-LUH15TX** **Surface Backbox: CB86-SGVPO** - **Add: TCC3022 Zone Page Amplifier**

Wire and Cable	**West Penn**	

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

4. Typical existing installation includes central master clock with interconnected clocks.

5. New construction shall utilize IP based sweep/digital clocks that are powered by a PoE data switch in the nearest MDF/IDF. Clocks shall synchronize to a network time protocol (NTP) server as determined by the District.

6. IP clocks are to use District standard network cabling, see Section 27 10 00.

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 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.

B. Data drops to be installed inside flush single-gang back box at clock location.
C. Clocks to be installed over wiring connection outlet.

D. Clocks to be installed flush against the mounting surface with no overhang.

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. IP Clock label – MAC address on rear of the Clock.

C. Network Cable Termination label - MDF/IDF-port number.

3.09 CONFIGURATION

A. Program all network clock equipment with network IP address information obtained from District's Technology Services (including VLAN and NTP server information).

B. The Contractor shall submit a spreadsheet of all Clock MAC addresses indexed by device location to facilitate the programming of reserved IP addresses.

C. 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, 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.

F. District or its representative to provide final sign-off for acceptance.

3.11 AS-BUILT DRAWINGS

A. See section 27 00 00 for requirements.

APPENDIX A – Pre-Approved Materials

DESCRIPTION	MFG	PART NUMBER
Digital Messaging Board, Small	**Rauland**	**TCC3011S**

END OF APPENDIX
END OF SECTION