FRESNO UNIFIED SCHOOL DISTRICT

Installation of HVAC Units on Portable Classroom Buildings at Burroughs, Ginsburg and King

A. SCOPE OF WORK

1. Contractor to provide all labor and materials to replace a total of 28 existing exterior wall mount HVAC units with new Owner supplied HVAC units. (9) units at Burroughs, (3) at Ginsburg and (16) at King.

B. RELATED SECTIONS

1. SECTION 097200 WALL COVERINGS
2. SECTION 099000 PAINTING
3. SECTION 260500 BASIC ELECTRICAL REQUIREMENTS AND MATERIALS
4. SECTION 262000 ELECTRICAL EQUIPMENT
5. 2020 Heat Pump Replacement Plans
6. Heat Pump Mounting Detail

C. QUALITY ASSURANCE

1. Contractor Qualifications:
    a. The CONTRACTOR must have a current California C20 contractor's license at time of bid.
2. Warranty:
    a. The CONTRACTOR/MANUFACTURER must supply a one-year (12 month) guarantee against faulty workmanship and materials.

D. PRODUCT

1. Product as supplied by District
    a. Bard Wall Mount Heat Pumps WH36HA-A05CP4

E. CONTRACTOR RESPONSIBILITIES

1. Remove and dispose of existing wall mount heat pump units.
2. Install District supplied heat pumps including all labor, necessary materials and equipment, to complete installation.
3. Transport and delivery of units from District Maintenance yard at 4600 N. Brawley Ave. Fresno, CA 93722, to the sites where installation will take place.
4. Remove and replace, or install new, any necessary framing, structural supports and siding to accommodate installation.
5. Disconnect and reconnect any and all necessary electrical and control wiring.
6. Provide and replace existing electrical breaker with new 60-amp breaker including removing and replacing wire with appropriate size.
7. Provide new NEMA 3R, fused AC disconnect switch, new metal watertight electrical flex conduit, and connectors for each heat pump.
8. Repair, paint, and clean interior and exterior after installation.
9. Paint any exposed structural steel supports to match AC units.
10. Start up and confirmation of proper operation.

F. DISTRICT RESPONSIBILITIES

1. Assist in coordination of any necessary utility outages.
2. Coordinate installation with site activities and schedules.
3. Provide any necessary inspections.

G. EXECUTION

1. Verify existing conditions and suitable for installation as intended by the manufacturer.
2. Comply with all necessary manufacturer's recommendations for proper and complete installation.
3. Protect all adjacent surfaces, finishes and building components during demolition and unit installation and connection.
4. Protect new units once installed prior to acceptance by the District.

SECTION 260000
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION:

A. This Section provides the Basic Electrical and Material Requirements, which supplement the General Requirements of Division 1 and apply to all Facility Services.

B. Related Work:
1. Excavating, Backfilling and Compacting for Utilities.
2. Steel Reinforcement.
3. Cast-in-Place Concrete.

1.02 BASIC ELECTRICAL REQUIREMENTS:

A. Drawings and Specifications coordination:
1. For purposes of clearness and legibility, the electrical drawings are essentially diagrammatic. The size and location of equipment is shown to scale whenever possible. The Contractor shall verify all conditions, data and information as indicated on the drawings and in Specifications Sections where electrical work is required prior to installation.
2. The Electrical Drawings show size and points of termination of the conduits, the number and size of wires, and suggest the proper route for the conduit. It shall be the responsibility of the Contractor to install the conduits with minimum number of bends to conform to the structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and meet all applicable Code requirements. The routing of conduits may be changed, if approved by the District Electrical Inspector.
If the length of a conduit run is increased more than 10% of the length shown on the drawings, the Contractor shall consider worst case voltage drop and adjust wire and conduit size accordingly in compliance with Code. If the length of a conduit run is decreased more than 10% of the length shown on the drawings, the Contractor shall offer a credit to the District for the length and size of the conduit and wire deleted.
3. It is intended that outlets be located symmetrical with Architectural elements notwithstanding the fact that locations shown on the drawings may be distorted for clarity.
4. The Architectural and Structural Drawings take precedence over the electrical drawings in the representation of the general construction work. The drawings of the various trades take precedence in the representation of the work of those trades. The Contractor shall refer to all drawings to coordinate the electrical work with the work of other trades to eliminate all conflicts.

B. Terminology:
1. The term “signal system” shall apply to the clock, bell, fire alarm, annunciator, sound, public address, buzzer, public telephone, television, inter-communication, and security systems.
2. The term “low voltage” shall apply to systems operating at 600 volts and under.

3. The term “provide” used on the drawings and elsewhere in the Specifications shall be considered to mean furnish and install.
4. The term “U.L.” means Underwriters Laboratories, Inc.

C. Ordinances and Regulations:
1. Electrical work shall meet requirements of local authorities having jurisdiction, including municipal ordinances, City and/or County Building Codes, the California Administrative Code Title 24, the Safety Orders of the State Division of Industrial Safety, and the Fire and Panic Safety Standards of the State Fire Marshal. Material and labor shall conform to the Regulations of the National Board of Fire Underwriters for Electrical Wiring and Apparatus. All new material shall be U.L listed. The latest Electrical Ordinance of the local jurisdiction, including amendments thereto, effective on the date of opening bids for the work, is hereby made a part of this Specification, and shall apply to all work, except for those portions which conflict with the requirements of the local authorities.
2. Meet the requirements of the latest National Electrical Code adopted by the local jurisdiction.
3. Electrical work shall comply with the American National Standards Institute (ANSI), which includes the National Electrical Installation Standards (NEIS).

D. Structural Considerations for Conduit Routing:
1. Where conduits are to pass through or will interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other building elements to accommodate the electrical work, such work shall conform to State Building Code, Title 24, for conduits and pipes embedded in concrete and for notches and bored holes in wood; for steel and when detailed on the Structural Drawings.
2. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, the encasement shall rest on a haunch integral with the wall or structure, or shall extend down to the footing projection, if any, or shall be doweled into the structures unless otherwise indicated. Underground structures shall include manholes, pull boxes, vaults or buildings.

E. Electrically Operated Equipment and Appliances:
1. Equipment and appliances furnished by the Contractor:
   a. The electrical work shall include furnishing and installing wiring enclosures for and the complete connection of all electrically operated equipment and appliances and any electrical control devices which are specified to be furnished and installed in this or other electrical Sections of the Specifications, except electrical work specified or indicated, to be in the Mechanical Work. All wiring enclosures shall be installed concealed, except where exposed work is indicated on the electrical drawings.
   b. Connections shall be made as necessary to completely install the equipment ready for use. The equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets of incorrect electrical characteristics or if any equipment fails to operate properly, the Contractor shall report to the District's Inspector in writing, listing the buildings and rooms in which located, the name, make and serial number of the equipment, and a description of the defect.
2. Equipment and appliances furnished by others:

a. Equipment and appliances shown on the drawings as Not in Contract, Furnished by Others, or Furnished by the District, will be delivered to the Site. Required electrical connections shall be made for all such equipment and appliances in accordance with accepted trade practices under the direction of the District Inspector. All motorized equipment will be furnished factory wired to a motor starter or junction box, unless otherwise indicated. Appliances will be furnished equipped with portable cord and cap. Provide disconnect switches where required.
b. Connections to equipment furnished under other Sections shall be part of the electrical Work. Work shall include internal wiring, installation, connection and adjustment of bolted drive motors in which the motor is supplied as a separate unit and connections only for equipment furnished with factory installed internal wiring, except as further limited by the drawings and other portions of the Specifications. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and the wiring necessary for a complete electrical installation. The work shall also include furnishing and installing the conduit and outlet box, if needed for the control system, furnished under Mechanical. Devices and equipment furnished shall be of the same type used elsewhere on the job or as specified.
c. Electrical equipment furnished under other Sections for installation and connection under work of this Section shall be delivered to the installation location by the Contractor furnishing the equipment.
d. Mechanical equipment furnished under other Sections and requiring electrical connection under this Section, will be set in place by Contractor furnishing the equipment.
e. Suitability and condition of equipment furnished by other Sections shall be determined in advance of installation. Immediate notice shall be given to the District of damage, unsuitability or lack of parts.

F. Protection of materials:
1. Provide for the safety and good condition of all materials and equipment until final acceptance of the project by the District. Protect all materials and equipment from damage and provide adequate and proper storage facilities during the progress of the work. All damaged and defective work shall be replaced prior to final inspection.

GROUNDING SYSTEM REQUIREMENTS:

A. Grounding shall be as approved by the State of California, Division of Industrial Safety.

B. Electrical continuity to ground for metal raceways and enclosures, which are isolated from the equipment ground by use of non-metallic conduit or fittings, shall be provided with a Code sized green insulated grounding conductor within each raceway connected to the isolated metallic raceways or enclosures at each end. Each flexible conduit shall be provided with a green insulated grounding conductor of Code approved size.

C. Cold water or other utility piping systems shall not be used as the main system grounding electrodes due to the possible use of insulating couplings and nonmetallic pipe in such installations. All grounding electrodes shall be made electrodes as indicated on the drawings. Within every building the panels shall be bonded to a 1" or larger underground cold water

service line with minimum 1" conduit, and one No. 6 wire. All metallic piping systems (gas, fire sprinkler) shall be bonded to the cold water line with 3/4" conduit with one No. 8 wire.

D. Non-current carrying metal parts of all high voltage, light and/or power, communications, control, and signal conduit systems, supports, cabinets, switchboards, enclosures, fixed equipment, portable equipment and motor frames
shall be permanently and effectively grounded.

E. Service neutral conductors of light and/or power alternating current systems shall be grounded as indicated on the drawings and as required by the Utility Company.

F. Secondary neutral conductors of all light, power and signal alternating current systems shall be grounded.

G. Provide a “made electrode” bonded to the equipment enclosure at each separate building, including portable buildings, for each light and/or power system. Grounded (neutral) conductors shall be terminated at the neutral bus of the first panel or switchboard encountered within the building, and the neutral bus, equipment enclosure and "made electrode” shall be bonded together.

G. Cleaning:
1. Exposed parts of the electrical work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be un-blemished and metal surfaces shall be polished.
2. Thoroughly clean all parts of the apparatus and equipment. Exposed parts, which are to be painted, shall be thoroughly cleaned of cement, plaster and other materials. Remove grease and oil spots with solvent. Such surfaces shall be wiped and all corners and cracks scraped out. Exposed rough metal work shall be smooth, free of sharp edges, carefully steel brushed to remove rust and other spots, and left in proper condition to receive finish painting.
3. The Contractor shall remove from the Site all debris and rubbish occasioned by the electrical work. He shall thoroughly clean the building of dirt, debris, rubbish, and marks caused by the performance of the work.

1.03 SUBMITTALS:

Submit a material list in accordance with Section 01300.

PART 2 - PRODUCTS - Not used.

2.01 GROUNDING MATERIALS:

A. Yard boxes for "made electrodes" shall be precast concrete as detailed on the drawings. Boxes shall be equipped with bolted down, checkered, cast iron covers and a cast iron frame cast into the box. Yard boxes shall be Brooks 36 or approved manufacturer.

B. "Made electrodes" shall be approved copper clad steel ground rods, minimum 3/4" diameter 10' 0" long or a copper ''Ufer conductor encased in the concrete building foundation as indicated on the drawings.

2.01 RACEWAYS, FITTINGS AND SUPPORTS:

A. Conduit Materials:
1. Metallic conduit and tubing shall be manufactured under the supervision of Underwriters' Laboratory, Factory Inspection and Label Service Program. Each 10' length of conduit and tubing shall bear the Underwriters' Laboratory label and manufacturer's name.
2. Rigid steel conduit shall be heavy wall, mild steel, zinc coated, with an inside and outside protective coating. Couplings, elbows, bends and other fittings shall be the same materials and finish as the rigid steel conduit. Fittings, connectors, and couplings shall be threaded type.
3. Electrical metallic tubing shall be steel tubing, zinc coated with a protective enamel coating inside. Fittings, couplings and connectors shall be gland compression type. Electrical metallic tubing is designated herein after as ''EMT".
4. Flexible steel conduit shall be of flexible interlocking steel strip construction with continuous zinc coating on the strips. Connectors and couplings shall be approved fittings of the type which thread into the convolutions of the flexible conduit or clamp type.
5. Liquid-tight flexible metal conduit shall be galvanized, heavy wall, flexible locked steel strip construction with a smooth moisture and oil proof, abrasion-resistant, extruded plastic jacket. Connectors shall be approved for use with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.
6. Acceptable Manufacturers: Crouse Hinds or Appleton.
7. No metal clad (MC) cable allowed as alternate.

B. Sleeves for Conduits:
Sleeves shall be adjustable type, of 26 gauge galvanized iron, Adjusto Crete Company, Adjusto-Crete, or Jet Line Products Inc., Jet-Line.

C. Expansion Joints:
Where conduits embedded in masonry or concrete cross seismic separations between buildings, expansion joints or at locations indicated, the Contractor shall provide sliding or a sliding and deflecting fitting, as conditions require in each conduit. Sliding fittings shall be O-Z Electrical Manufacturer Company, Inc., Type AX, with bonding strap and clamps. At exterior locations use O-Z Electrical Manufacturer Company Inc., Type EX.

D. Penetration in Fire Rated Structures:
Provide Dow Corning No. 3-6548, RTV silicone foam for making fire rated seals around penetrations through floors or walls.

2.02 WIRES, CABLES AND CONNECTOR:

A. Pull Wires: A 1/8" polypropylene cord shall be installed in each empty conduit. A 1/8" polypropylene cord shall be installed in each underground service conduit unless otherwise required by the utility company.

B. 600 Volts or Less Wires:
   1. Wire shall be NEC type THHN or THWN in sizes No. 4 and smaller and NEC type THWN in sizes No. 2 and larger, unless otherwise indicated. All wire shall have copper conductors. Wires No. 14 and larger shall be stranded. Wires smaller than 12 gauge shall not be used in the light and power systems.
   2. Wire adjacent to ovens and boilers, in range hoods, and at other dry locations where the operating temperature of the wire may be expected to exceed 60□ C, but not to exceed 90□ C, shall be National Electric Code Standard Type THHN. Where the temperature may be expected to exceed 90□ C, wire shall be a type approved by Underwriters' Laboratory for the temperature and installed conditions involved, silicone type wire 200□□C or equivalent.

C. Color Code, Signal and Communications Systems:
   All wires for signal and communication systems shall be color coded per District standards and shall be installed under the direction of the District's Electrical Inspector. Request a copy of the District Standards for color coding prior to ordering wiring—black, red, blue, white – 208-240; brown, orange, yellow – 480/277.

2.03 BOXES, ENCLOSURES, KEYS AND LOCKS:

A. Outlet Boxes and Fittings:
   1. Outlet boxes used in concealed work shall be galvanized or sherardized steel, pressed or welded type, with knockouts.
   2. In exposed work, outlet boxes and conduit fittings required and where conduit runs change direction or size, shall be cast metal with threaded cast hubs cast integral with the box or fitting. Boxes and fittings shall not have unused spare hubs, except as otherwise indicated or approved manufacturer.
   3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium plated or zinc galvanized. The castings shall be true to pattern, smooth, straight, with even edges and corners, of uniform thickness of metal and shall be free of cracks, gas holes, flaws, excessive shrinkage and burnt out sand.
   4. Covers for fittings shall be galvanized steel or non-corrosive aluminum and shall be designed for the fitting with which used.
   5. Light fixture outlets shall be 4" octagon, 4” square, or larger, depending upon the number of wires or conduits therein, and shall be equipped with 3/8” malleable iron fixture studs, and plaster rings. Plaster rings shall have round opening with two ears drilled 2 23/32” center to center.
   6. For local switch outlets use 4" square boxes for single gang, 4 11/16” square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than two switches.
   7. For all receptacle, clock, bell, fire station, speaker, security and telephone outlets, use 4” square boxes or larger with single gang plaster rings. For television outlets, use 4-gang deep boxes and 4-gang plaster rings. For communication switch, use 4" square boxes with single gang or larger plaster rings.
   8. Plaster rings shall be provided on all flush mounted outlet boxes, except where otherwise indicated or specified. All plaster rings shall be same depth as the finished surface.
   9. Factory made knock-out seals shall be installed to seal all box knock-outs, which are not intact.

10. At each location where flexible conduit is extended from a flush outlet box, provide and install a weatherproof universal box extension adapter by Bell Electric Company.
11. No more than one box extension or cuffs used anywhere.

B. Junction and Pull Boxes:
   1. Junction and pull boxes, in addition to those indicated, shall only be used where absolutely necessary with the specific approval of the District's Electrical Inspector in each case.
   2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded and shall be rigid under torsional and deflecting forces. Boxes shall have auxiliary angle iron framing where necessary to ensure rigidity. Covers shall be fastened to the box with a sufficient number of brass or stainless steel machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws at the site if the boxes are not installed plumb. All surfaces of pull and junction boxes and covers shall be given one coat of metal primer, and one coat of aluminum paint, and shall have permanent labels with box designation or system or circuit numbers.
   3. Weatherproof pull and junction boxes shall conform to the foregoing for interior boxes with the following modifications: The cover of flush mounting boxes shall have a weather-tight gasket cemented to and trimmed even with the cover all around. Surface or semi-flush mounting pull and junction boxes shall be Underwriters' Laboratory approved as rain-tight and shall be complete with threaded conduit hubs. All exposed portions of boxes shall be galvanized and finished with a prime coat and standard coat of baked-on enamel. For underground pull-boxes, the cast iron cover shall be permanently marked Electrical, Power, Signal, Telephone or Ground.
   4. All junction and pull-boxes shall be rigidly fastened to the structure and shall not depend on the conduits for support.

C. Floor Outlets:
   1. All flush floor outlet boxes shall be adjustable, cast iron, set flush with the finished floor material, Hubble No. B-2503.
   2. Telephone, microphone and similar floor outlets shall be equipped with a brass cover plate with 2 1 /8” flush cap, Hubble No. S-3061.
   3. Receptacle floor outlets shall be equipped with a flush brass cover plate with screw-in caps, appropriate for the type of receptacle shown on the drawings.

D. Floor Pockets:
   1. Single Gang: Receptacle floor pockets shall be single gang, flush floor type, with cast iron floor plate, hinged cast iron door notched for cable and cast iron box, C.W. Cole No. TLS-362-1-FE. Equip each pocket with a standard single grounding type receptacle, unless otherwise indicated. Use C.W. Cole No.
      TLA-362-1 in wood floors.
   2. Microphone, speaker or projector sound floor pockets shall be single gang flush floor type with cast iron floor plate, hinged cast iron door, notched for cable and cast iron box, C. W. Cole No. TLA-362-3-FE. Use C. W. Cole No. TLS-362-3 in wood floors.

2.04 RECEPTACLES AND SWITCHES:

A. Receptacle shall be industrial Specifications grade, back and side wired with binding screws and plaster ears with captive mounting screws. Receptacle bodies shall be phenolic, plastic or bakelite with ivory colored faces, unless otherwise indicated. Receptacles shall have heavy duty, current carrying contacts and double wipe flat ground contacts. Receptacles shall be Hubbell, Arrow-Hart, Bryant or Leviton.
   1. Duplex receptacles shall be 20 amps (NEMA 5-20R), 125 volts, two-pole, three-wire with parallel slots, U-ground.
   2. Single receptacles shall be of the voltage, rating and configuration shown on the drawings.
   3. Ground fault interrupting type receptacles shall consist of a duplex receptacle with a test and a reset device manufactured in a standard configuration for use with a duplex cover plate. Receptacles shall be 20 amps (NEMA 5-20R) or as indicated on the drawings. Exterior receptacles shall be weatherproof.
   4. Weatherproof receptacles, except where otherwise indicated or specified, shall consist of a duplex receptacle, as specified herein, and a metal plate with die cast hinged lid and weatherproof mat.

B. Switches:
   1. Local Switches:
      a. Local switches shall be tumbler type, industrial specification grade, rated 20 amps at 120-277 volts AC only, with plaster ears, binding screws for back and side wiring and standard size composition cups which fully enclose the mechanism. Switches shall be approved for use at currents up to the full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80% of the rating for motor loads. Switches shall be single pole, double pole, three-way, four-way, non-lock type, (or lock type when indicated). Non-lock type switches shall have ivory handles. Switch shall be Hubbell 1221I or approved manufacturer specified by the District.
      b. All lock type switches shall have metal or nylon key guides with ON/OFF indication, and shall be operable by the same key. Keys for lock type switches shall be forked type, cut from 1/16" stock. Fork dimensions shall be: External 1/4", Internal 5/32”, depth 3/16" and radius 5/64". Key switches shall be Hubbell 1221L only. Where pilot light is required for key switch see paragraph on Pilot Lights. Provide minimum ten keys to District.
      c. Pilot light switches shall be rated 20 amps and shall conform to the Specifications for local switches. The switches shall have red, rugged lexan handles that are lighted by long lasting neon lamps. Pilot light shall light when load is on. Single pole, 120 volts witches shall be Hubbell 1221-PL
      d. Remote control switches for mechanically held contractors arranged for three-wire control shall be tumbler type, momentary contact, single pole, three-position with center "OFF rated 20 amps at 120/277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclose the mechanism and ivory handles. Lock type switches shall be Hubbell 1557L.
   2. Time Switches and Photo Electric Controls:
      a. Time switches shall be 7-day Intermatic or approved manufacturer specified by the District.
      b. Photo electric Control: Photo electric control shall be rated 2000 watts with single pole, single throw, normally closed contact, enclosed in a die cast aluminum gasket enclosure, Tork Series, Intermatic or approved manufacturer by the District.

2.05 IDENTIFICATION AND SIGNS:

A. Name Plates:
1. The following equipment shall be provided with name plates unless otherwise specified: Switchboards, motor control centers, control panels, push button stations, time switches, contractors, motor starters, motor switches, relays, panel boards and terminal cabinets.
2. Name plates shall give equipment designation and adequately describe the function, voltage and phase of the particular equipment involved. For panel boards, the nameplates shall indicate the panel designation, voltage and phase of the panel. For terminal cabinets, the nameplates shall indicate the system housed therein.
3. Nameplates shall be black and white nameplate stock of bakelite with characters cut through the black exposing the white. Plates shall have beveled edges and shall be securely fastened in place with No. 4 Phillips head, cadmium plated steel, self tapping screws. Characters shall be 3/16" high, unless otherwise indicated.

B. Markings:
The following equipment and controls shall have markings: Pull and junction boxes, and other devices controlling motors and appliances. Abbreviations acceptable to the District's Electrical Inspector, along with an identifying number, shall be used. Markings shall be done with locking type stencils using paint of a contrasting color. Figures shall be 3/8" high unless otherwise indicated.

C. Warning Signs:
1. Provide a warning sign firmly secured to the outside of each door or gate to enclosures containing high voltage equipment over 600 volts A.C. The signs shall read: "Danger High Voltage Keep Out ". Signs shall be 7" x 14" with all lettering 1" high, except the word "Danger", which shall have 1 1/2" high letters.
2. Signs shall be of standard manufacturer 18 gauge steel, with porcelain enamel finish. Letters shall be red on white background.

RACEWAY AND CABLE LABELS

A. Manufacturer’s Standard Products: Where more than one type is listed for a specified application, selection is Installer’s option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, California Electrical Code, and these Specifications.

B. Conform to ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway or cable size.
1. Color: Black legend on orange field.
2. Legend: Indicates voltage and services.

C. Adhesive Labels: Preprinted, flexible, self-adhesive vinyl. Legend is over-laminated with a clear, weather- and chemical-resistant coating.

D. Pretensioned, Wraparound Plastic Sleeves: Flexible, preprinted, color-coded, acrylic bands sized to suit the diameter of the line it identifies and arranged to stay in place by pretensioned gripping action when placed in position.

E. Colored Adhesive Tape: Self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide (0.08 mm thick by 25 to 51 mm wide).

F. Underground Line Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
   1. Size: Not less than 6 inches wide by 4 mils thick (152 mm wide by 0.102 mm thick).
   2. Compounded for permanent direct-burial service.
   3. Embedded continuous metallic strip or core.
   4. Printed Legend: Indicates type of underground line.

G. Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound type with preprinted numbers and letters.

H. Aluminum, Wraparound Marker Bands: Bands cut from 0.0140-inch (0.4 mm) thick aluminum sheet, with stamped or embossed legend, and fitted with slots or ears for permanently securing around wire or cable jacket or around groups of conductors.

I. Plasticized Card-Stock Tags: Vinyl cloth with preprinted and field-printed legends. Orange background, except as otherwise indicated, with eyelet for fastener.

J. Aluminum-Faced Card-Stock Tags: Weather-resistant, 18-point minimum card stock faced on both sides with embossable aluminum sheet, 0.002 inch (0.05 mm) thick, laminated with moisture-resistant acrylic adhesive, and punched for the fastener. Preprinted legends suit each application.

K. Brass or Aluminum Tags: Metal tags with stamped legend, punched for fastener. Dimensions: 2 x 2 inches (51 x 51 mm) x 0.05 inch (1.3 mm).

ENGRAVED NAMEPLATES AND SIGNS:

A. Manufacturer's Standard Products: Where more than one type is listed for a specified application, selection is Installer's option, but provide single type for each application category. Use colors prescribed by ANSI A13.1, California Electrical Code, and these Specifications.

B. Engraving stock, melamine plastic laminate, 1/16-inch (1.6 mm) minimum thick for signs up to 20 sq. in. (129 sq. cm), 1/8-inch (3.2 mm) thick for larger sizes.
   1. Engraved Legend: Black letters on white face.
   2. Punched for mechanical fasteners.

C. Baked-Enamel Signs for Interior Use: Preprinted aluminum signs, punched for fasteners, with colors, legend, and size as indicated or as otherwise required for the application. 1/4-inch (6.4 mm) grommets in corners for mounting.

D. Exterior, Metal-Backed, Butyrate Signs: Weather-resistant, nonfading, preprinted, cellulose acetate butyrate signs with 0.0396 inch (1 mm) galvanized steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6.4 mm) grommets in corners for mounting.

E. Fasteners for Plastic-Laminated and Metal Signs: Self-tapping stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.04 MISCELLANEOUS IDENTIFICATION PRODUCTS:

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties with the following features:
   1. Minimum Width: 3/16 inch (5 mm).
   2. Tensile Strength: 50-lb. (22.3 kg) minimum.
   3. Temperature Range: Minimum 40 to 185 degrees F (minimum 4 to 85 degrees C).
   4. Color: As indicated where used for color-coding.

B. Paint: Alkyd-urethane enamel over primer as recommended by enamel manufacturer.

PART 3 - EXECUTION

3.01 INSTALLATION OF EQUIPMENT AND APPLIANCES:

A. Conduit stubs for equipment shall be terminated in a coupling flush with the finished floor and shall be extended with minimum 6" high rigid conduit to a motor starter, receptacle, or junction box. Flexible conduit as applicable shall be installed from the rigid conduit to motors and other vibrating equipment.

B. If the connection is from a flush wall-mounted junction box, install a weatherproof universal box extension and adaptor by Bell Electric Company, and extend with rigid steel conduit to the motor starter or junction box on the equipment.

C. All exposed final connections to equipment shall be by a water tight flexible metal conduit, unless otherwise indicated. A maximum of 36" of flexible metal conduit may be used except that all extensions from the flush floor couplings shall be rigid conduit to a distance not less than 6" above the floor.

D. Flexible conduit for all motors, cafeteria equipment and other equipment, including HVAC equipment, shall be liquid-tight flexible metal conduit and shall contain a Code size insulated green bond wire.

E. All exposed conduit shall be run vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to the equipment with suitable iron brackets and one-hole pipe straps.

F. Connectors for flexible steel conduit shall be the type, which threads into the convolutions of the conduit or clamp type. Connectors for water-tight flexible metal conduit shall be approved for such use and shall be installed to make a watertight connection.

3.01 INSTALLATION OF GROUNDING EQUIPMENT:

A. Grounding "made electrode" rods shall be located in the nearest usable planting area, where not otherwise indicated on the drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, concrete yard box shall be 2" above planting surfaces.

B. Rods shall be driven to a depth of not less than 8' 0". Electrodes shall have a resistance to ground of not more than 25 ohms if practicable. If the resistance exceeds 25 ohms, two or more electrodes connected in parallel shall be provided. The minimum number and size of ground rods shall be as required by State Electrical Safety Orders. Electrodes shall be separated from one another by not less than 6' 0". Parallel electrodes shall be connected together with approved fittings and approved grounding conductors in galvanized rigid steel conduit, buried not less than 12" below finish grade.

The grounding resistance shall be tested by an approved independent testing laboratory in the presence of the District Inspector, District Electrical Maintenance Supervisor and the District Engineer. The test results shall be submitted to the District Maintenance Supervisor on an official form for file with copies distributed to the District Inspector and Electrical Consulting Engineer

3.01 CONDUIT INSTALLATION:

A. General Requirements:
   1. Provide complete and continuous systems of rigid steel conduit, outlet boxes, junction boxes, fittings and cabinets for all systems of electrical wiring including lighting, power, communications, control and signal systems, except as otherwise specified.
      a. Site electrical distribution conduit sizes shall be:
         1.) Electrical power and lighting, and control systems distribution - 1" minimum.
         2.) Signal and communications distribution - 2" minimum and separate conduit for each system.
      b. Site underground pullboxes minimum – Christy N30.
   2. Within buildings EMT may be used in lieu of rigid steel conduit where permitted by ordinance. EMT shall not be used in the following cases: exposed below 8 feet elevations; in concrete; underground.
   3. Within buildings flexible steel conduit may be used in lieu of rigid steel conduit where permitted by ordinance, but no metal clad (MC) cable. Flexible steel conduit shall not be used for runs longer than 6 feet or for exposed conduits.
   4. Flexible steel conduit shall be used, except where otherwise specified, for final connection of all motor terminal boxes and shall be of sufficient length (not to exceed 36") to allow full travel or adjustment of the motor on its base.

5. Underground feeder distribution conduits for all systems may be nonmetallic polyvinyl chloride (PVC) Schedule 40 conduit in lieu of rigid steel conduit, except where otherwise specified or indicated.
6. Conduit shall be concealed, unless otherwise indicated. Conduits exposed to view (except those in attic spaces and under buildings) shall be installed parallel or at right angles to structural members, walls, or lines of the building. Conduits shall be routed to clear access openings.
7. Bends or offsets will not be permitted, unless absolutely necessary. The radius of each conduit bend or offset shall be as required by ordinance, except for underground conduits, for public telephone conduits, and where otherwise indicated or specified. Bends and offsets shall be made with standard tools and equipment made especially for the purpose or may be factory made bends or elbows complying with the requirements for radius of bend specified herein. Public telephone conduit bends and offsets shall have a radius, which is not less than ten times the trade size of the conduit, unless otherwise approved by the telephone company. Refer to "Underground Conduit Installation" for the radius of bends and offsets required for underground installations.

8. Running threads will not be permitted. Provide approved conduit unions where union joints are necessary. Conduits shall be kept at least 6" from the coverings on hot water and steam pipes and 18" from flues and breechings. The open ends of conduits shall be kept closed with approved conduit seals during construction of the buildings and during the installation of underground systems.

9. The joints in conduits installed in concrete, wet locations, exposed to the weather or underground shall be made liquid tight.
10. Conduits run exposed on roofs shall be rigid conduit (no EMT).
11. Where auxiliary supports, saddles and brackets are required to meet special conditions, they shall be made rigid and secure before the conduit is attached thereto.
12. Conduit in ceiling spaces, in stud walls and under floors, shall be supported with factory made pipe straps or shall be suspended with pipe hangers or pipe racks. The pipe straps shall be attached to and shall hold the conduit tight at the point of support against the ceiling, floor joists, rafters, wall studs or 2" x 4" headers fitted between the joists or wall studs.
13. Conduits installed on exposed steel trusses and rafters shall be fastened with factory made conduit straps or clamps, which shall hold the conduit tight against the supporting member at the point of support.
14. Conduits under buildings shall be buried below the surface of the ground.
15. Pipe hangers for individual conduits shall be factory made, consisting of a pipe ring and threaded suspension rod. The pipe ring shall be malleable iron, split and hinged, and shall securely hold the conduit, or shall be springable wrought steel. Rings shall be bolted to or interlocked with the suspension rod socket. Rods shall be 3/8" for 2" conduit hangers and smaller and shall be 1/2” for 2 1/2" conduit hangers and larger.
16. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapezed type and shall consist of a cross channel, Steel City Kindorf No. B-900 or Unistrut No. P-1000 suspended with a 3/8" minimum diameter steel rod at each end. Each rod shall be fastened with nuts, top and bottom to the cross channel and with a

square washer on top of the channel. Each conduit shall be clamped to the top for the cross channel with conduit clamps, Steel City Kindorf No. C-105 or Unistrut Nos. P-1111 through P-1124. Conduits shall not be stacked one on top of the other, but a maximum of two tiers may be on the same rack by providing an additional cross channel. Where a pipe rack is to be longer than 18" or if the weight it is to support exceeds 500 pounds, submit details of the installation to the Architect for approval.

17. Conduits, which are suspended on rods more than 2' long, shall be rigidly braced per State Seismic Regulations to prevent horizontal motion or swaying.
18. Factory made pipe straps shall be one- or two-hole formed galvanized clamps, heavy duty type, except as otherwise specified.
19. Hangers, straps, rods or pipe supports under concrete shall be attached to inserts set at the time the concrete is poured. Under wood, use bolts, lag bolts or lag screws; under steel joists or trusses, use beam clamps.
20. Conduits shall be supported at intervals required by ordinance, but not to exceed 10'. One inch and smaller conduits installed exposed shall be fastened with 2-hole straps. Perforated strap and plumber's tape shall not be used in the support of conduits.
21. Each conduit stubbed up through a roof or an arcade shall be flashed with a waterproof flashing. The base of the flashing shall extend on the roof not less than 10" from the conduit. Flashing shall extend up the conduit not less than 6" and shall be in contact with the conduit for minimum 1" at the top. Refer to Division 7, Sections 07310, 07510, and 07541.
22. Bushings for all sizes of rigid steel conduits shall be threaded insulating type. Set screw bushings are not acceptable.
23. All flex conduits shall be cut square and not at an angle.
24. It shall be the responsibility of the Contractor to install the conduits with a minimum number of bends in such a manner as to conform to the structure and meet all applicable code requirements.
25. The routing of conduits may be changed if approved by the District Inspector, providing the length of any conduit run is not decreased more than 10% of the length shown on the drawings.
26. Minimum size conduit for all signal and communication systems shall be 3/4”.
27. A minimum of two 1" conduits shall be installed (stubbed) into nearest accessible ceiling space from each panelboard, terminal cabinet, distribution panelboard, backboard or switchboard. Cap conduits with appropriate conduit caps.
28. Conduits installed vertically on the outside surface of buildings shall be strapped tight to the building surface with no space behind.

B. Underground Requirements:
   1. All conduits installed underground shall be entirely encased in concrete 3" thick on all sides with multiple conduits spaced not less than 1 1/2" apart, unless otherwise specified. Provide approved conduit spacers as required to prevent any deflection of the conduits when concrete is poured and to preserve the position and alignment of the conduits in the concrete. Conduits shall be tied to the spacers. Anchors shall be installed to prevent floating of conduits during pouring of concrete. Red colored concrete shall be used to encase conduits of systems operating above 600 volts.
   2. All underground conduits shall be buried to a depth of not less than 24" below finished grade to the top of the concrete envelope, unless otherwise specified.

3. Assemble the sections of conduit with approved fittings and stagger all joints. Cut ends of conduit shall be reamed to remove all rough edges. The joints in all conduits shall be made liquid tight. All bends at risers shall be completely below the surface where possible.
4. Two or more conduit runs in a common trench shall be separated by at least 1 1/2" of concrete. Electric conduit runs installed in a common trench with other utility lines shall be separated from such lines by at least 12" horizontally. Public telephone conduits shall be separated from electric conduits or other utility lines by not less than 3" of concrete, 2' horizontally and 1' vertically.
5. The District's Electrical Inspector shall be called to the site for approval of all underground installations before and during concrete pour. Where considered necessary by the District's Electrical Inspector, a mandrel shall be drawn through each run of conduit in the presence of the Inspector, before and after pouring concrete. The mandrel shall be 6" in length minimum and have a diameter which is within 1/4" of the diameter of the conduit to be tested.
6. Nonmetallic conduit installations shall comply with the following additional requirements: All joints in PVC conduit shall be sealed by means of approved solvent-weld cement supplied by the conduit manufacturer. All nonmetallic conduit bends and deflections shall comply with the requirements of the applicable Electrical Code, except that the minimum radius of any bend or offset for conduits sized from 1/2" to 1 1/2" inclusive shall not be less than 24". All 90° Ell's, 1" and larger, shall be rigid conduit. All 90 degree bends, bends at risers, and the risers shall be rigid steel conduit and shall comply with the requirements specified herein for underground rigid steel conduit installations. The radius of the curve of any bend or offset in non-metallic conduit for the Public Telephone System shall be not less than ten times the trade size of the conduit, unless otherwise specifically approved by the Public Telephone Utility Company.
7. Rigid steel conduit installations shall comply with the following additional requirements: Where sweeps are specified or indicated, the radius shall be not less than 10'. The radius of the curve of the inner edge of any bend or offset shall be not less than is permitted in the Conduit Bend Radii table for rigid steel conduit field bends in the applicable Electrical Code, unmodified by any exemptions, bulletins, or amendments. The radius of the curve of bends or offsets for the Public Telephone System shall be not less than ten times the trade size of the conduit, unless otherwise specifically approved by the Telephone Utility Company. Rigid conduit underground to be double wrapped with 10 mill tape.

C. In Slabs on Grade:
1. Unless specifically approved by the Office of the State Architect, conduits 1 1/4 size and larger shall not be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, the slabs shall be thickened at the bottom where conduits occur to provide 3" of concrete between the conduit and earth. Conduits shall clear all rebar. The required excavation shall be part of the work of this Section.
2. If the concrete slab is 5" or more in thickness with a moisture barrier plastic sheet between the earth and the slab, the 1" and smaller conduits shall be installed in the slab with a minimum of 1" concrete between earth and conduit.

D. Penetration in Concrete Walls, Beams and Floors: Provide sleeves where conduits pierce concrete walls, beams and floors, except floor slabs on earth. Sleeves shall have 1/2" clearance around conduits. Sleeves shall not extend beyond the exposed surfaces of the concrete and shall be securely fastened to the forms. Where conduits pass through walls below grade, calk

with District approved sealant and provide backer materials between the conduit and the sleeve to obtain a water tight joint.

3.02 STUBS:

A. Floor: At each point where floor stubs are indicated in open floor areas for connections to equipment, the conduits shall be terminated with couplings, the tops flush with the finished floor. Stubs shall extend above the couplings the indicated distance, but in no case less than 6" high. Where capped stubs are called for, the couplings shall be closed with cast iron plugs with screw drive slots.

B. Underground:
   1. Underground conduit stubs shall be terminated at the locations indicated, but minimum 5' beyond building foundations, steps, arcades, concrete walks and paving, unless otherwise noted. Rigid steel conduit stubs and nonmetallic conduit stubs shall be capped by installing a coupling flush in the end wall of the concrete encasement and plugging with an approved plug or terminated stub in a concrete box (Christy). The As-Built Record drawings shall show the location of the ends of underground conduit stubs fully dimensioned with reference to the buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on the "As-Built" Record Drawings in the presence of the District's Inspector before backfilling in the trench.

3.03 WIRE INSTALLATION:

A. Wire shall not be installed until all plastering throughout the building is completed, and all debris and moisture removed from the conduits, boxes, and cabinets.

B. Wire-pulling compounds used as lubricants in installing conductors in raceways shall only be compounds approved and listed by Underwriters' Laboratory. No oil, grease, graphite, or similar substances may be used. Pulling of No. 1/0 or larger conductors shall be done only with an approved cable pulling machine.

C. The District's Inspector shall be called to the site and shall supervise the installation of all feeder cables. The District shall be notified not less than two working days in advance of the proposed time of installation.

D. At all outlets for light, power, communications, control, and signal equipment, pigtail splices with 8" circuit conductor leads shall be provided for connection to fixtures, equipment and devices.

E. Pressure cable connectors, pre-insulated "Scotchlok" Type "'Y", "R", or "B" spring loaded twist-on type, may be used for splicing 8 gauge or smaller conductors, in lieu of soldered connectors for all wiring systems, except the public address, District owned telephone system, or system clocks.

F. All joints, splices, taps and connections for cables 6 gauge and larger, shall be made with high-pressure cable connectors approved for use with copper conductors.

G. Wire in switchboards, panels, terminal cabinets, pull boxes and other cabinets (except public address) shall be neatly grouped and tied in bundles with nylon ties at 10" maximum intervals. At switchboards, panels and terminal blocks, wires shall be fanned out to the terminals.

H. Each neutral conductor larger than 6 gauge which is not color identified throughout its entire length shall be painted white or taped white wherever it appears in a switchboard, cabinet, gutter or box. Neutral conductors 6 gauge and smaller shall be white color identified throughout their entire length.

I. All systems of wiring shall be so installed that when completed, the systems will be free from short circuits and from grounds, other than required grounds. The Contractor shall provide all instruments for testing and shall demonstrate in the presence of the District's Electrical Inspector that each system of wiring meets the following minimum requirements for insulation resistance:
   1. For circuits of No. 12 AWG wiring or smaller: 1,000,000 ohms.
   2. For circuits of No. 10 or larger conductors, a resistance shall be based on the following allowable current-carrying capacities of conductors:

25 to 50 amperes inclusive	250,000 ohms
51 to 100 amperes inclusive	100,000 ohms
101 to 200 amperes inclusive	50,000 ohms
201 to 400 amperes inclusive	25,000 ohms
401 to 800 amperes inclusive	12,000 ohms
Over 800 amperes inclusive	5,000 ohms

   3. The above values shall be obtained with all switchboards, panel boards, fuse holder, switches, and overcurrent devices in place and connected, and with all switches closed.
   4. If lamp holders, receptacles, fixtures and appliances for a system are also connected, the minimum insulation resistance permitted shall be one-half the values specified above.

J. The Contractor shall provide a "Meager" insulation tester, which will apply a minimum of 500 volts direct current for these tests when requested by the District’s Inspector.

K. 120 volts and 277 volts circuits shall be routed in separate conduits, raceways and enclosures.

L. Other conductors in raceway or cable: Conductors, other than service conductors, shall not be installed in the same service raceway or service cable.

   All low voltage wiring regardless of insulation voltage rating shall be in a separate raceway. It shall not be in the same raceway or pullbox with systems 100 volt or more.

3.04 FEEDER IDENTIFICATION:

Lighting, power, and low voltage feeder wires and cables shall be identified at each point of termination and at each point the conduit run is broken by a cabinet, box and gutter. Identification shall be by means of wrap around type markers, E-Z Code or Brady Perma-Code, and shall include the feeder designation, size and description.

3.05 TAPE:

Splices, joints and connectors joining conductors shall be covered with insulation equivalent to that on the conductors. Free ends of conductors connected to an energized source shall be taped. The voids in irregular connectors shall be filled with insulating compound before taping. Thermo plastic insulating tape approved by Underwriters' Laboratory for use as the sole insulation of splices shall be used and shall be applied according to the manufacturer's printed specifications. Heat shrink tubing may be used as per manufacturer's specifications.

3.06 BOXES INSTALLATION AND SUPPORT:

A. Outlet boxes shall be flush with finished surface of wall or ceiling. They shall be plumb and securely fastened to the structure independent of the conduit. Except where otherwise indicated, factory made bar hangers shall be used to support outlet boxes.

B. Outlet boxes installed in ceilings suspended or furred with steel runner and/or furring channels shall be supported (except where otherwise indicated) by a Unistrut No. P-4000 channel spanning the main ceiling runner channels. Each box shall be supported from its channel by a 3/8" 16 threaded steel rod with a Unistrut No. P-4008 nut and a Tomic No. 711-B Adapta-Stud. The rod shall be tightened to a jamb fit with the channel and its nut. The box shall be locked to the rod by means of a 1/2" locknut on the stud and a 3/8" 16 hex nut locking the stud to the rod.

C. The heights of outlets and equipment indicated on the drawings shall govern, but in the absence of such indications, the following heights shall be maintained. Heights are to centerline from finished floor surface, unless otherwise noted:
   1. Communication switch, pushbutton, light switch, other switches, and fire station outlets: 48".
   2. Bell and/or horn outlets in corridors: 12" below ceiling.
   3. Clock, speaker, and bell outlets in classrooms and offices: 8' 0".
   4. Outside bell and yard light outlets: 12" below the top plate level for one-story buildings without covered porch or arcade, and 12" below covered porch and arcade ceilings.
   5. Desk public telephone, television, desk interphones, and receptacle outlets 12".
   6. Panel boards and terminal cabinets: 6' 6" to top.

D. Receptacle outlet boxes shall not be located within 6' of water sinks, except where a ground fault interrupter circuit breaker or ground fault type receptacle is provided to protect receptacle outlets located within 6' of water sinks.

3.07 PLATES:

A. Provide an appropriate plate on each outlet. Plates shall be of stainless steel, unless otherwise specified. Public telephone plates shall have single bushed openings. Sectional plates will not be accepted.

B. Flush wiring device and signal system outlets indicated to be blank covered, shall be covered with blank stainless steel plates. Flush lighting outlets to be capped shall be covered with Wire

mold No. 5736 steel covers, painted to match the surrounding finish. Surface-mounted outlets indicated to be capped shall be covered with blank stainless steel covers.

C. Switch and receptacle plates shall be provided with engraved designations under any one of the following:
   1. Pilot Switches.
   2. Switches so located that the operator cannot see one of the fixtures or items for equipment controlled with his hand on the switch.
   3. Switches not in the same room with the fixtures or items of all unit heaters, air curtains, fly fans, and exhaust fans.
   4. Receptacles operating at other than 120 volts.
   5. Where so indicated on the drawings.

D. The designations shall be as indicated on the drawings or as specified and shall be engraved in the plates with 3/16" high block type letters filled with black enamel. Where designations are not indicated or specified they shall be requested from the Engineer. For estimating purposes, they may be assumed 12", not to exceed more than ten letters per gang.

3.08 IDENTIFICATION OF CIRCUITS AND EQUIPMENT:

A. Switchboards, motor control centers, transformers, panel boards, circuit breakers, disconnectinq switches, starters, pushbutton control stations and other apparatus used for the operation or control of circuits, appliances or equipment, shall be properly identified by means of descriptive nameplates or tags permanently attached to the apparatus or wiring.

B. Nameplates shall be engraved laminated bakelite. Shop Drawings with dimensions and format shall be submitted to the District or Architect for approval before installation. Attachment to equipment shall be with self-tapping screws. Self-adhering or adhesive backed nameplates shall not be used.

C. Tags shall be attached to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Circuit, phase and function shall be indicated. Branch circuits shall be tagged in distribution boards, panel boards, and motor control centers. Tags shall be made of pressure sensitive plastic or embossed self-attached stainless steel or brass ribbon.

D. Cardholders and cards shall be provided for circuit identification in panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to the inside of panel door. List of circuits shall be typewritten on a card. Circuit description shall include name or number of circuit, area and connected load.

E. Junction and pull boxes shall have covers stenciled with box number when shown on the drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.

F. Name as described in part 2A shall be correctly engraved with a legend showing function or areas when required by Codes or shown on the drawings.

G. Provide identity tags as to source and destination of all underground feeder cables in underground boxes.

H. Underground feeder cables not to exceed 200 feet without a pull box.

3.08 ELECTRICAL IDENTIFICATION INSTALLATION:

A. Install identification devices according to manufacturer's written instructions.

B. Install labels where indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

C. Lettering, Colors, and Graphics: Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations used in the Contract Documents or required by codes and standards. Use consistent designations throughout the Project.

D. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

E. Self-Adhesive Identification Products: Clean surfaces of dust, loose material, and oily films before applying.

F. Install painted identification as follows:
1. Clean surfaces of dust, loose material, and oily films before painting.
2. Prime Surfaces: For galvanized metal, use single-component, acrylic vehicle coating formulated for galvanized surfaces. For concrete masonry units, use heavy-duty, acrylic-resin block filler. For concrete surfaces, use clear, alkali-resistant, alkyd binder-type sealer.
3. Apply one intermediate and one finish coat of silicone alkyd enamel.
4. Apply primer and finish materials according to manufacturer's instructions.

G. Identify Raceways and Exposed Cables of Certain Systems with Color Banding: Band exposed and accessible raceways of the systems listed below for identification.
1. Bands: Pretensioned, snap-around, colored plastic sleeves; colored adhesive tape; or a combination of both. Make each color band 2 inches (51 mm) wide, complete encircling conduit, and place adjacent bands of two-color markings in contact, side by side.
2. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot (15 m) maximum intervals in straight runs, and at 25 feet (7.6 m) in congested areas.
3. Colors—as follows:
   a. Fire-Alarm System: Red.
   b. Fire-Suppression Supervisory and Control System: Red and yellow.
   c. Combined Fire-Alarm and Security System: Red and blue.
   d. Security System: Blue and yellow.
   e. Mechanical and Electrical Supervisory System: Green and blue.
   f. Telecommunications System: Green and yellow.

H. Install Circuit Identification Labels on Boxes: Label externally as follows:
1. Exposed Boxes: Pressure-sensitive, self-adhesive plastic label on cover.

2. Concealed Boxes: Plasticized card-stock tags.
3. Labeling Legend: Permanent, waterproof listing of panel and circuit number or equivalent.

I. Identify Paths of Underground Electrical Lines: During trench backfilling, for exterior underground power, control, signal, and communications lines, install continuous underground plastic line marker located directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Where multiple lines installed in a common trench or concrete envelop, do not exceed an overall width of 16 inches (400 mm); use a single line marker.
1. Limit use of line markers to direct-buried cables.
2. Install line marker for underground wiring, both direct buried and in raceway.

J. Color-Code Conductors: Secondary service, feeder, and branch circuit conductors throughout the secondary electrical system.
1. 208/120-V System--as follows:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White.
   e. Ground: Green.
2. 480/277-V System--as follows:
   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral: Grey.
   e. Ground: Green.
3. Factory-apply color the entire length of the conductors, except the following field-applied, color-coding methods may be used in lieu of factory-coded wire for sizes larger than No. 10 AWG.
   a. Colored, pressure-sensitive plastic tape in half-lapped turns for a distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps or made. Apply the last two turns of tape with no tension to prevent possible unwinding. Use 1-inch (25 mm) wide tape in colors as specified. Adjust tape bands to avoid obscuring cable identification markings.
   b. Colored cable ties applied in groups of 3 ties of specified color to each wire at each terminal or splice point starting 3 inches (76 mm) from the terminal and spaced 3 inches (76 mm) apart. Apply with a special tool or pliers, tighten to a snug fit, and cut off excess length.
4. For all system voltages:
   a. Isolated ground conductors: Green with yellow stripe.
   b. Mark with a 1” band of green tape, followed by a 1” band of yellow tape, followed by a 1” band of green tape.

K. Power Circuit Identification: Use metal tags or aluminum wraparound marker bands for cables, feeders, and power circuits in vaults, pull boxes, junction boxes, manholes, and switchboard rooms.
1. Legend: 1/4 inch (6.4 mm) steel letter and number stamping embossing with legend corresponding to indicated circuit designations.
   2. Fasten tags with nylon cable ties; fasten bands using integral ears.

L. Apply identification to conductors as follows:
1. Conductors to be extended in the future: Indicate source and circuit numbers.
2. Multiple power or lighting circuits in the same enclosure: Identify each conductor with source, voltage, circuit number, and phase. Use color-coding for voltage and phase indication of secondary circuit.
3. Multiple control communications circuits in the same enclosure: Identify each conductor by its system and circuit designation. Use a consistent system of tags, color-coding, or cable marking tape.

M. Apply warning, caution, and instruction signs and stencils as follows:
1. Install warning, caution, and instruction signs where indicated or required to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved, plastic-laminated instruction signs with approved legend where instructions or explanations are needed for system or equipment operation. Install butyrate signs with metal backing for outdoor items.
2. Emergency-Operating Signs: Install engraved laminate signs with white legend on red background with minimum 3/8 inch (9 mm) high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

N. Install Identification as follows:
1. Apply equipment identification labels of engraved plastic laminate on each major unit of equipment, including central or master unit of each system. This includes communication, signal, and alarm systems, unless units are specified with their own self-explanatory identification. Except as otherwise indicated, provide a single line of text with 1/2 inch (13 mm) high lettering on a 1 1/2 inch (38 mm) high label; where two lines of text are required, use lettering 2 inches (51 mm) high. Use white lettering on black field. Apply labels for each unit of the following categories of equipment.
   a. Panel boards, electrical cabinets, and enclosures.
   b. Access doors and panels for concealed electrical items.
   c. Electrical switchgear and switchboards.
   e. Motor control centers.
   f. Motor starters.
   g. Push-button stations.
   h. Contactors.
   i. Remote-controlled switches.
   j. Dimmers.
   k. Control devices.
   l. Transformers.
   m. Telephone switching equipment.
   n. Clock/program master equipment.
   o. TV/audio monitoring master station.
   p. Fire-alarm master station or control panel.
   q. Security-monitoring master station or control panel.

2. Apply designation labels of engraved plastic laminate for disconnect switches, breakers, push-buttons, pilot lights, motor control centers, and similar items for power distribution and control components above, except panel boards and alarm/signal components where labeling is specified elsewhere. For panel boards, provide framed, typed circuit schedules with explicit description and identification of items controlled by each individual breaker.

END OF SECTION

SECTION 262000
ELECTRICAL EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

A. Work Included:
1. Provide all underground service conduits from the Utility Company's service point to the projects service equipment as indicated on the drawings and herein specified.

2. The Contractor shall consult the Utility Company before submitting bid to determine the exact location of the serving point and the work and material. The Contractor is required to leave the service installation complete and ready for cable installation without additional cost to the District. The service cable will be provided by the Utility Company and will be paid for by the District.

3. All work shall comply with the requirements of the Utility Company. Where required and indicated on the drawings, install outdoor transformer enclosure, pad and slab box, pull boxes or other equipment related to the service.
4. Transformers:
a. Transformers as specified and as indicated.
b. Provide mounting and seismic anchorage for all transformers complying with regulations of the State of California.

B. Switchboards and Protection Devices work Included:
1. Furnish, install and connect the switchboard, including metering facilities as required by the Power Utility Company.
2. All switchboards shall be complete with pull, service and distribution sections.
3. All protective devices shall have a minimum symmetrical short circuit interrupting rating, as described by the Utility and as indicated on the drawings complying with regulations of the State of California.
4. Provide mounting and seismic anchorage for all switchboards.

C. Panelboards Work Included: Lighting and power distribution facilities, including panel boards.

D. Motor Control and Control Devices Work included:
1. The connection to the terminals of motors, the furnishing and installation of disconnect switches, motor starters and control devices for motors.

D. Related Work:
1. Basic Electrical Requirements and Materials.
3. Excavating, Backfilling and Compacting.
4. Concrete.

1.02 REQUIREMENTS:

A. Comply with the requirements of the Utility Company having jurisdiction.

B. The interrupting capacity of the main circuit breaker and distribution circuit breakers shall be equal to or greater than the available short circuit current at the point as obtained by the Utility Company or computed by the Engineer. Selective coordination between main and all other feeder circuit breakers throughout the distribution system is required by the approved manufacturer of electrical power distribution equipment.

1.02 TRANSFORMER REQUIREMENTS:

A. Transformers, Dry Type: Distribution transformers shall be constructed and tested in accordance with ASA and NEMA Standards, and shall be wound with copper conductors. Performance of transformers shall be equal to or exceed ASA and NEMA published criteria.

B. Transformers shall be self-cooled type with Class H, NEMA, Group 111 insulation and a temperature rise of 150 ^{o} C under continuous full load conditions with an ambient of 400^{o} C.

Transformers supplying voltage to wave altering devices (computers, electronic ballasts, etc.) shall be K rated.

C. Transformers shall be equipped with four 2 1/2% taps (2 above and 2 below normal voltage). Windings shall be of the fire-resistant type, designed for natural convection cooling through normal air circulation.

D. Core mounting frames and enclosures shall be of welded and bolted construction with sufficient mechanical strength and rigidity to withstand shipping, erection and short circuit stresses.

E. Enclosure cover plates shall be Code gauge sheet steel, captive bolted to the enclosure framework. Enclosure shall have suitable ventilating openings with rodent-proof screens. Enclosure shall be provided with lifting lugs and jacking plates as required.

F. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, except cores and core mounting frames, shall be cleaned, rust-proofed and given a heavy coating of an inert primer.

G. Transformers used indoors shall be “low noise.” They shall be provided with vibration dampers. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.

1.03 MOTOR CONTROL AND DEVICES REQUIREMENTS:

Motor running protection of the manual reset type, as a separate device or as part of a motor starter and set at not to exceed 125% of the motor full load current rating, shall be provided for each motor exceeding 1/8 HP in size, except where indicated otherwise and except for the following: Motors of sufficient impedance to prevent overheating or failure to start (such as clock motors), and motors provided with an approved built in manual reset type device, responsive to

motor current and set at not to exceed 125% of the motor full load current rating, which will interrupt all current to the motor.

1.04 SUBMITTALS:

A. All submittals shall be made in accordance with Section 01300.
B. Product Data: Submit catalogs indicating make, capacity, size and catalog number for disconnect switches, motor starters and control devices.
C. Shop Drawings: Include make, catalog number, dimensions, finish, type, insulation, class design temperature and taps provided. Include regulation at 80% and 100% of full load, no load loss, full load loss, percent efficiency, percent impedance, noise level and continuous capacity rating. Provide a connection schematic.
D. Test Reports:
   1. No-Load Losses.
   2. Total Losses.
   3. Applied Voltage.
   4. Temperature Rise.
   5. Induced Voltage.
   6. Sound Level.
   7. Impulse Test.

E. Transformer Submittals:
   1. Include a front elevation showing the dimensions and the locations of the equipment on the switchboard, the make, kind and size or capacity of all equipment and bussing, the location of each service conduit entering the switchboard, all barriers, nameplate inscriptions, finish, total weight, size of switchboard, and locations and sizes of anchor bolts.
   2. Coordination curves shall be provided by the manufacturer for the main circuit breaker and all distribution circuit breakers in the power and lighting electrical distribution systems.
F. Record Drawings:
   a. Provide a single reproducible drawing of the project as installed, showing all circuit numbers.
G. Panelboards Shop Drawings: Include a front elevation, indicate circuit numbers, devices and ratings, cabinet dimensions, make, ratings, nameplate, location and capacity of equipment, size of gutters, type of mounting, finish and catalog number of locks.

1.04 DESIGN REQUIREMENTS:

A. Lighting and Appliances Panel boards:
   1. Lighting and appliance panel boards shall be wall-mounted, enclosed, safety type with 277/480 volts, 4-wire or 120/208 volts, 4-wire surface or flush mounting, neutral mechanical equipment ground and main as indicated on the drawings or specified. First panel boards of each separate building shall be provided with main and/or sub-feeder circuit breakers where so indicated or specified.
   2. Single-pole branches for 120/208 volt panels shall be molded case, bolt on, thermal magnetic circuit breakers with inverse time delay, trip-free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be rated 20 amps, 120 volts,

except where otherwise indicated on the drawings, and the amp rating shall be marked on the handle and indicate "ON - OFF" and tripped positions. Single-pole branches for 277/480-volt panels shall be the same as for 120/208-volt panels, except they shall be thermal magnetic circuit breakers only with higher voltage rating. Ground fault interrupters shall be incorporated into circuit breakers where indicated and shall be listed by Underwriters' Laboratory as a ground fault device.

3. Two- and three-pole branch circuit shall be enclosed and shall be bolt-on, thermal magnetic with inverse time delay, non-tamperable, ambient compensated, single handle with no tie-bar, common-trip, quick-make and quick-break mechanism with silver alloy contacts. Circuit breakers shall be rated as indicated on the drawings.
4. Main and subfeeder circuit breakers shall be enclosed, bolt-on thermal magnetic type with inverse time delay, single-handle common-trip, quick-make, quick-break mechanism, corrosion resistant bearings and silver alloy contacts. Amp frame size and trip rating shall be as indicated on the drawings. Breakers over 225 amperes shall have interchangeable trip units. The handles of main and subfeeder circuit breakers shall be under the cabinet door. Voltage rating shall be as indicated on the drawings.
5. All circuit breakers shall be one-piece, bolt-on type and shall meet the short circuit interrupting capacity requirements shown on the drawings. All one-pole, two-pole, three-pole circuit breakers shall be rated for minimum 10,000 amps interrupt capacity, unless otherwise indicated on the drawings.
6. All internal connections shall be made with plated copper bus bars, and the busses shall extend for the full length of the space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. All terminals shall have copper conductors. Panel boards fed by conductors having over-current protection greater than 200 amps shall be protected on the supply side by over-current devices having a rating not greater than that of the panel board.
7. Except where otherwise indicated, circuit breakers shall be in two vertical rows connected to the bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on the busses. Each single-pole branch shall be numbered adjacent to its circuit breaker with odd numbers on the left and even numbers on the right.
8. All specified circuit breaker spaces shall include necessary hardware required for future installation of the circuit breakers.

B. Panel board Cabinets:
   1. Panel board cabinets shall be Code gauge galvanized steel or blue steel; fronts, doors, and trims shall be code gauge furniture steel. The width of the cabinets shall be 20".
   2. Doors shall be cut true, shall accurately fit opening and finish smooth across the joints. Rabbets shall be inside. The hinges shall be entirely concealed, except for barrels and pins. Hinge flanges shall be welded to the door and trim. Each door shall be equipped with flush type lock, spring latching, Corbin lock for metal door, keyed to Yale LL 803 or LL 134.
   3. Where contactors, time switches and control devices are specified or indicated to be installed within panel board cabinets, a separate compartment and lockable door shall be provided at the top of the cabinet for such devices. The door shall be sized as required to permit removal of the contactor and other devices intact. Gutters shall be provided at the sides and top of the compartment.

C. Panel Board Schedule:

The Contractor shall prepare a neatly type written schedule with the number or name of the room or area of the equipment served by each panel board circuit. The room numbers or names used shall match those as determined at the site and shall not necessarily be those used on the drawings. The schedule shall also indicate the panel designation, voltage and phase, the building and distribution panel or switchboard from which it is fed. The schedule shall be mounted in a frame under transparent plastic 1/32" thick on the inside of each panel board cabinet door.

D. Signal and Communication Terminal Cabinets:
   1. All terminal cabinets shall conform in every respect to the Specifications for Panel board Cabinets, except as modified herein.
   2. All terminal cabinets shall be flush type, unless otherwise noted, with 2" trim and separate door with lock over each section, unless otherwise indicated or specified. Cabinets shall be provided with barriers to separate each system. Cabinets over 24" in width shall be provided with double door and lock. Each terminal cabinet, or section of a terminal housing a separate system, shall measure 12" wide x 18" high x 5 3/4" deep, unless otherwise indicated on the drawings. Trims for sectional cabinets shall be of one-piece construction.
   3. All terminal cabinets shall be equipped with 1/2" thick plywood backboards within the cabinets, and fastened in place with machine screws. Backboards shall be the largest size the cabinet and conduit terminations will permit.
   4. Flush mounting terminal cabinets shall be finished as specified for flush mounting panel board cabinets. Surface mounted terminal cabinets shall be finished as specified for surface mounting panel board cabinets.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Transformer Pads: Concrete transformer pads shall be provided as indicated on the drawings and as specified under the Concrete Section of the Specifications.

B. Service Conduits: As described under Section 16050 for utility wiring and must comply with all Utility Company's requirements.

2.02 TRANSFORMER EQUIPMENT:

A. Transformers shall be by Square D, General Electric, or equal dry type (interior) all- copper windings.

2.03 SWITCHBOARDS:

A. General Description: Switchboards shall be the products of Square D, General Electric or equal, unless otherwise specified (600 amp minimum, all copper components), and shall conform to the following requirements:
   1. All switchboards shall be floor standing, dead front, dead rear, line bussed, front operated and connected, circuit breaker type, unless otherwise indicated, and shall contain the equipment indicated and specified. Switchboard shall be complete with pull, service and distribution sections.

2. The required equipment shall be enclosed in fully interchangeable die formed steel sectional cabinets with top and bottom plates and required braces and gussets all welded together in such a manner that the cabinets will be absolutely rigid, plumb and uniform in size. Each cabinet shall be a separate and independent unit with all assembly holes die stamped or jig drilled and openings for interconnections so placed that any cabinet can be located at any position in the assembly without drilling or cutting holes on the job. Deliver the switchboard to the site in completely assembled sections and provide all required assembly bolts and blanking plates. The front plates and doors shall be die formed steel, of not less than 12 gauge furniture steel, completely removable, secured to the cabinet with oval head machine screws with cup washers, uniformly and symmetrically spaced.
3. Breakers shall be automatic, one-piece molded-case, trip-free, common-trip, quick-make, quick-break, thermal-magnetic type bolted to the bus with handles clearly indicating rating in amps and tripped position. Breakers shall have a single handle with no tie-bar. Voltage, amperage and number of poles shall be as indicated on drawings. Breakers shall have lock-out provisions approved by the State for padlocking and shall have a minimum symmetrical short circuit interrupting rating, as determined by the Utility Company and as indicated on the drawings.
4. The meter panel or plate shall meet all requirements of the respective serving Utility and shall be equipped with the fittings required by the serving Utility.
5. Provide silver plated copper bus bars of the capacity as indicated on the drawings between the current transformer and the main section and the distribution sections; also, the full height of the available breaker space in the distribution portions. Bus bar bracing shall be designed to withstand maximum available short circuit current. Provide service cable lugs as required by the Utility Company. Copper bus bars shall be rated at a minimum of 1000 amps per square inch of cross-sectional area. Heat test rating on the bus bars are not acceptable in lieu of the required cross-sectional area.
6. Provide a nameplate for each component on the switchboard. Plates shall indicate the designation of the service, or feeders controlled and the fuse size. Provide a similar nameplate for meters and transformer compartments.
7. Paint the cabinets, framework and all plates inside and out with one coat of rust resisting metal primer and one coat of grey enamel, baked on, or lacquer sprayed on.
8. Manufacture the boards according to standardized drawings and Specifications, which are available for checking, and prepare Shop Drawings and submit for approval. The switchboard shall meet the requirements of all legally constituted authorities having jurisdiction and the respective serving Utility.
9. For the grounded electrical wye service switchboard, provide ground fault protection for the main device. The ground fault protection shall be listed and approved by U.L. and shall consist of a ground sensor encircling all phase conductors and neutral connected to a solid state ground relay which initiates tripping of the circuit interrupting device. The manufacturer shall provide all necessary testing equipment at the site and perform a certified test on the ground protection system in the presence of the District Inspector, Electrical Engineer, and State of California Inspectors during a scheduled "pre-final" observation visit by the Electrical Engineer. All ground fault settings shall not exceed 10% of the main circuit board rating at .2 seconds, unless otherwise indicated.

B. Building Main Switchboard:

1. Building main switchboard shall be of the floor standing metal clad dead front type. Arrangement and construction shall be as indicated and specified. Design, construction and testing shall comply with all Code requirements and applicable ASA, AIEE and NEMA Standards. Structural elements of cubicles shall consist of standard rolled shapes or formed sheet steel members with a 12 gauge minimum thickness. Construction shall be of the bolted or welded type with sufficient mechanical strength to maintain rigidity under shipping, erection, or short circuit stresses. Cubicles shall be insulated and enclosed with captive bolted P & O Mill prime or cold rolled sheet steel covers. End cubicles shall be provided with blanking plates for future additions. Switchboard shall not exceed 91" in height, including wiring gutters or pull spaces. All steel work shall be sanded, cleaned, rustproofed and primed. Finish coating shall be factory standard. Construction marks or damaged surfaces shall be refinished at the job site to match original finish.
2. Bus work and connections shall be hard drawn copper bars having a minimum conductivity of 98%. Current density for copper shall not exceed 1,000 amps per square inch for connections. Continuous full load temperature rise shall not exceed Code and NEMA requirements. Bus structure shall be free fitted, and shall have sufficient strength and rigidity to withstand short circuits of the magnitude shown on the drawings, without damage or permanent distortion. Connections shall be silver plated and securely bolted together. Fastening bolts shall be nonmagnetic corrosion resistant plated steel or electrical bronze, secured with constant pressure type locking devices. Insulating supports shall be made of high strength impact resistant, flame retardant material. Connections for incoming and outgoing cables shall be supplied with heavy duty pressure type terminal lugs. Cables and internal wiring shall be supported with suitable bolted cleats. Arrangement of incoming and outgoing feeder cables shall be as shown on the drawings or as required. Neutral bus shall have terminals for all active, spare or inactive circuits.
3. Current transformer mounting facilities and metering mounting facilities shall be provided in accordance with Utility Company requirements.
4. Main fusible switch shall be quick-make, quick-break type and shall be equipped with current limiting fuses of the size and capacity indicated on the drawings. Main switch shall have a minimum short circuit interrupting rating of not less than the available symmetrical amperes determined by the Utility Company as indicated on the drawings.
5. Feeder branch circuit breakers shall be bolt-on molded case type, quick-make, quick-break, minimum 480 volts rated, with thermal magnetic trips of frame size and trip rating indicated on drawings. Feeder breakers shall have a minimum short circuit interrupting rating in symmetrical amperes as indicated on the drawings.
6. Nameplates shall be furnished for each device. A large nameplate identifying the switchboard, showing service voltage, function and current rating shall be supplied.
7. Provide a minimum of 1" grout under switchboards.

C. 120/208 volts Distribution Switchboards:
1. 120/208 volts Distribution Switchboards shall be of the convertible floor-standing metal clad dead front type for three-phase, four-wire service. Arrangement and location, including the number of circuit breakers, active and inactive spares, bussing and other details shall be as shown on the drawings or schedules. Circuit breakers shall be of the bolted-on molded case type, with thermal magnetic trips and shall be rated at 250 volts

with frame sizes, number of poles and trip settings shown on the drawings or schedules. Minimum interrupting capacity shall be as indicated on the drawings.

2. Temperature rise and current-carrying capacity of busses and parts shall be in accordance with NEMA Standards and NEC requirements. Components shall possess sufficient strength and rigidity to safely withstand any stresses imposed by shipping, erection or short circuits. Identification nameplates and cardholders shall be provided in accordance with the paragraph entitled "Identification of Circuits and Equipment." Neutral bar shall have terminals for all active, spare or inactive circuits.
3, Lock-off provisions shall be included for all circuit breakers. Padlocking device shall be permanently secured to the panel deadfront plate.
4. Provide a minimum of 1" grout under all switchboards.

D. Multi-pole Circuit Breakers: Multi-pole circuit breakers shall have a common operating handle. Construction shall be in accordance with Paragraph 2.01 B5. Phase sequence and circuit numbering shall be uniform. Temperature rise and current carrying capacity of parts shall be in accordance with NEMA Standards and NEC requirements. Components shall possess sufficient mechanical strength and rigidity to safely withstand any stresses imposed by shipping, erection or short circuits. Lock-off provisions shall be included for all circuit breakers.

2.04 CIRCUIT BREAKER ENCLOSURES:

Circuit breaker enclosures shall be U.L. listed, suitable for use as service entrance equipment. The short circuit current rating of an enclosed circuit breaker shall equal the interrupting rating of the supply components' upstream of the unit.

2.05 PANELBOARDS EQUIPMENT:

All panel boards shall be manufactured by Square D, General Electric or equal, unless otherwise specified by the District.

2.06 MOTOR CONTROLS AND CONTROL DEVICES EQUIPMENT:

A. Disconnect Switches:
1. Switches shall be 480 volts or 600 volts, totally enclosed, externally operated, with quick-make, quick-break operating mechanism, interlocked cover with provisions for locking the cover in the closed position and locking the switch in ON and OFF positions. Switches shall be single throw, unless otherwise indicated or specified.
2. Switch enclosure shall be general purpose NEMA Type 1 for indoor locations, and rain tight NEMA Type 3R for outdoor locations, except where otherwise specified. Switches shall be fusible or non-fusible as indicated on the drawings. Fusible switches shall accept cartridge fuses. Current rating of switches, number of poles, solid neutral facilities, and the current rating of fuses shall be as indicated on the drawings. Switches shall have the proper horsepower rating equal to or greater than the horsepower of the motor controlled. Only the lower horsepower rating of dual rated switches will be accepted as a switch rating.
3. A padlocking device shall lock the operating handle and cover with one padlock in both the ON or OFF positions. Switches shall be heavy-duty type, manufactured by General Electric, Westinghouse or Square D. Furnish one padlock and two keys with each switch. Padlock shall be keyed to Master 611 or M-20.
4. Motors 1/3 HP and less: Switches shall be of the toggle type, quick-make, quick-break, rated 2 HP, 250 volts, AC with the number of poles required, provided with wall plate for flush mounting, or in Code approved surface mounting NEMA enclosures. Switches and enclosures shall be weatherproof NEMA 3R when mounted outdoors.

B. Motor Starters:
   1. Motor starters shall be AC magnetic across line starters, unless otherwise indicated on the drawings.
   2. AC magnetic across the line starters shall have manual reset thermal overload protective devices, including heating elements and, unless otherwise indicated or specified, shall be housed in general purpose enclosures with start-stop-reset device or H.O.A. switch as indicated on drawings, built-in and operable from the front and low voltage protection. The NEMA size, voltage rating, number of poles, and special features shall be as indicated on the drawings. The horsepower rating of each starter shall be equal to or greater than the motor horsepower. Starters for motor circuits rated above 240 volts and which are controlled at locations other than the starter, shall be provided with a control circuit transformer having a 120 volts secondary as required. Combination magnetic starters are acceptable. Three-phase starters shall have three-element protection.
   3. Thermal switch starters shall be tumbler type with plaster ears, binding screws for wiring, standard size composition cups which fully enclose the mechanism, and shall be designed to fit standard outlet boxes. Thermal switches shall be fractional horsepower motor starters with thermal overload protective devices including heating elements and with handle providing ON-OFF-RESET control. The horsepower rating, voltage rating, and number of poles shall be determined from the motor horsepower and the voltage indicated on the drawings. Switches shall be key-operated where so indicated on the drawings. Furnish one key with each key type switch. The horsepower rating of each switch shall be equal to or greater than the motor horsepower.
   4. Relays used for directly controlling motors shall have general purpose enclosures, unless otherwise indicated or specified and shall be horsepower rated. The relay size, voltage rating and number of poles shall be determined from the motor horsepower and voltage indicated on the drawings.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. The service conduits shall terminate at the service point as indicated on the drawings and shall extend underground to the main service terminating pull section as indicated. All bends in the conduits shall be long radius type and all sweeps shall have a radius of not less than ten times the conduit trade size. Underground conduits shall be encased in concrete with a minimum 3” thick cover on all sides with multiple conduits spaced not less than 1 1/2” apart.

B. The service cable shall be connected to the service terminating pull section by the Utility Company.

3.02 CONDUITS CROSSING PUBLIC DEDICATED PROPERTY:

Where service or other conduits cross any public dedicated property, the Contractor shall make the necessary arrangements to open and close the public property and shall pay all costs in connection with the required licenses, permits, fees and deposits. The conduits shall be installed in a manner required by the authorities having jurisdiction.

3.03 STRUCTURAL CONDITIONS:

A. Where conduits are to pass through or interfere with any structural member, or where notching, boring or cutting of the structure is necessary, or where special openings are required through walls, floors, footings, or other building elements to accommodate the electrical work, all such work shall be done as directed and approved by the Architect or designated District representative.

B. The placement of conduits in concrete slabs and structural members shall comply with the requirements of the applicable Section of CCR Title 21, Public Works and shall be as approved by the Architect.

C. Where a concrete encasement for underground conduits abuts a foundation wall or underground structure which the conduits enter, the encasement shall be maintained in position in relation to the structure as indicated on the drawings, or rest on a haunch integral with the wall or structure, or shall extend down to the footing projection, or shall be doweled into the structure. Underground structures shall include pull boxes and buildings.

D. All cutting and patching of the rough and finish construction work shall be done as required for the installation of the work under this Section. Patching shall be of the same materials, workmanship and finish as, and shall accurately match the surrounding work. The work shall be done under the instruction of the Architect.

3.04 TRANSFORMER INSTALLATION:

A. Transformer core frame shall be installed level on shock absorbing pads within the enclosure.

B. Mounting bolts on floor-mounted transformers shall be extended into pads only and shall not be in direct contact with building structural members.

C. Flexible jumpers shall be installed for grounding continuity from enclosure to conduits.

3.05 TRANSFORMER VOLTAGE CHECK:

A. The Contractor shall set the taps on all transformers (which are a part of this contract) as necessary to provide satisfactory operating voltages with all present loads energized. A check shall be made in the presence of the District Inspector at a panel fed from each transformer and which is the farthest from the transformer. Voltages at the transformers ranging from 118 to 122 volts inclusive, for 120-volt systems and proportionately equivalent for higher voltage systems, are acceptable.

B. The Contractor shall provide all instruments and accessories required to perform the checks. Volt meters shall be accurate within 1% and shall have scales permitting the voltage readings to be made on the upper half of the scale. Calibration of the meters shall be satisfactory to the District.

3.06 SWITCHBOARD AND PROTECTION DEVICES INSTALLATION:

Torque valves for tightening of wire lugs or any wire/cable connections shall be the minimum as recommended by the manufacturer.

3.07 SWITCHBOARD AND PROTECTION DEVICES PADS AND ANCHORING:

Where free standing equipment is installed, concrete pads shall be provided as described under Division 3, Concrete, and as detailed on the drawings. Where a utility meter is housed in a switchboard, the pad shall extend 3' from the face of the switchboard door or board, whichever is greater. Anchor bolts for free standing equipment shall be designed to meet State Seismic requirements. Equipment shall be anchored to new slab with expansion bolts as indicated on the drawings. All anchor bolts shall be tested to withstand minimum torque as indicated on the drawings.

3.08 SWITCHBOARD AND PROTECTION DEVICES TESTING:

A. All systems of wiring shall be so installed that when completed, the systems will be free from short circuits and from grounds, other than required grounds. The Contractor shall provide all instruments for testing and shall demonstrate in the presence of the District Electrical Inspector that each system of wiring meets the following minimum requirements for insulation resistance;
   1. For circuits of No. 12 AWG or smaller - 1,000,000 ohms.
   2. For circuits of No. 10 AWG or larger conductors, a resistance shall be based on the following allowable current-carrying capacity of conductors:

25 to 50 amperes inclusive	250,000 ohms
51 to 100 amperes inclusive	100,000 ohms
101 to 200 amperes inclusive	50,000 ohms
201 to 400 amperes inclusive	25,000 ohms
401 to 800 amperes inclusive	12,000 ohms
Over 800 amperes inclusive	5,000 ohms

   3. The above values shall be obtained with all switchboards, fuse holders, switches, and over current devices in place and connected and all switches closed.

B. The Contractor shall provide a Meager insulation tester which applies a minimum of 500 volts direct current for the tests when requested by the District Inspector.

3.09 PANELBOARDS INSTALLATION:

A. Fronts shall be flush type, unless otherwise indicated and shall be fastened to the cabinets with 1/4" No. 20, nickel plated oval headed machine screws and cup washers. Sufficient screws shall be installed to prevent buckling or warping of the panel front. Flush type fronts shall be aligned plumb and square and cabinet shall be drilled and tapped for cover screws at the site to accomplish this if necessary.

B. All surfaces of flush mounted panel board cabinets shall be galvanized. The fronts shall be given two coats of metal primer, and a finish coat of baked on gray enamel and shall not be installed on the cabinets until after the finish coats of paint have been applied to the wall and cabinet fronts and they are thoroughly dry. Screws and cup washers shall not be painted.

C. All surfaces of surface mounted cabinets and fronts shall be given one coat of metal primer and a finish coat of baked on gray enamel.

D. Panel board cabinets shall be rigidly supported in place independent of the conduits.

3.10 PANELBOARDS, MODIFICTION OF EXISTING SURFACE MOUNTED PANELS:

A. When an existing flush mounted panel is to be abandoned. Remove existing bussing, breakers and covers. Install new panel with one of the following methods:
   1. Provide new weatherproof surface mounted cabinet over existing flush panel cabinet. New cabinet shall be sized to fit over existing panel with hinged padlock able door. Back cover of new cabinet shall be cut to fit the existing panel's opening. Make sure old panel has clean surface for a sufficient ground. All cut edges shall be grounded smooth. Drill edge of new cabinets back cover and existing panel front and secure with ¼ 20 nuts and bolts, lockwashers, new cabinet shall be used as a pull box. See detail E-1.
   2. Provide new weatherproof surface mounted panel on wall, new panel shall have breakers per panel schedule. Secure to existing wall next to new surface cabinet. Run between new panel and new cabinet: one 2" C with new feeders to new panel: two 2" c with new wiring as required to connect existing and new branch wiring. See detail E-3.
   3. Remove existing panel front, buss assembly, circuit breakers and ground bar, provide a new solid cover with a continuous gasket around parameter to blank off existing enclosure. New cover shall be manufactured of 12 ga. Sheet metal and shall be primer coated for final finish coat by the painting contractor. Attach new solid cover to existing panel enclosure with galv. Tamperproof screws. Contractor shall field verify exact dimensions of existing enclosure. Provide four 2-1/2" conduit nipples between existing panel. Pick up and extend existing feeders and all branch circuits to the new panel and reconnect to matching circuit breakers. Provide power distribution / terminal blocks as required. Bond and ground new panel per N.E.C. article 250.

END OF SECTION

SECTION 097200
WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
1. Provide all materials, labor, equipment and services necessary to furnish and install Vinyl Covered Tackboard Panels, accessories and other related items necessary to complete the Project as indicated by the Contract Documents unless specifically excluded

1.2 SUBMITTALS

A. Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:
1. Product Data.
a. Submit manufacturer's full color range (including any standard, premium and custom colors) of all Wall Coverings for selection by the Architect.
2. Samples.
a. Provide 6 inch square sample of each Wall Covering product for color and pattern selected.
b. Provide 6 inch lineal samples of each Wall Covering trim material specified.
3. Closeout Submittals in accordance with the following:
a. Warranty in accordance with Specification Section - WARRANTIES.

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's warranty requirements.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:

a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the project is located.
b. CBC California Building Code (CBC 803.1.1)

1.4 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
a. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.

1.5 PROJECT CONDITIONS

A. Environmental requirements:
1. Temperature: Maintain ambient temperature in space to receive products between sixty (60) degrees Fahrenheit and eighty (80) degrees Fahrenheit for three (3) days prior, during, and three (3) days minimum following installation. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.

1.6 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer's Warranty:
   1. In accordance with manufacturer's written standard warranty:
      a. Warranty Period — One (1) Year.

C. Installer's Warranty:
   1. In accordance with the terms of the Specification Section - WARRANTIES:
      a. Warranty period — One (1) Year.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.
   1. Specified Vinyl Covered Tackboard product manufacturer:
      a. CHATFIELD-CLARKE COMPANY, INC., a Divison of KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
      b. Acceptable alternative manufacturers:
         1) KOROSEAL SCHOOL COLLECTION as manufactured by KOROSEAL WALLCOVERINGS, as distributed through WESTERN BUILDING MATERIALS.
         2) LAMVIN INC.
   2. Specified Acoustical Panel product manufacturer:
      a. Low Impact Panels:
         1) LAMVIN INC.
      b. High Impact Panels:
         1) LAMVIN INC.
      c. Acoustical Wall Board Panels:
         1) ARMSTRONG.
      d. TECTUM Panels:
         1) TECTUM.

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

2.2 MATERIALS

A. Vinyl Covered Tackboard:
   1. Tackboard Size: 1/2" x 48" wide by maximum practical height to minimize joints.

a. Wood fiber substrate tackboard shall be 1/2" thick, cellulose fiberboard sheathing, beveled side edges and square end edges, in accordance with ASTM C 208 “Specification for Cellulosic Fiber Insulating Board”, complying with the minimum standards listed below:

1)	Weight, lb/1000 ft2	640
2)	Transverse strength, lbf	14.5
3)	Tensil Strength, lb/in2	242
4)	MOR, lb/in2	380
5)	"k" Factor	0.37
6)	Maximum Flame Spread - Class B	75
7)	Maximum Smoke Developed - Class B	175

2. Finish: Architect to select from manufacturer's standard textures and colors from the following series: Type I, Group 1.
   a. All vinyls used are to be 15 oz. total weight per lineal yard (Type I) with a cloth backer to insure consistent emboss.
      1) Class A vinyls shall be tested in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials", with the following maximum requirements:

a)	Maximum Flame Spread - Class A	25
b)	Maximum Smoke Developed - Class A	5

3. Edge:
   a. Beveled, long side edges with vinyl wrapped to back side. Short end edges to be square cut with vinyl flush with end of substrate board.
4. Accessories:
   a. Provide vinyl covered PVC moldings in the following configurations: edge, inside and outside corner, and intermediate splice moldings. Provide colors to match the field panels. Use of moldings and locations shall be indicated on the drawings.
5. Overall panel when wrapped with Class A vinyls shall meet flame spread and smoke developed index approval in accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials", as follows:

a.	Maximum Flame Spread - Class B	75
b.	Maximum Smoke Developed - Class B	175

6. Adhesive:
   a. In accordance with tackboard panel manufacturer's written recommendations, and in compliance with CARB Standards and VOC requirements.

B. Acoustical Panels:
1. Low Impact:
   a. Design: Standard Acoustical Panel by LAMVIN INC., or approved equivalent.
   b. Material: 7 lb density, rigid fiberglass covered by an acoustically transparent 100% woven polyester, 66 inches wide, 2-ply, 16 ounce fabric. Fabric is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
   c. Size: 1" thick panel with beveled edges - see drawings for widths and lengths.

d. Mounting: Laid directly against wall surface and secured mechanically with "Z" clips per manufacturer's written recommendations.
e. In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
   1) Flame Spread Index: Class A with a Flame Spread of 25 or under.
   2) Smoke Density Index: 0.
f. NRC in accordance with ASTM C 423 “Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method”.
   1) 0.85 to 0.95.
g. Color: As selected by Architect from manufacturer's standard colors.

2. High Impact:
   a. Design: Tackable High-Impact Acoustical Panel by LAMVIN INC., or approved equivalent.
   b. Material: 7 lb density/10-20 lb density smooth fiberglass face / fabric, rigid fiberglass covered by microperforated vinyl "Le Cirque" as manufactured by VICRTEX. Vinyl is bonded directly to the panel face with all edges wrapped a minimum of 1-1/2 inches to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
   c. Size: 1-1/8" thick panel with beveled edges - see drawings for widths and lengths.
   d. Mounting: Laid directly against wall surface and secured mechanically with "Z" clips per manufacturer's written recommendations.
   e. Flame Spread Index: Class A with a Flame Spread of 25 or under.
      1) In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
   f. Smoke Density Index: 0.
      1) In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials".
   g. NRC in accordance with ASTM C 423 “Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method”.
      1) 0.85 to 0.95.
   h. Color: As selected by Architect from manufacturer's standard colors.

3. Acoustical Wall Boards:
   a. "Soundsoak" Vinyl Wall Panels as manufactured by ARMSTRONG, or approved equivalent.
   b. Dimensions 2'-0" wide x full panel height x 5/8" thick.
   c. Mineral Fiber composition with plastic "H" spline for installation.
   d. Vinyl Covered. Color to be selected by the Architect from manufacturer's standard offering.

4. Custom:
   a. "TECTUM": Provide and install TECTUM panels (or approved equivalent), composed of aspen wood fibers bonded with an exclusive inorganic hydraulic cement binder, and is formed in a continuous process under heat and pressure.
   b. In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
      1) Flame Spread Index: Class A with a Flame Spread of 25 or under.
      2) Smoke Density Index: 0.

c. Edge Profile: Square edges all around.
d. Wall Panels: TECTUM wall panels, 2 feet by 2 feet by 1 inch thick.
e. Ceiling Panels: TECTUM ceiling panels, 23-3/4 inches by 47-3/4 inches by 1 inch thick.

C. Acoustical Carpet:
1. "Bedford Volume II" Acoustical Carpet as manufactured by BEDFORD, or approved equivalent.
a. Composition: Fossfibre 100 percent Solution Dyed Polyester Staple Fiber with fusible clear latex backing.
b. Width: 54".
c. In accordance with ASTM E 84 "Standard Test Method for Surface Burning Characteristics of Building Materials":
1) Flame Spread Index: 15.
2) Smoke Density Index: 15.
3) NRC in accordance with ASTM C 423 “Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method”.
4) 0.60 over acoustical board.
5) 0.20 over gypsum board.
d. Color: As selected by Architect from manufacturer's standard colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual, which affect the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

3.2 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's written instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.

3.3 INSTALLATION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.

B. Layout:
1. Lines shall be straight and true.

3.4 FIELD QUALITY CONTROL

A. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by Regulatory Requirements.

3.5 CLEANING

A. Clean in accordance with Specification Section - PROJECT CLOSEOUT.
1. Clean any soiled surfaces immediately.
2. Finish shall be clean and ready for the application of any additional finishes.
3. In accordance with manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 099000
PAINTING

PART 1 - GENERAL

1.01 REFERENCE:
Requirements in Addenda, Alternates, Conditions, and Division 1 collectively apply to this work.

1.02 DESCRIPTION:
A. Principal Work Items Are:
1. Complete application of paint to interior and exterior surfaces.
a. Unfinished materials.
b. Back-priming.
c. Metals, including certain hidden surfaces.
d. Woods and fabrications of wood.
e. Sheet metal.
f. Plaster, except where integrally colored.
9. Gypsum wallboard.
h. Doors.
I. Exposed piping, conduits, ducts, panels, mechanical and electrical equipment and items.
j. Visible roof-top equipment.
k. Miscellaneous items.
I. Concrete block.
m. Painted stripes at stairs, to conform to Handicap Requirements.
2. Application of finish coats to shop-primed metal surfaces:
a. Door louvers.
b. Pressed metal frames.
c. Hollow metal doors.
d. Coiling grilles.
3. Structural steel.

B. Some Surfaces Not To Be Painted:
1. In general, items with District approved integral finishes, approved plated finishes, approved complete factory finishes, except where otherwise indicated.
2. Finish hardware, except where primed for paint.
3. Integrally colored plaster.
4. Acoustical materials: Acoustic tile, acoustic panels, and exposed suspension grids.
5. Metal items:
a. Approved plated or factory finished items.
b. Anodized and color anodized aluminum.
c. Stainless steel.
d. Toilet partitions.
e. Factory finished steel or aluminum frame sliding glass doors.

f. Passenger lift doors, frames and cars.

C. Related Work Specified Elsewhere:
1. Materials and items which receive paint: Respective Sections.
2. Factory finished items: Respective Sections.
3. Pavement Marking: Section O2584.
4. Finish Carpentry: Section 06200 and Hardware removal and replacement in coordination with painting work: Section O6200.
5. Factory finishing of Custom Casework: Section 06410.
6. Joint Sealers: Section 07900.
7. Paint Materials List: Section 09901.
8. Custom Casework: Section 06410.
9. Electrical fixture trim and plates removal and replacement in coordination with painting work: Division 16.

D. Definitions:
1. DFT: Abbreviation for dry film thickness.
2. Concealed Ungalvanized Steel: Defined in Paragraph 3.06B.
3. Paint: A collective general reference to include all materials of every component for finishing systems of every type, and preparation of surfaces for and application of said materials.
4. Rough-surface wood: Rough-sawn, re-sawn, or sandblasted woods.
5. Visible roof-top equipment: Mechanical and electrical equipment, piping, ducts, conduits, panels and other materials exposed on building roof tops which can be seen by a person standing on the earth's surface at any point within 1,000' of any building.

1.03 SUBSTITUTIONS:
Only written approval of the will permit substitutions for materials specified. Refer to Section 00700, Article 30, Substitutions, for procedure.

1.04 QUALITY ASSURANCE:
A. Reference Standards: Steel Structures Painting Council-Surface Preparation Specifications (SSPC-SP).

B. Job Mock-Up, Supergraphic Designs: Layout designs full-size on indicated walls, revise as required by District. Obtain District's approval prior to doing any finished work.

1.05 SUBMITTALS:
A. Samples
1. Number required: Three each.
2. Paints and enamels:
a. Typical: Each type, in each selected color; 8" x 10" size on stiff smooth material typical; on sandpaper for rough surfaces.
b. Stipple enamel: Each selected color District approved, roller texture on 12" x 24" piece of drywall.

3. Stains, varnishes, lacquers: Each finish type on each specie and texture of wood; 8" x 10" size for plywood, 16" length for casing or boards, show clearly each step of finishing process.
4. Make samples by same methods to be used to produce actual work. Samples will be examined for color, texture, and workmanship.
5. Re-make and re-submit samples when required for approval.

B. Product Data: Complete list of all paint materials.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING:

A. Deliver in sealed containers. Manufacturer, brand name, product, and use instructions clearly identified thereon.

B. Store in assigned spaces.

C. Handle to prevent damage during storage and use.

1.07 JOB CONDITIONS:

A. Environmental Requirements:
1. Follow manufacturer's printed recommendations for product when they are more stringent than limits stated herein.
2. Do not apply materials when temperature is below 50□ F or above 110□ F.
3. Do not apply materials when RH is above 90%.
4. As necessary to provide air movement, aid drying, disperse noxious fumes.
5. Do not apply paint to wet-applied construction until such work is dry, and acceptable to District and paint manufacturer.
6. Do not apply exterior paint in rainy, damp, misty, smoggy, or excessively windy weather.
7. Do not apply paint in areas where dust is being generated.

B. Protection:
1. Cover or otherwise protect finished work of other trades, work not to be painted concurrently, landscaping, and adjacent property from damage.
2. When not in use, store paints in designated areas. Keep containers closed. At end of day's work, remove empty containers, paint soaked rags, and debris. Vent fumes. Take precautions to prevent fire.

C. Sequencing, Scheduling:
1. Coordinate removal and replacement of hardware, electrical fixtures and trim, and related work of other Sections.
2. Stain, prime, back paint, and pre-finish items before installation as required.

D. Cleaning and Disposal:
Do not use Project plumbing fixtures or piping systems for:
1. Cleaning painting equipment and utensils.
2. Disposal of waste from cleaning or disposal of paints.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Acceptable Manufacturers and Products:
   1. Materials shall be those listed in Paint Materials List Specifications, Section 09901.
   2. Each material type to be same manufacturer throughout. All materials in a coating system to be by a single manufacturer.
   3. Brand Names: Shall constitute a standard of quality.
   4. Other Manufacturers: Refer to Paragraph 1.03, Substitutions.

B. Colors:
   1. As selected by, using ICI/Sinclair color and finish systems as a standard.
   2. Concrete block: As selected by District using Triarch Industries, Incorporated and Pittsburgh Paints color and finish systems as a standard.
   3. A number of colors (8 minimum to 12 maximum) will be selected, arranged in various combinations, used to accent trim and other Architectural features, and colors and combinations will vary from exterior-to-interior, space-to-space, surface-to-surface, material-to-material, feature-to-feature.
      a. Supergraphic designs: Two additional colors may be selected.
   4. Colors to be factory mixed, and to match approved samples.
   5. Tint undercoats sufficiently different so that they are readily distinguishable in any light from each other and the finish coat.

2.02 CONCRETE BLOCK AT INTERIOR:

A. Acceptable Manufacturers and Products:
   1. Triarch Industries, Incorporated.

B. Materials and Products:
   1. DUROPLEX acrylic coating finish, (Smooth Sand; SPRAYTEK II over undercoat).

C. Spray Pattern; SPRAYTEK over undercoat (DS-IV texture).

2.03 MIXING:

A. Follow manufacturer's printed recommendations.

B. Mix all paints thoroughly prior to application.

C. Mix only in Inspector's presence in assigned spaces.

D. Except where thinning is specifically recommended by manufacturer, do not thin products.

PART 3 - EXECUTION

3.01 INSPECTION:

A. Examine surfaces for suitability to receive paint. Prior to application of any paint, surfaces to be cleaned free of dust, corrosion, and other foreign matter.

Sand, scrape, fill and repair surfaces flush with suitable materials. Fill voids between adjoining surfaces flush with suitable fillers.

B. Wood:
   1. Clean solid surfaces.
   2. Except for rough-surface finishes, sand to a smooth even finish and dust clean.
   3. Seal knots, pitch spots, and resinous sapwood with shellac or knot sealer before priming.
   4. Puttying:
      a. Do after first priming coat is dry.
      b. For transparent or stained work, color putty to match finish.
      c. Fill flush all nail holes, open joints, cracks and other defects.

C. Drywall:
   Fill any cracks or defects with drywall joint compound or speckle. Sand any rough spots smooth. Do not raise nap on paper covering.

D. Portland Cement Plaster:
   Where surfaces alkali is present, wash surface clean with zinc-sulphate in water solution. Fill cracks and defects with cement grout, match surface texture. Small defects may be filled with exterior speckle.

E. Concrete:
   Brush and wash with clean water to remove laitance, efflorescence, from oil bond breaker, and other foreign matter. Fill cracks and defects with cement grout; match surface texture.

F. Galvanized Metal:
   1. Cleaning: Solvent clean per SSPC-SP, No. 1, Solvent Cleaning.
   2. Vinyl wash: Apply Dunn-Edwards Galva-Etch, No. GE-123. Follow manufacturer's directions.
      a. Application: Mop or brush-apply in a thin even coat. Remove excessive solution from surface with rags, squeegee or sponge. When using full strength, rinse surface with water.
      b. Thinning: Use water, do not reduce solution beyond three parts water to one part Galva-Etch.
      c. Drying: One-half hour minimum and four hours maximum before priming.

G. Ungalvanized Shop Primed Structural Steel:
   1. Cleaning method: Clean member free of corrosion, loose paint, and foreign matter by either SSPC-SP, No. 2, Hand Cleaning or SSPC-SP, No. 3, Power Brush Cleaning at the Project site after steel is erected.
   2. Touch-up paint, with compatible primer, all abraded, damaged, or uncoated areas.

H. Ungalvanized Shop Primed Metals Other Than Paragraph G Above:
Clean free of all loose paint and foreign matter. Touch-up paint, with compatible primer, all abraded, damaged, or uncoated areas.

I. Factory Finished Equipment and Items:
Where indicated to receive job-applied finish coats, sand or etch factory finish as required for proper paint adherence.

J. Concrete Block:
Substrate shall be cleaned of dust, oils, and other substances that might reduce adhesion of the finish material.

3.03 APPLICATION:

A. Workmanship:
1. Execute all work with skilled craftsmen.
2. Evenly apply all coats with suitable equipment, well flowed on, free of laps, runs, skips, dead spots, and other imperfections. Last coat to present a uniform surface, color and texture.
3. Stipple texture to be as approved by District.

B. Manufacturer's Printed Recommendations:
Follow where more stringent than limits specified herein.

C. Equipment:
Brushes, rollers, and spraying equipment as required and suitable for material being applied; keep clean and in proper operating condition.

D. General:
1. Paint and color areas per District's color schedules.
2. Mask and cut-in as required to accomplish the various color combinations. Make edges of paint clean and sharp (no overlaps) where they adjoin other colors or materials.
3. Paint entire surface parts and items including reveals, returns, rebates, soffits, projections, openings, and ornamental features.
4. Do not apply initial coating until moisture content of surface is within paint manufacturer's recommended limits.
5. Do not apply next coat until previous coats are properly cured and prepared to receive them.

E. Examination of Work:
1. Refer to Paragraph 3.04, Field Quality Control, for required examination of work.
2. Notifies Inspector when work is ready for examination.
3. Do not proceed with next operation until required examination has been made.

F. Number of Coats:
1. Specified number is the minimum number to be applied.

2. Contractor shall, at his expense, apply additional coats as directed by District if:
   a. Contractor does not produce full even coverage and/or required dry film thickness with specified number of coats.
   b. Contractor applies a coat before Inspector has examined previous coat.

G. Dry Film Thickness:
DFT thickness stated in Paragraph 3.06, Schedule of Paint Finishes, is the minimum thickness to be applied and must be increased to manufacturer recommended thickness when such exceeds the thickness stated herein.

H. Drying Time:
Minimum interval between coats shall be the most stringent of the following conditions.
1. Until coat is dry.
2. Manufacturer's printed recommendations.
3. Three days for exterior work, two days for interior work, except where other time requirements are specifically stated in manufacturer's printed recommendations.

I. Preparation Work Between Coats:
Prepare each coat to receive succeeding coat:
1. General: Repair defects, sand, dust, wipe clean.
2. Wood, enameled: When dry, lightly sand smooth.
3. Wood, varnished or lacquered: When dry, steel wool smooth.
4. Plaster and concrete: Neutralize suction spots or hot spots then touch up so coat surface is uniform.

J. Back-Priming:
1. Immediately upon delivery to Project site, back-prime all surfaces which will be concealed after installation for following items: exterior and interior finish lumber and millwork, door frames, trim, plywood wall lining and paneling.
2. Painted or Enameled Work: One coat clear sealer.
3. Work With Stained Finish: One coat linseed oil.
4. Keep back-priming off exposed faces.

K. Priming:
1. General: Prime work as soon as possible after surfaces are prepared.
2. Ungalvanized Steel: Prime immediately after cleaning on the same day.
3. Galvanized Sheet Metal: Prime immediately after erection.
4. Exterior and Interior Woodwork: Prime immediately after erection.
5. At Glazing: Paint all glass beads, stops and rebates, except for aluminum.

L. Application Methods:
Apply by brush or roller, except as listed below:
1. Enamel: to doors: Roller only.
2. Enamel: Roller typically.
3. Stipple enamel: Roller only, with District approved texture.

4. Varnish or lacquer: Spray.
5. Exterior wood stains: Apply by brush or roller only. Work well into surface, especially on rough surface woods.

M. Doors:
Finish faces, edges, top, and bottom. On wood doors, apply first coat to all parts at the same time. At exterior doors, paint interior face with same material used on the exterior face.

N. Colors:
Make color changes at inside corners typically. Paint to a clean straight line.

3.04 FIELD QUALITY CONTROL:

A. Examination of Work (By Inspector):
1. Surface preparation--prior to application of prime coat.
2. Each coat--prior to application of succeeding coat.
3. Final coat and finished work.

3.05 ADJUSTMENT AND CLEANING:

A. Cleaning:
1. Clean surfaces as work progresses.
2. Remove all paint spillage and droppings and stains as soon as possible.
3. Do not use tools or cleaners, which will mar finish of item being cleaned.
4. Leave work and paint storage area clean and free of droppings, stains, dirt or defacements resulting from this work.

B. Correction of Defective Work:
1. Repair abraded, damaged or incomplete paint surfaces by methods acceptable to District. Spot repairs to be well-blended into adjacent work. For large repairs, re-coat entire plane or building element in which damaged area occurs.
2. Defaced surfaces of work not to be painted shall be cleaned and their original finish restored.

3.06 SCHEDULE OF PAINT FINISHES:

A. Reference: Refer to Paragraphs 3.03, F and G, regarding number of coats and DFT.

B. Metal Work, Exterior and Interior:
1. Galvanized Metal Exterior and Interior:
a. Coat 1: Zinc Dust Primer or Oil-Cementitious Primer. If Oil Cementitious Primer is used, it shall be re-coated within 48 hours in accordance with the manufacturer's recommendations.
b. Coat 2: Sash and trim.
c. Coat 3: Sash and trim.
d. DFT: Five mils.

2. Ungalvanized Shop Primed Structural Steel, Exposed On Building Exterior: Apply prime coat immediately after steel is cleaned.
   a. Touch-Up: Spot prime any abraded, damaged, rusted, or uncoated areas with rust inhibitive primer for ferrous metals.
   b. Coat 1: Rust Inhibitive Primer For Ferrous Metals.
   c. DFT For Coat 1: 1.3 mils.
   d. Coat 2: Sash and trim.
   e. Coat 3: Sash and trim.
   f. DFT For Coats 2 + 3: 3 mils.
3. Ungalvanized Shop Primed Structural Steel, Exposed On Building Interior:
   a. Touch-up: Spot prime any abraded, damaged, rusted, or uncoated areas with rust inhibitive primer for ferrous metals.
   b. Coat 1: Sash and trim.
   c. Coat 2: Sash and trim.
   d. DFT: 4.5 mils.
4. Ungalvanized Shop Primed Structural Steel, Concealed: Touch-up by spot priming any abraded, damaged, rusted, or uncoated areas with rust inhibitive primer for ferrous metals.
5. Shop Primed Metals and Door Louvers, Exterior and Interior, Except For Subparagraphs 2, 3, and 4 above:
   a. Coat 1: Sash and trim.
   b. Coat 2: Sash and trim.
   c. DFT: Three mils.
6. Factory Finished Equipment and Items, Exterior and Interior:
   a. Coat 1: Sash and trim.
   b. DFT: 1.5 mils.
7. Visible Roof-Top Equipment: Refer to definition in Paragraph 1.02, D.
   a. Paint the various materials, items, and equipment per requirements of Paragraph 3.06, B, Metal Work, Exterior and Interior.

C. Exterior Work, Other Than Metals:
   1. Wood Typical:
      a. Coat 1: Exterior wood primer.
      b. Coat 2: Sash and trim.
      c. Coat 3: Sash and trim.
      d. DFT: Five mils.
   2. Surface Trim, Wood, And Plywood:
      a. Coat 1: Exterior wood stain, opaque.
      b. Coat 2: Exterior wood stain, opaque.
      c. Application Rate: 150 SF per gallon per coat.
   3. Surface Plywood Siding:
      a. Coat 1: Exterior wood stain, opaque. Prime all surfaces of all pieces completely before installation (faces, edges, ends).
      b. After installation, inspect members; touch-up any damage, cuts, and nail holes.
      c. Application Rate: 150 SF per gallon per coat.

4. Surface Boards Over Plywood at Building Fascias and Certain Building Walls, Both Stained Same Color:
   a. Finish: Exterior wood stain, opaque.
   b. Coat 1, Plywood: Apply stain after plywood is installed, but before any boards or trim are installed over plywood.
   c. 2 x 3 Boards:
      1. Boards to be cut to size by Carpentry Section prior to any staining.
      2. Coat 1: Prime stain all surfaces of all pieces completely before installation (faces, backs, edges, ends).
      3. Touch-Up: After installation over plywood by Carpentry Section, inspect members, touch-up stain any damage, cuts and nail holes.
   d. Coat 2, All Parts: Apply stain to all exposed wood and plywood surfaces.
   e. Application Rate: 150 SF per gallon per coat.
5. Exposed Structural Plywood Sheathing At Roof Screens Smooth Surface:
   a. Coat 1: Exterior wood stain, opaque.
   b. Coat 2: Exterior wood stain, opaque.
   c. Application Rate: 250 SF per gallon per coat.
6. Soffit Construction Behind Screen Vents:
   a. Coat 1: Exterior wood stain, opaque; black color.
   b. Application Rate: 250 SF per gallon per coat.
   c. Apply to all construction, which will be visible through installed vents. Apply prior to installation of screen.
7. Plaster Smooth Troweled Finish:
   a. Coat 1: Exterior masonry finish.
   b. Coat 2: Exterior masonry finish.
   c. DFT: 2.3 mils.
8. Concrete Exposed Foundation Walls and Curbs, Recessed Letters at Sandblasted Concrete Name and Office Signs:
   a. Coat 1: Concrete sealer.
   b. Coat 2: Exterior masonry finish.
   c. Coat 3: Exterior masonry finish.
   d. DFT: 3.6 mils.
9. Plastic Condensate Piping and Other Plastic Piping Exposed On Rooftops:
   a. Coat 1: Chlorinated rubber base paint.
   b. Application Rate: One coat to cover.
10. Building Dado (8' Height):
    a. Coat 1: Light tack coat.
    b. Coat 2: Semi-gloss enamel.

D. Interior Work, Other Than Metals:
   1. Softwood Typical:
      a. Coat 1: Enamel undercoater.
      b. Coat 2: Sash and trim.
      c. Coat 3: Sash and trim.
      d. DFT: Four mils.

2. Hardwood Doors and Handrails, Softwood Casework Where Not Factory Finished:
   a. Sealer: At Contractor's option and expense, Clear Sealer may be used as an aid in obtaining a uniform stain color.
   b. Coat 1: Oil Stain, or wiped white glaze, as selected by District.
   c. Coat 2: Gloss varnish. Sand smooth.
   d. Coat 3: Gloss varnish. Steel wool smooth.
   e. Coat 4: Satin varnish.
   f. DFT: 3.5 mils.
   g. Lacquer Option: With specific approval of District, lacquer may be used in lieu of varnish.
3. Rough Surface Wood and Trim:
   a. Coat 1: Exterior wood stain, semi-transparent.
   b. Coat 2: Exterior wood stain, semi-transparent.
   c. Application Rate: 150 SF per gallon per coat.
4. Rough Surface Board On Plywood Wall Treatment:
   a. Coat 1: Exterior wood stain, semi-transparent. Prime all pieces completely before installation (faces, edges, and ends). After installation, inspect members, touch up any damage, cuts, and nail holes.
   b. Coat 2: Exterior wood stain, semi-transparent. Apply to all exposed surfaces.
   c. Application Rate: 150 SF per gallon per coat.
5. Plywood Wall Lining At Storage Areas:
   a. Coat 1: Exterior wood stain, semi-transparent.
   b. Coat 2: Exterior wood stain, semi-transparent.
   c. Application Rate: 250 SF per gallon per coat.
6. Hardboard Panels At Integrated Ceiling:
   a. Coat 1: Clear methacrylic lacquer.
   b. Apply before items are installed.
7. Concrete; Exposed Foundation Wall and Curbs:
   a. Coat 1: Concrete sealer.
   b. Coat 2: Exterior masonry finish.
   c. Coat 3: Exterior masonry finish.
   d. DFT: 3.6 mils.
8. Drywall Walls; Typical:
   a. Coat 1: Latex sealer.
   b. Coat 2: Enamel undercoater.
   c. Coat 3: Stipple enamel, semi-gloss. Apply with a District approved heavy-texture stipple roller.
   d. DFT: Five mils.
9. Drywall Ceilings, Soffits, and Beams:
   a. Coat 1: Latex sealer.
   b. Coat 2: Flat wall latex.
   c. Coat 3: Flat wall latex.
   d. DFT: Four mils.
10. Drywall Walls and Ceilings At Janitor's Rooms, Toilets, Storage Rooms,

And Kitchen:
a. Coat 1: Latex sealer.
b. Coat 2: Enamel undercoater.
c. Coat 3: Stipple enamel, semi-gloss. Apply with a District approved heavy-texture stipple roller.
d. DFT: Five mils.

11. Painted Strips At Interior Concrete Stairs, Conform To State Handicap Requirements:
    a. Coat 1: Traffic paint.
    b. Coat 2: Traffic paint.
    c. Application Rate: Two coats, at 400 SF per gallon per coat.
    d. Stripes: 2" wide, located 1" maximum from and parallel to nosing.
    e. Required Locations: Bottom tread and upper approach of each flight of stairs and landings.
12. Concrete Block: Interior.
    a. SPRAYTEK II over undercoat.
        1. Coat 1: Primer, undercoat with hopper or other equipment qualified for heavy bodied material to a minimum thickness of 20 mils.
        2. Finish Coat: SPRAYTEK, minimum thickness of 10 mils.
        3. Texture: Smooth sand; DS-IV Texture.
    b. Water-base Acrylic-epoxy
        1. Pittsburgh Paints; Pitt-glaze, (tinted).
        2. Wet film; 20 to 40 mils thickness as required to fill the surface. Films in excess of 25 mils wet should be applied in two coats to facilitate their cure.
13. Special Paint and Varnish Areas:
    a. Kitchen and cafeteria.
    b. Walls and ceiling: High Gloss Enamel.
    c. Pool areas: Marine Epoxy, High Gloss.
    d. Shower and locker areas: Marine Epoxy, High Gloss.
    e. Playground equipment: High Gloss Enamel.
    f. Lunch benches: High Gloss Enamel.
    9. Furniture, cabinetry and trim: McCloskey Varnish, Plastic, Semi gloss.
    h. Gym floors: Hockwald Varnish.
    I. Wood floors: Hockwald Varnish.
    j. Bleachers: McCloskey Varnish, Gloss Spar.

E. Mechanical and Electrical Work:
    1. General: Unless otherwise specified herein, paint all exposed mechanical, plumbing, fire sprinklers, and electrical equipment, apparatus, piping, conduit, fittings incidental thereto, and coverings applied thereto as specified above in Paragraph 3.06, B, Metal Work, Exterior and Interior.
        a. Finished rooms and spaces: Paint equipment, panel boards, and all other items to match room finish.
        b. Unfinished rooms and spaces: Same requirements as “Finished Rooms and Spaces,” except that equipment, panel boards, and other items with complete

factory-applied paint finishes need not be painted.

c. Do not paint out nameplates, labels, or stamped designations of sizes, qualities, standards and manufacture on pieces of equipment.
d. Do not paint canvas connections between fans and ducts.
e. Do not paint brass fittings, rough or polished, plated or non-plated.
f. Items mounted in floors: Paint cover plates to sumps and pipe trenches, and manhole covers and rings mounted in floors, and similar items two coats of cement color floor paint.
9. Exposed exterior items: Paint per Paragraph 3.06, B.
h. Painting flat black: Paint two coats flat black color as far back as visible the inside surfaces of ducts, dampers, louvers, vents, and similar items.
I. Plumbing fixtures: Paint unfinished exposed surfaces to match adjoining walls.
j. Main sprinkler riser: Paint bright red color.
k. Sprinkler head canopies: Paint to match color of adjacent surfaces, unless canopies are chrome-finished or stainless steel.
l. Paint work not specifically mentioned shall be as specified for work of similar character.

3.7 MATERIALS GENERAL:

A. Standard Materials and Finishes: Use pure unadulterated factory-mixed material delivered to site in unopened containers bearing manufacturer's name and brand; colors, as selected by District, shall be factory-mixed.
1. Manufacturers shall verify that their products conform to latest California Air Resources Board regulations.

3.8 2.0ACCEPTABLE MANUFACTURERS AND PRODUCTS:

A. General:
1. All materials used in the work shall be a proprietary brand of one of the manufacturers listed below for each type.

B. Metal Primers:

MANUFACTURER	PRODUCT
1. Zinc Dust:	
Sherwin-Williams	B69A8 Zinc-Clad IV
Kelly Moore	Devoe 1405
2. Oil-Cementitious:	
Sherwin-Williams	B66-310 ProCryl Universal Primer
Dunn Edwards	Galv-Alum White Anti-Corrosion Primer #43-7
TNEMEC	Series 22 Galv-Gard Oil

	Cementitious Exterior Coating
Ameritone Mirrolac	Galvanized Metal Primer#13201
Kelly Moore	Devoe 1405

3. Rust-Inhibitive Primer for Ferrous Metals:

Dunn Edwards	Block-Rust Red Oxide Primer #43-4
Sherwin-Williams	DTM Primer/Finish B66W1
Kelly Moore	Devoe/Devprime 1404

C. Exterior Wood Primers:

1.	Dunn Edwards	Apex Extr. Primer # 42-9
2.	Sherwin-Williams	ProBlock Latex Primer B51W20
3.	Kelly Moore	Acryshield 225

D. Exterior Surfaces - Acrylic Enamel:

1.	Dunn Edwards	Permasheen Semi Gloss W901
2.	Sherwin-Williams	A-100 Gloss A8 Series
3.	Kelly Moore	Acryshield 1250

E. Semi-Transparent Exterior Wood Stain; For Interior Wood; Must Be An Oil-Base Stain:

1.	Dunn Edwards	Rancho-Hues, #17 Series Semi-Transparent
2.	Sherwin-Williams	WoodScapes Ext. Semi-Transparent Stain A15T5
3.	Kelly Moore	Acryshield 1285

F. Opaque Exterior Wood Stains; For Exterior Wood; Must Be An Oil-Base Stain:

1.	Olympic	Exterior, Solid Color Stain
2.	Sherwin-Williams	WoodScapes Ext. Solid Color Stain A15W50 Series
3.	Kelly Moore	Storm #4 Enduradeck

G. Exterior Masonry Finish:

1.	Dunn Edwards	Evershield #W 701-1; 100% acrylic
2.	Sherwin-Williams	A-100 Flat A6 Series
3.	Kelly Moore	Acryshield 1240

H. Sealer; Latex:

1.	Dunn Edwards	Vinylastic Pigmented Wall Sealer W-101
2.	Sherwin-Williams	ProMar 200 Zero Primer B28
3.	Kelly Moore	PVA Sewler 971

I. Sealer; Concrete:

1.	Dunn Edwards	Eff-Stop Concrete Sealer W-709.
2.	Sherwin-Williams	Loxon Masonry Primer A24W300
3.	Kelly Moore	Acryshield Exterior Masonry 247

J. Interior Finishes:

1. Enamel Undercoater. Interior:

a. Dunn Edwards — Enamel Undercoater #42-31 or E22-1 Super-U 365
b. Sherwin-Williams — Water Reducible Alkyd Primer B49WJ1100
c. Kelly Moore — Zinser / Coverstain

2. Enamel Semi-Gloss Stipple:
   a. Sherwin-Williams — ProMar 200 Zero B31
   b. Dunn Edwards — Semi-Gloss Stipple Enamel #8-14
   c. ICI/Sinclair — Semi-Gloss Stipple #782

   Color Selection: Dunn Edwards, Navajo White 60.

3. Lacquer Sanding Sealer: High Solids:
   a. Dunn Edwards — Lacquer Sanding Sealer #LQ-101
   b. Sherwin-Williams — Lacquer Sanding Sealer B44MJ91
   c. Kelly Moore — Gemini Lacquer System

4. Interior Lacquer System:
   a. Dunn Edwards — Lacquer Clear (gloss #LQ-103) (Semi-gloss #LQ-104) (Flat #LQ-105)
   b. Sherwin-Williams — Gemini Lacquer System
   c. Kelly Moore — Gemini Lacquer System

5. Interior Varnish System:
   a. Dunn Edwards — Pale Synthetic Varnish: Gloss #V-197; Satin #V-199
   b. Sherwin-Williams — WoodClassics Waterborne Polyurethane Varnish A68-90 Series
   c. Kelly Moore — Interior Clear Old Masters System

6. Clear Sealer:
   a. Dunn Edwards — Reinseal Clear Sealer #V-195
   b. Sherwin-Williams — WoodClassics Waterborne Polyurethane Varnish A68-90 Series
   c. Kelly Moore — Exterior Clear Varnish / Old Masters System

K. Traffic Paint:
1. Dunn Edwards — "Vin-L-Stripe'' #W-801, vinyl-epoxy.
2. J.E. Bauer — Latex base; formulas #1030A9 white, #1056A9 Yellow, #1865A9 blue, #1118A9 Green, and #1854A9 Red.
3. Kelly Moore — Alkyd Traffic Paint System 1475
4. Sherwin-Williams — Set Fast Traffic Marking Paint
   a. Color Selection:
      1) Text: White.
      2) Parking Dividers: White.
      3) No Parking Zones: Yellow.
      4) No Parking Curb: Red.

5) Handicap Zones: Blue.
6) Directional Arrows: White.
7) Driving Lane Dividers: White.
8) Playground Striping: Beige or Green.
9) Blue paint for Handicap shall match No. 15090 in Federal Standard 595A.
10) Traffic Paint 1475 – Kelly Moore

END OF SECTION

SECTION 00 00 11 – SECTION NAME

PART 4 - GENERAL

4.3 RELATED DOCUMENTS

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

4.4 SUMMARY

A. This Section includes the following:
1. Provide all material, labor, equipment and services necessary to completely install all [***Insert description here***] materials, accessories and other related items necessary to complete the Project as indicated by the Contract Documents.

a) Related Sections: The following Project Manual Sections contain requirements that relate to this section:
2. ALL DIVISION 00 SPECIFICATION SECTIONS.
3. ALL DIVISION 01 SPECIFICATION SECTIONS.
4. ALL SPECIFICATION SECTIONS IN THE FACILITY CONSTRUCTION SUBGROUP.
5. ALL SPECIFICATION SECTIONS IN THE FACILITY SERVICES SUBGROUP.
6. ALL SPECIFICATION SECTIONS IN THE SITE AND INFRASTRUCTURE SUBGROUP.
7. ALL SPECIFICATION SECTIONS IN THE PROCESS EQUIPMENT SUBGROUP.

B. Allowances:
1. An allowance for the total cost of providing XXXXXXXXXXXXXXXXXXXXXX (and to be included in the Base Bid) Should the allowance not be needed by agreement of all parties, then the allowance amount shall be credited to the Owner by way of a Change Order.

4.5 REFERENCES

A. Standards:
1. In accordance with the following standards:

4.6 SYSTEM DESCRIPTION

A. Design Requirements:
1. In accordance with allowable values and properties assigned and approved by CBC. It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.

B. Performance Requirements:
1. In accordance with allowable values and properties assigned and approved by CBC. It is the intention of this section and the drawings to form a guide for a complete and operable system. Any items not specifically noted but necessary for a complete and operable system shall be provided under this section.

Division One Specification - SUBMITTALS

A. General: Submit in accordance with Specification Section - SUBMITTAL PROCEDURES:

B. Format for Submittals:

C. Coordination Drawings:
1. Submit installer's coordination drawings indicating the work of this section with that of related work of other sections for proper interface of the completed work. Installer shall coordinate and obtain approvals from the work of other related sections prior to submitting to the Architect.

D. Product Data: For each type of [***Insert description here***].
1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Submit manufacturer’s standard color range for selection by the Architect.
3. Submit manufacturer’s full color range (including any standard, premium and custom colors) for selection by the Architect.

E. Shop Drawings.
1. Submit shop drawings prepared by, or under the supervision of a registered Civil or Structural Engineer in the State of California, detailing fabrication and assembly of the work under this section, as well as procedures and diagrams. Include setting drawings, templates, and directions for installation of anchor bolts and other anchorage to be installed as unit of work of other related sections.
2. Submit shop drawings showing fabrication and installation of the work of this section

including plans, elevations, sections, details of components, and attachments to other units of work.
   a. Where installed products are indicated to comply with certain design loading, include structural computations, material properties, and other information needed for structural analysis that has been signed and stamped by a registered Civil or Structural Engineer in the State of California.
3. Submit shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, loading, required clearances, method of field assembly, components, and location and size of each field connection.

F. Samples.
1. Item type
   a. Provide 24 inch square sample of each color and pattern selected.
   b. Provide 12 inch square sample of each color and pattern selected.
2. Different item type
   a. Provide 6 inch square sample of each color and pattern selected.
   b. Provide 3 inch square sample of each color and pattern selected.
   c.
3. Accessories/Trim/Etc.
   a. Provide 6 inch lineal samples of each piece of trim material specified.
   b. Provide 4 inch lineal samples of each piece of trim material specified.
   c.

G. Quality Assurance/Control Submittals:
1. Design Data.
2. Item/Assembly/System: [Describe submittal required.]
3. Test:
4. Item/Assembly/System:
   a. Item/Assembly/System: Submit reports required by regulatory requirements.
   b. Item/Assembly/System: [***Insert description here***]
   c. [Insert description here]
5. Certificates:
   a. Item/Assembly/System: [***Insert description here***]
6. Manufacturer's Instructions:
   a. Item/Assembly/System: Submit manufacturer's written instructions.
   b. [Insert description here]
7. Manufacturer's Field Reports:
   a. Item/Assembly/System: Submit manufacturer's written field reports.
   b. [Insert description here]
8. Engineering Calculations:

a. Item/Assembly/System: Submit engineering calculations computed and signed by a registered Civil or Structural Engineer in the State of California.

H. Closeout Submittals in accordance with the following:
1. Maintenance Data in accordance with Specification Section - PROJECT CLOSEOUT.
2. Operation Data in accordance with Specification Section - PROJECT CLOSEOUT.
3. Record Documents in accordance with Specification Section - RECORD DOCUMENTS.
4. Warranty in accordance with Specification Section – WARRANTIES.

4.8 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:
a. Engage an experienced Installer who has successfully completed three (3) projects of similar scope and size to that indicated for this Project.
b. Engage an experienced Installer who is certified in writing by the manufacturer listed herein as qualified to install manufacturer's product (or system) in accordance with manufacturer's written warranty requirements.
c.
2. Manufacturer/Supplier Qualifications:
a. Firm experienced in successfully producing/supplying products, similar to that indicated for this Project, with sufficient production/supply capacity to produce/supply required units without causing delay in the work.
b. [Insert description here].

B. Regulatory Requirements:
1. In accordance with Specification Section - REGULATORY REQUIREMENTS.
2. In accordance with Specification Section - REGULATORY REQUIREMENTS, and the following:
a. CARB Materials and equipment used for this Project shall comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA), in the area where the Project is located.

C. Certificates:

1. Provide a letter on Contractor's Letterhead certifying work provided meets or exceeds the requirements of this Section.
2.

D. Field Samples:
   1. Provide one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Project and will serve as the standards by which the subsequent work of this section will be judged.
   2.

E. Mockups:
   1.

F. Meetings:
   1. Pre- Demolition: Schedule prior to the start of work.
      a. Coordinate the work with other work being performed.
      b. Review requirements of work performed by others that rely on substrates exposed by selective demolition work.
      c. Identify any potential problems, which may impede planned progress and proper demolition of work.
      d. Review structural load limitations of existing structure.
      e. Review areas where existing construction is to remain and requires protection.
      f. Review demolition waste disposal and material recycling procedures.
   2. Pre-Construction:
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems, which may impede planned progress and proper construction of work.
      c. Review structural load limitations of existing structure.
      d. Review areas where existing construction is to remain and requires protection.
   3. Pre-Installation:
      a. Coordinate the work with other work being performed.
      b. Identify any potential problems, which may impede planned progress and proper installation of work.
      c. Review structural load limitations of existing structure.
      d. Review areas where existing construction is to remain and requires protection.
   4. Progress: Scheduled by the Contactor during the performance of the work.
      a. Review for proper work progress.
      b. Identify any problems and acceptable corrective measures.
      c. Identify any measures to maintain or regain project schedule if necessary.
   5. Completion: Scheduled by the Contactor upon proper completion of the work.
      a. Inspect and identify any problems.
      b. Establish method and procedures to maintain protections while progressing to project completion.

4.9 DELIVERY, STORAGE, AND HANDLING

A. Packing, shipping, handling, and unloading:
1. Products shall be individually wrapped.
2. Products shall be handled in such a manner as to assure that they are free from dents, scratches and other damage.

B. Acceptance at Site:
1. Products must be in manufacturer's original unopened containers with labels indicating brand name, model, and grade.
2. Damaged products will not be accepted.

C. Storage and protection:
1. Products shall be stored in a dry, protected area.
2. Products shall be stored in locked storage building.
3. Products shall be stored above ground on level platforms, six (6) inches above ground, allowing air circulation under stacked units.
   a. Cover materials and protect against wetting prior to use.
   b. Cover materials with protective waterproof covering providing for adequate air circulation and ventilation.
   c.

4.10 PROJECT CONDITIONS

A. Environmental requirements:
1. Dust control: Perform work in a manner as to minimize the spread of dust and flying particles. Thoroughly moisten all surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other on-site work.
2. Burning: No burning will be allowed on-site.
3. Rain: The work under this section shall not be started or maintained under threat of rain unless the work is not affected by the rain.
4. Temperature: Maintain ambient temperature in space to receive products at sixty-eight (68) [***insert number***] degrees Fahrenheit for two (2) [***insert number***] days prior, during, and two (2) [***insert number***] days minimum following installation.
   a. After this period, maintain a temperature of not less than 55 degrees Fahrenheit.
   b. After installation, at no such time shall the temperature exceed 85 degrees Fahrenheit.
   c. Inform the Owner of ambient temperature requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.
5. Humidity: Maintain humidity in space to receive products between 6 [***insert number***] percent to 9 [***insert number***] percent for four (4) [***insert number***] days minimum prior,

during, and following installation in accordance with manufacturer's recommendations. Inform the Owner of humidity requirements for products installed and maintain until Substantial Completion and turn-over of the building or facility to the Owner.

B. Existing Conditions:
1. Examine site and compare it with the drawings and specifications. Thoroughly investigate and verify conditions under which the work is to be performed. No allowance will be made for extra work resulting from negligence or failure to be acquainted with all available information concerning conditions necessary to estimate the difficulty or cost of the work.
2. Conduct work so as not to interfere unnecessarily with adjacent roads, streets, drives and walks.
3.

4.11 SCHEDULING

A.

4.12 SEQUENCING

A.

4.13 WARRANTY

A. Contractor's General Warranty:
1. In accordance with Specification Section - WARRANTIES.

B. Manufacturer’s Warranty:
1. In accordance with manufacturer's written standard warranty:
a. Warranty Period One (1) Year.
b. Vinyl Composition Tile Five (5) Years.
c. Rubber Tile Ten (10) Years.
d. Solid Vinyl Tile Ten (10) Years.
e. Static Dissipative Tile Five (5) years.

C. Installer's Warranty:
1. In accordance with the terms of the Specification Section - WARRANTIES:

Pick the appropriate Warranty Period below in [ ].

a. Warranty period [One (1) Year.][Five (5) years.]

4.14 SYSTEM STARTUP

A.

4.15 OWNER'S INSTRUCTIONS

A. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train the Owner's maintenance personnel as specified below:
1. Test and adjust controls and any safeties. Replace damaged or malfunctioning controls and equipment.

4.16 COMMISSIONING

A.

4.17 MAINTENANCE

A. Extra Materials:
1.

B. Maintenance Service:
1. Starting at the date of Substantial Completion, provide full maintenance of units for a period of three (3) months on a weekly surveillance basis, followed by nine (9) months on a monthly surveillance basis.
a. Correct operational imperfections and restore or replace defective or deteriorated components and finishes.
b. Use only genuine parts, components, and supplies as used in the manufacture and installation of original equipment.
c.

PART 5 - PRODUCTS

5.3 MANUFACTURERS

A. These products listed herein establish the size, pattern, color range and function selected by the Architect for this Project. Manufacturers that are listed as acceptable alternative manufacturers and substitutions must still comply with the requirements of this project and the products listed in order to be approved as an equivalent during the Submittal Process. If the acceptable alternative manufacturers listed or substitutions are not approved during the Submittal Process due to non-compliance with the contract documents, then the Contractor shall submit product specified.

1. Specified product manufacturer:
   a. MANUFACTURER PRODUCT.
   b. Acceptable alternative manufacturers:

1)	MANUFACTURER	PRODUCT.
a)	x	

B. Products from other manufacturers not listed must submit in accordance with Specification Section - SUBSTITUTION PROCEDURES.

5.4 EXISTING PRODUCTS

A.

5.5 MATERIALS

A.

5.6 MANUFACTURED UNITS

A.

5.7 EQUIPMENT

A.

5.8 COMPONENTS

A.

5.9 ACCESSORIES

A.

5.10 MIXES

A.

5.11 FABRICATION

A. Shop Assembly:
1.

B. Fabrication Tolerances:
1.

5.12 FINISHES

A. Shop Priming:
1.

B. Shop Finishing:
1.

5.13 SOURCE QUALITY CONTROL

A. Tests, Inspection:
1.

B. Verification of Performance:
1.

PART 6 - EXECUTION

6.3 ACCEPTABLE INSTALLERS

A.

6.4 EXAMINATION

A. Site verification of conditions:
1. Prior to the execution of the work under this specification section, inspect the installed work executed under other sections of this Project Manual that affects the execution of work under this specification section.
2. Report unacceptable conditions to the Architect. Do not begin work until unacceptable conditions have been corrected.
3. Execution of work under this specification section shall constitute acceptance of existing conditions.

6.5 PREPARATION

A. Coordination:
1. Coordinate work under this specification section with work specified under other sections to ensure proper and adequate interface of work.

B. Protection:
1. Protect all adjacent surfaces from drips, spray, air pollution of surrounding environment, and other damage from work under this specification section.

C. Surface preparation:

1. Prepare surface in accordance with manufacturer's instructions and recommendations.
2. Clean substrates of substances (oil, grease, rolling compounds, incompatible primers, loose mill scale, etc.) which could impair bond of materials specified within this section.
3.

6.6 ERECTION / INSTALLATION / APPLICATION / CONSTRUCTION

A. General:
1. In accordance with manufacturer's written instructions and recommendations unless specifically noted otherwise.
2. In accordance with approved submittals.
3. In accordance with Regulatory Requirements.
4. Set plumb, level, and square.
5. In accordance with Specification Section .

B. Layout:
1. Lines shall be straight and true.

C. Assistance:
1. Application shall be in direct consultation and review of .

D. Special Techniques:
1.

E. Interface with other work:
1.

F. Sequences of operation:
1.

G. Site Tolerances:
1.

6.7 REPAIR / RESTORATION

A.

6.8 RE-INSTALLATION

A.

6.9 FIELD QUALITY CONTROL

A. Site Tests:
1. As required by Regulatory Requirements.
a.

B. Inspection:
1. As required by Regulatory Requirements.
2. Schedule inspections and notify the Architect, Project Inspector and any other regulatory agencies of the time at least 48 hours prior to the inspection.
3. No work shall be without the inspections required by regulatory requirements.
4. .

C. Manufacturer's Field Services:
1.

6.10 ADJUSTING

A. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
1.

6.11 CLEANING

A. Clean in accordance with Specification Section - TEMPORARY FACILITIES AND CONTROLS.
1. Leave area level and free of any ruts or debris. Appearance of earth surface shall be equal to or better than adjacent undisturbed surfaces.
2. Clean any soiled surfaces immediately.
3. Clean any soiled surfaces at the end of each day, minimum.

4. Finish shall be clean and ready for the application of any additional finishes.
5. In accordance with manufacturer's instructions and recommendations.

6.12 DEMONSTRATION

A. In accordance with Specification Section - PROJECT CLOSEOUT.
   1. Provide the services of a factory-authorized service representative to provide start-up service and to demonstrate and train Owner's maintenance personnel as specified below.
   2. Schedule training with the Owner's maintenance personnel with at least seven (7) days advance notice.
      a. Train Owner's maintenance personnel on procedures and schedules related to start-up and shut-down, troubleshooting, servicing, and preventative maintenance.
      b. Review data in "Operating and Maintenance Manuals". Refer to Specification Section - PROJECT CLOSEOUT.

6.13 PROTECTION

A. Protection from weather:
   1. Protect newly installed work from freezing for twenty-four (24) hours after erection, installation or application.

B. Protection from traffic:
   1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, which ensures the work of this section being without damage or deterioration until the time of Substantial Completion.
   2. Immediately after cleaning, neatly apply four (4) mil thick, minimum, polyethylene film over finished surfaces at traffic areas. Fasten film firmly to surface.
   3.

6.14 SCHEDULES

A.

GROUP XX – (EACH OPENING TO HAVE):

DOUBLE DOORS, INTERIOR EXIT, RATED, NO DOGGING

QUANT.	DESCRIPTION	MANUF. NO.	FINISH	MANUF.
1 EA	REMOVABLE MULLION	A-FL-KR822	689	PR
1 EA	MULLION CYLINDER	20-057	626	SC
1 EA	RIM CYLINDER	20-057	626	SC
2 EA	MORTISE CYLINDER	26-091	626	SC
2 EA	CLOSER	7500	689	NOR
2 EA	KICKPLATE	37 10" X 2" LDW	630	TR
2 EA	DOOR STOP	1211	626	TR
1 SET	SMOKE GASKET	S88D HEAD AND JAMBS	719L	PK