SECTION 26 00 10

BASIC ELECTRICAL REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Table of Contents, Division - Electrical:

<u>SECTIONO</u> .	<u>SECTIONITLE</u>
260010	BASIC ELECTRICAL REQUIREMENTS
260060	POWER SYSTEM STUDY
260090	ELECTRICAL DEMOLITION
260519	BUILDING WIRE AND CABLE
260526	GROUNDING AND BONDING
260529	ELECTRICAL HANGERS AND SUPPORTS
260531	CONDUIT
260533	BOXES
260543	UNDERGROUND DUCTS AND STRUCTURES
260553	ELECTRICAL IDENTIFICATION
260942	DIGITAL LIGHTING CONTROL
262213	DRY TYPERANSFORMERS
262413	SWITCHBOARDS
262416	PANELBOARDS
262719	SURFACE RACEWAYS
262726	WIRING DEVICES
262736	ENERGY INFORMATION SYSTEMS
262816	OVERCURRENT PROTECTIVE DEVICES
262819	DISCONNECT SWITCHES
263100	PHOTOVOLTAIC POWER SYSTEMS
264313	SURGE PROTECTI ₩₩IO ES
265000	LIGHTING

- B. Work included: This Section includes general administrative and procedural requirements for Division26. The following administrative and procedural requirements are included in this Section to supplement the requirements specifile Division01.
 - 1. Quality assurance.
 - 2. Definition of terms.
 - 3. Submittals.
 - 4. Coordination.
 - 5. Record documents.
 - 6. Operation and maintenance anuals.
 - 7. Project management and coordination services.

- 8. Contract modification pricing procedures.
- 9. Excavation.
- 10. Roughin.
- 11. Electrical installation.
- 12. Cutting, patchingpainting, and sealing.
- 13. Field quality control.
- 14. Cleaning.
- 15. Projectcloseout.
- 16. Interface/Responsibility Matrix.
- C. Related Work: Consult all other Sections, determine the extent and character of related Work, and propely coordinate Work specified herein with that specified elsewhere to produce a complete and operable installation.
 - 1. General and supplementary conditions: Drawings and general provisions of Contract and Division 01 of the Specifications, apply to all Division Sections.
 - 2. Earthwork: Include trenching, backfilling, boring and soil compaction as required for the installation of underground conduit, **ig**rade pull boxes, vaults, lighting pole foundations, etc. Refer to Division 31, Earthwork.
 - 3. Selective demolion: Nondestructive removal of materials and equipment for reuse or salvage as indicated. Also dismantling electrical materials and equipment made obsolete by these installations. Refer to Division 02, Selective Demolition.
 - 4. Concrete work: Include forming, steel bar reinforcing, caist-place concrete, finishing and grouting as required for underground conduit encasement, light pole foundations, pull box slabs, vaults, housekeeping pads, Atlso includes setting of floor boxes in existing concrete abs, sawcutting of existing slabs and grouting of conduits in sauture. Refer to Division 03, Concrete.
 - Miscellaneous metal work: Include fittings, brackets, backing, supports, rods, welding and pipe as required for support and bracingacewaysluminaires panelboards, distribution boards, switchboards, motor control centers, etc. Refer to Division 05, Miscellaneous Metals.
 - 6. Miscellaneous lumber and framing work: Include wood grounds, nailers, blocking, fasteners and anchorage for support of elecationaterials and equipment. Refer to Division 06, Rough Carpentry.
 - 7. Moisture protection and smoke barrier penetrations: Include membrane clamps, sheet metal flashing, counter flashing, caulking and sealant as required for waterproofing of conduit penetrations and sealing penetrations in or through fire wallsarpenlsarpenlsarpenlsarpenl

- 8. Access panels and doors: Required in wallistings, and floors to provide access to electrical devices and equipment. Refer to Division 08, Access Doors also, Division 05, Metals.
- 9. Painting: Include surface preparation, priming and finistation as required for electrical cabinets, exposed conduit, pull and junction boxes, etc. where indicated as field painted in this Division. Refer to Division 09, Painting.
- 10. Luminairesupports: Provide slack support wire **forminairesinstalled** in acoustical tile or layin suspended ceilings. Refer to Division 09, Acoustical Treatment.
- D. Work furnished and installed under another Division requiring connections under this Division includes but is not limited to:
 - Electric motors.
 - 2. Package mechanical equipmtefans, fan coil units, pumps, boilers, compressors, etc.
 - 3. Flow switches and valve monitors for sprinkler system.
 - 4. Elevator controllers.
 - 5. Prewired electrified partition furniture.
 - 6. Temperature control panel(s). (Line voltage only)
 - 7. Irrigation controller(s). L(ine voltage only)
 - 8. FM-200 control panel. (Line voltage only)
 - 9. Kitchen equipment and appliances.
 - 10. Laboratory equipment.
 - 11. Electric signage.
 - 12. Electric door locks.
 - 13. Electric heat trace tape.
 - 14. Door holdopen/release devices.
 - 15. Variable frequency drive units.
 - 16. Chiller starters.
 - 17. Motorized roll down/sliding doors and grills.
 - 18. Motorized dock levelers.
 - 19. Projection screens.
- E. Items furnished under this Division, but installed and connected under another Division includes but is not limited to:
 - 1. Diesel generator day tankDivision 22)
 - 2. Diesel generator silencer. (Division 23)
 - 3. Generator daytank fuel strainer, manual fuel pump, check valve and any other specified accessories. (Division 22)

- 3. Testing Agency shall meet Federal Occupationately and Health Administration (OSHA) requirements for accreditation of independent testing laboratories, Title 9, Part 1907.
- 4. On-site technical personnel shall be currently certified by the International Electrical Testing Association in electrical powdestribution system testing.
- 5. Testing Agency shall use technicians who are regularly employed by the firm for testing services.
- 6. Contractor shall submit proof of above Testing Agency qualifications with bid documentation upon request.
- F. All base material shape ASTM and/or ANSI standards.
- G. All electrical apparatus furnished under this Section shall conform to NEMA standards and the CEC and bear the UL label where such label is applicable.
- H. Certify that each welder performing Work has satisfactorily passed **AVAIS** ication tests for welding processes involved and, if pertinent, has undergomertification.

1.03 DEFINITION OF TERMS

- A. The following list of terms as used in the Division 26 documents shall be defined as follows:
 - "Provide": Shall mean furnish, stall, and connect unless otherwise indicated.
 - 2. "Furnish": Shall mean purchase and deliver to Project site.
 - 3. "Install": Shall mean to physically install the itemplace.
 - 4. "Connect": Shall mean make final electrical connections for a complete ting piece of equipment.
 - 5. "As directed": Shall be as directed by the Owner or their authorized Representative.
 - 6. "Utility Companies": Shall mean the company providing electrical, telephone or cable television services to the Project.

1.04 SUBMITTALS

- A. Format: Furnish submittal data in electronic format for each Specification Section with a table of contents listing materials by Section and paragraph number.
- B. Submittals shall consist of detailed Shop Drawings, Specifications, block wiring diagrams, "catalog cuts and data sheets containing physical and dimensional information, performance data, electrical characteristics, materials used in fabrication and material finish. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories which are included and those which are excluded. Furnish quantities of each submittal as noted in Division 01.
- C. Each submittal shall be labeled with the Specification Section Number and shall be accompanied by a cover letter or shall beartamp stating that the submittal has been thoroughly reviewed by the Contractor and is in full compliance with the requirements of the Contract Documents provide a Specification Section Section compliance response statement with detailed exception deviation response statements for all applicable provisions for the applicable Specification Section S

- detailed exception/ deviation response statement shall be treated a treated a treated of the treated a tre
- D. The Contractor shall submitetailed Drawings of all electrical equipment rooms and closets if the proposed installation layout differs from the construction documents. Physical size of

- c. Equipment used to conduct the test.
 - 1) Type.
 - 2) Manufacturer.
 - 3) Model number.
 - 4) Serial number.
 - 5) Date of last calibration.
 - 6) Documentation of calibration leading to NIST standards.
- d. Description of test.
- e. Test results, asompared to Manufacturers or industry accepted standards and tolerances.
- f. Conclusion and recommendation.
- g. Signature of responsible test organization authority.
- 3. Furnish completed test report to Engineer no later thandays after completion of testing, unles otherwise directed.

K. Substitutions:

- 1. All requests for substitutions shall conform to the general requirements and procedure outlined in Division 01.
- 2. Where items are noted as "or equal," a product of equal design, construction and performance will be consided. Contractor must submit to the Engineer all pertinent test data, catalog cuts and product information required substantiating that the product is in fact equal to that specified. Only one substitution will be considered for each product specified.
- 3. Manufacturers' names and model numbers used in conjunction with materials, processes or equipment included in the Contract Documents are used to establish standards of qualityutility, and appearance. Materialprocessesor equipment, which in the opinion of the Engineer is equal in qualitytility, and appearance, will be approved as substitutions to that specified.
- 4. Whenever any material, process or equipment is specified in accordance with a Federal specification, an ASTM standard, an ANSI specificatil rating or other association standard, the Contractor shall present an affidavit from the Manufacturer certifying that the product complies with the particular standard specification. When requested by the Engineer, support test data to substantiatempliance shall be submitted by the Contractor at no additional cost.
- 5. Substitutions shall be equal, in the opinion of the Architect/Engineer, to the specified product. The burden of proof of such shall rest with the Contractor. When the Architect/Engineer in writing accepts a substitution, it is with the understanding that the Contractor guaranteed the substituted article or material to be equal to the one specified and dimensioned to fit within the construction. Approved substitutions shall not relieve the Contractor of responsibilities for the proper execution of the Work or from any provisions of the Specifications.

6. The Contractor shall be responsible for all expenses in connection with the substitution materials, processes, and equipment, including the effect of the substitution on the Contractor, Subcontractor's, or other Contractor's Work. No substitution of material, processes or equipment shall be permitted without written authorization of the Architect/Engineer. Anysaumptions on the acceptability of a proposed substitution prior to acceptance by the Engineer are at the sole risk of the Contractor.

1.05 COORDINATION

A. Discrepancies:

- 1. In the event of discrepancies within the Contract Documents, the Engineer shall be so notified, within sufficient time, as delineated in Division 01, prior to the Bid Opening to allow the issuance of an Addendum.
- 2. If, in the event that time does not permit notification or clarification of discrepancies prior to the Bid Opening, the following shapply: The Drawings govern in matters of quantity and the Specifications govern in matters of quality. In the event of conflict within the Drawings involving quantities or within the Specifications involving quantities or within the Specifications involving quality, the greater quantity and higher quality shall apply. Such discrepancies shall be noted and clarified in the Contractor's Bid. No additional allowances will be made because of errors, ambiguities or omissions that reasonably should have be eliscovered during the preparation of the Bid.

B. Project conditions:

- 1. Examination of Project site: The Contractor shall visit the Project site and thoroughly review the locale, working conditions, conflictintialities, and the conditions in which the Electrical Work will take place. Verify all existing conditions in the field. No allowances will be made subsequently for any costs that may be incurred because of any error or omission due to failure to examine the Project site and to notify the Engineer of any discrepancies between Contract Documents and actual Project site conditions.
- 2. Protection: Keep conduits, junction boxes, outlet boxes and other openings closed to prevent entry of foreign matter. Cover fixtures, equipmed vices and apparatus and protect them against dirt, paint, water, chemical or mechanical damage, before and during construction period. Prior to final acceptance, restore to original condition any fixture, apparatus or equipment damaged including restoration of damaged factory applied painted finishes. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.
- 3. Supervision: Contractor shall personally or through an authorized and competent representative constantly supervise the Workn beginning to completion and, within

- 16) 120/208V generator equipment.
- C. Fieldlabels, markings, and warning signs: Provide in accordance and as required by:
 - 1. General: CEC Article 110.21.
 - 2. HighLegSystem: CEC Article 110.15.
 - Arc-Flash Warning: CEC Article 110.16.
 - 4. Identification of Disconnecting Means: CEC Article 110.22 (A).
 - 5. Engineered Series Combination Systems: CEC Article 110.22 (B).
 - 6. Tested Series Combination Systems: CEC Article 110.22 (C).
 - 7. Available Fault Current: CEC Article 110.24.
 - 8. Depth of Working Space in Existing Buildings: CEC Article 110.26 (A)(1)(c).
 - 9. Guarding of Live Parts: CEC Article 110.27 (C).
 - 10. Locked Rooms or Enclosures: CEC Article 110.34 (C).
 - 11. Manholes: CEC Article 110.(Æ).

1.07 OPERATION AND MAINTENANCE MANUALS

A. Prior to Project closeout furnish to the Owner, six (6) hard backgbinders containing all bulletins, operation and maintenance instructions, part lists, service telephone numbers and other pertinent informationas noted in each Section all equipment furnished under Division 26. Binders shall be indexed into Division Sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled

1.08 PROJECT MANAGEMENT AND COORDINATION SERVICES

- A. Overview: Contractor shall provide a Project Manager/Engineer for the duration of the Project to coordinate the Division 26 Work with all other trades. Coordination services, procedures and documentation resnsibility shall include, but shall not be limited to the items listed in this Section.
- B. Review of Shop Drawings prepared by other Subcontractors:
 - 1. Obtain copies of all Shop Drawings for equipment provided by others that require electrical service connectins or interface with Division 26 Work.
 - 2. Perform a thorough review of the Shop Drawings to confirm compliance with the service requirements contained in the Division 26 Contract Documents. Document any discrepancy or deviation as follows:
 - a. Prepare memo summizing the discrepancy.
 - b. Provide a copy of the specific shop drawing, indicating via cloud, the discrepancy.
 - 3. Prepare and maintain a shop drawing review log indicating the following information:
 - a. Shop drawing number and brief description of the system/materia
 - b. Date of your review.

- c. Indication if followup coordination is required.
- C. Request for information (RFI):
 - 1. Thoroughly review the Contract Documents prior to the preparation and submission of an RFI. If an RFI is submitted, attach 8 1/2" x 11" copieds reflevant documents to clarify the issue.
 - 2. Prepare and maintain an RFI log indicating the following information:
 - a. RFI number and brief summary of the issue.
 - b. Date of issuance and receipt of response.

D.

- liability, workers' compensation, property damage and other forms of insurance required by the Owner. No other cost will be included aas labor burden.
- c. NECA Manual of Labor Units will be utilized as the basis for determining labor productivity rates for Electrical Work as follows:
 - 1) 85% of NECA column 1 (north)nfaor change in scope issued well in advance of Work needing to be performed, so as not to cause subsymmetry or Work stoppage.
 - 100% of NECA column 1 (normal) for Work being performed with other Base Contract Work, not out of sequence and with minimal skdown or Work stoppage.
 - 3) 100% of NECA column 2 (difficult) for Work performed out of sequence, requiring Work stoppage and reconstruction in areas already complete. This Work may involve the removal of ceiling tiles or the cutting and patching of walls.
- d. No abor costs shall be included for the following items since the labor is already covered by the NECA labor units for conduit and construction channel:
 - 1) Conduit straps and clips.
 - 2) Construction channel accessories (nuts, washers, etc.).
 - 3) Screws.
 - 4) Conduit elbows ¾ and smaller.

2. Material:

- a. The cost of material shall be the direct cost, including sales tax and may include the cost of transportation from the Supplier to the Contractor, but charges for final delivery to the Project site will not be allowed.
- b. Electrical commodities priced based on most current Trade Service Book with a 15% discount. Noncommodities priced per invoice from Supplier.

3. Equipment rental:

- a. Payment for equipment costs will be made at the rental rates listed for such equipment as spetied in the current edition, at the time of the Work, of "Labor Surcharge and Equipment Rental Rates," a Caltrans Publication. Such rental rates shall be adjusted as appropriate and will be used to compute payments for equipment; regardless of the hether the equipment is under Contractor's control through direct ownership, leasing, renting or other method of acquisition. Daily, weekly, or monthly rates shall be used, whichever is lower. Hourly rates including operator shall not be used.
- b. The actual time to be paid for equipment shall be the time the equipment is in productive operation on the Work. No payment will be made time while properties is inoperative due to breakdown or for new orking days.
- c. Individual pieces of equipment having a replacement value of \$1,000 or less shall be considered small tools or small equipment and no payment will be made since the

- 1. Project change order request submission:
 - a. Provide copies of all takeff sheets showing material and labor charges in line item format.

b.

BASIC ELEC**CR**L REQUIREMENTS 26 00 10 16

- 6. Where mounting height is not detailed or dimensioned, contact the Architect for direction prior to proceeding with roughin.
- 7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with wirements of governing regulations, franchised service companies and controlling agencies. Provide required connection for each service.
- 8. Install systems materials, and equipment to conform with approved submittal data, including coordination Drawings, to reatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are indicated only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer of the to the Architect.
- 9. Install systems, materials, and equipment level and plum parallel, and perpendicular to other building systems and components, where installed exposed in finished spaces.
- 10. Install electrical equipment to facilitate servicing, maintance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
- 11. Coordinate electrical systemsquipment, and materials installations with ther building components.
- 12. Provide access panel or doors where devices or equipment are concealed behind finished surfaces. Furnish and install access doors per the requirements of Division 08.
- 13. Install systems, materials and equipment giving rightway priority to other systems that are required to maintain a specified slope.
- 14. 0.0000000912 0 612 792 re -3(isio)-4(n 08.)] TJ ET q0

BASIC ELECTRL REQUIREMENTS

BASIC ELECTRL REQUIREMENTS 26 00 10 20

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- 15. TIA/EIA TSB7 Transmission Performance Specifications for Field Testlungsoffielded Twisted Pair Cabling Systems.
- 16. TIA/EIA TSB2 Centralized Optical Fiber Cabling Guidelines.

1.03 DEFINITIONS

- A. The following is a list of abbreviations generally used in Divis2071& 28:
 - 1. ADA- Americanswith Disabilities Act
 - 2. AHJ- Authority Having Jurisdiction
 - 3. ANSI AmericanNational Standards Institute
 - 4. APWA American Public Works Association
 - 5. ASTM American Society for Testing and Materials
 - 6. CBG California Building Code
 - 7. CEG California Electrical Code
 - 8. CFG California Fire Code
 - 9. FCG Federal Communitions Commission
 - 10. HVAG Heating, Ventilating and Air Conditioning
 - 11. IEC International Electretechnical 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, roplete and ready for the intended use.
- C. Furnish: Supply and deliver to the project site, ready for unpacking mblyand installation.
- D. Install: Includes unloading, unpacking, assembling, erecting, installing, applying, finishing, protecting, deaning 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 draits and draits and draits are selected to develop various was and draits and draits are selected to develop various was an extension of the selected
 - 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 etallic parts to form an electrically conductive path

- 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 buildis of a multibuilding premises environment.
- 7. Channel: The entito-end transmission path between two points at which application specific equipment is connected; may include one or more links, crosssect jumper and/or patch cords, and work area stati cords. Does not include connection to active equipment.
- 8. CrossConnect: Equipment used to terminate and tie together communications circuits.
- 9. CrossConnect Jumper: A cluster of twisted ir conductors without connectors used to establish a circulary linking two crossconnect termination points.
- 10. Fiber Optic Distribution Unit (FDU): Cabinet with terminating equipment used to develop fiber optic crossonnect facilitiesAlso known as LIU.
- 11. Grounding: a conducting connection to earth, orstorne conducting body that serves in place of earth.
- 12. Hinged Cover Enclosure: Walbunted box with a hinged cover that is used to house and protect electrical devices.
- 13. Horizontal: Pathway facilities and media connecting MDF or IDFto

- 25. Pathway: Facility for the placement of communications cable. A pathway facility can be composed of several components including conduit, wire was let 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 chan**de**signed 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. Rack An openor enclosed structure, typically made of aluminum or steel, used to mount equipment; usually referred to as an equipment rate by befree standing and floor mounted or a wall mounted cabinet. ν μ š Œ Ç š ν Œ í õ Á] š Z ‰
- 29. Wiring Block: Punch down terminating equipment used to develop twisted **pais** 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 PRODUCSUBMITTALS

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 proved, and show demonstrated and documented equivalence to the product(s) specified. Documentationudes but not limited to product samples, data sheets, and actual test data. The request for product substitution, and supporting documentation, must be submitted writing to the Project Manager/Designer
- 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, telephonle, oadbandand cable television utilities.

F. Contractor Qualifications:

- 1. D]v]uµu}((]À Ç Œ•[Ɖ Œ] v]v šZ •]PvU]v•š oo š]} of low-voltagesystems.
- 2. Maintain a local seize facility which stocks spare devices and/or components for servicing systems.
- 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 projectust be certified by the manufacturer of the products and utilize these components for completion of work.
- 5. Holds and minimatains a valid California-Cor G10 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.
- 8. o]• š } (š Zv] o % CE} μ š š CE] v] v P š š v C š Z V š CE š install the specified manufacturer system
- 9. List of SulContractor(s) who will assist the contractortime performance this work.

installation supervisor who will be assigned to this project.

to-point wiring diagrams or all connections and the like. Refer to individual Specification Sections for additional requirements for the shop drawings.

1.10 WARRANTY

A. W Œ } À] v Æ š v u v μ (š μ Œ Œ [• Á Œ Œ v š Ç] v š Z l] v Communications systems as specified in other sections of Division 27.

1.11 CLOSE OUT DOCUMENTS

- A. Final coordination drawings, with absult 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 changerder items.
 - 2. Show exact routes of athway facilities and service entrance conduits.
 - 3. Showthe exactlocation of racks, cabinets, mounting frames and the like.
- C. Operation and Maintenanc 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, suchwise/cable, jacks, modular plugspatch panels, equipment connection cords, wall plates, and the like. See individual sections for detailed information.

2.02 MATERIALS

A.

C. Vacuum clean interiors of new and modified electrical signal and communication ment enclosures.

END OF SECTION

SECTION 27 05 00 COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Thissection specifies the basinaterials 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 Divisi26 that apply to Communications and extoav-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/BackboxeRaceways
 - 6. Underground
 - 7. Sleeves and penetrations

1.03 SUBMITTALS

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

1.04 RELATED REQUIREMENTS

- A. Division 07t Thermal and Moistur@rotection
- B. Division26 t Electrical
- C. 27 00 00t Communications Basic Requirements

1.05 REFERENCES

A. ANSI American Nation Standards Institute

COMMON WORK RESULTS FOR COMMUNICATIONS 27 05 00 -

PART 2t PRODUCTS

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

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.
 - Concrete / cinder block / solid mason Expanding compression type lag, expanding compression type bolt, expanding compression type lag, expanding equal.
 - 3. Tile / Stucco / hollow masonryToggle bolts or approved equal.
 - 4. Wood:Lagscrews wood screws, or approved equal.
 - 5. Metal: Beamclamps, sheet metalscrews self-drill

3. All new conduits shall be sized accordingly to achieve an 40% mum fill ratio with initial cables installed

B. INNERDUCT

- 1. Orange orrugated HDPE (High Density Polythylene) Innershatt be used for fiber optic cable protection in interior locations.

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 INE

1. Minimum 1/8" diameter, or larger braided line of polypropylemecontinuous fiber polyplefin. The minimumbreaking strength of 1/8 in. linis 200 lbs.

2.06 BACKBOXES, JUNCTION BOXES AND FLOOR BOXES

- A. Galvanized on piece or weldedpressed steel type. Boxes for fixts schall not be less than 4" square and shall be equipped with fixture stud. Boxes shall be at 2 da 8 deep, 4" square for 1 or 2 gang devices, with device rings. Boxes mounted in wall or ceiling finished with ñ l ô P Ç ‰ μ u } Œ Z ο ο (μ Œ ν] Z Á] š Z ñ l ô _ ‰ À] for all boxes without fixture or device.
- B. Junction boxesU o CEP CE šZ v ô_U o} hisinged, NENJA, OF arted Z o o
- C. : $\mu v \ \tilde{s}$] $v \ AE \bullet U \ o \ CEP \ CE \ \tilde{s} \ Z \ v \ \hat{o} \ U \ o$ $\tilde{s} \ \mu \tilde{s}$ } $CE \bullet U \ CE$] $v \ A \ \tilde{s}$ hinged, NEMA3R.
- D. Provide and install tamperroof 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.

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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 foordditional requirements
- C. $/v \bullet \check{s}$ oo POE $\}\mu\nu$]vP μ \bullet OE% OEuv μ (be \check{s} n μe s0Eh NMED $[F \bullet ar]$ vhUšFOE μ \check{s}] $\}v$ \bullet v
- 3.03 HANGERS AND SUPPORTS

 - B., vP OE \(\times \)] vP Z o o v \(\hat{\delta} \) [\(\hat{\delta} \) Z] \(\times \) (OE \(\hat{\delta} \) (\(\hat

COMMON WORK RESULTS FOR COMMUNICATIONS

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 CBC Dision 07 for more information.

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 See Division 07 formore information.

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 manage&eeDivision 07 for more information.

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 acceptane.
- 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 247 00 AUDIOVISUAISYSTEMS

PART I GENERAL

1.01 SUMMARY

A. This section specifies equipment, accessories, materials, installation, configuration, and testing requirements for a complete and operabledio-visual system This system shall provide multi-media presentation capabilities multiple purposes including board meetings, professional development meetings, committy revents and other functions

1.02 SCOPE

- A. The work will include but not be limited to the following objectives:
 - 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 proipstallation of a turn-key Audio Visual system to the District.
 - 2. The contractor will coordinate with the District in writing for any needed information (i.e. IP addresses, et@) least 2 weekprior to date the information is needed.
- E The Contractor is responsible for user/operatraining
- F. The Contractor shall complete all required project closeout documentation in a timely fashion.

1.03 RELATED REQUIREMENTS

- A. Division 01t General Requirements
- B. Section27 00 00 Communications
- C. Section27 05 00t Common Work Results for Communication Systems.
- D. Section27 10 00t Structured Cabling

1.04 REFERENCES

A. See section 27 00 00 for requirements.

- B. dZ]•šŒ] š[• WŒ}i š }Œ }v•šŒμ š]}v D v P Œ Á]oo Z À šZ 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 contrn 0 612lo<0000000912 0 612 792 re W* n BT /F2 10.98 Tf 1 0 0 1 535.42 64

PART 2 PRODUCTS

2.01 GENERAL

- A. The approved manufacturers for the project are:
 - 1. A-V Control unit and related accessories: restron
 - 2. See Appendix A foodditional pre-approved equipment/materials.
- B. All products shall be new, unused and without blemishes samed 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. Contrator shall provide all components needed for complete and satisfactory installation and operation.

D. Product Availability

- 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such cides ations 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-approved materials.
- B. $^{\mu \bullet i} v \bullet CE ^{\mu}CE ^{$

- 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 the approved Shoprawings, Design Documentend Specifications.
- E All low voltage cables shall be kept away from power circuits.
- F. Contractor shall provide programming and configurationeach AV control/input system
- G. Cables/wire shall be installed in a neat and orderly manner. Loose sables shall be bundled andwrapped with Velcro

3.06 LABELINGCHEDULES

- A. All labels are to be machine generated black letters on white adhesive label stock that is appropriate for the insallation environment (interior/exterior).
- B. Cables shall be identified with a machipmented tag identifying the system type, source or head end location, and destination location in all access points (i.e. junction boxes, ground boxes, MDF, IDF, etaind as they enter or exit and conduit pathway.

3.07 CONFIGURATION

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

3.08 FIELD QUALITY CONTROL AND TESTING

- A. The installation contractor will fine tune and tetale systems for optimal audio and visual performance.
- B. Audio System:
 - 1. Frequency Response: ± 3 dB per octave band, 125 Hz to 10,000 Hz. 3dB per octave roll off below 125 Hz and above 10 kHz.
 - 2. Total Acoustical Harmonic Distortion: Less than 2% at 85 dBC (1kHz reference) at four feet (1,220mm) above finished floor in the ddle of the room.
 - 3. Adjust the gain structure for all audio system components (mixer input to amplifier output) to achieve the highest signal-noise ratio, 75 dB from 50 Hz to 15 kHz minimum.

- 4. Ensure that the audio frequency response of the elements system with equalizers bypassed varies less than ±1 dB from 50 Hz to 12 kHz.
- 5. The electronic system audio distortion shall be less than 0.5% at 1 kHz at the equipment's rated input signal level.
- 6. Sound Output Capability: Provide program level not less than 95 dB and speech reinforcement levels of not less than 85dB in the seating area without objectionable distortion, rattles, or buzzes, employing as test signals several different samples of recorded music and microphones applied at earls term input.
- 7. Hum and Noise: Hum and noise shall be inaudible (below the background noise level of the space) under normal operation and as observed in normal seat locations.
- G. Upon reaching substantial completion, perform a complete test iaspection 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.
- H. Submit the Record Drawings (asilts) to District for review prior to inspect.
- I. During the formal Test & Inspection (Commissioning) of the system, have personnel available with tools and equipment to inspect wiring, devices, and system operation.
- J. If corrections are needed, the Contractor will be provided with a Punistof all discrepancies. Perform the needed corrections in a timely fashion.
- K Notify the District when ready to perform a-inespection of the installation.
- L District or its representative to provide final **sig**ff for acceptance.
- 3.09 ASBUILT DRAVINGS
 - A. Asbuilt drawings shall be provided for this section.
- 3.10 TRAINING

A.

ASSISTIVE LISTENING SYSTEMS 27 51 26-1

outlets or other supplementary wiring necessary to support a portable assistive ing system shall be provided.

F.

PART 2 PRODUCTS

2.01 GENERAL

- A. Manufacturers t The District has standardized on Listen Technologies.
- B. All products shall be new, unused and without blemeis 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 contractors hall provide all components needed for complete and satisfactory installation and operation.

D. Product Availability

- 1. Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and hall 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-approved materials.
- B. Substitutions require proof of equivalence and prior approval by District arits/or representative before ordering.

- B. BASE TRANSMITTER (provide 1 for each permanent sound system).
 - 1. Provide base transmitter with rack mount kit. Install where specified in the sound equipment rack and connect to content source.
 - 2. Install antennawhere specified and cabling from the Base Transmitter to the antenna location.
 - 3. Program the transmitter to an interferendee transmit frequency in coordination with any adjacent systems
- C. RECEIVERS (provide a quantity equal to or greater than 4% of the total number of seats, but in no case less than 2)
 - 1. Install rechargeable batteries, if applicable
 - 2. Program receivers to the broadcast frequency of the Base Transmitter

D. SIGN

1. Provide Assistive Listening System sign per ADA requirements to indicate equipment