

FRESNO UNIFIED SCHOOL DISTRICT SCOPE OF WORK

A. SCOPE OF WORK

1. The work of this contract is comprised of providing all labor and materials to design, fabricate, provide, and install a new LED message center marquee sign and pole per District specifications.
 - a. Location: Cooper Middle School, 2277 W. Bellaire Way, Fresno, CA 93705

B. RELATED SECTIONS

1. Section 02 22 20 – Excavating, Backfilling and Compaction for Utilities
2. Section 03 20 00 – Concrete Reinforcement
3. Section 03 30 00 – Cast-In-Place Concrete
4. Section 26 00 00 – Basic Electrical Requirements
5. G-008 – Detail for Typical High School Marquee
6. Site Plan Key for Cooper Middle School

C. QUALITY ASSURANCE

1. Contractor/Manufacturer Qualifications:
 - a. The contractor and the manufacturer must be the same.
 - b. Proposed marquee design drawing shall be submitted for District review, revision and final approval prior to proceeding with DSA submittal.
2. Warranty:
 - a. The CONTRACTOR/MANUFACTURER must supply a one-year (12 month) guarantee against faulty workmanship and materials.

D. PRODUCT

1. For Product Substitutions please refer to; Fresno Unified School District's General Conditions 01 25 13.01 Product Substitution Procedures.
2. Pylon Sign
 - a. Double-sided with overall height at 16'-8" above finish grade and approximate width at 7'-10".
 - b. Pylon decor to include on both sides the school mascot and the wording, "COOPER MIDDLE SCHOOL".
 - c. Top and bottom decor to be routed out of .125 aluminum with a 2" square tube aluminum frame.
 - d. Logo and lettering box to be pan channels fabricated out of .040 pre-coated aluminum with 5" deep returns painted with Matthews satin acrylic polyurethane paint finish or equal.
 - e. Faces to be routed out of 3/16" white acrylic decorated with 3M translucent vinyl film and digital print graphics with a UV laminate and 1/2" blue trim cap retainers.
 - f. Internal illumination to be supplied with high output 7000 white LED

modules and remote 12-volt 60-watt power supplies.

- g. Display to be have a 3'-1.75" x 7'-10.5" 16mm RGB LED message center capable of full color with wireless Ethernet communication.
- h. LED message center to be painted with a satin black acrylic polyurethane finish with perforated aluminum side enclosure to allow for ventilation.
- i. Sign to be mounted on a single pole with direct burial footing and mow-strip.
- j. Fabrication, electrical and installation to be done in accordance with DSA, UL & NEC requirements. Sign to bear UL Label.

3. LED Board

- a. LED Pixel Pitch: 16.0mm
- b. Matrix Size: 60 x 150
- c. Viewing Area: 3' 1 13/16" x 7' 10 1/2", minimum.
- d. Cabinet Size: 3' 113/16"x7' 101/2"x611/16", minimum.
- e. Color: RGB
- f. Color Processing: RGB 1.15 quintillion Colors
- g. LED's per pixel: Red: 1 Green: 1 Blue: 1
- h. Total# of LED's: 54000
- i. Character Size: 4.4 Inches
- j. # of Lines/Char. Line: 8 line(s), 25 characters
- k. Brightness: 10000 NIT's (+-5%)
- l. Viewing Angle: 140 Degrees Horizontal
- m. Display Configuration: Double Face (2 Cabinets - Primary/Secondary)
- n. Maintenance Door: Front
- o. Cabinet Design: Module
- p. Display Net Weight: 325.67 lbs. per face (+/- 10%)
- q. Ventilation: Rear Vent
- r. Dimming Levels: 100 - Auto & Manual
- s. Dimming/Temp. Sensor: Included
- t. Software: ME Pro Plus, or equal
- u. Software Upgrade: 5 Years Software Upgrades
- v. Software Training: Webinar
- w. AC Power Required: Single Phase 120V or 240V 50/60Hz
- x. Total Boot Up Amps* (120V): 18.1
- y. Regular Operating Amps* (120V): 5.26
- z. Example Electrical Cost* (120V): US\$0.82/Day
- aa. Venting Requirement*: 347.39 CFM
- bb. Warranty*: 5 Year Parts/In Factory Labor Warranty
- cc. Communication: Wireless Ethernet

E. CONTRACTOR RESPONSIBILITIES

- 1. Removal and disposal of existing marquee sign, concrete footing and mow-strip, including electrical disconnections as necessary. Costs associated with repairs to infrastructure shall be the responsibility of contractor.
- 2. Design, provide, and install a new marquee sign and new pole.
- 3. Contractor to include all services related to obtaining Division of State Architect (DSA) approval, including but not limited to, engineering and architectural services, producing required submittal drawings, specifications, and any necessary revisions,

- submission of drawings, specifications, and other DSA required paperwork in order to achieve both approval to proceed with construction and final DSA project closeout.
4. Contractor is responsible for submitting fees/check as part of DSA submittal and approval process.
 5. Contractor to provide minimum 48 hours' notice to District Project Manager requesting state required testing and inspections.
 6. Compact subgrade and pour new 4" thick concrete pad at 3,000psi.
 7. Supply and install all electrical, data, concrete and signage per manufacturer, DSA, UL and NEC requirements.
 8. Responsible for final hookup and initial programming.
 9. Contractor is responsible for providing new electrical and data connection to new sign. District will show point of connection.

F. DISTRICT RESPONSIBILITIES

1. District is responsible for providing underground utility locating.
2. District to provide and coordinate all DSA required inspections and testing.

SECTION 02222
EXCAVATING, BACKFILLING AND COMPACTION FOR UTILITIES
REV DATE: 02/01/01

FRESNO UNIFIED SCHOOL DISTRICT
EXCAVATING, BACKFILLING AND COMPACTION FOR UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work Included: Excavating, backfilling, and compacting trenches for utility pipes, water, gas irrigation and sewer lines, storm drain lines, manholes, vaults, valve boxes, catch basins, underground tanks, thrust blocks, yard boxes, pull boxes and concrete encased electrical conduits.

B. Related Work:

1. Site Clearing: Section 02200.
2. Excavating, Backfilling, and Compacting for Pavement: Section 02200.
3. Excavating, Backfilling, and Compacting for Structures: Section 02200.
4. Water Distribution System: Section 02665.
5. Gas Distribution System: Section 02685.
6. Site Drainage: Section 02720.
7. Sanitary Sewer System: Section 02730.
8. Automatic Irrigation: Section 02494.
9. Basic Mechanical Requirements: Division 15.
10. Basic Electrical Requirements: Division 16.

1.02 SOILS INFORMATION:

A. Information on the drawings or in the soil investigation reports does not constitute a guarantee of uniformity of soil conditions over the construction site.

B. A copy of the foundation investigation and soils report included herein "For Reference Only."

1.03 IMPORT AND EXPORT OF EARTH MATERIALS:

A. Fees: Pay as required by the government authority having jurisdiction over the area.

B. Bonds: Post as required by the government authority having jurisdiction over the area.

C. Hauling Routes and Restrictions: Comply as with requirements of the government authority having jurisdiction over the area.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Use fill materials free of foreign materials, vegetable growths, sod, expansive soils, and all debris.
- B. Imported Fill Material:
 - 1. If the amount of suitable earth materials obtained from the jobsite excavations is not sufficient to properly construct the refill, furnish imported earth materials as necessary.
 - 2. All imported earth shall be of a granular nature with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60% of fines passing a 200-mesh sieve. Material shall have a coefficient of expansion of not more than 2% from air dry to optimum moisture content and not more than 6% from air dry to saturation.
- C. Backfill Materials: Use clean earth materials previously removed from excavations or imported fill material as specified above, free from large clods and stones larger than 4".

2.02 BASE MATERIALS:

- A. Under Concrete Slabs On Grade: Where indicated on the drawings, use 3/4" maximum size crushed aggregate base.
- B. Under Bituminous Surfacing: As indicated elsewhere on the drawings and specified in "Base Course," Section 02513.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Field conditions may require deviations from information indicated on drawings, or recommendations made in Soils Report. Such changes in the work shall be covered by a Change Order indicating an increase or decrease in the Contract sum.
- B. The Contractor shall contact the "Underground Service Alert of U.S.A." for information on buried utilities and pipelines.
- C. Trenches, ditches, pits, sumps, and similar items, which are outside the barricaded working area, shall be barricaded to conform to California OSHA standards.
- D. Trenches over 5' in depth shall conform to Construction Safety Orders of the California Division of Industrial Safety.

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- E. Where it is necessary to excavate in lawn areas, protect the same and preserve the sod. Replace the sod upon completion of backfill by bringing sod level with surrounding lawns. If preservation of sod is impossible, seed and fertilize the area after backfilling to match existing turf as directed.
- F. Backfill excess excavations to the required level with earth, gravel, sand, or concrete as directed by the Engineer and compact thoroughly. Grade the ground adjacent to all excavations to prevent water from running in.
- G. No pipe shall be laid lengthwise under concrete walks without the approval of the Project Inspector.
- H. Do not excavate trenches parallel to footings closer than 24" from the face of the footing or below a plane having a downward slope of two horizontal to one vertical, from a line 9" above the bottom of the footings.
 - 1. Unless otherwise indicated on the drawings, depth of excavations outside the buildings shall allow for a minimum coverage above the top of pipe, tank or conduit measured from the adjoining finished grade, as follows:

Steel Pipe	24" below finished grade
Copper Water Tube	18" below finished grade
Cast-Iron, Pressure Pipe	36" below finished grade
Plastic Pipe (other than waste)	30" below finished grade
Tanks or other structures	36" below finished grade
Soil, sewer and storm drain	As required for proper pitch. (Install plastic pipe with not less than 12" coverage.)
 - 2. Trench width shall provide ample space for working and joining. Dig holes for bells for all bell and spigot pipe and for fittings for all pipe.
- I. Excavate trenches for utilities, pipes, concrete encased electrical conduits and fuel tanks to required depth as indicated on drawings. Grade bottom of trenches to a uniform surface to prevent pockets. Remove all loose soil from the excavation before placing 6" of 90% compacted sand bedding. Use clean fine-grained sand of such size that not less than 90% shall pass through a 1/4" screen and not more than 25% shall pass through a number 50 screen. Sand meeting the specifications for fine aggregate for concrete work may be used. Place pipes, encased conduits and other utilities on a uniformly bearing sand bed.
- J. Keep excavation free of water during the installation work. Dispose of water in such a manner as not to endanger public or private property or public health. Remove accumulated water in excavations by pumping or other approved means.

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- K. Where an extension or addition is being made to an existing plant, perform all work in such a manner and at such times as not to interrupt the satisfactory performance of the existing services to the buildings on the site used by the District. Where an interruption is necessary, obtain written approval from the District.
- L. Where portions of existing structures, walks, and paving are or must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work.
- M. Provide a minimum space of 2" between outer surfaces of buried pipes, including conduits placed in the same trench or, where used, outside surfaces of containers.
- N. Do not place backfill until the work installed has been inspected, tested and approved by the Project Inspector. Remove excavated rocky material unsuitable for backfill from the site.
- O. Trenches for electrical installation outside of the barricaded working area shall be backfilled within 72 hours after approval of the electrical installation by the District Electrical Inspector.

3.02 INSPECTION AND TESTING:

- A. The Project Inspector will inspect all subgrades and excavation prior to the placing of fill materials.
- B. Make compaction test in accordance with ASTM D1557, method "C".

3.03 EXCESS MATERIAL DISPOSAL:

Remove all excess excavated and imported material not used for fill or backfill and all waste and debris from the jobsite.

END OF SECTION

SECTION 032000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, Alternates and Addenda apply to this Section.

1.2 SUMMARY:

- A. Principal Work Items Are:
 - 1. Rebar.
 - 2. Welded wire mesh.
 - 3. Accessories.
 - 4. Work furnished but installed by another section.
 - a. Fabricated rebar for masonry.
 - b. Fabricated rebar for site drainage concrete structures.
- B. Related Work Specified Elsewhere: The following Project Manual Sections contain requirements that relate to this section:
 - 1. CAST-IN-PLACE CONCRETE
 - 2. SITE DRAINAGE

1.3 SUBMITTALS:

- A. Substitutions:
 - 1. In accordance with Substitutions Procedure.
 - 2. Only written approval of District will permit substitutions for materials specified.
- B. Quality Assurance / Control Submittals:
 - 1. Reports: For analysis and required tests.
 - 2. Mill certificates.
 - 3. Certificate for Off-Site Work: Provide for all Off-Site Work Contract Close-out.

1.4 QUALITY ASSURANCE:

- A. Requirements of Regulatory Agencies:
 - 1. Codes: Conform to Title 24, CCR and CBC.
 - 2. Off-Site Work: Conform to local governing agency requirements.
- B. Source Quality Control: Refer to Section 014000, Quality Control, for analysis and tests required.

- C. Reference Standards: Concrete Reinforcing Steel Institute (CRSI) Manual of Standard Practice.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size, length, configuration, and building location.
- B. Handle and store materials to prevent injury or unwanted bends.
- C. Store materials on blocking to prevent contact with ground. Do not store materials in water puddles.

1.6 SCHEDULING:

- A. Sequencing, Scheduling: Coordinate work with trenching for foundations, concrete forming and placement. Schedule delivery of rebar for masonry with respective sections.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General: Conform to applicable Codes.
- B. Rebar: ASTM A-615; deformed; grade 60 typical, other stresses where noted.
- C. Welded Wire Mesh: ASTM A-185; 75,000 psi tensile strength for 10 gage and larger wire, 70,000 psi tensile strength for 11 gage and smaller wire. Flat sheets only.
- D. Tie Wire: ASTM A-82; annealed steel, 16 gage minimum.
- E. Accessories:
 - 1. General: CRSI Standards for chairs, spacers, supports and other accessories.
 - 2. Support Blocks for Rebar and Welded Wire Mesh: Dense precast concrete.

2.2 FABRICATION:

- A. General: Per CRSI Standards.
- B. Fabricate to lengths and shapes required.
 - 1. Bends: Bend cold around a pin; minimum diameter shall conform to applicable codes and regulations.
 - 2. Do not bend or straighten bars in a manner, which will injure material.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. Scope:

1. Install all steel reinforcement for concrete work.
2. Install all dowels in concrete, to match locations of masonry wall reinforcement.

B. General:

1. Conform to codes.
2. Do not use rebar, which has bends or kinks other than those required.
3. Do not heat, bend, cut, or alter rebar at Project site without concurrence of District.

C. Placement; Rebar:

1. Accurately position rebar; securely anchor against displacement.
2. Support rebar above earth or previous concrete pour on concrete support blocks.
3. Support rebar above forms on vinyl coated metal chairs, plastic chairs or stools. Anchor securely to maintain required clearances from form faces.
4. At columns or piers, do not drive nails into outside forms to support rebar, nor use any other supporting device, which will contact outside form.

D. Spacing; Rebar: Maintain following minimum clear distances between bars, or greater distances where required.

1. All Cases: 1 1/2" minimum.
2. Parallel Bars (except at splices): 1 1/2 times nominal diameter.

E. Clearances; Rebar: Maintain following minimum clear distances to provide concrete coverage for protection of rebar, or greater distances where required.

1. Footing surfaces poured directly on earth: 3".
2. Walls against earth, but placed in forms: 2".
3. Walls formed (except [2] above): 1-1/2".
4. Columns: 2" to main steel.

F. Splices; Rebar:

1. Splice only at approved locations.
2. Lap splices: Wire tie securely together.
 - a. Use typically for splices, corners, intersections.
 - b. Minimum lap distance, unless otherwise required:
 - 1) Concrete: 30 bar diameters, but not less than 24" in any case.
3. Other splice methods: Only with specific District approval.
4. Separate splices code-required distances.

G. Welded Wire Mesh:

1. Install in longest practicable length.
2. Lap adjoining pieces one full mesh minimum, and tie splices with 16 gage wire.
3. Offset laps in adjacent widths to prevent continuous laps.

4. Where mesh is 12" x 12" or greater, support on precast concrete blocks spaced 3', maximum, o.c. each way.

3.2 FIELD QUALITY CONTROL:

- A. Inspection: Refer to Testing and Inspection Requirements.

3.3 ADJUSTMENT AND CLEANING:

- A. Just prior to concrete placement, clean reinforcement free of coatings, rust, scale, that will reduce or destroy bond. Reinforcement appreciably reduced in section by cleaning shall be replaced as directed by District. Reposition any misaligned reinforcement.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE (SITE WORK)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specifications Sections, Alternates and Addenda apply to this Section.

1.2 SUMMARY:

- A. Principle Work Items Are:
1. Concrete Work:
 - a. Rough concrete.
 - b. Finish concrete.
 - c. Specially finished concrete.
 - d. Bases for light poles.
 - e. School name sign with cast-in letters.
 - f. Grouting at folding panel partition sills.
 2. Formwork.
 3. Curing and protection.
 4. Plastic membrane.
 5. Off-site work:
 - a. Sidewalks, driveways, curbs and gutters.
 6. Work installed but furnished by another Section:
 - a. Setting rough hardware and other embedded items.
 - b. Setting grates and frames for areaways.
- B. Related Work Specified Elsewhere:
1. Furnishing rough hardware and other embedded items: Respective Sections.
 2. EARTHWORK.
 3. SITE DRAINAGE CONCRETE STRUCTURES.
 4. CHAIN LINK FENCES AND GATES.
 5. STEEL REINFORCEMENT.
 6. BITUMINOUS DAMPPROOFING, at planters and retaining walls.
 7. IDENTIFYING DEVICES.
 8. Door sills: Respective Sections.
 9. Rough concrete encasement for certain piping systems and concrete thrust blocks for piping systems: Various Sections of Division 22 & 23.
 10. Rough concrete encasement for underground electrical conduits: Various Sections of Division 26.

1.3 SUBMITTALS:

A. Substitutions:

1. In accordance with Substitutions Procedure.
2. Only written approval of District will permit substitutions for materials specified. Refer to Section 00700, Article 30, Substitutions, for procedure.

B. Shop Drawings for Cast-in Letters: Full-size template layout of wording for school name sign.

C. Concrete Design Mix: By testing laboratory.

D. Test Reports: Source and Field Quality Control tests.

E. Certificates:

1. Weighmaster's Certificates: Per DSA requirements.
2. Certificate for Off-Site Work: Provide for all off-site work, per Paragraph

1.4 QUALITY ASSURANCE:

A. Design criteria; formwork:

1. Contractor shall be solely responsible for all formwork and Contractor shall:
 - a. Design, construct and maintain formwork to safely support all loads.
 - b. Obtain Governing Agency approval when such is required.

B. Testing Agency:

1. On-Site Work: District designated testing laboratory.
2. Off-Site Work: Governing Agency approved testing laboratory.

C. Requirements of Regulatory Agencies:

1. Codes: Conform to Titles 21 and 24 of the CCR and conform to CBC.
2. Off-site work:
 - a. Conform to Local Governing Agency requirements.
 - b. Obtain and pay for all permits, licenses and fees.
 - c. Arrange for all tests and inspections.

D. Tests and Inspection: General: Refer to Section 014000.

E. Allowable Tolerances for Concrete Surface Smoothness: 1/8" maximum permissible variation from a true plane measured from a 10' straight edge placed anywhere on the surface, non-cumulative.

F. Job Mock-Ups:

1. General:
 - a. Make samples on-site; revise as required; obtain District's approval, 10 days prior to casting finished work.
 - b. Finished work to match approved samples.

- c. Approved sample may be incorporated into the work.
 - 2. Specially Finished Concrete: Flatwork:
 - a. Sample size: 20 SF minimum.
 - b. Required for following finishes: Salt.
 - 3. Specially Finished Concrete; School Name Sign:
 - a. Sample size: 2 SF minimum wall area.
 - b. Required for following finishes: Sandblasted.
- G. Source Quality Control:
- 1. Testing laboratory shall provide continuous inspection at concrete batch plant for all structural concrete, defined as follows:
 - a. Footings, foundation walls, floor slabs-on-grade, exterior reinforced slabs.
 - b. Walls.
 - 2. Furnish Weighmaster's Certificates for all concrete.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. A. Storage; Concrete Materials:
- 1. Cement: Store in weather tight enclosures and protect against dampness, contamination and warehouse set.
 - 2. Aggregates
 - a. Stock pile to prevent excessive segregation or contamination with other materials or other sizes of aggregates.
 - b. Use only one supply source for each aggregate stock pile.
 - 3. Admixtures:
 - a. Store to prevent contamination, evaporation or damage.
 - b. Protect liquid admixtures from freezing or harmful temperature ranges.
 - c. Agitate emulsions prior to use.
- B. Delivery: Ready-Mixed Concrete: Conform to Title 24, CBC Chapter 19A.
- C. Formwork Materials:
- 1. On delivery to job-site, place materials in area protected from weather.
 - 2. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
 - 3. Handle materials to prevent damage.

1.6 PROJECT CONDITIONS

- A. Environmental Requirements:
- 1. Allowable Concrete Temperatures:
 - a. Cold Weather: When depositing concrete in freezing or near-freezing weather, concrete mix temperature shall be between 50° and 90° F when cement is added. Maintain a concrete temperature of 50° F. minimum for 72 hours minimum after placing or until concrete has thoroughly hardened. When necessary, heat

concrete materials before mixing. Take necessary precautions to protect transit-mix concrete.

- b. Hot Weather: 90° F. maximum.
- B. Protection:
 - 1. Do not place concrete during rain, sleet, or snow unless protection is provided.
 - 2. After placement, protect from injury by elements, traffic, construction operations and other causes.
- C. Sequencing, Scheduling: Coordinate work with earthwork, trenching for foundations, underground utilities, plumbing, electrical, mechanical, Section furnishing imbedded items, steel reinforcement and related work of other Sections.

PART 2 - PRODUCTS

2.1 MATERIALS; GENERAL:

- A. Conform to Codes and additional requirements stated herein.

2.2 BASIC CONCRETE MATERIALS:

- A. Portland Cement:
 - 1. Type I or II; per CBC and ASTM C150.
 - 2. Use tested cement only. Use same cement brand for all exposed work.
- B. Water: Clean, fresh, free of injurious amounts of minerals, organic, substances, salts, acids or alkali.
- C. Aggregates:
 - 1. General: Per CBC.
 - 2. Hardrock Aggregates: Per CBC and ASTM C33.
 - a. Fine: Sand well graded from coarse to fine.
 - b. Coarse: Uniformly graded from 1/4" to maximum permissible size. Maximum size per Title 24, CBC Chapter 19A, but not to exceed 1" in any case.
 - 3. Lightweight concrete: Per ASTM Standard C330-80.

2.3 MATERIALS; CONCRETE ADDITIVES:

- A. Admixtures:
 - 1. General: Inclusion in concrete mix is at the Contractor's option and expense.
 - 2. Types:
 - a. Conform to Title 24, CBC Chapter 19A, which is based on ASTM C260, C494, C618. Admixtures shall increase workability and reduce water demand.
 - b. Acceptable Products:

- 1) Floor slabs-on-grade: Red Label or Anti-Hydro.

2.4 MATERIALS; CONCRETE SURFACE TREATMENTS:

A. Liquid Curing Compounds:

1. General: Conform to ASTM C309.
2. Acceptable Manufacturers: Hunt Process Co., Burke Co., Scofield Sonneborn.
3. Black, Permanent Type (for areas to receive resilient flooring or carpet):
 - a. Hunt Black, as a standard of quality.
4. Clear, Oxidizing Type (for areas to be exposed, interior or exterior):
 - a. Hunt Clear No. ARB as a standard of quality.

B. Floor Hardeners:

1. Color Hardeners; Dry shake:
 - a. Color: Natural gray.
 - b. Acceptable manufacturers and products:
 - 1) Scofield Co., Lithochrome, as a standard of quality.
 - 2) Master Builders, Colorcon.
 - 3) Sonneborn, Harcol.

C. Abrasive Grains:

1. Type: 60% minimum aluminum oxide abrasive, ceramically bonded to vitrification, neutral color, homogeneous, rustproof; crushed and graded from 1/32" to all passing 1/4" screen.
2. Acceptable Manufacturers and Products:
 - a. Norton Co., Alundum Fine DF, as a standard of quality.
 - b. Scofield Co., Lithochrome Abrasive Grains.

2.5 MATERIALS: CONCRETE JOINTS:

A. Metal Joint Form/Screed:

1. Type: 24 gauge galvanized formed steel, tongue and groove design, 7/8" diameter rebar knockouts at 6" on center; depth equal to slab depth. Complete system with form/screed, stakes, splice plates, clips and all accessories.
2. Acceptable manufacturers and products:
 - a. Burke, Keyed Kold, as a standard of quality.
 - b. Greenstreak, No. 500 Series, Joint Screed.
 - c. Heckmann, No. 95, Tongue and Groove Joint.
 - d. Jahn, Screed Key Joint.

B. Zip-top Control Joints:

1. Type: Extruded one-piece plastic T-shape, removable zip-off top.
2. Acceptable manufacturer, Zipcap.

C. Expansion Joints; Asphalt Impregnated Fiber:

1. Type: Cane fiber, p e-formed, waterproof asphalt impregnated; 1/2" thick x slab depth; per AASHO M213.
2. Acceptable Manufacturers and Products:
 - a. Burke Co., Fiber Expansion Joint.
 - b. Sonneborn, Sonoflex.

2.6 MATERIALS; SPECIALLY FINISHED FLATWORK:

- A. Rock Salt: Commercial coarse granular-type, (similar to that used in water softening systems) sized from 1/4" to 3/8", with 65% 3/8" in size.

2.7 MATERIALS; WOOD FORMWORK:

- A. Grade Marks and Rules For Lumber and Plywood: Per Section ROUGH CARPENTRY.
- B. Framing Lumber; General: Douglas Fir; Standard Grade Light Framing or better.
- C. Boards for Unexposed Concrete and Basic Forms: Douglas Fir, S4S; Standard Grade or better.
- D. Plywood:
 1. For unexposed concrete and basic forms: Douglas Fir; Exterior Grade C-C or better.
 2. For exposed concrete: Douglas Fir Plyform, Exterior Class 1; B-B wood face or high density overlay sheet (HDO).
- E. Form Ties; Typical:
 1. Type: Snap-ties, carbon steel, 1/4" maximum diameter, 1" minimum break back, 5,000 lb. minimum strength; adjustable or accurately sized.
 2. Acceptable manufacturers and products:
 - a. Burke, Penta-Tie, as a standard of quality.
 - b. Concrete Tie, Contac.
- F. Form Coatings and Release Agents--Types:
 1. Per manufacturer's recommendations, suitable for type of form materials and finished concrete surface.
 2. Materials shall not stain or change color of exposed concrete.
 3. Materials shall be compatible with finishes to concrete.
- G. Chamfers and Control Joints:
 1. General: Wood or plastic, saw kerf backs, 15 taper sides, width or least equal to depth, configurations as required.
 2. Chamfers: 3/4" minimum width.

2.8 MATERIALS; ACCESSORIES AND MISCELLANEOUS:

- A. Leveling Filler For Floor Slabs:

1. Type: Liquid latex compound and filler powder.
2. Acceptable manufacturers and products:
 - a. Flintkote, Latex Underlayment Binder and Powder.
 - b. Dowman Products, Fixallatex latex underlayment.
 - c. Webtex No. 660 Latex Underlayment.

- B. Nailing Blocks and Other Embedded Wood: Pressure-treated Douglas Fir, per Section ROUGH CARPENTRY.

- C. Sand for Sandblasting: Hard, sharp, quartz sand.

- D. Non-Shrink Grout Por-Rok by Hallemite Co; Masterflow No. 713 Grout by

- E. Master Builders; Lithochrome, TRU Grade, by Scofield.

- F. Cast-in Letters for School Name Sign: Wood block style letters similar to West-On Letters, Inc. products.

- 2.9 MIXES; CONCRETE:
 - A. Mix Proportioning:
 1. General:
 - a. Designed Mix, per Title 24, CBC Chapter 19A , and ACI 318; for all concrete.
 - b. Mix design by designated Testing Laboratory.
 - c. Design shall include all admixtures and/or additives, if any. Use as approved by DSA.
 - d. Do not add salt, chemicals, or other materials to mix to prevent freezing.
 2. Strengths, Proportions and Criteria:
 - a. 2,500 psi Concrete: Typical for all locations; except where higher strengths are indicated.
 - 1) Strength: 2,500 psi and 28 days; 1,500 psi at 7 days.
 - 2) Cement content, minimum 5-1/4 sacks (94#) cy.
 - 3) Slump maximum: 4".

 - B. Mixing:
 1. General: Per Title 24, CBC Chapter 19A and ASTM C94.
 2. Batch Mixed: Use ASTM C94 batch mixer; or capacity to handle one or more full sack batches. No split-sack batches.
 3. Transit Mixed: Per ACI 318.
 4. Mix concrete only in quantities necessary for immediate use.
 5. Do not re-temper concrete.
 6. Discharge all wash water from mixer before reloading.
 7. Include additives and admixtures.

2.10 MIXES; DRYPACK:

- A. Mix Proportions: One part cement, 1 1/2 parts sand (fine aggregate).
- B. Mixing: With sufficient water to make a stiff mixture, which can be molded by hand into a sphere.

2.11 MIXES; GROUT MIX FOR SACKED FINISH:

- A. Mix Proportions: One part cement, 1 1/2 parts fine sifted sand.
- B. Mixing: With sufficient water, to the consistency of thick paint.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine excavations for foundations, footings, structures and examine earthwork operations and subgrade for defects that will adversely affect the execution and quality of work.
- B. Do not start work until unsatisfactory conditions are corrected.

3.2 PREPARATION:

- A. Layout: Accurately lay out work to properly position all elements to lines and levels.
- B. Joining to Previous Pours or Existing Work: Sandblast, roughen and clean existing joining concrete and rebar surfaces to provide a proper bond to new work.

3.3 WOOD FORMWORK:

- A. Scope:
 - 1. General: All concrete shall be cast-in forms.
 - 2. Footings: When specifically approved by District/Engineer and DSA, earth banks may be used as forms in lieu of wood forms.
- B. Form Face Types:
 - 1. Unexposed Concrete: Plywood or horizontal boards.
 - 2. Exposed Concrete:
 - a. General: All new materials, or materials reconditioned to like new.
 - b. Typical Work: Plywood panels, 4' x 8' typical size. Layout symmetrically, long diameter vertical; panels stacked; all joints aligned, level, plumb, and tight.

- C. General Construction:
 - 1. Forms shall be substantial, unyielding, true to line and level; sufficiently tight to prevent leakage of mortar; adequately tied and braced; and conform exactly to dimensions of finish concrete.
 - 2. Forms shall provide adequate work clearances, temporary access openings necessary for concrete placement, provisions for attachment to previous work; and provide for stripping without injury to concrete work.
 - 3. Cleanouts: Provide continuous cleanouts on one side at bottom of vertical work (such as walls), and other openings as necessary to facilitate cleaning and inspection of the work.

- D. Fabrication:
 - 1. Nail board and/or plywood form faces securely to studs. Space studs to adequately support form faces and prevent bulging. Provide stud or solid backing at all joints.
 - 2. Install chamfer strips at all exposed corners and edges.
 - 3. Securely fasten chamfers, control joints and other detail work.

- E. Erection:
 - 1. General: Erect formwork plumb and level; double wales; adequately brace, shore and support; set so finished concrete surfaces will drain.
 - 2. Ties and Spreaders:
 - a. General: Position to securely anchor forms; maintain accurate wall dimensions, true surfaces and prevent bulging.
 - b. Exposed Concrete: Position in similar symmetrical patterns.
 - 3. Footings and Foundation Walls: Form both sides; secure to stakes.
 - 4. Walls: Form both sides; set so tops of exposed work will be a straight, level line.

- F. Form Coatings and Release Agents: Apply, per manufacturer's recommendations, to evenly coat all contact surfaces.

3.4 INSTALLATION; EMBEDDED ITEMS:

- A. General:
 - 1. Install per Title 24, CBC Chapter 19A.
 - 2. Place accurately; anchor securely to prevent displacement.
 - 3. No wood to be permanently embedded in concrete, except where indicated.
 - 4. Coordinate, notify, provide access for other Sections to set their required work.

3.5 INSTALLATION; GRATES AND FRAMES FOR AREAWAYS:

- A. Install accurately, level, at proper elevations, securely anchored, and with all fastenings in place.

3.6 INSTALLATION; SCREEDS FOR SLABS, WALKS AND FLAT WORK:

- A. General:
 - 1. Set and securely support screeds accurately to lines, levels and grades required for finished work.
 - 2. Where membranes occur, supports shall not puncture membranes.
 - 3. Spacing: 8' 0" on center typically; closer intervals where construction conditions require.

- B. Permanent Metal Joint Form/Screeds:
 - 1. Scope: Install in all exterior slabs, walks, paving and flatwork.
 - 2. Spacing/Location: 20'-0" on center maximum each way; all points where concrete changes direction; and where indicated.
 - 3. Installation: Burke Keyed Kold system, as a standard of quality.
 - a. Stakes: Space 2'-0" on center typical, and 6" maximum from ends of runs.
 - b. Screeds: Hang screeds on stakes, crimp top leg into hole in stake, clip bottom leg to stake, butt joints and install splice plates.
 - c. Coating: Oil screeds prior to concrete placement.
 - d. When concrete pour is against one side only, bend knock-out tabs into pour at 45° approximate.

3.7 INSTALLATION; PLASTIC MEMBRANE:

- A. Scope:
 - 1. Install under all interior floor slabs on-grade.

- B. Installation:
 - 1. General: Place over prepared 2" sand over compacted earth, cover with 2" sand, prior to steel reinforcement placement. Use as large sheets as practicable. Cut and fit neatly around all penetrations.
 - 2. Joints: Lap 6" typical; lap floor sheets 2' 0" minimum over footing sheets.
 - 3. Taping: Spot tape joints to hold sheets in place. Tape seal all punctures and around all penetrations and all lap joints.

3.8 PREPARATION; CONSTRUCTION JOINTS:

- A. General:
 - 1. Comply with Title 24, CBC Chapter 19A.
 - 2. Locate joints where they will least impair strength of structures.
 - 3. For joints at locations other than those indicated, obtain District/Engineer approval.

- B. Preparation:
 - 1. Clean and roughen entire joint face to remove entire surface and expose clean aggregate solidly embedded in mortar matrix by one of the following methods.
 - a. Sandblast or chip, not earlier than five days after initial pour.
 - b. Hose wash clean between two and four hours after concrete is placed. Remove all wash water, laitance and debris.
 - 2. Vertical Joints: Wet and flush with neat cement grout, just prior to concrete placement.

3. Horizontal Joints: Wet and deposit 2" to 6" layer of specified modified concrete mix, prior to placing regular mix.

3.9 PREPARATION; SLABS-ON-GRADE:

- A. Tamp sand sub-base to a firm unyielding surface.

3.10 CONCRETE PLACEMENT:

- A. General: Comply with Title 24, CBC Chapter 19A.

- B. Preparation and Inspection Prior to Concrete Placement:

1. Preparation--do not place concrete until:
 - a. Footing excavations are cleaned and dry.
 - b. Steel reinforcement is correctly positioned, securely anchored and cleaned.
 - c. Forms are cleaned, coated, and ties are tightened.
 - d. Embedded items are positioned and anchored.
 - e. Construction joints are cleaned and prepared.
 - f. Subgrade is prepared and moistened.
 - g. All preparations for a pour are completed.
 - h. Work has been inspected.
2. Inspection: All formwork, steel reinforcement, footing excavations and preparation work (as stated in Paragraph No. 1.2. A) to be inspected and approved by District/Engineer, prior to pouring any concrete.

- C. Placement:

1. Convey concrete from mixer to final position by method, which will prevent separation or loss of material and cause minimum handling.
2. Deposit concrete in continuous operation will panel or section is completed.
3. Regulate rate of placement so concrete remains plastic and flows into position.
4. Keep tops of vertical lifts approximate level during placement.
5. Maximum permissible free-fall for concrete is 3'. Use elephant trunks or other approved means necessary to meet this limitation.
6. Maximum permissible thickness of concrete layers is 2'.
7. Where reinforcement is congested or consolidation is difficult, specified modified concrete mix may be used in a 2" to 6" layer.
8. Special conveyance and placement methods may be used with prior approval of District/Engineer and DSA.
9. Do not use partially hardened or contaminated concrete; do not retemper concrete; or do not use concrete, which has been remixed after initial set.

- D. Consolidation:

1. Use mechanical vibrating equipment. Supplement with hand rodding, spading and tamping.
2. Vertically insert and remove hand-held vibrators.

3. Work concrete thoroughly around reinforcement, embedded items and into all parts of forms.
 4. Consolidate to a dense, uniform mass without voids, rock pockets, or entrapped air. Consolidate each layer.
- E. Slabs, Walks and Flatworm:
1. Lift reinforcement as placement progresses to proper position in slab.
 2. Tamp and screed to required lines and levels.
 3. Depress coarse aggregate with grille-blade tamper.
- 3.11 FINISHING FLATWORK; TYPICAL:
- A. Scope: Finish all flatworm as specified herein.
- B. Interior Slabs:
1. General:
 - a. Monolithically finish all slabs.
 - b. Do not dust with dry cement to remove water.
 2. Floating:
 - a. Power float upon disappearance of water shown.
 - b. Hand float areas inaccessible to power float.
 3. Trowel Finishing:
 - a. Areas depressed for ceramic and quarry tile: Further finishing is not required.
 - b. Areas to receive carpet and resilient floor coverings: Power trowel to a dense, smooth, even surface, until no more excess water may be brought to surface.
 - c. Exposed concrete areas: Gray color hardened.
 4. Just prior to floating, evenly apply 20 lbs. hardener per 100 SF.
 5. After floating, spot touch-up uneven areas; then evenly apply ten lbs. hardener per 100 SF.
 6. First Troweling: Power trowel per Paragraph B above.
 7. Hand steel trowel (causing trowel to ring) to a smooth, slick, burnished surface, free of defects and blemishes.
- C. Exterior Flatworm (slabs, walks, paving and similar work):
1. General:
 - a. In indicated areas, finish concrete as specified herein, in lieu of typical finishes.
 - b. All work to match approved samples.
 - c. The Contractor is to limit pour areas and provide sufficient ratio of finishers to produce specified finishes.
 2. Sweated Finish; Typical:
 - a. Two steel troweling IS, while concrete is still green.
 - b. Non-slip sweated finish with regular light trowel marks in an approximately 2' circular arc pattern.
 3. Salt Finish; where Indicated:
 - a. Preparation: Screed and float. Steel trowel smooth and even in circular arc pattern, free of blemishes and ridges.

- b. Salt Application:
 - 1) While concrete is still plastic evenly and uniformly seed surface at 10 ls. minimum per 100 SF; 3" maximum between pockmarks any where on surface.
 - 2) Press, roll or trowel salt grains to embed them flush with concrete surface; do not shatter salt grains.
 - 3) After concrete sets, completely dissolve and wash salt away from planting areas.
 - 4. Marking:
 - a. Type; Typical: V-groove radius tool.
 - b. Patterns: Follow indicated patterns; where not indicated, mark as follows:
 - 1) Walks: Into squares, equal to walk width.
 - 2) All areas 8' or wider: Into approximate squares, 8' maximum diameter.
 - D. Tooling: Radius tool all exposed edges, edges adjacent to all permanent wood headers and edges at each side of all metal joint screeds..
 - 1. Abrasive Surface Treatment:
 - a. Scope: Apply to all exterior and interior exposed concrete steps and ramps and where indicated:
 - b. Ramp defined as surface sloping ½" or steeper.
 - 2. Application: Apply evenly at 25 ls. per 100 SF just prior to final troweling Tamp and trowel to securely embed, but not cover abrasive.
- 3.12 FLATWORK CONTROL JOINTS:
- A. General: Conform to Title 24, CBC Chapter 19A.
 - B. Interior Slabs-on-Grade:
 - 1. General: Create construction joints to divide slabs into 400 SF maximum approximate rectangular shapes, by any of the following methods.
 - a. Alternate pours, checkerboard pattern.
 - b. Saw cutting within 12 hours from time of pour.
 - c. Install Zip-Top control joints concurrently with tamping and floating work. Using sawing motion, push straight-edge into concrete to form groove. Insert Zip-Top control joint into groove, using sawing motion, until joint top is flush with concrete surface. When concrete sets sufficiently, pull-off removable top flange.
 - 2. Location: Locate joints typically to occur under partitions, avoid exposed concrete floor areas; align with structural features, points where slab changes configuration or direction and points where stresses localize.
 - C. Exterior Flatwork (Walks, Paving and Similar Work); General: Construction joints formed by permanent Metal Joint Form/Screeds per Paragraph 3.06 B.
- 3.13 FORMWORK REMOVAL:

- A. General: Do not remove or disturb forms, shoring or bracing until concrete has hardened sufficiently to permit safe removal, support all imposed loads including its own weight, nor in any case until the following minimum times have elapsed:
 - 1. Foundation Walls: Three days.
 - 2. Slabs-On-Grade: Three days.
 - 3. Walls: Three days.
 - B. Ties: Remove or snap-off ties, spreaders, tie rods, and other devices so no metal is left within 1" of concrete face.
 - C. Exposed Concrete Work: Carefully remove formwork and detail strips so surfaces, corners, edges, details, and all features will be true, level, sharp, unbroken, unmarred or damaged in any way.
- 3.14 PROTECTION AND CURING OF CONCRETE:

- A. Protection: Protect all work from injury and defacement of any nature during construction operations.
- B. Curing:
 - 1. General:
 - a. Keep concrete surfaces wet until curing medium is applied.
 - b. Cure drypack same as concrete.
 - 2. Walls, Mass and Reinforced Concrete:
 - a. Scope: Maintain in a thoroughly wet condition all forms containing concrete, top of concrete between forms, all exposed concrete surfaces after removal of forms.
 - b. Time Period: Wet continuously each day for 10 consecutive days, including Saturdays, Sundays and holidays.
 - 3. Flatwork:
 - a. Scope: Apply specified liquid curing compounds to all interior floor slabs, and all exterior flatwork (slabs, walks, paving, and similar work).
 - b. Application: Apply uniform, continuous, tightly adhered film, free from pinholes or defects at rate of 1 gallon per 250 SF.

3.15 FINISHING WALLS AND VERTICAL CONCRETE SURFACES; TYPICAL:

- A. Scope: Finish all walls and vertical concrete surfaces as specified herein, except for school name sign.
- B. Exposed Concrete at Tops of Forms:
 - 1. Strike concrete smooth and level.
 - 2. Float and/or trowel to texture comparable to formed surfaces.
- C. Preparation, Formed Surfaces:
 - 1. Remove fins and irregularities while concrete is green.

2. Tie Holes: Fill full and flush with compacted drypack.
3. Surface Defects:
 - a. Cut out blemished and defective areas as directed by the District.
 - b. Patch flush with drypack, typically, or as directed by the District.
- D. Cleaning:
 1. Exposed Surfaces:
 - a. Remove form coatings, bond breakers and other surface coatings.
 - b. Scrub form surfaces with solution of 1 1/2 lbs. caustic soda per 1 gallon water.
 - c. Scrub smooth wood or waste mold areas with 20% muriatic or hydrochloric acid solution.
 - d. Wash surfaces clean with clear water, immediately after scrubbing.
 - e. If above methods fail to remove all substances, lightly sandblast surfaces clean as directed by the District.
 2. Surfaces with Finish Materials Applied Directly to Concrete: Clean as stated for Exposed Surfaces, except where uncleaned surface will not affect application, bond, performance or appearance of finish materials.
- E. Sacked Finish for All Exposed Concrete:
 1. General: Schedule work to complete entire panel, element or area in one continuous operation.
 2. Application:
 - a. Wet surface to control suction of water from grout.
 - b. Apply grout mix; uniformly spread and scour to fill depressions.
 - c. While still plastic, sponge rubber float finish surface and remove excess grout.
 3. Sacking: Allow surface to dry, but not completely harden; then rub vigorously with clean dry burlap to remove loose excess material. Finished surface to have a smooth slick burnished finish (similar to a steel trowel finish), which is free of defects and blemishes.

3.16 PREPARATION OF HORIZONTAL CONCRETE SURFACES TO RECEIVE MASONRY WALLS:

- A. Prepare and roughen as specified for horizontal concrete construction joints in paragraph 3.08, B, 1.

3.17 SCHOOL NAME SIGN; CAST-IN LETTERS:

- A. Accurately set letters in place; space to match approved Shop Drawings.
- B. Coat with bond breaker. After concrete hardens, carefully remove wood letters to leave sharp, clean recesses in the concrete.
- C. Sandblast Finish:
 1. General:
 - a. Scope: Heavily and uniformly sandblast to expose coarse aggregate.
 - b. All work to match approved samples.

- c. Complete entire side in one continuous operation.
2. Preparation: Per Paragraphs 3.15, B and C.
3. Sandblasting:
 - a. Wet or dry processes, as permitted by Local Governing Ordinances.
 - b. Control dust from drifting to adjacent areas.
 - c. Where wet process is used, build dams and otherwise control and direct flow of run-off water.
4. Cleaning:
 - a. Wash down all blasted surfaces with clear water to remove dust, sand and leave them clean.
 - b. Remove all blasting sand and debris.

3.18 FIELD QUALITY CONTROL:

- A. General: Refer to Section 01400, Testing and Inspection.
- B. Inspections:
 1. Steel reinforcement.
 2. Structural concrete.
- C. Tests:
 1. Concrete slump.
 2. Making concrete compression test cylinders.
 3. Core tests of defective work.

3.19 ADJUSTMENT AND CLEANING:

- A. Correction of Defective Work:
 1. General: Work not conforming to Contract requirements shall be removed and replaced; except where patching or other remedial work is specifically permitted by the District. The Contractor shall bear all costs of correction of defective work.
 - a. Surface patching materials and methods shall be as approved by the Architect.
 - b. Structural concrete replacement, strengthening, and/or repair methods and materials shall be as approved by District/Engineer and the Office of the State Architect.
 2. Filling and Leveling Slab Surfaces to Receive Resilient Flooring or Carpet:
 - a. High Spots: Remove, hone or power grind to required levels.
 - b. Low Spots: Fill to required levels with specified Leveling Filler, mixed and applied manufacturer's recommendations.
- B. Cleaning: Clean exposed surfaces just prior to acceptance.

END OF SECTION

SECTION 26 00 00

GENERAL ELECTRICAL

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

Contact requirements of the foregoing GENERAL CONDITIONS, SPECIAL CONDITIONS and supplements thereto and all requirements of Division 1 of these Specifications shall form a part of this Section with the same force and effect as though repeated herein. The provisions of this Section shall apply to all of the following Sections of Division 26 of these Specifications. All applicable portions of the work under Division 26 shall conform fully to all provisions of all other Division 26 Sections along with other Sections of these Specifications including, but not limited to the following:

1.02 SUMMARY OF WORK:

The Contractor shall provide all materials, tools, equipment, labor and services necessary to furnish and install complete working electrical systems as shown on the plans and described within these Specification. All systems, at project completion and before final acceptance, shall be demonstrated to have a complete and working functional operation. The work includes but is not specifically limited to items indicated on Drawings and specified herein.

1.03 DESCRIPTION AND INSTALLATION OF SYSTEMS:

- A. The electrical drawings are diagrammatic and do not necessarily show all raceway, wiring, number or types of fittings, offsets, bends or exact locations of items required by the electrical systems. Items not shown or indicated which are clearly necessary for proper operation, payment or installation of systems shown shall be provided at no-increase in contract price.
- B. The exact routing of systems and location of devices and equipment shall be governed by coordination with other trades, structural and architectural conditions. The Architect or Electrical Engineer reserves the right, at no increase in contract price, to make reasonable changes in location of electrical equipment or wiring systems; so as to coordinate with other systems, group them into orderly relationships, or to increase their utility. Contractor shall verify requirements in this regard prior to roughing in.
- C. Install electrical work in cooperation with other trades and make proper provisions to avoid interferences and coordinate with structural and architectural features, in a manner approved by the Architect or Electrical Engineer. All changes caused by neglect to make such provisions shall be at Contractor's expense. Provide offsets and special fittings, as required to facilitate installation of the work.
- D. When a particular product or type of product is specified with a manufacturer's designation, the latest published specifications, installation, and construction information of the manufacturer shall constitute the minimum acceptable standard. Any substitutions shall be made in accordance with Section 1.09 SUBSTITUTIONS.

1.04 RELATED DOCUMENTS:

A. Codes and Regulations: All electrical equipment and material and its installation shall conform to the current requirements of the following authorities and Section for CODES AND STANDARDS:

1. Occupational Safety and Health Act (OSHA).
2. 2019 California Electric Code (CEC),
3. California Code of Regulations (CCR).
 - a. Title 8, Safety Orders.
 - b. Title 19, Fire and Panic Safety Standard.
 - c. Title 24, Part 1, Administrative Regulations.
4. 2019 California Fire Code (Based on the International Fire Code by NFPA).
5. 2019 California Building Code (Based on the International Building Code,, now incorporated as CCR-T24, Part 2.)

NOTE: Where two or more codes or designs conflict, the most restrictive shall apply. Nothing in these Plans and Specifications shall be construed to permit work not conforming to applicable codes.

B. Tests and Standards: The tests, standards, or recommended procedures of the following agencies shall relate to all parts of these Specifications and shall be considered a minimum:

1. American National Standards Institute (ANSI).
2. Underwriters Laboratories, Inc. (UL).
3. National Electric Manufacturers Association (NEMA).
4. Electrical Testing Laboratories (ETL).
5. National Fire Protection Association (NFPA).
6. Insulated Power Cable Engineers Association (IPCEA).
7. Institute of Electrical and Electronic Engineers (IEEE).
8. Illumination Engineering Society (IES).

1.05 EXAMINATION OF DOCUMENTS AND SITE:

Before submitting a proposal, each bidder shall carefully examine the electrical, mechanical,

architectural, and structural drawings and specifications. He shall also visit the site and fully inform himself as to all existing conditions and limitations applying to the work. If, after such examination and study, it appears that any change from the drawings and specifications should be allowed, the bidder shall so state in writing together with any change in cost involved.

By the act of submitting a proposal, each bidder shall be deemed to have made such examinations of the drawings and specifications and premises, and it will be assumed that he is therefore familiar with the entire scope of the project and has based his proposal upon the work described in the Plans and Specifications and upon all existing conditions and limitations applying to his work.

1.06 EXECUTION:

- A. Workmanship: The work shall be performed by competent workmen, skilled in the particular phase of the work entailed. The work shall be first class throughout, neat, accurate and in full accordance with the intent of these Specifications and the satisfaction of the Architect or Electrical Engineer.
- B. Safety: All standard safety procedures as set forth by OSHA, CCR, and California Division of Industrial Safety shall be strictly adhered to.
- C. Coordination: The Contractor shall familiarize himself with the work of other crafts so as to be able to provide electrical service of correct size and voltage and other requirements to any equipment to be installed. The installations shall be coordinated as to location and time, and interference causing delays and non-acceptable construction shall be avoided.

Prior to commencing construction the Electrical Contractor shall arrange a conference with the Mechanical and Plumbing Contractors and sub-contractors as well as equipment suppliers and shall verify types, sizes, locations, requirements, controls, and diagrams of all equipment furnished by them. Prior to roughing in, he shall, in writing, inform the Architect or Electrical Engineer that all phases of coordination of this equipment have been covered. Exact equipment rough-in locations shall be verified from shop drawings.

- D. Cutting and Repairing: The Electrical Contractor shall do all cutting necessary for the proper installation of his work, repair any damage done by himself or his workmen, and coordinate his work with that of others. Do no cutting or patching without approval of the Architect or Electrical Engineer. Round holes through concrete slabs or walls shall be core drilled with a diamond drill, rectangular openings shall be cut with a diamond saw. In no case shall any concrete beam or column be cut.
- E. Sleeves and Openings: Electrical Contractor shall be responsible for all sleeves and openings through walls and floors required by electrical work. All openings around conduits in sleeves shall be sealed with a material of equal fire rating as the surface penetrated. Openings not utilized shall be temporarily sealed in a similar manner. All required sleeves shall be furnished to and coordinated with the General Contractor.

- F. Cleaning and Painting: All exposed work shall be thoroughly cleaned upon completion of work. All panelboards and equipment not located in electrical or mechanical rooms or closets shall be field painted per painting specifications, finish M2, color as selected by Architect. Panelboard enclosures, fixtures, and equipment, where finish has been marred in shipment or installation, shall be completely refinished. Minor finish damage shall be rectified as indicated by the Architect or Electrical Engineer. Contractor shall remove all waste and rubbish resulting from his work from the site.

1.07 QUALITY CONTROL:

- A. Supervision: The Contractor shall personally, or through a competent representative, constantly supervise the work from beginning to completion and final acceptance. He shall cooperate fully with the inspection authorities in the provision of information and access to the work. He shall, to the best of his ability, maintain the same job foreman throughout the life of the project unless a replacement is requested or authorized by the Architect or Electrical Engineer.
- B. Inspection and Tests: The Contractor shall furnish all labor and test equipment required to fully test and adjust the equipment installed under this specification and demonstrate its proper operation.
 - 1. Arrange for all tests and inspections and provide minimum 48 hours notice to the Architect or Electrical Engineer.
 - 2. A test must demonstrate that each piece of equipment, outlet, fixture, device, and appurtenance is in sound operating condition and in proper cooperative relation to associated equipment.
 - 3. All tests shall be conducted under supervision of the Architect or Electrical Engineer, and any defects of any nature which are apparent as a result of such test shall be made correct to the satisfaction of the Architect or Electrical Engineer before final acceptance is made.
 - 4. No equipment shall be tested, or operated for any other purpose, such as checking motor rotation, until it has been fully checked in accordance with the manufacturer's instructions.
 - 5. Check and tighten nuts, bolts, lugs, and similar elements of equipment; switchboards, motor control centers, busways, panels, etc.
 - 6. Submit complete test reports with maintenance manual submission.
- C. Guarantee: The Contractor agrees to replace or repair, to the satisfaction of the Owner, any part of the installation which may fail due to defective material and/or workmanship or failure to follow Plans and Specifications, for a period of one year after final acceptance. Any damage to other work resulting from such failure or the correction thereof shall be remedied at the Contractor's expense. The Contractor shall, further, secure from the manufacturers of special equipment, such as signal systems, their respective guarantees and deliver same to Owner. Guarantees

between Contractor and his suppliers shall not affect guarantees between Contractor and Owner.

1.08 GROUNDING:

- A. The conduit system supports, cabinets, switchboards, etc., and neutral conductors must be permanently and effectively grounded by means of approved ground clamp, in accordance with the electrical safety orders of the Department of Industrial Relations of the State of California.
- B. This Contractor shall exercise every precaution to obtain good contacts at all panel boxes, pull boxes, etc. Where it is not possible to obtain good contacts, the conduit shall be bonded around the boxes with a #6B&S gauge, rubber covered, double braided wire with ground clamps.
- C. Equipment and raceway bonding procedures shall be rigidly maintained and meet all jurisdictional requirements of codes and regulations.
- D. A separate grounding conductor shall be run in all PVC conduit runs.

1.09 SUBSTITUTIONS:

- A. The Specifications or Plans are in no way to be construed as being proprietary toward one product. Those products, or types of products, listed are intended to set the standard for quality, design, and installation procedure. However, no right is implied upon the part of the Contractor to substitute other materials, products or systems without the written approval of the Architect or Engineer.
- B. All requests for substitution shall be made in accordance with Section of the General requirements - SUBSTITUTIONS.
- C. All requests for substitutions shall be in writing, received at least 10 days prior to bid date, and shall indicate all information required thereon including differences from the specified item. The request for substitution shall be accompanied by cuts, product literature, performance data, specifications, drawings, samples or other means as may be required for proper evaluation by the Architect or Electrical Engineer.
- D. All proposed substitutions shall be standard product of the firm under current manufacture and be a catalog item at time of bid.
- E. Acceptance of substitution shall not relieve the Contractor from responsibility for complying with requirements of the Contract Documents. The Contractor shall be responsible for changes in other parts of the work occasioned by his substitutions and shall bear their expense.
- F. Representative samples may be required for determination of equality.

1.10 SUBMITTAL:

- A. Make submittal for all material to be used on the project, whether as specified or

substitutions, within five (5) days after award of Contract by the Owner, in accordance with the following:

1. All submittal shall be neat and bound in a suitable folder or binder.
 2. Identify each item by manufacturer, brand, trade, name, number, size, rating, and whatever other data is necessary to properly identify and check materials and equipment. Words "as specified" are not sufficient identification.
 3. Identify each submittal item by reference to specifications section paragraph in which item is specified, or Drawings and Detail Number.
 4. All submittal shall be submitted in coherent groups, e.g. all light fixtures at one time. No partial, or incomplete submittal will be accepted.
 5. Organize submittal in same sequence as they appear in specification sections, articles or paragraphs.
- B. Product Data: Submit eight copies, in groups, as follows:
1. Conduits and raceway types required, including fittings
 2. Electric Wire, cable and connectors
 3. Electrical boxes and fittings
 4. Wiring devices
 5. Power distribution boards, panels, transformers, disconnects, and switchboards.
- C. Shop Drawings: Shop drawings shall show physical arrangement, wiring diagram, construction details, finishes, materials used in fabrication, provisions for conduit entrance, access requirements for installation and maintenance, physical size, electrical characteristics, foundation and support details, weight, power sources, circuit numbers, and shall be compatible with the Contract Drawings and Specifications.

Show wiring as actually installed, connected, and identified for this specific project. Include identification of cables and cable conductors.

Shop and instruction drawings shall cover the equipment or device to be installed and not merely the general class of such equipment or device.

1.11 DOCUMENTATION:

- A. Construction Record Drawings: The Contractor shall furnish to the Architect or Engineer, in accordance with the GENERAL REQUIREMENTS, a complete set of "as constructed" drawings which clearly indicate all deviations from the basic contract drawings, including exact dimension locations and depths for all stubbed conduits,

location and size of spare conduits, & conductors, all new and uncovered existing work outside the buildings, power feeder runs, and communications "primary" conduit runs. Corrections and changes shall be kept up to date at all times.

- B. All submittal and shop drawings will be resubmitted with record drawings showing all revisions and changes made, clearly marked with field termination wire so as to reflect actual construction record conditions. Revisions and changes will be enumerated and new dates of drawings shown.

1.12 EARTHWORK:

- A. Scope: Do all earthwork required for installation of the underground electrical work in accordance with Trench Excavation and Backfill Specifications and the following:
- B. Existing Utilities: Prior to performing any excavation, Contractor shall establish all existing utilities in area.
- C. Patching and Paving: General Contractor to patch and pave all surfaces involved with underground utilities after fill compacted by Contractor to specified values.
- D. After Excavation: Raceways shall be installed as quickly as possible and the excavation backfilled in order to reduce hazards. Barricades, construction signs, battery operated flashing lights and guards, as required, shall be placed and maintained during the progress of the construction to protect persons from injury and to avoid property damage as per General Conditions.

1.13 EXISTING SUB-SURFACE STRUCTURES:

- A. The civil plans indicate all known electrical and major sewer and water systems on the site, underground. No exact recorded information is available on any and/or all buried systems on the site. Responsibility for absolute accuracy of site data indicated on electrical plans is not assumed by the Architect or Electrical Engineer.
- B. It shall be the Contractor's responsibility to protect all underground systems and structures while excavating and installing the electrical distribution system. Any damage done to the existing system during the course of the electrical work shall be repaired to the satisfaction of the Owner and the utility or agency involved, at the expense of the Contractor.

1.14 PORTABLE OR DETACHABLE PARTS:

The Contractor shall retain in his possession and shall be responsible for all portable and detachable parts or portions of the installation such as fuses, keys, locks, adapters, locking clips, and inserts until final completion of his work. These parts shall be itemized and delivered to the Owner at Project Closeout.

1.15 OPERATION AND SERVICE MANUALS:

- A. Contractor shall prepare manuals describing the operations, servicing, and maintenance requirements of all electrical equipment provided and complete parts

lists, in accordance with Section Operating and Maintenance Data.

- B. Equipment: Equipment described in the manual shall include all equipment listed under "Submittal", and on all other auxiliary miscellaneous systems.
- C. Information contained in the manual shall consist of 8-1/2" x 11" size catalog data on each item, together with parts lists, description of operation, maintenance information, shop drawings, wiring and riser diagrams and test reports as installed. Catalogs and data in the manuals shall be neat, clean copies. Drawings shall be accordion folded to letter size and installed in an envelope within the manual. An index shall be provided, which shall list all contents in an orderly manner with the respective equipment supplier's name, address and telephone number, and the manufacturer's recommended servicing instructions. Diagrams shall be complete for each system installed. Provide divider sheets with identifying tabs between each category.

END OF SECTION