PROJECT MANUAL

INTERIM HOUSING for

STANLEY G. OSWALT ACADEMY

19501 Shadow Oak Dr.
Walnut, California

for

ROWLAND UNIFIED SCHOOL DISTRICT

1830 S. Nogales Street
Rowland Heights, California 91748

September 20, 2019

Prepared By

ZIEMBA + PRIETO ARCHITECTS

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INTERIM HOUSING
STANLEY G. OSWALT ACADEMY

Signature Page

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IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP03 119935
AC FLS SS
DATE 7/3/19

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SECTION 01010

SUMMARY OF WORK

1.1 GENERAL

A. Project Description: The Project consists of INTERIM HOUSING for STANLEY G. OSWALT ACADEMY, in the Rowland Unified School District. The project is located at 19501 Shadow Oak Drive, Walnut, CA 91789. The project is described in the Contract Documents prepared by Z+P Architects, dated June 12, 2019

B. Description of Interim Housing: The Work consists of site preparation, grading and paving for the installation of 6 portable modular buildings. Installation of Electrical utilities and low Voltage systems on the portable buildings, consisting of 12 classrooms, and all miscellaneous work indicated in the plans & specifications as required to complete the project. The school will be operational during the period of construction.

C. Not used

D. Not used

E. Base Bid: The Project consists of one Base Bid.

1. Description of Base Bid:
   a. Base Bid: This includes all work described in the project plans and specifications (complete).

F. Basis of Award: The method to determine the lowest bid will be the lowest total of the base bid.

G. Tentative Project Schedule: The project tentative project schedule is subject to change at the sole discretion of the Owner, and is as follows:

1. School Board Award of Construction Contract:
2. Processing and submittal of bonds, agreements, etc.
   (including OPSC review of low bid package as needed)
3. Notice to Proceed issued by the District (See section “H” below):
4. Start of the on-site formal construction schedule
5. Completion of Construction: 02-28-2020

H. Phase 0 (Prior to formal start of construction): This is an advance phase of work that will occur prior to the construction contract calendar. This phase of work includes administrative items only. No physical on-site construction activities or mobilization will be permitted. This phase of work includes field verification and measuring. The time shall be used for field measuring, submittal of shop drawings, samples, requests for information (RFIs), etc., to facilitate smooth operations in subsequent construction phases. The time will be used to help procure construction materials, particularly those with long lead times (21 consecutive calendar days).

I. Work Beyond the Project Schedule: If the project is not completed within the contract schedule, the District may terminate the Contract. At District's sole discretion as an alternative, they may allow (or require) the Contractor to continue working toward completion of the project while assessing liquidated damages. It is possible that the District could take beneficial occupancy of all, or part of the facility prior to Substantial Completion.

1. Hours of Work: Some work may be required to take place after school hours and on weekends. Work on all days is governed by City ordinances. Work on school days may begin no earlier than 6:30 a.m., and will conclude by 4:30 pm the same day.
2. No utility outages at any site (such as water, power or fire alarm system), may take place during school days. On weekends where utility interruptions are planned, the school and Construction Manager must be given three days prior written notification describing the work taking place, which utilities will be interrupted and the duration of the interruption.

J. Owner's Use of Site and Premises: Owner reserves the right to occupy and to place and install equipment in completed areas of buildings and site, prior to Substantial Completion, provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

1. A Certificate will be executed for each specific portion of the Work to be used by Owner ("beneficial occupancy") prior to obtaining Certificate of Occupancy from authorities having jurisdiction.
2. Prior to use of portions of the Work by Owner, mechanical and electrical systems shall be fully operational. Required inspections and tests shall have been successfully completed. Unless otherwise agreed, Owner will provide operation and maintenance of mechanical and electrical systems in portions of the building used by Owner.

K. Contractor's Use of Site and Premises: Limit the use of the premises to construction activities, allow for Owner access.

1. Keep driveways and entrances clear at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize requirements for storage of materials.
2. Keep all tools and building materials in places where they will not be accessible to unauthorized individuals or to vandals so as to not present a safety or security problem at the campus.
3. Remove all debris, excess materials and demolished items from the site promptly so as not to cause safety or security problems.

L. Owner-Furnished Products: Owner will furnish, for installation by Contractor, products which are identified on the Drawings and in the Specifications as "OFCI (Owner-Furnished/Contractor-Installed)", "installed by General Contractor," or similar terminology. See Drawings for identification of such products, which include, but are not necessarily limited to standard toilet accessories, paper towel holders, etc.

1. Relationship to Work Under the Contract: Work under the Contract shall include all provisions necessary to fully incorporate such products into the Work, including as necessary fasteners, blocking, backing, supports, piping, conduit, conductors and other such provisions from point of service to point of connection and field finishing as shown on Drawings and specified herein.

M. Work Under Separate Contracts: The Work includes coordination of work being performed by others under separate contracts with Owner. Owner will award separate design and construction contracts concurrent with and after this Contract as determined by the Owner for work listed below and for other work as Owner may determine. Such work under separate contracts may be indicated on the Drawings and in the Specifications as "Not in Contract", "NIC", "Future" or "Under Separate Contract", include but may not be limited to the following:

1. Relocation of Interim Housing Facilities or moving of furniture for construction phase.

   Relationship to Work Under the Contract: Work under the Contract shall include all provisions necessary to make such concurrent work under separate contracts complete in every respect and fully functional including field finishing. Provided necessary blocking, backing, supports, piping, conduit, wiremold and other such provisions from point of service to point of connection, as shown on Drawings and specified herein. The Prime contractor will allow a reasonable and mutually agreed upon amount of time within the project contract schedule for installation of these items under separate contract. The work schedule will be shown on the project critical path schedule.

N. Documents for Work Under Separate Contracts: Owner will make available, in a timely manner, drawings and specifications (if not included herein) of work under separate contracts for coordination and further description of that work. If available, such information will include drawings, specifications, product data, lists and construction schedules for such work. Information concerning work under separate contracts of directly by Owner will be provided for convenience only and shall not be considered Contract Documents. Such drawings and other data required for the coordination of the work of separate contracts with the Work of the Contract may be included with the Contract Documents. If so, they will be for convenience only and shall not be considered Contract Documents provided by Architect or Architect's consultants.

O. Contractors Staging and Storage Area: The District will designate construction staging. This area is intended to accommodate material storage, staging and preparation activities. It should also accommodate the contractor's construction trailer and other temporary facilities. Finally, it should contain parking areas for construction and employee vehicles as designated by the District.

   The area must be completely fenced and secured with lockage access gates. Ingress and egress to the staging area shall be regulated for the safety of the students and site occupants. Contractors will not drive above the speed of five miles per hour on school grounds. If the site is occupied by students and staff (site is scheduled to have occupants moved to another location) in and out access may be limited to before and after school, and/or to periods when students are inside classroom spaces at the District's sole discretion. If the staging area provided is not adequate for site based activities, the

contractor will make arrangements for additional off-site storage, staging and parking areas as part of the bid pricing.

At the completion of construction, the Contractor will demobilize and remove all fencing, temporary access drives and other temporary facilities.

The bid scope shall include full restoration of this area to its pre-construction condition, including turf repair with sod, plant replacement if needed and irrigation system repairs or replacement. Damaged A.C. paving shall be repaired to match existing paving thickness and base. Re-stripe and slurry contractor's storage and work area.

P. DVBE Requirements: In accordance with Education Code Section 17076.11, the Rowland Unified School District has a participation goal for Disabled Veteran Business Enterprises of a least three percent per year of the overall dollar amount expended each year by the District since the District uses funds allocated to the District by the State Allocation Board pursuant to the Leroy F. Greene School Facilities Act of 1988 for the construction or modernization of schools within the District. Bidders much conform as prescribed in the Information for Bidders and Contract documents to the requirements related to meeting this participation goal.

Q. Security: The Contractor will be completely responsible for safety and security at the project site. The Contractor will provide complete temporary perimeter security fencing (the existing fencing is acceptable) around the project work area throughout the entire project. Refer to Section 01500, Construction Facilities and Temporary Controls, for more information.

R. Where small, miscellaneous work is described and no specification section is included, refer to Section 01120, Alteration Procedures, and notes on drawings and details for basic specification information. Otherwise match existing adjacent surface to remain (in material, texture, color and sheen) as approved by Architect.

S. The work also includes all demolition of items described to be removed in the drawings and specifications or needed to install new improvements, even if not indicated. The Contractor shall completely remove items including connections, piping, electrical switches, conduits and wire, mechanical ductwork and other accessories as well as all supports, blocking, furring or other such items associated with being removed. Unless noted otherwise upon the removal of demolished items, the Contractor shall restore all surfaces, elements, walls, floors, ceilings and roofs which are left unfinished or with holed marks, gaps, etc. to match existing adjacent surfaces and including finished coatings, flashing, etc. as applicable. Any items to be demolished that are reusable or which have a salvage value shall be offered to the Owner to keep for warehousing and use on other projects. Any such items that the Owner declines to accept/retain will be removed from the site by the Contractor immediately.

END OF SECTION

SECTION 01018

OWNER-FURNISHED ITEMS

PART 1 - GENERAL

1.01 DESCRIPTION:

This section includes general requirements for Owner-furnished, Contractor-installed materials and equipment, referred to collectively as OFCI items. It also includes description of responsibilities regarding Owner-furnished, Owner-installed items, referred to as OFOI items.

1.02 DEFINITIONS:

A. OFCI: Owner furnished, Contractor installed.

B. OFOI: Owner furnished, Owner installed.

1.03 SUBMITTALS:

Obtain all necessary information from Owner as to manufacturer, model, and type of each item to be incorporated in the project. Submit, or obtain from Owner as applicable, shop drawings showing dimensioned rough-in diagrams for each Owner furnished item requiring utility connection, dimensional locations of backing plates required in walls and partitions and details of connections to supports of all items.

1.04 CONDITIONS:

In each case, the Contractor is responsible for correct and properly located installation of the OFCI items in accordance with the various manufacturers' specifications and instructions.

A. Conflicts: If a conflict occurs between requirements for OFCI items and actual field conditions, Contractor shall not install the affected items until the conflict is resolved. No extra payment will be made to the Contractor for correction of improper installation of OFCI items when reasonably adequate data and instructions for installation were furnished by the Owner or various OFCI item manufacturers.

B. Installation: Install OFCI items complete in every detail with each item accurately and correctly placed, connected, adjusted and tested.

C. Delivery: OFCI items will be delivered to site. Contractor shall receive and unload the OFCI items, verify that the items have not been damaged in transit, place in covered storage or enclosed building and be responsible therefore after delivery. OFCI items that are damaged, abused, lost or stolen while in Contractor's custody and control, or damaged or defaced during installation shall be repaired, replaced or otherwise made good to the Owner's satisfaction at the Contractor's expense.

D. Inspection of New Owner furnished Items: Within 10 working days after delivery of the items, Contractor shall open and uncrate the items for inspection. The Owner's

representative and Contractor shall inspect each item and maintain a written record of all damage, missing parts and other defects disclosed, all of which will be made good by the Owner. After the inspection, Contractor shall be fully responsible for the equipment and items as specified above.

E. Protection of Existing Owner furnished items: refer to Section 01120.

F. Additional Information: Contractor may request and receive from the Owner all necessary additional information, specifications, templates and similar items from any of the manufacturers of the OFCI items. The Contractor may request a manufacturer's representative to supervise installation of any OFCI item, but at no additional cost to Owner.

G. OFOI Items: The Owner will provide and install or have installed by others, certain items, which may or may not be indicated in detail on the drawings. Contractor shall allow the Owner access to spaces and facilities as required to perform the work. Refer to the General Conditions and Supplementary Conditions for provisions for work under separate contracts.

PART 2 - PRODUCTS

2.01 OFCI EQUIPMENT:

A. List: The list of OFCI items is shown in Section 01010.

B. Installation Materials: Contractor shall provide attachments, fittings, fasteners, connectors and other ancillary material required for installation which is not usually furnished by the OFCI manufacturers, types as approved.

2.02 OFOI ITEMS:

The Owner will provide and install or have installed by others, certain items including movable furniture and other items which may or may not be indicated in detail on the drawings. Contractor shall allow the Owner access to spaces and facilities as required to perform the work. Refer to the General Conditions for provisions for work under separate contracts.

2.03 OFOI, CONTRACTOR ROUGHIN AND CONNECT:

The Owner will provide and install, or have the following items and systems installed by others. Contractor shall allow the Owner access to spaces and facilities as required to perform the work. Refer to the General Conditions and Supplementary Conditions for provisions for work under separate contracts. Contractor shall rough in utilities as noted below, together with all other utilities required for each component. Contractor shall provide blocking, supports, anchors, fire-stopping, sealants, painting and such other ancillary items and work as required for complete and operable installation.

A. IDF.
B. Over head projectors.

PART 3 - EXECUTION

3.01 INSTALLATION:

Conform to each OFCI item manufacturer's specifications, templates and information including the necessary assembling of components of sub-assemblies.

3.02 TESTS:

Contractor shall operate and test each operable OFCI item when installed and connected. If malfunctions occur through no fault of the Contractor, the Owner will make the defect good; otherwise, the Contractor shall effect all necessary corrections so the OFCI item operates properly and as intended, at the Contractor's expense.

END OF SECTION

SECTION 01030

ALTERNATES

PART 1 - GENERAL

1.01 DESCRIPTION:

This section summarizes the alternate bids to be submitted to Owner. Alternate bids shall state the NET AMOUNT to be added to or deducted from the base bid price or the contract sum, as applicable.

A. Acceptance or Rejection: Acceptance or rejection of each alternate bid is at the discretion of the Owner. Any, none or all of the alternate bids may be accepted or rejected in any sequence by the owner.

B. Costs: Include under each alternate bid the net amount of all changes in costs, whether additive or deductive, resulting to the work of all section affected by alternate bids.

C. Extent of Alternate Bids: Bidders shall determine the full extent of work affected by each alternate bid and shall make full and proper allowance for such extent in the preparation of bids.

1.02 DESCRIPTION OF ALTERNATE BIDS:

Following are the minimum requirements and shall govern except as exceeded by requirements of drawings, other sections and codes. The workmanship and materials not modified under each alternate bid shall conform to the drawings and applicable sections of the specifications.

A. Alternate No. 1: TBD.

PART 2 – PRODUCTS Not applicable to this Section.

PART 3 – EXECUTION Not applicable to this Section.

END OF SECTION

SECTION 01048

CONTRACTOR'S REQUESTS FOR INFORMATION

PART 1 - GENERAL

1.01 DESCRIPTION:

All other sections of Division 1 apply to this Section. This Section covers the general requirements for Contractor's Requests for Information and pertains to all portions of the contract documents.

A. Related work specified elsewhere:

1. Project meetings
2. Submittals
3. Substitutions

1.02 DEFINITION:

A. Request for Information: A document submitted by the Contractor requesting clarification of a portion of the contract documents, hereinafter referred to as RFI.

1.03 CONTRACTOR'S REQUESTS FOR INFORMATION:

A. When the Contractor is unable to determine from the contract documents, the exact material, process or system to be installed, the Architect shall be requested to make a clarification of the indeterminate item. Wherever possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need or the complexity of the item, Contractor shall prepare and submit an RFI to the Architect.

B. Contractor shall endeavor to keep the number of RFI's to a minimum. In the event that the process becomes unwieldly in the opinion of the Architect because of the number and frequency of RFI's submitted, the Architect may require the Contractor to abandon the process and submit all requests as either submittals, substitutions or requests for change.

C. RFI's shall be submitted on a form provided by or approved by the Architect. Forms shall be completely filled in and if prepared by hand, shall be fully legible after copying by xerographic process. Each page of attachments to RFI's shall bear the RFI number in the top right corner.

D. RFI's from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the Architect.

E. Contractor shall carefully study the contract documents to assure that the requested information is not available therein. RFI's which request information available in the contract documents will not be answered by the Architect.

F. In all cases where RFI's are issued to request clarification of coordination issues for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically and similar items, the Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's which fail to include a suggested solution will not be answered.

G. RFI's shall not be used for the following purposes:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request changes which entail additional cost or credit.
4. To request different methods of performing work than those drawn and specified.

H. In the event the Contractor believes that a clarification by the Architect result in additional cost, Contractor shall not proceed with the work indicated by the RFI until a change order is prepared and approved. Answered RFI's shall not be construed as approval to perform extra work.

I. Unanswered RFI's will be returned with a stamp or notification: Not Reviewed.

J. Contractor shall prepare and maintain a log of RFI's and at any time requested by the Architect, Contractor shall furnish copies of the log showing all outstanding RFI's. Contractor shall note all unanswered RFI's in the log.

K. Contractor shall allow for 7 days review and response time for RFI's.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide field engineering, complete.

A. Work specified in this Section: Layout of the work.

B. Related work specified elsewhere: Record drawings.

1.02 LAYOUT OF THE WORK:

Contractor shall lay out the work from the drawings, the benchmarks and establish all additional benchmarks, monuments, lines and levels necessary for the construction covered by the contract.

1.03 UTILITIES SURVEY:

Contractor shall verify and confirm the exact locations of utility services where connections or extensions are required. Where trenches or excavations are required to determine locations, repair surface to match existing undisturbed condition.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers the general requirements for regulatory requirements pertaining to the work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the contract documents.

1.02 REQUIREMENTS OF REGULATORY AGENCIES:

All pertaining statutes, ordinances, laws, rules, codes, regulations, standards and the lawful orders of all public authorities having jurisdiction of the work are hereby incorporated into these contract documents the same as if repeated in full herein and such are intended where any reference is made in either the singular or plural to code or building code unless otherwise specified including, without limitation, those in the list below. Contractor shall make available at the site such copies of the listed documents applicable to the work as the Architect or Owner may request including mentioned portions of the 2016 California Building Code.

A. The list of applicable codes is shown on the drawings.

B. Also comply with other statues, ordinances, laws, regulations, rules, orders and codes specified in other Sections of the Specifications or bearing on the Work.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01091

SOURCES FOR REFERENCED MATERIAL

PART 1 - GENERAL

1.01 DESCRIPTION:

All other sections of Division 1 apply to this Section. This Section covers the general information for obtaining referenced information, including standards, specifications, catalogs and other printed and electronic material pertaining to the work.

1.02 REFERENCE AND STANDARD SPECIFICATIONS:

A. Specifying by reference to a reference and standard specification document or to another portion of the contract documents shall be the same as if the referenced document or portion of the contract documents referred to were exactly repeated at the place where such reference is made. In case of a conflict between the requirements of regulatory agencies and the referenced reference and standard specification documents, Contractor shall conform to the most restrictive requirement if such conformance is legal.

B. Reference or standard specification documents shall be the current issues in effect on the date bids are received, unless otherwise specified or unless codes or statutes make reference to earlier editions. Contractor shall make available at the site such copies of reference or standard specification documents as Architect or Owner may request.

1.03 WEB SITES:

Because of the frequency of changes, web addresses are not given in the specifications. Contractor may contact specified manufacturers and trade associations by accessing 4specs.com (http://www.4specs.com/) and following the instructions for reaching the appropriate web site.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01092

SPECIFICATION ABBREVIATIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers abbreviations for documents mentioned or referenced elsewhere in the contract documents, and language abbreviations used in the text of the Specifications. Abbreviations in drawings and specifications shall be interpreted according to recognized and well-known technical, industry or trade meanings.

1.02 ORGANIZATION NAME ABBREVIATIONS:

These abbreviations include but are not limited to the following:

AA	The Aluminum Association, Inc.
AABC	Associated Air Balance Council
AAIEE	American Institute of Electrical and Electronics Engineers
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Traffic Officials
ACI	American Concrete Institute
ADA	Americans with Disabilities Act
ADAAG	Americans with Disabilities Act Accessibility Guidelines
AGA	American Gas Association
AGC	Associated General Contractors
AHA	American Hardwood Association
AI	Asphalt Institute
AIA	American Institute of Architects
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
AMCA	Air Moving and Conditioning Association, Inc.
ANSI	American National Standards Institute
APA	APA – The Engineered Wood Association
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	ASTM International (formerly American Society for Testing and Materials)
ATBCB	Architectural & Transportation Barriers Compliance Board
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
CBM	Certified Ballast Manufacturers
CCR	California Code of Regulations
CFPA	Certified Forest Products Council
CFR	Code of Federal Regulations
CLFMI	Chain Link Fence Manufacturers Institute

CISPI	Cast-Iron Soil Pipe Institute
CRA	California Redwood Association
CRI	Carpet and Rug Institute
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard, US Department of Commerce
CSFM	California State Fire Marshal
CSI	Construction Specifications Institute
CTI	Cooling Tower Institute
CTIOA	Ceramic Tile Institute of America
DHI	Door and Hardware Institute
DOD	Department of Defense
DSA	Division of the State Architect, Office of Regulation Services
EIA	Electronic Industries Association
EPA	United States Environmental Protection Agency
ETL	Electrical Testing Laboratories
Fed Spec	Federal Specification or Standard
FIA	Factory Insurance Association
FM	Factory Mutual
FS	Federal Specifications
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
HMMA	Hollow Metal Manufacturers Association
HPVA	Hardwood Plywood & Veneer Association
IAMPO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IGMA	Insulating Glass Manufacturers Association
IPCEA	Insulated Power Cable Engineers Association
ISAT	International Seismic Application Technology
ISO	International Organization for Standardization
MFMA	Maple Flooring Manufacturers Association
MIA	Masonry Institute of America
MLMA	Metal Lath Manufacturers Association
MLSFA	Metal Lath/Steel Framing Association
NAAMM	National Association of Architectural Metal Manufacturers
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFC	National Fire Code
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health

NIST	National Institute of Standards and Technology
NLMA	National Lumber Manufacturers Association
NPDES	National Pollutant Discharge Elimination System
NRCA	National Roofing Contractors Association
NSF	National Sanitation Foundation
NSWMA	National Sold Wastes Management Association
NUSIG	National Uniform Seismic Installation Guidelines
PCA	Portland Cement Association
PDI	Plumbing and Drainage Institute
PEI	Porcelain Enamel Institute
PS	Product Standard, US Department of Commerce
RIS	Redwood Inspection Service
SAE	Society of Automotive Engineers
SCAQMD	South Coast Air Quality Management District
SDEI	Steel Deck Institute
SDI	Steel Door Institute
SFM	State Fire Marshal
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SPR	Simplified Practice Recommendations, U.S. Dept. of Commerce
SSPC	Steel Structures Painting Council
SWI	Steel Window Institute
TCA	Tile Council of America
UBC	Uniform Building Code
UBPPA	Uni-Bell PVC Pipe Association
UFAS	Uniform Federal Accessibility Standards
UL	Underwriters' Laboratories, Inc.
WCLIB	West Coast Lumber Inspection Bureau
WDMA	Window and Door Manufacturers Association (formerly National Wood Window and Door Association)
WI	Woodwork Institute (formerly Woodwork Institute of California)
WWPA	Western Wood Products Association

1.03 TEXT ABBEVIATIONS:

Text abbreviations include but are not limited to the following:

ac	Alternating current
amp	ampere
BTU	British thermal unit
cfh	Cubic feet per hour
cfm	Cubic feet per minute
cm	Centimeter
Co.	Company
COP	Coefficient of performance
Corp.	Corporation
d	Penny

db.	Decibel
DB	Dry bulb
dc	Direct current
EER	Energy efficiency ratio
F	Degrees Fahrenheit
fpm	Feet per minute
ft	Foot or feet
gph	Gallons per hour
gpm	Gallons per minute
HP	Horsepower
HVAC	Heating, ventilating and air conditioning
Hz	Hertz
Inc.	Incorporated
KHz	Kilohertz
Kip	thousand pounds
Ksf	Thousand pounds per square foot
Ksi	Thousand pounds per square inch
Kv	Kilovolt
KVA	Kilovolt amperes
KW	Kilowatt
KWH	Kilowatt hour
LF	Linear foot
MPH	Miles per hour
lb	Pound
LED	Light emitting diode
MBH	1000 BTUs per hour
MHz	Mega hertz
mil	Thousandth of an inch
mm	Millimeter
mph	Miles per hour
oz.	Ounce
PCF	Pounds per cubic foot
pH	Acidity-alkalinity balance
psf	Pounds per square foot
psi	Pounds per square inch
psig	Pounds per square inch, gage
RF	Radio frequency
rpm	Revolutions per minute
SF	Square foot
SY	Square yard
V	Volt
WB	Wet bulb

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01094

DEFINITIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers definitions supplementary to those given in the Conditions of the contract.

1.02 DEFINITIONS:

A. District or Owner: The term “District” or “Owner” refers to ROWLAND UNIFIED SCHOOL DISTRICT, 1830 South Nogales Street, Rowland Heights, California 91748, or their authorized representative. The terms are used interchangeably.

B. Architect: The term “Architect” refers to ZIEMBA + PRIETO ARCHITECTS, 601 South Glenoaks Boulevard, Suite 400, Burbank, CA 91502, or their authorized representative.

C. References to Drawings: Words such as “shown”, “indicated”, “detailed”, “scheduled”, “noted”, and words of similar meaning shall mean that reference is made to the information on the drawings unless stated otherwise.

D. Actions of Architect: Such words as “directed”, “designated”, “selected”, and words of similar meaning shall mean the direction, designation, selection, or similar action of the Architect is intended unless stated otherwise.

E. Required: The word “required” and words of similar meaning shall mean “as required to complete the Work” and “required by the Architect”, as is applicable to the context of the place where used, unless stated otherwise.

F. Perform: The word “perform” shall mean that Contractor, at Contractor’s expense, shall perform all the operations necessary to complete the Work or the mentioned portions of the Work, including furnishing and installing materials as are indicated, specified or required to complete such performance.

G. Provide: The word “provide” shall mean that Contractor, at Contractor’s expense, shall furnish and install the Work and mentioned portion of the Work, complete in place and ready for the intended use. These definitions apply the same to future, present and past tenses except “provided” may mean “contingent upon” where such is the context.

H. Equal: Words such as “equal”, “approved equal”, “equivalent”, and terms of similar meaning shall be understood to be followed by the phrase “in opinion of the Architect” unless stated otherwise.

I. Approval: The words “approved”, “approval”, “acceptable”, acceptance” and other words of similar meaning shall mean that approval or acceptance of Architect, or similar meaning, is intended unless stated otherwise.

J. Review: The word “review” and words of similar meaning shall mean the review and observation of the Architect is intended unless stated otherwise.

K. Submit: The words “submit”, “submittal”, “submission”, and other terms of similar meaning shall include the meaning of the phrase “submit to the Architect for approval” unless otherwise stated.

L. Expense: Such phrases as “at Contractor’s expense”, “at no extra cost to Owner”, “at no additional contract cost”, “with no extra compensation to Contractor”, or phrases of similar meaning shall mean that Contractor shall perform or provide the operation of work without increase in the contract price.

M. Fees and Charges: District reimburses contractor for utility fees charged by jurisdictional agencies. DSA fees are paid by District. Contractor is required to pay for all licenses and similar requirements that he must have in effect in order for him to accomplish his work.

N. Language: Specifications are written in a modified brief style consistent with clarity. Words and phrases requiring an action or performance, such as “perform”, “provide”, “erect”, “install”, “furnish”, “connect”, “test”, “coordinate”, and words and phrases of similar meaning, shall be understood to be preceded by the phrase “The Contractor shall” unless otherwise stated. Requirements indicated and specified apply to all work of the same kind, class and type, even if the word “all” is not stated. The use of the singular number implies the plural, if more than one of an item or unit is required; likewise the use of the plural number implies the singular, if only one of an item or unit is required.

O. Titling and Arrangement: Article, paragraph and subparagraph titles and other identifications of subject matter in the specifications are intended as an aid in locating and recognizing the various requirements in the specifications. Except where the titling forms a part of the text, such as beginning words of a sentence or where the title establishes the subject, the titles are subordinate to and do not define, limit or restrict the specification text. Underlining or capitalizing of any words in the text does not signify or mean that such words convey special or unique meanings having precedence over any other part of the contract documents. Specification text shall govern over titling and shall be understood to be and interpreted as a whole. The listings of various parts of work to be included or not included under various sections of the specifications are for convenience only and do not control the Contractor in dividing the work among the subcontractors or establish the extent of the work to be performed or provided by any subcontractor or trade. Contractor is solely responsible for providing the complete work without respect to where or how the various parts of the work may be indicated or specified. The sequence of articles, paragraphs, subparagraphs and subsubparagraphs in the specifications text is defined by the sequence 1.01A.1.a.(1)(a).

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01120

ALTERATION PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION:

The requirements of all other sections of the specifications apply to this section. This Section covers the general requirements for special project procedures pertaining to the alteration of existing construction and is complementary to similar requirements indicated or specified.

A. Work In This Section: Principal items include:

1. Alterations and repairs to existing facilities as required to complete the work.
2. Relocation and reinstallation of existing construction and finish.
3. Storage and protection of existing items to be reinstalled.

1.02 DESIGN INTENT:

The intent of the drawings and specifications is to construct the school building complex in accordance with Title 24, California Code of Regulations. If any conditions develop which are not covered by the contract documents wherein the finished work would not comply with said Title 24, California Code of Regulations, a construction change document detailing and specifying the required work shall be submitted to and approved by DSA before proceeding with the work.

1.03 SUBMITTALS:

A. Manufacturer's Data: Submit complete product data, test reports and application instructions for floor leveling materials.

1.04 QUALITY ASSURANCE:

A. Video Documentation: Refer to Division 1. Before starting work of this section, provide one video of existing conditions to be affected by the demolition work. Provide progress videos as the work progresses, at intervals as approved, illustrating substrates, connections, concealed conditions and other conditions which will benefit the Owner's permanent records.

1.05 JOB CONDITIONS:

A. General: Coordinate work of other sections and with the Owner to assure the correct sequence, limits, methods and times of performance. Arrange the work to impose minimum of hardship on operation and use of the facilities. Install protection for existing facilities, contents and new work against dust, dirt, weather, damage and vandalism, and maintain and relocate as work progresses.

B. Access: Confine entrance and exit operations to access routes designated by the Owner.

C. Existing Portable Items: Owner will remove portable equipment, furniture and supplies from involved existing areas prior to start of work therein. Cover and protect remaining items to remain.

D. Verification of Conditions: Perform a detailed survey of existing site and building conditions pertaining to the work before starting work. Report to Architect discrepancies or conflicts between the drawings and actual conditions in writing for clarification and instructions and do not perform work where such discrepancies or conflicts occur prior to receipt of Architect's instructions.

E. Building Security: Secure building entrances and exists with locking or another approved method in accordance with the Owner's instructions.

F. Safeguarding of Owner's Property: Contractor shall assume care, custody and responsibility for safeguarding all of the Owner's property of every kind, whether fixed or portable, remaining in rooms and spaces vacated and turned over to the Contractor by the Owner for his exclusive use in performance of the work until the work therein or related thereto is completed and the rooms or spaces are reoccupied by Owner. Furnish all forms of security and protection necessary to protect the Owner's property. Regardless of cause, Contractor shall repair, replace or otherwise acceptably make good all of the Owner's property under the Contractor's care, custody and safeguarding that is damaged, injured, missing, lost or stolen from time each such room or space is turned over to the Contractor for the work until re-occupied by Owner, at Contractor's expense and as directed by Owner.

G. Protection of Floors: Use care to protect all floor surfaces and coverings from damage. Equip mobile equipment with pneumatic tires.

1.06 EXISTING CONDITIONS:

The intent of the drawings is to show existing site and building conditions with information developed from the original construction documents, field surveys and Owner's records, and to generally show the amount and types of demolition and removals required to prepare existing areas for new work. Contractor shall make a detailed survey of existing conditions pertaining to the work before commencing demolition. Report discrepancies between drawings and actual conditions to the Architect for instructions and do not perform any removal work where such discrepancies occur prior to receipt of the Architect's instructions.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION

3.01 CUTTING AND PATCHING:

Execute cutting, including excavation, fitting and patching of work required to make the several parts fit properly, to remove and replace defective work, to remove and replace work not conforming to requirements of the contract documents, and to install specified work in existing construction.

A. When directed by Architect, uncover work to provide for Architect's observation of covered work, remove samples of installed materials for testing and remove work to provide for alteration of existing work.

B. Do not damage work by cutting or altering any part of it.

C. Do not cut or alter work of separate contractors without written consent of Architect.

D. If it is necessary to cut work which affects the structural safety of the project, or which affects the work of a separate contractor, submit written notice to Architect requesting consent to proceed with cutting. The request shall include the following items:

1. Description of affected work and necessity for cutting it.

2. Effect on other work and on the structural integrity of project.

3. Description of proposed work, including scope of cutting and patching, trades which will execute the work, products and materials to be used, and refinishing methods and extent.

4. Alternative methods, if any, to accomplish the work without cutting and patching.

5. Cost estimate, if additional cost is anticipated.

6. Notification of interruption of services, if applicable.

E. If conditions of work or schedule indicate a change of materials or methods, submit written commendations to Architect, stating the conditions which affect the change, recommendations for alternative materials or methods. Provide submittals as specified for substitutions for all materials and methods proposed to be changed.

F. Inspect all existing conditions of work, including elements subject to movement or damage during cutting and patching and during excavation and backfilling.

G. Provide shoring, bracing and coverings as required to maintain structural integrity to provide protection of project and surrounding improvements.

H. After uncovering work, inspect conditions affecting installation of new materials and products.

I. Restore work which has been cut or removed, install new products to provide completed work in accordance with the contract documents.

J. Refinish patched, new and existing surfaces to match adjacent, undisturbed construction. Where repainting is necessary, the painting shall be carried to natural breaks or natural terminations, as approved.

K. Repair and patch offsite paving, concrete, landscaping and related work where disturbed by installation of utilities, and where damaged by the work of the contract.

3.02 ALTERATIONS AND REPAIRS:

A. Basic Requirement: Restore and refinish all new and existing construction and improvements that are cut into, altered, damaged, relocated, reinstalled or left unfinished by removals to original condition or to match adjoining work and finishes unless otherwise shown, specified, directed or required. Workmanship and materials shall

conform to applicable provisions of other Sections. Provide new fasteners, connectors, adhesives and other accessory materials as required to fully complete approved reinstallations and restorations. Where restorations and refinishing are defective or are otherwise not acceptable to Owner, remove all the defective or rejected materials and provide new acceptable materials and finish at no extra cost to Owner.

B. It is the Contractor's responsibility to verify the condition of utilities prior to accomplishing the work above and below grade. Exploration and sensing devices are required. Contractor is responsible for all utility coordination (new and existing), depths required and correct inverts for a complete and operative system.

END OF SECTION

SECTION 01150

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION:

All other sections of Division 1 apply to this Section, and the requirements of this Section apply to all sections where the work involves the protection of the environment. During the progress of the work, the Contractor shall protect the environment, both on-site and off-site, throughout and upon completion of the construction project.

A. Related work specified in other sections:

1. Cleaning.
2. Field engineering.

1.02 MITIGATION OF CONSTRUCTION IMPACTS:

A. Requirements: The Contractor's operations shall comply with all federal, state and local regulations pertaining to water, air, solid waste and noise pollution.

B. Definitions of Contaminants:

1. Sediment: Soil and other debris that has been eroded and transported by storm or well production runoff water.

2. Solid Waste: Rubbish, debris, garbage, vegetation and other discarded solid materials resulting from construction activities.

3. Chemical Waste: Includes petroleum products, bituminous materials, salts, acids, alkalies, herbicides, pesticides, organic chemicals and inorganic wastes.

4. Sanitary Wastes:

a. Sewage: That which is considered as domestic sanitary sewage.

b. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing and consumption of food.

C. Contractor is to protect existing water system during construction from contamination. Water is to be tested as required for purity during construction. It is the Contractor's responsibility to provide a testing policy for the full duration of the project.

1.03 PROTECTION OF NATURAL RESOURCES:

A. General: It is intended that the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract be preserved in their

existing condition or be restored to an equivalent or improved condition upon completion of the work. The Contractor shall confine the construction activities to areas defined by the public roads, easements and work area limits shown on the drawings.

B. Temporary Construction: Remove all signs of temporary construction facilities such as haul roads, work areas, structures, foundations of temporary structures, stockpiles of excess or waste materials, or any other vestiges of construction as directed by the Architect. Level all temporary roads, parking areas and any other areas that have become compacted or shaped. Any unpaved areas where vehicles are operated shall receive a suitable surface treatment or shall be periodically wetted down to prevent construction operations from producing dust damage and nuisance to persons and property, at no additional cost to the Owner. Keep haul roads clear at all times of any object which creates an unsafe condition. Promptly remove any contaminants or construction materials dropped from construction vehicles. Do not drop mud and debris from construction equipment on public streets. Sweep clean turning areas and pavement entrances as necessary.

C. Land Resources: Do not remove, cut, deface, injure or destroy trees or shrubs outside the work area limits. Do not remove deface, injure or destroy trees within the work area without permission from the Architect. Such improvements shall be removed and replaced, if required, by the Contractor at his own expense.

1. Protection: Protect trees that are located near the limits of the Contractor's work areas which may possibly be defaced, bruised or injured or otherwise damaged by the Contractor's operations. No ropes, cables or guys shall be fastened to or be attached to any existing nearby trees or shrubs for anchorages. No vehicles or equipment shall be parked within the extents of the canopy of any tree.

2. Repair or Restoration: Repair or replace any trees or other landscape feature scarred or damaged by equipment or construction operations as specified below. The repair and/or restoration plan shall be reviewed and approved by the Architect prior to its initiation.

D. Water Resources: Contractor shall investigate and comply with all applicable Federal, state and local regulations concerning the discharge (direct or indirect) of pollutants to the underground and natural waters. All work under this contract shall be performed in such a manner that any adverse environmental impacts are reduced to a level that is acceptable to the Owner and regulatory agencies.

1. Oily substances: At all times, special measures shall be taken to prevent oily or other hazardous substances from entering the ground, drainage areas or local bodies of water in such quantities as to affect normal use, aesthetics or produce a measurable ecological impact on the area.

2. Mosquito Abatement: Construction activities shall be conducted such that ponding of stagnant water conducive to mosquito breeding habitat will not occur at any time.

E. Dust Control, Air Pollution and Odor Control: Take measures to avoid the creation of dust, air pollution and odors.

1. Unpaved areas where vehicles are operated shall be periodically wetted down or given an equivalent form of treatment to eliminate dust formation.

2. All volatile liquids, including fuels or solvents, shall be stored in closed containers.

3. No open burning of debris, lumber or other scrap will be permitted.

4. Equipment shall be properly maintained or reduce gaseous pollutant emissions.

1.04 NOISE CONTROL:

Perform demolition and construction operations to minimize noise. Perform noise producing work in less sensitive hours of the day or week as directed by the Architect.

A. Repetitive, high level impact noise will be permitted only between the hours of 8:00 AM and 6:00 PM, Monday through Friday. Repetitive impact noise on the property shall not exceed the following limitations:

Sound level (dB)	Duration of impact noise
70	12 minutes per hour
80	3 minutes per hour

B. Provide equipment, sound-deadening devices and take noise abatement measures that are necessary to comply with these requirements.

C. Maximum permissible construction equipment noise levels at 50 feet:

80 dB: Scrapers, stationary pavers, rock drills, pneumatic tools.
75 dB: All other construction equipment.

D. Whenever work is being performed which exceeds 55 dB noise level, measure the sound level every 5 days to determine noise exposure to the construction. Use the A weighing network of a general purpose sound level meter at slow response. Take measurements not less than six feet in front of building faces. Submit records to Architect.

1.05 CONSTRUCTION STORAGE AREAS:

Storage of construction equipment and materials shall be limited to designated work areas. Store and service equipment at the designated areas where oil wastes shall be collected. Oily wastes shall not be allowed to flow on to the ground or to enter surface waters.

1.06 DISPOSAL OPERATIONS:

A. Solid Waste Management: Supply storage containers. Remove daily all debris, such as spent air filters, oil cartridges, cans, bottles, combustibles and litter. Convey contents only to a favorably reviewed sanitary landfill. Care shall be taken to prevent papers from blowing onto adjacent property. Personnel shall be encouraged to use refuse containers.

B. Chemical Waste Management: Supply containers to store spent chemicals used during construction operations. Chemicals shall be disposed of in a favorably reviewed sanitary landfill.

C. Garbage: Garbage shall be stored in covered containers, picked up daily and disposed of a favorably reviewed sanitary landfill.

1.07 PRESERVATION OF MONUMENTS AND EXISTING FEATURES:

All monuments, bench marks or property line stakes disturbed by construction operations shall be promptly re-established by a registered land surveyor or civil engineer.

1.08 SAFETY:

Comply with all rules and regulations of NIOSH, CAL/OSHA and local authorities concerning jobsite safety.

1.09 EXISTING UTLITIES:

The Contractor shall coordinate construction activities with the government agencies, land owners and utility companies, and operations shall be planned to allow access to all property and utility owners.

1.10 PROTECTION OF WORK:

The Contractor shall be responsible for the care of all work until its completion and final acceptance. Replace damaged or lost material and repair damaged parts of the work at no additional contract cost.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers the general requirements for the project meetings.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION

3.01 PROJECT MEETINGS:

A. Attendees: Unless otherwise specified or required by the District, meetings shall be attended by the District, Architect, Contractor, Contractor's Superintendent and the Inspector of Record. Subcontractors may attend the meetings when involved in matters to be discussed or resolved but only when requested by the District, Architect or Contractor.

B. Meeting Records: The Architect will record minutes of each meeting and furnish copies within a reasonable time thereafter to the District, Contractor, Inspector of Record and other attendees. Unless written objection to contents of the meeting minutes is received by Architect within 3 days after presentation, it shall be understood and agreed that the minutes are a true and complete record of the meeting.

C. Meeting Schedule: Dates, times and locations for various meetings shall be agreed upon and recorded at pre-construction meeting. Thereafter, changes to the meeting schedule shall be agreed between the District and the Contractor, with appropriate written notice to all parties involved.

3.02 PRE-CONSTRUCTION MEETING:

A. General: Before issuance of Notice to Proceed, a pre-construction meeting shall be held at the location, date and time designated by District. In addition to attendees named herein, this meeting shall be attended by representatives of the regulatory agencies having jurisdiction, if required, and such other persons the District may designate.

B. Agenda: The matters to be discussed or resolved and the instructions and information to be furnished to or given by the Contractor at the preconstruction conference include:

1. Schedule of progress meetings.
2. Progress schedule and schedule of values submitted by Contractor.
3. Communication procedures between the parties.
4. Names and titles of all persons authorized by Contractor to represent and execute documents for Contractor, with samples of all authorized signatures.

5. The names, addresses and telephone numbers of all those authorized to act for the Contractor in emergencies.
6. Construction permit requirements, procedures and posting.
7. Public notice of starting Work.
8. Forms and procedures for Contractor's submittals.
9. Change Order forms and procedures.
10. Payment application forms and procedures and revised progress schedule reports to accompany the applications.
11. Contractor's designation of his organization's accident prevention member and his qualifications if other than the Superintendent.
12. Contractor's provisions for barricades, traffic control, utilities, sanitary facilities and other temporary facilities and controls.
13. Consultants and professionals employed by District and their duties.
14. Construction surveyor and initiation of surveying services.
15. Testing Laboratory or Agency and testing procedures.
16. Procedures for payroll and labor cost reporting by the Contractor.
17. Procedures to ensure nondiscrimination in employment.
18. Warranties and guarantees.
19. Long lead item status.
20. Other administrative and general matters as needed.

3.03 CONSTRUCTION PROGRESS MEETINGS:

Progress meetings shall be held according to the agreed schedule. All matters bearing on progress and performance of the Work since preceding progress meeting shall be discussed and resolved including, without limitation, any previously unresolved matters, deficiencies in the work or methods being employed for the work and problems, difficulties or delays which may be encountered.

3.04 PROGRESS MEETINGS:

Conduct progress meetings at the project site at regularly scheduled intervals. Notify the District and Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.

A. Attendees: In addition to representatives of the District and Architect each subcontractor, supplier or other entity concerned with current progress or involved in planning, coordination or performance of future activities shall be represented at these meetings by personnel familiar with the project and authorized to conclude matters relating to progress.

B. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the project.

C. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's construction schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities

will be completed within the contract time. Provide a 2 week “look ahead” schedule at each construction progress meeting.

D. Review the present and future needs of each entity present, including such items as interface requirements, time, sequences, deliveries, off-site fabrication problems, access, site utilization, temporary facilities and services, hours of work, hazards and risks, housekeeping, quality and work standards, change orders, documentation of information for payment requests.

E. Reporting: No later than 5 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary of progress since the previous meeting and report.

F. Schedule Updating: Revise the construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

3.05 SPECIAL MEETINGS:

After notice to other parties, special meetings may be called by the District, Architect or Contractor. Special meetings shall be held where and when designated by the District. Other special meetings, such as the pre-roofing conference, shall be conducted as specified in the various sections of the specifications.

3.06 POST-CONSTRUCTION MEETING:

This meeting shall be held prior to the final inspection of the work to discuss and resolve all unsettled matters. Bonds and insurance to remain in force and the other documents required to be submitted by the Contractor will be reviewed and any deficiencies determined. Schedule and procedures for the final inspection and for final correction of defects and deficiencies shall be agreed.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

1.01 DESCRIPTION:

All other Sections of Division 1 apply to this Section. Provide shop drawings, product data, samples and certificates, complete. Refer also to Articles 23 and 31 of the General Conditions.

A. Submit for approval of Architect shop drawings, product data and samples required by specification sections.

B. Prepare and submit, with construction schedule, a separate schedule listing dates for submission and dates reviewed shop drawings, product data and samples will be needed for each product.

C. Requests for substitutions of materials or processes shall not be submitted as part of the submittal process specified herein. All requests for substitutions shall be separately submitted.

1.02 SHOP DRAWINGS:

A. The requirements of the article on shop drawings in the General Conditions of the contract shall include the following additional requirements.

1. Transmittals: Submittal of shop drawings to the Architect shall be made by the Contractor with a dated transmittal form or letter; (not by sub-contractor or suppliers) at least 15 days before dates reviewed submittals will be needed.

2. Email PDF Digital format is the preferred delivery method, or alternately:

3. Reproducible and Method of Review: With initial submittal of two copies, include a reproducible of the shop drawings. Comments will be noted on the reproducible and returned to the Contractor, who shall revise the original and resubmit in the same manner. When approved, the reproducible will be stamped and returned to the Contractor, who shall make distribution of copies as specified hereinafter.

4. Information Copy: For each submittal and resubmittal, deliver one copy of shop drawings and a copy of the letter of transmittal therefore to the District for information, at same time as Architect’s copy.

5. Number of Copies: 6 minimum, and not less than the following:

   a. Initial Submittal: Reproducible and 3 copies to the Architect, one copy to the District, one copy to the Inspector of Record.

   b. Resubmittals: Reproducible of revised original and 3 copies to the Architect; one copy to the District.

   c. Final Distribution: Two copies to the Architect, two copies to the District and copies to those concerned.

B. Additional Requirements for Shop Drawings and Schedules:

1. Drawings and schedules shall be identified by serial numbers and descriptive titles indicating their reference to specific portions of Contract drawings and specifications, and shall be dated and signed. A box shall be provided at the lower right corner above the title block, for the Architect's use. Drawings not dated, signed, certified, and/or completed by the Contractor will be returned unchecked.

2. When the Contractor's drawings indicate deviations or changes from the Contract drawings and specifications that may be acceptable, the Contractor shall clearly indicate in his drawings all other changes required to correlate the work, and shall state in writing, his assumption of the costs of all other related changes.

3. Drawings and schedules shall be certified and stamped by the Contractor that they have been checked by him and conform to the Contract requirements.

4. Drawings shall be complete in every respect, and shall contain the following:

   a. Details of fabrication, assembly, erection and connection.

   b. Materials used, including fasteners and attachments.

   c. All required dimensions, including variations between dimensions shown on the Contract drawings and actual conditions.

   d. Complete schedules, as applicable.

   e. All protective coatings and factory finishes, fully described as to materials, number of coats, plated finishes, treatments, and similar information.

5. No changes are to be made to resubmitted drawings and schedules in excess of those corrections noted by the Architect unless the resubmitted drawings are accompanied by a separate written notice from the Contractor precisely setting forth such additional changes and stating his assumption of costs as specified for deviations; and/or such changes as are approved by the Architect.

1.03 PRODUCT DATA:

A. A bound list of products to be used in the work shall be submitted according to the following procedure:

1. Within 35 days after agreement between District and Contractor is executed, submit bound copies, 2 copies to the Architect and 1 copy to the District.

2. The Architect will notify the Contractor in writing of any disapproved items. Within 15 days after receipt of such notice, the Contractor shall submit proposed substations for disapproved items, number of copies, and distribution of the same as initial submittal for each resubmittal until approval is obtained for proposed substitutions. Resubmittals need not be bound, but the transmittal shall identify each disapproved item and the proposed substitute therefore. The Architect will notify the Contractor in writing of approved substitutions.

3. Within 15 days after receipt of notice of approval, the Contractor shall submit corrected bound copies, 2 copies to the Architect, 2 copies to the District, and copies to others concerned.

4. In determination of acceptability, the Architect will consider the ready availability of maintenance and replacement parts and materials, the availability of manufacturer's technical representatives, and such other factors that relate to the maintenance and repair of installed

items without excessive inconvenience to the District, as well as determination of conformance with the Contract Documents.

5. The Contractor shall provide those items included in the approved lists, without deviation, unless subsequently revised by change order procedure.

B. The items shall be submitted in the following manner:

1. Manufacturer's Standard Schematic Drawings:

a. Modify drawings to delete information which is not applicable to project.

b. Supplement standard information to provide additional information applicable to project.

2. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.

a. Clearly mark each copy to identify pertinent materials, products, or models.

b. Show dimensions and clearances required.

c. Show performance characteristics and capacities.

d. Show wiring diagrams and controls.

3. All items shall be neatly bound in a loose-leaf binder with a proper project identification label and a table of contents.

1.04 SAMPLES:

A. Submittal of samples, where specified or directed, shall be made by the Contractor with a dated transmittal form or letter, and not by subcontractor or suppliers. Samples of manufactured or process materials and equipment will be submitted within 15 days after receipt of approved material list. Samples of field-applied Paint materials and colors shall be submitted not less than 30 days prior to start of field painting work. Unless otherwise specified, samples shall be submitted in triplicate; two to the Architet and one to the District, with copy of letter of transmittal.

1. Label or tag each sample or set of samples identifying the manufacturer's name and address, brand name, catalog number, project title, and intended use.

2. For items required to be of selected and approved colors, patterns, textures or other finish sufficient samples to show the range of shades, tones, values, patterns, texture, or other features corresponding to the instructions, shall be smutted. Submit color samples of field-applied paint materials as specified for painting work.

3. Selection of colors will not be made until all related items requiring selection have been submitted.

1.05 CERTIFICATES:

A. Professional Certification: Where calculations or certification of performance criteria of materials, systems or equipment is required by the contract documents, the Architect and District shall be entitled to rely upon the accuracy and completeness of such calculations and certifications.

B. Certificates Required of Contractor: Where certificates are required attesting to compliance with regulations, compliance with standards or with the specifications, or for other reasons as specified, they shall be provided in 4 copies. Certificates required as part of the shop drawing or substitution approval processes shall be submitted with the shop drawings or request for substitution as applicable. All other certificates shall be submitted no later than the date of final acceptance.

C. All copies of certificates shall bear original signatures of appropriate sub-contractor and material suppliers and the Contractor.

D. Calculations and certifications shall be prepared under the direction of, and signed and sealed by, a professional engineer registered in the State of California, unless otherwise specifically permitted.

PART 2 – PRODUCTS Not applicable to this Section.

PART 3 – EXECUTION Not applicable to this Section.

END OF SECTION

SECTION 01400

TESTS AND INSPECTIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers testing and inspection procedures.

A. Requirements not in this Section:

1. Specific test requirements are specified in each section where they occur.
2. Verification of conditions.
3. Tolerances nomenclature.

1.02 PAYMENT FOR TESTING:

A. District will employ and pay for services of an independent testing laboratory approved by DSA to perform specified inspection and testing, including required continuous inspection. Contractor shall reimburse the District for excessive inspection costs incurred by the District because of the following:

1. Contractor's failure to complete entire work within the contract time stated in Agreement, and any previously authorized extensions thereof.
2. Claims between separate contractors.
3. Covering of work before required inspections or tests are performed.
4. Extra inspections for Contractor's correction of defective work.
5. Overtime costs for acceleration of work for Contractor's convenience.

B. Contractor shall pay cost of the following:

1. Additional tests necessitated if materials fail to meet contract requirements.
2. Tests required by Architect to substantiate proposed substitutions.
3. Tests required to determine code compliance.
4. Costs of concrete mix designs.

1.03 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY:

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on the requirements of the contract documents.
2. Approve or accept portion of the work.
3. Perform any duties of the Contractor.
4. Stop work.

B. Work of the testing laboratory shall in no way limit Contractor's quality control procedures or relieve Contractor of his obligation to perform work in accordance with the contract documents.

1.04 ADDITIONAL TESTING:

A. If the Architect determines that any work requires additional inspection, testing or approval, District will direct the Contractor to order such special inspection, testing or approval.

B. If special inspection, testing or approval reveals a failure of the work to comply with the contract documents, the Contractor shall reimburse the District for the costs, including additional services made necessary by such failure.

C. If special inspection, testing or approval indicates that the work complies with the contract documents, the District will bear the costs.

D. Provide water vapor testing and pH testing, and remedial measures necessary to remove excessive moisture and reduce pH from on grade slabs to receive moisture and alkaline sensitive finishes (VCT), complete.

1.05 GENERAL QUALITY CONTROL REQUIREMENTS:

A. General Test Requirements: Materials to be furnished under the Contract are subject to testing and inspection for compliance with the requirements of drawings and inspections.

B. Testing laboratory: The licensed testing laboratory certified as meeting requirements of ASTM D3666, D3740, E329, E543 and E548, as applicable to work involved and approved by District, referred to hereafter as the testing laboratory. Perform testing under the supervision and control of a California registered professional engineer employed by testing laboratory.

C. Disqualified Material: Material shipped or delivered to the site by Contractor from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of a notice from the Architect that such testing and inspection will not be required, shall not be incorporated in the work.

D. Notification of Field Tests: Architect and District reserve the right to be present at field testing as required by the contract documents. Contractor shall notify the Architect not less than 24 hours in advance of field testing.

E. Disqualified Work: Work in place which fails to conform to test requirements shall be removed and replaced without cost to the District. Where feasible, and subject to the approval of the Architect, disqualified work may be repaired, strengthened or otherwise modified to bring it into conformance with test requirements.

1.06 TEST PROCEDURES:

A. Materials to be furnished under the Contract shall be subject to testing for compliance with the contract documents. Tests will be made in accordance with the applicable standard methods of the ASTM, AASHTO or procedure herein specified.

B. Materials so specified herein, including such others as the Architect may direct, shall be tested. The Contractor shall furnish samples of the materials prepared for tests as required to the testing laboratory providing adequate time for testing before need at the project. The materials represented by samples under tests shall not be incorporated in the work without the approval of the Architect.

C. Test Procedures: Testing laboratory shall perform tests according to ASTM or other methods of test specified for various materials in other sections. If no procedure or test method is specified, testing shall conform to the material specification referenced except as otherwise directed. Testing laboratory shall tag, seal, label, record or otherwise adequately identify materials for testing and no such materials, shall be used or installed in the work until test result reports are submitted and approved, excepting only those materials specified to be placed or installed prior to testing.

D. Test Repeating: Repeat applicable tests at specified intervals, whenever source of supply is changed, or whenever the characteristics of materials change or vary in the opinion of District or Architect.

1.07 COORDINATION AND COOPERATION:

The Contractor shall initiate and coordinate testing and inspections required by the contract documents and public authorities having jurisdiction of the work. Notify the testing laboratory sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but not limited to:

A. Providing access to the work and furnishing incidental labor and facilities necessary for inspections and tests.

B. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

C. Providing facilities for storage and curing of test samples and delivery of samples to testing laboratories.

D. Providing testing laboratory with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.

E. Security and protection of samples and test equipment at the project site.

D. Furnish copies of mill test reports.

1.08 TEST REPORTS:

A. Reports shall be provided of tests. Such reports shall include tests made, regardless of whether such tests indicate that the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations as required shall also be reported. The reports shall show that the material or materials were sampled and tested in accordance with the requirements of CBC and with the approved specifications. Test reports shall show the specified design strength. They

shall also state definitely whether or not the material or materials tested comply with requirements.

B. Furnish and deliver copies of each test report, signed and certified by the testing laboratory professional engineer, as follows:

No. of Copies:

1	District
1	Architect
1	Structural Engineer (structural tests only)
2	Contractor
1	DSA
1	DSA Inspector or Record

C. Promptly notify the Architect of observed irregularities or deficiencies in the work or in products to be used in the work.

D. Each report shall include:

1. Date issued.
2. Project title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the project.
10. Type of inspection or test.
11. Results of tests and compliance with contract documents.
12. Interpretation of test results, when requested.
13. DSA application number.

1.09 VERIFICATION OF TEST REPORTS:

Each testing agency shall submit to DSA a verified report in duplicate covering the tests which are required to be made by that agency during the progress of the project. Such report shall be furnished each time that work on the project is suspended, covering the tests up to that time, and at the completion of the project, covering the tests.

1.10 REPORTING TEST FAILURES:

Immediately upon determination of a test failure, the laboratory will telephone the results of the test to the Architect. On the same day, the laboratory will send written test results to those named on the above distribution list.

1.11 AVAILABILITY OF SAMPLES:

A. Contractor shall make materials available to the laboratory and assist in acquiring these materials as directed by the District's Inspector. The samples shall be taken under the immediate direction and supervision of the testing laboratory or inspector.

B. If work which is required to be tested or inspected is covered up without prior notice or approval, such work may be uncovered at the discretion of the Architect at no additional cost to the District.

C. Unless otherwise specified, the Contractor shall notify the testing laboratory a minimum to 10 working days in advance of required tests and a minimum of 2 working days in advance of required inspections. Extra laboratory expenses resulting from a failure to notify the laboratory will be paid by the District and reimbursed by the Contractor.

D. The Contractor shall give sufficient advance notice to the testing laboratory in the event of cancellation or time extension of a scheduled test or inspection. Charges due to insufficient advance notice of cancellations or time extension will be paid for by the District and reimbursed by the Contractor.

1.12 REMOVAL OF MATERIALS:

Unless otherwise directed, materials not conforming to the requirements of the contract documents shall be promptly removed from the site.

1.13 DISTRICT'S INSPECTOR:

A. The District will furnish inspection of the work at not cost to the Contractor except as otherwise provided herein and except for those inspections required to be furnished and paid for by the Contractor elsewhere in the contract documents. Perform and construct work under inspection of the District's Inspector unless waived in writing by the District in each case or exempted wholly or in part from inspection elsewhere in the contract documents. Any work requiring such inspection that is performed or constructed during the absence of the District's Inspector is considered defective and is subject to rejection. The Contractor shall give written notice to District at least 2 working days in advance of performance of any part of the work requiring special inspection by someone other than District's Inspector and shall state probable duration of the required special inspection.

B. The inspection of any material or equipment at the factory or shop will not constitute an acceptance. The District's Inspector will advise the District to suspend any part or all of the work, by notice to the Contractor confirmed in writing, whenever a question arises as to whether materials or equipment being installed or the methods or workmanship being employed comply with the contract documents until such question is decided upon by District.

C. The District's Inspector is not authorized to accept or reject any work, to modify any contract document requirement, to advise or instruct Contractor or his employees as to prosecution of the work, or to perform any duty or service for the Contractor. Inspection of the work will not relieve the Contractor of the obligation to fulfill requirements of the contract documents.

1.14 INSPECTOR – DISTRICT'S:

A. An inspector employed by the District in accordance with the requirements of 2001 CBC will be assigned to the work. His duties are specifically defined in 2001 CBC.

B. The work of construction shall be subject to the personal continuous observation of the Inspector. He shall have free access to any or all parts of the work at any time. The Contractor shall furnish the Inspector reasonable facilities for obtaining such information as may be necessary to keep him fully informed respecting the progress and manner of the work and the character of the materials. Inspection of the work shall not relieve the Contractor from any obligation to fulfill this Contract.

1.15 INSPECTOR – DISTRICT – FIELD OFFICE:

The Contractor shall provide for the use of the District's Inspector a temporary office to be located as directed by the Inspector and to be maintained until removal is authorized by the District. This office shall be of substantial waterproof construction with adequate natural light and ventilation by means of stock design windows. The door shall have a lock. A table satisfactory for the study of plans and two chairs shall be provided by the Contractor. The Contractor shall provide and pay for adequate electric lights, private local telephone service with a loud exterior bell and separate line for a Contractor-provided FAX machine, and adequate heat and air conditioning for this field office until the completion of the Contract.

1.16 CONTINUOUS INSPECTIONS

A. Inspections: Continuous inspections shall be performed by registered special inspectors (hereinafter referred to as inspector) as required by the contract documents and building code. During course of work under inspection, inspector shall submit detailed reports relative to the progress and condition of work including variances from contract documents and stipulating dates, hours and locations of the inspections.

1.17 REQUIRED TESTS AND INSPECTIONS:

Tests and inspections, as set forth in DSA 103 T & I sheet.

PART 2 – PRODUCTS – Not applicable.

PART 3 – EXECUTION – Not applicable.

END OF SECTION

SECTION 01410

QUALITY ASSURANCE/QUALITY CONTROL

PART 1 - GENERAL

1.01 DESCRIPTION:

The requirements of this Section apply to, and are a component part of each section, of the specifications.

1.02 DEFINITIONS:

A. Quality Control: Activities performed by the Contractor to assure compliance with the contract documents.

B. Quality Assurance: Activities performed by the Owner, the Architect, or persons or firms employed and paid by them to assure compliance with the contract documents.

1.03 SUBMITTALS:

The following shall be submitted in accordance with Section 01300, in sufficient detail to show full compliance with the specification:

A. Certificates: Submit qualifications of Contractor's Quality Control Representative and required special certifications.

B. Contractor's Quality Control Plan: Describe the Contractor's Quality Control (QC) plan and procedures that will be implemented to meet the project quality requirements of the specifications. The system shall address:

1. Management and organization.
2. Identification and data retrieval.
3. Procurement and subcontract.
4. Quality control.
5. Nonconformance control.
6. Drawings and change control.
7. Control of field services.
8. Quality records.
9. Handling and storage.

C. Records: Records shall include all quality control data; factory tests of manufacturer's certifications, quality control coordinating actions, quality training/certifications, concrete pour records and records of inspections and tests.

1.04 QUALITY CONTROL PLAN:

The Contractor shall establish a quality control plan which shall include procedures to assure that the construction, and all components thereof, conform to the contract documents. The

Contractor shall assign competent personnel as Contractor Quality Control Representative (CQCR) to provide the inspection and direction to ensure the implementation of the Contractor's quality control plan.

A. The Contractor's quality system shall encompass management and supervisory actions required to ensure the quality of the completed construction work.

B. The CQCR shall report to the Contractor's management and shall have the necessary authority to discharge contractual responsibilities.

C. Contractor shall be responsible for ensuring that the activities and work of its suppliers and subcontractors meet contractual quality requirements.

D. The Contractor shall be responsible for controlling procurement and subcontracts to ensure that the quality requirements of the project are properly specified. The CQCR shall maintain a site receiving inspection system that ensures procured materials and equipment are inspected and tested. Records of site receiving inspection shall be maintained by the Contractor and made available to the Architect for review. Records shall show the results of inspections and tests, including defects, discrepancies and waivers.

E. Quality Control Records shall be maintained at the site. Maintenance of quality records shall not relieve the Contractor from submitting samples, test data, detail drawings, material certificates, or other information required by each section in the specification. Contractor shall ensure that each record is identified and traceable to specific requirements in the specification and drawings.

F. Nonconformance Control: Control nonconformances discovered by the CQCR, the Contractor, Subcontractors or Owner's quality representatives to prevent their use and to correct deficient operations. Monitor and correct deficient operations.

G. Quality Audits: The Architect may verify the Contractor's implementation of the Quality Control plan at any time during the performance of the work.

H. Contractor Responsibilities: The Contractor shall be responsible for:

1. Maintaining a site receiving inspection system that ensures procured materials and equipment are inspected and tested;

2. Ensuring that any nonconformance identified is documented and controlled;

3. Notifying the Architect of the completion of work or activities identified in the QA/QC Plan as hold or witness points;

4. Maintaining the calibration of measuring and test equipment used for the performance of the work within the required accuracy;

5. Maintaining results of any inspection and tests performed by the Contractor and making them available to the Architect for review;

6. Generating monthly summary report of all quality system activities, including inspections and tests, nonconformances, discrepancies and corrective action taken; and

7. Maintaining quality records.

1.05 QUALITY ASSURANCE:

A. The owner will provide testing and inspection as the Owner may required to assure that the construction, and the Contractor's quality control efforts are sufficient to protect the interests of the Owner under the contract. In addition, as described in Section 01400, the Owner will provide for testing laboratory services to perform tests as required by the specifications.

B. Inspections and tests performed by or for the Owner are for the sole benefit of the Owner and do not:

1. Relieve the Contractor the responsibility for providing adequate quality control measures;

2. Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;

3. Constitute or imply acceptance; or

4. Affect the continuing right of the Owner after acceptance of the completed work under paragraph I below.

C. The Architect has the right to observe and evaluate the work performed or being performed under the contract, and the premises where the work is being performed, at all reasonable times and in a manner that will not unduly delay the work. If the Architect performs observation or evaluation on the premises of the Contractor or a subcontractor, Contractor shall furnish and shall require subcontractors to furnish all reasonable facilities and assistance for the safe and convenient performance of these duties.

1.06 VERIFICATION OF CONDITIONS:

Prior to installing any portion of the work, inspect the work in place to receive the work to be installed and arrange for correction of defects in the existing workmanship, material or conditions that may adversely affect work to be installed. Such inspections shall include test applications of the materials to be installed as required to establish the correct condition of surfaces involved. Installation of materials on work in place constitutes acceptance of such work in place as being in proper condition to receive the materials to be applied and waiver of claim that the work in place is defective as pertains to warranty requirements, excluding unascertainable or concealed conditions. Where the specifications require a material to be installed under the supervision or inspection of the material manufacturer or his representative, the manufacturer or his representative also shall inspect the work in place and issue a letter of approval to Architect.

1.07 TOLERANCES NOMENCLATURE:

A. Tolerance of Numbers: Unless other tolerances are indicated or specified elsewhere, specified numbers such as gauges, weights, temperatures and similar references, but specifically not including dimensions and time, will be acceptable if within formally established, written and recognized commercial tolerances established for the affected trade. In the absence of formally written and recognized commercial tolerances, plus or minus 1 percent will be acceptable. If a specified number cannot be obtained, the number shall be interpreted as the next larger, provided it meets other requirements of the contract documents including sufficient space being available as indicated on the drawings.

B. Tolerances of Specified Words: Unless otherwise specified, the following words shall have the following meanings. Construction executed within these tolerances will be considered acceptable.

1. “Straight”: Allowed deviations from an absolutely straight line of sight shall be plus or minus 1/16” in one foot, plus or minus 1/8” in 10 feet, and plus or minus 1/4” for the entire length of a particular construction. These deviations shall be non-accumulative. Straight lines or planes on drawings shall conform to these tolerances.

2. “Flat”: Allowed deviations from an absolutely flat plane shall be plus or minus 1/1000 inch in one square inch, within plus or minus 1/16 inch in one square foot, within plus or minus 1/8 inch in an area ten feet by ten feet, and within plus or minus 1/4 inch for the entire area of a particular construction item. Flat planes on drawings shall conform to these tolerances.

3. “Level”: Allowed deviation from an absolutely horizontal plane shall be 1/2 degree of angle. Horizontal lines or planes on drawings shall conform to this tolerance.

4. “Plumb”: Allowed deviation from an absolutely vertical plane of plus or minus 1/2 degree of angle. Vertical lines or planes on drawings shall conform to this tolerance.

END OF SECTION

SECTION 01500
TEMPORARY FACILITES AND CONTROLS

1. PART 1 GENERAL

1.1. SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, telephone service, communication service, water, and sanitary facilities.

B. Temporary Controls: Barriers, enclosures and fencing. Water, erosion, pollution, noise and fire protection control.

C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.

1.2. TEMPORARY ELECTRICITY

A. Provide power from existing campus sources as required by General Contractor for construction use including requirements by subcontractor.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes. Provide flexible power cords as required. Provide power poles as required. Upon removal, repair any damaged surfaces to original conditions.

C. Provide main service disconnect and over current protection at convenient location.

D. Comply with NECA, NEMA, and UL standards and regulations for temporary electric service.

E. Permanent convenience receptacles may be utilized during construction where available.

F. Power usage cost from existing Owner supplied power sources to be paid by Owner.

1.3. TEMPORARY LIGHTING

A. Provide and maintain lighting for construction operations, observations, inspections, and traffic conditions.

B. Provide and maintain lighting to exterior staging and storage areas after dark for security purposes.

C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

D. Maintain lighting and provide routine repairs.

E. Permanent building lighting may not be utilized during construction.

1.4. TEMPORARY HEATING/COOLING

A. Provide and pay for devices as required to maintain specified thermal conditions for construction operations.

B. Only electric or indirect fired combustion heaters shall be used. No direct fired space heaters will be allowed.

C. Heaters will be equipped with controls to automatically turn off heater if airflow is interrupted or internal temperature exceeds design temperature.

D. Do not use permanent equipment for temporary purposes. Maintain minimum ambient temperature of 50, degrees F and maximum ambient temperature of 80 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

E. Maintain temperature above dew point of enclosed space based upon relative humidity of enclosed area.

F. Continuously monitor temperature of enclosed space(s) using an electronic monitoring device (s). Place devices in locations that will record average temperature of building(s). Provide print out to Architect upon request.

1.5. TEMPORARY VENTILATION

A. Ventilate enclosed areas to assist cure of materials and to prevent accumulation of dust, fumes, vapors, or gases.

B. Do not use permanent equipment for temporary ventilation purposes.

C. Ventilate enclosed spaces to dissipate humidity. Maintain a maximum relative humidity level of less than 60 percent. Avoid pockets of high humidity.

D. Continuously monitor humidity of enclosed space(s) using an electronic monitoring device(s). Place devices in locations that will record average humidity of building(s). Provide print out to Architect upon request.

1.6. TEMPORARY HUMIDITY CONTROL

A. Provide temporary ventilation during construction activities to protect installed construction from adverse effects of high humidity and moisture.

B. Select equipment that will not have a harmful effect on completed installations or elements being installed.

C. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

D. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

E. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

1.7. TELEPHONE SERVICE

A. Provide, maintain and pay for telephone service to contractor's field office at time of project mobilization if required.

B. Provide mobile telephone service for project superintendent, key employees and subcontractor's foremen for duration or project.

C. Provide, maintain and pay for facsimile machine in contractor's field office, if required.

1.8. ELECTRONIC COMMUNICATION SERVICE

A. Contractor is responsible to provide their own internet service and pay all costs associated with said service.

1.9. TEMPORARY WATER SERVICE

A. Provide, maintain and pay for suitable quality water service required for construction operations. Contractor may obtain water from existing fire hydrant is appropriate clearances are acquired and fees paid for private water meter. Cost of water usage from private water meter to be paid by Contractor.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections.

1.10. TEMPORARY SANITARY FACILITIES

A. Provide temporary chemical type toilet facilities and enclosures and hand washing stations for all tradesman during construction period as required by OSHA. Additional unit facilities to be provided at construction managers request.

B. Maintain temporary toilet facilities in a sanitary manner. Provide twice a week service as required.

C. Existing facilities shall not be used.

D. In addition to the chemical toilet and hand wash facilities for construction workers, provide, pay for and maintain bi-weekly, ONE temporary toilet and one hand wash facility for the sole use of the construction manager and project inspector.

1.11. BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

B. Provide protection for plant life and trees designated to remain and for soft and hardscape areas adjacent to work, replace damaged materials in kind.

C. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

1.12. FENCING

A. Construction: Commercial grade chain link fence.

B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks. Post fences and gates with no trespassing signs.

C. Temporary fence posts to be driven into the ground and wind screen attached by use of steel Hog Rings. The use of T stands is not acceptable.

1.13. WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
B. Provide water barriers as required to protect site from running water.

1.14. EROSION AND SEDIMENT CONTROL

A. Conform to Best Management Practices for erosion and sediment control and non-storm water management as defined in Sections 3 and 4 of the Construction Activity Handbook published by the Storm Water Quality Association.

B. Plan and execute construction Dy methods to control surface drainage from cuts and tills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

C. Minimize amount of bare soil exposed at one time.

D. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

E. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

F. Coordinate construction activities with control procedures established in the

Storm Water Pollution Prevention Plan (SWPPP).

G. Contractor to provide water truck and operator for the sole purpose of dust control. Said truck and operator are to be available to address dust control seven days a week, 24 hours a day per the construction manager's discretion throughout the duration of the project.

1.15. TEMPORARY FIRE PROTECTION

A. Maintain temporary fire protection facilities of the types needed until permanent facilities are installed.

B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations".

C. Fire safety during construction shall comply with CFC - California Fire Code (CCR) California Code of Regulations, Title 24, Part 9, Chapter 14.

D. Store combustible materials in containers in fire-safe locations.

E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes.

F. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

1.16. NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by construction operations.

B. Refer to specific noise restrictions during student testing periods as described in the General Conditions and Special Conditions.

1.17. POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Conform to Best Management Practices for waste management and material controls as defined in Section 4 of the Construction Activity Handbook published by the Storm Water Quality Association.

C. Coordinate construction activities with control procedures established in the Storm Water Pollution Prevention Plan (SWPPP).

1.18 EXTERIOR ENCLOSURES

A. Provide temporary weather-tight closure of exterior openings to accommodate acceptable working conditions and protection for materials, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification Sections, and to prevent entry of unauthorized persons.

B. Provide access doors with self-closing hardware and locks.

1.19 SECURITY

A. Provide security and facilities to protect Work and existing facilities and Owner's operations from unauthorized entry, vandalism, or theft.

B. Coordinate with Owner's security program.

1.20 ACCESS ROADS

A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area. Extend and relocate as work progress requires. Provide detours necessary for unimpeded traffic flow.

B. Stabilize temporary vehicle transportation routes and construction entrances to prevent erosion and control dust immediately after grading in accordance with best management practice techniques defined in Section 3 of the Construction Activity Handbook published by the Storm Water Quality Association.

C. Maintain stabilization techniques as work progresses.

D. Provide and maintain access to fire hydrants, free of obstructions.

E. Designated existing on-site roads may not be used for construction traffic.

1.21 PARKING

A. Existing on-site parking areas may not be used for construction personnel. Parking will take place in the designated parking area.

1.22. TRAFFIC CONTROL

A. Comply with requirements of authorities having jurisdiction.

B. Obtain all permits, provide all materials and maintain controls as required of authorities having jurisdiction.

C. Maintain access for fire-fighting equipment and access to hydrants.

1.23. PROGRESS CLEANING

A. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

B. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

1.24. WASTE DISPOSAL

A. Waste Management: In compliance with Section 01573 Construction Waste Management and Disposal.

B. Maintain building areas free of waste materials, debris, and rubbish.

C. Remove waste materials, debris, and rubbish from site periodically and legally dispose of off-site.

D. Maintain site area in a clean and orderly condition.

E. District owned trash containers are not to be used for construction waste.

1.25. PROJECT IDENTIFICATION

A. Provide 8 x 4 foot project sign of exterior grade plywood and wood frame construction, painted, with exhibit lettering by professional sign painter to Architect's design and colors.

B. List title of Project, names of Owner, Architect and Contractor.

C. Erect on site at location established by Construction Manager.

D. Sign to remain in place through construction period and shall be removed by general contractor only after dedication of the project.

E. Provide temporary directional signs for construction personnel and visitors.

F. No other signs are allowed except those required by law.

1.26. FIELD OFFICES

A. Construction Manager and Inspector job trailers are provided by the District. All other job trailers and containers required for construction use are to be provided by the General Contractor for their use.

B. General Contractor to provide both the Construction Manager and Inspector job trailers with the following services and supplies for the duration of the project.

a. Professional coffee service to include necessary equipment and coffee.

b. Professional drinking water service to include cold/hot dispenser and cups.

c. Cleaning services as on a bi-weekly basis.

d. Copy paper as required.

e. Compatible printer toner cartridges.

f. Provide a new refrigerator/freezer combo unit.

1.27. STORAGE AREAS AND SHEDS

A. Size to storage requirements for products of individual Sections. Allow for access and orderly provision for maintenance and for inspection of products.

1.28. REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Maintain temporary equipment, facilities and controls until Substantial Completion or when use is no longer required.

B. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to Substantial Completion review.

C. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.

D. Clean and repair damage caused by installation or use of temporary work.

E. Materials and facilities that constitute temporary facilities are property of the Contractor.

F. Restore existing facilities used during construction to original condition.

G. Restore permanent facilities used during construction to specified condition.

H. Replace construction that cannot be satisfactorily restored.

END OF SECTION

SECTION 01573

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 SUMMARY

A. Work Specified in this Section:

1. Construction waste management plan.
2. Construction waste recycling.
3. Construction waste adaptive reuse.

B. Related Work Specified in Other Sections:

1. Sustainable design requirements.
2. General commissioning requirements.

1.02 REFERENCES

ASTM International:

E 1609	Guide for Development and Implementation of a Pollution Prevention Program.

1.03 PLAN REQUIREMENTS:

A. Develop and implement construction waste management plan in accordance with ASTM E1609 and as approved by Architect, for compliance with High Performance Incentive (HPI) credit ME2.0 & ME2.1. Recycle, compost, and/or salvage at least 90 percent (by weight) of the non-hazardous construction and demolition debris.

B. Intent: Divert construction, demolition, and land clearing debris from landfill disposal. Redirect recyclable material back to manufacturing process. Generate cost savings or increase minimal additional cost to project for waste disposal.

1.04 SUBMITTALS:

A. Construction Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:

1. Transportation company hauling construction waste to waste processing facilities.

2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.

3. Construction waste materials anticipated for recycling and adaptive reuse.

4. On site sorting and site storage methods.

B. Submit documentation with each application for payment substantiating construction waste management plan was maintained and goals are being achieved.

1. Trash: Quantity by weight deposited in landfills. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal.

2. Salvaged Material: Quantity by weight with destination for each type of material salvaged for resale, recycling, or adaptive reuse. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal. Also include reimbursements due to salvage resale.

3. Total Cost: Indicate total cost or savings for implementation of construction waste management plan.

C. Closeout Submittals: Submit completed USGBC LEED NC & Major Renovations Letter Template indicating diverted waste quantity, total waste quantity and percentage of waste diverted from landfills.

1.06 CONSTRUCTION WASTE MANAGEMENT PLAN

A. Construction Waste Landfill Diversion: Minimum 75 percent by weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.

B. Implement construction waste management plan at start of construction. Submit within 7 calendar days after receipt of Notice to Proceed.

C. Propose means and methods for collecting and separating each type of debris deemed reusable or recyclable.

D. Identify the off-site recycling service and hauler of each designated debris item, who has agreed to accept and divert that item from landfill, in the proposed quantities anticipated. Schedule each item and list off-site recycling service and hauler company name, telephone number, address, and person contacted.

E. Review construction waste management plan at pre-construction Meeting and progress meetings specified in Section 01200.

F. Distribute approved construction waste management plan to subcontractors and others affected by Plan Requirements.

G. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.

H. Purchase Products to prevent waste by:

1. Ensuring correct quantity of each material is delivered to site.
2. Choosing products with minimal or no packaging.
3. Requiring suppliers to use returnable pallets or containers.
4. Requiring suppliers to take or buy-back rejected or unused items.

1.07 CONSTRUCTION WASTE RECYCLING

A. Use source separation method or co-mingling method suitable to sorting and processing method of selected recycling center. Dispose non-recyclable trash separately into landfill.

B. Source Separation Method: Recyclable materials separated from trash and sorted into separate bins or containers, identified by waste type, prior to transportation to recycling center.

PART 3 – EXECUTION Not applicable to this project.

END OF SECTION

SECTION 01630

SUBSTITUTIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. This Section covers provisions for, and restrictions on, substitutions of material, equipment and processes.

1.02 SUBSTITUTIONS:

A. Wherever catalog numbers and specific brands or trade names, whether or not followed by the designation “or equal” are used in conjunction with a designated material, product, thing or service mentioned in these specifications, they are used to establish the standards of quality, utility and appearance required.

B. Substitutions which are considered equal in quality, utility, performance and appearance to those specified will be reviewed, subject to the following provisions:

1. All substitutions must be reviewed and approved by the Architect in writing prior to fabrication and installation.

2. For this purpose, submit to the Architect 10 days prior to the bid due date, a typewritten list containing a description of each proposed substitute item, material or assembly.

3. No substitutions will be allowed within 10 days of the bid date for review.

4. Contractor shall comply with the General Conditions in regard to submittal of substitutions.

5. Append to the list, a complete side-by-side comparison between the specified item and the substitute item; include sufficient data, drawings, samples, long lead status, literature, guranry, warranty, or other detailed information as will demonstrate to the Architect that the proposed substitute is equal or better in quality, utility, performance and appearance to the material specified.

6. The Architect will approve, in writing, such proposed substitutions as are in the Architect’s opinion, equal in quality, utility, performance and appearance to the items or material specified.

7. Such approval shall not relieve the Contractor from complying with the requirements of the drawings and specifications, and the Contractor’s own expense for any changes resulting from the Contractor’s proposed substitutions which affect other parts of the Contractor’s own work or the work of others, time required to review the drawings and details.

8. If such substitutions impact the design of the project, the Contractor shall reimburse the District for the cost of revisions of contract documents by the Architect.

C. Failure of the Contractor to submit proposed substitutions for review and approval in the manner described above, and within the time prescribed, shall be sufficient cause for disapproval by the Architect of any substitutions otherwise proposed.

D. If specified items are listed in the following format or similar format: “First manufacturer and model number, equivalent second manufacturer and model number, or equal” the Contractor wishing to submit any “equivalent named manufacturer” shall so do in accordance with this provision.

E. Wherever catalog numbers and specific bands or trade names not followed by the designation “or equal” are used in conjunction with a designated material, product, assembly, thing or service mentioned in these Specifications, no substitutions will be approved.

F. Contractor shall discuss at the time of bid if the product being supplied is per the plans and specifications or if it is intended to be an or equal substitution.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01650

PRODUCT HANDLING AND PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers the requirements for handling and protection of materials and equipment to be incorporated into the work.

A. Transport, deliver, handle and store materials and equipment at the job site in such manner as to prevent damage, including damage which might result from the intrusions of foreign matter or moisture from any source. Comply with:

1. Material and equipment manufacturer's instructions regarding temperature limitations.

2. Other environmental conditions which are required to maintain the original quality of the materials and equipment.

3. Handle materials to prevent damage to products and finishes.

B. Packaging:

1. Maintain packaged materials in manufacturer's original containers with seals unbroken and labels intact until they are incorporated into the work.

2. Packaged material shall bear the name of the manufacturer, the product, including brand name, color, stock number and all other complete identifying information.

C. Remove all damaged or otherwise unsuitable materials and equipment promptly from the job site.

D. Storing:

1. Locate storage piles, stacks or bins so as to avoid being disturbed. Provide barricades as required to protect storage from damage.

2. Store all materials and equipment in accord with manufacturer's instructions, above grade and properly protected from weather and construction activities. Provide space heaters to prevent condensation where required.

E. Protection:

1. Protect all finished surfaces, including jambs and soffits of all openings used as passage-ways through which materials and equipment are handled.

2. Provide protection for all finished flooring surfaces in traffic areas before allowing any materials and equipment to be moved over those finished surfaces.

3. Maintain all finished surfaces clean, unmarred and suitably protected until occupied by Owner.

4. Consult individual Specification Sections for any additional specific product handling and protection requirements.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

END OF SECTION

SECTION 01700

PROJECT COMPLETION

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Perform duties specified herein for project completion, complete.

1.02 SUBSTANTIAL COMPLETION:

A. When the work is considered substantially complete, submit to Architect a written notice that the work, or designated portion thereof, is substantially complete, and a list of items to be completed or corrected.

B. After receipt of such notice, Architect will make an inspection to determine the status of completion.

C. If Architect determines that the work is not substantially complete, Architect will promptly notify the Contractor in writing, giving the reasons therefore. Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the Architect. Architect will re-inspect the work.

D. When Architect concurs that the work is substantially complete, he will prepare a Certificate of Substantial Completion on AIA Form G704, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect. Architect will submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

1.03 FINAL COMPLETION:

A. When the work is considered complete, submit written certification that:

1. Contract Documents have been reviewed.
2. Work has been inspected for compliance with Contract Documents.
3. Work has been completed in accordance with Contract Documents.
4. Equipment and systems have been tested in the presence of the Owner's representative and are operational.
5. Work is completed and ready for final inspection.

B. Architect will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

C. If Architect considers that the work is incomplete or defective, he will promptly notify the Contractor in writing, listing the incomplete or defective work. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to Architect that the work is complete. Architect will reinspect the work.

D. When the Architect finds that the work is acceptable to the requirements of the Contract Documents, he will request the Contractor to make closeout submittals.

1.04 PROJECT CLOSEOUT:

The following items shall be completed and approved prior to the approval of the final certificate of payment.

A. Warranties and Guarantees: Provide as specified in Section 01740. Unless otherwise provided elsewhere, warranties and guarantees shall commence with the date of final acceptance of the project. Verify date with the Architect, execute the forms and deliver to Architect for transmission to the Owner.

B. Final cleaning: Perform final cleaning as specified in Section 01710, immediately prior to final inspection.

C. Project Record Documents: Deliver to Architect record documents specified in Section 01720 at time of final inspection.

D. Operations and Maintenance Manuals and Parts: Deliver all documents and parts specified in Section 01730 at time of final inspection.

E. Keys: Unless keys are shipped directly to Owner from the factory, properly tag and deliver all keys to Owner at time of final inspection.

F. Instructions: Instruct the Owner's operating and maintenance personnel in proper operation and maintenance of systems, equipment and similar items which were provided as part of the work. Submit evidence that such instruction has been satisfactorily completed to Architect.

G. Provide all documentation required by DSA and CBC.

H. Certificate of Insurance for Products and Completed Operations: Furnish to Owner at time of final inspection.

1.05 REINSPECTION FEES:

Should Architect perform reinspection due to failure of work to comply with the claims of status of completion made by the Contractor:

A. Owner will compensate Architect for such additional services.

B. Owner will deduct the amount of such compensation from the final payment to the Contractor.

1.06 FINAL ADJUSTMENT OF ACCOUNTS:

A. Submit a final statement of accounting to Architect.

B. Statement shall reflect all adjustments to the Contract Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:

a. Previous Change Orders.
b. Allowances.
c. Unit Prices.
d. Deductions for uncorrected work.
e. Deductions for liquidated damages.
f. Deductions for reinspection payments.
g. Other adjustments.

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. Architect will prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.07 FINAL APPLICATION FOR PAYMENT:

Submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

1.08 INSTRUCTIONS:

Instruct the Owner’s operating and maintenance personnel in proper operation and maintenance of systems, equipment and similar items which were provided as part of the work.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION– Not applicable to this Section.

END OF SECTION

SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide cleaning, complete.

A. Maintain premises and public properties from accumulations of waste, debris and rubbish caused by operations.

B. At completion of work, remove waste materials rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave project clean and ready for occupancy.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. Use cleaning materials recommended by manufacturer of surface to be cleaned.

B. Use each type of cleaning material on surfaces recommended by manufacturer.

PART 3 – EXECUTION

3.01 DURING CONSTRUCTION:

A. Execute cleaning to ensure that building, grounds and public properties are maintained free from accumulations of waste materials and rubbish.

B. Wet down dry materials and rubbish to prevent blowing dust.

C. Daily during progress of work, clean construction site and utilized public properties, and dispose of waste materials, debris and rubbish.

D. Provide on-site containers for collection of waste materials, debris and rubbish. Provide for frequent emptying or pickup.

E. Remove waste materials, debris and rubbish from site and legally dispose of at public or private dumping areas off Owner’s property.

F. Vacuum clean interior building areas when ready to receive finish painting and continue vacuum cleaning on an as-needed basis until building is ready for substantial completion or occupancy.

G. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights; rather a closed chute shall be used.

H. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly painted surfaces.

3.02 FINAL CLEANING:

A. Employ experienced workers, or professional cleaners, for final cleaning. Clean all surfaces which have been replaced, remodeled or altered as part of the work. Clean for their entire extent, or to natural stopping point, as approved.

B. Exterior: Clean surfaces of the construction and site including fixtures, walls, soffits, floors, hardware, roofs, window and opening ledges and sills, horizontal projections, steps and platforms, walkways, rails and similar surfaces, and adjoining private and public property to the extent soiled by the Contractor's operations.

C. Interior: Leave surfaces in vacuum clean condition with all dust, dirt, stains, handmarks, paint spots, droppings and other blemishes and defects completely removed, and conform to following requirements:

1. Hard Floors: Wash and dry concrete, tile, elastomeric and similar floors, free of streaks or stains. Cleaning materials to be approved by District.

2. Resilient Flooring: Thoroughly clean floors with neutral soap or mild detergent as recommended by flooring manufacturer. Do not wax floors.

3. Resilient Bases: Clean off adhesive smears and wipe clean.

4. Carpet: Vacuum clean free of lint, soil and dust.

5. Bare and Painted Surfaces: Clean of dust, lint, streaks or stains.

6. Tile Walls: Clean and polish. Cleaning materials to be approved by District.

7. Tackable Vinyl Wall Covering: Remove all adhesive on surfaces per manufacturer's written instructions.

8. Hardware and Metal Surfaces: Clean and polish all exposed surfaces using noncorrosive and nonabrasive materials.

9. Glass: Wash and polish both sides, and leave free of dirt, spots, streaks and labels. Clean and polish mirrors.

10. Ceilings: Clean and free of stains, handmarks and defacing.

11. Replace air conditioning filters if units were operated during construction.

12. Clean ducts, blowers and coils if air conditioning units were operated without filters during construction.

13. Lighting fixtures: Replace lamps and clean fixtures and lenses if fixtures were used during construction or scheduled to remain u.n.o. by electrical drawings or specifications.

14. Fixtures and Equipment: Clean and polish mechanical and electrical fixtures and like items. Leave lighting fixtures free of dust, dirt, stains or waste material. Clean and service equipment and machinery, ready for use.

15. Surfaces Not Mentioned: Clean according to the intent of this Section and as required for Architect's approval.

D. Contaminated Earth: Final clean up operation includes the removal and disposal of earth that is contaminated or suitable for support of plant life in planting areas, and filling of resulting excavations with suitable soil as directed and approved. Contaminated areas include those used for disposal of waste concrete, mortar, plaster, masonry and similar materials, areas in which washing out of concrete and plaster mixers or washing of tools and like cleaning operations have been performed, and all areas that have been oiled, paved or chemically treated. Do not dispose of waste oil, solvents, paints, solutions or like penetrating material by depositing or burying on Owner's property.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

Provide project record documents, complete.

1.01 MAINTENANCE OF DOCUMENTS:

A. Maintain at job site at all times during construction and until final acceptance, one copy of:

1. Contract drawings and specifications.
2. Addenda, bulletins, change orders and construction change directives.
3. Reviewed and approved shop and erection drawings.
4. Samples, manufacturer's product data and installation instructions.
5. Field test reports.
6. Project correspondence and transmittals.
7. Other documents relevant to work.

B. These documents shall be latest current issue and shall bear, as applicable, all approvals and revisions.

C. Store documents in temporary field office apart from documents used for construction. Provide files and racks for storage of documents. File documents in accordance with project filing format of CSI Masterformat. Maintain documents in clean, dry legible condition.

D. Do not use record documents for construction purposes. Make documents available at all times for inspection.

1.02 RECORD DRAWINGS:

A. Record drawings are required for all construction. Record drawings shall conform to the following requirements.

1. Maintain, and keep up to date, a complete record set of blue line prints which shall be corrected daily to show every change from the original contract drawings. In addition, the prints shall be marked to show the precise horizontal and vertical location of concealed work and equipment, including concealed or embedded piping and conduit. Prints for this purpose shall be obtained from the Owner at not cost to the Contractor for original issue. This shall not be construed as authorization for the Contractor to make changes in the layout or work without definite instructions in each case.

2. At completion of the work, obtain from the Architect a set of transparent reproducible drawings. Enter the changes on one sheet and submit a print of that sheet to the Architect for review of the quality of the draftsmanship. The required quality is that

the record entries shall be equal to that of the original drawings. Following acceptance of the quality of work, record all changes neatly in ink on the reproducibles. Submit one set of corrected drawings to Architect for review, and following review, make corrections as required, stamp each sheet “Record Drawing”, stamp Contractor’s name, print and sign name of preparer, and date the drawings. Each sheet shall be signed by an authorized representative of the Contractor. Upon completion, deliver the set of drawings to the Architect for transmittal to the Owner.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION– Not applicable to this Section.

END OF SECTION

SECTION 01730

OPERATIONS AND MAINTENANCE MANUALS AND PARTS

PART 1 - GENERAL

1.01 DESCRIPTION:

This Section covers the general requirements for operations and maintenance manuals, spare parts and extra material.

1.02 SUBMITTALS:

A. Conform all submittals under this Section to applicable requirements of Section 01300.

B. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of work. Architect will review draft and return one copy with comments.

C. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit documents within ten days after acceptance.

D. Submit 1 copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned, with Architect comments. Revise content of all document sets as required prior to final submission.

E. Submit two sets of revised final volumes in final form within 10 days after final inspection.

1.03 QUALITY ASSURANCE:

Prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.04 FORMAT:

A. Prepare data in the form of instructional manuals.

B. Binders: Commercial quality, 8-1/2 x 11 inch, three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of project; identify subject matter of contents.

D. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

E. Text: Manufacturer’s printed data, or typewritten data on 20 pound paper.

F. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

G. Arrange content by systems under section numbers and sequence of table of contents of this project manual.

1.05 CONTENTS, EACH VOLUME:

A. Table of Contents: Provide title of project; names, addresses and telephone numbers of Architect, subcontractors and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.

B. For each Product of System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.

C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use project record documents as maintenance drawings.

E. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer’s instructions.

F. Warranties: As specified in Section 01740.

1.06 MANUAL FOR MATERIALS AND FINISHES:

A. Building Products, Applied Materials and Finishes: Include product data, with catalog number, size, composition and color and texture designations. Provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Include manufacturer’s recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition and details of installation. Provide recommendations for inspections, maintenance and repair.

D. Additional Requirements: As specified in individual product specifications sections.

E. Provide a listing in table of contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. Each Item of Equipment and Each System: Include description of unit or system and component parts. Identify function, normal operating characteristics and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

B. Panelboard Circuit Directories: Provide electrical service characteristics, controls and communications; typed or by label machine.

C. Include color coded wiring diagrams as installed.

D. Operating Procedures: Include start-up, break-in and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down and emergency instructions. Include summer, winter and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair and reassembly instructions; and alignment, adjusting, balancing and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer’s printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer’s parts list, illustrations, assembly drawings and diagrams required for maintenance.

J. Provide control diagrams by controls manufacturer as installed.

K. Provide Contractor’s coordination drawings, with color coded piping diagrams as installed.

L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Provide list of original manufacturer’s spare parts, current prices and recommended quantities to be maintained in storage.

N. Include test and balancing reports as specified in Division 15.

O. Additional Requirements: As specified in individual product specification sections.

P. Provide a listing in table of contents for design data, with tabbed dividers and space for insertion of data.

1.08 INSTRUCTION OF OWNER PERSONNEL:

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment and maintenance of products, equipment and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in operation and maintenance manual when need for such data becomes apparent during instruction.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION

3.01 MAINTENANCE MATERIALS AND SPARE PARTS:

Furnish and deliver special tools, instruments, accessories, spare parts and maintenance materials required by the contract documents, and furnish and deliver the special tools, instruments, accessories, and the special lifting and handling devices shown in the instruction manuals approved above. Unless otherwise specified or directed, deliver the items to the Owner with the Contractor's written transmittal accompanying each shipment, in the manufacturer's original containers labeled to describe the contents and the equipment for which it is furnished. Deliver a copy of each transmittal to Architect for record purposes.

END OF SECTION

SECTION 01740

WARRANTIES AND GUARANTEES

PART 1 - GENERAL

1.01 DESCRIPTION:

This section specifies the general requirements for written warranties and guarantees required by the Contract Documents. Final payment under the contract will not be made until the warranties and guarantees have been submitted in acceptable form.

1.02 WARRANTIES AND GUARANTEES:

A. General: Provide all warranties and manufacturer's guarantees with Owner named as beneficiary. For equipment and products, or components thereof, bearing a manufacturer's warranty or guarantee that extends for a period of time beyond the Contractor's warranty and guarantee, so state in the warranty or guarantee.

B. Specific Warranty and Guarantee Requirements: Refer to Divisions 2 through 16.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties shall not relieve the Contractor of warranty on the work that incorporates the products, nor shall they relieve suppliers, manufacturers and installers required to countersign special warranties with Contractor.

D. Related Damages and Losses: When correcting warranted work that has been found defective, remove and replace other work that has been damaged as a result of such defect or that must be removed and replaced to provide access for correction of warranted work.

E. Reinstatement of Warranty: When work covered by a warranty has been found defective and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to be original warranty with an equitable adjustment for depreciation.

F. Replacement Cost: Upon determination that work covered by a warranty has been found to be defective, replace or reconstruct the work to a condition acceptable to Owner, complying with applicable requirements of the contract documents. Contractor shall be responsible for all costs for replacing or reconstructing defective work regardless of whether Owner has benefited for use of work through a portion of its anticipated useful service life.

G. Owner's Recourse: Written warranties made to the owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights or remedies.

H. Rejection of Warranties: The Owner reserves the right to reject warranties and to disallow the use of products with warranties in conflict with contract document requirements.

I. Warranty as Condition of Acceptance: The Owner reserves the right to refuse to accept work for the project where a special warranty, certification or similar commitment is required until evidence is presented that those required to countersign such commitments are willing to do so.

1.03 PREPARATION OF WARRANTY AND GUARANTEE SUBMITTALS:

A. Number of Copies: 2, unless otherwise specified, or directed.

B. Special Project Warranty and Manufacturer's Guarantee Forms: Forms for Special Project Warranties and for Manufacturer's Guarantees are included at the end of this Section. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or the Contractor and subcontractor, supplier or manufacturer. Submit a draft to the Owner through the Architect for approval prior to final execution.

1. Refer to Divisions 1 through 16 for specific content requirements, and particular requirements for submittal of special project warranties.

2. Prepare standard product warranties and product guarantees, excepting manufacturer's standard printed warranties and guarantees, on Contractor's sub-contractor's material supplier's or manufacturer's own letterhead, addressed to Owner.

3. Warranty and guarantee letters shall be signed by all responsible parties and by Contractor in every case, with modifications only as approved by Owner to suit the conditions pertaining to the warranty or guarantee.

C. Manufacturer's Guarantee Form: Manufacturer's guarantee forms may be used in lieu of special project forms included at the end of the Section. Manufacturer's guarantee forms shall contain appropriate terms and identification, ready for execution by the required parties.

1. If proposed terms and conditions restrict guarantee coverage or require actions by Owner beyond those specified, submit draft of guarantee to Owner through Architect for review and acceptance before performance of the work.

2. In other cases, submit draft of guarantee to Owner through Architect for approval prior to final execution of guarantee.

D. Signatures: By persons authorized to sign warranties and guarantees, on behalf of entity providing the warranty or guarantee. All signatures shall be notarized.

E. Co-Signature: All warranties, except manufacturer's printed guarantees, shall be co-signed by the Contractor.

1.04 FORM OF WARRANTY SUBMITTALS:

A. At final completion, compile 2 copies of each required warrantee and guarantee properly executed by the Contractor, or by the Contractor and sub-contractor, supplier or manufacturer. Collect and assemble all written warranties and guarantees into binders and deliver binders to Architect for final review and acceptance.

B. Prior to submission, verify that documents are in proper form, contain all required information and are properly signed.

C. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.

D. Include Table of Contents for the finder, neatly typed, following order and Section names and numbers of the Project Manual.

E. Bind warranties and guarantees in heavy-duty, commercial quality, 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, with clear front and spine to receive inserts, and sized to receive 8-1/2” by 11” paper.

F. Provide heavy paper dividers with celluloid or plastic covered tabs for each separate warranty. Mark tabs to identify products or installation, and Section number and title.

G. Include on a separate typed sheet, if information is not contained in warranty or guarantee form, a description of the product or installation, and the name, address, telephone number and responsible person for applicable installer, supplier and manufacturer.

H. Identify each binder on front and spine with typed or printed inserts with title “WARRANTIES AND GUARANTEES”, the project title and the name of the Contractor. If more than one volume of warranties and guarantees is produced, identify volume number on binder.

I. When operating and maintenance data manuals are required for warranted construction, include additional copies of each required warranty in each required manual. Coordinate with requirements specified in Section 01730.

1.05 TIME OF WARRANTY AND GUARANTEE SUBMITTALS:

A. Preliminary Submittal: Unless otherwise specified, obtain preliminary copies of warranties and guarantees within 10 days of completion of applicable item or work. Prepare and submit preliminary copies for review as specified herein.

B. Final Submittal: Submit fully executed copies of warranties and guarantees within 10 days of date of substantial completion by not later than 3 days prior to date of application for final payment.

C. Date of Warranties and Guarantees: Unless otherwise directed, the commencement date for warranty and guarantee periods shall be the date of substantial completion.

1. Warranties for work accepted in advance of date of substantial completion: Commencement date will be the date of acceptance of such work.

2. Warranties for work not accepted as of the date of substantial completion: Commencement date will be the date of acceptance of such work.

PART 2 – PRODUCTS – Not applicable to this Section.

PART 3 – EXECUTION – Not applicable to this Section.

WARRANTY/GUARANTEE

FOR _____ WORK

We, the undersigned, do hereby warranty and guarantee that the parts of the Work described above which we have furnished and/or installed for:

INTERIM HOUSING for
STANLEY G. OSWALT ACADEMY
19501 Shadow Oak Dr
Walnut, California 91789

is in accordance with the Contract Documents and that all said Work as installed will fulfill or exceed all of the Warranty and Guarantee requirements. We agree to repair or replace Work installed by us, together with any adjacent Work which is displaced or damaged by so doing, that proves to be defective in workmanship, material or operation with a period of _____( ) year(s) from the date of final acceptance by Owner or from the Date of Certificate of Substantial Completion, whichever is earlier, ordinary were and tear and unusual neglect or abuse excepted.

In the event of our failure to comply with the above–mentioned conditions within a reasonable time period determined by the Owner, after notification in writing, we, the undersigned, all collectively and separately, hereby authorize the Owner to have said defective Work repaired and/or replaced and made good, and agree to pay to the Owner upon demand all moneys that the Owner may expend in making good said defective Work, including all collection cost and reasonable attorney fees.

_____
(Subcontractor, Subsubcontractor, Manufacturer or Supplier)

By_____

Title_____

State_License_No._____Date_____

_____
(Contractor)

By_____

State_License_No._____Date_____

Local_Representative. For Maintenance, repair or replacement service, contact:

Name:_____

Address_____

Phone Number_____

SECTION 02010

GENERAL REQUIREMENTS FOR SITEWORK

PART 1 – GENERAL

SUMMARY:

A. Section Includes: Division 1 applies to this Section. This Section includes provisions applicable to all sections of Division 2.

1. Reference Documents.
2. Quality assurance.
3. Project site conditions.

B. Related Work Specified Elsewhere:

1.02 DEFINITION:

A. The term "Soils Engineer", or "Geotechnical Engineer" as used in Division 2 sections refers to Harrington Geotechnical, 1590 N. Briant St., Orange CA 92867 (714) 637-3093.

1.03 REFERENCE DOCUMENTS:

A. Data:

1. Geotechnical Report dated 12-07-2018.

B. Reference Specifications: The work of Division 2 shall conform to following reference specifications to extent specified. The term "Engineer" in the reference specifications shall be understood to mean "Architect". Requirements for measurement or payment in reference specifications are hereby deleted; include work of this section under the contract sum for entire work.

1. Green Book: "Standard Specifications for Public Works Construction", 2018 Edition, published by BNI Building News, 990 Park Center Drive, Suite I, Vista CA 92081 (888) 264-2665 https://www.bnibooks.com/product/2018-greenbook-public-works

2. State Standard Spec: Standard Specifications, State of California, Department of Transportation, 2018 Edition.

1.04 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies: Refer to Safety Orders of the State of California, Division of Industrial Safety, Title 8, Subchapter 4, Article 6, Sections 1540 and 1541; secure and pay for required permits. For off-site work and installations, conform to requirements of public agencies having jurisdiction; obtain and pay for required permits and inspections.

B. Professional Observation: Perform work of this division under observation and approval of the Geotechnical Engineer employed and paid for by the Owner to the extent required in each section. Give Geotechnical Engineer not less than 48 hours advance notice of readiness for observation.

C. Civil or Structural Engineer: All design work required to be performed by the Contractor in this division shall be performed by a civil or structural engineer, employed by the Contractor, licensed to practice in the State of California.

D. Surveyor: All survey work required to complete and monitor the work of this division shall be performed by a surveyor or civil engineer employed by the Contractor, and licensed to practice in the State of California.

1.05 PROJECT SITE CONDITIONS:

A. The Site will be occupied during construction. The Project will be executed in Phases, starting with Installation of 6 Temporary Portable Classroom Buildings in the SE. corner Playfield for use as Interim Classrooms. Provide paved area for parking and portable classroom buildings. Contractor shall provide a 20 foot access gate and fencing around the project.

B. Digital Photographs: Refer to Section 01380. Before starting work of Division 2, provide digital photographs of existing improvements, public and private, adjoining the site and project area to record all existing conditions.

PART 2 - PRODUCTS Not applicable to this section.

PART 3 - EXECUTION

3.01 REQUIREMENTS FOR TRENCHING AND EXCAVATION: Conduct trenching and excavation operations with regards to the following:

A. The Contractor shall include in his base bid pay all costs incident to the provision of adequate sheeting, shoring, bracing, or equivalent method for the protection of life or limb, which shall conform to applicable Federal and State safety orders.

B. Before beginning any excavation five feet or more in depth, the Contractor shall submit to the Architect a detailed plan showing the design of shoring, bracing, sloping, or other provisions to be made for worker protection from the hazard of caving ground during the excavation. The proposed plan shall comply with the standards established the State of California Construction Safety Orders and the California Building Code. If the detailed plan varies from such shoring system standards, it shall be prepared by a registered civil or structural engineer whose name and registration number shall be indicated on the drawing. If a dispute arises as to whether the plan must be prepared by a registered civil or structural engineer, the engineer's determination of the matter shall be deemed to have been included in the contract price for the work as specified.

C. Neither the review nor approval of any plan showing the design of shoring, bracing, sloping, or other provisions of worker protection, shall relieve the Contractor from his obligation to comply with Construction Safety Order Standards and CBC for the design and construction of such protective work, and the Contractor shall indemnify the Owner and the Architect from any and all claims, liability, costs, actions, and causes of action arising out of or related to the failure of such protective systems. The Contractor shall defend the Owner, its officers, employees, and agents and the Architect in any litigation or proceeding brought with respect to the failure of such protective systems.

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 - GENERAL

1.01 SUMMARY:

A. Work In This Section: Division 1 applies to this Section. Perform demolition and removals as specified and required:

1. Demolish and remove Site playfield grass & irrigation lines, fence structures, broken asphalt, and prepare to grade per civil drawings..

5. Make all necessary arrangements to phase, disconnect/re-connect, and/or remove abandoned on-site utilities including capping and sealing underground services at points of connection indicated or directed.

6. Clean up and disposal of demolition and removal debris.

7. Salvage as indicated on drawings and as directed by the District, including delivery to District's storage.

B. Related Work Specified Elsewhere:

1. Temporary facilities.
2. Clean-up.
3. Earthwork.
4. Utility location, disconnect, removal and /or re-connection.

1.02 RECORD DRAWINGS:

Provide record drawings as specified in Division 1. Identify and accurately locate capped utilities and other subsurface structural, electrical or mechanical conditions.

1.03 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies: Secure and pay for demolition and removal permits required by public agencies having jurisdiction. Give notices and comply with requirements of SCAQMD rule 1403.

B. Demolition Firm Qualifications: Engage an experienced firm that has successfully completed demolition work similar to that indicated for this project.

C. Public Utilities: Give all required notices, pay fees and charges, and arrange for disconnection and removal of abandoned public utilities and meters.

D. Video Documentation: Before starting work of this section, provide one video of existing conditions to be affected by the demolition work. Provide progress videos as the work of demolition progresses, at intervals as approved, illustrating substrates, connections, concealed conditions, and other conditions which will benefit subsequent work.

1.05 DEFINITIONS:

The following terms have the meanings indicated when used in this Section and on related drawings.

A. Remove: Remove and legally dispose of items except those indicated to be reinstalled, salvaged or to remain the District's property.

B. Remove and Salvage: Items indicated to be removed and salvaged remain the District's property. Remove, clean and pack or crate items to protect against damage. Identify contents of containers and deliver to District's designated storage area.

C. Remove and Reinstall: Remove items indicated; clean, service and otherwise prepare them for reuse; store and protect against damage. Reinstall items in locations indicated.

D. Existing to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by the Architect, items may be removed to a suitable, protected storage location during demolition and then cleaned and reinstalled in their original locations.

1.06 MATERIALS OWNERSHIP:

District has first right of ownership. Except for items or materials indicated to be reused, salvaged or otherwise indicated to remain the District's property, demolished materials shall become the Contractor's property and shall be removed from the site with further disposition at the Contractor's option.

1.07 ENVIRONMENTAL CONDITIONS:

A. Hazardous Materials: Prior to starting work, obtain from the District certification that hazardous materials have been removed under a separate contract. In the event additional material which is suspected to be friable asbestos or other regulated hazardous material is encountered during the demolition work, the Contractor shall stop work in such areas and notify the District. The material will be inspected and tested, if necessary, by the District. If the material is found to be friable asbestos or other hazardous material, the District will provide for its removal or encapsulation without delay at District's expense. After treatment the District will test and certify that the contamination has been removed or controlled to within legal requirements and Contractor will be notified to proceed with the work in writing.

B. Noise Control: Perform all work in a manner and at times which will keep production of objectionable noise to a minimum amount of noise. Instruct all workers in noise control procedures. Noise that adversely affects adjacent properties will not be tolerated. Such conditions shall be the District's determination.

C. Dust Control: Take appropriate action to check the spread of dust, and to avoid the creation of a nuisance in the surrounding area. Do not use water if it results in hazardous or objectionable conditions, such as flooding or pollution. Comply with all dust regulations imposed by local air pollution agencies. Remove dust and dirt from work area at least daily or more frequently as needed or directed.

1.08 PROJECT SITE AND BUILDING CONDITIONS:

A. The intent of the drawings is to show existing site and building conditions with information developed from the original construction documents, field surveys and District's records, and to generally show the amount and types of demolition and removals required to prepare existing areas for new work. Contractor shall make a detailed survey of existing conditions pertaining to the work before commencing demolition. Report discrepancies between drawings and actual conditions to the Construction Manager for instructions, and do not perform any demolition or removals where such discrepancies occur prior to receipt of the Architect's instructions.

B. Extent: Perform removals to extent required plus such additional removals as are necessary for completion even though not indicated or specified. More or less of the existing construction may be removed is such variation will expedite the work and reduce cost to the District, subject to prior approval in each case.

C. At completion of removal and demolition work, the Contractor shall compare existing conditions with drawings and with new construction to be attached to, aligned with or otherwise influenced by said existing conditions. In all cases where modifications may be required because of differences between existing conditions and assumed conditions shown or not shown on the drawings, the Contractor shall provide detailed information, dimensions, limitations and other documentation to enable the Architect to design the necessary modifications.

1.09 PROTECTION:

A. Existing Work: Protect existing work which is to remain in place, that is to be reused, or which is to remain the property of the District by temporary covers, shoring, bracing and supports. Items which are to remain and which are to be salvaged and which are damaged during performance of the work shall be repaired to original condition or replaced with new. Do not overload structural elements. Provide new supports or reinforcement for existing construction weakened by demolition or removal work.

B. Weather Protection: For portions of the building to remain, protect building interior and all materials and equipment from the weather at all times. Where removal of existing roofing is necessary to accomplish work have materials and workmen ready to provide adequate and approved temporary covering of exposed areas. Damage at areas to be protected shall be replaced to the satisfaction of the District at the Contractor's expense. Temporary coverings shall be attended, as necessary, to insure effectiveness and to prevent displacement. Protect building interiors from damage by weather and vandalism when windows and doors are removed by use of rigidly constructed, weatherproof barriers.

C. Trees: Protect trees within the project site, which might be damaged during demolition, and which are indicated to be left in place, by a 6-foot high fence. Erect fence a minimum of 5-feet from the trunks at the outer perimeter of branches of individual trees or follow the outer perimeter of branches of clumps of trees. Restore trees scarred or damaged by Contractor equipment or operations to the original condition or replace as determined by the Architect.

D. Fire Protection: Maintain fully charged fire extinguishers and water hoses readily available during all demolition operations. Test electrical conductors for disconnections prior to removing.

E. Precaution Against Movement: Provide shoring and bracing or other supports to prevent movement, settlement or collapse of facilities adjacent to areas of alteration and removal that are to remain.

F. Overloading: Do not overload any part of the structures beyond the safe carrying capacity by placing of materials, equipment, tools, machinery, or any other item thereon.

G. Building Security: Take appropriate measures, as approved, to protect the work from theft and vandalism.

1.10 EXPLOSIVES:

Use of explosives will not be permitted.

1.11 BURNING:

Burning will not be permitted.

PART 2 – PRODUCTS

2.01 FILL:

As specified for fill soils in Division 2.

PART 3 – EXECUTION

3.01 EXAMINATION:

Verify that utilities have been Phased disconnected/re-connected, and/or capped.

3.02 PREPARATION:

Conduct demolition operations and remove debris to ensure minimum interference with roads, streets, walks and other adjacent occupied and used facilities. Do not close or obstruct streets, walks or other adjacent occupied or used facilities without permission from the District and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.

3.03 UTILITIES:

A. Drain, purge, or otherwise remove, collect and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

B. Prior to demolition or in the event unrecorded utilities are encountered, notify the Construction Manager or serving utility companies, as applicable, for work necessary and scheduled to be performed. Coordinate responsibility for limits of utility removals and be responsible for the removal of all utility installations both above and below grade except for those installations the utility companies agree to move. Use care to protect utility lines to remain in service, repair all damage which does occur, and remove those not to remain in service.

C. Interruption of Service: In the event existing utility service requires interruption to accomplish the demolition work, obtain written approval by the District for interruption of service. Request approval not less than 48 hours prior to proposed scheduled interruption. State the exact services involved and the expected duration. Except in an emergency affecting life and limb, do not cause any interruption of utility service without written authorization from the District.

D. Provide for protection of utility lines to remain in service. Repair damage done to these facilities as a result of the work of this Section, to the satisfaction of the District. Locations of existing utilities to remain shall be identified on record drawings, and their physical location shall be indicated by tags or stakes as applicable.

E. Provide approved paths of travel over utility trenches, etc. Use trench plates. School circulation shall be maintained at all times. Provide plates, bridges, protective barriers and guardrails as required to accomplish this.

3.04 WORKMANSHIP:

A. Lowering material: Use hoists and chutes as required to lower removed material. Throwing, dropping or permitting the free fall of material and debris from the roof or from heights which would cause undue noise or nuisance or excessive dust, is prohibited.

B. Protection of work to remain: Establish cut off points between work to be removed and work to remain.

C. Partial demolition and removal: When portions of pavement, slabs, sidewalks, curbs, curb and gutters and cross-gutters are to be removed, cut with a concrete saw to the full depth along all joint lines, unless noted otherwise on drawings, before breaking off the portion to be removed.

3.05 DEMOLITION OF SITE IMPROVEMENTS:

A. Site Improvements: Remove walks and pavement, including herbicide treated base courses and fences, walls, stoops and miscellaneous improvements.

B. Paving and Slabs: Remove, grind, scarify, sawcut concrete and asphaltic concrete paving and slabs including aggregate base as indicated.

C. Underground Utilities: Expose pipe and conduit and cap at property line with permanent waterproof plugs or seals of concrete or metal. Except for items indicated to be abandoned in place, remove on-site abandoned pipe and conduit, cap and seal remaining pipe or conduit ends, and backfill the excavations as specified for new construction.

3.06 SALVAGE AND DISPOSAL:

A. General: Existing items the District intends to retain are indicated on drawings or will be designated by the District prior to start of work. Contractor shall carefully remove, salvage, box or bundle as approved, and deliver such items to storage as directed.

B. Disposal: All removed material other than items to be salvaged or reused shall become Contactor's property and be removed from the District's property. Clean up and dispose of debris promptly and continuously as the work progresses, and do not allow to accumulate. Sprinkle water on the surface to prevent dust nuisance.

C. Secure and pay for required hauling permits and pay dumping fees and charges.

END OF SECTION

SECTION 02210

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide and perform earthwork in construction as required for new paving, and utility trenches, complete. Normal Site preparation will include building pad graded and certified to support the Portable Classroom buildings on wood foundations. Specific soil preparation shall be per the recommendations of the geotechnical report. All fill imported to project site must be tested for toxic substances, it shall be tested by an independent testing laboratory and certify that it meets all State, Local and National regulations and laws, the contractor shall pay for this testing and provide a written certification to the owner stating that materials meet these standards prior to bringing fill materials to the site.

A. Work In This Section: Principle items include:

1. Site clearing.
2. Excavation, filling, backfilling and compaction.
3. Imported fill material as required.
4. Subgrade preparation for on-grade paving.
5. Clean up and disposal.

B. Related Work Not In This Section:

1. Underground utility systems.

1.02 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies: Refer to Construction Safety Orders, Title 8, CCR, Section 1503 and Article 6; secure and pay for required permits. For off-site excavation, backfill, and compaction, conform to all requirements of public agencies having jurisdiction; obtain and pay for required permits and inspections.

B. Source Quality Control: Obtain approval by the Inspector of imported fill material before material is brought to site, and same approval of excavated material for use in fills or backfills prior to placing. Imported material shall be tested for toxic substances by an independent testing laboratory approved by the District.

C. Foundation Soils: Obtain approval of Inspector, and DSA as required, for proper conditions and suitable bearing materials

1.03 SUBMITTALS:

Provide certification, signed by an authorized representative of an approved testing laboratory, that proposed imported fill material and other earthwork materials to be brought to the site, are free from toxic substances, and are in conformance with applicable state and local regulations.

1.04 JOB CONDITIONS:

A. Protection: Provide and maintain protection to retain earth banks and to protect adjoining grades and structures from caving, sliding, erosion or other damage. Provide suitable protection against all bodily injury. Construct all bulkheads and shoring to requirements of State and Local codes and regulations. Shore vertical banks or slope banks back as required for stability and safety. Erect temporary barricades located at least 5-feet away from the top of slopes and provide temporary berms as required to prevent slope erosion from water.

PART 2 – PRODUCTS

2.01 MATERIALS:

Provide approved imported material as required if the quantity of approved site and excavated material is insufficient to complete the work.

A. Earthwork Materials: Approved excavated or imported granular soil such as silty sand of the non-expansive type (that undergoes no undesirable volumetric change with changes in the moisture content) and containing not more than 20% by weight of material passing the No. 200 sieve, free from trash, roots, organic material, clay lumps and rocks over 6” size.

B. Gravel Fill Material: From approved source, 90% to 100% passing a 3/4" sieve, 0% to 10% passing a No. 4 sieve and 0% to 3% passing a No. 100 sieve.

PART 3 – EXECUTION

3.01 SITE CLEARING AND PREPARATION:

Before starting grading operations, Coordinate with Construction Manager, remove trash and strip all vegetation on the site, including roots.

3.02 EXCAVATION:

Perform excavation to the dimensions and elevations indicated on Drawings, with additional space allowed as required for the installation and stripping of forms, and inspection of the various types of work, except where approval may be given to deposit certain miscellaneous concrete directly against earth banks. Avoid loosening of soils in bottoms or sides of excavations.

A. Adverse Subsurface Conditions: Notify Construction Manager should unsuitable bearing soil or other adverse subsurface conditions be found which are not indicated by the Drawings or Specifications.

3.03 SUBGRADE PREPARATION FOR PAVING:

Prepare subgrade for asphalt concrete paving placed directly on earth by excavating, filling, and grading as required, and bring to optimum moisture content. Finish the subgrade within 3/8 inch tolerance when tested along a 10-foot straightedge in any direction at any location. Compact to 90 percent of maximum dry density and maintain moisture content until paving is placed.

3.04 COMPACTION:

Moisten or aerate all material to specified moisture content, then uniformly compact the fills and backfills in maximum 8" thick loose layers to 90% of the maximum dry density determined by ASTM D1557. Flooding or jetting is not allowed.

3.05 DISPOSAL:

Clean up and remove all trash, debris, waste and surplus and rejected earthwork materials from the site to a legal disposal area. Conform to pertaining laws, codes and regulations, obtain and pay for required hauling and dumping permits, and pay all dumping charges. Perform trucking and material handling in a careful manner to prevent spillage and dusting or damage to surfaces and structures. Remove planks used to protect surfaces subject to public traffic at finish of each day's operations. Maintain public streets and sidewalks in broom clean condition.

3.06 FIELD QUALITY CONTROL:

A. Testing: Testing Laboratory will take test samples and perform materials, moisture content, compaction densities, and other tests to the extent and by the methods directed by Inspector.

END OF SECTION

SECTION 02510

ASPHALT CONCRETE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide asphalt concrete paving in construction phases as indicated by Construction Manager, as specified and required.

A. Work Specified in this Section:

1. Patching and repair of existing pavement and new paving.
2. Fog seal coat with screenings over existing paved surfaces.

B. Related Work Not in this Section:

1. Earth subgrade preparation for asphaltic paving.
2. Pavement striping.

1.02 PROTECTION OF EXISTING INSTALLATIONS:

A. Protect existing installations, and if any such installations are damaged or broken by operations of this Section, they shall be repaired or replaced to the satisfaction of the Architect.

1.03 TESTING AND CONTROL OF MATERIALS:

All material shall meet the requirements specified herein. Laboratory tests of all materials will be required. Costs of such tests shall be paid by the Contractor.

1.04 QUALITY ASSURANCE:

A. Reference Specifications: Conform to the “Standard Specifications for Public Works Construction”, 2018 Edition with 2018 Cumulative Supplement, published by Building News Inc., Los Angeles, California, hereafter referred to as Green Book. The term “Engineer” in the reference specifications shall e understood to mean “Architect”. Requirements for measurement or payment in reference specifications are hereby deleted; include Work of this Section under the Contract Sum for entire work.

B. Proportioning of Plant Mix: Determine the exact proportions of bituminous binder and mineral aggregate required to produce a mixture equal to mix quality specified.

PART 2 – PRODUCTS

2.01 MATERIALS:

A. Acceptable Manufacturers: Asphalt Emulsion Coat, “Guardtop” manufactured by Vulcan Materials Company (626) 960-4788 or (916) 773-3968, “ Slurry-Mix” by Ted R. Jenkins Co., Inc. or “Plush Tex” by Koch Asphalt Company.

B. Prime Coat: Grade SC-250 liquid asphalt or Grade SC-70, as approved.

C. Paving Asphalt: Conform to Section 203-1 of the Green Book, Grades AR 4000 or AR 8000 as appropriate for conditions and temperature of placement.

D. Asphaltic Concrete Surface Course: Conform to Section 203-6 of the Green Book, asphalt type AR-4000 or AR-8000, aggregate graded as specified in Table 203-6.4.3, Type D-1 Open Fine, 1/2 inch mix.

E. Fog Seal Coat: Conform to Section 203-9 Green Book.

F. Tack Coat: Asphalt paint conforming to Section 203-8 of the Green Book.

PART 3 – EXECUTION

3.01 OVERLAYING OR PATCHING EXISTING PAVEMENT:

Where new paving joins existing, and where trenches are cut in existing paving, patch with asphalt concrete. Prior to patching, sawcut edges at least 6” back from all ragged edges and compact subgrade to a firm, unyielding subgrade.

A. Asphalt Concrete: Conform to Green Book Subsection 302-5 including the requirements for smoothness and density. Smoothness shall be appropriate for school playgrounds and walking surfaces. Construct paving to minimum compacted thickness indicated.

1. Where thickness of more than 2-inches is shown, install asphalt surface materials in two courses, leveling course and surface course, total compacted depth as scheduled.

B. Field verify extent and location of paving scheduled for overlaying, replacement, repair and resurfacing. The work includes filling trenches in existing paving, where indicated or required because of utility construction.

C. Coordinate junction of new and existing pavement. For patching, saw cut existing pavement to provide a uniform straight line transition. Meet existing surface levels and maintain drainage slopes. Feathering of transitions is not acceptable.

D. Apply emulsion or hot liquid asphalt tack coat to the area to be overlayed or the sawcut edges prior to patching. Apply and compact asphalt concrete pavement making neat edges where new and existing join.

3.04 CRACKS IN EXISTING PAVEMENT:

Clean cracks prior too and overlay area or repair area, remove weeds and dirt. Place herbicide in cleaned cracks. Fill cracks less than 1/4” with emulsion slurry and cracks 1/4” and larger with hot liquid asphalt.

3.05 FOG SEAL COAT:

Apply to new and existing asphalt concrete paving within the contract area. Seal coat shall conform to State Standard Spec Section 37. Spray apply at rate of 0.05 to 0.10 gallons per square yard, the exact quantity as required to fully seal paving surface, as approved. Spread screenings immediately after application of emulsion at rate of 12 to 20 pounds per square yard. Cover and protect adjoining surfaces from staining.

3.06 PROTECTION AND CLEANING:

A. Protect newly placed material from traffic by barricades or other suitable methods acceptable to the Architect. Protect asphalt paving from construction and vehicular damage until project acceptance.

B. Sweep asphalt paving and wash free of stains, discolorations, dirt and other foreign material immediately before project acceptance. If stains remain after cleaning, apply a coat of sealer.

3.07 CLEAN-UP:

Clean-up paved areas prior to acceptance of the Work. All dirt, spoil and debris of any nature shall be removed, and the entire site shall present a clean, workmanlike appearance. Damage to paint work from paving or seal-coating operations shall be corrected.

END OF SECTION

SECTION 02580

PAVEMENT MARKING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide pavement paint marking, and striping, complete.

A. Related Work Specified Elsewhere: Tactile warning strips.

1.02 SUBMITTALS:

A. Manufacturer's Data: Submit manufacturer's technical product data covering recommended preparation and application methods with paint coverage rates.

B. Lay out markings in place on surface, and obtain approval of layout prior to commencement of striping. Notify Owner 72 hours in advance of time approval is required.

C. Submit certification of compliance with regulations required below.

1.03 WEATHER LIMITATIONS:

Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits.

1.04 COMPLIANCE WITH REGULATIONS:

All materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in paint. • Traffic Paint: Conforming to Fed Spec TT-P-1952B and bearing approval of SCAQMD:

PART 2 – PRODUCTS

2.01 HIGH BUILD REFLECTIVE MARKING:

High build acrylic coating with reflective media embedded there in, as follows:

A. High build acrylic coating: conform to FS TT-P-1952, color as selected, one of the following:

TMT-Pathway
1021 N. Mission Road
Los Angeles, CA 90033
(800) 338-7680

Pervo Paints
6624 Stanford Ave.
Los Angeles, CA 90001
(323) 758-1147

Vogel Traffic Services
1920 Albany Place South
PO Box 140
Orange City, IA 51041
(712) 737-4016

B. Reflective media: Conform to FS TT-B-1325, Type I, Gradation A.

C. Traffic Paint:

a. Frazee Traffic Line Paint No.506.
b. Dunn-Edwards Vinyl-L-Stripe, No. W-801.
c. Decratrend Decrazone Traffic Paint No. 735.

- Color: Striping and its width, signs, ramp markings and similar items to be in compliance with Title 24 and local jurisdiction.
- Lines: Paint line 4" wide. Apply minimum 2 coats to achieve complete opacity.
- Marking: Provide directional arrows, numbering, and lettering in similar manner and with same paint.
- Disabled Access Marking:
  a. Painted lines and markings on pavement shall be 3" minimum wide and blue in color equal to Color No. 15090 per Federal Standard 595B. Parking spaces for person with disabilities shall be marked according to CCR, Title 24, CBC
  b. Tactile warning lines shall be in conformance to CCR, Title 24, CBC sec. 1133B.8.3 and 1133B.8.4.

2.02 COLORS:

As selected by Architect. Allow for striping, signs, ramp markings and similar items to be in different colors.

PART 3 – EXECUTION

3.01 SURFACE PREPARATION:

A. General: All surfaces to be marked shall be thoroughly cleaned before application of the paint. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing water or a combination of these methods as required.

B. Layout: Striping indicated on drawings is indicative of quantity and type required, the Owner reserves the right to modify striping prior to layout by Contractor. Obtain from Owner the exact striping required, and layout all markings on the surface.

C. Existing Pavement:

1. Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. If approved, and if demonstration of method is satisfactory, existing striping may be obliterated by use of paint matching surface color.

2. Where oil or grease are present on old pavements to be marked, affected areas shall be scrubbed with several applications or trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the paint.

3.02 APPLICATION – GENERAL:

Paint shall be applied to clean, dry surfaces. Paint shall be applied pneumatically with approved equipment at rate of coverage specified herein. Provide guide lines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined. Lines shall be straight, or curved as applicable, to within 1/4" in 15 feet. Greater deviations shall be removed or obliterated and lines reapplied. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected. Where areas are to be restriped, slurry these areas where new markings are to occur.

A. Lines: Paint lines 4” wide unless otherwise indicated. Apply one or more coats as required to achieve complete opacity. Provide stall divisions between standard and small size parking stalls, spaced as indicated.

B. Markings: Provide directional arrows, numbering, and lettering in similar manner and with same paint, not necessarily the same color. Paint directional arrows with stencils or other approved method. Strokes of letters to be as indicated. Islands and “No Parking” areas shall have 4” stripes as indicated on drawings.

C. Disabled Access Markings:

1. Painted lines and markings on pavement shall be 4” minimum wide and blue in color equal to Color No. 15909 per Federal Standard 595B. Parking spaces for persons with disabilities shall be marked according to CCR, Title 24, California Building Code Section 1129B.5.

2. Tactile warning lines shall be in conformance to CCR, Title 24, California Building Code, Sections 1133B.8.3 and 1133B.8.4.

3.03 RATE OF APPLICATION:

A. High Build Acrylic Coating: 50 square feet per gallon. Apply glass spheres uniformly to the wet paint at a rate of 6 plus or minus 0.5 pounds of glass spheres per gallon.

3.04 SPECIAL REQUIREMENTS FOR HIGH BUILD ACRYLIC COATING:

A. Apply paint pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. Discontinue painting operations if there is a deficiency in drying of the markings until cause of the slow drying is determined and corrected.

B. Reflective Media: Application of reflective media shall immediately follow the application of paint. Accomplish drop-on application of the glass spheres to ensure even distribution at the specified rate of coverage. Should there be malfunction of either paint applicator or reflective media dispenser, discontinue operations until deficiency is corrected.

3.05 COMPLETION:

Remove paint droppings, loose glass beads and overspray, and repair all injured or stained surfaces as approved.

END OF SECTION

SECTION 02720

STORM DRAINS

PART 1 - GENERAL

1.01 DESCRIPTION: Division 1 and Section 02010 apply to this Section. Provide storm drain lines and catch basins, complete in phases as indicated, specified, and required.

A. Work In This Section: Principal items include:

1. Storm drain pipe and fittings and connection to existing storm drain line.

2. Catch basins

3. Trenching, backfilling and compaction for storm drain system.

B. Related Work Not in This Section:

1. Earthwork.

1.02 REFERENCE SPECIFICATIONS: Perform all work in accordance with applicable provisions of "GreenBook" Section 306.

1.03 SUBMITTALS:

A. Product Data: Provide list of all material proposed for use. Provide manufacturer's printed literature and technical data on the following:

1. Pipe and fittings.

2. Gratings.

B. Shop Drawings: As required.

C. Installation Instructions: Submit manufacturers' recommended installation procedures for the following items:

1. Pipe and fittings. Submit the pipe manufacturer's jointing procedures.

2. Gratings.

D. Certificates: Manufacturers' certification that materials meet specified requirements.

1.04 RECORD DRAWINGS:

Provide complete record drawings showing dimensioned locations and depths of all piping, and exact locations off all accessories.

1.05 INSPECTION AND TESTING: Refer to Division 1 for procedures.

A. Inspection: Soils Engineer will inspect and test the backfilling work of this section. Notify Soils Engineer prior to commencement of work.

B. Testing: Soils Engineer will make tests to determine degree of compaction in accordance with the following ASTM test methods:

PART 2 - PRODUCTS

2.01 PIPE MATERIALS:

A. High Density Polyethylene (HDPE N-12) Pipe: ASTM F 2648.

B. Frame and grates: Conform to the drawings and to the manufacturer's installation requirements. For gratings located in the surface of pedestrian ways at path of travel, grid/openings at gratings shall not exceed 1/2 inch maximum in the direction of traffic flow.

2.02 DRAINAGE STRUCTURES: Construct catch basins at locations indicated and to the design and dimensions indicated. Provide grates, frames and covers for catch basins as detailed and indicated.

2.03 IDENTIFICATION: Not used

PART 3 - EXECUTION

3.01 TRENCHING:

A. Excavate trenches per requirements stated in paragraph below. Accurately shape and thoroughly compact trench bottom to grade. Excavate joint space when bells are used, so that the lowest 1/3 of all pipe has firm bearing for its entire length. Lay pipe to lines and grades indicated with sections close jointed to form a smooth flow line. Keep trenches clean until installed work has been approved.

B. Bedding material shall be clean sand extending from 6 inches thick beneath pipe to 12 inches above top of pipe. Place sand simultaneously on each side of the pipe, and thoroughly compact to provide lateral support for the line. Place remaining backfill in 6 inch layers about top of bedding material, moisten as required and compact with hand or pneumatic tampers. Compacting by flooding is prohibited.

C. Compaction shall be performed and comply with the related requirements of Section 02210.

3.02 LAYING PIPE AND JOINTS:

A. HDPE Pipe: Join and install pipe per manufacturer's installation requirements.

3.03 SPECIFIC ITEMS

A. Protection: Comply with requirements of Division 1. Drain lines, including trenches, shall be protected from damage during the construction period. Contractor shall replace or rework any damaged portion of the work at no additional cost to the Owner until time of final acceptance of project.

3.04 CLEAN-UP. Upon completion of the work, all storm drain systems shall be left free from silt, debris and obstructions. Hydro-jet line as required.

END OF SECTION

SECTION 02830

CHAIN LINK FENCE AND GATES

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide galvanized chain link fence and gates, complete in phases as indicated by Construction Manager.

A. Work Specified In This Section:

1. Layout and staking of fence lines.
2. Excavation and backfill for post foundations.
3. Concrete post foundations.
4. Fence supports, fabric, gates and other accessories shown or required to complete the work.
5. Removal of portion of existing fence to accommodate new gate.
6. New gate posts.
7. Reinstallation of portion of existing fabric, and new fence fabric as required.
8. Excavation and backfill for post foundations.
9. Gates and other accessories shown or required to complete the work.
10. Signs on gates.

1.02 QUALITY ASSURANCE:

A. Reference Standards: Except as otherwise indicated or specified, conform to the CLFMI Product Manual and to Standards for Chain Link Fence Installation; all as published by the Chain Link Fence Manufacturers Institute, 1776 Massachusetts Avenue N.W., Suite 500, Washington, DC 20036, (202) 659-3537, FAX (202) 857-1220 hereinafter referred to as CLFMI Standards.

B. Covers for electrical equipment enclosures shall be designed to support a live load of 100 pounds per square foot.

1.03 SUBMITTALS:

A. Shop Drawings: Submit showing details of each typical installation. Indicate post spacing and location, new posts; new connections to existing posts, top rails and tension wires; location and size of new gates, hardware and method of attachment of hardware. Show details of posts, beams, bracing and corner conditions for covers over electrical equipment enclosures.

B. Product Data: Submit for approval, with manufacturer’s catalog data.

C. Calculations: Submit calculations, signed by a structural engineering registered in the State of California, demonstrating that electrical equipment enclosure covers will support specified live load.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Allied Tube and Conduit Corp.
16100 S. Lathrope Avenue
Harvey, IL 60426
(800) 882-5543

Anchor Fence, Inc.
6500 Eastern Ave.
Baltimore, MD 21224
(410) 633-6500

Cyclone Fence Division/TJSX Corp.

2.02 MATERIALS:

A. Galvanized Chain Link Fence Fabric: Provide 1-3/4" or 2" mesh 9 gauge fabric as required to match existing, with knuckled selvages, minimum 1.2 ounce per square foot zinc coating weight, all fabric in one piece height. For new enclosures, use 1-3/4", 9 gauge.

1. Selvage: Fabric 72 inches high and over with 2- or 2-1/8"-inch mesh shall be knuckled at both selvages. In all cases, the knuckled side shall be up, with the twisted side facing down.

2. Modifications to existing fencing shall match the height of the existing adjacent fence or gate to remain, fabricated of galvanized steel mesh fabric.

3. Galvanized Steel Finish: ASTM A 382, Class 2, with minimum 2.0 ounces of zinc per square foot of uncoated wire surface.

B. Posts and Rails: Match existing, but not less than sizes conforming to Table II in CLFMI Standards, and strength requirements for posts and rails conforming to ASTM F 66B, based on required heights or widths. Include top rail. Provide posts, cross bracing and fittings for covers over electrical equipment enclosures, sizes as required by approved submittals.

1. Type I Pipe: Hot-dipped galvanized steel pipe conforming to ASTM F 1083, plain ends, standard weight (schedule 40) with not less than 1.8 oz. zinc per square foot of surface area coated, use for posts, rails, etc.

2. Fittings: Comply with ASTM F 626. Galvanized steel, to suit manufacturer's standards.

3. Top Rail: Manufacturer's longest lengths, with expansion type couplings, approximately 8 inches long, for each joint. Provide means for attaching top rail

securely to each gate and adjacent posts. Constructed to galvanized steel, 1-1/4 inch NPS (1.66 inch OD) Type I steel pipe.

4. Tension Wire: 0.177 inch diameter metallic-coated steel tension wire conforming to ASTM A 824 with finish to match fabric.

5. Line, center, equipment enclosure cover and pull posts: Not lighter than 2.875-inch OD Type I steel pipe, or as required for specified loads.

C. Post Tops: Provide ornamental post top to match existing. Provide hole in post top for passage of top rail.

D. Gate Posts: Furnish posts of not lighter than 2.875-inch OD Type I steel pipe.

E. Gates: Steel gate frames shall be not less than 1.90” OD, 0.120” minimum wall thickness and intermediate braces shall be 1.869” OD, weighing not less than 0.940 pounds per foot of length. Fabric and accessory materials shall match fencing. Gate latches shall be fork type. Attach gate fabric to gate frame in accordance with manufacturer’s standards, except that welding will not be permitted.

1. Install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates to ensure frame rigidity without sag or twist.

2. Equip swinging gates with 3 malleable steel, non-lift off type, offset hinges, embedded pipe strike, and forked or plunger bar type latch with padkock eyes, all items galvanized. Gate latches and strikes shall be types as approved. Weld gate latches and strikes to gate posts and frames. Welding shall be done before gate frames are galvanized. Burr or center punch threads of gate hinge bolts to prevent removal of nuts.

3. Concrete: 2,500 psi at 28 day for foundations at each post (no pea gravel).

PART 3 – EXECUTION

3.01 INSTALLATION:

Conform to approved submittals and to CLFMI Standards unless more stringent requirements are specified.

A. Clearing and Grading: Clear fence line of trees, brush, and other obstacles to install fencing. Establish a graded, compacted fence line prior to fencing installation. Compact fill used to establish fence line.

B. Install fence on prepared surfaces to line and grade indicated.

C. Excavation: Drill or hand-excavate holes for posts at not over 10 feet on center unless otherwise indicated. Bottom of excavation shall be not less than 36 inches below finish grade surface at fences up to 8 feet high. Excavate holes for each post to not less than 4 times largest cross section of post. Clear post holes of loose material.

D. Setting Posts: Set posts in concrete conforming to requirements of Section 03300. Center and align posts in holes as recommended by manufacturer. Check posts to insure that they are set plumb and in line. Place concrete around posts and vibrate or tamp for consolidation. Extend concrete footings 2 inches above grade in grass areas and flush to grade in paved areas and smooth trowel to a crown to shed water. Allow concrete to cure a minimum of 72 hours before performing other work on posts.

E. Fence Frames: Reinstall fence framing to complete the installation. Replace framing damaged by removal. Secure fastening and hinge hardware in place to fence framework by peening or welding. Allow for proper operation of components. Coat peened or welded areas with a repair coating matching original coating. Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

F. Top and Rails: Reinstall top rails before installing chain link fabric. Pass top rail through intermediate post caps. Provide expansion coupling at junctions of new with existing work.

G. Brace Assemblies: Install braces, so posts are plumb when diagonal rod is under proper tension.

H. Bottom Tension Wire: Install new or reinstall existing taut with 6 inches of bottom of fabric and attach to posts with tie wire. Fasten fabric to tension wire with 9 gauge hog rings spaced maximum 18 inches. o.c.

I. Fasteners: Install nuts for tension bands and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts.

J. Fabric: Cut existing fabric to size or provide new fabric where fencing is cut for new posts. Pull fabric taut and secure fabric to top rail, close to both sides of each post and at maximum intervals of 24 inches on center. Secure fabric to posts using stretcher bars, ties or clips spaced 15 inches on center, or by integrally weaving to integral fastening loops of end, corner, pull, and gate poses for full length of each post. Install fabric so that bottom of fabric is 2 inches above ground level. Where tie wires are used, they shall be twisted at least 2 full turns. Bend ends of wires to eliminate sharp points.

K. Gates: Allow clearance of gates of 1-1/2" at bottom and one inch at top. Construct gates set in sloping areas to conform to the grade. Install in accordance with CLFMI Standards.

L. Accessories: Install top rail, post caps, bottom tension wire, truss rods at end panels, gates and signs, all in accordance with CLFMI Standards.

3.02 REPAIR OF EXISTING FENCING:

Where existing fencing is damaged, straighten or replace posts, replace damaged fabric, and replace missing or damaged hardware.

3.03 REPAIR OF AND CONNECTIONS TO EXISTING FENCING:

A. Repair: Where existing fencing is damaged, straighten or replace posts, replace damaged fabric, and replace missing or damaged hardware.

B. Connections: Where new fencing connects to existing, make the connections as closely matching existing similar conditions as possible. Replace parts in existing fencing as required to accomplish this.

END OF SECTION

SECTION 10400

SIGNAGE

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this section. Provide signage, complete.

A. Work included: Required signage for disability access, including:

1. Plastic signs for interior & exterior signage.
2. Metal signs for exterior and utility signage.

B. Related work specified elsewhere:

1. Painted signs and symbols on pavement.

1.02 SUBMITTALS:

A. Manufacturer's Literature: Provide brochures showing signs, including general specifications, materials and construction.

B. Shop and Layout Drawings: Provide complete drawings showing details of fabrication and erection; color type and style of letters, background and frame, setting details and full size templates of lettering layouts.

C. Samples: Provide one full size sample of each type of accessibility, room and door sign, indicating construction, color, size, layout of letters and method of attachment.

D. Maintenance Instructions: Provide manufacturer's recommended procedures for care of finished surfaces.

E. Certificates: Manufacturer's certification that materials meet Specification requirements.

1.03 QUALITY ASSURANCE:

A. Signage shall comply with CBC Sections 1114B, 1115B and 1117B.5.

B. All signs, unless otherwise specified, shall be products of one manufacturer.

1.04 EXTENT OF SIGNAGE:

A. If signs are not indicated on drawings, obtain from District an exact list and lettering of signs required. In general, provide signs as indicated on drawings and as required by DSA for toilet rooms, occupancy, access and non-access and parking signs.

B. In addition, provide the following signage:

1. Tow-away signs at parking lot entrance.

2. Accessible parking signs, including van sign.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

Sign manufacturer shall have local fabrication or distribution system, so that additional signs may be ordered as the need arises. Acceptable manufacturers include the following:

Gemini Incorporated
103 Mensing Way
Cannon Falls, MN 55009
Phone: 800-538-8377 or 507-263-3957
Fax: 800-421-1256 or 507-263-4887

Vomar Products, Inc.
15850 Strathern Street
Van Nuys, CA 91406
(818) 894-7174

Architectural Signing, Inc.
5849 Uplander Way
Culver City, CA 90230
(310) 645-1400
FAX (310) 645-9877

Mohawk Sign Systems, Inc.
P.O. Box 966
Schenectady, NY 12301
(518) 370-3433

2.02 BASIC MATERIALS:

A. Aluminum:

1. Extrusions: Alloy 6063-T5/ High-Grade, Aluminum 5052 Alloy, minimum thickness 1/8” profiles as indicated or as required for each condition.

2. Sheet: Alloy 5005-H5, minimum thickness 0.0090”.

B. Galvanized sheet steel: ASTM A 570.

C. Steel tubing: ASTM A 500, Grade B, galvanized.

D. Steel pipe: ASTM A 53, Grade B, galvanized.

E. Acrylic sheet shall be Plexiglass or Lexan, with surface hardener, thicknesses as indicated or as required for size of sign. Acrylic sheet shall meet the flammability requirements of ASTM E 84 and shall conform to ASNI Z97.1.

F. Polycarbonate sheet shall conform to SAE AMS 3611.

G. Anchors and Fasteners:

1. Exposed anchor and fastener materials shall be compatible with metal to which applied and shall match in color and finish.

2. Sealant for application of signs to glass: GE Silicones SCS 2000 Series or Dow Corning 795.

3. Adhesive: Dow Corning N. 999-A silicone type. Adhesive shall be transparent, long aging, high tech formulation.

2.03 BRAILLE:

California Contracted Grade 2 Braille shall be provided wherever Braille symbols are required. Dots shall be 1/10 inch (2.54 mm) on center within each cell with 2/10 inch (5.08 mm) space between cells. Dots shall be raised 1/40 inch (0.635 mm) above background. Refer to CBC Section 1117B.5 and 1103B.2.4.

2.04 COLORS:

As selected from manufacturer’s standard colors, or as indicated on drawings.

2.05 METAL FINISHES:

Surface texture of signs shall be matte in accordance with ADA standards.

A. Steel and Galvanized Steel Surfaces shall be cleaned, degreased, primed, and given a semi-gloss baked enamel or two-component acrylic polyurethane finish in accordance with NAAMM AMP 505 with total dry film thickness not less than 1.2 mils. Surface texture of signs shall be matte in accordance with ADA standards.

2.06 SHOP FABRICATION AND MANUFACTURE:

A. Workmanship: Work shall be assembled in the shop, insofar as practicable, ready for installation at the site. Work that cannot be shop assembled shall be given a trial fit in the shop to ensure proper field assembly. Holes for bolts and screws shall be drilled or punched. Drilling and punching shall produce clean, true lines and surfaces. Exposed surfaces of work shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practicable. Items specified to be galvanized shall be by hot-dip process after fabrication if practicable. Galvanizing shall be in accordance

with ASTM A 123 and ASTM A 525, as applicable. Joints exposed to the weather shall be formed to exclude water. Drainage and weep holes shall be included as required to prevent condensation buildup.

B. Dissimilar Materials: Where dissimilar metals are in contact, or where aluminum is in contact with concrete, mortar, masonry, wet or pressure-treated wood, or absorptive materials subject to wetting, the surfaces shall be protected with a coat of asphalt varnish or a coat of zinc-molybdate primer to prevent galvanic or corrosive action.

C. Shop Painting: Surfaces of miscellaneous metal work, except nonferrous metal, and stainless steel shall be given one coat of zinc-molybdate primer or an approved rust-resisting treatment and metallic primer in accordance with manufacturer's standard practice. Surfaces of items to be embedded in concrete shall not be painted. Upon completion of work, damaged surfaces shall be recoated.

2.07 TYPES OF SIGNS:

A. Post and Panel Signs:

1. Posts: One-piece galvanized steel posts shall be galvanized steel pipe or tubing, with minimum 0.125 inch wall thickness. Posts shall be designed to accept signage system described herein. Caps shall be provided for each post.

2. Panels: Shall be double pan background formed from 16 gauge galvanized steel or 0.090 aluminum with a return edge on two sides and top. Pans shall wrap around support post with an 1/8 inch reveal between adjoining edges.

3. Finish: Post finish shall be galvanized, unpainted. Metal signage finish shall be baked enamel or two-component acrylic polyurethane. Reflective enameled finish, blue background, white symbols and lettering as detailed. Reverse of sign shall be enameled in solid blue.

4. Graphics: Message shall be applied to panel using the silkscreen process. Silk screened images shall be executed with photo screens prepared from original art. No handcut screens will be accepted. Original art shall be defined as artwork that is a first generation stencil of the original specified art. Edges and corners shall be clean. Rounded corners, cut or ragged edges, edge buildup, bleeding or surfaces pinholes will not be accepted.

B. Sheet Metal Signs:

1. Sizes: As shown on drawings, or specified hereafter.

2. Facing: Single sided.

3. Fabrication: 16 gauge galvanized metal, formed to radius shown, with all corners and edges eased and ground smooth.

4. Lettering: Helvetica medium, sizes as indicated or appropriate for each sign.

5. Finish: Painted, color as indicated on the drawings.

6. Design Standard: Custom designed sign as manufactured by Vomar Products, Inc.

C. Plaque Signs:

1. Plaque signs for interior signage shall be a modular type signage system. Signs shall be fabricated of melamine acrylic plastic.

2. Plaque signs shall consist of matte finish acrylic plastic, with silk screened images, thickness and size as shown and specified. Signs shall be frameless. Corners of signs shall be 3/8 inch radius.

2.08 SPECIFIC SIGN TYPES:

The following requirements apply to specific requirements apply to specific signs. Where a sign is required, but not listed herein, provide the equivalent type; i.e. plaque signs for interior signs, post and panel or sheet metal signs as applicable for exterior.

A. Disabled Parking Sign: 12” x 18” x 0.80 aluminum sign, baked enamel finish. Blue and white international symbol of access reading “RESERVED” single face. Sign available from Safeway Sign Co., 321-4608; Zumar Industries, 233-8231; or Western Highway Products (213) 924-6831.

1. Support: 2” diameter galvanized steel pole, washed and primed for field painting.

B. Toilet Room Identification Signs:

1. Signage Types: Provide the following:

a. Disabled sign with wheelchair symbol.

b. Men’s toilet room sign with upper case Helvetica lettering spelling the word “men” and silhouette symbol.

c. Women’s toilet room sign with upper case Helvetica lettering spelling the word “women” and silhouette symbol.

d. Unisex toilet room sign with upper case Helvetica lettering and silhouette symbols as indicated.

2. Provide Braille tactile indicator at latch side of door, as required by CBC regulations.

3. Size: For MEN, WOMEN, BOYS, GIRLS: 2-1/2 inches high by 6 inches long, or as indicated.

4. Facing: Single sided.

5. Design Standard: 100 Series as manufactured by Vomar Products, Inc.

2.09 FASTENERS AND OTHER MATERIALS:

A. Fastenings: Provide non-corrosive fasteners, hangers and mounting devices which are compatible with sign material and finish.

B. Related Materials: Other materials, no specifically described but require for a complete and proper installation of signs, shall be as approved.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Substrate: Examine foundations, walls, doors, ceilings, and other area scheduled to receive signs for conditions that would affect quality and execution of work.

B. Defects: Do not proceed with installation until defects are corrected.

3.02 INSTALLATION, PROTECTION AND CLEANING:

A. General: Signs shall be installed in accordance with approved manufacturer's instructions at locations shown on the drawings. Signs shall be installed plumb and true at mounting heights indicated, and by method shown or specified. Signs on doors or other surfaces shall not be installed until finishes on such surfaces have been installed. Comply with ADA requirements for mounting heights of signs.

B. Anchorage shall be in accordance with approved manufacturer's instructions. Anchorage not otherwise specified or indicated shall be theft resistant, and shall include slotted inserts, expansion shields, and power-driven fasteners when approved for concrete; toggle bolts and through bolts for masonry; machine carriage bolts for steel; lab bolts and screws for wood.

C. Interior Signs: Locations shown on drawings are approximate. Verify exact mounting heights and locations of all signs. Attach door signs, toilet room signs and similar small signs with adhesive and mechanical fasteners. Attach large signs with adhesive and mechanical fasteners.

D. Post and Panel Signs: Drill foundation as detailed. Use concrete conforming to requirements of Section 03300, having compressive strength of 2,000 psi. Locate sign post vertically, all posts in alignment and height, and support until concrete has set. Dome concrete to shed water away from posts.

E. Fastening Signs: Install sign units and components at locations shown or scheduled, securely mounted with concealed theft-resistant fasteners, unless otherwise indicated. Attach signs to substrates in accordance with manufacturer's instructions, unless otherwise indicated. Attach signs on glass with specified silicone adhesive.

F. Installation: Install, level, plumb and at the proper height. Comply with ADA requirements for mounting heights of signs. Cooperate with work of other sections for installation of sign units to finish surfaces.

G. The work shall be protected against damage during construction. Hardware and electrical equipment shall be adjusted for proper operation. Glass, frames and other sign surfaces shall be cleaned in accordance with the manufacturer's instructions.

END OF SECTION

SECTION 16010

BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section.

B. This Section specifies the basic requirements for electrical installations and includes requirements common to more than one section of Division 16. It expands and supplements the requirements specified in sections of Division 1.

C. Related Sections:

1. Section 02318: Excavating, Backfilling, and Compacting for Utilities.

2. Section 03300: Cast-in-Place Concrete.

3. Section 09900: Paints and Coatings.

4. Division 15: Mechanical.

1.02 BASIC ELECTRICAL REQUIREMENTS

A. Quality Assurance:

1. Workers possessing the skills and experience obtained in performing work of similar scope and complexity shall perform the Work of this Division.

2. Refer to other sections of the Specifications for other qualification requirements.

B. Drawings and Specifications Coordination:

1. For purposes of clearness and legibility, Drawings are essentially diagrammatic and the size and location of equipment is indicated to scale whenever possible. Verify conditions, dimensions, indicated equipment sizes, and manufacturer’s data and information as necessary to install the Work of this Division. Coordinate location and layout with other Work.

2. Verify final locations for rough-ins with field measurements and with the requirements of the equipment to be connected.

3. Drawings indicate required size and points of termination of conduits, number and size of conductors, and diagrammatic routing of conduit. Install conduits with minimum number of bends to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear, and comply with applicable code requirements.

4. Routing of conduits may be changed provided that the length of any conduit run is not increased more than 10 percent of length indicated on the Drawings.

5. Outlet locations shall be coordinated with architectural elements prior to start of construction. Locations indicated on the Drawings may be distorted for clarity.

6. Coordinate electrical equipment and materials installation with building components and the Work of other trades

7. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

8. Coordinate connection of electrical systems with existing underground utilities and services.

C. Terminology:

1. Signal Systems: Applies to clock, bell, fire alarm, annunciator, sound, public address, buzzer, telephone, television, inter-communication, elevator access controls, lighting control systems and security systems.

2. Low Voltage: Applies to signal systems operating at 120 volts and less, and power systems operating at less than 600 volts. Medium voltage: Applies to power systems operating at more than 600 volts.

3. UL: Underwriter's Laboratories Inc, Nationally Recognized Testing Laboratory (NRTL), or equal.

D. Regulations: Work shall comply with the requirements of authorities having jurisdiction and the California Electrical and Building Codes. Material shall conform to regulations of the National Board of Fire Underwriters for electrical wiring and apparatus. Materials shall be new and listed by UL, or another NRTL.

E. Structural Considerations for Conduit Routing:

1. Where conduits 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 buildings elements, conform to CBC, Part 2, Title 24, Section 1906 A 3 for conduits and pipes embedded in concrete and Section 2320 A 11.10 for notches and bored holes in wood; for steel, as detailed on the structural steel Shop Drawings.

2. Where a concrete encasement for underground conduit abuts a foundation wall or underground structure which the conduits enter, encasement shall rest on a haunch integral with wall or structure, or shall extend down to footing projection, if any, or shall be doweled into structure unless otherwise indicated. Underground structures shall include maintenance holes; pull boxes, vaults, and buildings.

3. Holes required for conduit entrances into speaker poles, floodlight poles or other poles, shall be drilled with the conduit nipple or coupling welded to poles. Welds shall be provided by the electric arc process and shall be continuous around nipple or coupling.

F. Electrically Operated Equipment and Appliances:

1. Furnished Equipment and Appliances:

a. Work shall include furnishing and installing wiring enclosures for, and the complete connection of electrically operated equipment and appliances and electrical control devices which are specified to be furnished and installed in this or other sections of the Specifications, wiring enclosures shall be concealed except where exposed Work is indicated on the Drawings.

b. Connections shall be provided as necessary to install equipment ready for use. Equipment shall be tested for proper operation and, if motorized, for proper rotation. If outlets are of incorrect electrical characteristics or any specified equipment fails to operate properly, repair and/or replace the outlet and/or equipment.

2. Equipment and Appliances Furnished by Others:

a. Equipment and appliances indicated on Drawings as "not in contract" (NIC), "furnished by others," or "furnished by the Owner," will be delivered to the Project site. Required electrical connections shall be performed for such equipment and appliances. Motorized equipment will be furnished factory-wired to a control panel 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 this Division shall be part of the Work of this section. 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 Drawings and this Specification. Work shall include furnishing and installing suitable outlets, disconnecting devices, starters, push-button stations, selector switches, conduit, junction boxes, and wiring necessary for a complete electrical installation. Work shall also include furnishing and installing conduit and boxes for HVAC control systems, furnished under Division 15. Devices and equipment furnished shall be of same type used elsewhere on the Work or as specified.

c. Electrical equipment furnished under other sections, for installation and connection under Work of this section, will be delivered to the Project site ready for installation.

d. Mechanical equipment furnished under other sections, and requiring electrical connection under this section, will be set in place as part of the Work of the section furnishing such equipment unless noted otherwise.

e. Suitability and condition of equipment furnished under other sections shall be determined in advance of installation. Immediate notice of damage, unsuitability, or lack of parts shall be given to the entity providing such equipment.

G. Protection of Materials:

1. Protect materials and equipment from damage and provide adequate and proper storage facilities during progress of the Work. Damaged materials and/or equipment shall be replaced.

H. Cleaning:

1. Exposed parts of Work shall be left in a neat, clean, usable condition. Finished painted surfaces shall be unblemished and metal surfaces shall be polished.

2. Thoroughly clean parts of apparatus and equipment. Exposed parts 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 corners and cracks scraped out. Exposed rough metal 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. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

I. WARRANTIES

1. Provide one year warranty on all work performed, unless noted otherwise in specific sections.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 GENERAL REQUIREMENTS

A. Advise the IOR before starting the Work of this Division.

B. Exposed conduits shall be painted to match the surfaces adjacent to installation.

C. Salvaged materials removed from buildings shall be removed from the Project site as required by the OAR.

D. Trenches outside of barricade limits shall be backfilled and paved within 24 hours after being inspected by the IOR. Provide traffic plates during the time that trenches are open in traffic areas and in areas accessible to students and staff.

E. Where existing structural walls are cored for new conduit runs, separation between cored holes shall be 3 inches edge to edge from new or existing holes, unless otherwise required by the Architect. All coring to be laid out and reviewed by Architect prior to drilling. Contractor to verify location of structural steel, rebar, stress cabling or similar prior to lay out.

F. Electrical equipment shall be braced and anchored for California Zone 4 seismic requirements, or as otherwise indicated on the Drawings.

3.02 DELIVERY STORAGE AND HANDLING

A. Deliver products to project site with proper identification, which shall include names, model numbers, types, grades, compliance labels, and similar information needed for District identification; all products and materials shall be adequately packaged and protected to prevent damage during shipment, storage, and handling.

B. Coordinate deliveries of electrical materials and equipment to minimize construction site congestion.

3.03 CUTTING AND PATCHING

A. Cutting and patching of electrical equipment, components, and materials shall include the removal and legal disposal of selected materials, components, and equipment.

B. Do not endanger or damage installed Work through procedures and processes of cutting and patching.

C. Repair or restore other work, or surfaces damaged as a result of the work performed under this contract.

3.04 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose off the Project site.

B. Remove equipment and implements of service, and leave entire work area neat and clean, to the satisfaction of the Owner Authorized Representative.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Boxes, enclosures, keys and locks.

2. Receptacles and switches.

3. Identifications and signs.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.

2. Section 16715: Fire alarm Systems.

3. Division 25.

PART 2 - PRODUCTS

2.01 BOXES, ENCLOSURES, KEYS AND LOCKS

A. Outlet Boxes and Fittings:

1. Outlet boxes installed in concealed Work shall be galvanized steel, pressed, or welded type, with knockouts.

2. In exposed Work, where conduit runs change direction or size, outlet boxes and conduit fittings shall be cast metal with threaded hubs cast integral with box or fitting.

3. Fittings shall be cast metal and non-corrosive. Ferrous metal fittings shall be cadmium-plated or zinc galvanized. 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 particular fitting installed.

5. Light fixture outlets shall be 4-inch octagon, 4-inch square, 2-1/8 inches deep or larger, depending upon number of conductors or conduits therein. Plaster rings shall be furnished with round opening with 2 ears drilled 2-23/32 inches center to center.

6. For local device outlets provide 4-inch square 2-1/8 inch deep, boxes for single gang, 5-inch square boxes for two-gang, and special solid gang boxes with gang plaster ring for more than 2 switches.

7. For TV outlets, and horns and strobes provide manufacturer's supplied back box as needed. For television outlets, provide 4-gang deep boxes and 4-gang plaster rings.

8. Plaster rings shall be provided on flush-mounted outlet boxes except where otherwise indicated or specified. Plaster rings shall be same depth as finished surface. Install approved ring extension to obtain depth to finish surface.

9. In existing plywood wall or drywall construction, and where flexible steel conduit is fished into walls, one-gang and 2-gang outlets for wiring devices may be sectional steel boxes with plaster ears. Boxes shall be fastened to plywood with flat-head screws in each plaster ear screw hole. Boxes fastened to gypsum board shall be Gripsite by Raco, or equal.

10. Factory made knockout seals shall be installed to seal box knockouts, which are not intact.

11. Where flexible conduit is extended from flush outlet boxes, provide and install weatherproof universal box extension adapters.

B. Junction and Pull boxes:

1. Junction and pull boxes, in addition to those indicated, shall only be used in compliance with codes, recognized standards, and Contract Documents.

2. Interior and non-weatherproof boxes shall be constructed of blue or galvanized steel with ample laps, spot welded, and shall be rigid under torsion and deflecting forces. Boxes shall be furnished with auxiliary angle iron framing where necessary to ensure rigidity.

3. Covers shall be fastened to box with a sufficient number of brass machine screws to ensure continuous contact all around. Flush type boxes shall be drilled and tapped for cover screws if boxes are not installed plumb. Surfaces of pull and junction boxes and covers shall be labeled in black marker ink designating system, panelboard and circuit designation contained in box. In exposed Work, designation shall be installed on inside of pullbox or junction box cover.

4. Weatherproof NEMA 3R pull and junction boxes shall conform to foregoing for interior boxes with following modifications:

   a. Cover of flush mounting boxes shall be furnished with a weather-tight gasket cemented to, and trimmed even with, cover all around.

   b. Surface or semi-flush mounting pull and junction boxes shall be UL, or another Nationally Recognized Testing Laboratory (NRTL) listed as rain-tight and shall be furnished complete with threaded conduit hubs.

c. Exposed portions of boxes shall be galvanized and finished with one prime coat and one coat of baked-on gray enamel, unless already furnished with factory baked-on finish.

5. Junction and pull boxes shall be rigidly fastened to structure and shall not depend on conduits for support.

6. Underground Concrete Pull Boxes:

a. Pre-cast concrete pull boxes. Concrete pull boxes shall be traffic type, reinforced for H-20 wheel loading, pre-cast concrete. Pull boxes with inside dimensions of 2 feet x 3 feet x 3 feet deep shall consist of a base section, top ring, and cover. Base section shall be furnished with 2 knockouts measuring 10 inch x 10 inch in each 3 feet side, and one 20 inch x 20 inch knockout in each 2-foot side. Pull boxes with inside dimension 4 feet x 4 feet x 4 feet deep shall consist of a base section, midsection, topping, and cover. Base section shall be furnished with 2 knockouts measuring 8 inches x 16 inches on each of 2 opposite sides, and one 20 inch x 20 inch knockout on each of other 2 opposite sides. Pull boxes shall be furnished with a minimum of 6-inch diameter sump knockout and one inch diameter ground rod knockout. In pull boxes, furnish and install cable racks on walls. Racks shall be furnished with 3 porcelain cable holders on vertical steel mounting bars. Pull boxes shall be furnished with 3/4 inch diameter pull irons. Covers shall be traffic-type consisting of steel safety plate bolted to frame. Covers shall be marked as electrical, power, or signal as required. Pull boxes shall be as manufactured by Quickset, or equal.

b. Provide end bells in duct entrances. Terminate each metal conduit with insulated bushing provided with a grounding terminal.

c. Install pulling irons on opposite walls and below horizontal centerlines of ducts and bricked-up openings, and in bottom. Install pulling irons with each end hooked around a reinforcing bar.

d. Remove floor drain knockout and provide a depth of 24 inches of crushed rock below box extending a minimum of 12 inches beyond on all sides.

e. Permanently and effectively ground metal equipment cases, cable racks, and similar items in pull boxes to site grounding electrode system. Provide grounding conductor in compliance with CEC Article 250.

f. Provide 6-inch deep sand base under pull boxes.

g. Identify power and signal cables by tagging in manholes and pull boxes. Tie securely to cables with nylon cord.

h. Top of steel plate shall provide a minimum coefficient of static friction of 0.5 for either wet or dry locations, when tested for any shoe sole material. Test shall comply with ASTM D 1047 or F 489 or F 609 standards. Submit manufacturer’s test results for Architect’s review as part of materials and equipment submittals.

7. Underground utility boxes shall be reinforced concrete with non-setting shoulders to prevent settlement following installation. Boxes shall be furnished with cast iron cover with finger hole, size as indicated on Drawings. Utility boxes shall be as manufactured by Quickset, or equal.

8. Manholes, vaults, and pull boxes required by a utility company, and installed as part of this Contract, shall meet requirements of servicing utility company.

C. Floor Outlets:

1. Provided floor outlets, except for extension outlets, shall be Harvey Hubbell Inc. B-2503, or equal, adjustable, cast iron, watertight floor boxes with flush brass floor plates, and shall be set to finish flush with finish floor covering, whether it be concrete, wood, resilient floor covering, or other finish materials.

2. Telephones above floor outlets shall be provided with Harvey Hubbell Inc. SC-3098 pedestals with SS309B plates, or equal. Refer to other Division 16 sections.

3. Plugs above floor outlets shall be provided with brass 2-1/8 inch flush caps and shallow brass extensions with 2 back-to-back, 15 amp, 125 volt, grounding type receptacles, Harvey Hubbell Inc. SC-3092, or equal.

4. Furnished extension floor outlets shall be cast iron floor boxes with cast iron covers and 1/2 inch offset entries for above-floor conduit extensions; Harvey Hubbell F3186, or equal. Boxes shall be designed to permit access to wiring without disturbing above-floor extensions and shall be set flush with finish floor.

5. Furnished above floor service fittings for surge suppression receptacles shall be Hubbell SC3098 with cover plates SS309DS, or equal.

6. Furnished above floor service fittings for data outlets shall be Hubbell SC3098 with required cover plates, or equal. Refer to other Division 16 sections.

D. Floor Pockets:

1. Three-Gang: Furnished three-gang floor lighting pockets shall be flush floor type, with cast iron floor plate and hinged cast iron door notched for cables. Three-gang floor pockets shall be C.W. Cole TLS-353-6, or equal, for wood floors and C.W. Cole TLS-353-6-C, or equal, for concrete slabs. Each floor pocket shall be provided with three 20 amp, 3 wire, 125 volt receptacles with matching caps.

2. Single Gang:

a. 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 TLA-362-1-FE, or Owner approved equal. Provide each pocket with a standard, single grounding type receptacle unless otherwise indicated. Provide C.W. Cole TLS-362-1, or equal, in wood floors.

b. Microphone or projector 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 TLA-362-3-FE, or equal. Provide C.W. Cole TLS-362-3, or equal, in wood floors.

E. Keys and Locks:

1. Provide 2 keys with furnished door locks, including cabinet door locks and switchboard locks, 2 keys for lock switches on switchboards or control panels, and 2 keys with interlocks or other furnished lock switches. Deliver keys to IOR.

2. Locks shall be keyed to Corbin No. 60 keys for access to operate equipment and Corbin 70 keys for service access. Special keys and locks shall only be provided where specified.

2.02 RECEPTACLES AND SWITCHES

A. Receptacles:

1. Duplex receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wired with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be PVC. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts.

NEMA #	Pass & Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20	RPS5362-I	HBL5362-I	5362-I
(15 amps) NEMA 5-15	RPS5262-I	HBL5262-I	5262-I

2. Duplex receptacles on circuits supplied by panel boards with integral surge suppression shall be Pass & Seymour model number PS5262LB (blue), 15 amps, 120 volts, or approved equal.

3. Single receptacles shall be heavy-duty specification grade, grounding type. Terminal screws shall be back and side wire with internal screw pressure plates. Mounting strap shall feature heavy-duty brass construction. Receptacle back body shall be thermoplastic. Receptacle face shall be ivory, impact resistant nylon. Receptacles shall have triple wipe brass power contacts. For circuits consisting of one single receptacle only, ampere rating of receptacle shall be same as circuit breaker or fuse.

NEMA #	Pass & Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20R	5361-I	HBL5361-I	5361-I
(15 amps) NEMA 5-15R	5261-I	HBL5261-I	5261-I

4. 15 and 20 amps single receptacles on circuits supplied by panel boards with integral surge suppression shall be Pass & Seymour NEMA 5-20R model number 5361-BL (blue), and NEMA 5-15R model number 5261-BL (blue) respectively. Equal receptacles by other Owner approved manufactures are acceptable.

5. For kiln receptacles and range receptacles, provide 3-pole, 4-wire, grounding type, rated 50 amps at 125/250 volts NEMA 14-50R . Provide with 2-gang, stainless steel plates, SS 703, or equal.

NEMA #	Pass & Seymour	Hubbell	Leviton
NEMA 14-50R	3894	HBL9450A	279
WALL PLATE	SS703	S703	84026

6. For dryer receptacles, provide 3-wire, non-grounding type, rated 30 amps at 125/250 volts, NEMA 10-30R, with 2-gang stainless steel plates.

NEMA #	Pass& Seymour	Hubbell	Leviton
NEMA 10-30R	3860	HBL9350	5207
WALL PLATE	SS703	S703	84026

7. Provide specification grade ground-fault circuit interrupter (GFCI) type receptacles in accordance with 2003 UL standards. GFCI receptacles shall have a trip indication light. Receptacle terminal screws shall be back and side wire with internal screw pressure plates. Test and reset buttons shall match device body and shall be ivory. GFCI receptacles shall be manufactured in standard configuration for installation with stainless steel smooth plates. Exterior mounted receptacles shall be mounted inside weatherproof enclosure.

NEMA #	Pass & Seymour	Hubbell	Leviton
NEMA 5-20R	2094-I	GFR5352-IA	8898-I
NEMA 5-15R	1594-I	GFR5252-IA	8598-I

8. Provide weatherproof receptacles, except where otherwise indicated or specified, consisting of GFCI receptacles, as specified herein, and metal plates with die-cast hinged lids and weatherproof mats; standard duplex cover Pass & Seymour CA8GV, or equal. Standard GFCI cover Pass& Seymour CA26GV, or equal.

9. Provide tamper-resistant receptacles with thermoplastic dual mechanism shutter system to help prevent insertion of foreign objects. Receptacles shall have extra heavy-duty brass, one-piece mounting strap with integral ground. Receptacles shall be ivory color, impact resistant nylon face and back body. For tamper-resistant receptacles rated 20 amps/125 volts, provide NEMA 5-20R, ivory in color,. For tamper-resistant receptacles rated 15 amps/125 volts, provide NEMA 5-15R, ivory in color.

NEMA #	Pass & Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20R	TR63-I	HBL8300SHIA	8300SGI
(15 amps) NEMA 5-15R	TR62-I	HBL8200SHIA	8200SGI

10. Provide transient voltage surge suppression (TVSS) receptacles offering metal oxide varistors (MOVs) protecting normal and common modes, (L-N, L-G, N-G) with 500V suppressed voltage. TVSS devices shall offer 3-mode equal protection with 210 joules minimum per mode of energy absorption and 13,000 amp maximum surge capability. TVSS devices shall have 3 thermal fuses and two over-current protection fuses. TVSS devices shall have LED visual only surge status indicator to alert user to surge suppression circuit condition. Visual indicator will be illuminated (red) when power is on and surge suppression circuit is fully functional. Visual indicator will not be illuminated when power is off or unit experiences loss of surge suppression protection. Terminals shall be back and side wire including ground terminal. Color shall be blue.

NEMA #	Pass& Seymour	Hubbell	Leviton
(20 amps) NEMA 5-20R	5352BLSP	HBL5360SA	5380B
(15 amps) NEMA 5-15R	5252BLSP	HBL5260SA	5280B

11. Receptacles within 6 feet of water fountains, counter tops, or any sources of water shall be GFCI type.

B. Switches:

1. Local Switches:

a. Provide local switches, high strength thermoplastic toggle, specification grade, rated 20 amps at 120-277 volts AC only, with plaster ears, external screw pressure plate back and side wired, and standard size composition cups which fully enclose mechanism. Switches shall be approved for installation at currents up to full rating on resistive, inductive, tungsten filament lamp and fluorescent lamp loads, and for up to 80 percent of rating for motor loads. Switches shall have oversized silver alloy contacts for long life and better heat dissipation. Provide switches as single pole, double pole, 3-way, 4-way, non-lock type. Provide non-lock type switches with ivory handles;

	Pass & Seymour	Hubbell	Leviton
Single pole	PS20AC1I	HBL1221I	1221-2I
Double pole	PS20AC2I	HBL1222I	1222-2I
Three way	PS20AC3I	HBL1223I	1223-2I
Four way	PS20AC4I	HBL1224I	1224-2I

b. Provide lock type switches, specification grade, 20 amp, 120-277 volts with metal or nylon key guides with on/off indication, and operable by same key. Keys for lock type switches as follows:

	Pass & Seymour	Hubbell	Leviton
Single pole	PS20AC1L	HBL1221L	1221-2L
Double pole	PS20AC2L	HBL1222L	1222-2L
Three way	PS20AC3L	HBL1223L	1223-2L
Four Way	PS20AC4L	HBL1224L	1224-2L

c. Rotary lock switches shall incorporate a tumbler type lock to prevent unauthorized operation. Lock shall be tumbler type by Corbin, keyed to a HH41 key. Lock switch to be installed with pin tumblers facing downward. Key shall be removable in all positions. Each device shall be complete with 2 keys. Keys shall be delivered only to IOR. Switches shall be rated at 20 amps, 120-277 volt AC. Switch plates shall be of stainless steel, engraved with on and off positions indicated.

	Pass & Seymour	Hubbell	Leviton
Single pole	PS20AC1-KL	HBL1221-RKL	1221-2KL
Double pole	PS20AC2-KL	HBL1222-RKL	1222-2KL
Three way	PS20AC3-KL	HBL1223-RKL	1223-2KL
Four way	PS20AC4-KL	HBL1224-RKL	1224-2KL

d. Pilot light switches shall be rated 20 amps and shall conform to specifications for local switches. Switches shall be furnished with red, Lexan handles that are lighted by long-lasting neon lamps. Pilot light shall light when load is on. Pilot light 120 volt switches

	Pass& Seymour	Hubbell	Leviton
Single pole	PS20AC1-RPL	HBL1221-PL	1221-PL
Double pole	PS20AC2-RPL	HBL1222-PL	1222-PL

Three way	PS20AC3-RPL	HBL1223-PL	1223-PL
	Pass & Seymour	Hubbell	Leviton
Single pole	PS20AC1-RPL7	HBL1221-PL7	1221-7P

e. Provide remote control switches for mechanically held contactors arranged for 3-wire control, tumbler type, momentary contact, single pole, 3-position with center off position, rated 20 amps at 120-277 volts AC only, with plaster ears, binding screws for side wiring, standard size composition cups which fully enclose mechanism, and ivory handles.

Pass & Seymour	Hubbell	Leviton
1251-I	HBL1557-I	1285-I

2. Time Switches and Photoelectric Controls for existing construction; use section 16515 for new construction.

a. Provide time switches with a 7-day, solid-state, electronic type capable of fully automatic or manual operation and housed in a sheet steel enclosure unless built into a panel or switchboard. Contacts rated for 25 amps resistive or inductive, each pole 240 VAC; 5 amps tungsten or 470 VAC pilot duty, each pole 240 VAC. Time switches to contain a non-volatile clock and non-volatile memory with a built-in rechargeable power carry-over system. Provide a minimum of 15 on/off set points per week. Timing to be in one minute increments with a minimum on or off time of one minute. Time switch digital displays to indicate days of week, hours, and minutes. Display to contain a load status light to indicate when equipment is in operation. Time switches; EZ Controls Model EZ-701-1, single pole or Model EZ-701-2, double pole, or equal.

b. For outdoor lighting control, provide time switches with digital and astronomic capabilities. Provide 365 days with holiday capabilities with 16 single dates and 5 holiday blocks of unlimited duration utilizing eighth and ninth day schedules. Provide 2 separately controllable relay closure output circuits. Each circuit to be single pole, double throw, with contacts rating of 10 amp resistive at 120/250V and 7.5 amp inductive at 120/250V. Provide 48 events per circuit per week; separate scheduling for each day of week. Provide selectable daylight saving or standard time, automatic leap year correction, and 72-hour memory backup with rechargeable battery. Time switch; Tork series DZS-200, or equal.

c. Where more than 2 timed circuits are required, provide; Tork K series, or equal, digital, 4, 6 or 8 circuits, with following features:

1) Liquid crystal display panel.

2) Holiday scheduling: Up to 40 dates may be assigned special holiday schedules, up to one year in advance.

3) Automatically adjusts to and from daylight savings time and for leap year.

4) Contact ratings: 10 amp at 240 VAC.

5) Safety override switch for each circuit to either provide shut down of circuit or to override on.

6) Selective review: All or part of schedule shall be displayed at touch of a key.

7) Battery backup for 24 hours.

8) Supply voltage: 120 V.

9) 365-day advance scheduling.

d. Photoelectric control: Photoelectric control rated 2,000 watts, 120V with single pole, single throw, normally closed contact, enclosed in a die-cast aluminum gasketed enclosure with 1/2 inch conduit fitting, Tork series 2100, or equal.

3. Telephone Dialers for Elevators:

a. Provide telephone dialers; Viking Electronics Inc. Model K-1500-4, or equal, with PG-1 programmer one number dialers.

b. Install dialers in elevator machine rooms and connect to a RJ-11 jack.

4. School Main Entrance Intercom Station: See other Division 16 sections

a. Single zone audio surveillance base station with talkback feature. Unit to be provided with a built-in speaker and microphone; Louroe Electronics API-TB, or equal.

b. Two-way talk/listen flush-mounted, vandal-proof remote station with microphone, 3-inch speaker and call button mounted to 11 gage stainless steel faceplate; Louroe Electronics TLSP-PB, or equal. For surface mounted applications; provide Louroe Electronics TLMC, or equal.

c. Provide wiring for base and remote stations as 2/C No. 18 unshielded for speaker and No. 22 drain; West Penn 360, or equal.

C. Hand and Hair Dryers:

1. Description: Electrically operated hand dryer shall be designed for heavy duty operation, intrinsically safe, tamper proof and be operated by either push button or automatic control, and be either surface mounted or semi-recessed as noted on Drawings.

a. Dryer cover shall be one piece, heavy duty, rib reinforcement, 0.25inches thick tamper proof cast iron. Cover shall be finished in acid-resistant porcelain enamel. Dryer operating instruction information shall be noted on front.

b. All units with an external nozzle shall be furnished with a chromium plated nozzle. Nozzle shall be fixed to blow air in a down position only.

c. Dryer cover shall be mounted with two recessed tamper proof bolts to a heavy steel wall plate which in turn is to be fastened to wall with four concealed ¼" mount bolts. Bolts shall be inserted through rubber grommets to reduce noise and wall vibration.

d. Dryer cover shall be furnished with an air intake, fabricated of heavy-gauge stamped steel with a chip proof baked polyurethane finish. There shall be no accessible live parts close to these openings. A fixed grating shall protect fan output area.

e. Dryer shall be either surface mounted or semi-recessed mounted as indicated on Drawings. Recessed units shall include a 16 gauge steel wall-mounting box.

f. Entire unit shall be internally grounded.

2. Mechanism: Motor shall be of a universal or of an induction design with permanently lubricated bronze bushing or bearings.

a. Unit shall be suitable for installation on standard 115, 208, or 220 volt, single phase AC supply, as designated on Drawings.

b. Heating element shall operate within a range of 1500 watt to 2300 watt.

c. Unit shall be UL, or NRTL listed.

d. Fan shall be furnished with a large single inlet and be centrifugal type, constructed of welded and plated steel or of molded R/C (QMFZ2) polypropylene rated at a minimum 94hb. It shall deliver a minimum 1300CFM and shall be mounted directly on motor shaft. All parts shall be easy to service and replace.

e. Heating element shall be spiral wound Nichrome wire mounted directly on fan housing. Element shall produce an air temperature of 142 degrees F. at a 72 degrees F. ambient room. Motor and heating element shall be protected by an automatic resetting device.

f. Means of Activation – A dryer, as designated on Drawings, shall be provided with either:

1) Push Button Control: On operation, dryer shall run no longer than 40 seconds.

2) Infrared Sensor Control: Dryer shall start automatically when hands are placed underneath nozzle and stop automatically when hands are removed. The infrared sensor shall be mounted to internal assembly and shall contain a failsafe feature, which will shut off dryer if it runs for more than 60 seconds.

3. Warranty: Manufacturer shall provide a 10 year material warranty.

4. Manufacturers: Model shall be push button operated or automatic sensing operated and shall be surface mounted or semi-recessed mounted as designated on Drawings.

	SURFACE MOUNTED		SEMI-RECESSED	
	Push Button Model	Automatic Model	Push Button Model	Automatic Model
a. American Dryer:	A60F	A60TF	A60RF	A60TRF
b. Bobrick:	B-731	B-700	---	B-750
c. World Dryer Co.:	A52	XA52	AR52	XRA52

E. Mounting heights shall be as shown on drawings, or according to Manufacturer's recommendations. Installation height shall conform to ADA requirements.

2.03 IDENTIFICATION AND SIGNS

A. Identification Plates:

1. Provide identification plates for the following unless otherwise specified, for switchboards, unit substations, motor control centers, control panels, push-button stations, time switches, contactors, motor starters, motor switches, panelboards, and terminal cabinets.

2. Identification plates shall be of plastic stock and shall adequately describe function, voltage and phase of identified equipment. Where identification plates are detailed or described on Drawings, inscription and size of letters shall be as indicated. For lighting and power panels, identification plates shall indicate panel designation, voltage, and phase of panel. For terminal cabinets, identification plates shall indicate system contained in terminal cabinet.

3. Identification plates shall be black-and-white nameplate stock of bakelite with characters cut through black exposing white. Plates shall be furnished with 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 inch high, unless otherwise indicated.

B. Markings:

1. Install identification markings to surface-mounted starters, switches, disconnect switches, contactors, and other devices controlling motors and appliances. Provide abbreviations required along with an identifying number. Markings to be provided with locking type stencils using paint of a contrasting color. Figures shall be 3/8 inch high unless otherwise indicated. Dymo Industries Inc., self-

sticking plastic labels, with embossed characters made with a typewriter may be installed instead of stencils and paint; p-touch self adhesive plastic, or Brother P-Touch self sticking laminated plastic labels may be installed.

2. High Voltage: High voltage switchboards, cabinets, boxes, and conduits exposed in accessible locations, including under buildings and in attics, are required to be marked "DANGER-HIGH VOLTAGE". Markings for switchboards shall consist of 18 gage steel, porcelain enamel sign of standard manufacture. Markings for boxes, cabinets, and conduits shall be by means of stenciling or printed self-adhesive markers, Westline Tel-A-Pipe, or equal. Provide letters of black on orange background and not less than 1-7/8 inches high. On conduit runs, install markings at intervals not exceeding 10 feet in any individual area. Markings shall be installed after other painting Work is complete.

C. Warning Signs:

1. Provide a warning sign on outside of each door or gate to rooms or enclosures containing high voltage equipment. Signs required to read, "WARNING - HIGH VOLTAGE - KEEP OUT". Provide 2 inch high lettering.

2. Provide a warning sign on each high-voltage non-load break disconnect and fused cutout (not oil filled). Signs required to read, "DO NOT OPEN UNDER LOAD". Provide 2 inch high lettering.

3. Provide signs of standard manufacture, 18 gage steel, with porcelain enamel finish. Provide red lettering on a white background.

PART 3 - EXECUTION

3.01 INSTALLATION AND SUPPORT OF BOXES

A. Install outlet boxes flush with finished surface of wall or ceiling. Install plumb and securely fastened to structure, independent of conduit. Except where otherwise indicated, provide factory-fabricated bar hangers to support outlet boxes. When installation is performed in fire rated walls, maintain the wall’s rating integrity by means of approved fire stop methods.

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

C. Heights of outlets and equipment indicated on Drawings shall govern. In absence of such indications, following heights shall be maintained with heights measured to centerline unless otherwise noted:

1. Install wall-mounted telephones, light switches, other switches, and fire alarm pull stations, 48 inches above finished floor. Refer to other Division 16 Sections.

2. Install bell outlets in corridors 12 inches below ceiling.

3. Install clocks, speakers, and bell outlets in classrooms and offices, 8 feet above finished floor. Unless otherwise indicated.

4. Install fire alarm strobe lights 80 inches to bottom of light above finished floor.

5. Install outside bells and yard light outlets 4 feet above second floor level for 2 or more story buildings, 12 inches below top plate level for one story buildings without covered porch or arcade, and 12 inches below covered porch and arcade ceilings.

6. Install desk telephones, power receptacle outlets, and data outlets 15 inches above finished floor.

7. Install panelboards and terminal cabinets 6 feet-6 inches from finish floor to top of cabinet.

8. Install television outlets at a height corresponding to location of television monitor, or a minimum of 15 inches above finished floor. Refer to other Division 16 sections.

3.02 COVER PLATES

A. Provide a plate on each switch, plug, pilot light, data, interphone, public telephone, and television outlet, and on existing and reset outlets where so indicated or required. Plates shall be of stainless steel unless otherwise specified.

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 blanked shall be covered with Wiremold 5736 steel covers, or equal, painted to match surrounding finish. Provide stainless steel covers to blank indicated or required surface-mounted outlets.

C. In the following cases, and at required locations. Switch and receptacle plates shall be engraved with the device(s), or fixtures being controlled, or as indicated:.

1. Three-gang and larger gang switches in locations other than classrooms.

2. Lock switches.

3. Pilot switches.

4. Switches so located that operator cannot see fixtures, or items of equipment controlled while his hand is on the switch.

5. Switches not in same room with fixtures or items of unit heaters, air curtains, fly fans, etc.

6. Receptacles operating at other than 120 V shall be labeled with the operating voltage.

7. Switches operating on 277 V shall be labeled with the operating voltage.

8. Where indicated on Drawings.

D. Designations shall be as indicated on Drawings or as specified by Architect,

3.03 IDENTIFICATION OF CIRCUITS AND EQUIPMENT

A. Provide descriptive nameplates or tags permanently attached to switchboards, motor control centers, transformers, panelboards, circuit breakers, disconnect switches, starters, pushbutton control stations and other apparatus installed for operation or control of circuits, appliances, fire alarm control panel(s), fire alarm annunciator(s), power supplies, terminal cabinets, energy management control units, and Information technology system backbone and distribution equipment points. .

B. Provide nameplates of engraved laminated plastic, or etched metal. Submit Shop Drawings denoting dimensions and format to Architect before installation. Fasten to equipment with escutcheon pins, rivets, self-tapping screws, or machine screws. Self-adhering or adhesive backed nameplates are not permitted.

C. Fasten tags to feeder wiring in conduits at every point where runs are broken or terminated, including pull wires in empty conduits. Indicate circuit, phase, and function. Tag branch circuits in panel boards and motor control centers. Tags may be manufactured of pressure-sensitive plastic or embossed self-attached stainless steel or brass ribbon.

D. Provide circuit identification cards and cardholders in all panel boards. Cardholders shall consist of metal frame retaining a clear plastic cover permanently attached to 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 indicated on Drawings, or circuit numbers according to panel schedules. Data shall be lettered in a conspicuous manner with a color contrasting with finish.

F. Name shall be correctly engraved, with a legend indicating function or areas, when required by codes or indicated on Drawings.

3.04 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

END OF SECTION

SECTION 16060

GROUNDING AND BONDING

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Provide and install grounding system as indicated or required.

C. Related Sections:

1. Refer to related sections for their system grounding requirements.

2. Section 16010: Basic Electrical Requirements.

3. Division 25: Low Voltage Systems

1.02 QUALITY ASSURANCE

A. Reference Standards:

1. IEEE 142 Green Book.

2. Underwriter's Laboratories (UL).

3. California Electrical Code.

4. Building Industry Consultant Services International (BICSI) (Signal).

5. EIA/TIA (Signal and power).

6. Nationally Recognized Testing Laboratory (NRTL) or equal.

1.03 SYSTEM DESCRIPTION

A. Metallic objects on the Project site that enclose electrical conductors, or that are likely to be energized by electrical currents, shall be effectively grounded.

B. Metal equipment parts, such as enclosures, raceways, and equipment grounding conductors, and earth grounding electrodes shall be solidly joined together into a continuous electrically conductive system.

C. Metallic systems shall be effectively bonded to the main grounding electrode system.

D. A separately derived AC source shall be grounded to the equipment grounding conductor, and to separate “made” electrode of building grounding electrode system.

E. Electrical continuity to ground metal raceways and enclosures, isolated from equipment ground by installation of non-metallic conduit or fittings, shall be provided by a green insulated grounding conductor of required size within each raceway connected to isolated metallic raceways, or enclosures at each end. Each flexible conduit over 6 feet in length shall be provided with a green insulated grounding conductor of required size.

F. Cold water, or other utility piping systems, shall not be utilized as grounding electrodes due to the installation of insulating couplings and non-metallic pipe in such installations. In addition to bonding to cold water pipe provide at least one of the following made grounding electrodes:

1. A dedicated "made" electrode, fabricated of at least 20 feet of galvanized 1/2 inch diameter rebar encased by at least 2 inches of concrete, and placed next to the bottom of a concrete foundation, or footing in direct contact with earth A welded extended portion shall surface at the location of the common grounding electrode bus bar and be extended by a 3/0 CAD welded bare copper cable, or be CAD welded directly to the bus. The CAD weld shall be at least 4 inches above finished floor in a dry location. The main grounding electrode and associated grounding conductors shall be in an enclosure and in conduit.

2. Grounding electrodes as specified hereafter in this section.

3. Concrete enclosed electrode, fabricated of at least 20 feet of No. 2 AWG, minimum size, bare copper conductor, encased by at least 2 inches of concrete, located within or near bottom of a concrete foundation, or footing, which is in direct contact with earth. Footing rebar shall be connected to copper wire with approved connectors. An external electrode, as specified hereafter or as required by the CEC, shall be installed and connected to foundation or footing rebar.

G. Non-current carrying metal parts of high-voltage equipment enclosures, signal and power conduits, switchboard and panelboard enclosures, motor frames, equipment cabinets, and metal frames of buildings shall be permanently and effectively grounded. Provide a CEC sized grounding conductor in every raceway.

H. Metallic or semi-conducting shields and lead sheaths of cables operating at high voltage, shall be permanently and effectively grounded at each splice and termination.

I. Neutral of service conductors shall be grounded as follows:

1. Neutral shall be grounded at only one point within the Project site for that particular service. Preferable location of grounding point shall be at the service switchboard, or main switch.

2. Equipment and conduit grounding conductors shall be bonded to that grounding point.

3. If other buildings or structures on the Project site are served from a switchboard or panelboard in another building, power supply is classified as a feeder and not as a service.

4. Equipment grounding conductor is installed from switchboard to each individual building. At building, grounding conductor is bonded with power equipment enclosures, metal frames of building, etc., to "made" electrode for that building.

5. Feeder neutrals shall be bonded at service entrance point only, neutrals of separately derived systems shall be bonded at the source only.

J. If there is a distribution transformer at a building the secondary neutral conductor shall be grounded to "made" electrode serving the building.

K. Within every building, the main switchboard or panelboard, shall be bonded to the cold water line. Metallic piping systems such as gas, fire sprinkler, or other systems shall be bonded to the cold water line.

1.04 SUBMITTALS

A. Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Furnished yard boxes shall be precast concrete and shall be approximately 14 inches wide by 19 inches long by 12 inches deep or larger, if necessary to obtain required clearances. Boxes shall be furnished with bolt-down, checkered, cast iron covers and cast iron frames cast into boxes. Yard boxes shall be Brooks 36, or equal.

B. "Made" electrodes shall be copper-clad steel ground rods, minimum 3/4 inch diameter by 10 feet long.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Grounding electrodes shall be installed in the nearest suitable planting area, where not otherwise indicated on Drawings, and each electrode shall terminate within a concrete yard box installed flush with finish grade. In planting areas, finish elevation of concrete yard boxes shall be 2 inches above planting surfaces.

B. If concrete enclosed electrode is provided, grounding wire shall be terminated to a suitable copper plate with grounding lugs and must be enclosed in a raceway or box..

C. Grounding rods shall be driven to a depth of not less than 8 feet. Permanent ground enhancement material, as manufactured by Erico Electrical Products, or equal, shall be installed at each ground rod to improve grounding effectiveness. Install in accordance with manufacture's installation instructions.

D. Grounding electrodes shall provide a resistance to ground of not more than 25 ohms.

E. When installing grounding rods, if resistance to ground exceeds 25 ohms, 2 or more rods connected in parallel, or coupled together shall be provided to meet grounding resistance requirements.

F. Ground rods shall be separated from one another by not less than 10 feet.

G. Parallel grounding rods shall be connected together with recognized fittings and grounding conductors in galvanized rigid steel conduit, buried not less than 12 inches below finish grade.

3.02 TESTING

A. Provide the services of an approved independent testing laboratory to test grounding resistance of “made” electrodes, ground rods, bonding of building steel, water pipes, gas pipes and other utility piping. Tests shall be performed as follows:

1. Visually and mechanically examine ground system connections for completeness and adequacy.

2. Perform fall of potential tests on each ground rod or ground electrode where suitable locations are available per IEEE Standard No. 81, Section 8.2.1.2. Where suitable locations are not available, measurements will be referenced to a known dead earth or reference ground.

3. Perform the two point method test per IEEE No. 81, Section 8.2.1.1 to determine ground resistance between ground rod and building steel, and utility piping - such as water, gas and panelboard grounds. Metal railings at building entrances and at handicapped ramps shall also be tested.

4. Test shall be performed in the presence of the IOR.

B. Submit 3 copies of test results to the Architect. Test results shall be submitted on an official form from the independent testing laboratory recording Project location, test engineer, test conditions, test equipment data, ground system layout or diagram, and final test results.

3.03 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.04 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16111

SPECIAL RACEWAY SYSTEMS

PART 1 – GENERAL

1.1 SUMMARY

A. The extent of special raceway systems work is indicated by drawings and schedules, and by requirements of this section.

B. The types of special raceway systems required for project include the following:
   1. Wireways
   2. Surface metal raceways
   3. Underfloor metal raceways
   4. Overhead metal raceways

1.2 RELATED SECTIONS

A. Section 16010 – "Electrical General Provisions"

1.3 QUALITY ASSURANCE

A. Installer: Qualified with at least five years of successful experience on projects with electrical raceway work similar to that required for this project.

B. NEMA Compliance: Comply with applicable portions of National Electrical Manufacturers Association standards pertaining to electrical raceways.

C. UL Compliance and Labeling: Comply with applicable portions of Underwriters Laboratories safety standards pertaining to special electrical raceway systems; and provide products and components which have been UL-listed and labeled.

D. NEC Compliance: Comply with National Electrical Code (NFPA No. 70) as applicable to construction and installation of special raceway systems.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver special raceway systems properly wrapped and protected in factory-fabricated containers.

B. Handle special raceway systems carefully to prevent damage to raceways, components, and finishes. Do not install damaged raceways; remove from project site and replace with new.

C. Store raceway systems in clean dry space which prevents formation of condensate; protect raceways from dirt, fumes, moisture and physical damage.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Provide products by one of the following (for each type and material of raceway system):

B. Wire-ways:
1. Square "D" Company
2. Hoffman
3. Wiremold Company
4. Thomas & Betts Corporation

C. Underfloor Raceways:
1. Square "D" Company
2. Walker Systems, Inc.

D. Overhead and Surface Metal Raceways;
1. The Wiremold Company
2. Thomas & Betts Corporation
3. Square "D" Company

2.2 MANUFACTURED UNITS

A. Except as otherwise indicated, provide manufacturer's standard materials and components and indicated by published product information, designed and constructed as recommended by the manufacturer, and as required for a complete installation. Where more than one type of component meets indicated requirements, selection is Installer's option.

B. Underfloor Metal Raceways: Provide underfloor duct systems of types, sizes, and number of ducts indicated; construct with 2" after set inserts installed after concrete is poured and set as indicated with junction boxes and rings, couplings, supports, and adapters, to form a complete installation. Underfloor ducts shall be finished with corrosion-resistant coating. Junction boxes shall be "Casino Rated" and shall be furnished with corrosion-resistant coating. Design with junction box cover plates to have an upward adjustment of 3/8" capable of leveling flush with finished concrete floor, before and after concrete has hardened; and recessed to hold vinyl tile or carpet, and protected with metal escutcheons. Refer to Drawings for approved junction box models.
1. Underfloor Duct Accessories: Provide underfloor duct accessories, hardware, sealing compound, and tape as recommended by duct manufacturer.

C. General Purpose Wireways: Provide wireway systems of types, and sizes indicated for refrigeration systems. Construct in accordance with UL 870 for Wireways, Auxiliary Gutters and Associated Fittings. Design with screwed cover, without use of parts other than standard lengths, fittings, and connectors. Provide wireways with knockouts for entering conduit. Construct wireway and fittings of 14-gauge steel and finish with rust inhibiting coating and baked enamel finish.

D. Overhead and Surface Metal Raceways: Provide wireway system of types and sizes indicated. Construct in accordance with UL standard for raceways. Design with hinge or screw cover. Provide wireways with knockouts for entering conduit. Construct wireway and fittings of 0.050" galvanized steel with 0.040" cover, with rust inhibiting coating and baked enamel finish.
   1. Wireway Accessories: Provide fittings, hangers, connectors, and other hardware as recommended by the manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Installer shall examine areas and conditions under which special electrical raceways are to be installed and notify Contractor in writing of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. Install special electrical raceways and components where indicated, in accordance with applicable NEC, NEMA and UL requirements, with equipment manufacturer's written instructions, and with recognized industry practices, to ensure that raceways comply with requirements and serve intended purposes.

B. Coordinate with other work including metal and concrete work, as necessary to interface installation of electrical raceways and components with other work.

C. Seal joints of underfloor ducts with sealing compound prior to placing concrete.

D. Level and square special raceway runs, and install at proper elevations/heights.

END OF SECTION 16111

SECTION 16120

LOW-VOLTAGE WIRES (600 VOLT AC)

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Low-voltage wire, splices, terminations and installation.

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 WIRES

A. Wires shall be single conductor type THHN or THWN insulated with polyvinyl chloride and covered with a protective sheath of nylon, rated at 600 volts. Wires may be operated at 90 degrees C. maximum continuous conductor temperature in dry locations, and 75 degrees C. in wet locations and shall be listed by UL Standard 83 for thermoplastic insulated wires, listed by Underwriter's Laboratories (UL) for installation in accordance with Article 310 of the California Electrical Code (CEC). Conductors shall be solid copper for 12 AWG and smaller conductors, and stranded copper for 10 AWG and larger conductors. Conductors shall be insulated with PVC and sheathed with nylon. Wires shall be identified by surface markings indicating manufacturer's identification, conductor size and metal, voltage rating, UL symbol, type designations and optional rating. Indentations for lettering is not permitted. Wires shall be tested in accordance with the requirements of UL standard for types THWN, or THHN.

B. Conductors shall be solid Class B or stranded Class C, annealed uncoated copper in accordance with UL standards, or another Nationally Recognized Testing Laboratory (NRTL).

2.02 STANDARDS

A. THWN/THHN wires shall comply with the following standards:

1. UL 83 for thermoplastic insulated wires.

2. UL 1063 for machine tool wires and cables.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Wires shall not be installed until debris and moisture is removed from conduits, boxes, and cabinets. Wires stored at site shall be protected from physical damage until they are installed and walls are completed.

B. Wire-pulling compounds furnished as lubricants for installation of conductors in raceways shall be compounds approved and listed by UL, NRTL, or equal. Oil, grease, graphite, or similar substances are not permitted. Pulling of 2 AWG or larger conductors shall be performed with a cable pull machine. Any runs shorter than 50 feet are exempt. When pulling conductors, do not exceed manufacturer's recommended values

C. The IOR will observe installation of feeder cables. Notify the IOR not less than 2 working days in advance of the proposed time of feeder installation.

D. At outlets for light, power, and signal equipment, pigtail splices with 8-inch circuit conductor leads for connection to fixtures, equipment, and devices.

E. Pressure cable connectors, pre-insulated Scotchlok, 3M, or equal, Y, R or B spring-loaded twist-on type, may be furnished in splicing number 8 AWG or smaller wires for wiring systems; except public address and telephone systems.

F. All Joints, splices, taps, and connections to switchboard neutral, bonding or grounding conductors, conductors to ground busses, and transformer connections for wires 6 gauge and larger shall be performed with high-pressure cable connectors approved for installation with copper conductors. Connectors shall be insulated with heavy wall heat shrink WCSM, or cold-applied roll-on sleeve RVS. Insulation level shall be a minimum of 600V and joints, splices, and taps shall be qualified to ANSI C 119.2, UL, NRTL, or equal listed mechanical pressure connections.

G. Connections to any bussing and high-press cable connectors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade 5 machine screws secured with constant pressure-type locking devices.

H. Connection of any bonding or grounding conductors shall be securely bolted together with corrosion-resistant plated carbon steel, minimum grade 5 machine screws secured with constant pressure-type locking devices.

I. Wire switchboards, panel cabinets, pull boxes, and other cabinets except public address, shall be neatly grouped and tied in bundles with nylon ties at 10-inch intervals. In switchboards, panels and terminal blocks, wires shall be fanned out to terminals. If bundles are longer than 24 inches, a maximum of 9 current carrying conductors may be bundled together.

J. Install conductor lengths with a minimum length within the wiring space. Conductors must be long enough to reach the terminal location in a manner that avoids strain on the connecting lug.

K. Maintain the conductor required bending radius.

L. Neutral conductors larger than 6 gauge, which are not color identified throughout their entire length, shall be taped, painted white or natural gray, or taped white where they appear in switchboards, cabinet, gutters or pull boxes. Neutral conductors 6 gauge and smaller shall be white color identified throughout their entire length.

M. Fire alarm and clock wiring shall be continuous from terminal cabinets or from equipment to each device. Splices are not permitted between devices and/or terminal cabinets at junction and pull boxes. Wiring shall be terminated at terminal blocks or devices only.

N. Wiring systems shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of feeder and branch circuit conductor's insulation resistance. The tests to be performed are as follows:

1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of feeder conductors. Tests must be conducted with wires disconnected at both ends.

    a. Provide calibration program records to assure the testing instrument to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).

    b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.

    c. Test reports shall include the following:

        i. Identification of the testing organization.
        ii. Equipment identification.
        iii. Ambient conditions.
        iv. Identification of the testing technician.
        v. Summary of project.
        vi. Description of equipment being tested.
        vii. Description of tests.
        viii. Test results.
        ix. Analysis, interpretation and recommendations.

2. Utilize the services of an approved independent testing laboratory or a qualified contractor's employee (Technician certified in accordance with ANSI/NETA ETT-2000 Standard for Certification of Electrical Testing Personnel) to perform megger time-resistance insulation testing of branch circuit conductors. Tests must be conducted with wires disconnected at both ends.

    a. Test equipment and report requirements stipulated under section 3.01.N.1 apply to branch circuit testing.

3. Tests shall be performed in the presence of the IOR.

4. Insulation resistance shall not be less than 100 mega-ohms.

3.02 COLOR CODES

A. General Wiring:

1. Color code conductor insulation as follows:

SYSTEM VOLTAGE		
Conductor	208Y/120	480Y/277
Phase A	Black	Brown
Phase B	Red	Orange
Phase C	Blue	Yellow
Neutral	White	Natural Gray

Neutrals shall be colored-distinguished if circuits of two voltage systems are used in the same raceway.

2. For phase and neutral conductors 6 gauge or larger, permanent plastic-colored tape may be furnished to mark conductor end instead of coded insulation. Tape shall cover not less than 2 inches of conductor insulation within enclosure.

B. Signal Systems: Wires for signal systems shall be color-coded and installed under observation of the IOR. Except where otherwise specified, color-coding shall be as follows:

SYSTEM	COLOR CODE
Clocks	Pink, Gray and Orange
Program Bells (some existing elementary schools)	White (Common)Black
Initiating Devices (Non-Addressable)	Red (+) and Black (-)
Program Bells (some existing secondary schools)	White (120 volt, common) Black (C.R. program) Blue (Shop program) Brown (Gym program) Yellow (Auditorium fire alarm)
Fire Alarm Horns	Pink (+) and Gray (-)
Fire Alarm Strobes	Orange (+) and Blue (-)
Un-Interruptible 24 Volt Power (Annunciator, Water	Yellow (+) and White (-) Note: A single white wire may be common to both

Flow, and Audible Device)	
Interruptible 24 Volt Power (4 wire smoke detectors, duct detectors)	Brown (+) and White (-) Note: A single white wire may be common to both
Switch-Leg Sprinkler Bell (Between water flow and audible device)	Violet (+) and White (-)
Door Holding Magnets (Non Power Limited)	Black (+) and White (-)

3.03 FEEDER IDENTIFICATION

A. Feeder wires and cables shall be identified at each point the conduit run is broken by a cabinet, box, gutter, etc. Where terminal ends are available, identification shall be by means of heat shrink wire markers, which provide terminal strain relief. Markers shall be Brady Perma-Sleeve, or equal. Identification in other areas shall be by means of wrap-around tape markers Brady Perma-Code or equal. Markers shall include feeder designation, size, and description.

3.04 TAPE AND SPLICE KITS

A. Splices, joints, and connectors joining conductors in dry and wet locations shall be covered with insulation equivalent to that provided on conductors. Free ends of conductors connected to energized sources shall be taped. Voids in irregular connectors shall be filled with insulating compound before taping. Thermoplastic insulating tape approved by UL, NRTL, or equal for installation as sole insulation of splices shall be furnished and shall be installed according to manufacturer's printed specifications.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.06 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16125

MEDIUM-VOLTAGE CABLES, SPLICES AND TERMINATIONS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Medium-voltage cables, splices and terminations.

2. Single conductor 15,000 volt shielded copper power cable insulated with ozone and discharge resistant flexible, rubber like thermosetting dielectric for medium-voltage applications, suitable for use in wet and dry locations in conduit and underground ducts.

1.02 SUBMITTALS

A. Samples: Submit three 36 inches long pieces of the proposed cable.

B. Submit a complete material list.

C. Shop Drawings: Submit a layout drawing of the proposed installation.

D. A certified test report per The Association of Edison Illuminating Companies (AEIC) CS-6 from the factory shall be furnished to the Inspector of Record, before installation, for each length of cable delivered to the Project site. This report shall certify that cable meets latest requirements of Insulated Cable Engineers Association (ICEA) and shall include all required test data. High voltage cable shall not be installed until cable and test report has been reviewed by the Architect. Submit 8 copies of the report, of which two will be returned. Test shall be performed in accordance with ICEA S-66-524 and UL Standard 1072; the test could be performed by a Nationally Recognized Testing Laboratory (NRTL) or approved equal.

1.03 QUALITY ASSURANCE

A. The cable manufacturer shall have a minimum of 15 years manufacturing EPR insulated cables.

B. Cables shall be tested for corona discharge and shall comply with AEIC requirements. A copy of the original x-y plot showing discharge levels shall be included as part of the certified test reports. Submit test report for Architect/Engineer review prior to installation.

1.04 WARRANTY

A. The manufacturer shall provide a 5 year material warranty.

PART 2 - PRODUCTS

2.01 CABLE

A. Medium-voltage cable shall be furnished where line-to-line operating voltage exceeds 600 volts. Cable shall be, unless otherwise specified, 15 KV, single conductor, 133 percent insulation level, ethylene propylene rubber insulated, shielded, PVC jacket Type MV-105.

B. Conductors shall be Class B stranded annealed, uncoated copper.

C. Insulation system conductor screens, insulation and insulation screens shall be capable of continuous operation at conductor temperatures of 105 degrees C. and emergency overload temperatures of 140 degrees C.

D. Cables shall be identified indicating manufacturer, size, insulation type, voltage rating, and UL, or other Nationally Recognized Testing Laboratory designations.

2.02 STANDARDS

A. Cables shall conform to the following standards where applicable:

1. Insulated Cable Engineers Association (ICEA).

2. Institute of Electrical and Electronic Engineers (IEEE).

3. California Electrical Code (CEC).

4. Underwriters' Laboratories (UL).

5. Association of Edison Illuminating Companies (AEIC).

B. Reels of furnished cable shall be newly manufactured of not more than 12 months old, and shall bear tags containing name of manufacturer, CEC designation, and year of manufacture.

PART 3 - EXECUTION

3.01 CABLE INSTALLATION

A. Installation of cable, including joints, splices, taps, bends, connections, terminations, and method of pulling cable into conduit shall be performed in accordance with manufacturer's recommendations. Install splices, taps and terminations in a manner recommended by cable manufacturer. Stress cones shall be installed on cable at joints, splices, and terminations as recommended by manufacturer of cable. Minimum bending radius of cable shall be in strict accordance with recommendations of manufacturer.

B. Cables shall be identified at points of termination and points where conduit run is broken, as to phase leg and feeder designation, with markers. This requirement applies at man-holes,

switchboards, pull boxes, and like items. Markers shall be E-Z Code, Brady Perma-Code, or equal.

C. After cable is installed and connected, but with all equipment disconnected from cable system, each cable shall be subjected to a high potential DC test in presence of the IOR. Notify the IOR not less than 2 working days in advance of proposed time for test.

D. Test shall be performed with equipment specifically designed for this type of test and in a manner recommended by cable manufacturer. Copies of test report shall be submitted to the Architect for review. Test voltage shall be raised gradually in steps to final voltage recommended by ICEA, which shall be applied for 5 minutes. Current readings shall be taken at each step after leakage current has stabilized and readings shall be plotted on graph paper. If breakdown is indicated during test by a sudden increase in current, discontinue tests and provide required repairs and replacements necessary to correct defective Work.

E. Provide new cable to replace entire length of each cable run not meeting minimum requirements of test. Perform splices and terminations necessary for replacement of cable. Repair and/or replace splices and terminations test results indicate to be defective Work.

3.02 CABLE TERMINATIONS

A. Provide termination kits capable of proper termination of 15 KV class single conductor cables. Kits shall meet Class I requirements and be design proof tested in accordance with IEEE 48-1990. Kits shall accommodate common forms of cable shielding/construction without the need for special adapters or accessories, and shall accommodate a range of cable sizes. Kits shall be capable of proper installation on out-of-round cable in accordance with ICEA and AEIC standards. Kits shall accommodate commercially available environmentally sealed connectors.

B. Terminations for single conductor shielded cables shall consist of heat shrinkable stress control and other required non-tracking insulation tubing or tapes. Kits shall also contain high relative permittivity stress relief mastic for insulation shield cutback treatment with a heat-activated sealant for environmental sealing.

C. Demonstrate actual field experience and suitable accelerated and real-time testing of weathering resistance. Test reports, which verify device stability with time, temperature, and electrical stress variations, shall be submitted for review.

3.03 CABLE SPLICES

E Splices, which consist of 3 or more cables, shall be performed with 600 AMP Elastomold T Bodies, or equal. The splice shall be capable of removing or adding a conductor and restoring the connection in an electrically safe and waterproof condition. Installation of 200 AMP T Bodies is not permitted.

3.04 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

3.05 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 16130

RACEWAYS, FITTINGS AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Raceways and wire ways
2. Conduit installation.
3. Underground requirements.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.
2. Section 16050: Basic Electrical Materials and Methods
3. Division 25: Low Voltage Systems

D. Applicable Standards and Codes

1. EIA/TIA 569 Standards.
2. National American Standards Institute (ANSI)
3. National Electrical Manufacturer’s Association (NEMA)
4. Nationally Recognized Testing Laboratory (NRTL)
5. California Electrical Code (CEC)
6. Uniform Building Code (UBC)
7. Underwriters Laboratory (UL)

1.02 SUBMITTALS

A. Materials List: Provide in accordance with Division 01.

PART 2 - PRODUCTS

2.01 RACEWAYS

A. Conduit Materials:

1. Metallic conduit, and tubing shall be manufactured under the supervision of an UL, or another NRTL factory inspection and label service program. Each 10-foot length of conduit and tubing shall bear the UL or another NRTL label and manufacturer's name.
2. Rigid metallic conduit shall be rigid steel, heavy wall, mild steel, zinc-coated, with an inside and outside protective coating manufactured in accordance with

ANSI C 80.1. Couplings, elbows, bends, condulets, bushings and other fittings shall be the same materials and finish as the rigid metallic conduit. Fittings, connectors, and couplings shall be threaded type, manufactured in accordance with ANSI C 80.1 and UL 6.

3. Electrical metallic tubing shall be steel tubing, zinc-coated with a protective enamel coating inside, manufactured in accordance with NEMA C 80.3. Fittings, couplings, and connectors shall be gland compression type, set screw couplings and connectors not permitted. All parts shall be manufactured in accordance with NEMA C80.3 and UL 6A Electrical metallic tubing is designated hereinafter as EMT. Steel and rain tight fittings shall be approved and listed for the intended application.

4. Flexible steel conduit shall be of flexible interlocking strip construction with continuous zinc coating on strips, manufactured in accordance with UL 1..

   a. Connectors and couplings shall be required fittings of the type, which threads into convolutions of flexible conduit.

5. Liquid-tight flexible metal conduit shall be galvanized heavy wall, flexible locked steel strip construction, UV rated, with smooth moisture and oil-proof, abrasion-resistant, extruded plastic jacket. Connectors shall be as required for installation with liquid-tight flexible conduit and shall be installed to provide a liquid-tight connection.

6. Non-metallic conduit shall be rigid PVC electrical conduit extruded to schedule 40 dimensions of Type II. Grade 1 high impact, polyvinyl chloride, sweeps, couplings, reducers and terminating fittings shall be listed under the UL, or another NRTL, and shall bear the manufacturer's listed marking.

7. Multi-cell raceway shall be 4 inch PVC, Type 40, UL or another NRTL listed for underground use with optical fiber and signal system cables. Raceway shall be furnished with 3-1/2 inch factory installed inner ducts with required internal spacers, and required couplers, sweeps, and end bells. Multicell raceway shall be Carlon Multigard, or District approved equal.

8. Metal Clad (MC) cable system is not allowed.

B. Sleeves for Conduits: Sleeves shall be adjustable type, of 26 gage galvanized iron, Adjust-to Crete Co. Adjust-to-Crete, or Jet Line Products Inc. Jet-Line, or equal.

C. Where conduit enters a building through a concrete foundation below grade, or ground water level, or where it is necessary to seal around a conduit where it passes through a concrete floor or wall, provide O-Z/Gedney Type FSK Thru Wall and Floor Seal, or equal.

D. Expansion Joints-Seismic Separations between building(s) and other locations as indicated on drawings:

1. Provide Thomas & Betts XJG-TB, O-Z/Gedney. type AX with bonding strap and clamps, or equal. At exterior locations, provide Thomas & Betts XJG-TB, O-Z/Gedney type EX, or equal. Provide O-Z/Gedney type AXDX, or equal combination deflection/expansion fittings at all seismic separations. Provide manufacture's internal and external bonding jumpers at all locations. Liquid-tight metal conduit or flexible metal conduit shall not be approved at expansion joints, separations between buildings or seismic separations.

2. Provide expansion fittings at intervals not exceeding 100 feet in conduits exposed to direct sunlight. Fittings may be installed in the conduit run or where conduit attaches to junction or pull boxes. OZ/Gedney type AX, TX or EXE series, or equivalent by Thomas and Betts or approved equal.

E. Conduit Seal Fittings:

1. Provide conduit seal fittings where indicated on the Drawings. Conduit seals shall be of rigid galvanized steel. Seals in horizontal conduit installations shall be Appleton Type ESU, Crouse Hinds Type EYS, or equal. Seals in vertical conduit installations shall be Appleton Type SF, Crouse Hinds Type EYD, or equal, with continuous drain. When installing conduit seals make provision for percent fill space reduction in accordance with CEC.

2. Install sealing compound after wire has been installed. Ensure drain is not blocked in vertical seals when installing compound. Where conduit seals are installed in hazardous area applications, there shall be no conduit coupling, fitting, etc., between seal and boundary of hazardous area.

F. Surface Steel Raceway:

1. The surface steel raceway system for branch circuit wiring, data network, voice, video, and other low voltage wiring shall be as manufactured by the Wiremold Company, Hubbell, or Mono-Systems, Inc. or equal. The raceway system may be supplied pre-wired in accordance with all sections of these specifications and requirements herein, and shall be.UL or another NRTL listed.Computer data installation shall be as required by other sections of this Division.

   a. If furnished pre-wired, the system must be listed in accordance with UL or another NRTL for "Multiple Outlet Assemblies" and so labeled on interior of the assembly. The pre-wired installation must contain no extra wire splices in the raceway as compared to a contractor assembled installation assembled from components. The pre-wired steel raceway shall be Hi-Pot tested at the factory to prevent any potential bare wire or shot circuit defects.

2. The raceway base, cover, and device bracket shall be manufactured of steel and finished in ivory, gray enamel or custom colors suitable for field painting to match adjacent finishes.

3. The raceway shall be a 2-piece design with a metal base and snap-on metal cover, except for the Wiremold V700 system, Hubbell V750 series and Mono-Systems Inc. S145-700 series. Which shall be a one-piece design. The base and cover sections shall be a minimum of 0.040 inch wall thickness. The base section shall be available in 10-foot lengths. A hand-operated cutting tool shall be available for the base and cover to ensure clean, square cuts. Wiremold V500, Hubbell V500, and Mono Systems inc. SM500 series are not permitted.

4. A full complement of fittings shall be furnished, including but not limited to, flat internal and external elbows, tees, entrance fittings, wire clips, cover clips, couplings, support clips, C-hangers and end caps. The fitting color shall match the raceway color. Fittings shall be supplied with a base where indicated and/or required. A take-off fitting shall be furnished as required to adapt to existing flush wall boxes.

5. Device brackets shall be furnished for mounting single or 2-gang devices within the raceway. Devices shall be provided with the ability of mounting flush or in conjunction with standard steel, stainless steel, or manufacturer's metal faceplates.

6. The raceway shall be furnished with a complete line of connectivity outlets and modular inserts for unshielded twisted pair including category 5, fiber-optic, coaxial, and other cabling types with face plates and bezels to facilitate installation. Computer data installation shall be as required by other sections of this Division, and Division 25.

7. Raceway shall be furnished with corner elbows and tee fittings to maintain a cable bend radius which meets the requirements of fiber-optic and copper cables under EIA/TIA 569 for communications pathways.

G. Factory Pre-Wired Surface Metal Raceway:

1. Furnish and install pre-wired surface metal raceways as indicated on Drawings and as specified.

2. Metal Raceway shall be galvanized steel Wiremold V4000, Hubbell 4000 series, or Mono-Systems Inc. SMS-4000 series complete with raceway base, cover, fittings, receptacles and mounting plates required for a complete assembly. Raceway shall have two wiring compartments with integral dividing barrier for isolating the wiring compartments.

3. Pre-wired assembly shall be UL, or another NRTL listed as a multi-outlet assembly and surface raceway as labeled on interior of assembly.

4. Wiring devices and other components shall be factory installed, electrically wired and covers labeled as indicated on drawings. Each receptacle shall be identified with panelboard and circuit number from which it was fed. Grounding shall be maintained by means of factory installed grounding conductors.

5. Where shown on Drawings, Raceway covers shall have provisions for mounting computer data outlets.

6. Complete assembly is to consist of required fittings such as elbows, slide couplings for joining raceway sections, blank end caps and flat tees.

7. Prewired assembly must contain no wire splices.

8. Receptacles and wiring shall be as indicated on drawings and as specified.

9. Where raceway is used for power and computer data outlets, installation of data outlets shall be as required by other sections of this specification.

10. Prior and during installation, verify and comply with manufacturer's installation instructions.

11. Entire assembly shall be tested for shorts, opens, ground faults, and wire insulation at factory and certified. Raceways shall be electrically continuous and bonded in accordance with California Electrical Code.

12. Submit shop drawings for approval showing the complete layout of all components of each raceway, raceway lengths, each component description, location and circuit identification.

13. All wiring devices shall be removable without requiring disassembly of wireway.

14. Standard non OEM wiring devices shall be used as specified in District's specifications.

H. Wireways shall be 16 gage galvanized steel enclosed hinge/screw wiring troughs, surface metal raceway, wireway, and auxiliary gutter designed to enclose electrical wiring. Wireway fittings shall be furnished with removable covers and sides to permit complete installation of conductors throughout the entire wireway run. Cover shall be furnished with keyhole slots to accept captive screws locking the cover securely closed. Wireways shall be UL or another NRTL listed, and shall be Square D Type LDG NEMA-1 enclosure for interior applications, or Type RD NEMA-3R enclosure for exterior applications, or equal by Cooper B-line, Hoffman, Wire Guard, or Circle AW.

I. Penetration in Fire-Rated Structures: Provide 3M, or equal, caulk and fire barriers for installing fire-rated seals around penetrations through floors, walls, and elevator shafts. Fire stop system must be UL, or another NRTL listed, and classified for through-penetration applications of metallic conduits and busways.

J. Pull Wires: Install 1/8 inch polypropylene cords in empty or spare conduits.

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

A. General Requirements:

1. Provide complete and continuous systems of rigid metallic conduit, outlet boxes, junction boxes, fittings and cabinets for systems of electrical wiring including lighting, power, and signal systems, except as otherwise specified.

2. EMT may be installed in interior concealed applications and in areas approved by owner. EMT shall not be installed in concrete, directly buried underground, outdoors, in boiler rooms, elevator pits, or where subject to damage.

3. Within buildings, flexible steel conduit may be installed instead of rigid steel conduit where permitted by code. Flexible steel conduit shall not be installed for conduit installations longer than 50 feet (inclusive of fittings and boxes), in concealed ceilings or walls, and where conduit size is 1-1/2 inches or greater.

4. Liquid-tight flexible steel conduit shall only be installed, except where otherwise specified, for final connection of motor terminal boxes, shop equipment, cafeteria equipment, HVAC equipment and other equipment, or for frequent interchange, and shall be of sufficient length, not exceeding 36 inches, to permit full travel or adjustment of motor on its base. Liquid-tight flexible conduit shall not be used for equipment not requiring adjustment or frequent interchange.

5. Connectors for flexible metal conduit shall be made of steel, and of the types which threads into convolutions of conduit. Connectors for watertight flexible metal conduit shall be as required for installation and shall be installed to provide a watertight connection.

6. Exposed conduit shall be installed vertically and horizontally following the general configuration of the equipment, using cast threaded hub conduit fittings where required and shall be clamped to equipment with suitable iron brackets and one hole pipe strap.

7. If connection is from a flush wall-mounted junction box, install an approved extension box.

8. Underground feeder distribution conduits for systems may be non-metallic conduit instead of rigid conduit except where otherwise specified or indicated.

9. 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 building. Conduits shall be installed to clear access openings.

10. Bends or offsets will not be permitted unless absolutely necessary. Radius of each conduit bend or offset shall be as required by ordinance. Bends and offsets shall be performed with standard industry tools and equipment or may be factory fabricated bends or elbows complying with requirements for radius of bend specified. Heating of metallic conduit to facilitate bending is not permitted. Public telephone conduit bends and offsets shall be provided with a radius which is not less than 10 times trade size of conduit unless otherwise permitted. Refer to underground installation, specified in this section, for radius of bends and offsets required for underground installations.

11. Running threads are not permitted. Provide conduit unions where union joints are necessary. Conduit shall be maintained at least 6 inches from covering of hot water and steam pipes and 18 inches from flues and breechings. Open ends of

conduits shall be sealed with permitted conduit seals during construction of buildings and during installation of underground systems.

12. Expansion Joints/Seismic Separations/Separations between buildings/Locations Indicated: Provide Thomas & Betts XJG-TB, O-Z Electrical Mfg. Co. Inc. Type AX with bonding strap and clamps. At exterior locations, provide Thomas & Betts XJG-TB, O-Z Electrical Mfg. Co. Inc. Type EX, or equal. Provide O-Z Electrical Mfg. Co. Type AXDX, or equal Combination Deflection/Expansion Fittings at all seismic separations. Provide manufactures internal and external Bonding Jumpers at all locations. Liquid-tight flexible conduit shall not be approved at expansion joints or seismic separations.

13. Where conduits are terminated in groups at panelboards, switchboards, and signal cabinets, etc., provide templates or spacers to fasten conduits in proper position and to preserve alignment. Conduits terminating at signal cabinets shall only enter cabinets in the following locations:

    a. Conduits entering top, side, and bottom of cabinets shall be aligned in a single row, centered 2 inches from rear of cabinet.

    b. Conduits entering back of cabinet shall be aligned in a single row centered 2 inches from top of cabinet.

    c. Conduits shall not be spaced closer than 3 inches on centers.

14. Conduits above metal lath ceilings shall be rigidly suspended with pipe hangers or pipe racks or shall be secured to superstructure with factory fabricated pipe straps. Conduits in metal lath or steel stud partitions shall be tied to furring channels or studs. In ceiling spaces and in partitions, tie wires shall be spaced not more than 5 feet apart, shall fasten conduit tight against channels and studs at point of tie and shall not support any of conduit weight. Tie wire shall be 16 gage galvanized double annealed steel.

15. Where auxiliary supports, saddles, brackets, etc., are required to meet special conditions, they shall be fastened rigid and secure before conduit is attached.

16. Conduit in ceiling spaces, stud walls, and under floors, shall be supported with factory fabricated pipe straps or shall be suspended with pipe hangers or pipe racks. Pipe straps shall be attached to and shall fasten conduit tight at point of support against ceiling and floor joists, rafters, and wall studs, or 2-inch x 4-inch headers fitted between joists or wall studs.

17. Conduits installed on exposed steel trusses and rafters shall be fastened with factory fabricated conduit straps or clamps, which shall fasten conduit tight against supporting member at point of support.

18. Conduits installed under buildings shall be strapped with factory fabricated conduit straps to underside of concrete floor or joists, or wood floor joists, or shall be suspended with pipe hangers or pipe racks. Conduits under building are not permitted to be placed directly on grade; they shall be suspended from building or shall be buried below surface or ground. 1-1/4 inch and larger conduits under buildings shall be installed with conduit hangers or racks.

19. Pipe hangers for individual conduits shall be factory fabricated. Steel rods shall be 3/8 inch for 2-inch conduit hangers and smaller and shall be 1/2 inch for 2-1/2 inch conduit hangers and larger.

20. Pipe racks for groups of parallel conduits and for supporting total weights not exceeding 500 pounds shall be trapeze type and shall consist of a cross channel, Steel City Kindorf B-900, Unistrut P-1000, or equal, suspended with a 3/8 inch minimum diameter steel rod at each end. Rods shall be fastened with nuts, top and bottom to cross-channel and with square washers on top of channel. Conduits shall be clamped to top for cross-channel with conduit clamps, Steel City Kindorf C-105 or Unistrut P-1111 through P-1124. Conduits shall not be stacked one on top of another, but a maximum of 2 tiers may be on same rack providing an additional cross-channel is installed. Where a pipe rack is to be longer than 24 inches, or if the supported weight exceeds 500 pounds, submit Shop Drawings of installation to the Architect for review.

21. Conduits suspended on rods more than 2 feet long shall be rigidly braced to prevent horizontal motion or swaying. Installation shall meet zone 4 seismic requirements.

22. Factory fabricated pipe straps shall be one or 2-hole formed galvanized clamps, heavy-duty type, except where otherwise specified.

23. Hangers, straps, rods, or pipe supports under concrete shall be attached to inserts set at time concrete is placed, or with approved concrete anchors. Under wood, install bolts, lag bolts, or lag screws; under steel joists or trusses, install beam clamps. Contractor shall submit size of anchors, bolts, screws, and installation method to Architect for approval prior to start of any work.

24. Conduits shall be supported at intervals required by code, but not to exceed 10 feet. One inch and smaller exposed conduits shall be fastened with one-hole malleable iron straps. Perforated straps and plumber's tape is not permitted for the support of conduits.

25. Conduits stubbed up through a roof or an arcade shall be flashed with a waterproof flashing. Refer to Division 07 for additional requirements.

26. Bushings and locknuts for rigid steel conduit shall be steel threaded insulating type. Setscrew bushings are not permitted.

27. Flex conduits shall be cut square and not at an angle.

28. Routing of conduits may be changed providing length of any conduit run is not increased more than 10 percent of the length indicated on Drawings.

B. Underground Requirements:

1. Conduits and multicell raceways installed underground shall be entirely encased in 3 inch thick concrete on all sides 3, except where otherwise specified. Provide required spacers to prevent any deflection when concrete is placed and to preserve position and alignment. Conduits and raceways shall be tied to spacers. Anchors shall be installed to prevent floating of conduits and raceways during

placing of concrete. Provide red colored concrete to encase conduits of systems operating above 600 volts.

2. Underground conduits and raceways shall be buried to a depth of not less than 24 inches below finished grade to top of the concrete envelope, unless otherwise specified.

3. Assemble sections of conduit with required fittings. Cut ends of conduit shall be reamed to remove rough edges. Joints in conduits shall be provided liquid-tight. Bends at risers shall be completely below surface where possible.

4. Conduits and raceways in a common trench shall be separated by at least 3 inches of concrete. Electrical power and/or lighting conduit runs installed in a common trench with conduits containing signal system wiring such as public address, telephone, intrusion detection, fire alarm, television, computer networking, and clock systems shall maintain a separation of a minimum of 6 inches from these types of signal system conduits and raceways. Electrical power, lighting and signal conduits and raceways installed in a common trench with other utility lines such as gas, water, sewer and storm lines shall maintain 12 inches separation from these types of utility lines.

5. The IOR will observe underground installations before and during concrete placement. A mandrel shall be drawn through each run of conduit in presence of the IOR before and after placing concrete. Mandrel shall be 6 inches in length minimum, and have a diameter that is within 1/4 inches of diameter of conduit to be tested.

6. Non-metallic conduit installations shall comply with following additional requirements. Joints in PVC conduit shall be sealed by means of required solvent-weld cement supplied by conduit manufacturer. Non-metallic conduit bends and deflections shall comply with requirements of applicable electrical code, except that minimum radius of any bend or offset for conduits sized from 1/2 inch to 1-1/2 inches inclusive shall not be less than 24 inches. Bends at risers and risers shall be PVC-coated rigid steel conduit. Radius of curve of bends or offsets in non-metallic conduit for public telephone system shall be not less than 10 times trade size of conduit, unless otherwise specifically permitted.

7. Furnish and install a 6-inch wide, polyethylene, red underground barrier type 12 inches above full length of concrete reading, "CAUTION ELECTRIC LINE BURIED BELOW".

8. Underground conduit systems provided for utility companies shall be furnished to meet the requirements of the utility companies requiring service.

9. Protect inside of conduit and raceway from dirt and rubbish during construction by capping openings.

10. Add bell-end bushings for conduit stub-up including underground entries to pull boxes, and manholes. Under floor standing switchboards and motor control centers provide a 4” galvanized nipple with ground bushing.

11. Underground conduit for systems operating above 600 volts shall be a minimum size of 4 inches.

12. At portable classroom all stub ups shall be installed with a coupling flush to finish grade.

13. All underground conduits and raceways shall be swabbed prior to wire pull.

C. General Installation Requirements for Computer Network System Conduits:

1. Location of outlet boxes and equipment on Drawings is approximate, unless dimensions are indicated. Drawings shall not be scaled to determine position and routing of wireways, drops, and outlet boxes. Location of outlet boxes and equipment shall conform to architectural features of the building and other Work already in place and must be ascertained in the field before start of Work.

2. The maximum pulling tensions of the specified cables shall not be exceeded and proper radius of cable bends shall be maintained.

3. For computer network wiring, conduit types shall be limited to rigid metal conduit, electrical metallic tubing, schedule 40 PVC, multi-cell raceways, and flexible metallic conduit for lengths less than 6 feet.

4. Interior section of conduit run shall be not longer than 100 feet and shall not contain more than 2 bends of 90 degrees between pull points or pull boxes.

5. The inside radius of a conduit bend shall be at least 6 times the internal diameter of the conduit. When the conduit size is greater than 2 inches, the inside radius shall be at least 10 times the internal diameter of the conduit. For fiber-optic cable, the inside radius of a conduit bend shall be at least 10 times the internal diameter of the conduit.

6. Conduit shall be sized in accordance with Table 4.4-1 of EIA/ TIA 569 standard.

7. Splicing or terminating cables in pull boxes is not permitted.

8. For indoor application, a pull box shall be provided in conduit run where:

   a. The length is over 100 feet.

   b. There are more than 2 bends of 90 degrees.

   c. There is a reverse bend in the run.

9. Boxes shall be provided in a straight section of conduit and shall not be installed in lieu of a bend. The corresponding conduit ends are to be aligned with each other. Conduit fittings shall not be installed in place of pull boxes.

10. Where a pull box is provided with raceways, pull box shall comply with the following:

    a. For straight pull-through, provide a length of at least 8 times the trade-size diameter of the largest raceway.

    b. For angle and U-pulls:

1) Provide a distance between each raceway entry inside the box and the opposite wall of the box of at least 6 times the trade-size diameter of the largest raceway, this distance being increased by the sum of the trade-size diameters of the other raceways on the same wall of the box.

2) Provide a distance between the nearest edges of each raceway entry enclosing the same conductor of at least:

a) Six times the trade-size diameter of the raceway; or

b) Six times the trade-size diameter of the larger raceway if they are of different size.

c) For a raceway entering the wall of a pull box opposite to a removable cover, provide a distance from the wall to the cover of not less than the trade-size diameter of the largest raceway plus 6 times the diameter of the largest conductor.

11. Drawings generally indicate Work to be installed, but do not indicate all bends, transitions of special fittings required to clear beams, girders or other Work already in place. Investigate conditions where conduits and wireways are to be installed, and furnish and install required fittings.

D. Slabs on Grade:

1. Unless specifically reviewed by the Architect and DSA, conduits 1-1/4 inches and larger are not permitted to be installed in structural concrete slabs. Where conduits are permitted, and are installed in concrete slabs on grade, slabs shall be thickened at bottom where conduits occur to provide 3 inches of concrete between conduit and earth. Required excavation shall be part of the Work of this section.

2. If concrete slab is 5 inches or more in thickness with a moisture barrier plastic sheet between earth and slab, one inch and smaller conduits shall be installed in the slab with a minimum of one inch concrete between earth and conduit.

E. Concrete Walls, Beams, and Floors: Provide sleeves where conduits pierce concrete walls, beams, and floors, except floor slabs on grade. Sleeves shall provide 1/2 inch clearance around conduits. Sleeves shall not extend beyond exposed surfaces of concrete and shall be securely fastened to forms. Where conduits pass through walls below grade, caulk with required sealant and backer materials between conduit and sleeve to provide a watertight joint. Sealant shall be as indicated in Section 07920: Joint Sealants.

3.02 STUBS

A. Panelboard: Install 2 one inch conduits from each flush mounted panelboard to access under floor space and to access above ceiling space where these conditions occur. Cap conduits with standard galvanized pipe caps.

B. Floor: At points where floor stubs are indicated in open floor areas, for connections to machines and equipment, conduits shall be terminated with couplings, tops flush with

finished floor. Stubs shall extend above couplings the indicated distance. Where capped stubs are designated, couplings shall be closed with cast iron plugs with screw drive slots.

C. Underground:

1. Underground conduit stubs shall be terminated at locations indicated, and shall extend 5 feet beyond building foundations, steps, arcades, concrete walks and paving. Rigid metallic conduit stubs and non-metallic conduit stubs shall be capped by installing a coupling flush in end wall of concrete encasement and plugging with a permitted plug. Project record drawings shall indicate location of ends of underground conduit stubs fully dimensioned and triangulated with reference to buildings or permanent landmarks. These dimensions, including depth below finished grade, shall be marked on project record drawings in presence of the IOR before backfilling trench. Where extending existing concrete encased stubs, clean, chip and wire brush end of existing concrete and brush on a heavy coat of neat cement paste or epoxy bonding agent.

2. Over ends of individual underground conduit stubs or groups of conduit stubs, install 4-inch x 18-inch deep PVC filled with concrete, flush with finished grade in asphaltic concrete or lawns, and 2 inches above finished grade in planting areas. Cast a 3-inch x 3-inch brass plate engraved "ELECT" flush in top of concrete. Secure plate to concrete with brass dowels or as indicated on drawings.

3.03 3.03 PROTECTION

A. A. Protect the Work of this section until Substantial Completion.

3.04 3.04 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16270

LOW-VOLTAGE TRANSFORMERS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: This specification covers single-phase and three-phase general purpose individually mounted dry-type transformers, 600 V maximum, for power and lighting applications. It includes transformers as specified and as indicated on Drawings.

C. All work, material or equipment shall comply with the codes, ordinances and regulations of the local government having jurisdiction, including the regulations of serving utilities and any participating government agencies having jurisdiction.

D. Related Sections:

1. Section 16010: Basic Electrical Requirements.
2. Section 16050: Basic Electrical Materials and Methods.
3. Section 16060: Grounding.
4. Section 16120: Low Voltage Wires (600 Volts AC)
5. Section 16130: Raceways, Boxes, Fittings and Supports.
6. Section 16470: Power Distribution Units.
7. Division 25: Low Voltage Systems.

E. Codes and Applicable standards: Products and installation shall meet or exceed the latest edition of the following standards.

1. ANSI/IEEE C57.96, Distribution and Power Transformers, Guide for Loading Dry-Type Transformers; Appendix to ANSI C57.12 Standards.
2. Department of Energy, Energy Act of 2005.
3. International Electrical Code adopted by the State of California.
4. ANSI/IEEE C89.2, Dry-Type Transformers for General applications.
5. IEEE C57.12.91, Test Code for Dry-Type Distribution and Power Transformers.
6. IEEE C57.110 – IEEE Recommended Practice for establishing capability when feeding nonsinusoidal load currents.

7. NEMA standard 20, Dry-Type Transformers for General applications.

8. UL 506, Specialty Transformers.

9. UL 1561, Dry-Type General Purpose and Power Transformers.

10. NEMA TP-1, 2002; Guide for Determining Energy Efficiency for Distribution Transformers.

11. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption of Distribution Transformers.

12. NEMA TP-3, Standard for the Labeling of Distribution Transformer Efficiency.

No requirement of these drawings and specifications shall be construed to void any of the provisions of the above standards. Any conflicts or changes required to the contract documents in order to obtain compliance with applicable codes shall be brought to the immediate attention of the Owner Authorized Representative by the Contractor.

F. ACRONYMS

ANSI	American National Standards Institute
AOR	Architect of Record
CEC	California Electrical Code
EOR	Engineer of Record
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
IOR	Inspector of Record
NEC	National Electrical Code
NEMA	National Electrical manufacturers Association

1.02 DESIGN REQUIREMENTS

A. Transformers, Dry Type: Distribution transformers shall be wound with copper conductors. Performance of transformers shall meet or exceed the requirements of applicable codes and standards, the DOE Energy Policy Act of 2005 - Public Law 109-58 and the latest requirements of the California Energy Commission Appliance Efficiency Regulations.

B. Transformers shall be self-cooled type with 220 degrees C. insulation and a maximum temperature rise of 150 degrees C. under continuous full load conditions with an ambient of 40 degrees C.

C. Transformers shall be furnished with four 2.50 percent (2 above and 2 below normal voltage) taps. Windings shall be of 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, installation, and short circuit stresses.

E. Enclosure cover plates shall be sheet steel, captive bolted to enclosure framework. Enclosure shall provide suitable ventilating openings with rodent-proof screens, NEMA 1 enclosure. Enclosure shall be provided with lifting lugs and jacking plates as required. Transformers installed outdoors shall be provided with weatherproof NEMA 3R enclosure and weather proof kit.

F. Transformers shall be furnished complete with mounting channels and mounting bolts. Metal parts, excepting cores and core mounting frames shall be furnished clean, rust-proofed, and provided with a coat of an inert primer.

G. Transformers up to 35 KVA shall be no more than 40 decibels. Transformers 36 KVA or more shall be a minimum of 5 decibels below NEMA standards per unit. Transformers shall be provided with vibration dampers consisting of Korfund spring loaded shock mounts and Elastorib sheeting. Size and number of shock mounts shall be in accordance with manufacturer's recommendations.

H. Transformers shall be UL listed.

I. Each transformer to be installed under this section shall be sound tested at the factory. Contractor shall provide two copies of transformers tests reports for EOR’s review.

J. Equipment shown on drawings to scale is approximate only and based upon a general class of equipment specified. The Contractor shall verify all dimensions and clearances prior to commencement of work.

K. The Contractor shall verify all points of connection with the manufacturer’s requirements, instructions, or recommendations prior to installation. Actual dimensions, weights, clearances and installation requirements shall be verified and coordinated by the contractor.

L. Provide transformers with a K rating as indicated on drawings. K-rated transformers shall be type NL-UL or NLP-UL as indicated on drawings and be equipped with the following features:

1. Electrostatic shield.

2. NLP series shall have a maximum sound level of 3 dB below NEMA standards.

3. Double-size neutral terminal.

4. Additional coil capacity to compensate for higher non-linear load loss.

5. Heavy-gage ventilated indoor enclosures (provide weather shields where installed indoors).

6. K-rated transformers shall meet all other requirements of this section.

1.03 SUBMITTALS

A. Provide in accordance with Division 01.

B. Shop Drawings: Include make, catalog number, dimensions, weight, KVA Rating, % Impedance, finish, type, insulation class, design temperature, sound levels, efficiency and taps provided. Include regulation at 80 percent and 100 percent of full load, no-load loss, full-load loss, percent efficiency, percent impedance, noise level and continuous capacity rating.

C. Provide manufacturers data and inspection report that confirms transformers to be UL 1561 listed with K rating equal to that indicated on drawings.

D. Provide a connection schematic diagram.

E. Provide the following tests reports: IOR will review the reports for conformance with specified criteria, and compliance with the applicable standards. Submit one copy for each set of shop drawings being submitted.

1. Load Losses: Measurements shall be taken at multiple load levels and plotted to show compliance with specifications and correlated to efficiency curve for the transformer size and type.

2. Provide No-Load and Total Losses report .

3. Applied Voltage.

4. Temperature Rise.

5. Induced Voltage.

6. Sound Level.

7. Impulse Test.

8. Manufacturer’s nonlinear load test representing real world load mix. Transformers not meeting this requirement shall not be installed.

1.04 WARRANTY

A. Transformers shall be warranted to be free from defects in materials and workmanship for a period of three years from the date of substantial completion.

PART 2 - PRODUCTS

1.02 EQUIPMENT

A. Transformers shall be Square D, General Electric, PowerSmiths, MGM, Cutler Hammer or owner approved equal.

PART 3 - EXECUTION

3.01 DELIVERY AND STORAGE

A. Deliver, storage, protect and handle products in accordance with the manufacturer's recommendations.

3.02 INSTALLATION

A. Transformer core frame shall be installed level on shock absorbing pads within enclosure. Comply with CBC zone 4 seismic requirements.

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 or bus ducts where required.

D. Transformers installed outdoors or below grade shall be mounted on concrete pads as specified in Section 03300: Cast-In-Place Concrete.

E. Install transformer ventilation openings not closer than 6 inches from wall surfaces.

F. Do not install transformers in corrosive environments such as swimming pool pump and boiler rooms, or similar areas.

3.03 VOLTAGE CHECK

A. Set taps on transformers to provide satisfactory operating voltages with present loads energized, including new loads and existing loads. A check shall be performed in the presence of the IOR at a panel fed from each transformer, which is farthest from transformer. Voltages at transformers ranging from 118 to 122 volts inclusive, for 120 volt systems and proportionately equivalent for higher voltage systems are permitted.

B. Provide instruments and accessories required to perform checks. Voltmeters shall be accurate within .075 percent or one percent and shall have scales permitting voltage readings to be performed on upper half of scale. Calibration of the meters shall be observed by the IOR.

C. Adjust transformer taps under full load operating conditions, to provide normal operating voltages at the loads.

3.04 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.05 CLEANUP

A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

B. Repair scratched or marred surfaces affected during the execution of work. Repair surfaces shall match original finish.

END OF SECTION

SECTION 16445
PANELBOARDS AND SIGNAL TERMINAL CABINETS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Lighting and power distribution facilities, including panelboards.

C. Related Sections:

1. Section 16010: Basic Electrical Requirements.

2. Section 16050: Basic Electrical Materials and Methods.

3. Section 16470: Power Distribution Units

4. Section 16500: Lighting.

5. Division 25: Low Voltage Systems

1.02 SUBMITTALS

A. Provide in accordance with Division 01.

B. Shop Drawings: Include a front elevation indicating cabinet dimensions, make, location and capacity of equipment, size of gutters, type of mounting, finish, and catalog number of locks. General layout of internal devices, wiring drawings with wire numbers and device connections, vendor cut sheets of devices in enclosure and bill of materials listing description, manufacturer, part number, and quantity of items shall be included.

C. Installation Instructions: Submit manufacturer's written installation instructions.

1.03 DESIGN REQUIREMENTS

A. Panelboards:

1. Panelboards shall be wall-mounted, enclosed safety type with 120/240 volt, 3-wire solid neutral 277/480 volt, 4-wire or 120/208 volt, 4-wire solid neutral mains as indicated on Drawings or specified. First panelboard of each building shall be provided with main or sub-feeder circuit breakers where so indicated.

2. Single pole branches shall be molded case, thermal magnetic circuit breakers with inverse time delay, trip free, quick-make, quick-break mechanism and silver alloy contacts. Circuit breakers shall be fully rated, with ampere rating marked

on handle and shall indicate on/off and tripped positions. Ground fault interrupters shall be incorporated into circuit breakers where indicated. They shall be listed by UL, or other NRTL as ground fault devices. Provide appropriate lug kit of sufficient size to accommodate the feeders.

3. Two- and 3-pole branches shall be enclosed, and shall be thermal magnetic circuit breakers with inverse time delay, tamper-proof, ambient compensated, single handle, internal common trip, and quick-make, quick-break mechanism with silver alloy contacts. Circuit breakers shall be fully rated or as otherwise indicated on the Drawings.

4. Main and subfeeder circuit breakers shall be enclosed, thermal magnetic type with inverse time delay, single handle common trip, quick-make, quick-break mechanism, corrosion-resistant bearings and silver alloy contacts. Ampere frame size and trip rating shall be as indicated on Drawings. Breakers over 225 amperes shall be furnished with interchangeable trip units. Handles of main and subfeeder circuit breakers shall be provided cabinet door. Voltage rating shall be as indicated on Drawings.

5. Circuit breakers shall be fully rated and of one-piece, bolt-on type and shall meet short-circuit interrupting capacity requirements indicated on Drawings. Series rated circuit breaker combinations are not acceptable

6. Internal connections shall be fabricated with plated copper bus bars and the busses shall extend for full length of space available for branch circuit breakers. Feeder cable connectors shall be installed at point of feeder entrance. Terminals shall be furnished with copper conductors. Panelboards fed by conductors having over-current protection greater than 200 amperes shall be protected on supply side by over-current devices having a rating not greater than that of panelboards. Copper bussing shall be fully rated. Heat rated bussing is not acceptable

7. Except where otherwise indicated, circuit breakers shall be in 2 vertical rows connected to bus bars in a distributed phase arrangement. Two-pole branches shall be balanced on busses. Single pole branches shall be numbered adjacent to its circuit breaker, with odd numbers on left and even numbers on right.

8. Specified circuit breaker spaces shall be furnished with hardware required for future installation of circuit breakers.

9. Provide locking devices for individual circuit breakers. Padlocking devices shall be secured to circuit breakers and by panel dead front plates.

B. Surge Suppressors: Where indicated on Drawings, provide transient voltage surge suppressors as an integral part of panelboards. Panelboards shall be complete with 200 percent rated copper neutral bus, ground bus and isolated ground bus in addition to requirements of this section. Surge suppressors shall be as follows:

1. Surge Capacity:

a. Line-to-neutral for wye systems: 80 KA.

b. Line-to-ground: 80 KA.

c. Neutral-to-ground: 80 KA, 3-phase wye.

d. Line-to-neutral plus line-to-ground: 160 KA.

2. UL 1449 2nd Edition Suppresseded Voltage Rating for 208/120 Wye System:

a. Line-to-neutral: 400 volts.

b. Line-to-ground: 400 volts.

c. Neutral-to-ground: 400 volts.

d. Maximum continuous over-voltage: 150 volts.

3. EMI/RFI High-Frequency Noise Power Filter (Characteristics):

a. 100 KHz at 444 dB.

b. 100 MHz at 44 dB.

c. 10 MHz at 44 dB.

d. 100 MHz at 444 dB.

4. MOVs shall be thermally protected for low current faults and shall be fused with surge-rated fuses. The surge-rated surge current passes and clears the circuit safely if the surge capacity is exceeded. Enhanced diagnostics shall continuously monitor the unit's status and shall include LEDs to signal a reduction in surge capacity or the loss of a suppression circuit. An audible alarm, with test and silence features, shall be furnished in diagnostic package.

5. Each phase or the entire unit shall be replaceable and have bolted-on, tin-plated copper connections. Unit to have UL witnessed fault current rating of 65,000 symmetrical amperes.

6. Surge suppression units shall comply with the following:

a. UL certified.

b. UL 1283.

c. UL 1449 2nd Edition.

d. IEEE C 62.45.

e. IEEEI C 62.41.

f. Nationally Recognized Testing Laboratory (NRTL) or equal

C. Panelboard Cabinets:

1. Panelboard cabinets shall be code gage galvanized steel or blue steel; fronts, doors, and trims shall be code gage furniture steel. Cabinets shall be furnished with at least 6-inch high gutters at top and bottom where feeder cable size exceeds 4 gage or where feeder cable passes through cabinet vertically. Cabinets shall be furnished with top and bottom gutters sized as required by inspection department having jurisdiction, but never less than 6 inches where more than one feeder enters top or bottom of cabinets. Side gutters shall not be less than 4 inches wide. Width of cabinets shall be 20 inches, unless otherwise indicated on Drawings.

2. Doors shall be cut true, shall accurately fit opening and finish smooth across joints. Rabbets shall be inside. Hinges shall be entirely concealed except for barrels and pins. Hinge flanges shall be welded to door and trim. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys.

3. Where contactors, time switches, and control devices are specified or indicated to be installed within panelboard cabinets, a separate compartment and door shall be provided at top of cabinet for such devices. Door shall be sized as required to permit removal of contactor and other devices intact. Gutters shall be provided at sides and top of compartment. Doors shall be equipped with flush type, spring-latching, Corbin locks for metal doors keyed to Corbin No. 60 keys.

4. Provide and install panelboard manufacturer’s permanent circuit number kit option.

5. Panelboards with control devices in compartment shall arrive at the Project site completely assembled with control devices installed and wired.

6. Outdoor cabinets shall be NEMA Type 3R. Construction shall be formed from code gage galvanized steel with ANSI No. 61 gray enamel finish. Provide heavy-duty, 3-point latching, vault type door handles with padlocking provisions. Provide stainless steel or galvanized butt hinges on doors. Padlocks shall be furnished, keyed to Corbin No. 60 keys.

7. Self-tapping screws and bolts not permitted.

D. Panelboard Schedule: Provide a neatly typewritten schedule with number or name of room or area, or load served by each panelboard circuit. Room numbers or names shall be determined at the Project site and shall not necessarily be those indicated on the Drawings. Schedule shall also indicate panel designation, voltage and phase, building and distribution panel or switchboard from which it is fed. Schedule shall be installed in

a frame under transparent plastic 1/32 inch thick on inside of each panelboard cabinet door.

E. Panelboard Standards: Panelboards shall be UL, or other NRTL listed and labeled. Panelboards shall meet latest revisions of following standards:

1. California Electric Code, Article 384.

2. UL 67, Panelboards.

3. UL 50, Cabinets and Boxes.

4. UL 943, GFCI.

5. UL 489, Molded Case Circuit Breakers.

6. NEMA PB1.

7. Federal Specifications W-P- 115C and WC-375B.

F. Signal Terminal Cabinets:

1. Signal terminal cabinets shall conform to the Specifications for panelboard cabinets, except as modified herein.

2. Terminal cabinets shall be flush type, with 2-inch trim or surface mounted type, as indicated on Drawings. Terminal cabinets shall be furnished with sections and barriers to separate each system. Sections over 24 inches in width shall be provided with double doors and locks. Terminal cabinets, or sections of terminals housing separate systems, shall measure 12 inches long x 18 inches high x 5-3/4 inches deep, unless otherwise indicated on Drawings. Trims for sectional cabinets shall be of one-piece construction.

3. Terminal cabinets shall be furnished with 3/4 inch thick plywood. Plywood shall be fastened in place with machine screws or factory installed mounting screws.

4. Flush-mounted terminal cabinets shall be finished as specified for flush-mounted panelboard cabinets. Surface and semi-flush mounted terminal cabinets shall be finished as specified for surface-mounted panelboard cabinets.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Panelboards shall be manufactured by W.A. Benjamin, General Electric, Cutler Hammer, Square D or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Panelboards shall be located so they are readily accessible and not exposed to physical damage.

B. Panelboards installed outdoors shall be specifically listed for wet locations and shall be weatherproof in NEMA Type 3R cabinets.

C. Panelboard locations shall provide sufficient working space around panels to comply with the California Electrical Code.

D. Panelboards shall be securely fastened to structure and mounted on surface by at least 4 points.

E. Unused openings in cabinets shall be effectively closed as required by the manufacturer.

F. Cabinets shall be grounded as specified in Article 250 of the California Electrical Code.

G. Conduits shall be installed so as to prevent moisture or water from entering and accumulating within the enclosure.

H. Lugs shall be suitable and listed for installation with the conductor being connected.

I. Conductor lengths shall be maintained to a minimum within the wiring gutter space. Conductors shall be long enough to reach the terminal location in a manner that avoids strain on the connecting lugs.

J. Maintain the required bending radius of conductors inside the cabinet.

K. Clean the cabinet of foreign material such as cement, plaster, and paint.

L. Distribute and arrange conductors neatly in the wiring gutters.

M. Use the manufacturer's torque values to tighten lugs.

N. Before energizing panelboards, the following steps shall be taken:

1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been provided.

2. Remove shipping blocks from component devices and panelboard interiors.

3. Manually exercise circuit breakers to verify they operate freely.

4. Remove debris from panelboard interior.

O. Follow manufacturer's instructions for installation.

P. Do not install in highly corrosive environments, unless rated for the application.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16470

POWER DISTRIBUTION UNITS

PART 1 - GENERAL

1.01 UMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes: Power centers suitable for outdoor location; of voltage and rating as indicated on Drawings.

C. Related Sections:

1. Section 03300: Cast-In-Place Concrete.

2. Section 05500: Metal Fabrications.

3. Section 16050: Basic Electrical Materials and Methods.

4. Section 16060: Grounding and Bonding.

5. Section 16270: Low-Voltage Transformers.

6. Section 16405: Service Entrance.

7. Section 16445: Panelboards and Signal Terminal Cabinets.

1.02 DESIGN REQUIREMENTS

A. Power center shall consist of a transformer, a primary main circuit breaker or a panel and a secondary distribution panel with a main circuit breaker.

B. Transformer shall be delivered to enclosure manufacturer for assembly and subsequent delivery to the Project site.

C. Commercial energy consumption meters capable of real-time power monitoring shall be provided as indicated in construction drawings. If meter(s) are required, these shall be suitable for interfacing with building energy management systems that utilize BACnet communication protocols.

1.03 SUBMITTALS

A. Provide in accordance with Division 01.

B. Shop Drawings:

1. Indicate dimensions, finish, elevations, and locking devices.

2. Indicate equipment make, catalog number, size and/or capacity, line and load conduit entrance location. Layout shall indicate locations of equipment.

3. Include data as required for transformers. Refer to Section 16270: Low-Voltage Transformers.

4. Indicate size and/or capacity of bussing, barriers, catalog numbers of locks, nameplate inscriptions, and interlocking facilities.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Transformers:

1. Copper wound, dry type, totally enclosed, class H insulation with a maximum winding temperature of 150 degrees C. Furnish with four 2-1/2 percent taps, 2 above and 2 below voltage.

2. Constructed and tested in accordance with NEMA standards; wound with copper conductors, to equal or exceed NEMA published criteria.

3. For other electrical characteristics, refer to Section 16270: Low-Voltage Transformers.

B. Power Center Enclosures:

1. Weatherproof formed sheet steel. Provide with catch and lock on doors of breakers and panels; furnish with padlocks.

2. Manufactured by Benjamin Electric Company, Square D Company, General Electric, Eaton/Cutler-Hammer, or equal.

C. As indicated on construction drawings distribution units shall be provided with multifunctional digital meter(s) with true RMS measured Amperes (each phase and neutral) Volts (line-to-line and line-to-neutral), Power Factor, VA, VAR, Watts, and KWH. Meter(s) shall be Veris Industries 8163 Energy series or equal.

1. Meter communication protocol shall match those of the site’s energy management system.

2. Meter with all peripheral devices and equipment shall be integral to the power center enclosure, and be installed by the manufacturer of the power distribution equipment.

D. Terminal Cabinets.

PART 3 - EXECUTION

2.01 INSTALLATION

A. Isolate and separate primary main circuit breaker and distribution panel from transformer by means of steel barrier. Bolt circuit breakers to panel with panel manufacture's machine bolts, or equal. Self-tapping screws are not allowed.

B. Install two 2-inch underground conduit stub-outs, from each panel to outside edge of concrete pad. Refer to Section 016130: Raceways and Boxes.

C. Install bollards as indicated. Refer to Section 05500: Metal Fabrications.

D. Functional operation of the power center shall be demonstrated to IOR.

E. Do not install in highly corrosive environments, unless rated for the application and approved by IOR.

F. Distribution equipment and system components shall be free from short circuits and grounds, other than required grounds. The contractor shall be responsible for the testing of bolted electrical connections, perform insulation resistance tests on each bus section, phase-to-phase and phase-to-ground for one minute in accordance with requirements stated in NETA-ATS 2007 table 100.

1. Utilize the services of an approved independent testing laboratory to perform megger time-resistance insulation testing of bussing, circuit breakers and/or fused switches. The fused switches shall be equipped with fuses or temporary jumpers in place of fuses. Breaker and fused switches shall be tested in the closed position. No wiring shall be connected to the line or load side of the power distribution unit during testing.

    a. Provide calibration program records to assure the testing instruments to be within rated accuracy. The test equipment accuracy shall be in accord with the requirements stated by the National Institute of Standards and Technology (NIST).

    b. Test equipment shall be provided with a label stating the date of last calibration. As a minimum the equipment shall have been calibrated within the past 12 months.

    c. Test reports shall include the following:

        i. Identification of the testing organization.
        ii. Equipment identification.
        iii. Ambient conditions.
        iv. Identification of the testing technician.
        v. Summary of project.
        vi. Description of equipment being tested.

vii. Description of tests.
viii. Test results.
ix. Analysis, interpretation and recommendations.

2. Tests shall be performed in the presence of the IOR.

3. During testing, provisions shall be made to prevent damage to any solid state components, or electronic equipment such as TVSS equipment that may be tied onto power distribution unit bussing.

4. Test results shall meet manufacturer's recommendations or NETA ATS-2007 recommendations, whichever is more stringent.

3.02 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.03 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16712

FIRE ALARM SYSTEMS

MIDLE SCHOOL AND HIGH SCHOOLS

PART 1 - GENERAL

1.01 SUMMARY

A. Provisions of Division 01 apply to this section

B. Section Includes:

1. Fire alarm system for middle and high schools or other large Project sites.

2. The furnishing, installation, connection, and testing of the microprocessor controlled, intelligent reporting fire alarm network equipment required to provide a complete, operative, coordinated system. It shall be furnished with alarm initiating devices, alarm notification appliances, network fire alarm control panels (FACPs), network liquid crystal display (NLCD), auxiliary control devices, annunciators, and wiring as indicated on the Drawings and specified.

3. The fire alarm system shall comply with requirements of 1996 NFPA Standard 72 for protected premises signaling systems except as modified and supplemented by this Specification. The system shall be electrically supervised and monitor the integrity of conductors.

C. Related Sections:

1. Section 14240: Hydraulic Elevators.

2. Section 15300: Fire Protection Sprinkler Systems.

3. Section 15700: Heating, Ventilating, and Air Conditioning Equipment.

4. Section 15870: Kitchen Ventilation System.

5. Section 15900: HVAC Instrumentation and Controls.

6. Section 16010: Basic Electrical Requirements.

7. Section 16050: Basic Electrical Materials and Methods.

8. Section 16120: Low-Voltage Wire 600 Volts AC.

9. Section 16720: Intrusion Detection.

1.03 SYSTEM REQUIREMENTS

A. Fire detection system shall continually supervise and monitor the following initiating, signaling, and monitoring circuits designated as:

1. Manual pull fire stations.

2. Smoke and heat detectors, including those installed under other sections.

3. Sprinkler flow switches and horns.

4. Alarm signaling circuits including alarm bells and visual alarm units.

5. Annunciators.

6. System controls, which shall be UL listed for power limited applications, per NEC 760-23.

7. Fire alarm devices shall be listed for installation in the fire alarm system panel to which they are connected.

B. The system and its components shall be UL listed under the appropriate UL testing standard for fire alarm applications.

C. Designated zones shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the Project site via a multiplexed communication.

D. The FACPs shall be active/interrogative-type systems where each transponder is repetitively scanned, causing a signal to be transmitted to the local FACP node indicating that the transponder and its associated initiating device and notification appliance circuit wiring is functional. Loss of this signal at the local FACP shall result in a trouble indication on both the FACP display and at the network display, as specified hereinafter for the particular input.

E. The furnished system shall be arranged so no less than 20 percent additional transponders may be installed into a network communication loop.

1.04 APPROVALS

A. Fire alarm, signal, and control equipment shall be reviewed by the Architect, in addition to other required approvals. Fire alarm system shall pass State of California Regulation 4 test administered by the Owner.

B. Certification: Installation of fire alarm system shall not start until Shop Drawings, including State Fire Marshal listing numbers of fire alarm components, are submitted and reviewed by the Architect. Written certification by fire alarm equipment distributor or manufacturer shall be submitted to the Architect stating the system and its component parts

are as approved and listed by the State Fire Marshal, and that the design conforms to requirements set forth in the CBC.

C. Equipment and services described in this section represent those supplied and supported by the Notifier Co., unless noted otherwise.

1.05 PERFORMANCE

A. System shall be fully programmable, configurable, and expandable in the field without need for special tools or electronic equipment. Programs shall be non-volatile memory.

B. Fire alarm equipment shall be the products of the Notifier Company, or equal. Catalog and model numbers listed are intended to establish type and quality of equipment and system design as well as operating features required. Deviations from intended functions of system specified are not permitted. Equipment shall not be ordered or installed until such equipment has been reviewed by the Architect.

C. Basic Performance:

1. The connection between network control panels shall be Arcnet-based or other recognized network communication scheme and shall be wired in a Class B, Style 4 fashion.

2. Alarm and trouble signals from the FACP, and NLCD network nodes shall be digitally encoded by listed electronic devices onto NFPA Style 6 looped multiplex communication system.

3. Alarm, trouble, and supervisory signals from intelligent reporting devices shall be encoded onto NFPA Style 4 (Class B) signaling line circuits (SLC).

4. Initiation device circuits (IDCs) shall be wired NFPA Style B (Class B).

5. Notification appliance circuits (NACs) shall be wired Class B (NFPA Style Y).

6. Power for initiating devices and notification appliances shall be from the main FACP, the transponder to which they are connected, or to a field charging power supply (FCPS).

7. A single ground or open on any system signaling line circuit, initiating device circuit, or notification appliance circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.

8. Alarm signals arriving at the main FACP shall not be lost following a power failure/outage until the alarm signal is processed and recorded.

9. Digitized electronic signals shall employ check digits or multiple polling.

10. Transponder devices are to consist of low current, solid-state integrated circuits, and shall be powered locally from a primary power and standby power source.

D. Network: Nodes may be intelligent FACP or intelligent NLCD annunciators (INA). Network shall be capable of expansion to at least 103 nodes. Network node address points shall be capable of processing a minimum of 1,980 analog addressable points. Network node addresses shall be software assignable at nodes. Systems which utilize a fixed network addressing scheme are not permitted. There shall be no limit to the types, mix, physical location, or quantity of node types below the overall limit of the network node capacity. In addition, Network nodes shall act as signal repeaters to reshape and regenerate the network signal.

1.06 SYSTEM FUNCTIONAL OPERATION

A. When a fire alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall occur:

1. FACP alarm LED on the FACP shall flash.

2. Local piezo-electronics signal in the FACP control panel shall sound.

3. The 80-character LCD display on the local FACP node and on the network displays shall indicate information associated with the fire alarm condition, including the type of alarm point, and its location within the protected premises. This information shall also be displayed on the network reporting terminal.

4. Printing and history storage equipment shall log the information associated with the FACP condition, along with the time and date of occurrence.

5. System output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system output (alarm notification appliances and relays) shall be activated on either local outputs or points located on other network nodes.

B. When a supervisory condition is detected and reported by one of the system initiating devices or appliances, the following functions shall occur:

1. FACP supervisory LED on the FACP shall flash.

2. Local piezo-electric signal in the FACP control panel shall sound.

3. The 80-character LCD display on the local FACP node and on the network displays shall indicate information associated with the condition, including the type of point, and its location within the protected premises. This information shall also be displayed on the network reporting terminal.

4. Printing and history storage equipment shall log the information associated with the FACP condition, along with the time and date of occurrence.

5. System output programs assigned via control-by-event interlock programming to be activated by the particular point shall be executed, and the associated system outputs such as alarm notification appliances and relays shall be activated on either local outputs or points located on other network nodes.

6. Remaining signaling devices at the Project site such as program bells, horns, or tones over PA systems, either manual or automatic, shall be rendered inoperable, however voice audio PA functions shall remain fully operational.

C. When a trouble condition is detected and reported by one of the system initiating devices or appliances, the following functions shall occur:

1. FACP trouble LED on the FACP shall flash.

2. Local piezo-electric signal in the FACP control panel shall sound.

3. The 80-character LCD display on the local FACP node and on the network displays shall indicate information associated with the condition, including the type of point, and its location within the protected premises. This information shall also be displayed on the network reporting terminal.

4. Printing and history storage equipment shall log the information associated with the FACP condition, along with the time and date of occurrence.

5. System output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system output (alarm notification appliances and/or relays) shall be activated on either local outputs or points located on other network nodes.

D. Network Communication:

1. Network architecture shall be based on a local area network (LAN), a firmware package which provides a peer-to-peer, inherently regenerative communication format and protocol. Protocol shall be based on Arcnet, or equal. Network shall utilize a deterministic token-passing method. Collision detection and recovery type protocols are not permitted. In addition, there shall be no master polling computer, central file computer, display controller or other central element in the network which, on failure, may cause complete loss of network communications or cause major degradation of network capability. There shall be no cascading of central processing units (CPUs) or master-slave relationships at the network level to facilitate network communications. Failure of any node shall not cause failure or communication degradation of any other node of change the network communication protocol among surviving nodes located within distance limitations. Nodes/panels shall communicate on the network at a baud rate of not less than 312 KBPS.

2. Network node addresses shall be capable of storing cooperative control-by-event (CCBE) equations. CCBE shall be provided to activate outputs on one network node from inputs on other network nodes. CCBE equations shall support the following minimum boolean operators: AND, OR and NOT.

1.07 POWER REQUIREMENTS

A. Control panels shall receive 120 VAC power, 60 Hz, 20A via dedicated circuits.

B. System shall be provided with sufficient battery capacity to operate entire system upon loss of normal 120 VAC power, in a normal supervisory mode, for a period of 24 hours with 5 minutes of alarm indication at end of this period. System shall automatically transfer to standby batteries upon power failure. Battery charging and recharging operations shall be automatic. Batteries, once discharged, shall recharge at a rate to provide a minimum of 70 percent capacity in 12 hours.

C. Circuits requiring system operating power shall be 24 VDC and shall be individually fused at control panel.

1.08 SUBMITTALS

A. Provide in accordance with Division 01.

B. Component Plan Submittal: Include the following information and details as applicable:

1. Installer name, address, telephone number.

2. List of system components, equipment and devices, including manufacturer model numbers and California State Fire Marshal listing numbers.

3. Copies of manufacturer specification sheets for equipment and devices indicated.

4. Voltage Drop Calculations: Include the following information for the worst case:

a. Point-to-point or Ohms law calculations.

b. Zone used in calculations.

c. Voltage drop percent. Voltage drop shall not exceed manufacture requirements. If voltage drop exceeds 10 percent, indicate manufacturer listed operating voltage ranges for equipment and devices.

5. Battery types, amp hours and load calculations, including the following information:

a. Normal operation: 100 percent of applicable devices for 24 hours to equal control panel amps plus list of amps per device which draw power form the

panel during standby power condition including but not limited to zone modules, detectors, and other devices as identified.

b. Alarm condition: 100 percent of applicable devices for 5 minutes to equal control panel amps plus list of amps per device which draw power from panel during alarm condition including, but not limited to, the following:

(1) Zone modules.

(2) Signal modules.

(3) Detectors.

(4) Signal devices.

(5) Annunciators.

(6) Other devices as identified.

c. Normal operation plus alarm operation load calculation shall include total amp hours required and total amp hours provided.

6. Provide one copy of testing procedures.

C. Shop Drawings: Provide Shop Drawings, in the same size of the Drawings, prepared, signed, and sealed by a electrical engineer licensed in the State of California. Shop Drawings shall include the following:

1. Provide, drawn to scale, elevations of all system enclosures, and actual layout of the Fire Alarm Control Panel.

2. One line drawing for the entire system network indicating panel to panel conductors including gauge, quantity and specific function.

3. System panel one-line drawings indicating the quantity of conductors exiting the enclosure for the purpose of initiating, notification, or other command control functions required for complete system operation:

a. Individual floor/building plan view drawings indicating all device locations in accordance with the legend provided.

b. Individual point addresses for all addressable field devices.

c. Device “typical” wiring diagrams. These drawings shall indicate specific termination details for all peripheral equipment and/or interface devices.

4. Provide interfacing with equipment furnished by others including voltages, and other required coordination items.

5. Each of the pictorial diagrams included shall appear identical to the products they are intended to depict, in order to speed installation of the system, and to enhance the accuracy of the installation Work. Typical wiring diagrams or catalog sheets are not permitted.

6. Background Drawings may be obtained from the Architect in electronic version. Shop Drawings shall be prepared in the latest version of AutoCad with 3 – CD ROM electronic copies submitted along with full sized Shop Drawings.

7. Other installation and coordination drawings specifically related to this section shall be included as follows:

   a. Size A (8-1/2 inch x 11 inch) and size B (11 inch x 17 inch) shall be bound into the manual.

   b. Larger drawings shall be folded and inserted into transparent envelopes and bound into the manual.

8. Installation and coordination drawings for items in other sections shall be included with submittal of Shop Drawings. Submit blue line copies and one reproducible copy of installation and coordination drawings.

9. Samples: Provide Samples of material and equipment as required by the Architect. If Samples are requested, they shall be submitted within 10 days from date of request.

D. In addition to above requirements, provide submittals to meet any additional requirements of DSA.

1.09 QUALITY ASSURANCE

A. Installer shall have successfully completed at least 5 projects of equal scope in the past 5 years, and have been in business of furnishing and installing fire alarm systems of this type for at least 5 years.

B. Installer shall be a factory authorized distributor and service provider for the brand of equipment offered and shall provide documentation to the Architect upon request.

C. Installer shall maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of major parts for the system at all times.

D. Furnish a letter from manufacturer of equipment certifying equipment has been installed according to factory standards and that system is operating properly.

E. Certifications: Submit certification from the major equipment manufacturer indicating that the installer is an authorized representative of the major equipment manufacturer and is trained on network applications.

F. Electrical materials and equipment installed shall be of new manufacture.

G. Material and equipment shall pass a State of California Regulation 4 test administered by Owner personnel.

H. System start-up and testing shall be performed under the direct observation of the electrical engineer responsible for the preparation of the Shop Drawings.

1.10 WARRANTY

A. Manufacturer shall provide a 5 year material warranty. Installer shall provide a 5 year labor warranty.

B. Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the equipment for a period of 5 years after expiration of the manufacturer's warranty.

1.11 MAINTENANCE PERIOD

A. Maintenance Service: Provide, as part of the Work of this section, a 12 month maintenance service period commencing from the date of Substantial Completion.

B. Maintenance and testing shall be as required by the local authority having jurisdiction. A preventive maintenance schedule shall be provided, describing the plan for preventive maintenance of devices and subassemblies requiring regular maintenance. The schedule shall include:

1. Systematic examination, adjustment and cleaning of detectors, manual fire alarm stations, control panels, power supplies, relays water flow switches and accessories of the fire alarm system.

2. Circuits in the fire alarm network shall be tested semiannually.

3. System shall be tested in accordance with the requirements of NFPA 72, Chapter 7.

PART 2 - PRODUCTS

2.01 FACP AND FCC

A. Network FACP shall be furnished with a microprocessor-based CPUs. FACP shall communicate with and control intelligent detectors, addressable modules, transponders, annunciators, and other system controlled devices. FACPs on the network shall perform the following functions:

1. Supervise and monitor intelligent/addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.

2. Supervise initiating signaling and notification circuits throughout the facility by way of connection to transponders.

3. Detect the activation of initiating devices and the location of the alarm condition. Operate notification appliances and auxiliary devices as programmed.

4. Visually and audibly annunciate trouble, supervisory or alarm conditions, on operator terminals, panel displays, and annunciators.

B. General FACP Operation:

1. FACP nodes shall provide full-featured operator interface controls and annunciation panels, which shall include backlit LCDs, individual, color-coded system status LEDs, and an alphanumeric keypad for field programming and control of the node.

2. Programming or editing of existing programming in the system shall be furnished without special equipment or interrupting the alarm monitoring functions of the FACP.

3. FACP nodes shall provide the following:

a. Block acknowledge for trouble conditions.

b. Rate charger control.

c. Control-by-time (delay, pulse, time-of-day, etc.).

d. Automatic day/night sensitivity adjustment (high/low).

e. Device blink control (turn of detector LED strobe).

f. Environmental drift compensation (selectable ON or OFF).

g. Smoke detector pre-alarm indication at control panel.

h. NFPA 72 smoke detector sensitivity test.

i. System status reports.

j. Alarm verification, by device, with tally.

k. Multiple printer interface.

l. Multiple CRT display interface.

m. Non-fire alarm module reporting.

n. Automatic NFPA 72 detector test.

o. Programmable trouble reminder.

p. Upload/download system database to PC computer.

q. One-man walk test.

r. Smoke detector maintenance alert.

s. Security monitor points.

t. Alphanumeric pager interface.

u. On-line or off-line programming.

C. FACP CPU:

1. FACP network nodes shall include CPUs, which shall communicate with, monitor, and control other modules within control panels. Removal, dis-connecting, or failure of any control panel module shall be detected and reported to the system display by the CPU.

2. CPUs shall contain and execute control-by-event interlocks for specific local and network action to be taken if an alarm condition is detected by the system. Control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost even if system primary and secondary power failure occurs.

3. CPUs shall provide real-time clocks for time annotation of system displays. Time-of-day and date shall not be lost if system primary and secondary power supplies fail.

D. Loop Interface Boards (LIBs):

1. LIBs shall be provided to monitor and control the signaling line circuit (SLC) loops in netWork nodes. The LIB shall contain its own microprocessor and shall be capable of operating in local mode in the case of a failure in the main CPU of the control panel. In local mode, the LIB shall detect alarms and activate output devices on its own SLC loop.

2. LIBs shall not require jumper cuts or address switch settings to initialize SLC loop operations.

3. LIBs shall provide power to, and communicate with, intelligent detectors and addressable modules connected to its SLC loop over a single pair of wires. This SLC loop shall be capable of operation as NFPA Style 4, Style 6, or Style 7.

4. LIBs shall be able to drive 2 Style 4 SLC loops, each up to 10,000 feet in length, for an effective loop span of 20, 000 feet.

5. LIBs shall receive analog information from intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular detector. LIB software shall include software to automatically adjust and compensate for dust accumulation to maintain detector performance as it is affected by environmental factors. The analog information may also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

6. LIBs shall communicate with intelligent addressable detectors and addressable modules on its SLC loop and verify proper device function and status. Communication with up to 198 intelligent devices shall be performed every 6 seconds or less.

E. Serial Interface Boards (SIBs):

1. SIBs shall provide EIA-232 interfaces between local FACP nodes and UL listed electronic data processing (EDP) peripherals.

2. SIBs shall allow connection of multiple printers, CRT monitors, and other peripherals connected to EIA-232 ports.

3. SIBs shall provide one EIA-485 port for serial connections of optional annunciators and control subsystem components.

4. SIBs shall include LEDs indicating that it is in regular communication with the annunciators and EIA-485 connected peripheral devices.

5. EIA-232 circuits shall be optically isolated and power limited.

F. FACP nodes shall be designed to permit continued local operation of remote transponders under both normal and abnormal network communication loop conditions. This shall be provided by transponders operating as local control panels upon loss of network communication.

G. FACP nodes shall be modular in construction to allow ease of servicing. CPUs and transponders shall be capable of being programmed on the Project site without the use of external programming equipment. Systems requiring external programmers or change of EPROM’s are not permitted.

H. CPUs and associated equipment shall be protected so that they will not be affected by voltage surges or line transients including RFI and EMI.

I. Transponders and peripheral devices connected to FACP node CPUs shall be continuously scanned for proper operation. Data transmission between network nodes, FACP CPUs, transponders and peripheral devices shall be reliable and error-free. The transmission

scheme provided shall employ dual transmission or other equivalent error checking techniques. Failure of a transponder of peripheral device to respond to an interrogation shall be annunciated as a trouble condition.

J. FACP Power Supplies:

1. Main power supplies shall operate on 120 VAC, 5/60Hz, and shall provide necessary power for the FACP.

2. Main supplies shall provide 3.0 amps of notification appliance power by using switching 24 VDC regulators.

3. Main power supply shall be expandable for additional notification appliance power in 3.0 ampere steps.

4. Main power supply shall provide a battery charger for 24 hours of standby with dual rate charging techniques for fast battery recharge. It shall charge 55 amp hour batteries within an 8-hour period.

5. Supply shall provide very low-frequency sweep earth detect circuits capable of detecting earth faults.

6. It shall provide meters to indicate battery voltage and charging current.

7. Main power supply shall be power-limited per 1995 UL 864 requirements.

K. FCPS: The FCPS shall be designed for installation as either a remote 24 volt power supply or to power notification appliances and shall contain the following features:

1. The FCPS shall furnish up to 6.0 amps (4.0 amps continuous) of regulated 24 volt power. It shall be furnished with an integral charger designed to charge 7.0 amp hour batteries and to support 60 hour standby.

2. FCPS shall have 2 input triggers. The input trigger shall be a notification appliance circuit (from the FACP) or a relay. Provide 4 outputs (2 Style Y or Z and 2 style Y) for connection to notification devices.

3. The FCPS shall be furnished with a surface-mounted black box.

4. The FCPS shall provide the ability to delay the AC fail delay in accordance with 1993 NFPA requirements.

5. The FCPS shall provide power limited circuitry, in accordance with 1995 UL standards.

L. System Circuit Supervision:

1. FACP nodes shall supervise circuits to intelligent devices, transponders, annunciators, and peripheral equipment and annunciate loss of communications with these devices. The FACP CPU shall continuously scan the above devices for proper system operation and, upon loss of response from a device, shall sound audible trouble information, and transmit to the printer.

2. Sprinkler system valves, standpipe control valves, PIV and main gate valves shall be supervised for off-normal position.

3. Transponders that lose communication with FACP CPUs shall sound audible trouble and light an LED indicating loss of communications.

4. Transponder Circuit Supervision: Transponders shall be designed to continuously scan initiating and notification circuits. With normal communications between FACPs and transponders, the transponders shall transmit initiating and notification circuit trouble conditions to the FACP for audible annunciation and printout. With or without communication with the FACP node, the transponders shall supervise their circuits and annunciate initiating circuits and notification circuit failures on LEDs located in transponders.

M. Field Programming:

1. The system shall be programmable, configurable, and expandable in the field without the need for special tools or electronics equipment and shall not require field replacement of electronic integrated circuits.

2. Local FACP node programming shall be provided through FACP keyboards.

3. Field-defined programs shall be stored in non-volatile memory.

4. The programming function shall be furnished with a password that may be defined specifically for the system when installed. Provide 2 levels of password protection in addition to a key-lock cabinet. One password level shall be furnished for status level changes such as zone disable or manual on/off commands; a second higher level shall be provided for actual changes to program information.

N. Specific System Operations:

1. Smoke Detector Sensitivity: Means shall be provided for adjusting the sensitivity of intelligent detectors in FACP nodes from system keypads. Sensitivity range shall be within permitted UL limits.

2. Alarm Verification: Intelligent addressable detectors in the system may be independently selected and enabled for alarm verification. FACPs shall record the number of times detectors have entered the verification cycle. Counters may be displayed and reset by proper operator commands.

3. System Point Operations:

a. Devices in FACP nodes may be enabled or disabled through local keypads or video terminals.

b. FACP node output points may be turned on or off from local system keypads or the video terminals.

4. Point Read: FACP nodes shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Points shall be annunciated for the parameters listed:

a. Device status.

b. Device type.

c. Custom device label.

d. Software zone label.

e. Device zone assignments.

f. Detector analog value.

g. Program parameters.

5. System Status Reports: Upon command from a password-authorized operator of the system, a status report shall be generated and printed, listing local FACP system status.

6. System History Recording and Reporting: FACP nodes shall contain a history buffer capable of storing a minimum of 400 system events. Local activation shall be stored and time and date stamped with the actual time of the activation until operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed, one event at a time, and the actual number of activations may also be displayed and/or printed.

7. Automatic Detector Maintenance Alert: FACP nodes shall automatically interrogate intelligent system detectors and shall analyze the detector responses over a period of time.

8. If an intelligent detector in the system responds with a reading either below or above normal limits, then the system shall enter the trouble mode. The particular intelligent detector shall be annunciated on the system display, network display and printed on the system printer. This feature shall not inhibit the receipt of alarm conditions in the system, nor shall it require special hardware, tools, or computer expertise to perform.

O. FACPs:

1. Main control panel shall be Notifier Type AM2020, or equal, (C.S.F.M. 7165-028:141), furnished complete with features and components required to comply with the Specifications and Drawings.

2. Sub-control panels shall be Notifier Type AFP 400, or equal, (C.S.F.M. 7165-028:181) furnished complete with features and components required to comply with the Specifications and Drawings.

P. INAs:

1. An INA shall be provided to display system intelligent points. The INA shall be capable of displaying information for 200,00 possible points on the network. Network display devices, which are only capable of displaying a subset of network points, are not permitted.

2. The INA shall be furnished with a minimum of 80 characters, backlit by a long life, solid state LCD display. The network display shall install in any of the network node FACPs, contained within a black box designed for this purpose. The network shall support over 103 network display annunciation's, not to exceed total node capacity, and shall connect to the network over either a wire or fiber interface.

3. The INA shall be furnished with a history buffer capable of storing a minimum of 400 events in nonvolatile memory.

4. The INA shall be furnished with 2 optically isolated, 2400 baud, industry standard EIA-232 ports for UL 864 listed printers and CRTs. These peripheral devices shall print or display network activity.

5. The INA shall be furnished with 5 control switches for system wide control of signal silence, reset, activate signals (drill), and lamp test (local). Provide a means, such as a key, by which the control switches are locked out.

6. The INA shall be furnished with long-life LEDs to display power, fire alarm, security alarm, system trouble, supervisory, signals silenced, and CPU failure.

7. The INA shall be furnished with 2 software assignable passwords, up to 5 digits in length.

8. For time keeping purposes, the INA shall be furnished with a time-of-day clock.

9. The INA shall provide the ability to interface to Motorola Alert Central paging system. With this option, the INA shall have the ability to transmit network events to Alert Central. Alert Central can then transmit the complete INA 80-character message to select pocket pagers.

10. INAs shall support up to 32 additional 80-character remote display annunciators for displaying network activity. These terminal mode displays will mimic the activity appearing on the corresponding INA.

11. The INA shall be Notifier Model INA, or equal. (C.S.F.M. 7165-0028:141)

Q. Network adapter modules shall be Notifier Model NAM-232, or equal, (C.S.F.M. 7165-0028:164) and shall be provided to interface the AFP-400 FACPs and the noti-fire-net.

R. Furnish with FACPs a universal zone coder, Notifier Model UZC-256, or equal, (C.S.F.M. 7165-0028:141), to enable panels to provide California Uniform Code.

S. Power supplies shall be Notifier FCPS-24, or equal. (C.S.F.M. 7315-028:178) Units shall be furnished with main printed circuit board (PCB), transformers, lockable cabinet, and batteries. Furnished unit shall be configured to drive 4 notification appliance circuits.

2.02 PERIPHERAL DEVICES

A. Manual Stations:

1. Interior Use: Station shall be Notifier Model BNG-1TS, or equal, addressable semi-flush, non-breakable glass type. Station housing shall be constructed of durable die-cast aluminum with reset lock and key. (C.S.F.M. 7150-028:003) Provide addressable zone monitor for each station Model FMM-101. (C.S.F.M. 7300-0028:202) Provide protective cover, Notifier Model STI Stopper II for either flush or surface mount, as required. Unit shall be furnished with horn.

2. Exterior Use: Station shall be a Notifier Model BG-1-2W, or equal, single action, breakglass-type, non-coded, die-cast aluminum housing fitted with a pull-out lever which, when operated, can not be reset without a key after activating an alarm initiating contact. Provide suitable gasket and box for weatherproof application. (C.S.F.M. 7150-028:003) Provide addressable zone monitor for each exterior manual station. (C.S.F.M. 7165-028:141) Provide protective cover Notifier Model STI Weather Stopper II for either flush or surface mounting, as required.

B. Smoke Detectors: Furnish and install where indicated on Drawings, Notifier Model IPX-751 smoke detectors, or equal. (C.S.F.M. 7258-0028:186) Provide addressable base Model B710LP. (C.S.F.M. 7300-028:173) Detectors shall be micro-processor based using a combination of photoelectric, ionization, and thermal sensing technologies.

C. Automatic Heat Detectors: Provide combination rate-of-rise and fixed-temperature type. When fixed-temperature portion is activated, units shall be non-restorable and provide visual evidence of such operation (LED). Heat detectors shall be Notifier Model FST-751R, or equal. (C.S.F.M. 7270-0028:196) Provide addressable base Model B501bh. (C.S.F.M. 7300-028:147) When located above ceiling, it shall be clearly labeled below ceiling. Detectors shall be easily accessible.

D. Duct Smoke Detectors: Provide Notifier Model FSP-75RP, or equal. (C.S.F.M. 3240-0028:205) Shall be of solid-state photoelectric type and shall operate on light-scattering photodiode principle. Installation shall comply with NFPA 90 A. The location of the detector shall be clearly marked on ceiling and unit shall be easily accessible. Provide remote test stations for detectors, Notifier Model RTS 451KEY, or equal, located below ceiling.

E. Monitor Modules:

1. Monitor module shall be Notifier Model FMM-1, or equal, provided to connect a supervised zone of conventional initiating devices (N.O. dry contact devices, including 4-wire smoke detectors) to one of SLC loops. Monitor module shall install in a 4-inch square by 2-1/8 inch deep electrical box.

2. Monitor module shall provide address-setting means using rotary decimal switches and shall store an internal type of device. An LED shall be provided which shall flash under normal conditions indicating that monitor module is operational and in regular communication with control panel. (C.S.F.M. 7300-0028:202)

F. Control and Relay Modules:

1. Control module shall be Notifier Model CMX-2, or equal, provided to connect a conventional indicating appliance to one of SLC loops. Control module shall install in a standard 4-inch square by 2-1/8 inch deep electrical box. Control module may be wired as a dry contact (form C) relay. Power for relay coil shall be provided by SLC loop to reduce wiring connection requirements. Audio/visual power shall be provided by a separate loop from main control panel or from supervised remote power supplies.

2. Control module shall provide address-setting means by rotary decimal switches and shall store an internal identifying code by which control panel shall use to identify type of device. An LED shall be provided which shall flash under normal conditions, indicating that control module is operational and in regular communication with control panel. (C.S.F.M. 7300-028:166)

G. Isolator Modules:

1. Isolator module shall be Notifier Model ISO-X, or equal, provided to isolate wire-to-wire circuits on an SLC loop in order to limit number of other modules or detectors that are incapacitated by short circuit fault. If a wire-to-wire short occurs, isolator shall automatically open-circuit SLC loop. When short is corrected, isolators shall automatically reconnect isolated section of SLC loop.

2. Isolator module shall not require any address setting, although each isolator will electrically reduce capacity of loop by 2 detectors or module addresses. Isolator module shall install in a standard 4-inch deep electrical box. It shall provide a single LED, which shall flash to indicate isolator is operational and shall illuminate

steadily to indicate that a short has been detected and isolated. (C.S.F.M. 7165-028:141)

H. Horns: Alarm horns shall be System Sensor Model MA-12/24D, or equal, (C.S.F.M. 7135-1209:124), and shall be polarized and operated by 24 VDC. Horn assemblies shall be provided with separate wire lead for in/out wiring for legs of associated signal circuits. T-tapping of signal device conductors to signal circuit conductors are not permitted. Suitable gaskets shall be provided for weatherproof installation. Horns shall provide a minimum sound pressure level of 97 dB at 10 feet.

I. Horn/strobe shall be Gentex Model GEC-24-15, 30, 75, 110WR, or equal, wall-mounted. Sounder/strobe shall operate on 24 VDC polarized circuit and shall be provided with a semi-flush mounting plate. Entire unit shall be red finish. Strobe light shall be white Lexan with the word "FIRE" in red on 2 sides. Horn shall provide a minimum sound output of 100 dB at 10 feet. The strobe shall provide a minimum light intensity of 15,30,75 or 110 Candela as indicated on Drawings and meet or exceed requirements of ADA and UL 1971. (C.S.F.M. 7135-569:122)

J. Room mini-alert sounder shall be System Sensor Model PA400R, or equal, polarized, 24 VDC, red, and rated 90 dB at 10 feet. (C.S.F.M. 7135-1209:143)

K. Strobes indicating appliances shall be Gentex GES series, or equal, for 24 VDC system. These devices shall be UL listed and shall be wall-mounted. Lexan lens shall be red with the word "FIRE" imprinted in white and shall be rectangular to allow better visibility. Strobes shall be as follows:

1. GES 24-15 WR, 15 Candela. (C.S.F.M. 7185-569:123)

2. GES 24-30 WR, 30 Candela. (C.S.F.M. 7185-569:123)

3. GES 24-75 WR, 75 Candela. (C.S.F.M. 7185-569:123)

4. GES 24-110 WR, 110 Candela. (C.S.F.M. 7185-569:123)

5. Strobes shall meet ADA and UL 1971 requirements.

L. Strobe synchronization modules shall be Gentex Model AVS44, or equal, to be provided in conjunction with strobe located in same room or corridor or as indicated on Drawings. (C.S.F.M. 7320-569:121)

M. Door Holder/Release: Electromagnetic door holder/releases shall be installed on each door as indicated on Drawings or as required. Holder/release shall consist of a wall-mounted electromagnet and a door-mounted armature with an adjustable contact plate. Electromagnets shall provide a force of attraction of 35 pounds when energized and less than 3 pounds residual with power disconnected. Armature contact plates shall provide a horizontal adjustment of 25 degrees. The holding force of holder/release shall be totally electromagnetic and without the use of mechanical linkage or other moving parts. Holder/releases shall normally be energized; a release shall be accomplished by

interrupting the circuit. Door holder/release shall be Notifier FM series, or equal, 24 VDC. (C.S.F.M. 3550-0028:177)

N. Bells (For Fire Alarm): Bells shall be Notifier Model KMS-6-24, or equal, semi-flush mounting for indoors and Notifier Model KMS-10-24, or equal, with W/P black box WBB for outdoors. Bells shall be polarized and operated by 24 VDC. Bell assemblies shall provide separate wire leads for in/out wiring for legs of associated signal circuits. Bells shall be vibrating type providing a minimum sound pressure level output of 84 - 87 dB at 10 feet. Indoor bells shall be 6 inches in diameter and outdoor bells shall be 10 inches in diameter, finished with baked-on red enamel paint, and UL listed for fire alarm installation. Bells shall be suitable for surface or semi-flush mounting. (C.S.F.M. 7135-028:117) Bells for classroom/program change shall be same as above, except operated by 120 volts.

O. Waterflow Switches:

1. Waterflow switches shall be Potter Electric Model VSR-F, or equal. Vane-type waterflow switches shall be installed on system piping as designated on the Drawings or as required. Detectors shall install on clear pipe spans of appropriate nominal size, either vertical or horizontal runs, at least 6 inches from fittings or valves which may change water direction, flow rate or pipe diameter, or not closer than 24 inches to valves or drains. Detector shall respond to waterflow in specified direction after a preset time delay, which is field-adjustable. Actuation mechanism shall include a polyethylene vane inserted through a hole in the pipe and connected by a mechanical linkage to delay mechanism. Outputs shall consist of 10 A (dual SPDT switches/form-C contacts). A conduit entrance for standard conduit fittings shall be provided on detectors. Detectors shall be listed by UL for indoor or outdoor use. (C.S.F.M. 7770-0328:001)

2. Sprinkler valve tamper switches shall be System Sensor Model OSY2, or equal. Supervisory switch shall be installed on each valve as designated on Drawings or as required. Switches shall be installed to not interfere with normal valve operation and shall be adjusted to operate within two revolutions of valve control or when stem has moved no more than 1/5 of distance from its normal position. Mechanism shall be housed in a weatherproof die cast metal enclosure, also providing a 3/4 inch tapped conduit entrance to incorporate necessary facilities for attachment to valve. Switch mechanism shall be furnished with a minimum rated capacity of 10 amps at 125 VAC and 2.5 amps at 24 VAC. Entire installed assembly shall be tamper-resistant. Tamper switches shall be UL listed. (C.S.F.M. 7770-1209:149)

P. FCCs shall be digital type, UL and Fire Marshal listed for fire reporting to a central station, Silent Knight Model 5104, or equal. It shall provide power and necessary components for 4 supervised detection circuits (1 class A, 3 class B). It shall be furnished with a charger and battery (12V, 7 AH) which will provide 24-hour standby power. (C.S.F.M. 7165-599:114)

1. Control/communicator shall be furnished with the capability to supervise 2 telephone lines, seize telephone line, and send alarm signal on one or both lines without the installation of additional equipment. It shall sound a local trouble signal

if telephone service is interrupted for longer than 45 seconds and shall transmit a signal indicating loss of telephone line. A signal shall also be transmitted indicating restoration of telephone service. Control/ communicator shall be able to report loss of either telephone without regard to which telephone line failed first. If both lines fail, a local signal shall sound.

2. Control/communicator shall be furnished with the ability to send a test signal to central station every 24 hours. Test signal shall be able to be transmitted at a specific time of day or night, by setting a program within panel.

3. Alarm signals transmitted to central station shall indicate which of 4 zones is in alarm and which zones are in trouble. Restoration from alarm or trouble shall also be transmitted by zone. Control/communicator shall be capable of communicating to Silent Knight, Radionics, or Ademco central station receivers.

Q. Network Cables:

1. Indoor Applications: Network cable shall be West Penn D975, one pair 18 gage solid copper, shielded, copolene II insulated, PVC jacketed.

2. Outdoor and Underground Applications: Network cable shall be West Penn AQ 3245, 4-conductor, 16 gage stranded copper, shielded, water-blocked construction, PVC insulated.

PART 3 - EXECUTION

3.01 SYSTEM INSTALLATION

A. Install required conductors to devices indicated on Drawings. Provide required conductor terminations to devices for a complete system to function as specified and indicated on Drawings. Refer to Section 16120: Low-Voltage Wire 600 Volt AC, for wire type and wire color for each type of device.

B. Splices shall not be provided in junction boxes. Terminations shall be in terminal cabinets or on equipment terminals.

C. Conductors shall be installed within conduits, boxes, and terminal cabinets in a totally enclosed installation. Furnish and install conductors required to connect incoming and outgoing circuits, including spare conductors, to terminal strips within terminal cabinets.

D. Wiring within equipment and terminal cabinets shall be installed to conform to standard engineering practice, and shall be terminated on terminal blocks having a terminal for each required connection. Wiring shall be cabled, laced, and securely fastened in place so that no weight is imposed on equipment or terminals.

E. Install required terminal blocks within terminal cabinets. Terminal blocks shall be installed on inside back of cabinets only, not on side. Incoming wiring shall be terminated on the

left side of terminal blocks; outgoing wiring shall be terminated on the right side of terminal blocks.

F. Conductors shall be color-coded and tagged with code markers at terminal cabinets, junction boxes, pull boxes and equipment. A wire index shall be typed and installed on terminal cabinet doors. Index shall be covered with clear plastic adhesive covers. Wiring shall be identified as to building and location of devices in the index.

G. Wiring within equipment and terminal cabinets shall be carefully strapped, and shall be formed in rectangular configuration. Wires shall be properly numbered in numerical order and shall maintain same number throughout the Project site.

H. Complete installation shall comply with local building codes and applicable provisions of the California Electrical Code.

I. Location of outlet boxes and equipment on Drawings is approximate, unless dimensions are indicated. Do not scale Drawings to determine location and routing of conduits and outlet boxes. Location of outlet boxes and equipment shall conform to architectural features of the building and other Work already in place, and shall be ascertained in the field before the start of Work.

J. Drawings generally indicate Work to be provided, but do not indicate bends, transitions or special fittings required to clear beams, girders or other Work already in place. Investigate conditions where conduits are to be installed, and furnish required fittings.

K. System shall be installed in accordance in accordance with local building codes and applicable provisions of the California Electrical Code.

3.02 SYSTEM OPERATION

A. Unless otherwise specified, actuation of manual stations, smoke detectors, heat detectors or waterflow switches shall cause the following operations to occur:

1. Activate audible circuits.

2. Actuate strobe units until the panel is reset.

3. Release magnetic door holders to doors to adjacent zones on the floor from which the alarm was initiated.

4. Where required, return elevators to the primary or alternate floor of egress.

5. Smoke detectors in elevator lobbies shall, in addition to the above functions, return elevators to the primary or alternate floor of egress.

6. Smoke detectors in elevator machine rooms or tops of hoistways shall return elevators to the primary or alternate floor. Smoke detectors or heat detectors

installed to shut down elevator power shall perform this function in accordance with ANSI A 17.1 requirements and shall be coordinated.

7. Duct type smoke detectors shall, in addition to the above functions, shut down the ventilation system or close associated control dampers as required.

8. Activation of sprinkler system low-pressure switches or valve tamper switches shall initiate a system supervisory alarm indication.

B. Alarm signals will only be transmitted to central station when fire alarm is initiated by a sprinkler flow switch, by activating, via a normally open contact in FACP, one of following:

1. School intrusion alarm system automatic dialer.

2. FCC, installed under this section, in existing schools where there is no existing or planned intrusion alarm system automatic dialer.

3.03 TESTING

A. A 24 hour advance notice shall be provided to the IOR before final testing.

B. Testing of fire detection system shall be as required by the State Fire Marshal and local authorities having jurisdiction. Installer is responsible for providing required testing, coordination, scheduling, and conducting tests before Substantial Completion. Provide all temporary equipment, software, and power necessary for the testing. Tests shall include following:

1. Operation of signal-initiating devices (smoke detectors, heat detectors and pull stations).

2. Operation of indicating devices (alarm horn and alarm lamp).

3. Operation of system features under normal operation.

4. Operation of supervisory features.

5. Operation of system features on standby power, with primary power off.

6. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.

7. Close sprinkler system flow valves and verify proper supervisory alarm at the FACP.

8. Verify activation of flow switches.

9. Open initiating device circuits and verify that trouble signal actuates.

10. Open signaling line circuits and verify that trouble signal actuates.

11. Open and short notification appliance circuits and verify that trouble signal actuates.

12. Open and short (wire only) network communications and verify that trouble signals are received at network annunciators or reporting terminals.

13. Ground initiating device circuits and verify response of trouble signals.

14. Ground signaling line circuit and verify response of trouble signals.

15. Ground notification appliance circuits and verify response of trouble signals.

16. Check alert tone to alarm notification devices.

17. Check installation, supervision, and operation of intelligent smoke detectors using walk test.

18. Alarm conditions that the system is required to detect shall be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.

19. When the system is equipped with optional features, consult the manufacturer manual to determine proper testing procedures.

C. Upon completion of installation of fire alarm equipment, provide to the IOR a signed, written statement confirming that fire alarm equipment was installed in accordance with the Specifications, Shop Drawings, instructions and directions provided by the manufacturer.

D. Demonstrate in presence of the IOR that circuit and wiring tests are free of shorts and grounds and that installation performs as specified herein and within manufacturer specifications.

E. Software Modifications:

1. If required, provide the services of a factory trained and authorized technician to perform system software modification, upgrades or changes. Response time of the technician to the Project site shall not exceed 24 hours.

2. If required, provide hardware, software, programming tools, and documentation necessary to modify the fire alarm network on the Project site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modification on-site.

Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being provided.

F. Complete the inspection and testing form, as required by NFPA 72 Chapter 7, and submit one copy of the completed form to the Architect and IOR.

G. Fire alarm system shall pass a State of California Regulation 4 test administered by Owner personnel.

3.04 OPERATING/SERVICE MANUALS

A. Submit 5 copies of operating/service manuals including the following:

1. Detailed explanation of the operation of the system.

2. Instructions for routine maintenance.

3. Detailed instructions for repair of major system components.

4. Pictorial parts list and part numbers.

5. Pictorial and schematic drawings of wiring systems, including operating and safety control panels, annunciators, and major components.

6. Installation instructions for system components.

7. Programming instructions.

8. Program listing.

9. Final test report.

10. A single reproducible set of record drawings reflecting the system exactly as it was installed including exact location of components.

11. Provide codes and passwords for fire alarm system at time of Regulation 4 testing.

3.05 SPARE PARTS

A. The following new spare parts shall be furnished in unopened boxes:

1. 10 percent spare pull stations of each type (minimum one spare pull station of each type).

2. 10 percent spare smoke and heat detectors of each type (minimum one spare smoke and heat detector of each type).

3. 10 percent spare audible devices of each type (minimum one spare audible device of each type).

4. 10 percent spare strobe devices of each type (minimum one spare strobe device of each type).

3.06 INSTRUCTION PERIODS

A. Before Substantial Completion, provide 2 instruction periods, one for Project site Owner operators and systems users, and one for Owner maintenance personnel. As a minimum, the following shall be provided:

1. Provide a minimum of one 4-hour Project site instruction period for Owner operators, including a complete set of written operation instructions, which shall remain on the Project site.

2. Provide a minimum of one 8-hour Project site instruction period for Owner maintenance personnel, consisting of a Project site walk-through indicating all device locations and demonstrating all system functions.

3. All instruction periods shall be scheduled and coordinated through the IOR.

3.07 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.08 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

END OF SPECIFICATIONS