

PROJECT MANUAL  
RE-CONSTRUCTION of  
**STANLEY G. OSWALT ACADEMY**

19501 Shadow Oak Drive  
Walnut, California

for

**ROWLAND UNIFIED SCHOOL DISTRICT**

1830 S. Nogales Street  
Rowland Heights, California 91748



January 14, 2020

Prepared By

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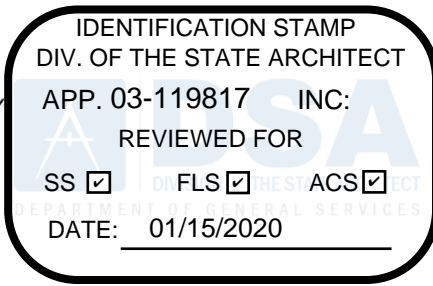
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RE-CONSTRUCTION of  
STANLEY G. OSWALT ACADEMY



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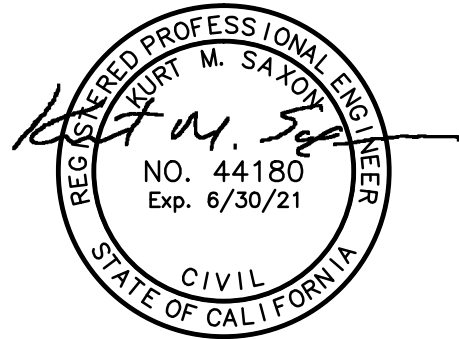
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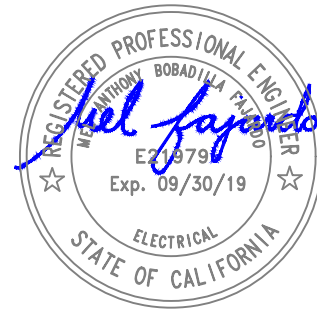
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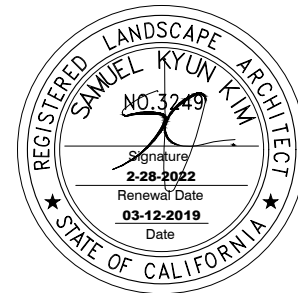
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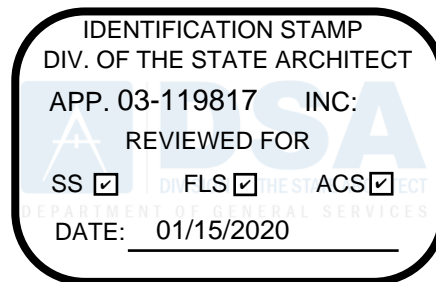




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SECTION 01010  
SUMMARY OF WORK

1.1 GENERAL

- A. Project Description: The Project consists of RECONSTRUCTION OF THE 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.
- B. Description of Improvements: The Work consists of 5-Construction Phases including selective demolition, site utilities & grading, landscape, irrigation, hardscape, construction of Administration/Library Building, Multi-purpose & Kitchen Building/Lunch Shelter, Kindergarten Building, East Classroom Building, and West Classroom Building, plumbing and mechanical systems, electrical lighting and power systems along with signal/communication systems 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. Overall Project Budget: The District's Budget is approximately \$ 35,000,000 for construction.
- D. Cash Allowance: The Contractor shall include in his bid a cash allowance in the amount specified in the Supplementary General Conditions, Article 75, to be used to pay for extra work, approved in accordance with Article 59, Changes and Extra Work. Any unused portions of the Cash Allowance remaining at the end of the project will be deducted from the final construction cost and credited back to Owner in the form of a Deductive Change Order (reducing the total Contract Price by that amount).
- 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 phasing and 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.

- 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 must conform as prescribed in the Information for Bidders and Contract documents to the requirements related to meeting this participation goal.
- Q. Hazard Material Abatement: The Project includes complete hazardous material abatement services by the District's Contractor. The District's Contractor is responsible for removing and legally disposing of all hazardous materials in accordance with the rules and regulations of all applicable Federal, State and local regulatory bodies so as to protect workers, building occupants and the environment. Refer to the Abatement Specifications prepared directly for the District CF Environmental and AAA Lead Consultants. This is provided for information only. The project Architect and its engineering team did not prepare and are not responsible for the hazardous materials abatement contract documents and abatement.
1. The specified insurance coverages for the designated hazardous material removal contractor will list the School District, Project Architect and all consulting engineers, Project Construction Manager and Prime Contractor (if applicable) as additional insurance for all abatement procedures.
- R. 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.

- S. 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.
- T. 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. Refrigerators.

## 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. SAMPLE Alternate No. 1: In lieu of standard galvanized chain link fencing under specification section 02830 provide vinyl covered chain link fencing under specification section 02831.

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 unwieldy 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 lower 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 14 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 the column lines established by the District, and shall 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 statutes, 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 Solid 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, 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. Welding: Conform to following requirements where welding is performed in or on existing facilities:
  - 1. Protection During Welding: Conform to Title 8, CCR. Further protect occupants and the public with portable solid vision barricades around locations where welding is performed plus signs warning against looking at welding without proper eye protection, or equivalent.
  - 2. Fire Extinguishers: Maintain a fully charged UL-labeled minimum 4A/60BC fire extinguisher at every location where welding is performed within or on the facilities.
  - 3. Welding Smoke Control: Verify locations of existing smoke detectors. Perform welding operations by methods that produce the minimum feasible smoke and fumes. Furnish portable type smoke collection and ventilating equipment as required to prevent smoke and fume nuisances. Notify Owner at least 48 hours in advance if temporary deactivation of any smoke detector is required to prevent false alarms from the welding operations. The Owner's personnel will deactivate detectors only for the time welding is actually in progress.
  - 4. Fire Prevention: Before welding, examine existing construction and backing for all combustible materials and finishes and for conditions where heat conduction in metals may bring adjoining materials to ignition temperature. Use positive fire prevention measures including temporary removal and reinstallation of combustible

materials, installation of temporary shields and/or heat sinks, and other necessary means. When actual field conditions are such that positive fire prevention measures cannot be achieved, notify Architect and do not proceed with the involved work until receipt of Architect's instructions.

- H. 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. Patching, Repairing and Finishing:
  1. Concrete: Dampen cut edges damp for 24 hours, then scrub with a neat Portland cement mortar just before new concrete is placed, epoxy adhesive may be used in lieu of cement mortar. Finish new concrete to match existing. Provide 3,000 psi concrete for repairs and slabs on grade. At cut concrete edges to remain exposed, apply adhesive and restore with minimum 3/4" thick cement mortar finished to match adjoining surfaces.

2. Openings to be Closed: Trim edges square and straight, and dampen and grout scrub or treat with an adhesive as specified above for cut concrete edges. Provide 3,000 psi concrete. Provide reinforcement as required to match existing concrete. Where installation of concrete is impracticable, fill openings with dry-packed non-shrink grout. Finish to match adjoining surfaces.
3. Metal Items: Grind cut edges to remain exposed smooth and rounded.
4. Connections of New and Existing Roofing: Remove surfacing from existing roof, a distance of not less than 36". Remove all loose or blistered felts and cut existing roofing to straight lines at location of sound bonded material. Apply two layers of felt (over sheathing paper if bare wood deck is exposed), extended out over existing roofing distances of 12" for the first layer and 24" for the second layer, each layer mopped solidly in hot bitumen. Install new roofing as specified over the two layers. Apply new surfacing of type to match existing, blended into existing at areas of joining.
5. Repair of Roofing at New Penetrations and Platforms: Wherever new penetrations are made through existing roofing and where new equipment bases or other items are installed on existing roofing, proceed as follow:
  - a. At penetrations, remove surfacing a distance of 24" from outside edge of penetration. Flash the penetration as specified for new flashings. Clean deck and apply 2 layers of felt over the new flashing and extended out over the existing roofing, the first 12" all around and the second 18" all around, each layer mopped solidly in hot asphalt. Apply coat of bitumen over the top layer and install new surfacing of type to match existing blended into existing.
  - b. At new equipment platforms or supports: Remove the surfacing from the area of the platforms or supports. Clean the surface of the roofing. Apply two layers of felt and flashing pans or supports as detailed and extend the additional layers as specified for connections of new and existing roofing. Apply coat of bitumen and surfacing around the equipment as specified for new roofing.
6. Patching Existing Roofing: Cut back to sound undamaged materials on straight lines and resecure cut edges. Apply new roofing materials in repair areas of same type and finish as existing roofing, connected to existing roofing with waterproof connections.
7. Metal Door Frames: Where new doors are scheduled to be installed in existing frames, remove the existing doors and measure the frames prior to fabrication of the new doors. Alter existing openings as required to accommodate new frames. Review existing hardware cutouts and reinforcing, and install new cutouts and reinforcing as required. Patch holes in frames which are not to be reused by fitting sections of plate into the frame, welding the plates to the frames and grinding smooth. Thoroughly clean the existing construction prior to installing the new work. If frames are damaged so as to preclude a satisfactory installation, remove the existing frames and provide new frames.



8. **Metal Windows:** Where new windows are scheduled to be installed, either in new frames or in existing frames, remove portions to be replaced and measure the resulting openings prior to fabrication of new windows. Fill unused openings for fasteners and hardware by fitting plates into the opening, welding the perimeter of the plate and grinding smooth. Provide new openings and blocking as required to accommodate new windows, fasteners and hardware. If frames are damaged so as to preclude a satisfactory installation, remove the existing frames and provide new frames. At existing openings provide all necessary blocking and alterations to accommodate new window frames. Cut and patch plaster for window installation as required to provide a waterproof finish.
9. **Glass:** Install new glass as specified in Division 8.
10. **Lath and Plaster:** Where old plaster is removed, provide new metal lath or gypsum lath and plaster as specified in Division 9. Where old plaster is left in place, new plaster shall be applied over the old in accordance with one of the following methods:
  - a. Apply 1" by 3" furring strips at 16" centers with 12 penny, 9 gage nails 3-1/4" long or of sufficient length to achieve 1-3/4" minimum penetration into framing. Apply gypsum lath and plaster as specified for new work.
  - b. Apply 3.4 pound self furring diamond mesh metal lath over old surface by nailing through into framing, using 2" long, 11 gage 7/16" head barbed shank galvanized roofing nails at 6" o.c. Wire tie side and end laps. Apply plaster in three coats, as specified for new work, except using wood fibered plaster for scratch coat.
  - c. Where patching of plaster over existing lath is feasible, renail all loose lath and install new lath to match to fill holes. Nail and renail at 6" centers. Where metal lath is used, lap new lath over existing 6" and tie at 6" centers. Restore paper backings as required, shingled in existing. Spray existing gypsum lath with water over a period of several hours to wet it thoroughly. Then apply a bonding coat to the cut edges of existing plaster and replaster as specified for new work. Cracking caused by failure to wet the lath properly will be considered defective work, and the lath and plaster shall be removed and replaced as specified above.
  - d. **Patching of Holes, Cracks and Gouges:** All existing holes, cracks, gouges, missing sections and other defects in existing work shall be patched. For holes over 1" in size, cut small sections of lath and place in opening, attached to existing material. Apply 3 coats of plaster. For holes 1" and smaller, apply bonding agent to existing surfaces and neatly fill hole with plaster, using several coats as necessary to fill to surface, eliminate cracks and match existing surface texture. Cracks, gouges and other defects shall be filled with plaster or spackle as applicable and neatly finished to match existing work.
11. **Gypsum Wallboard:**
  - a. **Small Holes,** such as those caused by doorknobs or removal of electrical boxes: Repair by patching. Patch shall be mechanically attached to the undamaged gypsum membrane surrounding the patch area, attachment by joint compound alone is not acceptable. Patch shall be cut from the same type and thickness as

gypsum board being repaired. Where two layers are patched, either layer of the existing surface shall be patched separately with the face layer patches larger than the base layer so that the joints do not align between layers. Cut the patch slightly larger than the hole, then cut away around the damaged area to make a hole the same size and shape as the patch. Use care not to cut into wiring, plumbing or other utilities concealed in the cavity. Replace damaged insulation where applicable. Install metal runner channel in the cutout, attached with drywall screws at 8" centers, or install clips designed to secure patches. Attach the gypsum board patch to the channel or the clips. Treat with joint compound and tape.

- b. Larger Holes: Remove damaged gypsum board back to the framing and replace with new gypsum board of the same type and thickness. Inspect the framing, and if damaged, repair or replace to match adjacent undamaged framing. Fill the damaged area by attaching new gypsum board to the framing. Ends and edges that are not supported by framing shall be supported by new metal runner track. For multi-layer installations, stagger the joints between layers.

12. Landscaping and Planting: Where trenches are cut through existing planted or landscaped areas, and where new construction damages existing planting and landscaping, repair the surfaces, prepare surfaces for planting and replace planting and landscaping with new materials to match existing. Provide all required soil preparation, soil amendments, fertilizers and plant materials necessary to accomplish this.

13. 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.

### 3.03 PREPARATION OF EXISTING WORK:

- A. Holes: Drill holes through existing concrete or masonry for new conduit and/or piping and do not jack-hammer.
- B. Beadblasting: Work includes beadblasting of existing surfaces to receive materials secured by cementitious, adhesive or chemical bond (such as concrete, toppings, elastomeric coatings, plaster, mortar, etc.) and the beadblasting of other surfaces as shown, specified, directed or required for proper preparation of surfaces. Completely remove existing finishes, stains, oil, grease, bitumen, penetrated mastics and adhesives including primers and substances deleterious to bond or connection of new materials and expose clean sound surfaces. Employ wet beadblasting for interior surfaces, and for exterior surfaces where directed or necessary to prevent creation of a dust nuisance or required by code.
- C. Filling, Patching and Grinding: Where existing surfaces are shown or required to receive new finish materials, and where such surfaces have cracks, holes, depressions, ridges, foreign materials or other conditions which preclude proper installation of the new finish materials, the existing surfaces shall be reconditioned. Holes, cracks and depressions shall be filled with patching compounds of suitable types compatible with new materials.

Ridges and “high spots” shall be ground down. Areas of different planes shall be feathered out. Foreign materials shall be removed by use of solvents where approved, or by sandblasting as specified above. Any other reconditioning as may be required shall be performed to enable existing surfaces to receive new finish materials.

3.04 CONCRETE FLOOR LEVELING:

All existing and new concrete floors which are out of level by 1/8” in 10’ or more shall be treated as specified herein.

A. Material for Concrete Floor Leveling: Self-leveling, self-smoothing, cementitious, factory mixed compound requiring only addition of water at the site. Materials shall be manufactured by Ardex Inc., 630 Stoops Ferry Road, Coraopolis, PA 15108, (412) 264-4240, types as listed below. Equivalent products, Level-Right Plus and related materials manufactured by Maxxon, 920 Hamel Road, Hamel, MN 55340 (612) 478-9600 FAX (612) 478-2431 may be submitted for approval for leveling 0” to 1-1/2”.

1. Primer for porous (concrete) surfaces: Ardex P-51.
2. Primer for non-porous surfaces, such as sealed concrete, ceramic and quarry tile, wood, etc.: Ardex P-82 Ultra Prime.
3. Leveling compound for surfaces to be covered for other materials, Ardex K-15 having the properties indicated in the following table.

Physical property, units	Test Method	Acceptable value
Initial set, minutes	ASTM C191	30, at 70 degrees F.
Final set, hours	ASTM C191	2, at 70 degrees F.
Compressive strength, psi: After 24 hours After 28 days	ASTM C109	2,630 4,100
Flexural strength, psi After 24 hours After 28 days	ASTM C348	770 1,000
Flammability Flame spread Smoke developed Fuel contributed	ASTM E84	0 0 0

4. Leveling compound for surfaces to remain exposed: Ardex K-500 Self-Leveling Fast Track Concrete Topping. Minimum properties shall be not less than those specified above.

- B. Mixing: Leveling compound shall be mixed 1 bag of compound to not over 7 quarts of water. Where depth of leveling compound will exceed 1/2", fine gravel (1/8"-1/4" gradation) may be added. Mix approximately 2 minutes until material is smooth and lump free.
- C. Test Area: Prior to application of floor leveling compound, provide primer and leveling compound on a test area of not less than 4 feet square to assure the suitability of the material for the intended use.
- D. Preparation: Floors shall be inspected and all uneven areas shall be treated by grinding to remove high spots, and with floor leveling compound to eliminate low areas. Floors shall be clean and free from oil, grease, wax, latex compounds, curing compounds dust and foreign matter. Floors shall be primed with appropriate primer for each type of surface.
- E. Mix the material in accordance with manufacturer's instructions and apply and smooth the material over the floor. Where pumping of the material is feasible, use manufacturer's recommended equipment and methods. Featheredge at edges. Where gravel is incorporated into the mix, apply to slightly below final elevation, then apply a thin layer of neat material over the first layer before the first layer has set. Finished surfaces shall be level to within 1/8" in 10 feet in any direction, non-accumulative. Texture of finish shall match adjacent floors.

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 UTILITIES:

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 Contractor 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

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## 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 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 substitutions 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 Architect 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 submitted. 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 01380

### CONSTRUCTION ELECTRONIC DIGITAL MEDIA

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

All other sections of Division 1 apply to this Section. Provide construction videos, complete.

##### 1.02 SUBMITTALS:

- A. DVD: Submit upon completion of recording as specified hereafter.

##### 1.03 QUALITY ASSURANCE:

- A. Video Camera Operator: Shall be a member of the Contractor's staff, such as the superintendent or one of his assistants. Video camera operator shall be able to demonstrate familiarity with the equipment and an understanding of the ongoing construction process, so that videos can be made of all significant operations.
- B. Associated Services: Cooperate with the video camera operator's work. Provide reasonable auxiliary services as requested, including access and use of temporary facilities including temporary lighting.

#### PART 2 – PRODUCTS

##### 2.01 ELECTRONIC DIGITAL MEDIA FILES (DVD and or any other acceptable media):

- A. Maintain a video camera / smart phone, etc., on the project at all times.
- B. Identification: Label each DVD and the case with the following information:
  1. Name of the Project, Architect and Contractor,
  2. Date or dates the recording was taken,
  3. Name of the person taking the recording,
  4. Description: Vantage points, in terms of location, direction (by compass point) and elevation or phase of construction.

#### PART 3 – EXECUTION

##### 3.01 PRE-CONSTRUCTION VIDEO DIGITAL MEDIA:

Before starting construction, take recording of the site and surrounding properties from different points of view as selected by the Architect. DVD shall contain views in sufficient number to show existing conditions adjacent to the property before starting Work. Take images of existing buildings either on or adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

3.02 VIDEO DIGITAL MEDIA:

- A. One recording shall be taken each week in sufficient detail to show all major construction operations, and additional recording exposure shall be taken whenever significant construction operations occur. Length of DVD will vary, depending on the complexity and diversity of construction operations, but approximately 30 minutes per week will be required for ongoing construction operations.
- B. In addition, DVD records shall be made of all concealed underground utilities, prior to covering. Recording shall be taken of pipes roughed-in walls and above solid ceilings prior to covering. Recording shall be taken of typical concealed construction details in sufficient number to enable the Owner to determine approximate locations and configurations of concealed conditions.
- C. During construction, DVD's shall be recorded on a weekly basis and given to the Owner's inspector for verification following completion of the recording session.

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 the 2016 California Building Code (CBC) of the following will be required.

TITLE 24, PART 2 (2016 CBC)      VOLUME 2

A. Concrete – CBC Chapter 19A

1. Materials:

- |                        |                  |
|------------------------|------------------|
| a. Portland Cement     | 1903A.2, 1929A.1 |
| b. Concrete Aggregates | 1903A.3          |
| c. Reinforcing Bars    | 1903A.5, 1929A.2 |

2. Concrete Quality:

- |                               |                       |
|-------------------------------|-----------------------|
| a. Proportions of Concrete    | 1904A., 1905A.1,2,3,4 |
| b. Strength Tests of Concrete | 1905A.6               |



- c. Splitting Tensile Test 1905A.1.4, 1905A1.5
- 3. Concrete Inspection:
  - a. Job Site 1905A.7
  - b. Batch Plant 1929A.4
  - c. Waiver of Batch Plant 1929A.5, 1929A.6
  - d. Reinforcing Bar Welding 1929A.12
- B. Masonry – CBC Chapter 21A
  - 1. Materials:
    - a. Masonry Units 2102A.2, (.4, .5, .6)
    - b. Portland Cement, Lime 2102A.2.(.2,.3,.8,.9),  
2103A.2
    - c. Mortar and Grout Aggregates 2102A.2.(1),2103A.3, A.4
    - d. Reinforcing Bars 2102A.2.(10)
  - 2. Quality:
    - a. Portland Cement Tests 1903A.2, 1929.A1
    - b. Mortar & Grout Tests 2105A.3.4(2)
    - c. Masonry Unit Tests 2105A.3.4.(1), 2105A.6
    - d. Masonry Core Tests 2105A.3.1
    - e. Reinforcing Bar Tests 1929A.2
  - 3. Masonry Inspection:
    - a. Reinforced Masonry 2105A.7
    - b. Reinforcing Bar Welding 1929A.12
- C. Steel – CBC Chapter 22A
  - 1. Materials:
    - a. Structural Steel, Cold Formed Steel 2202A.1, 2231.A.1
    - b. Identification 2203A
  - 2. Quality:
    - a. Tests of Structural & Cold Formed Steel 2231.A.1
    - b. Non-Destructive Weld Testing 1703A
  - 3. Inspection:
    - a. Shop Fabrication 2231A.4
    - b. Welding 2231A.5
- D. Wood – CBC Chapter 23A

1. Materials:

a. Lumber and Plywood 2304A

2. Inspection:

a. Timber Connectors 2337A.2

E. Expansion and Epoxy Anchors 1923A.3.5 & DSA IR 19-1.

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 FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Provide temporary facilities and controls, complete.

PART 2 – PRODUCTS – Not applicable to this Section.

#### PART 3 – EXECUTION

##### 3.01 TEMPORARY UTILITIES:

Except as otherwise specified below, District will furnish electrical power, water and gas from existing outlets designated by the District without charge to Contractor for quantities used for the work. Provide all temporary piping, fittings, wiring and lighting necessary to supply utilities in sufficient quantities at locations required by the work. Contractor shall carefully conserve utilities, and if, in the opinion of the District, the usage is excessive, Contractor may be required to provide separate services from serving utility companies.

- A. Electrical Power for in the Building: Characteristics of current furnished by the District is limited to that existing and available; if current of other characteristics or quantity is required by Contractor, the Contractor shall supply the power as necessary at no extra cost to the District. Power for small tools and lighting may be taken from the existing 120-volt 60 Hz 1-phase convenience receptacles provided there is no disturbance to occupants and functions, cables and conductors do not prevent or interfere with closing of fire-labeled doors, and load connected to any single or duplex outlet does not exceed 12 amperes. Total load connected to any circuit shall not exceed 25% of circuit capacity as labeled in panelboard. Contractor shall repair and make good damage to existing electrical facilities caused by his use, as directed and approved, at no extra cost of the District.
  - 1. Electrical Power for the Project Offices and Trailers: Contractor shall arrange for service with serving utility and pay all costs directly.
  - 2. Temporary Lighting: Provide lighting and outlets wherever necessary for proper performance and inspection of work. If operations are performed during hours of darkness and whenever natural lighting is deemed insufficient by Architect, provide adequate floodlights, clusters and spot illumination, as required to facilitate reading of drawings and specifications.
- B. Water:
  - 1. Construction Water: District will furnish water from such existing outlets as do not interfere with the normal operation of the facilities. In general, obtain water from outlets in janitor, mechanical and similar utility rooms. If used, do not run water

hoses down corridors or across doorways in use by occupants. Provide temporary backflow prevention devices as required by Code or directed by the District.

2. Drinking Water: Maintain on the site at all times, adequate supply of drinking water. Provide bottled water, dispenser and disposable cups. Keep the equipment and the area around the equipment clean and dry at all times.
- C. Gas: Limit quantity used to the amount that causes no interference to existing gas-fired devices and equipment.

### 3.02 TEMPORARY HEAT AND VENTILATION:

Provide heat, fuel and services to protect the work against injury from dampness and cold until final acceptance of all work of the Contract.

- A. When the new system is used for temporary heat and ventilation, comply with air quality requirements of ASHRAE 62 and the following:
1. Temporary Filters for Air Systems: Provide temporary filters in air conditioning and ventilating systems to prevent dust and fumes from contaminating the new ductwork and equipment. Use commercial viscous-coated throw-away filters, or equal, having efficiency of not less than 60 percent.
  2. At completion, inspect the entire system for dirt and debris. Clean equipment, ducts and plenums that are soiled, at not extra cost to Owner. Replace filters.
- B. For not less than 7 days prior to plastering and drywall during application, setting and curing thereof, sufficient heat to maintain building temperature of not less than 55 degrees F while maintaining adequate ventilation for drying of plaster.
- C. Before casework is delivered to the building, for not less than 5 days prior to installing wood finish, and throughout placing of this finish and other finishing operations such as painting and laying of resilient floor covering, sufficient heat to maintain building temperature at 65 degrees F.
- D. Operate HVAC system over a weekend as directed, for not less than 48 hours to purge VOC and other contaminants from the building.

### 3.03 TEMPORARY TELEPHONE SERVICE:

Provide, maintain and pay for duration of work, two line telephone service (one for voice, one for FAX and data) in the Owner's and Architect's office for use of Owner and Architect only. Long distance calls will be paid by Owner. However, phone calls by Owner or Architect to Contractor, subcontractors or suppliers located in Los Angeles, San Bernardino and Orange Counties are not considered as long distance calls regardless of tolls, and Owner is not liable for additional payment for such phone calls. Provide separate telephone service for Contractor and subcontractor use.



### 3.04 TEMPORARY SANITARY FACILITIES:

Provide and maintain temporary portable chemical toilet facilities and wash sink for duration and operation. Properly proportion number of units for number of workers employed. Provide weather-tight and floored structures, maintained in clean and sanitary condition acceptable to Owner and Architect.

### 3.05 TEMPORARY FIRE PROTECTION AND SAFETY REQUIREMENTS:

- A. The Contractor shall take necessary precautions to guard against and eliminate fire hazards and to prevent damage to construction work, building materials, equipment, temporary field offices, storage sheds and public and private property. The Contractor shall be responsible for providing, maintaining and enforcing the following conditions and requirements during the entire construction period. Comply with 2015 CFC Article 87 during all phases of the project.
1. Fire Inspection: The Contractor's Superintendent shall inspect the entire project at least once each week to make certain that the conditions and requirements are being adhered to.
  2. Hose: The number of outlets, supply of hose and proper hose size to protect the construction area shall be determined by the local Fire Marshal and provided by the Contractor.
  3. Fires: Employees shall not be allowed to start fires with gasoline or kerosene or other highly flammable materials. No open fires shall be allowed.
  4. Flammable Building Materials: Only a reasonable working supply of flammable building material shall be located inside of, or on the roof of, any storage facility.
  5. Combustible Waste Materials: Oil-soaked rags, papers and other highly combustible materials must be stored in closed metal containers at all times, and shall be removed from the site at the close of each day's work and more often where necessary, and placed in metal containers with tight hinged lids.
  6. Gasoline and other flammable or polluting liquids/materials shall not be poured into sewers, manholes or traps, but shall be disposed of, together with flammable or waste material subject to spontaneous combustion, in a safe manner meeting all applicable laws and ordinances. Make appropriate arrangements for storing these materials outside of the building.
  7. Provide and maintain fire extinguishers during construction, conveniently located for proper protection, one fire extinguisher for each 5,000 square feet of floor area or less, but not less than four extinguishers. Fire extinguishers shall be ten-pound ABC type. Extinguishers shall meet approval of Underwriters' Laboratory, and shall be inspected at regular intervals and recharged as necessary.
- B. All self-propelled construction equipment, except light service trucks, panels, pickups, station wagons, crawler type cranes, power shovels and draglines, whether moving alone or in combination, shall be equipped with a reverse signal alarm (hub-cap type).

C. Conduit trenching and excavation operations with regards to the following:

1. Pursuant to Labor Code 6706, 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.
2. 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 Title 24 of the California Code of Regulations. 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.
3. Neither the review nor approval of any plan showing the design of shoring, bracing, sloping or other provisions of work protection, shall relieve the Contractor from his obligation to comply with Construction Safety order Standards and Title 24 CCR 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.

3.06 TEMPORARY OFFICES:

- A. Prior to starting work, provide and maintain for duration of operations, separate temporary office facilities as required for Contractor's, Owner's and Architect's administration; likewise, all necessary sheds and facilities for proper storage of tools, materials and equipment employed in performance of work.
- B. The office shall be a separate structure located where directed, or may be located within the building at location acceptable to the Owner. If a separate structure is provided, it shall be substantially and neatly constructed, weather-tight, well lighted and neatly painted inside and out. The office shall be heated and cooled. It shall have doors which are separately keyed and two or more windows on opposite sides.
- C. The facilities for the Architect's and Owner's use shall be not less than described herein. Contractor may provide whatever additional space he requires for his administration and supervision of the work. The facilities shall be of suitable size to accommodate the Architect's and Owner's office (120 square feet), and shall be furnished with a desk, 2 chairs, one 3-shelf standard bookshelf, one 3-drawer file cabinet, one wastebasket, one drawing layout table and one drawing stick file. The desk shall be provided with one

phone line. Additionally provide separate phone lines for a fax machine and for electronic communications equipment specified below.

- D. Costs of the field offices and utilities, including cleaning service not less than once per week, shall be borne by the Contractor.
- E. Contractor shall provide telephone instruments, FAX machine and computer equipment as required.

### 3.07 TEMPORARY ELECTRONIC COMMUNICATIONS:

Contractor shall provide at the site, in the office, an experienced data processing and digital camera operator, and the following equipment for the use of the Contractor, Owner and Architect:

#### A. CPU

- 1. 600 MHZ Pentium III processor
- 2. 256 MB RAM
- 3. 20 GB hard drive
- 4. Wireless modem
- 5. Ports for digital camera connection
- 6. Read/write/DVD drive
- 7. Battery backup system
- 8. Windows X
- 9. Office 2017

#### B. Digital Camera

- 1. 1152 x 864 minimum image resolution
- 2. Built in flash
- 3. Software to download images to on-site CPU
- 4. Software to optimize images for speedy e-mail transmission
- 5. Battery supply sufficient for continuous use of camera

#### C. Internet Service

- 1. E-mail address for use at the job site
- 2. Internet software installed for use by the Architect during site visits
- 3. Phone line dedicated for internet access and available for Architect's use during site visits.

### 3.08 TEMPORARY SCAFFOLDING, STAIRS AND HOISTS:

Provide and maintain for duration of work, in accordance with CAL-OSHA and applicable laws and ordinances, all required temporary standing scaffolding and temporary stairs, ladders, ramps, runways and hoists for use during construction, unless otherwise specified in contract documents.

### 3.09 TEMPORARY GUARDS, BARRICADES AND LIGHTS:

- A. Provide construction canopies, barricades, fences, guards, railings, lights and warning signs necessary and required by law, and take necessary precautions required to avoid injury or damage to any and all persons and property.
- B. Construction Site Fencing: Construct fence around construction site at exact location as indicated or directed, of chain link fence fabric not less than 6 feet high. Use 1-3/4" mesh not lighter than 9 gauge galvanized fabric with knuckled selvages. Use round posts, top tension wire and bottom tension wire, and bracing as required for rigidity. Provide steel gates and frames of not less than 1.90" OD, 0.120" minimum wall thickness galvanized tubing. Provide gates as required for access of vehicles and pedestrians. Equip swinging gates with galvanized hinges and latch. Provide change and double padlocks, arranged so that unlocking of either padlock will open the gate. Contractor provide one padlock for his use. District will provide the other padlock. Set posts for support of fences into sleeves or buried direct in ground. Hold posts aligned and plumb.

### 3.10 PROTECTION OF WORK AND FACILITIES:

- A. Protect all adjacent property, roads, streets, curbs, shrubbery, lawns, erosion control materials and planting during construction operations. All damaged material shall be replaced and/or repaired at the expense of the Contractor.
- B. Upon completion deliver the entire work to the Owner in proper, whole and unblemished condition.
  - 1. Parts of work in place that are subject to injury, because of operations being carried on adjacent thereto, shall be covered, boarded up, or substantially enclosed with adequate protection.
- C. The Contractor shall be responsible for preventing the overloading of any part of the facilities beyond their safe calculated carrying capacity by the placing of materials and/or equipment, tools, machinery, or any other items thereon.
- D. The Owner may provide such watchman services deemed necessary to protect the Owner's interest, but any protection so provided by the Owner shall not relieve the Contractor of the responsibility for the safety and condition of the work and material until the completion and acceptance thereof. The Contractor shall employ such watchman services as he may deem necessary to properly protect and safeguard the work and material.

### 3.11 DUST CONTROL:

Throughout the entire Contract period, effectively dust-palliate the working area, roads and storage areas constructed under this Contract and involved portions of the site, except during such periods that other contractors may be performing work of separate contracts in these areas. Such application shall consist of intermittent watering and sprinkling of such frequency as will satisfactorily allay the dust during all hours that work is being performed. At no time shall

water be allowed to pond or puddle. Ponds and puddles shall be removed immediately and steps taken to remove or dry the mud resulting from the ponds or puddles.

### 3.12 WATER CONTROL:

Surface or subsurface water or other fluid shall not be permitted to accumulate in excavations or under the structures. Should such conditions develop or be encountered, the water or other fluid shall be controlled and suitably disposed of by means of temporary pumps, piping, drainage lines and ditches, dams or other methods approved by the Architect.

### 3.13 PROJECT IDENTIFICATION:

Provide and maintain one sign only on the property at location as directed by Architect. Signboard shall contain information and be of size as detailed on the drawings. Small direction signs may be installed if specifically approved by Architect. Signs by subcontractors and material suppliers will not be permitted.

### 3.14 CONTRACTOR VEHICLES ON CAMPUS:

Contractor's vehicles shall be restricted to access routes established by the Owner. Parking of Contractor's employees vehicles will be limited to offsite parking areas as arranged by Contractor, not necessarily adjacent to the site.

### 3.15 REMOVAL OF TEMPORARY CONSTRUCTION:

Remove temporary office facilities, toilets, storage sheds, fences and other construction of temporary nature from site as soon as progress of work permits. Recondition and restore portions of site occupied by same to a condition acceptable to Architect.

END OF SECTION

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## 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

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## 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. Water Purity: Deliver reports of water sterilization to Architect at time of final inspection.
- G. Air Balance Reports: Deliver to Architect at time of final inspection.
- H. Extra Materials: Deliver extra materials specified in the various sections to Owner's storage facility as directed.
- I. 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.
- J. Provide all documentation required by DSA and CBC.
- K. 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

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## 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.

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## 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 subcontractor'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 warranty 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 binder, 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:

RE-CONSTRUCTION of  
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 wear 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 12-14-2018.

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 5 Phases, starting with Phase 1: Installation of 6 Temporary Portable Classroom Buildings in the SE. corner Playfield for use as Interim Classrooms.(N.I.C.).  
Phase 2: Demolition of 12 existing portable classroom buildings and Construction of the West Classroom Building and site utilities.  
Phase 3: Demolition of existing Classroom buildings. and Construction of the East Classroom Building and site utilities.  
Phase 4: Demolition of the existing Administration Building, Multipurpose Building & Lunch Shelter, and Kindergarten Building, and Construction of the new Administration, Multipurpose, & Kindergarten Buildings and site utilities.  
Phase 5: Demolition of existing Parking lots, driveways, Site miscellaneous, Site Utilities, and Construction of remaining Site Utilities & Improvements.  
Refer to Phasing Plan as provided by Construction Manager.

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 in Construction Phases as indicated by Construction Manager, as specified and required:
1. Demolish and remove 12 existing portable classroom buildings indicated as Phase 2 on Construction Manager phasing site plan. Phase 3: Demolish (6) existing classroom buildings and (1) portable classroom building. Phase 4: Demolish (3) existing buildings: Administration, Kindergarten, MPR & Lunch Shelter Structures. Phase 5: Demolish existing Parking lots (2), Site playground structures, playfield, & Fire road access.
  2. Demolish and remove existing interior improvements, including partitions, ceilings, walls, floor finishes and other items as indicated or required. Remove chalkboards, tackboards, fire hose cabinets and toilet accessories.
  2. Demolish and remove existing interior and exterior doors and windows as indicated. Existing door frames to remain in place where noted. Remove sunshades.
  3. Demolish and remove existing site improvements including walks, paving, fences, walls and foundations to extent indicated.
  4. Demolish and remove existing roofing, fascias and flashings on buildings to be reroofed.
  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.
  8. Mechanical demolition, including removal of plumbing fixtures, piping, air conditioning equipment and ducts and controls.
  9. Electrical demolition, including removal of fixtures, conduits and accessories.
  10. Removal of abandoned utility piping, ducts and conduits.

B. Related Work Specified Elsewhere:

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

1.02 SUBMITTALS:

Prepare and submit a detailed Phased demolition plan of the work, & procedures proposed for use in the identification, demolition, handling, removal, transportation and salvage or disposal of removed materials. For each item to be salvaged and delivered to the District for future use, indicate proposed sizes, weights, handling, packaging and labeling methods. This requirement does not apply to items to be reinstalled under the contract.

1.03 RECORD DRAWINGS:

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

1.04 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 if 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 REMOVAL (OF PORTIONS) OF BUILDINGS:

- A. Removals: Carefully remove work to be salvaged or reinstalled and store under cover.
- B. Walls, Partitions and Ceilings: Remove by cutting down and not by tumbling, throwing or dropping.

- C. Concrete: Where concrete work is to be removed, and where saw cutting or breaking out is required for passage of new ducts, pipes and conduits, core drill or saw concrete as applicable. Square, straight edges shall be provided where existing concrete adjoins new work and other locations. Existing steel reinforcement shall be protected where indicated; otherwise, it shall be cut off flush with face of concrete.
1. Saw cutting: Cut concrete along straight lines to a depth of not less than 2 inches. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. The remainder of the concrete shall be broken out, provided that the broken area is concealed in the finished work and the remaining concrete is sound. At locations where the broken face cannot be concealed, it shall be ground smooth or the saw cut shall be made entirely through the concrete. Cut off reinforcing bars, except where bonded into new concrete or masonry, and paint ends with bituminous paint before enclosing.
  2. Core drilling: For small holes in concrete, use core drilling. Use sharp tools to minimize spalling, control water on both sides of the concrete floor or wall. Use minimum of water to avoid damage to adjacent construction.
- D. Masonry: Remove masonry carefully so as to prevent damage to surfaces to remain and to facilitate the installation of new work. Cut back to joint lines and remove old mortar. Allow space for repairs to backing where applicable. Where new masonry adjoins existing, the new work shall abut or tie into the existing construction as indicated or as specified for new work.
- E. Miscellaneous metals: Shop-fabricated items and light-gauge metal items shall be disposed of by the Contractor.
- F. Wood framing: Remove portions as indicated or as required to complete new work. Cut to neat straight lines at points of minimum stress, or provide supplementary supports as required.
- G. Woodwork: Cut or remove to a joint or panel line.
- H. Roofing:
1. Remove existing roofing and insulation where occurs, to expose the existing roof deck. Remove related flashings, anchors, attachments and similar items, unless designated to remain. Dispose of removed materials.
- I. Sheet Metal: Remove completely, unless partial removal is indicated, in which case remove back to joint, lap or connection. Secure loose or unfastened ends or edges and make watertight.
- J. Doors and Windows: Remove completely, where new windows and doors are indicated.
- K. Glass: Remove broken or damaged glass and clean glazing channels and stops of setting materials.

- L. Plaster: Cut back to sound plaster on straight lines, and back-bevel edges of remaining plaster.
  - M. Gypsum Wallboard: Carefully dismantle portions of walls & ceilings.
  - N. Acoustical Ceilings: Carefully dismantle portions of ceilings where required to accomplish the work. Remove hanger wires where ceilings are not reinstalled. Remove adhesive from substrates.
  - O. Tile: Remove ceramic tile completely from rooms. Remove concrete slab and mortar bed.
  - P. Carpet, Resilient and Other Soft Flooring: Completely remove flooring, tackless strips, edgings and other accessories, and dispose.
  - Q. Adhesives: Removal of resilient flooring, carpet, thinset floor and wall tiles and acoustic tile, and similar materials shall include the complete removal of adhesives.
  - R. Sealants: Removal of windows, door frames, panels and similar items, shall include the complete removal of perimeter sealants. Where such items are to remain, inspect the sealants, and if defective, remove the sealant and prepare surfaces for replacement of sealant as specified for new work.
  - S. Hangers: Where piping, ductwork, suspended ceilings and similar work are removed, completely remove all hanger wires and rods, suspension channels, tees and other devices. Inserts in slabs may remain.
  - T. Sleeves: Where holes in concrete, masonry or plaster are to be filled, remove sleeves.
  - U. Miscellaneous Items: Remove items not mentioned but required to be removed in such manner as minimizes damage to work to remain.
- 3.07 DEMOLITION OF MECHANICAL EQUIPMENT AND FIXTURES:
- A. Mechanical hardware shall be disconnected at location indicated or at an approved point of connection to existing services that are to remain. Mechanical equipment and fixtures shall be disconnected at fittings.
  - B. Piping: When piping is removed from walls and framing and finishes are damaged, they shall be replaced to match existing per the Architect's approval and building code. If new piping is to be installed at existing construction and cannot by code or damaging the existing construction shall be replaced. In some cases it may be necessary to furr walls. This direction shall be given by the Architect at no additional cost to the Owner.
  - C. Air Conditioning Equipment: Remove air conditioning equipment without releasing chlorofluorocarbon refrigerants to the atmosphere in accordance with the Clean Air Act Amendment of 1990. Recover all refrigerants prior to removing air conditioning equipment. Prevent discharge of Class I and Class II ODS to the atmosphere. Place recovered ODS in cylinders meeting ARI Guideline K suitable for the type ODS (filled to no more than 80 percent capacity) and provide appropriate labeling. Recovered ODS

shall be removed from the site and disposed of in accordance with 40 CFR 82. Products, equipment and appliances containing ODS in sealed, self-contained systems (e.g. residential refrigerators and window air conditioners) shall be disposed of in accordance with 40 CFR 82.

- D. Ducts: Remove duct work as indicated, and seal ends if applicable.
- E. Fixtures associated with plumbing, heating, air conditioning, refrigeration and other mechanical system installations shall be removed. Motors and machinery items associated with the plumbing, heating, air conditioning, refrigeration and other mechanical system installations shall be removed.

### 3.08 DEMOLITION OF ELECTRICAL EQUIPMENT AND FIXTURES:

- A. Motors, motor controllers and operating and control equipment shall be removed.
- B. Wiring systems and components shall be removed. Primary, secondary, control, communication and signal circuits shall be disconnected at the point of attachment to their distribution system.
- C. Fixtures: Electrical fixtures shall be removed, complete with lamps.
- D. Electrical devices: Switches, receptacles, switchgear, transformers, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items shall be removed.
- E. Conductors, including insulated wire and nonmetallic sheathed and flexible armored cable, shall be removed. Conduit, except where embedded in concrete or masonry, shall be removed. Wiring ducts or troughs shall be removed.

### 3.09 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 Contractor'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 phases as required for new slabs, paving, foundations and utility trenches, complete. Normal Site preparation will include building pad graded and certified to support the main portion of building on spread footing foundation. 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 concrete.
5. Clean up and disposal.

B. Related Work Not In This Section:

1. Vapor barrier under floor slabs.
2. Excavating and backfilling for underground utility systems.
3. Landscaping including planting fill and irrigation 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: Excavate for foundations to sizes indicated, clean, and leave in condition ready for concrete placement. Prior to placement of forms, reinforcing or concrete, 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 CONCRETE:

Prepare subgrade for concrete items 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 concrete is placed.

### 3.04 TRENCHING:

Trenching and excavating for underground piping, conduits and related items is performed under other sections. Conform trenching operations to the following requirements:

- A. Trenches: Excavate trenches to widths required for proper laying of pipe, with banks as nearly vertical as practicable. Bring bottoms of trenches to the required depths, all accurately graded to provide uniform bearing on undisturbed soil for entire length of each section of pipe, except where necessary to excavate for pipe bells or for pipe bedding specified in other sections.
- B. Methods: Machine excavation method may be used down to rough elevations. Perform fine grading and trimming by hand method.
- C. Trench Backfilling: Conform to Paragraph "Compaction" except compact all backfill to at least 90% of maximum dry density where the trenches are located in paved areas or under building or structures. Take precautions in placing and compaction of backfill to avoid damaging pipes, ducts, conduits and structures.

### 3.05 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.

### 3.06 SUBGRADE PREPARATION FOR CONCRETE:

Prepare subgrade for concrete items placed directly on earth by excavating, filling, and grading as required and as specified, and bring to optimum moisture content. Finish the subgrade within 3/8" tolerance when tested along a 10-foot straightedge in any direction at any location. Compact to density specified for fills, and maintain moisture content until concrete is placed.

### 3.07 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.



3.08 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 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.
- 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 02520  
SITE CONCRETE WORK

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide on-site exterior concrete work, including curbs, ramps, walks and pavement, in construction phases as indicated by Construction Manager, as specified and required. Concrete paving shall be integral color with troweled joints and expansion joints as selected by Landscape Architect/ or Civil Engineer.

1.02 SUBMITTALS:

- A. Layout Drawings: Provide a layout drawing showing locations of each type of pavement and construction, and dimensioned locations of all expansion and control joints. Provide full size drawing showing grooves in access ramps.
- B. Product Data: Submit for expansion and control joint material.
- C. Site Samples: Prepare following samples at the site cast in the directed locations and orientations. Prepare as many samples of each type of concrete as are required for approval. Remove samples from the site when no longer needed and removal is approved. Approved samples may be part of permanent construction if meeting all other requirements shown and specified and are so approved.
  - 1. Slab Samples: Prepare minimum 4-foot square samples of each required slab finish including each color and texture. Include a transverse expansion joint, scoring and edging. Where paving adjoins other materials such as pavers, include one edge of sample constructed of the other materials.

1.03 QUALITY ASSURANCE:

Conform to Division 3 for requirements not specified in detail herein.

1.04 WEATHER LIMITATIONS:

Placement and finishing of site concrete shall be limited to times when the ambient temperature is above 50 degrees Fahrenheit and without precipitation. Finished concrete shall be protected against all weather factors until cured sufficiently to be completely resistant to such factors.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Concrete:

1. Portland cement: ASTM C150, Type V.
  2. Aggregates: ASTM C33, from approved source to insure uniform quality and grading. Deliver so that moisture content variations will not decrease production of reasonably uniform concrete. Do not use aggregates that are reactive with alkalis. No pea gravel.
  3. Water: Clean, fresh and potable.
- B. Strength: Minimum ultimate compressive strength of 3,000 psi. No sack mix or pea gravel allowed. Refer to Division 1 for testing requirements.
- C. Reinforcing: Use only where called for:
1. Bars: ASTM A615, grade 40.
  2. Wire: ASTM A82.
  3. Wire mesh: ASTM A 185.
- D. Expansion and Control Joints:
1. Expansion joints for slabs: Conform to Green Book, Subsection 201-3.
  2. Expansion joints for curbs and gutters: Asphalt impregnated fiber filler material, 1/2 inch thick.
  3. Control Joints: "Zip Strip" as distributed by S.C.A. Construction Supply, Santa Fe Springs, CA, or equal.
- E. Curing Compound: Conform to Green Book, Subsection 201-4.
- F. Concrete Water Repellant: Hydrozo Environseal 20, or equal.
- G. Polyethylene Film: Clear, 6 mil thick, "Visqueen", or equal. Provide compatible tape for sealing joints.

## PART 3 – EXECUTION

### 3.01 ON-SITE CONCRETE WORK:

Construct all site concrete of 3,000 psi concrete unless otherwise indicated or specified. Provide reinforcing bars or mesh where indicated. Form accurately to profiles shown, using wood, metal or plastic forms as approved. Place and handle concrete in a manner that will avoid segregation of ingredients. Refer to Section 03300 for additional requirements.

### 3.02 SUBGRADE PREPARATION: Refer to Section 02200.

- A. General: Conform to Green Book, Subsections 301-1.2 through 301-1.4, inclusive, performed under the supervision of the Soils Engineer.

- B. Maintenance of subgrade: The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the concrete is placed.

### 3.03 CONCRETE SLABS, PADS, WALKS, CURBS AND OTHER EXTERIOR CONCRETE FLATWORK:

- A. Form Setting: Conform to Green Book, Subsection 303-5.2.1. Concrete surfaces, where left exposed, shall be formed on all sides with plywood with taped joints to give a smooth, uniform straight finish.
- B. Reinforcing steel shall be securely tied in place. Do not use bars with kinks or bends not shown on drawings. Reinforcing steel shall be clean, free from rust, oil, scale, or any foreign material. Place all reinforcing as detailed and comply with typical detail for bends, splices, clearance, etc., and with requirements of the Uniform Building Code.
- C. Placing Concrete: Conform to Green Book, Subsection 303-5.3 and Section 03300.
- D. Expansion Joints:
  - 1. Concrete Curbs: Provide 1/2" thick expansion joints at beginning and at end of curves, intersections, and 20-foot intervals between, set plumb, square, and to same profile as the curbs. Edge curb tops to 1/2" radius and vertical joints to 1/4" radius.
  - 2. Concrete Gutters: Provide 1/2" thick expansion joints as above for curbs.
  - 3. Concrete Walks: Provide 1/2" expansion joints as specified for curbs and where walks abut rigid structures, aligned with joints in curbs where adjoining. Provide expansion joints at 20 foot intervals, unless noted otherwise, in concrete walks.
- E. Control Joints: As shown on site plan. Where not shown, conform to ACI recommendations. Control joints shall be a formed joint. Tops of joints shall be installed flush with the concrete surface. Depth of joint shall be a minimum of 1/4 the thickness of slab. Use control joints on all curbs, curbs and gutters, and cross gutters at maximum intervals of 20 feet on center. Sawed joints may be used in lieu of the above, providing they are at least one inch deep.
- F. Concrete Ramps: Construct pedestrian and disabled ramps of profile indicated. Excavate below bottoms of ramps to allow for full thickness of concrete throughout. Do not feather the concrete unless specifically indicated. Provide reinforcing as indicated. Provide smooth transitions between ramps and adjoining surfaces. Provide uniform slopes throughout. Provide grooved pavement as detailed, matching approved sample.

### 3.04 SLAB FINISHES:

- A. Description of Finishes: Produce finish slab surfaces level or sloped as shown with maximum deviation of 1/8" from a 10-foot straightedge. Keep surface moist with a fine fog spray of water as necessary. Dusting with dry cement or sand during finishing operations is not permitted. Finish all slab edges and joints with an edging tool. Match

the approved sample panels. Apply the following finishes as indicated, specified, directed and applicable.

1. Monolithic Trowel Finish: For slab and flatwork surfaces not indicated or specified to receive another finish. After surface water disappears and floated surfaces are adequately hardened, steel trowel and re-trowel concrete to a smooth surface. After concrete has set sufficiently to ring the steel trowel, re-trowel twice to a smooth uniform finish free of trowel marks and blemishes. Avoid excessive re-troweling that produces burnished areas.
  2. Steel Float Finish: Same as for monolithic trowel finish except omit the third re-troweling.
  3. Broom Finish: Same as for monolithic steel trowel finish less the second re-troweling. When ready, apply approved course texture finish by sliding a wire or stiff bristle broom in one direction along a straightedge guide set at right angles to the direction of traffic. At walking areas, smooth 1" wide at edges, expansion joints and scoring.
- B. Locations of Finishes: Unless otherwise indicated, provide the following broom finishes on areas as specified:
1. Fine broom finishes: On curbs and gutters, unless other finishes are indicated. Score walks in direction and pattern indicated or directed. Provide 3 inch wide trowelled finish at flowlines of gutters.
  2. Medium broom finishes: On level flatwork and ramps of slopes not over 6 percent.
  3. Course broom finishes: On ramps of slopes 6 percent and over.

### 3.05 CURING:

Concrete work shall be properly cured and protected against injury and defacement of any nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water, starting not later than 2 hours after final troweling. Surface of finish shall be kept continuously wet for at least 10 days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.

- A. In lieu of water curing, within 24 hours after finishing, the concrete which is not to receive special finishes, may be cured with an approved clear liquid curing compound, applied in accordance with the manufacturer's recommendations.

### 3.06 BACKFILLING:

After curing, debris shall be removed and the area adjoining the work shall be backfilled, graded and compacted to conform to the surrounding area in accordance with lines and grades indicated.



### 3.07 PROTECTION:

Completed work shall be protected from damage until accepted. The Contractor shall remove damaged concrete and clean concrete discolored during construction. Work that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints at no expense to the owner. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

### 3.08 REMOVAL OF FORMS:

Do not remove forms until the concrete has attained adequate strength to prevent damage. Take extreme care in stripping to avoid breaking off corners, marking concrete or defacing the finish surface in any way. Minimum stripping time at walls shall be 3 days.

### 3.09 CLEANING AND PATCHING:

After stripping forms, clean all exposed and concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, burrs, and projections by grinding. Patch all voids, rock pockets, holes, cracks, etc., by chipping loose concrete and exposing clean sound aggregate. After inspection, dampen prepared recesses for 2 hours minimum and fill with drypack to within 1/4" of surface. Keep drypack damp for two days minimum. Apply mortar to final surface and keep patch damp for 5 days minimum. Entire surface of concrete to be sac ked with neat cement and water after surface is cleaned and patched.

### 3.10 FLOOD TEST:

All concrete gutters and concrete pavement shall be given a flood test. All concrete work where water ponds and does not run off in a reasonable amount of time, shall be removed to the nearest score or joint line and replaced to provide proper drainage.

### 3.11 DEFECTIVE CONCRETE:

- A. If concrete tests indicate that the strengths do not meet those specified, or if concrete has excessive pockets, or if reinforcing steel is exposed, or if concrete does not comply with the drawings and specifications, the defective concrete shall be removed and replaced as directed.
- B. Concrete paving that shows evidence of cracking prior to completion of the project or during the 60-day maintenance period shall be replaced at no cost to the Owner. Such replacement shall include the entire panel of concrete in which the cracking occurs, to the nearest expansion or control joints, as approved.

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 of 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 02660  
WATER DISTRIBUTION

PART 1 - GENERAL

1.01 SUMMARY: Division 1 and Section 02010 apply to this Section. Provide piping and specialties for potable-water service outside the building in construction phases as indicated by Construction Manager. All hydrants shall measure 6" x 4" x 2 1/2", brass or bronze, conforming to current AWWA Standard C503 or approved equal. Hydrants shall be installed per Specification of the Los Angeles County Water Ordinance No. 7834. (Title 20) Utility Manual, section 4.0 to 4.6. All required public fire hydrants shall be installed, tested and accepted prior to construction per Fire Code 901.3.

A. Related Work Specified Elsewhere: Earthwork for excavation and backfill for utilities.

1.02 REFERENCE SPECIFICATIONS: Perform all work in accordance with applicable provisions of "Standard Specifications" Section 306. Mention herein of section numbers refers to sections of the "Standard Specifications" unless otherwise indicated. For the purpose of this Section, the word "Inspector" in the Standard Specification shall mean the District's authorized representative.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

A. Minimum Working pressure, Pressure, Portable-Water Service: 150 psig.

1.04 SUBMITTALS

A. Material List: Submit list of materials proposed for use accompanied by manufacturer's catalogs and technical data for each item proposed for use.

B. Certificates: Submit manufacturer's certification that materials meet specified requirements.

1.05 QUALITY ASSURANCE

A. Comply with standards of authorities having jurisdiction for potable water-service piping. Include materials, installation, testing, and disinfection.

B. Comply with NSF 61, "Drinking Water System Components—Health Effects", for materials for potable water.

C. Comply with standards of authorities having jurisdiction for water-service piping. Include materials, hose threads, installation, and testing.

D. Provide listing/approval stamp, label, or other marking on piping and specialties made to specified standards.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Ensure that valves are dry and internally protected against rust and corrosion. Protect valves against damage to threaded ends and flange faces. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Do not remove end protectors, unless necessary for inspection; then reinstall for storage. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.

C. Handling: Handle valves in manner to avoid damage to exposed valve parts. Do not use handwheel or stems as lifting or rigging points.

D. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris and moisture.

E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside. Protect flanges, fittings, and specialties from moisture and dirt.

F. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

#### 1.07 PROJECT CONDITIONS

A. Verify existing utility locations. Contact utility-locating service for area where project is located.

B. Verify system pressure and size according to lowest pressure and regulate the higher pressure.

#### 1.08 SEQUENCING AND SCHEDULING

A. Coordinate piping materials, sizes, entry locations, and pressure requirements with building water distribution piping.

B. Coordinate with other utility work.

### PART 2 - PRODUCTS

#### 2.01 PIPES AND TUBES

A. PVC Plastic Pipe: ASTM D 1785, Schedule 40, with marking "NSF-PW" in accordance with NSF 14.

B. Fittings shall be PVC Schedule 80, injection-molded of an improved PVC compound. Fittings shall conform to ASTM D 1784, Cell Classification 122454-B. Threaded nipples shall be standard weight Schedule 80 with molded threads.

#### 2.02 JOINING MATERIALS

A. Pipe couplings: Iron-body sleeve assembly, fabricated to match OD of pipes to be joined.

1. Sleeve: ASTM A 126, Class B, gray iron.

2. Followers: ASTM A 47, malleable iron; or ASTM A 536, ductile iron.

3. Gaskets: Rubber.
4. Bolts and Nuts: AWWA C111.
5. Finish: Enamel paint.

B. Coatings: grease, never-Seize, or equivalent for application to all nuts and bolts. Fittings shall be wrapped with minimum 6 mil polyvinyl sheathing.

## 2.03 VALVES

A. Nonrising-Stem, Resilient-Seated Gate Valve, 3-Inch NPS: AWWA C509 gray-or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut. Include 200-psig minimum working-pressure design, interior coating according to AWWA C550, and push-on- or mechanical-join ends.

B. Nonrising-Stem Gate Valves, 2-Inch NSP and Smaller: MSS SP-80; body and stem, bonnet of ASTM B 62 cast bronze; with Class 125 threaded ends, soils wedge, nonrising copper-silicon-alloy stem, brass packing gland, PTFE-impregnated packing, and malleable-iron handwheel.

C. Valve Boxes: Cast-iron box with top section and cover with lettering "WATER", bottom section with base of size to fit over valve and barred approximately 5 inches in diameter, and adjustable cast-iron extension of length required for depth of bury of valve.

1. Provide steel tee-handle operating wrench with each valve box. Include tee handle with one pointed end, stem of length to operate valve, and socket-fitting valve-operating nut.

D. Check Valves: AWWA C508, with 175-psig working-pressure rating. Include interior coating according to AWWA C550.

E. Pressure-Regulating Valves: Automatic, pilot-operated, cast-iron body with interior coating according to AWWA 0550. Include 250-psig working-pressure design, bronze pressure-reducing pilot valve and tubing, and means for discharge pressure adjustment.

## 2.04 ANCHORAGES

- A. Clamps, Straps, and Washers: ASTM A 506, steel.
- B. Rods: ASTM A 575, steel.
- C. Rod Couplings: ASTM A 197, malleable iron.
- D. Bolts: ASTM A 307, steel.
- E. Cast-Iron Washers: ASTM A 126, gray iron.

F. Concrete reaction Backing: Portable cement concrete mix, 3000 psig, conforming to requirements of Division 3.

## 2.05 IDENTIFICATION

- A. Refer to Division 2 Section "Earthwork" for underground warning tape materials.



B. Arrange for detectable warning tapes made of solid blue film with metallic core and continuously printed black-letter caption "CAUTION--WATER LINE BURIED BELOW."

C. Nonmetallic Piping Label: Engraved, plastic-laminate label at least 1 by 3 inches, with caption "CAUTION--THIS STRUCTURE HAS NONMETALLIC WATER-SERVICE PIPING," for installation on main electrical meter panel.

## PART 3 - EXECUTION

### 3.01 EARTHWORK

A. Refer to Division 2 Section "Earthwork" for excavation, trenching, and backfilling.

B. Install piping a minimum of 30 inches below finish grade, except shut-off valves 3 inches and smaller shall be brought up into meter boxes 6 inches below grade.

### 3.02 PIPING APPLICATIONS

A. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below, unless otherwise indicated.

B. Do not use flanges or keyed couplings for underground piping. Piping in boxes and structures, but not buried, may be joined with flanges or keyed couplings instead of joints indicated.

### 3.03 JOINT CONSTRUCTION

A. PVC Piping, Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.

B. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, OD, and system working pressure. Refer to "Piping Systems- Common Requirements" Article below for joining piping of dissimilar metals.

### 3.04 PIPING SYSTEMS- COMMON REQUIREMENTS

A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved on Coordination Drawings.

B. Install piping at indicated slope.

C. Install components with pressure rating equal to or greater than system operating pressure.

D. Install piping free of sags and bends.

E. Locate groups of pipes parallel to each other, spaced to permit valve servicing.

F. Install fittings for changes in direction and branch connections.

G. Piping Connections:

1. Install unions, in piping 2-inch NPS and smaller, adjacent to each valve and at final connection to each piece of equipment with 2-inch NPS or smaller threaded pipe connection.

2. Install flanges, in piping 2-1/2-inch NPS and larger, adjacent to flanged valves and at final connection to each piece of equipment with flanged pipe connection.

3. Install dielectric fittings to connect piping of dissimilar metals.

H. Fitting Protection: Wrap all metal fittings with polyvinyl sheathing. Coat all bolts and nuts with grease or Never Seize.

### 3.05 SERVICE ENTRANCE PIPING

A. Extend water-service piping and connect to water-supply source and building water piping systems at outside face of building wall in locations and pipe sizes indicated. Terminate water-service piping at building wall until building water piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building water piping systems when those systems are installed.

B. Sleeves and mechanical sleeve seals are specified in Division 15.

C. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

### 3.06 PIPING INSTALLATION

A. Water-main Connection: Tap water main with size and in location as indicated according to requirements of water utility.

B. Comply with NFPA 24 for fire-protection water-service piping materials and installation.

C. Install AWWA PVC plastic pipe according to AWWA M23 and ASTM F 645.

D. Bury piping with depth of cover over top at least 30 inches

### 3.07 ANCHORAGE INSTALLATION

A. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorage for gasketed-Joint, PVC Potable-Water Piping in accordance with AWWA M23.

B. Apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of installed ferrous anchorage devices.

### 3.08 VALVE INSTALLATION

A. General Application: Use mechanical-joint-end valves for 3-inch NPS underground installation. Use threaded- and flanged-end valves for installation in pits. Use full-port bronze corporation stops and ball valves, with ends compatible with piping, for 2 1/2 inch NPS and smaller installation. 3-piece valves shall not be used underground.

B. AWWA-Type Gate Valves: Comply with AWWA 0600.1 install underground valves with stem pointing up and with indicated valve box.

C. Bronze Corporation Stop and Curb Stops: Comply with manufacturer's written instructions. Install underground curb stops with head pointed up and with cast-iron curb box.

### 3.09 IDENTIFICATION INSTALLATION

A. Install continuous plastic underground warning tape during back-filling of trench for underground water-service piping. Locate 12 inches below finished grade, directly over piping.

B. Attach nonmetallic piping label permanently to main electrical meter panel.

### 3.10 FIELD QUALITY CONTROL

A. Piping Tests: Conduct piping tests before joints are covered and after thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.

B. Hydrostatic Tests: Test at not less than 1-1/2 times working pressure (150 psig minimum) for 2 hours. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for one hour; decrease to 0 psig. Slowly increase again to test pressure and hold for one more hour. No perceptible leakage shall be observed. Remake leaking joints with new materials and repeat test until leakage is within above limits.

C. Prepare reports for testing activities.

### 3.11 CLEANING

A. Clean and disinfect water distribution piping. Purge new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use. For potable water, use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities, use procedure described in AWWA C651

B. Prepare reports for purging and disinfecting activities.

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. Sanitary sewer lines.
2. Water, gas and electric lines.
3. 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: Provide shop drawings for catch basins, specially prepared for the project, for the items listed herein. For each item, indicate each component and accessory, and installation and assembly details.

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:

1. Maximum Density and Optimum Moisture Content: ASTM D 1557, 5 layers.

2. Density of soil in place: ASTM D 1556.

C. Report: Soils Engineer will submit a written report that trenches were backfilled with acceptable material, and that compaction meets the requirements of these specifications.

PART 2 - PRODUCTS

2.01 PIPE MATERIALS:

A. Polyvinyl Chloride (PVC SDR35) Pipe: ASTM D 3034, with a minimum pipe stiffness of 46 psi, and with ends suitable for elastomeric gasket joints or solvent cement joints. Pipe shall contain ultraviolet inhibitor to provide protection from exposure to direct sunlight.

B. Joints and Jointing Material: Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

C. Frame and grates: Conform to the drawings and to the requirements of ASTM A 48, Class 30. 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:

A. Construct catch basins at locations indicated and to the design and dimensions indicated. Exposed concrete work shall have a smooth troweled finish with rounded corners and edges finished plumb and true. Provide grates, frames and covers for catch basins as detailed and indicated.

B. Concrete for catch basins shall be 3,000 psi concrete at 28 days.

C. Forms for concrete drainage structures shall be rigid and substantial. Plywood or tongue and grooved lumber shall be used for forming the exposed faces of all concrete drainage structures. The top surfaces of the concrete shall be finished by bringing mortar to the surface by tamping, troweling smooth and tooling the edges.

D. Forms shall be kept in place not less than five days after placing, unless otherwise directed or approved. Concrete work shall be cured by keeping it continuously wet for not less than seven days after placing.

2.03 IDENTIFICATION: Metallic-Lined Plastic Underground Warning Tapes: Polyethylene plastic tape with metallic core, 6 inches wide by 4 mils thick, solid green in color with continuously printed caption in black letters "CAUTION - STORM DRAIN LINE BURIED BELOW."

## 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 02200.

### 3.02 LAYING PIPE AND JOINTS:

A. Polyvinyl Chloride Pipe: Join and install PVC pipe using solvent cement joint pipe and fittings, joining with solvent cement in accordance with ASTM D 2855 and ASTM F 402. Pipe with gasketed fittings shall be joined with elastomeric seals in accordance with ASTM D 321 2

B. Unless otherwise indicated, lateral connections to main lines and angles in lines shall be made with the use of 45 degree wyes.

### 3.03 SPECIFIC ITEMS

A. Installation of Identification: Install continuous metallic underground warning tape during back-filling of trench for underground plastic piping. Locate 6 to 8 inches below finished grade, directly over piping.

B. 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.

END OF SECTION

SECTION 02730  
SANITARY SEWERS

PART 1 -GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide sanitary sewers in phases as indicated, specified, and required.

A. Work in This Section: Principal items include:

1. Sanitary sewer pipe and fittings.
2. Lateral services extended to 5-feet from building.
3. Sewer lines to drinking fountains.
4. Connections of new sewer lines to existing.
5. Trenching, backfilling and compaction for sewer system.

B. Related Work Not in This Section:

1. Storm drainage lines.
2. Water, gas and electric lines.
3. Earthwork.

1.02 REFERENCE SPECIFICATIONS: Perform all work in accordance with applicable provisions of "Standard Specifications" Section 306. Mention herein of section numbers refers to sections of the "Standard Specifications" unless otherwise indicated. For the purpose of this Section, the District's authorized representative shall be referred to as the Inspector.

1.03 SUBMITTALS

A. Layout Drawings: Submit drawings for layout of piping systems. Indicate locations of fittings and other accessories on layout drawings; detail cleanouts. Do not deliver pipe, fittings, and accessories until layout drawings have been approved.

B. Manufacturer's Data: Submit manufacturer's standard drawings or catalog cuts of the following items:

1. Fittings.
2. Joints and Couplings.
3. Piping.

C. Standards Compliance: Submit manufacturer's certificates of conformance or compliance for each of the following materials which are specified to conform to publications referenced under paragraph "Materials" in this section:

1. Pipe and fittings, including factory-applied linings.
2. Pipe joint materials.

1.04 VERIFICATION SURVEYS: Provide verification survey for complete pipeline, and accessories, as specified in Division 1. Show locations of lines, invert elevations, distance of pipes from other pipes and distances from adjacent buildings and structures.

1.05 QUALITY CONTROL: All tests required by the applicable referenced publications shall have been performed, whether specified in that publication to be mandatory or otherwise. For tests which are not specified in the referenced publication to be performed at definite intervals, during manufacture, the tests shall have been performed within three years of the date of submittal of certificates on the same type, class, grade, and size of material as is being provided for the project.

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

1.07 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:

1. Maximum Density and Optimum Moisture Content: ASTM D 1557, 5 layers.

2. Density of soil in place: ASTM D 1556.

C. Report: Soils Engineer will submit a written report that trenches were backfilled with acceptable material, and that compaction meets the requirements of these specifications.

## PART 2 - PRODUCTS

### 2.01 MATERIALS:

A. Polyvinyl-Chloride (PVC) Plastic Piping and Fittings: Conform to ASTM D 3033 or D 3034, shall be SDR 35, with ends suitable for elastomeric gasket joints.

B. Pipe jointing materials: Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

C. Concrete Materials: Concrete materials shall be as specified in Division 3. Concrete shall have minimum compressive strength of 3,000 psi.

D. Metal Items: Frames and covers shall conform to Fed. Spec. RR-F-621 and shall be of cast iron.

E. Cleanouts: In accordance with the drawings, of the sizes and at locations indicated. Cleanouts in PVC pipe shall be PVC body with threaded plug.

## PART 3- EXECUTION

3.01 TRENCH EXCAVATION: Perform all excavation for the construction of trenches and all additional excavation required for structures forming a part of the pipeline. Trench excavation



shall conform to the requirements of Section 02200 and of Section 306-1 of Standard Specifications. Trenches shall be inspected by the Soils Engineer before proceeding with the work.

### 3.02 GENERAL INSTALLATION REQUIREMENTS:

A. Location of Piping: Install a continuous length of tracer wire for the full length of nonmetallic pressure pipe. Attach wire to top of pipe in such a manner that it will not be displaced during construction operations.

B. Survey line and grade: Grade controls and survey lines shall be provided by a licensed land surveyor obtained by the Contractor.

C. Protect existing piping and structures to prevent dirt or debris from entering new or existing piping and accessories.

#### D. Pipe Laying and Jointing:

1. Each pipe and fitting will be inspected before and after installation and those found defective will be rejected. Provide proper facilities for lowering sections of pipe into trenches. Lay pipe with the bell or groove ends in the upgrade direction. Adjust spigots in bells and tongues in grooves to give a uniform space all around. Blocking or wedging between bells and spigots or tongues and grooves will not be permitted. Replace by one of the proper dimensions any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint material. At the end of each day's work, close open ends of pipe temporarily with wood blocks or bulkheads.

2. Make joints with gaskets and assemble in accordance with the requirements of UNI- B-5 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

3. Install cleanouts and riser extension from pipe to cleanout at grade. Use PVC pipe and fittings. Install piping and box so cleanouts open in direction of the flow in the pipe. Set cleanout frames and covers in the ground one inch above finish grade. Set cleanouts in paving flush with the paving.

B. Tap connections: Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete.

3.03 BACKFILL AND COMPACTION: Perform in accordance with requirements of Section 02200 and with Section 306-1.3 of the Standard Specifications. In back-filling the trench take all necessary precautions to protect the pipe from damage or shifting.

3.04 CONNECTIONS TO EXISTING MAINS: Where connections are made between new work and existing mains, the connections shall be made by using special couplings, Rockwell Clamp and Coupling-Tapping Sleeves, and other fittings to suit the on-site conditions. Methods of connections to existing mains shall be as required by local codes.

### 3.05 FIELD TESTS AND SURVEYS:

A. General: Conduct field tests in presence of Architect, as specified herein.

1. Pipelines: Check each straight run of pipeline for gross deficiencies by holding a light in a manhole; it shall show a practically full circle of light through the pipeline when viewed from the adjoining end of line.

a. Leakage Tests: Test lines for leakage by exfiltration test. Fill the line to be tested with water so that the head will be at least 4 feet above top of pipe at upper end of pipeline section being tested. Allow filled pipe-line to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, re-establish the head and measure amount of water needed to maintain this water level during a two-hour test period. Amount of leakage, as measured by either infiltration or exfiltration test shall not exceed 0.2 gallon per inch of diameter per hour per 100 feet of pipeline. When leakage exceeds the amount specified, make satisfactory correction and retest pipeline section in the same manner as previously specified. Correct all visible leaks regardless of leakage test results.

b. Deflection Testing: Make a deflection test an entire length of installed plastic pipeline on completion of all work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Deflection of pipe in the installed pipeline under all external loads shall not exceed 4.5 percent of the normal inside diameter of pipe. Testing may be by either pull-through device or deflection measuring device.

B. Provide verification survey for each pipeline and accessories, as specified in Division

1. Show locations of lines, invert elevations, and locations of cleanouts.

3.06 CLEANUP: Upon completion of work, leave the site clean and clear of debris and construction materials.

END OF SECTION

## SECTION 02810

### IRRIGATION

#### Part 1 - GENERAL

##### 1.01 DESCRIPTION:

- A. The Work of this Section shall include the furnishing of all labor, materials, equipment and services necessary to provide complete automatic operating irrigation systems, including 120 volt electrical service to the controller, all as shown on the Drawings and as specified.
- B. The principal work in this section include: trenching; piping; gate valves; backflow prevention device; automatic controller and wiring; remote control valves (electric); sprinkler heads; quick coupler valves at 150' spacing; tests and adjustments; valve boxes; record drawings and colored controller chart encased in plastic.
- C. Related Work Specified Elsewhere:
  - 1. Planting: Section 02900.
  - 2. Electrical: Division 16.

##### 1.02 SUBMITTALS

- A. Materials List: The Contractor shall submit a complete materials list for approval by the landscape architect prior to performing any Work. Catalog data and full descriptive literature must be submitted whenever the use of items different than those specified is requested. Notarized certificate must be submitted by plastic pipe and fitting manufacturer indicating that material complies with the Project Specifications, unless material has been previously approved, and used on other projects by the landscape architect.
- B. Specifications, unless material has been previously approved, and used on other projects by the landscape architect.
- C. Material list shall be submitted using the following format example:

<u>Item</u>	<u>Description</u>	<u>Manufacturer</u>	<u>Model No.</u>
1	Pressure Supply Line	Lasco	Class 315 PVC
2	Lawn Head	Rainbird	1800

##### 1.03 RECORD DRAWINGS

- A. Record daily and accurately on one set of blue-line prints all changes in the Work constituting departures from the original Contract Drawings, including changes in pressure and non-pressure line locations.
- B. The changes and dimensions shall be recorded in a legible and workmanlike manner

to the satisfaction of the Owner's representative.

- C. Before the date of the final inspection, the Contractor shall transfer all information from the "as-built", convert to PDF format and put on the CD disc. The dimensions shall be made so as to be easily readable on the final controller chart. The original "as-built" plans and CD(s) shall be submitted to the Owner's representative for approval prior to the making of controller chart.
- D. The Contractor shall dimension from two (2) permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
  - 1. Point of connection to existing waterlines.
  - 2. Routing of irrigation pressure lines (dimension maximum 100 feet along routing).
  - 3. Gate valves.
  - 4. Sprinkler control valves.
  - 5. Quick coupling valves.
  - 6. Routing of control wires.
  - 7. Point of connection to existing electrical power.
  - 8. Related equipment (as may be directed).
- E. Maintain record prints on-site at all times.

#### 1.04 INSPECTIONS

- A. Inspections will be required for:
  - 1. Pressure test of irrigation main line.
  - 2. Coverage test.
  - 3. Final inspection/start of maintenance.
  - 4. Final acceptance.
- B. Inspection Requests: Contractor shall notify the Owner's representative in advance for requesting all inspections as follows:
  - 1. Pressure supply line installation and testing - 48 hours (2 working days)  
System layout - 48 hours (2 working days)  
Coverage tests - 48 hours (2 working days)

Final Inspection - 72 hours (three working days)

2. No inspection is to commence without "record" prints available on the site. In the event the Contractor calls for an inspection without up to date "record" prints, without completing previously noted corrections, or without preparing the system for inspection, the inspection may be cancelled and the Contractor back charged for the direct costs of all Owner's and consultant time lost, at the discretion of the Owner's representative.
- C. Closing in Uninspected Work: Do not allow or cause any of the Work of this Section to be covered up or enclosed until it has been inspected, tested and approved.
- D. Coverage test: When the sprinkler system is completed, the Contractor shall perform a coverage test in the presence of the Owner's representative to determine if the water coverage for planting areas is complete and adequate. The Owner's representative must accept this test before planting can commence.
- E. Hydrostatic test:
1. Prior to the installation of any valves, all pressure lines shall be tested under a hydrostatic pressure of 150 psi for a period of not less than two hours, with all ends of lines capped and the line fully charged with water after all air has been expelled from the line.
  2. No pressure line shall be backfilled until it has been inspected, tested, approved in writing and the mainline and valve locations have been noted on the "record" prints.
  3. The Contractor shall furnish the necessary force pump and all other test equipment, and shall perform the test.
- 1.05 TURNOVER ITEMS
- A. Operation and Maintenance Manuals:
1. Within a minimum of 14 calendar days prior to acceptance of construction, prepare and deliver to the Owner's representative all required descriptive materials, properly prepared in two individually bound copies in a three ring hard cover binder of the operation and maintenance manual. The manual shall describe the material installed and shall be in sufficient detail to permit operating personnel to identify, operate, and maintain all equipment. Catalog and parts lists and related manufacturer's information shall be included for each equipment item installed. Each complete, bound manual shall include the following information:
  2. Index sheet stating Contractor's address and telephone number, including a list of equipment names and addresses and telephone numbers of local manufacturer's representatives.

3. Complete operating and maintenance instructions on all major equipment.
4. Guarantee statement.

B. Supply as part of this Contract the following items:

1. 2 additional sprinkler heads of each type and spray pattern shown.
2. Two (2) wrenches for disassembly and adjustment of each type sprinkler head installed.
3. Two keys for automatic controller.
4. One (1) quick-coupler key with hose swivel for quick-coupler valve installed.
5. Two valve box cover keys.
6. Remove and turn over backflow device valve handles.
7. Documentation of Water Department's inspection and acceptance of backflow device.

C. The above items shall be turned over to the Owner's representative at the conclusion of the Project - Final Acceptance Inspection.

1.06 GUARANTEE

A. General:

1. The entire sprinkler system, including all Work done under this Contract, shall be guaranteed against all defects and fault of material and workmanship for a period of one (1) year following the filing of the Notice of Completion. All materials used shall carry a manufacturer's guarantee of one (2) years.
2. Should any problem with the irrigation system be discovered within the guarantee period, it shall be corrected by the Contractor at no additional expense within ten (10) calendar days of receipt of written notice from the Owner.
3. When the nature of the repairs as determined by the Owner constitute an emergency (e.g. broken pressure line) the Owner may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the Owner by the Contractor, all at no additional cost to the Owner.

## Part 2 - MATERIALS

### 2.01 GENERAL PIPING

- A. Irrigation design will incorporate 6" supply pipe connection to street water supply. Pressure supply lines downstream of backflow prevention units: Sch. 80 PVC.
- B. Non-pressure lines: Sch. 40 PVC. For all piping sizes up to three(3) inches. Three inches diameter and larger shall be class 315 pipe.
- C. Piping under paved areas.
  - 1. All lines under driveway and roadway pavement shall have a 24-inch minimum cover.
  - 2. Wherever possible, irrigation pipes shall be routed in the same trench to avoid excess trenching.
  - 3. Coordinate installation of sleeves under paved areas with General Contractor.
  - 4. Sleeves under hardscape shall be twice the size of piping being utilized.
  - 5. If the only piping installation is over 20 feet long, pressure testing is required for that section at the time of installation. Upon completion of piping installation, the entire system must be tested.
  - 6. If wires under paved areas cannot be continuous, all splices shall be enclosed in an approved box.
- D. Care shall be taken to ensure that all internal areas of piping remain free of dirt and debris during construction.
- E. All main irrigation piping shall be buried a minimum twenty-four (24) inches deep.
- F. All lateral piping should be buried minimum of eighteen (18) inches deep.
- G. All irrigation piping should be shadowed with four (4) inches of clean sand.
- H. On two (2) inch pressure main lines and above, an appropriate sized thrust block shall be used whenever a ninety (90) degree tee or elbow is installed.
- I. Any galvanized piping should be wrapped per industry standards. P.V.C. male adaptors may not be used at any point in the irrigation system. The use of a schedule 80 nipple cut to remove thread from one end and glued to slip coupling is acceptable.
- J. Double swing joints should be used at each sprinkler head location. The double swing joint shall be constructed with a marlex elbow closest to the lateral line and a p.v.c. elbow closest to the connection of the sprinkler head.

## 2.02 PLASTIC PIPE AND FITTINGS

### A. Identification markings:

1. Identify all pipe with the following indelible markings:
  - a. Manufacturer's name.
  - b. Nominal pipe size.
  - c. Class or schedule.
  - d. Pressure rating p.s.i.
  - e. NSF (National Sanitation Foundation) seal of approval.
  - f. Date of extrusion.

B. Pipe (solvent weld type): Manufacture from virgin polyvinyl chloride compound in accord with ASTM D 1784 or ASTM D 2241, cell classification 12454B; hydrostatic design stress rating not less than 2000 psi.

C. Fittings: Standard weight, Schedule 40, injection molded PVC Comply with ASTM D 1784, cell classification 12454B.

1. Threads, where required, injection molded type.
2. Tees and ells: side gated.

D. Threaded nipples: Standard weight, Schedule 80 with molded threads.

## 2.03 JOINT CEMENT

A. Primer: Weld on P-70 purple primer and shall be used on all glue joints.

B. Pipe cement: Weld on 711 P.V.C. industrial grade grey heavy bodied pipe cement shall be used on all main irrigation lines and any irrigation line under continuous pressure.

C. Pipe cement: Weld on 721 P.V.C. medium bodied fast setting blue glue shall be used on lateral lines or any irrigation lines other than main lines under continuous pressure.

D. Pipe cement: Christy's Brand Red Hot glue may be used as a substitute for the Weld On 721 P.V.C. medium bodied fast setting blue glue.



## 2.04 CONNECTION TO EXISTING IN (STRUCTURE) STUB OUT

- A. Contractor shall coordinate connection to existing stubbed out (phases) with general contractor. Such connections shall be made with standard-quality branch connections in conformance with recognized standard practice.
- B. Coordinate with other trades for the electrical conduits installed within the structure. Contractor shall pull all low voltage wires through existing conduit from controller location to outside landscape area and install a pull box (watertight). If any obstruction or differences shall be brought to the attention of the architect, in the event that this notification is not performed, the contractor shall assume full responsibility for any revision necessary.
- C. A separate water meter and backflow devices shall be supplied for irrigation systems.

## 2.05 ELECTRICAL WIRING AND SERVICE

- A. High voltage:
  - 1. Obtain new meter and pay costs involved, where required.
  - 2. Service to automatic controller will be provided by other trades. Provide final hookup to equipment.
- B. Low Voltage:
  - 1. Connections between controller and remote control valves shall be made with direct Sch. 40 in PVC pipe conduit burial AWG-UF, copper 600-volt wire.
  - 2. Splices, where permitted, shall be waterproof, using Rain Bird, Pen-Tite Connectors, or equal.
  - 3. Wire sizing shall be according to Manufacturer's recommendations, in no case less than No. 14.
  - 4. Ground wires shall be white in color.

## 2.06 WATER SERVICE

- A. The Contractor shall be responsible for making all point(s) of connection as indicated on the drawings.

## 2.07 GATE VALVES

- A. 1" valve: ASTM B 62 brass body, 150 lb. Saturated steam rated; with screwed joints; non-rising stem; screwed bonnet, solid disc. Provide with handwheel.

## 2.08 QUICK COUPLING VALVE

- A. Two piece type brass body, 150-lb. class, with 3/4-inch female threads opening at base. Valve design to permit operation with a special connecting device (coupler) designed for this purpose.
  - 1. Coupler threads: Lug type.
  - 2. Hinge cover: Provide with rubber-like vinyl cover when installed outside boxes.

## 2.09 AUTOMATIC CONTROLLER AND RELATED EQUIPMENT

- A. Controller(s) shall be as indicated on the drawings and shall be manufactured by ETwater Corp. The controller shall be installed per manufacturer's specifications, as shown on the drawings, and as specified herein.
- B. All controllers shall be ETwater Model#205W or 205T.
- C. The controller shall operate on a 117 VAC "10% at 60 Hz and be capable of actuating up to two 24 VAC, 7 VA, solenoids per station plus a master valves and pump start relay. The controller output and input shall be protected against severe electrical surge by a 2.0 amp self-retting fuse. The controller shall measure 14.5"L x 12.5"W x 4.75"D.
- E. The controller shall communicate two ways – from the on-site controller(s) to a central web server and from the central web server to the on-site controller(s).
- F. The on-site controller(s) access shall include, but not limited to , land-line telephone analog, wireless via the GSM network, power-line through 110 volt power, and Ethernet CAT 5 cabling capability.
- G. The central servers shall be located in two geographically different states of the United States to ensure backup protection against different common natural disasters that may occur in each of these regions.
- H. The controller shall be access local weather via the internet to a central server. The local weather source shall be monitored 24 hours a day, 7 days week.
- I. The central server shall be capable of computing a custom schedule on a station-by-station basis for each controller using local weather and irrigation scheduling algorithms that are based on detailed landscape profile for each station. The landscape profile shall be entered via a web interface that enables theuser to select six specific descriptive inputs for each station, including sprinkler or drip type, plant type, soil type, sun/shade condition, slope and precipitation rate.
- J. The controller will have available a user defined ET adjusted schedule option with ET Water picking cycle and soak intervals or user picking cycle and soak. The controller will have within this feature a rain event delay of 1 day to 99 days if it rains from 1/8"

to  $\frac{3}{4}$ " of an inch of rain.

- K. The controller will have a fixed schedule with run item from 1 minute to 255 minutes with the user to pick 1 to 7 days in a 7 day week.
- L. The custom schedule and user defined schedule shall be updated daily and communicated to the on-site controller(s).
- M. Current detection – The controller will have the ability to detect if a valve solenoid is connected and current is regular or if there is a current problem. Either (1) not connected or burned open which has low current reading or (2) a “short” condition which has a high current reading. The controller display panel will indicate OK (regular current), OC (open circuit – not connected) or SH (short). The controller will do the current test each time the controller runs and if a problem is detected an “alert” will be sent via email. This feature may also be used to test valve solenoids at the time of installation.
- N. Multiple Valve Operation in Manual Mode – The controller shall have multiple valve operation that will enable a manual test of multiple valves (e.g. stations 1 and 4 or stations 1, 4 and 6) at the time of install to determine if there is adequate pressure to run multiple valves at a time.
- O. The on-site controller(s) will execute the schedule(s) in a water window that has been set on the web site.
- P. Set-up, monitoring, adjustments will be accomplished from any PC via internet connection with the central server.
- Q. Standard connections for rain sensor, booster pump, master valve and flow sensor. Compatible with normally open or normally closed master valves, rain/ freeze or wind sensors (users are notified via email when irrigation is blocked or restarted).
- R. Optional flow monitoring service provides mainline break protection, individual station flow monitoring, and leak detection. Features include automatic shut-off in event of mainline break and email alerts for high flow, low flow, no flow, and leak conditions. Compatible with Data Industrial IR Series flow sensors and Bermad 910P or equivalent.
- S. The controller shall be capable of retrofitting into select controller brands without the need to re-wire the controller wires to field wires.
- T. The controller shall be capable of learning flow parameters by valve through a 3 minute system test operation. The learned flow shall be accepted by user via internet based access.
- U. The controller shall have station output terminal sized for up to 12 gauge wire.
- V. The controller shall have a LCD display to provide output verification for station being

irrigated.

- W. The controller shall include chassis-mounted grounding lug for added lightning protection.
- X. The controller shall include a built-in 120 VAC convenience outlet for optional powerline communication.
- Y. The controller shall be capable of dual-voltage for 120 VAC or 24 VAC.
- Z. All 24VAC output terminals shall have surge protection rated up to 4KV in accordance with IEC 6100-4-5 standard.
- AA. All outputs shall be protected by a 2.0 amp or less at 120 VAC.
- BB. Input power draw shall be 1.0 amp or less at 120 VAC.
- CC. Each valve station, master valve, and booster pump output terminal shall handle up to two 24 VAC solenoids.
- DD. The total controller output shall be 2.0 amps and may operate four solenoids including master valve and pump start relay.
- EE. The controller shall be supplied with three 1.5V batteries and has the capacity to maintain time and date for several months.
- FF. The controller shall have non-volatile memory to retain all programming information indefinitely.
- GG. The controller shall be capable of integrating an optional remote receiver or connector.
- HH. Controller must be properly grounded in the controller cabinet.
- II. Master valve must be wired to controller and flow sensor.

#### 2.10 Internet Based Features:

- A. Weather-based watering schedules with ET and rain adjustments automatically generated on a daily basis for all stations.
- B. The system shall include step-by-step configuration process enabling the system to generate customized watering schedule for each station to optimize water use and minimize runoff.
- C. Daily display of both ET (evapotranspiration) and rain data.

- D. The system shall include an interface for all critical functions—setting water windows, choosing blocked days, and making watering adjustments.
- E. Simple, intuitive navigation provides landscape maintenance contractor with ability to access any controller at any site from single web page.
- F. User-defined water window with option to include/exclude any station. Automatically carries over required irrigation if water window is exceeded.
- G. Establishment schedules with up to 8 start times per zone automatically revert to self-adjusting schedules after establishment period.
- H. Unlimited watering interval for weather-based schedules.
- I. Water budget adjustable from 50% to 400% in 5% increments on a station by station basis.
- J. Allowable depletion level adjustment from 15% to 50% for any station.
- K. Viewable 30-day watering history available for all stations.
- L. Automatic compliance with fixed-interval and day-of-the-week municipal water restrictions.
- M. Station copy feature to replicate settings from one station to any other station.
- N. Default or user-defined precipitation rates.
- O. Default Distribution Uniformity (DU) adjustable from 5% to 100% in 1% increments.
- P. Default root depth adjustable for all plant types.
- Q. Secure password-protected access ensures privacy of all client information.
- R. Security password overview privileges for more than one user.
- S. Controller to controller global scheduling capability feature to allow for global system adjustments by landscape settings including, but not limited to, head type, distribution uniformity, precipitation rate, plant type, root depth, slope factor, soil type, or shade.
- T. In manual mode, the ability to manual test operates multiple valves, simultaneously to determine maximum flow parameters.

2.11 Communication Features:

- A. Two-way Internet communication for downloading ET-based schedules, reporting irrigation and site data and generating alerts.
- B. The system shall be capable of communicating via wireless (GSM Network), standard analog telephone, or powerline (110V. wiring), and Ethernet CAT 5 cabling capability.
- C. Automatic email alerts to notify user(s) of various conditions. Alerts shall be categorized by severity level: courtesy service notification, warning attention required, urgent-attention required.
- D. Alerts via email and posted on user's account page on Manufacturer's website.
- E. Alert conditions include: any schedule changes made at controller, irrigation turned off at controller, loss of communication, rain sensor activation, and resumption of watering.
- F. Alerts for optional flow monitoring service includes shut-offs caused by possible mainline breaks; low flow, high flow, or unscheduled flow; slow leak (continuous flow over 24 hours); and incomplete flow sensor set-up.
- G. Controller should be compatible with Eicon brand remote control units as used by District Grounds personnel- cables or adaptors must be included for immediate use.

2.12 Stainless Steel Enclosure (where applicable):

- A. The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304 grade stainless steel. The main housing shall be louvered upper and lower body to allow for cross-flow ventilation. A stainless steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment.
- B. The backboard shall be mounted on four stainless steel bolts that will allow for removal of the backboard.
- C. The inside door area shall provide adequate storage for plans, operating instructions, and scheduling information.
- D. The enclosure door shall have a continuous stainless steel piano hinge, carriage bolted on one side, and a three point locking mechanism on the other side. The handle controlling the locking mechanism shall be located at the base of the door and be concealed within the surface of the door. A stainless steel cam style lock shall be mounted in the door and a provision for a padlock shall be included within the locking mechanism.

- E. The enclosure shall be manufactured with a continuous drainage channel which mates with a teardrop shaped, hollow center, water-tight, thermoplastic door seal. The above described product shall be a NEMA 3R Rain-proof enclosure, as listed by Underwriter Laboratories, Inc.
- F. Controller enclosures shall be "Strong Box" manufactured by V.I.T. Products. Inc.

2.13 Controller / Enclosure Assembly (where applicable):

- A. The number and location of the controllers shall be as shown on the drawings.
- B. All controller assemblies shall communicate via land-line phone or wireless communication.
- C. The controller assembly shall be pre-assembled by an authorized "Smart Controller" in a Strongbox stainless steel weatherproof, vandal resistant, lockable enclosure with flush mounted handle as manufactured by V.I.T. Products, Inc., per article 2.7. The complete assembly shall be listed by Underwriters Laboratories, Inc. with a 3R rating.
- D. The controller assembly (product #ICA series) shall consist of a stainless steel enclosure, stainless steel removable backboard, terminal interface board with radio receiver connector, key operated on/off switch, a ground fault circuit interrupter duplex receptacle. Ground rod, wire, and clamp shall be provided with two or multi-conductors paths only.
- E. The controller assembly shall include a 117 volt line surge protection.
- F. The controller assembly shall have an integrated master valve relay/pump start relay assembly when more than one controller is connected to the same master valve.
- G. The controller assembly shall include a flow sensor capable of direct controller connection.
- H. The controller assembly shall be covered by a five-year limited warranty. Warranty service shall be performed in the field where equipment is located.
- I. The bid shall include any website, satellite, etc., interface, and control fees for ten years.

2.14 REMOTE CONTROL VALVES

- A. All valves shall be Superior 950 series, non-pressure related valves, and sized as needed. Master valves shall be Superior 3100 prs normally open, pressure regulated valve, sized as needed. Master valves must be wired to controller and

flow sensor.

- B. An upstream shutoff valves (S.O.V.) shall be placed ahead of each control valve. This inline gate valve shall be a Nibco T-113-irr, all brass, sized as needed, with brass or galvanized nipples and installed between the valve and main line.
- C. All irrigation control wires must be sleeved under hardscape areas and tagged with I.D. number.
- D. Valve type: Spring-loaded, packless diaphragm activated, normally closed type with brass body, equipped with flow control and pressure regulator.
- E. Valve solenoid: 24 volt AC, 4.5 watt maximum, 500 milli-amp maximum surge, corrosion proof, stainless steel construction, epoxy encapsulated to form a single integral unit.
- F. Provide bleeder valve to permit operation in the field without power at the controller.

#### 2.15 VALVE BOXES

- A. Carson/ Brooks valve boxes may be used. No Dura brand valve boxes at any time. Box must be placed flush with grade and have a bolt in place to lock down the lid.
  - 1. Number placard for valve on control wire inside valve box.
  - 2. Valve number etched in irrigation box lid and/or the appropriate designation (i.e., quick connect, gate valve, isolation valve, etc.).
  - 3. Irrigation valve box lids screwed down for vandalism.

#### 2.16 OPERATING AND MAINTENANCE TOOLS

- A. Deliver the following items to the District when work is completed and prior to final acceptance of work:
  - 1. Two wrenches for disassembly and adjustment of each type of sprinkler head supplied.
  - 2. Two keys for each automatic controller.
  - 3. 4 couplers and matching hose swivels with globe valves.
  - 4. 3 keys for opening valve boxes.

#### 2.17 BOOSTER PUMP

The Booster Pump shall be a simplex water pressure booster system as designed and fabricated by Barrett Engineered Pumps. The system shall be a completely prefabricated



system with pump, piping, electrical, and structural elements. The entire booster pump assembly shall be UL Listed and Approved.

Electrical requirements for the pump system shall be site specific, based on pump requirements.

The pump shall be single stage end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal, back pullout design. Impeller shall be threaded directly to the end of the shaft. Pump shaft shall be stainless steel with no sleeve. Pump shall be directly coupled to a C-face electric motor.

Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall have horsepower ratings such that the motor will carry the maximum possible load to be developed under the designed pumping conditions and not overload the motor beyond the nameplate rating of the motor. Motor shall have a 1.15 service factor. The motor shall conform to the latest NEMA Standards for motor design and construction.

Pump Control Panel shall have a NEMA 4X plain front non-metallic enclosure with padlock latches. This includes power and control re-settable thermal circuit breakers, heavy duty magnetic starter with adjustable overload protection, hand-off-auto switch to select mode of operation, and heavy duty numbered terminal strips for power and control wiring lead terminations. Metal oxide varistor protected pump start relay(s) incorporated in panel to start pump with signal from each irrigation controller.

All system piping shall be type 304 stainless steel. All fittings shall be stainless, with unions or flanges to allow for system disassembly or major component removal. System shall incorporate an integral full pipe size bypass line with isolation valve to allow for pump removal and repair without disrupting water supply to system. Isolation valves shall be all brass quarter turn ball valves with hard chrome ball on lines 2" and less. Isolation valves shall be lug style butterfly valves with Buna-N elastomeric seats, ductile iron nickel coated disc, and stainless steel stem with handle and 10 position galvanized memory plate on lines 2½" and greater.

Flow activated paddle style magnetically coupled flow switch, sensitive to flows as low as 1 fps, mounted on piping, and interconnected to time delay relay to shut down pump on no-flow conditions, time delay relay adjustable from 0 to 5 minutes.

Pump system shall be mounted on a structural aluminum skid with mounting flanges on front and back to allow for mounting of skid to concrete pad. Skid equipped with pipe support on suction and discharge piping. All nuts and bolts and washers to be heavy zinc coated steel on skid and piping. Skid shall include mounting hardware for integral aluminum enclosure.

The system enclosure shall be vandal and weather resistant, marine grade aluminum alloy 5052-H32 construction, with rectangular punch-outs for viewing and heat dissipation. The enclosure shall be low profile hinged top design with padlock provision. The cover

shall be secured to the concrete pad with stainless steel hardware.

2.18 Pump Assembly shall include the following option(s):

(VFD) Where specified by the System Design Parameters, a Variable Frequency Drive system to receive feedback signal from system mounted stainless steel pressure transducer, and in conjunction with internal software driven PID control loop maintain customer adjustable constant system discharge pressure by varying the speed of the pump in response to varying system load.

The services of a factory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct the operating personnel. A startup report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the owner.

A booster pump shall only be used on cases where such a need is identified in the individual site data.

The individual site data will call out the correct booster pump specification.

The final booster pump location shall be determined in the field by the architect in conjunction with a District representative.

Coordinate the appropriate electrical service with the District representative.

Booster pump shall be installed per manufacturer's directions. Wire booster pump per all local codes.

Booster pump shall be installed in a vandal resistant enclosure.

Booster pump shall be tested for proper operation prior to acceptance. This shall include:

1. Demonstrate the start and stop functions of the pump.
2. Show the safety shut-off devices of the pump.
3. Show the integrated system protection devices of the pump.
4. Demonstrate the pump provides the required pressure to operate the irrigation system in an efficient manner.

### Part 3 - EXECUTION

#### 3.01 UTILITY SERVICES

- A. Contractor shall make connections to existing lines at locations indicated on drawings and make any minor changes in location as may be necessary due to actual site

conditions as a part of this contract.

- B. Make connections to existing electrical service. Make minor changes in location as may be necessary due to actual site conditions, as part of this work.

### 3.02 SITE REVIEW

- A. Before any work commences, a conference shall be held with the Landscape Architect and Contractor regarding general requirements of this work.
- B. Contractor's responsibility:
  - 1. Notify the Landscape Architect for the following reviews within 48 hours minimum notice.
    - a. Pressure supply line installation and testing.
    - b. System layout.
    - c. Coverage tests: Prior to landscaping planting.
    - d. Final review.
  - 2. Provide "walkie-talkie" equipment and/or personnel to maintain communication from review area to automatic controllers.
  - 3. Provide up-to-date record at each review.
- C. Examine surfaces for conditions that will adversely affect execution, permanence and quality of work.
  - 1. Verify that grading has been completed and the work of this section can properly proceed.
  - 2. Exercise extreme care in excavating and working near existing utilities. Contractor is responsible for damages to utilities which are caused by his operations or neglect. Check existing utility drawings for locations.
- D. Notify the Landscape Architect in writing, describing unacceptable conditions.
- E. Do not proceed with work until unacceptable site conditions are corrected or existing utilities are located.

### 3.03 LAYOUT

- A. All piping or equipment shown diagrammatically on drawings outside of planting areas shall be installed inside planting areas whenever possible.

- B. Lay out sprinkler heads and make any minor adjustments required due to differences between actual site conditions and the Drawings. Minor adjustments shall be maintained within the original design intent.
- C. Lay out each system using staking method as approved by Architect. Maintain and protect approved staking layout.

### 3.04 TRENCHING

- A. Excavate trenches to required depths. Follow approved layout for each system.
- B. Maintain bottom of trenches flat to permit all piping to be supported on an even grade continuously for full run.
- C. Where lines occur under paved areas, consider dimension to be below the subgrade.
- D. Coverage (provide as follows):
  - 1. Pressure supply lines (2-1/2 inches and smaller): 18"
  - 2. Non-pressure lines: 12"
  - 3. Control wire: 18"
  - 4. Sleeves: 36" below sub-grade

### 3.05 LINE CLEARANCES

- A. Provide not less than 4 inches clearance between each line and not less than 6 inches clearance between lines of other trades.
- B. Do not install parallel lines directly over any other line.

### 3.06 BACKFILLINGS

- A. Initial backfill: Clean, fine granular material as approved by Architect.
- B. Compact trench backfill to a dry density equal to adjacent undisturbed soil. Restore to adjacent grade, free of dips, depression, humps or other irregularities.
  - 1. Where acceptable soils exist, the Architect may authorize flooding in lieu of tamping.
  - 2. Compaction by truck or other vehicle is not permitted.
- C. Sand bedding for pipe:
  - 1. Under paved areas: Not less than 3 inches below and above the pipe.

### 3.07 INSTALLATION

- A. All plastic pipe and fittings shall be installed in complete accord with manufacturer instructions for same.
- B. Install backflow assemblies in shrub areas at minimum height permitted by local code.
- C. Routing of pressure supply lines as indicated on Drawings is diagrammatic. Install lines (and various assemblies) to conform to details on plan.
- D. Install all specified assemblies in accordance with the Drawings.
- E. Pressure supply steel pipe and fittings: Assemble using red lead and boiled linseed oil paste or an approved equivalent. Apply to male threads only.
- F. Plastic pipe and threaded fittings: Assemble using Teflon tape applied to male threads only.
- G. Tape all open ends of pipe during installation to prevent entry of any foreign matter into the system.
- H. Quick coupling valves: Unless otherwise indicated, locate valves within 12 inches of hardscape.
- I. High pop risers: Locate and install as indicated on Drawings.
- J. Sprinkler heads:
  - 1. Locate approximately as indicated on Drawings. Do not exceed the maximum or minimum spacing indicated by Manufacturer.
  - 2. Elevate full heads in lawn areas to a minimum of 3 inches above grade.
  - 3. Elevate heads along curbs, walks, paving, etc.
  - 4. Lower raised heads within 10 days after notification by Owner:
  - 5. Pop-up sprinkler with piston drive installation safety, security and regulations as per manufacturer's recommendations.

### 3.08 EXISTING PAVEMENTS

- A. Piping under existing pavements may be installed by jacking, boring or by hydraulic driving except as otherwise specified or directed.
- B. Secure District's permission prior to cutting or breaking existing pavements.

- C. Make all cuts clean using power saws. Make cuts at approved locations only.
- D. Replace and restore all surfaces to original condition, including grades and landscaping.
  - 1. Restoration work shall match the original work in every respect, including type, strength, texture and finish.

### 3.09 VALVE BOXES

- A. Provide at all locations indicated.
- B. Fill area under box with minimum of 3 cubic feet of pea gravel before box is installed.
- C. Identification:
  - 1. Stencil identification number of each remote control valve box in 2 inch high characters (letters and numbers).
  - 2. Stencil using epoxy-resin based paint, colors as selected by the Architect.
  - 3. Do not stencil boxes until identification system has been approved by the Architect.

### 3.10 LOW VOLTAGE WIRING

- A. Place wiring in the Sch. 40 PVC conduit at same trench and routing as the pressure supply lines unless otherwise approved.
  - 1. Install wiring prior to main lines whenever possible.
  - 2. When more than one wire is placed in a trench, tape wires together at 12 feet o.c., maximum.
- B. Provide a 12-inch expansion loop at each connection and directional change.
- C. Use a continuous wire between controller and remote control valves.
  - 1. Except as otherwise approved, do not splice wire at any point.
  - 2. At locations where splicing is allowed, make splices within an approved box.
- D. Each controller shall be provided with separate ground wire.

### 3.11 SYSTEM FLUSHING

- A. After all sprinkler pipelines and risers are in place and connected, and prior to installation of sprinkler heads, thoroughly flush all lines with a full head of water.
- B. Do not install sprinkler heads lines have been flushed to the satisfaction of the Architect.

### 3.12 SYSTEM ADJUSTMENT

- A. Valves: Adjust flow control for proper operation.
- B. Heads: Adjust for alignment and coverage.
- C. If it is determined that coverage could be improved by a nozzle change, make sure such changes or arrange with the manufacturer to have changes made as part of the work of this Section.
  - 1. Make changes prior to any planting.

### 3.13 PRESSURE TESTS

- A. Provide all equipment necessary to test systems, including force pump.
- B. Perform all hydrostatic tests in presence of the Architect.
- C. Do not backfill over any line more than is necessary for testing until it has been inspected, tested, and approved.
- D. Do not install remote control valves, quick couplers or any other valve assembly until testing is complete and approved.

### 3.14 COVERAGE TESTS

- A. Perform coverage tests after sprinkler system is completed, but prior to any planting, and perform testing in the presence of the Architect.
- B. Test systems to assure that all lawn and planting areas are watered completely and uniformly.
- C. Make all necessary adjustments, including realignment of heads to provide required coverage as directed by Architect.

### 3.15 POST-INSTALLATION CHECK

- A. After installation of the drip system, the following procedure should be followed:
  - 1. System Flush: Immediately after installation, the main drip hose shall be flushed. This may be done by activating the system, opening the flush valve at the end of the drip hose line, and permitting the water to flow. Flow should be

maintained until the water is visually clear and free of contamination. If there is no valve at the end of the line, the end connection, of whatever form, should be removed and the water permitted to flow until clear. After flushing the line, the filter screens should be cleaned. If the filter has a flush valve, this can be done by opening the flush valve to the full open position and letting water flow through the filter until it is clear and free of contamination. Water should flow for at least 10 seconds. If the filter has no flush valve, remove the filter elements from the filter. Visually inspect the element for contamination. If the element is partially clogged, wash and/or replace the element and reassemble the filter. If the element contains algae, wash in household bleach solution before reassembly.

### 3.17 OPERATING INSTRUCTIONS

- A. Train the District's maintenance personnel in proper operation of all major equipment, including recommended winterization procedures.
- B. Provide this training at the District's convenience.
- C. Submit written evidence that training has been successfully completed.

### 3.18 CLEAN-UP

- A. Upon completion of the work, restore ground surfaces to required elevations and remove excess materials, debris and equipment from the site to satisfaction of Architect.

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 padlock 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 02835

### METAL FENCE AND GATES

#### PART 1 – GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide metal fencing and gates, indicated on drawings as “steel tube,” complete as shown and specified.

A. Work Specified In This Section

1. Rail and picket fences and swinging gates.
2. Galvanized screen mesh on fencing and gates as shown.
3. Layout and staking of fence lines.
4. Excavation and backfill for post foundations.
5. Concrete post foundations.

B. Related Work Specified Elsewhere: Hardware for swinging gates, except as specified herein.

1.02 QUALITY ASSURANCE:

- A. Manufacturer’s and Installer’s Qualifications: Work of this section shall be fabricated and installed by a specialty firm having not less than 5 years local experience in fabrication of metal fencing and gates. Provide list of not less than five projects of similar complexity, including location, owner’s name and address and contact party.
- B. Gates in path of travel must comply with door requirements. CBC Section 11B 404.1/ADAAG 4.13.3.
- C. Hand-activated gate opening hardware, handles, pulls, latches, locks, and other operating devices on accessible gates shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate. CBC Section 11B-404.2.7.
- D. The lever of lever actuated latches or locks shall be curved with a return to within ½” of the (face of) gate to prevent catching on clothing or persons. California Referenced Standards code. T-24 Part 12, Section 12-10-202, Item (F).
- E. The bottom 10” of an accessible gate shall have a smooth, uninterrupted surface on each side. The bottom of the gate shall be within 3” of the finish surface of the path of travel. The maximum effort to operate a gate shall not exceed 5 lbf (22.2N). CBC 11B-404.2.9

1.03 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings fully detailing work of this section. Indicate hardware type, locations and mounting. Indicate accessories, fastenings, and welding. Show complete installation details including location of each post, depth and size of footings, and locations and attachment of hardware.
- B. Metal Samples: Submit samples of rail and picket fencing and gate, not smaller than 12” square, showing one corner, pickets and rail. Sample shall show welding, workmanship and finish. Submit sample of corrugated metal gate, 12” square showing one corner, corrugated metal and finishes.

1.04 PRODUCT DELIVERY AND HANDLING: Protect items from damage during shipping, handling and storage. Work showing dents, creases, deformations, weathering, or other defects is not acceptable.

## PART 2 – PRODUCTS

### 2.01 MATERIALS

- A. The materials for fence framework, pickets, rails, gates and posts shall be manufactured from coil steel having a minimum yield strength of 50,000 psi. The steel shall be galvanized in accordance with ASTM A 526 with a minimum zinc coating weight of 0.90 ounces per square foot (coating Designation G-90), hot-dip process.
- B. The material for fence frame shall be hollow steel sections, sized as indicated.
- C. Material for fence pickets shall be hollow steel sections, set into frame at top and bottoms. Post and picket spacing shall be as indicated. Continuous welding or rubber grommets shall be supplied to seal all picket-to-rail intersections.
- D. Concrete: 3,000 psi at 28 day for foundations at each post (no pea gravel).

### 2.02 FABRICATION

- A. Fencing and gates shall be custom fabricated as detailed, or, subject to approval, may be products of one of the following, providing fence configuration, design and section sizes are as indicated.

Ameristar Fence Products  
P.O. Box 581000  
Tulsa OK 74158  
(800) 321-8724  
FAX (877) 926-3747

Fortress Fence Products  
King Architectural Metals  
6340 Valley View Street  
Buena Park, CA 90621  
(714) 670-8980

Builders Fence Company Inc.  
8937 San Fernando Rd.  
Sun Valley, Calif. 91352  
818-504-3700  
[www.buildersfence.com](http://www.buildersfence.com)

- B. Design components to allow for expansion and contraction for a minimum ambient temperature range of 100 degrees F. without causing buckling, excessive opening of joints, and overstressing of welds and fasteners.
- C. Pickets, rails, and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

- D. Grommets shall be inserted into the pre-punched holes in the rails and pickets shall be inserted through the grommets so that pre-drilled picket holes align with the internal upper raceway of the rails using an alignment jog to assure square and plumbness of components. Retaining rods shall be inserted into each rail so that they pass through the predrilled holes in each picket.
- E. Gates shall be fabricated using panel material and gate ends having the same outside cross-section dimensions as the fence rails. Each upright and rail intersection shall be joined by welding. Each picket and rail intersection shall also be joined by welding.
- F. Drill suitable vent holes in underside of all tubular bottom rails and hot-dip galvanize.
- G. Fabricate items to design shown. Furnish members in longest lengths commercially available within the limits shown and specified. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items. Provide openings, cut-outs, and tapped holes for attachment and clearances required for other work. Prepare members for the installation and fitting of hardware. Provide reinforcement to support cut edges where required. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
- H. Welding: Conform to AWS D1.1, as modified by referenced AISC Standards, and as indicated or noted on drawings. Unless otherwise indicated or specified, weld joints by shielded electric-arc method. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces. Grind exposed welds subject to contact to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds and other exposed welds except as specified. Cut out defective welding and replace.
- I. Joining: Miter or butt members at corners. Where frame members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
- J. Cutting and Fitting: Accurately cut, machine and fit joints, corners, copes, and miters. Fit removable members to be easily removed. Design and construct field connections as indicated on approved submittals. Fit pieces together as required. Joints shall be firm when assembled. Conceal joining, fitting and welding on exposed work. Do not show rivets and screws on the exposed face. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.
- K. Make threaded connections up tight so threads are entirely concealed. Provide Phillips flat head countersunk bolts and screws in exposed work and elsewhere as required, unless otherwise indicated.

### 2.03 PEDESTRIAN GATES:

- A. Fabricate gates of material to match fencing. Provide 1/8" thick steel full welded lock and strike boxes, finished same as frame; coordinate required sizes and shapes with Section 08710. Drill suitable vent holes in underside of bottom rails and hot-dip galvanize. Equip with heavy-duty galvanized malleable iron or steel pintle hinges.



- B. Gate Hardware for swinging gates in the path of travel: Gates in the path of travel shall conform with exit door requirements, CCR Title 24, California Building Code. Sections 1003.3.2 and 1133B.1.1.1.4. Hardware shall not require pinching, grasping or twisting action to operate.
1. Provide panic hardware, Von Duprin No. 9NL, of solid brass or other material suitable for exterior exposure, as indicated on drawings.
  2. Provide plates of solid or perforated metal as indicated, on one or both sides of the gates, to prevent operating exit device from ingress side when gate is locked.
  3. Provide hydraulic gate closer, Sentinel No. SN 55 SL, or equal, of solid bronze or other material suitable for exterior exposure.
  4. Provide solid kick plates, 10 inches minimum high and 3 inches maximum from the paving on both sides of the gate, or provide a sign on or adjacent to gate stating that "This gate is to remain locked in the open position during business/school hours during any public function." The sign shall be mounted at 60 inches above grade on or adjacent to the gate.
- 2.04 FINISH OR RAIL AND PICKET FENCING AND GATES: Galvanized fencing and gates shall be given a six stage pretreatment/wash (with zinc phosphate) followed by an electrostatic spray application of a two coat powder system. The base coat shall be a thermosetting epoxy powder coating (gray in color) with a minimum thickness of 2-4 mils. The top coat shall be polyester powder coat finish with a minimum thickness of 2.4 mils. The color shall be as selected by Architect. Coated galvanized framework shall have a salt spray resistance of 3,500 hours using ASTM B 117 without loss of adhesion.

### PART 3 – EXECUTION

- 3.01 INSPECTION: Report in writing those conditions that prevent or interfere with correct installation of work of this section.
- 3.02 PREPARATION: Lay out the lines and grades for the fencing to conform to the drawings and the on-site conditions. Obtain approval before proceeding.
- 3.03 INSTALLATION: Conform to approved submittals unless more stringent requirements are indicated or 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 spacing 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 02520. Center and align posts in holes 3 inches above bottom of excavation. Check posts to insure that they are set level. 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. Panels shall be attached to posts using panel brackets supplied by the bolt-on hardware supplied by manufacture.

3.04 CLEANING AND PROTECTION: Provide exposed finished surfaces free from results of welding and stains. Clean and protect exposed surfaces at completion of work. Restore protective coverings damaged during shipment or installation of the work. Remove protective coverings immediately prior to final acceptance, unless otherwise directed.

END OF SECTION

SECTION 02840  
PARKING BUMPERS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide parking bumpers as indicated, specified and required.

1.02 SUBMITTALS:

- A. Product Data: Submit technical data and installation instructions. Submit technical data on fasteners.

PART 2 – PRODUCTS

2.01 PARKING BUMPERS:

Standard product units cast of minimum 3500 psi concrete and reinforced full length to within 3” of ends with not less than two deformed No. 4 reinforcing bars, units about 7-1/2” wide and 5-1/2” high with the upper portion of sides beveled and stake holes located 8” to 11” from ends.

PART 3 – EXECUTION

3.01 INSPECTION:

Report in writing all conditions that prevent or interfere with correct installation of work of this section.

3.02 INSTALLATION:

Set bumpers on asphalt concrete with two 1/2" diameter galvanized steel rods or pipes, or equal, driven to minimum 12” penetration into subgrade.

END OF SECTION

## SECTION 02846

### SURFACE APPLIED TACTILE PANELS

#### PART 1 - GENERAL

##### 1.01 SUMMARY:

Division 1 applies to this Section. Provide ADA approved, surface applied tactile panels on new and existing concrete where indicated.

##### 1.02 SUBMITTALS:

- A. Product Data: Submit manufacturer's literature describing products, installation procedures and routine maintenance. Submit application recommendations for each type of adhesive and sealant proposed for use.
- B. Samples: Submit 3 samples of full surface applied tactile panels of the kind proposed for use. Submit one tube or can of each type adhesive and sealant.
- C. Shop Drawings: Provide shop drawings showing fabrication details; composite structural system; plans of panel placement including joints, and material to be used as well as outlining installation materials and procedure.
  - 1. Panel pattern shall be designed and shown between existing expansion joints with panel rib dimension used for the cut size of panels.
- D. Material Test Reports: Submit test reports from approved independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. Test reports shall be conducted on a surface applied tactile panel system as certified by a qualified independent testing laboratory.
- E. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile panel and accessory as required.
- F. Certification: Submit evidence of acceptance under Title 24 for tactile panels.

##### 1.03 QUALITY ASSURANCE:

- A. Provide surface applied tactile panels and accessories as produced by a single manufacturer.
- B. Installer's Qualifications: Engage an experienced Installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed installations similar in material, design, and extent to that indicated for Project. Manufacturer's supervisor shall be present at initial pour.
- C. Americans with Disabilities Act (ADA): Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with

Disabilities Act (Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces. In addition products must comply with Title 24 requirements regarding pattern, color and sound on cane contact.

1.04 DELIVERY, STORAGE AND HANDLING:

- A. Panels shall be packaged to prevent damage in shipment and handling. Finished surfaces shall be protected from damage, and panel type shall be identified by part number.
- B. Panels shall be delivered to location at building site for storage prior to installation.

1.05 SITE CONDITIONS:

- A. Environmental Conditions and Protection: Install panels only when temperature is above 40 degrees F and rising so that the ambient temperature on site will be above 40 degrees for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile panel material in spaces where they will be installed for at least 48 hours before beginning installation.
- B. Cleaning materials shall have comply with SCAQMD requirements for low VOC solvent content and low flammability if used on the site.

1.06 WARRANTY:

Furnish manufacturer's written warranty covering surface applied tactile panels for a period of 5 years from date of final completion. Warranty shall include defective work, breakage, deformation, fading and chalking of finishes, and loosening of panels.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

ARMOR-TILE  
300 International Drive, Suite 100 •  
Williamsville, NY 14221 •  
Phone: 1-800-682-2525

2.02 MATERIALS:

- A. Vitrified Polymer Composite (VPC) Panels: "Armor-Tile Model ADA-M001" or equal, manufactured by Engineered Plastics, Inc. Epoxy polymer composition with an ultra violet coating employing aluminum oxide particles in the truncated domes:
  - 1. Water Absorption of Panels when tested by ASTM-D 570 not to exceed 0.35%.
  - 2. Slip Resistance of Panels when tested by ASTM-C 1028 the combined wet/dry static co-efficient of friction not to be less than 0.80.

3. Compressive Strength of panels when tested by ASTM-D 695-91 not to be less than 18,000 psi.
  4. Tensile Strength of Panels when tested by ASTM-D 638-91 not to be less than 10,000 psi.
  5. Flexural Strength of Panels when tested by ASTM-C 293 not to be less than 24,000 psi.
  6. Chemical Stain Resistance of Panels when tested by ASTM-D 543-87 to withstand without discoloration or staining – 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum and red aerosol paint.
  7. Abrasive Wear of Panels when tested by BYK – Gardner Tester ASTM-D 2486 with reciprocating linear motion of 37 cycles per minute over a 10” travel. The abrasive medium, a 40 grit Norton Metallite sand paper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block to be 3.2 lb. Average wear depth shall not exceed 0.030 after 1000 abrasion cycles measured on the top surface of the dome representing the average of three measurement locations per sample.
  8. Fire Resistance: When tested to ASTM E 84 flame spread be less than 25.
  9. Gardner Impact to geometry “GE” of the standard when tested by ASTM-D 5420-93 to have a mean failure energy expressed as a function of specimen thickness of not less than 450 1bf/in. A failure is noted if a hairline fracture is visible in the specimen.
  10. Accelerated Weathering of Panels when tested by ASTM G 26 for 2000 hours shall exhibit the following result – no deterioration, fading or chalking of surface of panels.
- B. Adhesives: Heavy duty elastomeric polyurethane sealant as manufactured by Boiardi, Mapei, or Bostik.
- C. Color: Unless otherwise indicated, panels shall be yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the panel.
- D. Stainless steel low profile expansion anchors 1/4 inch diameter by 2-1/8 inch long to be positioned in the molded recess of fourteen truncated domes per panel minimum.
- E. Heavy duty elastomeric polyurethane sealant as manufactured by Boiardi, Mapei, or Bostik.

## PART 3 – EXECUTION

### 3.01 PREPARATION OF SURFACES:

Concrete to receive surface applied tactile panels shall be clean, free from dust, dirt, efflorescence and foreign materials.

- A. Do not install tactile panels on asphalt concrete paving. Where occurs, remove and replace with 4" thick concrete paving.

### 3.02 INSTALLATION:

- A. The application of all adhesives, sealants and mechanical fasteners shall be in strict accordance with manufacturers recommendations as approved.
- B. Lay out area to receive panel and mark with an indelible felt pen a reference line for the saw cut to be made.
- C. Make saw cut in existing substrate straight and true. Ensure all dimensions and tolerances are as shown on the contract drawing. The saw cut at the leading edge of the installed panel shall be approximately 1/4" wide x 3/4" deep and 2'0" from the platform edge. A trial of the saw cut approximately 10' long shall be done on each platform to allow for checking dimensions and fitting.
- D. After the saw cut is made, the surface within the saw cut is ready for planing. Setting the diamond head planer to the appropriate depth, plane approximately 10 feet slab. Use two of the tactile panels as a template to check all tolerances are within specified amounts. Make necessary adjustments and continue to plane slab depression ensuring planing is straight and true and the depth of the cut is within tolerances.
- E. After planning has been completed, the surface shall be vacuumed and flushed with clean clear water, free from all dirt and debris. Inspect all surface and saw cut for obtrusions or foreign matter. If obtrusions are present, promptly grind away, making sure saw cut is not chipped or damaged.
- F. Immediately prior to installing the surface applied tactile panels, all surfaces shall be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oils, grease, sealers and determined to be structurally sound before the application of the setting adhesive. The setting adhesive requires that the substrate and the ambient temperature are 40 degrees F minimum.
- G. Spread the adhesive to provide complete coverage over the planed concrete surface and platform edge, using a clean, well-maintained 1/4" x 1/4" V notch trowel. The adhesive is also to be applied to the leading edge saw cut to a depth of 1/2" for proper panel embedment.
- H. Inspect the panel and clean with acetone all dust and other contaminants from the surfaces to be adhered, then set the panel in place, true and square to the platform edge. Drill holes true and straight to the depth required using the recommended bit with holes located by the molded recesses provided in the panel. Clean dust from the holes to provide clear passage for the anchor.

- I. Mechanically fasten panels to the floor or slab surface using a punch pin and hammer to set the stainless steel impact anchors provided. Ensure the fastener has been set to full depth, straight and true. Care should be taken when setting the fastener to avoid any inadvertent blows with the hammer to the panel surface.
  - J. The leading edge of the panel should be checked to ensure that the tolerance provided is in accordance with the contract drawings. Adjustment to the panels leading edge is accomplished with a small shim driven into the leading edge saw cut to wedge the panel flange against the side walls of the groove and hold the panel to the desired elevation.
  - K. All subsequent panels shall be similarly set. Maintain a gap of 1/8" between panels for expansion and contraction.
  - L. Following the installation of the panels and allowing the panel setting adhesive 12 hours for curing, the urethane sealant system color matched to the adjacent floor finish should be applied to the leading edge saw cut to finish the panel flush with the adjacent floor finish. Follow the manufacturer's recommendations when mixing or applying the sealant system and ensure that the joint is clean and free of debris, and any excess adhesive is cut away to provide sufficient depth for the sealant in the saw cut in accordance with the contract drawings.
- 3.03 CLEANING AND PROTECTING:
- A. Protect panels against damage during construction period. Do not permit traffic on panels until adhesives have fully set.
  - B. Protect panels against damage from rolling loads following installation by covering with plywood or hardwood.
  - C. Clean tactile panels not more than 4 days prior to date of substantial completion. Use methods recommended by panel manufacturer.

END OF SECTION



SECTION 02870  
SITE FURNISHINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions a Division 1 specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Skate Stop
2. Concrete Tree Well Cover : Manufactured by Quikcrete Products Corp.
3. Concrete Table and Bench: Manufactured by Dura Art Stone, Inc.

1.3 SUBMITTALS

A. Section 01330 – Submittal Procedures.

B. Product data for each type of product specified, including manufacturers installation instructions.

1.4 WARRANTY

A. Section 01785 – Warranty Procedural Requirements.

B. Submit manufacturer's guarantees/warranties.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirement provide products by one of the following approved Manufactures listed below and conform to Local Regulatory agencies:

B. Skate stop.

1. Provide skate stop from Skate Stoppers.

- a. Skate Stoppers.  
1444 Pioneer Way, Ste.13  
El Cajon, CA 92020-1640  
Tel. (619)447-6374 Fax. (619)447-6396  
[www.skatestoppers.com](http://www.skatestoppers.com)

- b. Concrete Tree Well Cover : Manufactured by Quickcrete Products Corp.  
Finish: CI Natural Concrete with T3 Santa Fe sandblast finish. (909)737-6240.
- c. Concrete Table and Bench: Manufactured by Dura Art Stone, Inc.  
Finish: S-17 mojave sand with LSB light sandblast finish. (909) 350-9000.

## PART 3 EXECUTION

### 3.1 PREPARATION

A. Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions, and directions for installing items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project site.

### 3.2 INSTALLATION

- A. Locate and place units plumb, level, and in alignment with adjacent construction.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to Protect sheet metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

END OF SECTION

SECTION 02880  
PLAYGROUND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION: Division 1 applies to this Section. Provide playground equipment, as indicated, specified, and required.

A. Work In This Section: Principal items include playground equipment for Kindergarten, Elementary & Upper grades children.

B. Related Work Specified Elsewhere:

1. Rubberized surfacing on play equipment areas.
2. Concrete for equipment foundations.

1.02 QUALITY ASSURANCE: Playground equipment shall be installed by a firm having not less than 5 years experience in installation of playground equipment similar to that specified herein, and trained by the manufacturer of specified equipment.

1.03 SUBMITTALS:

A. Product Data: Submit for each item, including technical data and installation instructions. Submit printed specification data for each component. Submit technical data on adhesives and fasteners.

B. Shop Drawings: Submit detailed shop drawings of each item of equipment. Provide plans with model numbers, descriptive labels, component names, and deck heights. Show component parts, connection devices, welding, and colors. Show complete installation and anchorage details. Coordinate numbering of parts and components with technical data specified above.

C. Certification:

1. Submit IPEMA certificates attesting that equipment furnished under this section is in compliance with ASTM F 1487.

2. Submit evidence of installer's qualifications, including list of similar projects installed over the past 5 years, and certification of training and acceptance by manufacturer.

3. Submit certification showing compliance with CPSC requirements and ADA "Final Accessibility Guidelines for Play Areas" requirements.

D. Samples

1. Submit color cards showing available colors for each item.
2. Submit 12 inches square or 12 inches long, sample of each finish in each color selected.

E. Maintenance Materials: Provide the following:

1. Finish Paint: Provide two 4.5 ounce cans of aerosol spray paint matching each color used on the project for touch-up purposes.

2. Primer: Provide two 4.5 ounce cans of rust resistant gray primer spray aerosol as a first coat for component touch-up.

3. Graffiti Remover: Provide two 8 ounce container of liquid graffiti remover. Ingredients consist of biodegradable surfactans, solvents, and citrus distillate.

4. Sandpaper: Provide two sheets each of 80, 100, and 150 grit sandpaper.

5. Hardware for Pipe Systems: Provide a bag of assorted hardware, hex wrenches and screw driver bits of all sizes used on the project.

F. Maintenance Instructions: Conform to requirements of Section 01730. Provide a 3 ring binder containing system guidelines, a structure drawing, installation instructions, maintenance documents, and warranty information. Include playground safety tips, preventive maintenance schedule, and inspection check list.

1.04 WARRANTY: Refer to Section 01740. In addition to warranties specified in Section 01740, provide warranties as follows:

A. Lifetime Warranty against structural failure due to weather corrosion or defects in materials and workmanship on aluminum deck posts, steel deck posts, clamping/fastening, and associated fastening hardware.

B. 15 Year Warranty against structural failure due to weather corrosion or defects in materials and workmanship on steel support legs and components on play system steel components including railings, rungs, and rigid climbers.

C. One Year Warranty against structural failure caused by defective materials or defective workmanship on main support materials and decks and seats for swings, and moving parts including swing hangers, swivels, chains, whirls, trolleys and flexible climbers.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER (DISTRICT STANDARD):

Playworld (Manufacturer)  
1000 Buffalo Road  
Lewisburg, PA 17837-9795  
(800) 233-8404

Dave Bang Associates, Inc. (Distributor)  
1885 North Main St.  
Orange, California 92865  
(800) 669-2585  
Email: info@davebang.com

2.02 EQUIPMENT: See drawings for type, style, configuration, size and height of playground equipment, structure or modular unit. Colors shall be as indicated.

## PART 3 – EXECUTION

3.01 INSPECTION: Report in writing all conditions that prevent or interfere with correct installation of work of this section.

3.02 INSTALLATION: Locate as shown. Install each item of equipment as detailed on drawings, and as shown on approved submittals. The installation shall conform to CPSC guidelines for public playgrounds.

A. Anchor playground equipment to the ground using concrete footings in accordance with approved manufacturer's installation instructions. Unless otherwise noted, primary footings (at 6x6 posts) shall have a minimum diameter of 15 inches and a minimum depth of 18 inches below the resilient surface. Secondary footings (galvanized steel tubing support at slide brackets, climbers, and similar items) shall have a minimum diameter of 12 inches and a minimum depth of 18 inches below the resilient surfacing.

B. Provide a concrete coverage of 12 inches minimum at all recycled plastic posts and 8 inches minimum at all metal posts. Provide a minimum clearance of 3 inches minimum from the edges of all steel posts to grade and 2 inches minimum from all edges of recycled plastic posts to grade. Concrete used for footings shall have a minimum strength of 3,000 psi.

END OF SECTION

## SECTION 02900

### PLANTING

#### Part 1 - GENERAL

##### 1.01 DESCRIPTION:

- A. The Work required is indicated on the Plans and includes, but is not necessarily limited to: soil preparation; finish grading; weed control chemicals; planting trees; staking trees; planting shrubs and groundcover; turf; wood bark mulch; lawn edging; maintenance; plant establishment; guarantees; and replacements.
- B. Related work, specified in other sections:
  - 1. Earthwork grading: Section 02210.
  - 2. Irrigation: Section 02810.
- C. Quantities given for plant materials specified for "on center" spacing is shown for convenience only and are subordinate to the spacing given. Check and supply sufficient number of plants to fulfill spacing requirements.

##### 1.02 WARRANTY

- A. Trees, shrubs, and plant materials, shall require unconditional 2-year installation warranty on recordation date of the notice of completion.
- B. Warranty periods commence from the time of final inspection, at the successful completion of the maintenance period.
- C. Replace, as soon as weather permits, dead plants and all plants not in vigorous condition as noted during the warranty period.
- D. Plants used for replacement shall be same kind and size as originally planted. They shall be furnished, planted, and fertilized as specified and guarantee.

##### 1.03 SOILS TEST

- A. The Contractor shall notify the Owner's representative upon completion of fine grading and prior to commencement of soil preparation work. The Contractor will obtain agronomic soils tests for all planting areas after completion of fine grading and prior to start of soil preparation work. Tests will be performed by an approved agronomic soils testing laboratory and will include a fertility and suitability analysis with written recommendations for soil preparation, planting backfill mix, auger hole requirements, and post plant fertilization program. The soils report recommendations

shall take precedence over the minimum amendment and fertilizer application rates specified herein only when they exceed the specified minimums. Contractor shall allow a minimum two-week period for the soils testing work commencing upon acceptance of the fine grading.

## Part 2 - PRODUCTS

### 2.01 GENERAL

- A. Submit samples of soil additives and plants for inspection and store on the site until furnishing of materials is completed. Delivery may begin upon approval of samples or as directed by the Owner's representative.
- B. Forward copy of delivery slips on all material used on project to Owner's representative.
- C. Substitution in plant material will not be permitted unless approved in writing by the Owner's representative.
- C. Insure that all materials will be reserved for the project.

### 2.02 SOIL AND SOIL AMENDMENTS

- A. Commercial fertilizer: Shall bear the manufacturer's guaranteed analysis and shall meet the following minimum requirements; for soil conditioning, 6% nitrogen, 20% phosphoric acid, and 20% potash (Best's Cropmaker or equivalent); for maintenance fertilization, BIDU Coarse Grade, 16% nitrogen, 6% phosphoric acid and 8% potash.
- B. Planting fertilizer tablets: Tightly compressed, long lasting, slow-release fertilizer tablets with an analysis of 20% nitrogen, 10% phosphoric acid and 5% potash (Agri-form or equivalent).
- C. Organic amendment: Nitrolized-mineralized fir bark (0.8-1.2% actual nitrogen), fine textured, having 75-100% passing #8 screen, and minimum 95-100% passing #4 (1/4") screen. Salinity shall be no higher than 3 milli-ohms/cm. at 25 deg. C. as measured by saturation extract conductivity. Organic content shall be minimum of 92% based on dry weight and determined by ash method.
- D. Sand shall be free from foreign matter and any other substance harmful to plant materials, with the following sieve analysis:

No.4 Gravel		0
No. 10	Fine Gravel	0-5
No. 18	Very Coarse Sand	0-10
No. 35	Coarse Sand	0-35

No. 60	Medium Sand	15-100
No. 140	Find Sand	0-50
No.270	Very Fine Sand	0-20

Pan	Silt & Clay	0-7
Permissible Range		

1. Salinity (milli-ohms per centimeter) of saturation extract (@ 25 deg.C.)  
Nil - 3 ppm
2. Boron (saturation extract concentration) Nil - 1 ppm
3. Sodium (sodium absorption ratio - SAR) Nil - 6 ppm

E. Coarse peat moss: Natural domestic or Canadian product of either sphagnum moss, reed or sedge peat, taken from a fresh water site, free of stones. Submit samples to Landscape Architect for approval.

F. Import soil shall be of the same structure (USDA Classification as the site soil and be free of all deleterious materials harmful to plant life. Submit sample to Soil and Plant Laboratory as specified in Paragraph 3.01, E of this Section, for all proposed import topsoil.

G. Backfill for plant pits (not over structure): Will be determined as a result of the required soil sample test. For bidding purposes, use a mixture of 2/3 site soil and 1/3 organic amendment as per soil report recommendation for exterior planting.

H. Send one sample of the site soil, requesting a complete soil evaluation as specified in Article 3.01 E.

I. Backfill mixes: Special conditions are specified on the Drawings and details.

## 2.03 PLANT MATERIALS

A. Quality and size of plants shall conform to the California Standard Grading Code of nursery stock and shall be No. 1 Grade.

1. Plants shall be vigorous, of normal growth, free from disease, insects, insect eggs and larvae.
2. Plants shall equal or exceed the measurements specified in the plant list and be supplied from those sources indicated when a source is specified.
3. The Contractor shall demonstrate an effort to locate and obtain the best available specified stock.



- B. Container stock shall have grown in containers for at least 1 year, but not over 2 years.
  - 1. Sample shall be shown to prove that no root bound conditions prevail.
  - 2. No container plants that have cracked or broken balls of earth when taken from containers shall be planted, except on special approval of the Architect.
- C. Plants shall have been grown under climatic conditions comparable to those of the Project site, unless otherwise approved by the Landscape Architect.
- D. Nomenclature conforms to customary usage: For clarification, the term "multi-trunk" defines a plant having a minimum of 3 trunks and a maximum of 5 trunks of nearly equal diameter.
- E. All plant materials of 15-gallon size or larger will be tagged or approved by the Landscape Architect in the nursery prior to delivery on the site.

#### 2.04 STAKING MATERIALS

- A. Wooden stakes: Minimum of 12 foot long and 2 to 3 inches in diameter, rough Construction Heart redwood or waterproof Lodgepole Pine, at least 2" x 2" redwood, 2" diameter Lodgepole, actual dimension, and not less than 10' long, free from loose knots, splits or bends, pointed at one end.
- B. Double staking: When a double-staking method is used, the stakes shall be braced by horizontal members (see Drawings) of 1" x 3" actual dimension Construction Grade Pine, free from loose knots, splits or bends, for protection against the directional wind of the planted tree and until the tree has matured and the stakes can be removed.
- C. There shall be no tripod or triangulated tree tying. The securing lines from the triangulated system are a safety hazard as the tie lines from the tree to the anchoring point in the turf are approximately three to four feet from the center of said tree. This causes a safety issue with children and site personnel.

#### 2.05 PRE-EMERGENT WEED CONTROL

- A. Surflan 75W.

#### 2.06 WOOD BARK MULCH

- A. Use 80% recycled bark mulch. If not available in bulk quantities, provide in bag form.  
Available from Recycle Our Resources Company  
122 South Clementine Street  
Oceanside, CA 92054  
Tel. (858) 518-5991

#### 2.07 Filter fabric

- A. Landscape filter fabric by EarthAid USA or equal.

### Part 3 - EXECUTION

#### 3.01 WORK PROCEDURES

- A. General: Commence work within 5 days after award of contract and conduct operations continually to completion, unless weather conditions are unfavorable.
- B. Site clearance: Clean up and remove from the planting areas weed and grasses, including roots and accumulated debris and rubbish before commencing work.
- C. Storage: Store plants on the Project site and insure that they are protected from damage by sun, rain, wind, and construction work.
- D. Send one sample of the site and/or import soil, requesting a complete soil evaluation to Soil and Plant Laboratory, Inc., 4741 East Hunter Ave., Suite A, Anaheim, CA 92807. (714) 282-8777, requesting that the final report with recommendations be forwarded to the Landscape Architect. Payment for this report is the responsibility of the Contractor. In taking the soil sample(s), the following points shall be observed:
  - 1. Take sample from root zone from a depth of 12" -18", avoiding the surface debris or crust.
  - 2. The sample should be at one quart in volume and consist of a number of sub-samples mixed together.
  - 3. Place sample in a plastic bag, close the open end and place in a paper bag. Write designation information on the paper bag. Never place slips of paper with written information in contact with the soil.
  - 4. Mail in suitable container.

#### 3.02 BACKFILLING OF PLANTERS

- A. Verify completed waterproofing and functioning of Planter drains before starting backfilling.
- B. Rip site soil to 12" min. depth at least one direction, and provide 2% min. slope toward drain gravel, following details on drawings.
- C. Backfill mix, after thorough blending and wetting, and water settle meeting finish grade (allow for displacement by rootballs of plants).

### 3.03 FINISH GRADING

- A. Do not work the soil when moisture content is so great that excessive compaction will occur, nor when it is so dry that dust will form nor when clods will not readily break up.
- B. Coordinate rough grade requirements (allowing for soil amendments and soil mixes). Remove and dispose of soil in planting areas that contain any deleterious substances, such as oil, plaster, concrete, gasoline, paint, solvents, etc., removing the soil to a minimum depth of 6" or to the level of dryness in the affected areas. The Contractor shall be responsible for damage to installed plants caused by such substances.
- C. If an area to be landscaped will not produce acceptable results, correct unsuitable condition(s) before proceeding.
- D. Finish grade planting areas to a smooth and even condition, eliminating water pockets and irregularities. Remove and dispose of foreign materials, clods and rock over 1" in diameter within 6" of the surface so that after conditioning and planting the grade in the shrub areas is 1" below and in lawn areas is 1/2" below the top of the curbs and lawn edging.

### 3.04 WEED CONTROL (Pre-emergent)

- A. Landscape areas (except hydro-seeded areas) shall receive an application of Surflan 75W following manufacturer's instructions and applied by licensed personnel.
- B. Apply 1/2" to 1" of overhead sprinkler irrigation within 2 to 3 hours after applying this combination.
- C. Equipment:
  - 1. Add the recommended rate of Surflan 75W to the spray tank during the filling operation. Apply in enough water to assure adequate coverage, 50 to 250 gallons per acre.
  - 2. Use properly calibrated low-pressure boom-type herbicide sprayer with 50-mesh or coarser screens in strainers, nozzles, and suction units. Spray equipment shall be equipped to provide vigorous by-pass agitation during application.
  - 3. Spray equipment shall be calibrated before use and checked frequently during application to insure a uniform spray pattern.
- D. Existing trees on site shall not be injured in any way (chemical or mechanical) by weed control operation.

### 3.05 WEED CONTROL (For existing weeds)

- A. Irrigate areas to be landscaped for 14 days to germinate existing weed seeds. Apply an application of "Round-Up" following manufacturer's instructions for rate and method to achieve 100% complete weed kill.
  - 1. Irrigate a second time for 14 days to germinate existing weed seeds.
  - 2. Apply a second application of "Round-Up" following manufacturer's instructions for rate and method to achieve 100% complete weed kill.
  - 3. Following manufacturer's recommendations, wait the required interval prior to seeding and planting.
- B. Application shall be made by licensed personnel.
  - 1. Add the recommended rate of "Round-Up" to the spray tank during the filling operation. Apply in enough water to assure adequate coverage.
  - 2. Use properly calibrated low-pressure boom-type herbicide sprayer with 50-mesh or coarser screens in strainers, nozzles and suction units. Spray equipment shall be equipped to provide vigorous by-pass agitation during application.
  - 3. Spray equipment shall be calibrated before use and checked frequently during application to insure a uniform spray pattern.
- C. Existing trees and shrubs on site shall not be injured in any way (chemical or mechanical) by weed control operation.

### 3.06 SOIL CONDITIONING

- A. Grade planted areas to finish-grade, allowing for amendments, then broadcast, uniformly and incorporate into the top 6" of soil, the following for each 1,000 square feet of areas: 6 cu. Yd. of organic amendments 25 lbs. of commercial fertilizer.
- B. Remove rocks or unbroken soil clods over 1" diameter brought to the surface.

### 3.07 PLANTING

#### A. Trees and shrubs:

- 1. All trees must be well rooted without any circling roots inside the container. Upon inspection, if these conditions are present, either in place or in container, they shall be removed from the site and be replaced at contractor's expense.
- 2. Position the trees and shrubs and stake their intended locations as indicated, and secure the approval of the Architect before excavating pits, making necessary adjustments as directed.

3. Excavate pits with vertical sides for all plants. Tree pits shall be large enough to permit handling and planting without injury to balls of earth or roots. See Landscape Drawings for required minimum sizes of pits. Remove and haul from site rocks or stones over 2" in diameter.
4. Prior to backfilling of sumps and tree planting, fill the tree pits to 1/3 of its depth with water and allow the pits to set for 16 hours. If, at the end of 16 hours, the water in the tree pits has not drained, notify the Architect in writing prior to placement of the tree. Placement of the trees in plant pits which do not drain shall be delayed until a suitable drainage solution is agreed upon by the District and the Contractor. This shall be done for all trees 36" box or larger.
5. Dig sumps as detailed on Drawings. Secure approval of Architect before backfilling initial sumps.
6. Set plants in center of pits in vertical position so that the crown or ball of plant will be level with finished grade after allowing for watering and settling of soil. The crown of the plant shall bear the same relation to finish grade that it did to the soil surface in place of growth.
7. Thoroughly pre-mix backfill mix prior to backfilling pits for trees and shrubs.
8. Place planting fertilizer tablets adjacent to the mid-level of the rootball evenly spaced around the rootball. Use 3 tablets for each 5-gallon plant; 5 tablets for each 15-gallon plant; and 1 tablets for each 1/2" of tree trunk diameter (taken at 4 ft. from ground level) for box size plant material.
9. Water plants immediately after planting.

B. Ground covers:

1. Ground covers shall be planted so that, after settling, the crown of the plant is even with finish grade.
1. After planting, smooth the soil around the plants and water thoroughly with a light spray until soil is saturated and all air is excluded from it.

3.08 WOOD BARK MULCH

- A. Apply a minimum of 2" layer in all shrub and ground cover areas except areas of hydro-mulch.

3.09 PRUNINGS

- A. Pruning shall not be done prior to delivery. Plants shall be pruned according to standard horticultural practice by a qualified arborist approved by the Architect.
- B. Any damage to the existing trees occurring during the duration of this Contract shall be repaired by the above arborist at no additional cost to the City with the exception of the Warranty Period.

### 3.10 CLEAN UP

- A. During the course of the work, remove surplus materials from the site and leave premises in a neat and clean condition.
- B. Clean up and remove remaining debris and surplus materials upon completion of work, leaving the premises neat and clean.
- C. Remove tags, labels, nursery stakes and ties from plants.

### 3.11 MAINTENANCE - TREE, SHRUBS AND GROUND COVER

- A. Begin maintenance operations immediately after each plant is planted and continue satisfactorily for 90 days after the time all items of work have been completed as specified herein, and to the satisfaction of the Landscape Architect.
- B. During the maintenance period specified above, keep all plants and planted area well watered at all times; remove weeds and grass and dispose of; maintain and cultivate basing and depressions and keep well formed around trees and shrubs; maintain and repair the water system and the entire project shall be so cared for that a neat and clean condition will be presented at all times.
- C. Maintain a sufficient number of men and adequate equipment to perform the maintenance work herein specified from the time of planting until completion of the maintenance period and acceptance by the Owner's representative.

### 3.12 INSPECTIONS

- A. Inspections of plant materials required by City, County, State or Federal authorities shall be the responsibility of the Contractor and, where necessary, the Contractor shall have secured permits or certifications prior to delivery of plants to the site.
- B. Plants shall be subject to inspection and approval or rejection at place of growth and on the project site at any time before and during progress of work, or during maintenance period, for size, variety, condition, latent defects and injuries; rejected plants shall be removed from the Project site immediately.
- C. A written notice requesting a pre-maintenance inspection shall be submitted to the Architect at least 3 days prior to the completion of the Project.

- D. The Contractor shall make periodic inspections of plant materials until the end of the warranty period. If unfavorable conditions exist which might be harmful to the guaranteed plant, the Contractor shall notify the Owner's representative in writing of the condition, or he can be held responsible under the warranty.

3.13 ACCEPTANCE

- A. Final acceptance by the Owner's representative shall occur after the Contractor has complete installation and maintenance procedures in an acceptable manner in compliance with the Drawings and Specifications.

END OF SECTION

## SECTION

### 02935 GREENSCREEN

#### Part 1 - GENERAL

##### 1.01 RELATED DOCUMENTS:

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

##### 1.02 SUMMARY

- A. Sections Includes:
  - 1. Welded wire grid panels, including gate panels.
  - 2. Panel channel and angle trim.
  - 3. Panel posts.
  - 4. Necessary clips, straps and spacers.
  - 5. Powdercoat finish.

##### 1.03 RELATED WORK

- A. Examine Contract Documents for requirements that affect work of this Section. Other Specification Sections that directly relate to work of this Section include, but are not limited to:
  - 6. Section 03300, CAST-IN-PLACE CONCRETE; Concrete footings.
  - 7. Section 02900, PLANTING; Furnishing and installing related plants.

##### 1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog details for specified products demonstrating compliance with referenced standards. Provide list of fittings being provided with descriptions and either photographs or drawings for each type.
- B. Shop Drawings: Submit Shop Drawings for fabrication and installation. Include the following:
  - 1. Plans, elevations, and detail sections showing sizes, critical dimensions, panel layout constraints using a 2 x 2 inch modular grid, and details and locations of accessories.
  - 2. Indicate materials, methods, finishes, fittings, fasteners, anchorages, and accessory items.
- C. Verification Samples: Two samples representing actual products and finishes as follows:
  - 1. Welded wire grid panel, 6 in. x 6 in., with one edge of channel trim and one edge of angle trim, all as one unit.
  - 2. Color Submittals: Submit metal chips, 2 in. x 3-1/2 in. minimum, showing color and texture to be provided.



1.05 QUALITY ASSURANCE

- A. Manufacturer: Minimum 10 years' experience in manufacturing and supplying welded wire panel systems of the type required for this Project

1.06 DELIVERY, STORAGE AND HANDLING

- A. Protect materials from damage. Store panels flat. Provide edge protection when strapping is used. Do not apply loads to panel edges.
- B. Inspect products upon delivery in order to submit timely freight claim for any damaged materials.
- C. Store products in manufacturer's packaging until ready for installation.
- D. Handle and store products according to manufacturer's recommendations. Leave products wrapped or otherwise protected and under clean and dry storage conditions until required for installation.
- E. Exercise care not to scratch, mark, dent, or bend metal components during delivery, storage, and installation.

1.07 PROJECT CONDITIONS

- A. Verify actual openings by field measurements before fabrication; show recorded measurements on shop drawings.
- B. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

Part 2 - PRODUCTS

2.01 PROJECT CONDITIONS

- A. The welded wire panel plant support system and accessories shall have completed an ISO Compliant 14040/44, third party verified Life Cycle Assessment (LCA).

2.02 ACCEPTABLE MANUFACTURER

- A. greenscreen®, 725 S. Figueroa St. Suite 1825, Los Angeles, CA 90017; Tel: 1-800-450-3494; sales@greenscreen.com, [www.greenscreen.com](http://www.greenscreen.com)

2.03 PANELS

- A. Panels shall be rigid, three dimensional welded wire grid fabricated of 14 gage galvanized steel wire.

1. Metallic-Coated Steel Wire: Welded-wire, galvanized in accordance with ASTM A641.

- B. Face Grid: Wires shall be welded at each intersection to form a 2 x 2 inch face grid on the front and back of panels,
- C. Trusses: Face grids shall be separated by bent wire trusses spaced at 2-inch centers and welded to front and back face grids at each truss apex.
- D. Thickness: As shown on Drawings.
- E. Length and Width: As indicated on the Drawings.
- F. Tolerance: 1/8 inch in width and 1/8 inch in length.

## 2.04 ACCESSORIES

- A. Trim:
  - 1. Fabricate from 20-gage ASTM A879 galvanized steel.
  - 2. Types:
    - a. Channel Trim: Thickness of panel x ½ inch legs.
    - b. Angle Trim: ½ inch x ½ inch legs.
  - 3. Locations:
    - a. As indicated on the Drawings.
- B. Clips and Straps: Provide manufacturer's standard types of clips and straps suitable for mounting conditions. Fabricate from ASTM A879 galvanized steel. Adjustable clips shall have ¼ inch diameter 18-8 stainless steel bolt, washer, and nut.
- C. Plastic Spacers: Provide ½ inch thick black Ultra High Molecular Weight polyethylene (UHMW) washers [to hold clips away from mounting surface].
- D. Fence Posts: 3-inch steel tube. The steel strip used in the manufacture of the post shall conform to ASTM A1011. Minimum yield strength shall be 45,000 psi. Provide steel post caps. Overall post length shall be as indicated on the Drawings.
- E. Fasteners for Mounting Clips to Fence Posts: Self drilling, self-tapping hex washer head screws, with strength of Type 410 stainless steel, and corrosion resistance of Type 304 stainless steel.
- F. Fasteners for Attachment to Structure Pull Out Value:
  - 1. To Concrete or Masonry: [480lbs.].

## 2.05 FABRICATION

- A. Cut to size.
- B. Weld trim to panels and grind smooth exterior surfaces of welds.

- C. Curved Panels: All curved panels shall be fabricated in the factory using approved “Cut-to-Curve” or “Crimped-to-Curve” procedures as recommended by manufacturer for diameter of curve and conditions of use prior to application of powder coat finish to ensure that all wire edges are coated and protected. The use of “Cut-to-Curve” or “Crimped-to-Curve” fabrication technique is dependent on the specific radius and the direction of the curve relative to the flat panel layout.

## 2.06 FINISH

- A. Metal components (except fasteners) shall receive commercial grade finish system after fabrication.
- B. Finish System:
  - 1. Pretreat with general purpose, alkaline, water based cleaner / degreaser applied at 240 degrees F.
  - 2. Prime with fusion bond epoxy powder coat.
  - 3. Topcoat with TGIC polyester or polyester-urethane powder coat with a minimum total dry film thickness of not less than 6 mils (0.15 mm).
- C. Salt Spray Resistance: Finish shall remain rust free when tested 1680 hours in accordance with ASTM B117.
- D. Finish and Color: Textured Green. from manufacturer’s standards
- E. Touch-Up Paint: Provide high quality, exterior-grade spray paint suitable for conditions of use.

## 2.07 WARRANTY

- A. Standard 1 year warranty is available from the date of substantial completion or 18 months from the date of shipment, whichever comes first. greenscreen® warrants against defects in workmanship and materials that would result in failure under intended application and use as exterior fabricated wall grillage. “Failure” is defined as structural failure of the wire of sufficient incidents in any panel that would result in the panel not performing in a structural or safe manner under the intended application and use. Installation is excluded. Contact greenscreen® for further information, and extensions.

## 2.08 MISCELLANEOUS MATERIALS

- A. Concrete: Refer to Section 03300, CAST-IN-PLACE CONCRETE.
- B. Concrete: Normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum aggregate size per manufacture’s recommendations.

### Part 3 - EXECUTION

#### 3.01 MISCELLANEOUS MATERIALS

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
- B. Do not begin installation before final grading is completed unless otherwise permitted by Architect.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.02 PREPARATION

- A. Stake locations of posts. Do not exceed intervals of 500 feet (152.5 m) or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
  - 1. Construction layout and field engineering are specified in Division 01 Section "Execution".
- B. Verify alignment, support dimensions, and tolerances are correct. not begin installation before final grading is completed unless otherwise permitted by Architect.
- C. Inventory components to ensure all required items are available for installation. Inspect components for damage. Remove damaged components from site and replace.

#### 3.03 INSTALLATION – GENERAL

- A. Spans: For freestanding fences and screens, span between structural supports should not exceed 8' for 3" thick panels without thorough review of specific site conditions and mounting details. For overhead horizontal or inclined panels span between structural supports should not exceed 4'. All curved panel spans should be reviewed based on specific panel radius and center to center of proposed structural support spacing.
- B. Install panels plumb and square, centered within area designated for panels, and aligned to maintain modular grid.
- C. Avoid cutting panels in field. Where field cutting is essential, clean and dry area and apply touch-up paint to cut edges.
- D. Install securely with fasteners located to meet manufacturer's requirements.
- E. Repair bent or damaged panels. If panels cannot be repaired to satisfaction of (Architect), remove from jobsite and replace with new panels.

3.04 INSTALLATION

- A. Install welded wire panel plant support system according to manufacturer's written instructions.
- B. Install welded wire panel plant support system by setting posts as indicated on the Drawings and fastening panels to posts according to manufacturer's written instructions.

3.05 ADJUSTING AND CLEANING

- A. Remove temporary coverings and protection of adjacent work areas. Clean installed products in accordance with manufacturer's instructions before Owner's acceptance.
- B. Do not use abrasive cleaners.
- C. Remove from project site and legally dispose of construction debris associated with this work.

3.06 PROTECTION

- A. Protect installed products until completion of Project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.
- C. Protect installed products and finished surfaces from damage during construction.
- D. Replace defective or damaged components as directed by Architect

3.07 PLANT INSTALLATION

- A. Refer to Section 02900, PLANTING.

END OF SECTION

SECTION 03100  
CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide concrete formwork, complete in phases as indicated by Construction Manager.

A. Work In This Section: Principal items include:

1. Formwork.
2. Setting in forms, anchor bolts, metal inserts, sleeves, and similar items embedded in concrete.

B. Related Work Specified in Other Sections:

1. Screeds for slabs.
2. Furnishing inserts in concrete for work of other sections.

1.02 QUALITY ASSURANCE:

Construct forms conforming to tolerances specified in ACI 301, "Specifications for Structural Concrete for Buildings", as specified, unless exceeded by requirements of regulatory agencies or otherwise indicated or specified.

PART 2 – PRODUCTS

2.01 MATERIALS:

Furnish materials conforming to following requirements:

- A. Form lumber: WCLIB "Construction" grade or better, WWPA No. 1 or better, or equal.
- B. Form plywood: PS 1-95, Group I, Exterior Grade B-B Plyform or better, minimum 5-ply and 5/8" thickness, grade marked, not mill oiled. Plywood having medium or high density overlay is acceptable.
- C. Foam coating: Resin type coating free of oil, silicone, wax, and non-drying material, not grain-raising.

PART 3 – EXECUTION

3.01 WORKMANSHIP:

- A. Rigidly construct forms to prevent mortar leakage, sagging, displacement or bulging between studs. Use clean, sound, approved form material, coated with specified

materials only, not oil. Provide backing on plywood joints. Sides of footings shall be formed, unless permission of the Architect is obtained to place concrete directly against earth. Where this permission is granted, the footing dimension shall be increased 3". Remove formwork prior to backfilling operations.

- B. Foundation concrete may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Structural Engineer, subject to the approval of DSA in each case. The minimum formwork shown on the drawings is mandatory to insure clean excavations immediately to and during the placing of concrete.
- C. Reglets, Rebates and Chases: Form as indicated or required for work of other sections. Verify sizes and locations before forming.
- D. Sleeves: Clear space between sleeves shall be 3 times average sleeve or opening dimension, and not less than 6" center to center for small sleeves. Submit proposed location of sleeves in structural members for approval.
- E. Embedded Items: Coordinate work with related sections. For slabs on grade, provide 3" minimum above and below conduit. Do not place conduit below bottom layer of reinforcing bars. Verify sizes, locations, and other requirements for anchor bolts, inserts, and like items, and provide or obtain necessary templates corresponding to approved shop drawings. Accurately and securely place in forms to prevent displacement after removing any substances deleterious to bond.
- F. Forms shall accurately conform to the lines and dimensions of concrete as indicated on the drawings. They shall be tight and securely braced to prevent any possibilities of movement. Removal of forms and shoring shall conform to latest ACI Codes and government directives.
- G. Formwork shall be designed in accordance with ACI 318, parts 1-2-3, ACI 347, ACI SP-4, and ACI 301, and requirements of local authorities.
- H. Forms shall be thoroughly cleaned before reusing. Where form release compounds are used to facilitate removal of forms, they shall be types which will not stain or injure concrete, or finish material or cause injury to the bond of the final material to be applied.
- I. Wood formwork, including that used in void spaces, pockets and other similar places shall be removed.
- J. Tops of slabs shall not vary more than 1/4" from designated elevations.

### 3.02 PREPARATION FOR CONCRETE PLACING:

- A. Debris: Remove foreign matter in forms and rigidly close parts and openings left in formwork. No concrete shall be placed until forms are clean.
- B. Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce suction and maintain concrete workability.

- C. Equipment: Thoroughly clean tools before and after each use.
- D. Earth Subgrade: Lightly dampen 24 hours in advance of concrete placing, but not muddied. Reroll where necessary for smoothness and remove loose material.

### 3.03 REMOVAL OF FORMS:

Conform to CBC 1906A.2.1.

- A. Remove forms only after concrete has developed sufficient strength such that it will not be damaged by form removal operations, and after concrete can safely sustain its own weight and superimposed loads, as determined by testing field-cured concrete cylinders, but not sooner than specified in ACI 347.
- B. Use care when removing forms that concrete surfaces are not marred or gouged, and corners are true, sharp and unbroken. Do not pry against concrete when removing forms.
- C. Cut off nails flush in concealed concrete surfaces. Cut back tie wires and nails in exposed concrete surfaces at least 1-1/2 inches. Remove rod and cone ties and separators or similar devices and pull inward away from finished surfaces.

END OF SECTION



SECTION 03200  
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide reinforcing steel, complete in phases.

A. Work In This Section: Principal items include:

1. Reinforcing bars for cast-in-place concrete.
2. Accessories, including but not limited to, chairs and tie wires.
3. Furnishing and delivery of steel bar reinforcing for concrete masonry.

1.02 QUALITY ASSURANCE:

A. Source Quality Control: Refer to Section 01400 for general testing requirements and to following paragraphs for specific procedures. Testing Laboratory shall perform following conformance testing, shall select test samples of bars, ties, and stirrups from the material at the site or from place of distribution, each sampling including at least two 18" long pieces, and perform the following tests according to ASTM A615.

1. Identified Bars: If samples are obtained from bundles as delivered from the mill, identified as to heat number, accompanied by mill analyses and mill test reports, and properly tagged with Identification Certificate so as to be readily identified, perform one tensile and one bend test of each size of bars. Submit mill reports when samples are selected.
2. Unidentified Bars: When positive identification of reinforcing bars cannot be made and when random samples are obtained, perform tests for each 2.5 tons or fraction thereof, one tensile and one bend test from each size of bars.

1.03 MARKING AND SHIPPING:

Bundle bars, tag with identification, and transport and store so as not to damage any material. Use metal tags indicating size, length and other marking shown on placement drawings. Maintain tags after bundles are broken.

PART 2 – PRODUCTS

2.01 MATERIALS:

- A. Reinforcing bars: ASTM A615, Grade 60 or A706, Grade 60, except Grade 40 for No. 3 bars.
- B. Tie wire: Annealed copper-bearing steel, 16 gage minimum.

- C. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcement in place.
  - 1. Use wire bar type supports complying with CRSI, Chapter 3 unless otherwise shown.
  - 2. For slabs on grade, use supports with sand plates, precast concrete blocks or horizontal runners where base material will not support chair legs.

## 2.02 FABRICATION OF REINFORCING BARS:

Fabricate bars of the indicated sizes and bend and form to required shapes and lengths by methods not injurious to materials. Do not heat reinforcement for bending. Bars with unscheduled kinks or bends are subject to rejection. Use only tested and approved bar materials.

## PART 3 – EXECUTION

### 3.01 WORKMANSHIP:

- A. Clean bars extending through construction joints of concrete while encrustations are soft, or sandblast.
- B. Additional Reinforcing Bars: Where reinforcement is interrupted by sleeves and openings, provide additional bars as shown or required to maintain total reinforcement.
- C. All reinforcing steel shall be thoroughly cleaned of rust, scale or other coating or foreign matter. Bars shall be accurately placed in position and secured in place by means of wire ties. Horizontal and vertical wall bars shall be securely wired together at each point of contact.
- D. Reinforcing bars shall be lapped as indicated on structural general notes, at all horizontal and vertical splices, and around all corners and intersections. All reinforcing bars shall dowel through all horizontal and vertical construction joints as indicated on structural drawings, and bars may be wired together at these locations.
- E. Provide a minimum of protective concrete coverings of reinforcing bars as follows: 3" on bottom and sides of footings placed directly on the ground; 2" for formed concrete exposed to earth; 1-1/2" for walls above grade.
- F. All slab and footing reinforcement shall be supported on precast concrete chairs or spacers of proper thickness to support the reinforcement. Blocks shall be spaced not to exceed 6'-0" o.c.
- G. Reinforcement shall be placed so that where temperature bars occur the temperature bars shall not be closer to the top of the slab than 1-1/2". Remove all tags from reinforcing bars after installation.

3.02 FIELD QUALITY CONTROL:

- A. Inspection: Obtain inspection and approval of reinforcing before concrete is placed.
- B. Welding Inspection: Whether welding is done in the shop or at the site, perform welding of reinforcing bars under inspection of the Testing Laboratory Welding Inspector who is specially qualified and approved by DSA.

END OF SECTION

SECTION 03300  
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide cast-in-place concrete, complete in phases as indicated by Construction Manager.

A. Work In This Section: Principal items include:

1. Furnishing, placing, patching, curing and finishing of cast-in-place concrete unless otherwise specified.
2. Placing of embedded anchor bolts and inserts.
3. Vapor retarder under interior floor slabs on grade.
4. Expansion and epoxy anchors.

B. Related Work Not In This Section:

1. Preparation and grading of earth subgrade under concrete.
2. Furnishing, erection and removal of forms.
3. Furnishing and placing reinforcing for cast-in-place concrete.
4. Site concrete work.

1.02 QUALITY ASSURANCE:

- A. Concrete Manufacturer: Furnish concrete from licensed commercial ready-mix concrete plant conforming to CBC Chapter 19A and DSA approved. Requirements herein govern when exceeding CBC.
- B. Allowable Tolerances: Conform to ACI 117 "Recommended Tolerances for Concrete Construction and Materials", as applicable, unless exceeded by requirements of regulatory agencies or otherwise indicated or specified.
- C. Source Quality Control: Refer to Section 01400 regarding general testing requirements and to the following paragraphs for specific procedures. Concrete materials which, by previous tests or actual service, have shown conformance may be used without testing when so approved by the Architect and DSA Inspector. Testing Laboratory shall perform following conformance testing.
1. Portland Cement: Furnish mill certificates in accordance with CBC 1929A.1, and acceptable to Architect and DSA, showing conformance with requirements specified; otherwise, the Testing Laboratory shall perform one test for each 250 barrels of cement in accordance with ASTM C150.

2. Aggregate: Test the aggregate before and after concrete mix is designed and whenever character of aggregate varies or source of material is changed. Include a sieve analysis. Obtain samples of aggregates at the dry batching or ready-mix concrete plant in accordance with ASTM D75 and perform tests for the properties listed in the following table. Aggregate to be free of any impurities that will cause damage to the concrete.

<b>PHYSICAL PROPERTIES</b>		
<b>Physical Properties, units</b>	<b>Test Method</b>	<b>Minimum Values</b>
Sieve analysis	ASTM C136	
Organic impurities	ASTM C40	Fine aggregate not darker than reference standard color
Soundness	ASTM C88	Loss after 5 cycles not more than 8 percent of course aggregate, not more than 10 percent of the fine aggregate
Abrasion	ASTM C131	Weight loss not more than 10.5 percent after 100 revolutions, 42 percent after 500 revolutions
Deleterious materials	ASTM C33	
Materials finer than No. 200 sieve	ASTM C117	Not over 1 percent for gravel, 1.5 percent for crushed aggregate
Reactivity potential	ASTM C227, C289, C342	Ratio of silica released to reduction in alkalinity not to exceed 1.0
Sand equivalent	ASTM D2419	California sand equivalent values operating range not below 71 percent

3. Concrete Batch Plant Inspections: Conform to CBC 1704A.4.3. Continuous batch plant inspection is required for structural concrete, performed by a specially qualified inspector approved by DSA. As allowed by CBC 1704A.4.4, bonded deputy weighmaster affidavit is acceptable for non-structural concrete and for slabs on grade; the weighmaster shall sign all load tickets and furnish legible copies to Architect, Project Inspector, and DSA.
- D. For epoxy dowels and expansion anchors, furnish the services of the epoxy manufacturer's technical representative to be present during installation of epoxy anchors to verify adequacy and quality of methods of installation.

- E. Tests: For expansion and epoxy anchors, tests will be performed as specified in Section 01400.
- F. 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 substances in construction products.

### 1.03 CONCRETE MIX DESIGNS:

Testing Laboratory shall design concrete mixes for concrete using Method B, CBC 1905A.

- A. Strength Requirements: Design mixes for structural concrete for minimum 28-day compressive strengths required by drawings and specifications, 3,000 psi min. for Footings/Grade Beams; 3500 psi minimum for Slabs. The trial batch strength for each mix shall exceed indicated or specified strength by 750 psi or a lesser amount based on the standard deviations of strength test records according to ACI 318.
- B. Design all mixes for workability and durability of concrete. Control the mixes in accordance with CBC 1905A.3, ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete, and Chapter 4, ACI 318, Building Code Requirements for Reinforced Concrete.
- C. Maximum Aggregate Sizes: Not exceeding 3/4 of minimum clear space between bars and between bars and forms, nor larger than 1/5 of least dimensions between the forms. Design the mixes with 3/4" maximum size, except maximum 1-1/2" size for foundations and maximum 3/8" size at congested reinforcing or thin sections.
- D. Pumped Concrete: Design concrete mixes specifically for pump placing with dry loose volume of fine aggregates not more than 47% of total aggregates; limit air entrainment to 5% maximum.

### 1.04 SUBMITTALS:

- A. Shop Drawings: Submit for concrete slabs showing dimensioned locations and types of construction and expansion joints.
- B. Product Data: Submit product data on all manufactured materials. Submit recommended mixing and application procedures for fiber reinforcement.
- C. Samples:
  - 1. Product Samples: Submit 24" square sample of vapor retarder.
  - 2. Site Samples: Prepare minimum 4-foot square samples of each required slab finish excluding only monolithic trowel and float finishes. Include a transverse expansion joint, scoring and edging.

- D. For expansion and epoxy anchors, submit product data and certified test reports for each type of epoxy for each application, manufacturer's recommended application instructions, and if requested, samples of each type material.

#### 1.05 JOB CONDITIONS:

Do not place concrete during rain or adverse weather conditions without measures or prevent damage. Conform to CBC Chapter 19A, and to ACI 305, Recommended Practice for Hot Weather Concreting and ACI 306, Recommended Practice for Cold Weather Concreting, as required except do not use calcium chloride or any type of accelerator.

### PART 2 – PRODUCTS

#### 2.01 MATERIALS:

Furnish materials meeting the test requirements of Paragraph "Source Quality Control" above, as applicable, and following requirements:

- A. Portland cement: ASTM C150, Type II. Do not change brand without prior approval.
- B. Aggregates: Grading of combined aggregate shall conform to CBC, Section 1903A. Aggregates shall conform to ASTM A33, from approved pits, free from vegetable matter and of opaline, feldspar, or siliceous magnesium substances; all washed, clean, hard, fine-grained sound crushed rock or gravel; not over 5% by weight of flat, thin, elongated, friable, or laminated pieces (pieces having major dimension over 5 times average dimension) or more than 2% by weight of shale or cherty material.
- C. Admixture: CBC, Section 1903A, Type A or D; only one brand.
- D. Pozzolan: CBC Section 1903A.5, ASTM C618, Class F or C Fly Ash, 100 pounds maximum per cubic yard, containing 1 percent or less carbon. Fly ash shall not be used in excess of 15 percent by weight of total cement quantity.
- E. Water: From potable domestic source.
- F. Joint filler: ASTM D1751 and D1752, as specified.
- G. Curing Materials:
  - 1. Liquid curing compound: ASTM C309, fugitive dye dissipating type, complying with Rule 1113 of the South Coast Air Quality Management District and Federal Air Quality Regulation 40 CFR 52.254.
  - 2. Curing sheet: ASTM C171, non-staining white types.
  - 3. Evaporation retardant and finishing air: Master Builders "Confilm", or equal.
- H. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Fortifiber Corporation; Moistop Ultra.
  2. Raven Industries Inc.; Vapor Block 10.
  3. Stego Industries, LLC; Stego Wrap, 15 mils.
- I. Non-shrink grout:
1. For concealed areas: Master Builders "Embeco 885", or equal, non-gas-forming and free of oxidizing catalysts and inorganic accelerators, used as dry or damp pack, or mixed to a 20-second flow (CRC-C611), without segregation or bleeding at any temperature between 45 degrees F and 100 degrees F. Working time 30 minutes or more. Minimum 28 day compressive strength shall be 5,000 psi.
  2. For exposed areas: Master Builders "Masterflow 928", with some characteristics as specified for concealed areas.
- J. Drypack: Field mixture of 1 part Portland cement to 2 parts fine aggregate mixed to a damp consistency such that a ball molded in the hands will stick together and hold its shape. At Contractor's option, the specified admixture may be added for increased workability at lower water/cement ratio. In lieu of field mixing, Contractor may use factory mixed drypack material, such as Master Builders "SetGrout". Minimum 28 day compressive strength shall be 7,000 psi.
- K. Expansion Joint Filler: Asphalt impregnated fiber, conforming to ASTM D994 and D1751, W.R. Meadows "Sealtight", or equal.
- L. Construction Joint Materials: "Key-Kold" or "Kwik-Joint", of profiles indicated.
- M. Bonding Agent: "Weld-Crete", manufactured by Larsen Products Co., P.O. Box 2127, Rockville, MD 20852, Master Builders "Concresive", or equal.
- N. Curing-sealer-hardener: Conforming to ASTM C309, W.R. Meadows "Vocomp 20", Ashford Formula by Curecrete Chemical Company, Inc. and distributed by Martech Associates, Chatsworth, Calif., (213) 993-1163, "Shur-Seal" distributed and applied by Paul M. Wolff Co., Inc., Orange, Calif., (714) 771-0500, "C-D-H" by VenChem Co., Inc. or equal, applied and warranted as specified herein.
- O. Epoxy Injection Anchors: Hilti HIT-RE 500 V3 or SIMPSON SET-XP. Anchors shall consist of rods, washers and nuts. Rods shall be encased in ceramic nozzle, set with dual component injector tool, which sets the anchor, disintegrates the nozzle, mixes and injects the epoxy into the hole.
- P. Epoxy: Appropriate for the intended application as recommended by manufacturer, and as indicated on approved submittals, selected from the following:
1. Sikadur by Sika Chemical Corporation.
  2. Euco Epoxy, by Euclid Chemical Company.
  3. Anchor-it System by Adhesives Technology Corporation.



## 2.02 CONCRETE MIXING:

Furnish ready-mixed concrete from an approved commercial offsite plant. Conform to UBC Std. 19-3, except materials, testing, and mix designs as specified herein. Use transit mixer trucks equipped with automatic devices for recording number of revolutions of drum. Comply with CBC 1905A.8 and 1905A.9.

- A. Admixtures: All approved admixtures shall be introduced into the concrete at the batch plant. Field additions are not acceptable.
- B. Slump: Adjust quantity of water so concrete at point and time of placing does not exceed the following slumps when tested according to ASTM C143. Use the minimum water necessary for workability required by part of structure being cast.

Part of Structure	Maximum Slump Inches	Maximum Water-Cement Ratio
Footings, foundation walls, and mass concrete, not reinforced	4	0.5
Slabs on grade, reinforced and non-reinforced	3	0.45
Slab & concrete curb on metal deck	4	0.45
All other concrete	4	0.5

## PART 3 – EXECUTION

### 3.01 PREPARATION FOR CONCRETE PLACING:

Remove all free water from forms before concrete is deposited. Remove hardened concrete, debris, and foreign materials from forms and from surfaces of mixing and conveying equipment.

- A. Wetting: Wet wood forms sufficiently to tighten up cracks. Wet other materials sufficiently to reduce suction and maintain concrete workability.
- B. Earth Subgrade: Lightly dampen 24 hours before placing concrete but do not muddy. Re-roll where necessary for smoothness and remove loose material.
- C. Vapor Retarder: Install under interior floor slabs on grade. Install 2" sand over prepared subgrade. Lap joints of vapor retarder 6" in the direction of concrete spreading and tape seal. Seal the joints at walls and around penetrations with tape. Cover retarder with 2" layer of clean sand.

- D. Screeds: Set screeds at walls and maximum 8-foot centers between. Set to provide level floor. Check with an instrument level, transit, or laser during placing operation to maintain level floor.
- E. Screeds Over Vapor Retarder: Use weighted pad or cradle type screeds and do not drive stakes through the vapor retarder. Check with an instrument level, transit or laser.
- F. Setting Miscellaneous Materials: Place and secure anchors and bolts, pipe sleeves, conduits and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

### 3.02 CONCRETE PLACING:

- A. Conveying and Placing: Comply with Title 24 1905A.9 and 1905A.10. Do not place concrete until reinforcing steel and forms have been approved by the DSA Inspector. Do not allow concrete to free fall from release points at mixer, hopper, tremie, or other conveying equipment in excess of 5-feet for concealed concrete or over 3-feet for exposed concrete. Deposit concrete so that surface is kept level throughout, with minimum being allowed to flow from one portion of forms to another. Place concrete in horizontal layers not more than 18" thick within 60 minutes after water is first added to the batch. Place all concrete by methods that prevent segregation of materials.
  - 1. Where new concrete is placed against or on old or existing concrete, apply bonding agent to surface of old concrete prior to placement of new concrete.
- B. Joints: Comply with CBC 1906A.4. Locate joints in concrete only where shown or approved and obtain prior approval for points of stoppage of any pour. Clean and roughen surface of construction joints by removing entire surface and exposing 1/4" of clean course aggregate solidly embedded in mortar matrix by sandblasting, chipping, use of an approved retarder agent, or equal. Water and keep hardened concrete wet for not less than 24 hours before placing the next lift or abutting concrete. Cover the horizontal surfaces of existing or previously placed and hardened concrete with a 2" thick layer of fresh concrete of required mix less 50% of course aggregate just before balance of concrete is placed.
- C. Compacting: Compact each layer of the concrete as placed with mechanical vibrators or equivalent equipment. Transmit vibration directly to concrete and in no case through the forms unless approved. Accomplish thorough compaction. Supplement by rodding or spacing by hand adjacent to forms. Compact concrete into corners and angles of forms and around reinforcement and embedded fixtures. Recompact deep sections with congestion due to reinforcing steel as required.
- D. Operation of Vibrators: Do not horizontally transport concrete in forms with vibrators nor allow vibrators to contact forms or reinforcing. Push vibrators vertically into the preceding layers that are still plastic and slowly withdraw, producing maximum obtainable density in concrete without creating voids or segregation. In no case disturb concrete that has partially set. Vibrate at intervals not exceeding two-thirds the effective visible vibration diameter of the submerged vibrator. Avoid excessive vibration that causes segregation.

E. Slabs:

1. Compact concrete, bring 1/8" to 3/16" of coarse mortar to surface. Screed to elevation. Bull float or darby. Remove all bleed water. Float with wood hand floats or wait until the weight of a machine with steel float shoes can travel on the slab without sinking or disrupting the surface.
2. On-grade Slabs: Place with maximum 40-foot edge dimension. Generally locate joints on column lines, exact locations as directed or approved.
3. On-Grade Slab Construction and Contraction Joints: Use standard types equal to "Key-Kold" construction joint where indicated, or as required, "Kwik-Joint" contraction joint at intermediate spacings. Machine saw cut 1/8" by 1/5 of the slab thickness at intermediate joints where indicated or approved. Conform to approved submittal.
4. Expansion joints: Conform to details and approved submittal. Provide expansion joint filler finished flush with slab surface except for those joints shown to be sealed with sealant. Conform to Section 07920 where sealant sealed joints are shown or specified, including the polymer joint filler, backing, and bond breaker.
5. Control Joints: Provide for concrete slabs as indicated. Provide sawed control joints, not less than 1/4 the slab thickness, except where other types of joints are indicated. Complete sawing of joints within 4 hours following paving unless otherwise approved. If early sawing causes undercutting or washing of the concrete, delay the sawing operation and repair the damaged areas. The saw cut shall not vary more than 1/2 inch from the true joint alignment. Discontinue sawing if a crack develops ahead of a saw cut. Immediately after each joint is sawed, thoroughly clean the saw cut and adjacent concrete surface. Respray surfaces treated with curing compound which are damaged during the sawing operations as soon as the water disappears. Protect joints in a manner to prevent the curing compound from entering the joints.

3.03 CURING FORMED CONCRETE:

Keep forms containing concrete in a wet condition until removed. Keep concrete continuously moist for not less than 7 days after placement, using approved curing methods. Do not use any curing materials or methods that could interfere with the correct application or bonding of subsequent materials; verify exact requirements with applicators of work of other sections. Comply with Sec. 1905A.11.

3.04 PATCHING AND FINISHING FORMED CONCRETE:

Remove ties and spreaders, cut back below finished surface. Fill rock pockets, holes and similar items with mortar and non-shrink grout materials. Chip away defective areas and patch. Match surrounding concrete surfaces in color and texture.

3.05 SLAB FINISHING:

Compact and tamp concrete as specified hereinbefore to bring 3/8" of mortar to surface, float and apply following finishes. Make finished surfaces level or sloped as detailed with maximum deviation of 1/8" from 10-foot straightedge for exposed finishes.

- A. Monolithic Trowel Finish: For all floor surface not otherwise specified. Float to straightedges, with sufficient pressure to bring water to surface. After surface water disappears and surface is sufficiently hardened, steel trowel and retrowel to smooth surface. After concrete has set enough to ring trowel, retrowel to a burnished impervious finish free of trowel marks or other blemishes. Use this finish on interior slabs to be covered with finish flooring, and to remain exposed, unless otherwise indicated.
- B. Broom Finish: Prepare same as monolithic trowel finish, except omit burnishing troweling. When ready, lightly broom at right angles to traffic, producing a light non-slip finish as approved. Use this finish on stairs, sidewalks, and walking surfaces, unless otherwise indicated.
  - 1. Medium Broom Finish: Same as above, but use medium textured broom. Use this finish on stairs and on ramps having slope of less than 6 percent.
  - 2. Heavy Broom Finish: Same as above, but use heavy textured broom. Use this finish on driveways, aprons, and ramps having slope of 6 percent or more.
- C. Rough Finish: Float to screeds. When surface water disappears roughen surface in two directions with stiff wire brooms or garden rakes. Apply on slabs to receive mortar underbeds and cement topping directly.

### 3.06 SLAB CURING:

Promptly apply curing media as soon as finishing is complete without marring surfaces, and in any case on same day. Apply liquid compound in accordance with manufacturer's published application rates; apply 2 spray coats, with second coat at right angle to first coat. Cover adjoining surfaces. Equip spray nozzles with a wind-shield suitable for wind conditions.

- A. Curing Period and Protection: Maintain all curing media intact and sealed for 10 days minimum after application. Keep foot traffic on the curing surfaces to minimum possible and completely off liquid compound cured surfaces; vehicular traffic is not permitted on the surfaces until curing is completed. Immediately restore all damaged or defective curing media.
- B. Restriction: Do not apply liquid membrane-forming curing compounds on concrete to receive or bond to concrete or mortar, or on any surfaces to receive subsequent material or finish unless such use and the specific compound used are acceptable to manufacturers of the materials and finishes to be applied. In the event that Contractor proposes to use liquid membrane-forming curing compounds, and such use is acceptable to manufacturers of floor finishes and approved by the Inspector, Contractor shall be solely responsible for the dryness and pH of subfloors. Floors shall be tested as specified in Section 07260 and remedial work performed as specified therein and as required. If liquid membrane forming compounds are used, remedial work shall be

performed as part of the contract, and the unit prices specified in Section 01026 shall not apply.

- C. Liquid Membrane-Forming Curing Compound: Use on exterior slabs and paving not designated to receive additional finishes. Their use on interior slabs is subject to the above restriction.
- D. Sheet Curing: Use the specified curing sheet material. Seal all laps and edges with plastic pressure-sensitive tape, and immediately repair tears during the curing period. Verify that surfaces remain damp for the full curing period; if necessary, lift sheet, wet surfaces with clean water, then replace and reseal the sheeting. Use on surfaces where curing compound is not permitted.
- E. Water Curing: Option to either liquid membrane-forming curing compound or sheet curing method. Keep concrete continuously wet for entire curing period.
- F. Curing-Sealer-Hardener: Employ material manufacturer's authorized applicator. Apply in accordance with manufacturer's instructions for multi-phase application (liquid, gel, add water, gel, rinse). Apply on following surfaces:
  - 1. Exterior concrete walking slabs.
  - 2. Interior slabs to remain exposed.

### 3.07 NON-SHRINK GROUTING:

Install as indicated or required. Where grouting is part of the work of other sections, it shall conform to the following requirements, as applicable.

- A. Mixing: Mix the approved non-shrink grout material with sufficient water per manufacturers recommendations.
- B. Application: Surfaces to receive the non-shrink grout shall be clean, and shall be moistened thoroughly immediately before placing the mortar. Before grouting, surfaces to be in contact shall be roughened and cleaned thoroughly, all loose particles shall be removed and the surface flushed thoroughly with neat cement grout immediately before the grouting mortar is placed. Place fluid grout from one side only and puddle, chain, or pump for complete filling of voids; do not remove the dimes or forms until grout attains initial set. Finish exposed surfaces smooth, and cure as recommended by grout manufacturer.

### 3.08 EXPANSION AND EPOXY ANCHORS:

- A. Drill hole 1/4" larger than anchor diameter, scrub with a wire brush and blow clean of dust with compressed air. Follow manufacture installation procedure.
- B. Anchors shall be clean and free from rust, laitance, grease.
- C. Fill holes with quantity of epoxy recommended by manufacturer. Apply epoxy from the back of the hole to the front. Insert the anchor into the hole in a manner to assure that the epoxy completely surrounds the anchor for the full depth of embedment.

### 3.09 FIELD QUALITY CONTROL:

- A. Supervision: Perform Work of this Section under supervision of a capable concrete superintendent.
- B. Continuous Inspection: Construct structural concrete under continuous inspection of Inspector. Obtain inspection and approval of forms and reinforcing by DSA Inspector as required before placing structural concrete.
- C. Testing/Evaluation of Concrete: Conform to CBC 1704A.4 and 1905A. Testing Laboratory shall perform following tests. Samples for testing shall be obtained in accordance with ASTM C172, and shall be taken from as close to point of placement as possible.
  - 1. Compressive Strength Tests: Cast one set of three or more cylinders from each day's placing and each 50 cubic yards, or fraction thereof, or not less than once for each 2,000 square feet of surface area for slabs and walls, of each strength of structural concrete. Date cylinders, assign record number, and tag showing the location from which sample was taken. Also record slump test result of sample. Do not make more than two series of tests from any one location or batch of concrete.
  - 2. Test Cylinders: Samples will be made in accordance with ASTM C172. Cast cylinders according to ASTM C31; 24 hours later, store cylinders under moist curing conditions at about 70 degrees F. Test according to ASTM C39 at 7 and 28 day ages. The remaining cylinder shall be kept in reserve in case tests are unsatisfactory.
  - 3. Control Test Cylinders: Cast a set of two or more cylinders for each day's placing of concrete for slabs supported on shoring. Place test cylinders on slabs represented by cylinders and cure the same as slabs. Test cylinders to determine proper times for removal of shores and reshoring. A strength test shall be the average of the compressive strengths of 2 cylinders made from the same sample of concrete and tested at 28 days.
- D. Core Tests: Comply with CBC 1930.A. If tests show that compressive strength of any concrete falls below required minimum at 28 day age, additional curing and testing of concrete which unsatisfactory test reports represent may be directed. Testing Laboratory shall take and test drilled cores as directed. Contractor shall refill core holes with drypack concrete of the same compressive strength required for cored concrete. If core tests results are unsatisfactory, Contractor shall furnish required labor, equipment, and weights, and the Testing Laboratory shall conduct load testing on involved parts of building or structure as directed. Contractor shall bear additional curing and test costs, including Testing Laboratory costs, for concrete not meeting required compressive strength at 28 day age even if testing demonstrates that concrete has eventually attained required minimum compressive strength, and all costs for required corrections or removals and replacements as directed and required for approved construction.

END OF SECTION

SECTION 04220  
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide concrete unit masonry, complete.

A. Work in this section: Principal items include:

1. Concrete block masonry.
2. Grouting of masonry.
3. Installing reinforcing steel bars in masonry.

1.02 SUBMITTALS:

A. Samples: Submit the following:

1. Two samples of each type of masonry unit to show full range of color and texture, for selection and approval.
2. Samples mortar showing finish color.

B. Sample Panels: Prepare as many of following sample panels at the site as are required for approval. Conform installed masonry to the approved panels. Approved panels may be a part of the permanent construction if so approved and conforming to all other requirements indicated and specified.

1. Minimum 6-foot long by 4-foot high panel of each type and pattern of vertical masonry, including special features and one corner or angle.

C. Mix Designs: Submit for mortar and grout.

1.03 JOB CONDITIONS:

Inspect and verify surfaces to receive work of this section. Report all conditions that prevent correct installation of masonry.

1.04 QUALITY ASSURANCE:

A. Standards: Conform to CBC Chapter 21A and to standards referenced herein. In case of a conflict between standards, the most stringent requirements govern.

B. Source Quality Control: Testing Laboratory shall perform following quality assurance tests:

1. Portland Cement: Furnish mill sampled and tested Portland cement and furnish certificates of compliance for each shipment of cement used; otherwise, Testing Laboratory shall sample and test the cement according to CBC 1903A.2 and 1929A.1.
  2. Mortar and Grout Aggregates: Furnish grading tickets from producer; otherwise, Testing Laboratory shall sample and test aggregates according to the material specifications.
  3. Concrete Masonry Units: Furnish manufacturer's certificate attesting that units delivered to site meet material and property requirements specified, including linear shrinkage requirements; otherwise, concrete masonry units shall be sampled from the material delivered to the site by the Testing Laboratory or Project Inspector and tested by Testing Laboratory as specified in ASTM C140 for conformance; test for linear shrinkage according to ASTM C426. Testing shall be completed and units approved prior to placing units in the Work.
  4. Batch Plant Inspection: If high lift grouting method is used, grout shall be batched and delivered to site ready-mixed from a batch plant conforming to CBC 1929A.4 and continuous batch plant inspection is required, performed by a specially qualified inspector approved by DSA. As allowed by CBC 1929A.4, and provided batch conforms to CBC 1929A.4, bonded deputy weighmaster affidavit is acceptable for grout; load tickets shall state amounts of grout ingredients and the weighmaster shall sign all load tickets and furnish legible copies to Architect, Project Inspector and DSA.
- C. Tolerances: Unit masonry shall be placed within 1/8" of dimensions noted. Reinforcement shall be placed within tolerances recommended by ACI 318 and ACI 530.

## PART 2 – PRODUCTS

### 2.01 BASIC MATERIALS:

- A. Portland cement: CBC 2102A.2, Type II, low alkali; mortar cement or plastic cement not permitted. Use one brand.
- B. Hydrated lime: ASTM C207, Type S.
- C. Mortar sand: ASTM C144, not less than 4% passing No. 100 sieve, uniformly graded from fine to course.
- D. Grout sand: ASTM C404, natural, Size No. 1.
- E. Pea gravel: ASTM C404, gravel, except maximum 5% passing No. 8 sieve and all passing a 3/8" sieve.
- F. Mortar admix: Sika Red Label or equal.
- G. Grout admix: Sika Chemical Corp. GA Grout Aid II; no substitution.



H. Water: From domestic potable source.

I. Control joint filler: Sealant and backer as specified in Section 07920.

## 2.02 CONCRETE BLOCK MATERIALS:

Manufactured by Angelus Block, Orco or equal, ASTM C90, Grade N-1, standard precision type medium weight aggregate units, steam-cured or yard air cured for 28 days with minimum compressive strength of 2,000 psi, meeting Quality Control Standards of Concrete Masonry Association, natural cement color smooth faced units unless otherwise indicated or specified. Include matching bond beam and other special shape, type or size units as required.

## 2.03 MORTAR AND GROUT PROPORTIONS AND MIXING:

A. Strengths: Minimum compressive strengths, 2,000 psi for mortar and 2,000 psi for grout at 28 days.

B. Proportions: Accurately measure all mortar and grout by the volume method using calibrated containers. Shovel measurements are not acceptable.

1. Mortar: Conform to ASTM C 270, CBC 2102A.2.8 and 2103A.3, one part Portland cement, 3-1/2 to 4 parts sand based on dry loose volume, and not less than 1/4-part nor over 1/2-part lime; include mortar admix in mortar for exterior masonry, quantity per manufacturer's directions.

2. Colored Mortar: Same as for mortar plus add color pigment to produce cured dry color matching concrete unit color and the approved sample.

3. Grout: By volume, 1 part Portland cement, 2-1/4 to 3 parts damp loose sand, and 1 to 2 parts pea gravel; exact proportions as required for the minimum 2,000 psi compressive strength. For fine grout, omit the pea gravel. Include grout admix of correct type, proportioned per manufacturer's directions. Conform to CBC 2102A.2.9 and 2103A.4. Mix with enough water to produce consistency for pouring without segregation.

C. Mixing: Place half of the required water and sand in an operating machine mixer; then add Portland cement, remainder of sand and water, and then hydrated lime. Machine mix not less than 5 minutes after all ingredients are charged.

D. Retempering: Retemper mortar within one hour after leaving the mixer and maintain high plasticity. Add water in a basin formed in the mortar and rework mortar into water. Discard all mortar that is not used within one hour or that has begun to initially set.

## PART 3 – EXECUTION

### 3.01 GENERAL INSTALLATION REQUIREMENTS:

A. Protection: Protect sills, ledges, offsets, jambs, corners from droppings of mortar and grout and from damage during construction.

- B. Layout: Lay plumb, level and to plane surface. Mortar joints straight, clean and uniform in thickness.
- C. Interface with other work:
  - 1. Locate dowel positions before concrete is placed so dowels match reinforcing steel in masonry. Furnish a dowel placing plan. Locate elevations for joint between concrete footing and masonry.
  - 2. Place bolts, anchors, drilled-in wedge type anchors, joist anchors, metal attachments, nailing blocks and inserts required for attaching other work to masonry.
  - 3. Coordinate with electrical work to align outlet boxes with masonry courses and joints to reduce cutting of units to minimum. Fit units neatly around and against pipes.

### 3.02 INSTALLATION OF CONCRETE BLOCK MASONRY:

Lay out unit masonry to minimize cutting of units and use of odd joint sizes or bond. Construct all masonry in accordance with Code and Concrete Masonry Association standards for reinforced masonry. Place and embed in masonry anchors, bolts, reglets, sleeves, conduits, and all other items furnished under other sections, fully grouted in place. Work out details and be responsible for size, position, and arrangement of embedded items and necessary openings. Cut units by machine saw. Install only clean uncracked units. Conform to CBC 2104A.

- A. Setting: Install masonry to preserve unobstructed vertical continuity of block cells. Full bed face shells and cross webs in mortar. Fill header or end joints solid with mortar to a depth from face of wall or unit not less than the thickness of the longitudinal face shells. Provide corner bond by lapping units in successive vertical courses.
- B. Cleanout Openings: Provide openings at the bottom of cells containing bar reinforcing, and at each lift or pour of grout exceeding 48" height. Remove all overhanging mortar and other obstructions or debris from the interior of block cells. Seal cleanouts with matching whole units and mortar joints.
- C. Placing Reinforcing Steel: Use deep-cut bond beam units at horizontal reinforcing bars. Install open end units for vertical bars unless otherwise shown.
  - 1. Position vertical bars accurately at the lateral position indicated within a tolerance of 1/8 inch. Maintain a minimum clearance between the bars and masonry units of 1/2 inch and between parallel bars of one diameter of the reinforcement. Hold vertical reinforcing in place using metal supports, centering clips, spacers, ties or caging devices located near the ends of each bar and at intermediate intervals of not more than 192 diameters of the reinforcement. Laying ties in mortar joints will not be permitted.
  - 2. Splices: Locate splices only as indicated. Stagger splices in adjacent bars at least 24 inches. Lap bars a minimum of 48 diameters of the reinforcement of two feet, whichever is greater. Welded or mechanical connections shall develop the full strength of the reinforcement.

- D. Grouting: Fill all cells with grout. Pour in 4-foot lifts, waiting about 1-hour between lifts. Pour fill height in each section of the wall in one work shift. Consolidate grout by puddling or internal vibration, then reconsolidate about 10 minutes later before plasticity is lost. Form horizontal construction joints by stopping the grout pour 1-1/2" below top of masonry units. High lift grout placement may be used at Contractor's option as approved and according to code.
- E. Grouting: High lift and low lift systems shall be used as noted on structural drawings.
1. Low Lift Grout System:
- a. Comply with CBC 2104A.6.1.2.2. This system includes placing reinforcing steel before or during construction of wall, and pouring grout in lifts not exceeding 4 feet, unless cleanouts are provided as specified under High Lift Grout System.
  - b. Keep mortar out of grout spaces.
  - c. Place reinforcing steel accurately according to drawings and notes thereon. Erect vertical reinforcing before laying masonry and brace firmly in position. Use frames or other suitable devices to prevent movement or jarring while placing masonry or grout. Place horizontal steel as construction progresses. Lap steel at least 40 bar diameters. Extend steel through points of stoppage to provide required lap. Horizontal steel may be wired temporarily above required position and tagged to indicate its location and vertically marked indicators maintained showing required location of horizontal bars.
  - d. After completion of grouting if doubts exists whether or not steel has been properly placed, use drill to locate steel, or open masonry as required by Architect. Make repairs as directed.
  - e. Install anchor bolts with the tail of bolt hooked over a continuous horizontal bar or an added #4 horizontal bar. Dry pack around void where anchor bolt penetrates masonry face shell.
  - f. Fill masonry cores with grout and immediately consolidate each cell with a mechanical vibrator having a 3/4 inch head and operating at 5000 RPM submerged.
  - g. Pour grout to 1-1/2 inches below top of masonry unit except at finish course. Immediately remove grout or mortar on exposed faces.
  - h. Form construction joints by stopping grout 1-1/2 inches below top of wall. If construction is to be stopped for more than 1 hour, form construction joint with block top surface free of mortar or grout.
  - i. At jambs use temporary wood dams where necessary to contain mortar and grout.

2. High Lift Grout System: Construct high lift concrete block masonry construction to conform to CBC 2104A.6.1.2.3, IR 21-2, and with the following requirements:
  - a. Provide cleanout openings for cells at the bottom of each pour. Make the openings before the start of laying, of sufficient size and location to allow flushing away mortar droppings and debris. Cleanout openings may be cut in the blocks or formed in the foundation.
  - b. After the laying of masonry units is completed, the cells cleaned, the reinforcing positioned and inspection completed, close the cleanouts by inserting face shells of masonry units or covering the opening with forms. Face shell plugs shall have a 2 day minimum curing time and shall be adequately braced to resist the pressure of the fluid grout.
  - c. Accurately place reinforcing steel inserts and bolts in strict accordance with the Contract Drawings. Hold both horizontal and vertical reinforcing in position by wire ties or spacing devices near ends and at intervals not exceeding 160 diameters of the reinforcement.
  - d. Place the horizontal reinforcing as the construction progresses. Thread the vertical reinforcing into position after the completion of laying if adequate positioning devices and clearances are provided to permit such placement. Otherwise, erect vertical reinforcement ahead of masonry work.
  - e. Use bond beam units to facilitate the horizontal flow of grout and at all horizontal bars to provide a minimum opening at cross webs 1-1/2 inches high for the width of the cell.
  - f. Fill head and bed joints solidly with mortar. Take care in placing the mortar to keep a minimum of droppings from falling into the block cells.
  - g. When adequate cross webs between face shells are not provided, install ties of heavy gauge wire (minimum of #9 galvanized) embedded in the horizontal mortar joints across continuous vertical joints or between face shells to prevent "blowouts" from hydrostatic pressure of the fluid grout. External ties or braces may also be used for this purpose.
  - h. Adequately brace ungrouted walls against wind and other lateral forces during construction.
  - i. Remove mortar droppings and overhangs from the foundation or bearing surface, cell walls, and reinforcing. Either wash with a high pressure jet stream at least twice a day, or provide a 1 to 2 inch blanket of dry sand over the exposed surface of the foundation, dislodge hardened mortar from the cell walls and reinforcing using a pole or rod, and remove the mortar debris with the same high pressure jet stream.
  - j. Intermediate horizontal construction joints are not permitted. Plan construction for one continuous pour of grout to the top of the high lift portion of the wall in 4' layers or lifts in the same working day. Should a blowout, a breakdown in

equipment, or any other emergency occur, cease the grouting operation. Use procedures as directed by the Architect.

- k. To prevent "blowouts", do not pour grout until the mortar has set and cured. However, grout the walls as soon as possible thereafter to reduce shrinkage cracking of the vertical joints. Cleanout closures, reinforcing, bolts and embedded connection items shall be in position before grouting is started. All cells shall be filled with grout.
  - l. Handle grout from the mixer to the point of deposit in the grout space as rapidly as practical by pumping and placing methods which will prevent segregation of the mix and cause a minimum of grout splatter on reinforcing and masonry unit surfaces not being immediately encased in the grout lift. Depending upon weather condition and absorption rates of the masonry units, the lift heights and waiting periods may be varied. Under normal weather conditions, with typical masonry units, limit the individual lifts of grout to 4 feet in height with a waiting period between lifts of 30 to 60 minutes.
  - m. Place the first lift of grout to a uniform height within the pour section and vibrate thoroughly to fill all voids. This first vibration shall follow the pouring of the grout by not more than 10 feet. Vibrate or consolidate with approved mechanical vibrators.
  - n. After a waiting period sufficient to permit the grout to become plastic, but before it has taken any set, pour succeeding lift and vibrate alternate cells by extending vibrator 12 inches to 18 inches into the preceding lift to reconsolidate the preceding lift and close plastic shrinkage cracks or separations from the cell walls.
  - o. If the placing of the succeeding lift is going to be delayed beyond the period of workability of the preceding lift, reconsolidate each lift by reworking with the vibrator as soon as the grout has taken its settlement shrinkage.
  - p. Repeat the waiting, pouring and reconsolidating steps until the top of the pour is reached. Also reconsolidate the top lift after the required waiting period and fill space left by settlement shrinkage with grout.
- F. Bond and Joints: Lay units with 1/2-unit running bond, vertical joints in alternate courses aligned and plumb. Make joints uniformly 3/8" size, concealed joints struck flush. Compact and dense concave tool exposed joints with 1-1/2" diameter plastic or similar non-staining tool.

### 3.03 PARGING:

Parge walls wherever required to assure smooth surfaces to receive waterproofing.

- A. Clean wall surfaces thoroughly. Apply Larson Products Co. Weldcrete bonding agent to surfaces of wall in accordance with manufacturer's instructions.

- B. Apply parge coat of Type S mortar, conforming to Title 24, Table 24-A (1 part Portland cement, 1/4 to 1/2 part hydrated lime, 2-1/4 to 3 parts fine aggregate) with Laticrete latex admix added per admix manufacturer's directions. Apply in 2 uniform coats to a total thickness of 3/4 inch. Scarify first parging coat to ensure full bond to subsequent coat.
- C. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom. Damp cure parging for at least 24 hours and protect until cured. Provide nailers if required for attachment of membrane.

#### 3.04 WALL CONTROL JOINTS:

Provide for walls where shown and as detailed. Caulk exterior face of joints according to Section 07920. The vertical mortar joint at control joint locations shall be continuous for full height of wall. This shall be accomplished by utilizing half blocks in alternating courses on each side of the joint. The control joint key shall be interrupted in courses containing continuous bond beam steel. The control joints shall be raked to a depth of 3/4 inch; backer rod and sealant shall be installed in accordance with Section 07920.

#### 3.05 CURING:

Keep newly constructed masonry damp for 3 days with regulated fog spray of water sufficient only to moisten faces of masonry not in an amount as to cause water to flow down over masonry. Do not saturate masonry with water for curing or any other purposes and protect from rain or flooding during curing period.

#### 3.06 CLEANING:

Clean mortar and grout off exposed surfaces immediately and as the work progresses. Acceptably repair imperfect joints, holes, defaced units, chipped edges or corners, and all other defects, or replace the defective units as required for approval. Mortar or grout staining on exposed masonry surfaces is subject to sandblast cleaning of the entire surface involved to obtain clean uniform approved appearance, as directed and at no additional contract cost.

#### 3.07 FIELD QUALITY CONTROL:

- A. Testing: Laboratory shall test mortar and grout to extent shown, as required by Code.
- B. Continuous Inspection: Construct masonry under continuous inspection of a specially approved inspector as required by CBC 1701A.5.7 and 2105A.7.
- C. Mortar and Grout Testing: Testing Laboratory shall test mortar and grout in accordance with ASTM C 780 and CBC 2105A including additional sampling and testing as required by Architect, Structural Engineer or DSA.
- D. Masonry Core Tests: Testing Laboratory shall take and test masonry cores in accordance with CBC 2105A.3.1. Take cores in locations as designated by Architect or Structural Engineer. Contractor shall restore walls from which cores are taken with whole face shells or complete units as approved.

END OF SECTION

SECTION 05120  
STRUCTURAL STEEL

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide structural steel, complete in phases as indicated by the Construction Manager.

A. Work in this section: Principal items include:

1. Steel beams, girders, headers, columns and other framing members indicated on drawings.
2. Steel pipe and tube framing.
3. Welding pertinent to this section.
4. Shop priming and field touch-up to extent specified.
5. Hoisting of metal floor and roof decking.

B. Related Work Specified in Other Sections:

1. Setting of anchor bolts and inserts in concrete.
2. Metal decking installation.
3. Reinforcing steel.
4. Field painting except as specified herein.
5. Metal fabrications including steel stairs.

1.02 REFERENCES:

- A. AISC Standards: Code of Standard Practice for Steel Buildings and Bridges; Specification for the Design, Fabrication and Erection of Structural Steel for Buildings; and Steel Construction Manual; as amended by local ordinance.
- B. AWS Standards: AWS D1.1, Structural Welding Code.

1.03 QUALITY ASSURANCE:

- A. Qualifications of Fabricator: Fabricate structural steel in shop of a licensed fabricator approved by DSA.

1.04 SUBMITTALS:

- A. Shop Drawings: Submit covering all structural steel including welding, accessories and fastenings. Fully detail minor connections and fastenings not shown or specified to meet

required conditions. Include detailed sequence plan for shop and field welding that minimizes locked-in stresses and distortion.

- B. Manufacturer's Mill Certificate: Submit, certifying that products meet or exceed specified requirements.
- C. Mill Test Reports: Submit Manufacturer's Certificates, indicating structural strength destructive and non-destructive test analysis.
- D. Weld Procedures: Submit weld procedures, indicating joint details and tolerances, preheat and interpass temperature, postheat treatment, single or multiple pass, electrode type and size, welding current, polarity and amperes and root treatment.
- E. Welder's Certificates: Submit Manufacturer's Certificates, certifying welders employed on the Work, verifying AWS qualification within the previous 6 months.
- F. Test Reports: Submit reports of tests conducted on shop and field welded and bolted connections. Include data on type of tests conducted and test results.

## PART 2 – PRODUCTS

### 2.01 MATERIALS:

- A. Structural steel: Grades as indicated on drawings.
- B. Unfinished threaded fasteners: ASTM A 307, Grade A, regular low carbon bolts and nuts.
- C. High strength threaded fasteners: ASTM A 325 SC, quenched and tempered, medium carbon steel bolts, nuts and washers. High-strength bolts shall have a suitable identifying mark placed on top of the head at the factory.
- D. Primer: Lead free metal primer, Tnemec 10-99 or Rust-Oleum X-60.
- E. Welding electrodes: AWS A5.1, E70XX Series, low hydrogen, having a minimum yield point of 60,000 psi.

### 2.02 FABRICATION:

Conform to approved submittals, Article "Quality Assurance" above as applicable to the work, and requirements herein. Fabricate and form the Work to meet actual installation conditions as verified at the site.

- A. Steel shall be well formed to shape and size, with sharp lines or angles, and accurate curves where indicated, and shall be welded or bolted, and furnished complete with proper anchorage, as detailed.
- B. Welding: Conform to AWS D1.1, as modified by referenced AISC Standards, and as indicated or noted on drawings. Unless otherwise indicated or specified, weld joints by shielded electric-arc method. Grind exposed welds subject to contact to smooth



surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds and other exposed welds except as specified. Cut out defective welding and replace.

- C. Shop priming: Clean surfaces according to AISC Specifications. Apply shop coat of metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime galvanized items or items embedded in concrete masonry. Shop prime all ferrous items not to be galvanized unless otherwise indicated or specified.
- D. Make threaded connections up tight so threads are entirely concealed.

#### 2.03 SPECIAL REQUIREMENTS FOR ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS):

- A. Welds shall be ground smooth. For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16", -0" of plate thickness.
- B. Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up.
- C. Where noted on the drawings, provide continuous welds of a uniform size and profile.
- D. Minimize weld show-through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
- E. Removal of field connection aids: Run-out tabs, erection bolts and other steel members added to connections to allow for alignment, fit-up and welding in the field shall be removed from AESS.
- F. Splice members only where indicated.
- G. Obtain permission for any torch cutting or field fabrication from the Architect. Finish sections thermally cut during erection to a surface appearance consistent with the mock up.

### PART 3 – EXECUTION

#### 3.01 ERECTION OF STRUCTURAL STEEL:

Brace and secure structural steel members until permanent connections are completed. Provide accessories and fasteners to secure steel in place as shown and required. Conform to Code 2016 CBC Chapter 22A, AISC Standards, and erection and bracing and procedure, as well as comply with minimum OSHA requirements for steel erection.

- A. General: Employ qualified riggers and plan erection to require minimum cutting. Erect members plumb, true to line and level, and in precise positions. Provide temporary bracing and guying to resist loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation.

- B. **Damaged Members:** During erection, straighten or replace members which are bent, twisted, or damaged as directed. If heating is required, perform heating by methods that ensure a uniform temperature throughout the entire member. When directed, remove members damaged to an extent impairing appearance, strength, or serviceability and replace with new members at no extra cost to the Owner.
- C. **Anchor bolts:** Furnish and deliver anchor bolts with setting drawings and templates. Verify position of bolts prior to delivery of steel; report errors or deviation for correction.
- D. **Connections:** Hold steel in correct position during welding and bolting, and provide for dead loads, wind, and all erection stresses. Do no welding or final bolting until members have been aligned and plumbed.
  - 1. **Field Welding:** Conform to requirements for shop fabrication. Comply with AWS D1.1 for procedures and appearance. Assemble and weld built-up sections by methods that will maintain true alignment of axes without warp. Verify that weld sizes, fabrication sequence, and equipment used for AESS will limit distortions to allowable tolerances.
  - 2. **Common Bolts:** Tighten and upset bolt threads to preclude loosening, or use approved self-locking nuts. Align bolts heads in AESS.
  - 3. **High Strength Steel Bolting:** For joints connected by high strength steel bolts, hardened washers, and nuts tightened to high tension, conform materials, method of installation and tension control, and wrenches to Reference Standards and Title 24 CCR 2227. Install all highstrength bolts under inspection required by CBC 2212A.6.
    - a. Connections shall be the "friction type" unless noted to be "bearing bolt type".
    - b. Bolt lengths shall be the grip plus 1-1/4".
    - c. Tightening of nuts shall be done with properly calibrated wrenches or by the turnofthenut method. Allowable bolt stresses shall conform to CBC 2205.11 and tables listed in Reference Standards.
    - d. Check calibrated wrenches individually for accuracy not less than once daily for actual conditions of application.
    - e. Clean all contact surfaces of bolted parts and threads free of scale, slag, burrs, pits, dirt, paint and other foreign material or defects which would prevent solid seating of connected parts.
    - f. Install hardened washers per AISC Standards.
    - g. Tighten bolts systematically from most rigid part of connection to the free edges.
    - h. Retighten first installed bolts that may have loosened by tightening of subsequent bolts so all bolts are tightened to correct tension.
    - i. Mark fully tightened bolts with identifying symbol.

- E. Tolerances: Erect members to the tolerances conforming to referenced AISC Standards and CBC.

### 3.02 FIELD TOUCH-UP PAINTING:

After structural steel erection and connections are completed and approved, clean all connections to be painted and damage to shop painted surfaces, and apply a field touch-up coat of same metal primer used for shop coat.

### 3.03 FIELD QUALITY CONTROL:

- A. Inspection: According to Reference Standards. Inspector shall visually inspect welds, shall be present to inspect and approve all groove and penetration welding, and shall inspect all erection including the grouting under base plates. Inspection of high strength bolting shall conform to 2016 CBC 2231A.6.
- B. Tests of Steel, Welded Studs and Bolting: Testing Laboratory shall inspect all shop and field welding, conform to requirements of 2016 CBC, 2231A.1, A.2, A.3 and A.5 and DSA requirements, and certify in writing, after completion of work, that testing has been performed in accordance with the drawings, specifications and 2016 CBC 2231A.
- C. Welding: Inspect and test during fabrication and erection of structural steel assemblies, as follows:
  1. Welding shall be inspected by an AWS-CWI inspector, and approved by DSA.
  2. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in the work. Record work required and performed to correct deficiencies.
  3. Perform visual inspection of all welds.
  4. Inspect groove welded connections of column to column, column to girder, girder to girder, and like connections by ultrasonic or other approved non-destructive tests.
  5. Ultrasonic testing shall be performed by a specially trained and qualified technician who shall operate the equipment, examine welds, and maintain a record of welds examined, defects found, and disposition of each defect. All defective welds shall be repaired and costs for retesting defective welds shall be paid by Contractor.
  6. Rate of Testing: All complete penetration groove welds contained in joints and splices shall be tested 100 percent either by ultrasonic testing or by radiography.
  7. Partial penetration groove welds when used in column splices shall be tested either by ultrasonic testing or radiography.
  8. Base metal thicker than 1-1/2 inches, when subjected to through-thickness weld shrinkage strains, shall be ultrasonically inspected for discontinuities and will be accepted or rejected on the basis of the defect rating.

9. Any material discontinuities shall be accepted or rejected on the basis of the defect rating in accordance with the criteria of AWS D1.1.
10. Doubler plate welds tested by U.T. are acceptable minus one-eighth inch.
11. Material in rolled shapes with flanges 1-1/2 inches or thicker shall have minimum Charpy V-notch (CVN) toughness of 20 foot-pounds at 70 degrees F.
12. CJP groove welds shall be made with filler metal providing CVN toughness of 20 foot-pounds at 0 degrees F and 40 foot-pounds at 70 degrees F.

END OF SECTION

## SECTION 05315

### METAL FLOOR AND ROOF DECKING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide metal floor and roof decking, complete.

A. Work in this section: Principal items include:

1. Composite steel floor deck with accessories.
2. Steel roof deck with accessories.
3. Bent plate and sheet metal closures at decking edges and openings.
4. Holes through decking, with reinforcing.
5. Welded shear studs for floor deck.

B. Related work not in this section:

1. Hoisting of decking.
2. Structural steel framing and supports for steel decking.
3. Structural concrete fill on steel floor deck.
4. Concrete fill on steel roof deck.
5. Electrical wiring and wiring devices in cellular steel decking.

##### 1.02 QUALITY ASSURANCE:

- A. Qualifications of Welders: Employ welding operators currently tested and certified in accordance with code.
- B. Requirements of Regulatory Agencies: Provide steel floor and roof deck system that, with concrete fill, meets UL and code requirements for 2 hour fire-rated deck system.
- C. Source Quality Control: Conform to California Building Code requirements; unidentified decking is not acceptable. Furnish deck manufacturer's certified mill analyses and test reports for each heat covering decking having  $F_y$  or 33 Ksi or less. In addition, for decking having  $F_y$  greater than 33 Ksi, Testing Laboratory shall perform one tension and elongation test one bend or flattening test for each gauge.

##### 1.03 SUBMITTALS:

- A. Shop Drawings: Submit fully detailing and dimensioning all steel decking including accessories, fastenings, welding, holes with reinforcing, flashings and closures. Indicate welding according to AWS Standard Welding Symbols. Show dimensioned layouts for openings and reinforcing details.
- B. Calculations and Data: If steel decking of type differing from that indicated or specified is proposed, submit the manufacturer's calculations and supporting data showing that

proposed decking conforms to requirements indicated and specified. Include the decking manufacturer's technical product data and copies of code approvals for proposed decking. Submit with shop drawings and obtain approval prior to fabrication and delivery of decking.

- C. Samples: Provide a 2 square foot sample of each type of proposed decking material, along with a sample of each of the accessories used. A sample of acoustical material shall be included.

#### 1.04 DELIVERY, STORAGE AND HANDLING:

Deck units shall be delivered to the site in a dry and undamaged condition, stored off the ground with one end elevated, and stored under a weather tight covering permitting good air circulation. Finish of deck units shall be maintained at all times by using touch-up paint whenever necessary to prevent the formation of rust.

### PART 2 – PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS:

Verco Manufacturing Co.  
4340 N. 42<sup>nd</sup> Avenue  
Phoenix, AZ 85019  
(602) 272-1347

ASC Steel Deck  
2110 Enterprise Blvd.  
West Sacramento, CA 95691  
(800) 726-2727  
FAX (916) 372-7606

BHP Steel Building Products USA  
2110 Enterprise Blvd.  
West Sacramento, CA 95691  
(800) 726-2727

#### 2.02 DECK UNITS:

- A. Decking Materials, General: Deck units shall conform to Steel Deck Institute Publication SDEI DMCDFDRD No. 29, Design Manual for Composite Decks, Form Decks and Roof Decks. Deck units shall be manufacturer and profile as indicated on drawings, made from steel conforming to ASTM A 653 or A 611, minimum yield strength 33,000 psi, with galvanized coating Class G60. Painted decking will not be acceptable.
- B. Panels of maximum possible lengths shall be used to minimize end laps. Deck units shall be fabricated in lengths to span 3 or more supports with flush, telescoped, or nested 2 inch laps at ends, and interlocking, or nested side laps, unless otherwise indicated.
- C. Manufacturer and profile shall be as indicated on drawings.

- D. Roof Decking: Fabricated of steel conforming to ASTM A 653, type and manufacture noted on the drawings, lengths to span over at least three supports unless otherwise shown, each panel factory slotted or having rolled-in moisture venting provisions.
- E. Composite Floor Deck: Type and manufacture noted on drawings, lengths to span over at least three supports unless otherwise indicated, manufactured from ASTM A653 Grade 33 steel. Deck units used in composite deck shall have adequate embossment to develop mechanical shear bond to provide composite action between the deck and the concrete.
- F. Decking Accessories: Provide indicated and required decking accessories including, without limitation, welding washers and welding anchors, transitions, and filler strips, as required for complete installations. Provide bent plate closures, angles, channels and attachments as required for openings through decking for ducts, shafts, piping and other penetrations: where decking changes direction; and at decking perimeter; fabricated of 16 gauge galvanized steel unless otherwise shown.
1. Closure Plates for Roof Deck: Voids above interior walls shall be closed with sheet metal where shown. Open deck cells at parapets, end walls, eaves and openings through roofs shall be closed with sheet metal. Sheet metal shall be same thickness as deck units.
  2. Closure Plates for Composite Deck: The concrete shall be supported and retained at each floor level. Provide edge closures at all edges of the slab of sufficient strength and stiffness to support the wet concrete. Metal closures shall be provided for all openings in composite steel deck 1/4 inch and over, including but not limited to:
    - a. Cover plates to close panel edge and end conditions and where panels change direction or abut. Butt joints in composite steel deck may receive a tape joint cover.
    - b. Column closures to close openings between steel deck and structural steel columns.
    - c. Sheet Metal: Where deck is cut for passage of pipes, ducts, columns, etc., and deck is to remain exposed, provide a neatly cut sheet metal cover to cover edges of deck. Do not cut deck until after installation of supplemental supports.
  3. Sump Pans: Provide sump pans for roof drains and shall be minimum 0.075 inch thick steel. Sump pans shall be shaped to meet roof slope. Bearing flanges of sump pans shall overlap steel deck a minimum of 3 inches. Opening in bottom of pan shall be shaped, sized and reinforced to receive roof drain.
- G. Galvanizing Repair Paint: Zinc rich paint conforming to Mil Spec MIL-P-21035 (SHIPS).
- H. Welded Stud Shear Connectors: Shear connectors shall be headed stud type, ASTM A 108, Grade 1015 or 1020, cold finished carbon steel with dimensions complying with AISC ASD Spec S335. Shear connector studs shall be manufactured by Nelson Stud Welding of TRW Nelson Division, KSM Division of Omark Industries, or equal.

## PART 3 – EXECUTION

### 3.01 INSTALLATION OF DECKING:

Verify dimensions and actual site conditions to ensure proper fit and installation.

- A. **Placing:** Place steel decking on supports with full bearings, end joints centered over supports, and adjust to correct final position before completing permanent attachments. Place units in straight alignment for the entire length of run of flutes with close registration of flutes and with maximum 1/8" gap between ends of units, minimum 2" bearing on the supports. Do not splice units except at supports. Conform to code approvals and approved submittals.
- B. **Cutting and Fitting:** Perform cutting and fitting at perimeters, stairs and other openings. Provide tight fitting closures at the open uncovered ends and edges of decking, and all miscellaneous supports required to carry the metal decking. Secure hole reinforcement to decking with fillet welds placed on both sides of reinforcing members. Place reinforcement channels and angles across flutes and to project a distance beyond sides of openings equal to the maximum size of the opening unless otherwise shown. Perform field cutting and trimming square and neat, equal to factory cutting.
- C. **Welding:** Use materials and methods in accordance with recommendations of steel decking manufacturer and approved submittals. Hold decking tight to the supporting elements with screws or other means as directed for proper welding or crimping of the decking edges. Conform to AWS D1.3, UBC Std. 27-13, and to the patterns and weld types indicated, with all finished welds free of sharp points or edges. Field coat welds and abraded surfaces at completion with an approved anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.
- D. **Damaged Decking:** Remove and replace all metal decking showing denting or other damage that adversely affects decking strength or subsequent materials as directed.

### 3.02 INSTALLATION OF SHEAR STUDS:

- A. Install studs only on dry surfaces. Do not use studs showing defects, rust, rust pits, scale, oil or other deleterious substance. Hold the steel decking tight to the supports prior to stud installation.
- B. Install studs promptly after cleaning and preparation. Hold welding gun in correct position and without movement until the weld metal has solidified. Break and remove arc shields after welding. Produce welded studs free from any defect or substance that interferes with intended functions.
- C. Exercise extreme care to prevent defective welds or damage to or excessive burning of decking when welding through metal decking.
- D. **Installation of Automatic End Welded Studs:** The studs shall be automatically end welded in accordance with the manufacturer's recommendations in such a manner as to



provide complete fusion between the end of the stud and the plate. There should be no porosity of evidence or lack of fusion between the welded end of the stud and the plate. The stud shall decrease in length during welding approximately 1/8" for 5/8" and under, and 3/16" for over 5/8" diameter. Welding shall be done only by qualified welders approved by the welding inspector.

### 3.03 CLEANING AND TOUCH-UP:

Remove surplus materials. Clean and touch-up raw edges of decking cut for openings with anodic galvanizing repair paint. Leave decks ready to receive subsequent materials.

### 3.04 FIELD QUALITY CONTROL:

- A. Steel Decking Inspection: Install steel decking under continuous inspection according to CBC Chapter 22A, 2231A.5, with welding approved and recorded by welding inspector before being covered.
- B. Inspection and Testing of Welded Shear Studs:
  - 1. Inspection, in accordance with Title 24, Section 2231A.5, of all the shop and field welding operations for the automatic end welded studs shall be made by a qualified welding inspector (approved by the Division of the State Architect). The type and capacity of the welding equipment shall be in accordance with the manufacturers recommendations and shall be checked and approved by a welding inspector. At the beginning of each day's work, a minimum of two test stud welds shall be made with the equipment to be used to metal which is the same as the actual work piece. The test studs shall be subjected to a 90% bend test by striking them with a heavy hammer. After the above test, the weld section shall not exhibit any tearing out or cracking.
  - 2. Testing of end-welded studs shall be in accordance with Section 2231A.3, Part 2, Title 24.

END OF SECTION

## SECTION 05400

### COLD-FORMED METAL FRAMING

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including General Conditions and Division 1 specification Sections, apply to this Section.

##### 1.02 SUMMARY:

- A. This Section includes the following:
  - 1. Interior load-bearing C-shaped steel-stud walls.
  - 2. Interior non load-bearing, C-shaped steel stud walls.
  - 3. Suspended C-shaped steel stud walls.
  - 4. Exterior canopy C-shaped steel stud walls.

##### 1.03 SUBMITTALS:

- A. Section 01330 – Submittal Procedures.
- B. Product data for each type of cold-formed metal framing, accessory, and product specified, clearly indicating all dimensions, gauges and proposed locations.

##### 1.04 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced Installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Fire-Test-Response Characteristics: Where fire-resistance-rated assemblies are indicated, provide cold-formed metal framing identical to that tested as part of an assembly for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

##### 1.05 DELIVERY, STORAGE AND HANDLING:

- A. Protect cold-formed metal framing from corrosion, deformation and other damage during deliver, storage and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURERS:

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated in the work include the following:
1. Approved Equal, Inc.
  2. Angeles Metal Systems.
  3. California Metal Systems, Inc.
  4. Dale Industries, Inc.
  5. Dietrich Industries, Inc.
  6. Steel Systems International, Inc.
  7. United Construction Supply.
  8. United States Steel.
  9. Knorr.

### 2.02 MATERIALS:

- A. Galvanized-Steel Sheet: ASTM A 446 (ASTM A 446M), zinc coated according to ASTM A 525 (ASTM A 525M).

### 2.03 WALL FRAMING:

- A. Steel Studs: Manufacturer's standard C-shaped steel studs of web depths indicated, with lipped flanges, with minimum yield point of 50,000 psi for 16 gage and heavier, 33,000 psi for 18 gage and lighter; ASTM A446, A570 or A611.
- B. Steel Track: Manufacturer's standard U-shaped steel track, unpunched, of web depths indicated, with straight flanges.

### 2.04 FABRICATION:

- A. Fabricate cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer' recommendations and the requirements of this Section.
1. Fabricate framing assemblies in jig templates.
  2. Cut framing members by sawing or shearing; do not torch cut.
  3. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
  4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to manufacturer's recommendations.

## PART 3 – EXECUTION

### 3.01 EXAMINATION:

- A. Examine supporting substrates and abutting structural framing for compliance with requirements, including installation tolerances and other conditions affecting performance of cold-formed metal framing. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION, GENERAL:

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing and accessories plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
- C. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.
- D. Provide temporary bracing and leave in place until framing is permanently stabilized.
- E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- F. Erection Tolerances: Install cold-formed metal framing to a maximum allowable tolerance variation from plumb, level and true to line of 1/8 inch in 10 feet (1:960) and as follows.

### 3.03 NONLOAD-BEARING PARTITION INSTALLATION:

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Squarely seat studs against webs of top and bottom tracks. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as noted on plans.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Where gypsum wallboard is omitted from one or both sides of partitions, install horizontal bridging, spaced in rows not more than 30 inches (762 mm) apart. Fasten at each stud intersection.

### 3.04 LOAD-BEARING PARTITION INSTALLATION:

- A. Connections shall be accomplished with self-drilling screws or welding so that the connection meets or exceeds the design loads required at that connection.
- B. Bridging shall be of size and type shown on the drawings and as called for in the design calculations.

- C. Install headers in all openings that are larger than the stud spacing in that wall. Provide jack studs to support each end of headers.
- D. Studs shall be spaced to suite the design requirements and limitations of collateral facing materials.
- E. Install additional studs at intersections, corners, doors, windows, control joints, etc., and as called for in the shop drawings or design calculations.
- F. Anchorage of the tracks to the structure shall be with methods designed for that specific application. Size, penetration, type and spacing shall be determined by design.
- G. Welds shall conform to the requirements of AWS E1.3, AWS D1.3 and AISI Manual. Welds may be butt, fillet, spot or groove type, the appropriateness of which shall be determined by, and within the design calculations. All welds shall be touched up using zinc rich paint. Steel drill screws shall be of the minimum diameter indicated by the design of that particular attachment detail. Penetration through joined materials shall not be less than 3 exposed threads. Screws shall have a protective coating at least equivalent to zinc plating when used in exterior assemblies.

### 3.05 REPAIRS AND PROTECTION:

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanizing repair paint according to ASTM A 780 and the manufacturer's instructions.
- B. Touch-up Painting: Wire brush, clean and paint scarred areas, welds and rust spots on fabricated and installed prime-painted, cold-formed metal framing.
  - 1. Touch-up painted surfaces with same type of shop paint used on adjacent surfaces.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer to ensure that cold-formed metal framing is without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 05500  
METAL FABRICATIONS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide miscellaneous metal fabrications as indicated on drawings, specified and required.

A. Work In This Section: Principal items include:

1. Pipe railings and handrails.
2. Railings at drinking fountains.
3. Guard rails.
4. Pipe Bollards.
5. Steel ladders and ladder covers.
6. Decorative tube steel frame canopies (window Eyebrows).
7. Steel Fence and Gates & Misc. Steel Fabrications.

B. Related Work Not In This Section:

1. Finish painting.
2. Setting of anchor bolts and inserts in concrete.

1.02 QUALITY ASSURANCE:

Conform to Code, Titles 8 and 24 CCR, and AISC Code of Standard Practice for Steel Buildings and Bridges; AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings; AISC Steel Construction Manual; and AWS D1.1, Structural Welding Code.

1.03 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings fully detailing work of this section, including accessories, fastenings, and welding. Include minor connections and fastenings not indicated or specified to meet required conditions; indicate in detail on shop drawings.
- B. Product Data: Submit brochures describing items, specifications and installation instructions for manufactured items.

1.04 PRODUCT DELIVERY AND HANDLING:

Protect items from damage during shipping, handling and storage. Work showing dents, creases, deformations, weathering, or other defects is not acceptable. Deliver welding electrodes to site in unbroken packages bearing manufacturer's name and contents identification.

1.05 JOB CONDITIONS:

Verify field measurements prior to fabrication of items. Use caution to protect concrete floor surfaces and adjacent work from damage.

## PART 2 – PRODUCTS

### 2.01 BASIC MATERIALS:

Furnish materials conforming to the following:

- A. Steel shapes: ASTM A36, ASTM A992 for all W shapes.
- B. Steel tubing: ASTM A513; and ASTM A500, Grade B, galvanized where indicated.
- C. Steel plates: ASTM A36, ASTM A283, Grade C for bending or forming cold. Thickness indicated for raised pattern safety plates is exclusive of projected pattern.
- D. Steel sheet: ASTM A611, Grade C, Type 1 or 2, matte finish.
- E. Steel pipe: ASTM A53, Grade B.
- F. Stainless steel tubing: ASTM A554, Grade MT 302 or MT 304, No. 4 satin finish, and with temporary protective coating.
- G. Bolts and nuts: ASTM A307, Grade A. High Strength bolts: ASTM A 325-SC. Anchor Bolts: ASTM F1554, Grade 36 & Grade 55 for braces frames.
- H. Machine screws: FS FF-S-92.
- I. Electrodes: AWS D1.1, E70XX Series as required for intended use.
- J. Primer: Lead free red metal primer per Fed Spec TT-P-86G, Type I, II, or III; zinc molybdate per Fed Spec TT-P-645A.
- K. Asphalt Emulsion: Conforming to ASTM D 1227, Type 3, No. 107 by Henry Co., or equal.
- L. Setting compound: Hallemite Inc., "Por-Rok" for interior dry conditions; "Super Por-Rok" for exterior and wet conditions.
- M. Non-shrink grout: Refer to Section 03300.
- N. Concrete inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron or cast steel, ASTM A47. Provide bolts, washers and shims as required, not dip galvanized.
- O. Galvanizing: Hot dip, conforming to ASTM A123 for steel shapes and pipes, ASTM A153 for steel hardware, as applicable.

- P. Galvanizing repair material: All States Galvanizing Powder, Drygalv by American Solder and Flux, or equal hot applied repair material, or anodic zinc-rich galvanizing repair paint conforming to Mil Spec DOD-P-21035.

## 2.02 GENERAL FABRICATION REQUIREMENTS:

Conform to approved submittals, Article "Quality Assurance" above as applicable to the work, and requirements herein. Fabricate and form the work to meet actual installation conditions as verified at the site. Obtain necessary templates and information and provide all holes and drilling indicated or required for securing work of other sections to metal fabrications.

- A. Fabricate items to design shown. Furnish members in longest lengths commercially available within the limits shown and specified. Fabricate straight, true, free from warp and twist, and where applicable square in same plane. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items. Provide openings, cut-outs, and tapped holes for attachment and clearances required for other work. Prepare members for the installation and fitting of hardware. Provide reinforcement to support cut edges where required. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.
- B. Welding: Conform to AWS D1.1, as modified by referenced AISC Standards, and as indicated or noted on drawings. Unless otherwise indicated or specified, weld joints by shielded electric-arc method. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces. Grind exposed welds subject to contact to smooth surfaces free of holes, slag, or other defects, flush with adjoining surfaces. No finishing treatment is required for concealed welds and other exposed welds except as specified. Cut out defective welding and replace.
- C. Joining: Miter or butt members at corners. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.
- D. Anchors: Where metal fabrications are shown to be preset in concrete, weld 1-1/4 by 1/8 inch steel strap anchors, 6 inches long with one inch hooked end, to back of member at 2 feet on center, unless otherwise shown. Where metal fabrications are shown to be built into masonry use 1-1/4 by 1/8 inch steel strap anchors, 10 inches long with 2 inch hooked end, welded to back of member at 2 feet on center, unless otherwise shown.
- E. Cutting and Fitting: Accurately cut, machine and fit joints, corners, copes and miters. Fit removable members to be easily removed. Design and construct field connections as indicated on approved submittals. Fit pieces together as required. Joints shall be firm when assembled. Conceal joining, fitting and welding on exposed work. Do not show rivets and screws on the exposed face. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.



- F. Miscellaneous Items: Fabricate items not specifically mentioned according to the drawings, approved shop drawings, and as required to complete the entire Work. Galvanize exterior items and shop prime interior items unless otherwise shown or specified.
- G. Provide all metal fabrications indicated, specified, and required to complete the work, including all anchors and supports. Include all parts necessary to complete metal fabrication work whether or not specifically indicated.
- H. Form exposed work true to line and level with accurate angles and surfaces and straight shape edges. Ease exposed edges to radius of approximately 1/32" unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- I. For fabrication of metal work which will be exposed to view in finished work, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, mill scale, rolled trade names and roughness.
- J. Close fit exposed joints to hairline joints. Cut off exposed bolts and screws flush with adjacent metal. Cut, drill punch and tap as required for installation and attachment of other work to metal work.
- K. Form metal work with anchorage when built into concrete or masonry or provide with suitable anchors, expansion shields, or other anchoring devices indicated or required. Provide such metal work in ample time for setting and securing in place.
- L. Make threaded connections up tight so threads are entirely concealed. Provide Phillips flat head countersunk bolts and screws in exposed work and elsewhere as required, unless otherwise indicated.

### 2.03 FABRICATION OF ASSEMBLIES TO BE GALVANIZED:

Conform to recommendations of the American Galvanizers Association and as follows:

- A. Avoid overlapping contact surfaces where possible, and where not feasible, edges shall be completely sealed by welding. Do not allow moisture to be trapped within contact surfaces.
- B. Use uncoated wire to prevent flux deposits, or remove flux residue by wire brushing, flame cleaning, or shot blasting.
- C. Do not apply paint tagging to any surface to be galvanized.
- D. Fabricate assemblies of similar materials, and of similar surface condition.
- E. Allow for thickness of coating in threaded items.
- F. Fabricate railings and other items of pipe in such manner that the molten zinc can flow freely through all portions of the assembly.

- G. Allow for warpage due to galvanizing in the fabrication.

#### 2.04 FINISHING:

- A. Shop Priming: Clean surfaces according to AISC Specifications. Apply shop coat of metal primer to minimum 1.0 mil dry film thickness. Work primer into joints. Do not prime galvanized items or items embedded in concrete or masonry. Shop prime all ferrous items not to be galvanized unless otherwise indicated or specified.
- B. Galvanizing: Hot dip galvanize specified items after fabrication is completed and produce coatings free of roughness, whiskers, unsightly spangles, icicles, runs, barbs, sags, droplets, and other surface blemishes. Handrails and guardrails to be galvanized, touch up weld with galvaloy. Do not paint.
  - 1. Exterior galvanized railings and handrails shall be sealed with Starcrete "Stonetone" sealer, Kemiko clear acrylic urethane, No. 44CF-1, manufactured by Epmar (562) 946-8781.
- C. Asphalt Emulsion: Clean surfaces, and apply to portions of metals, galvanized and prime finished, which will be embedded in concrete. Do not coat exposed portions.

### PART 3 – EXECUTION

#### 3.01 INSPECTION:

Report in writing those conditions that prevent or interfere with correct installation of work of this section.

#### 3.02 GENERAL INSTALLATION REQUIREMENTS:

- A. Grouting: Provide grouting for work of this section as show, specified, and required. Use non-shrink grout and conform to manufacturer's directions.
- B. Galvanizing Repair: Wire brush welds and damaged coating to clean bright metal. Apply one coat of galvanizing repair paint where surfaces are concealed or are to be finish painted. Use the specified hot-applied galvanizing repair compound where surfaces remain exposed and unpainted.
- C. Shop Prime Coat Repair: Do not apply metal primer in wet weather unless steel is protected from dampness and is dry. Clean field welds, field bolts, and all damaged shop primer after erection and apply a spot coat of the same primer used for the shop coat.
- D. Fasteners: Provide fasteners and connectors of approved types as required for the installations, whether or not indicated. Provide galvanized fasteners for galvanized items and for exterior use. Fasten metal work to solid masonry with expansion bolts and to hollow masonry with toggle bolts. Provide screws threaded full length to screw head.
- E. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

- F. Fastening: Field weld in accordance with AWS. Design and finish as specified for shop welding. Use continuous weld unless specified otherwise. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- G. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.

### 3.03 SCHEDULE OF ITEMS:

- A. General: Following list of specific items is not necessarily complete. Check drawings and all other sections, and provide miscellaneous metal fabrications as required to complete the entire work.
- B. Specific Items:
  - 1. Steel Ladders: Construct as shown and according to code, Title 8 CCR, and ANSI A14.3. Continuously weld all joints and grind welds smooth and flush, and provide required brackets and attachments. Galvanize.
  - 2. Ladder Covers: Construct of steel angle framing, galvanized sheet steel cover plate with piano hinge and locking device, wire mesh closure strips, all as detailed.
  - 3. Pipe Railings: Railings and supports shall withstand a concentrated load of not less than 200 pounds applied at any point, downward or horizontally and uniformly distributed load of not less than 50 pounds per lineal foot applied downward or horizontally. Fabricate of nominal 1-1/4" diameter steel pipe, not lighter than Schedule 80 extra strong, with joints mitered at angles and coped at intersections unless otherwise shown, and continuously welded, all welds ground smooth and flush, or Fabricate of ASTM A 513 steel tubing. Provide cast malleable steel brackets with mounting plates for railings on walls. Return exposed rail ends to within 1/4" of walls unless otherwise shown. Galvanize exterior railings.
    - a. Exterior Post Anchors: Fabricate tube or pipe sleeves with closed ends or plates as shown. Where inserts interfere with reinforcing bars, provide flanged fittings welded or threaded to posts for securing to concrete with expansion bolts. Provide heavy pattern sliding flange base plate with set screws at base of pipe or tube posts. Base plates are not required on pipe sleeves where ornamental railings occur.
    - b. Interior Post Anchors: Provide flanged fittings for securing fixed posts to floor with expansion bolts, unless shown otherwise. Weld or thread flanged fitting to posts at base. For securing removable posts to floor, provide close fitting sleeve insert or inverted flange base plate with stud bolts or rivets concrete anchor welded to the base plate. Provide sliding flange base plate on posts secured with set screws. Weld flange base plate to removable posts set in sleeves.

- c. Railings in the interiors of buildings and at interior drinking fountains, shall be fabricated of Type 304 stainless steel with No. 4 finish. Provide smooth long radius bends and cross bars as indicated. Grind welds smooth and finish to match railings.

END OF SECTION

SECTION 06100  
ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Rough carpentry. Wood and Plywood Framing. Division 1 applies to this Section.
- B. Misc. fire retardant treated wood curbs and blocks.
- C. Installation of prefabricated wood members.

1.02 REFERENCES

- A. ASTM D4601 - Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
- B. Chapters 7 and 23, 2016 CBC.
- C. DOC PS 1-09 - Department of Commerce Product Standard, U. S. Product Standard for Construction and Industrial Plywood.
- D. DOC PS 20-05 - Department of Commerce Product Standard, American Softwood Lumber Standards.
- E. DOC PS 2-04 - Department of Commerce Product Standard, U. S. Product Standard for Construction, Performance Standard for Wood-Based Structural-Use Panels.
- F. WWPA - Western Lumber Grading Rules 88, Latest Edition, by Western Wood Products Association.
- G. APA - American Plywood Association Design/Construction Guide (Engineered Wood Association).
- H. AQMD - Local Air Quality Management District Regulations.
- I. AWPA C1, C2, C3, C9, C27 - American Wood Preservers Association - Manual of Recommended Practice.
- J. AWPA C20-02 - American Wood Preservers Association Standards, Structural Lumber – Fire-Retardant Treatment by Pressure Process.
- K. WCLIB - West Coast Lumber Inspection Bureau Standard Grading Rules No. 17.
- L. ASTM E84 - Surface Burning Characteristics of Building Materials.
- M. Title 8 - California Code of Regulations, Construction Safety Orders.
- N. ICC –ESR – International Code Council Evaluation Service, Inc. Evaluation Service Reports.

### 1.03 SUBMITTALS

- A. Product data and current ICC Evaluation Service Reports for framing anchors.

### 1.04 QUALITY ASSURANCE

- A. Rough Carpentry Lumber: Visible grade stamp on all products required.
- B. Grade Stamp: Association under whose rules it was graded, or official grade mark of other recognized grading agencies using grading rules, equivalent to WWPA or WCLIB.
- C. Nailing guns and nail operators shall be approved in accordance with Title 8 Construction Safety Orders.

### 1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver rough carpentry items until site conditions are adequate to receive the Work. Protect items from weather while in transit.
- B. Store lumber and plywood at the site under cover or otherwise protected against exposure to weather, raise above ground and out of contact with damp or wet surfaces. Stack lumber and plywood and provide for air circulation within and around stacks and under temporary covers. For pressure treated lumber and plywood, provide spacers between courses to permit air circulation.

### 1.06 PROJECT CONDITIONS

- A. Cooperate with other trades in coordinating their Work with the Work of this Section. Provide wood grounds, blocking and nailer where indicated or as required for Work of other trades.

## PART 2 - PRODUCTS

### 2.01 ROUGH CARPENTRY MATERIALS

- A. Lumber: Graded in accordance with WWPA or WCLIB; maximum moisture content of 19 percent at time of loading. Provide Douglas Fir Larch for structural and framing lumber, surfaced four sides to standards of the grading association unless otherwise indicated on Drawings, use the following grades:
  - 1. Joists, rafters, beams, horizontal framing: No. 1 unless otherwise indicated or noted on drawings.
  - 2. Structural Drawings take precedence for lumber grades.
  - 3. All lumber in contact with concrete shall be pressure treated.
- B. Exposed Exterior Construction: Dimension Lumber and Timber per DOC PS 20. Species: Douglas-fir larch Select Structural, WCLIC. Provide material hand-selected for uniformity of appearance and free from characteristics, on exposed surfaces and edges that would impair finish appearance, including decay, honeycomb, knot-holes, shakes, splits, torn grain, and wane.

1. Provide timber framing complying with requirements, according to grading rules of grading agency indicated.
  2. For exposed lumber and timber to receive a stained or natural finish omit grade stamp and provide Certificates of Grade compliance issued by grading agency.
- C. Plywood: Section 2303.1.5 CBC, Douglas Fir 1 Group Species, PS 1, APA Structural I Rated Sheathing. Bond Classification: Exterior. Thickness as indicated, span rating sized for spacing.
1. For natural finished plywood: Panel Grade N veneer on face and B on back side.
  2. For painted finish: APA Sanded Plywood Panels, A-C Group 1, Exterior, sanded face, touch sanded back side.
  3. Thickness: As indicated on Drawings.
- D. Roof Plywood Decking: requiring FM 1-90 Wind and Fire Classification. Section 2304.8.2 CBC, Douglas Fir 1 Group Species, PS 1, APA Structural I Rated Sheathing. Bond Classification: Exposure 1, B-C Veneer Grade, sanded 1 side. Thickness as indicated, span rating sized for spacing.
- E. Preservative (Pressure) Treated Lumber: Section 2303.1.9 Conform to AWPA Manual of Recommended Practice, kiln dry after treatment. Use preservative complying with AWPA C2 lumber and C9 plywood, latest edition. Products NOT containing arsenic or chromium. Conform to AQMD, Local Regulations.
1. Douglas Fir Larch, used as required by Section 2303, CBC, shall conform to the following:
    - a. Lumber shall be WWPA or WCLIB grade stamped.
    - b. Lumber shall be No. 1 grade or better unless indicated otherwise on Drawings.
- F. Waterproof Membrane: ASTM D4601; Type II, asphalt saturated glass felt.
- G. Plywood Backing Panels
1. Telephone and Electrical Equipment, fixed equipment, cabinets, grab bars, door stops and plates: DOC PS 1, Exposure 1, APA A-C, sanded, Veneer Grade, fire-retardant treated, in thickness indicated or, if not indicated, not less than 5/8 inch nominal thickness. Installed "A" side out for paint finish.
- H. Nails, Spikes and Staples: Section 2304.9, Galvanized for exterior applications, high humidity locations and treated wood; plain finish for other interior locations; size and type to suit application. Comply with Table 2304.10.1. Use common nails only.
- I. Bolts, Nuts, Washers, Lags, Pins and Screws: Section 2304.9 CBC, sized to suit application, galvanized for exterior locations, high humidity locations and treated wood, plain finish for other interior locations. Full diameter body bolts only per ASME B18.2.1(.2) or B18.2.6 for structural applications.
1. Pre-drill pilot hole for Lag screws.
- J. Fasteners: Expansion type or powder actuated type for anchorage to solid masonry or concrete. Refer to Division 01, General Requirements for acceptable types and required testing.

- K. Stock Framing Connectors: Section 2304.9 CBC types indicated on Drawings, galvanized, with nails fully driven in all holes in each face of connector. Conform to the following.
  - 1. Manufacturers: Simpson Strong Tie Co., Inc., San Leandro, CA, United Steel Products, Montgomery, MN. or equal as approved in accordance with Division 01 General Requirements for Substitutions.
  - 2. ICC Listed.
- L. Non-Stock Framing Connectors: Conform to details.

### PART 3 - EXECUTION

#### 3.01 FRAMING

- A. Erect wood framing, furring, stripping and nailing members true to lines and levels. Do not deviate from true alignment more than 1/4 inch in 10 feet, non-cumulative.
- B. Construct members of continuous pieces of longest possible lengths.
- C. Provide double joist headers at joist ends and around openings unless otherwise indicated on Drawings. Bridge joists and rafters to conform Section 2304 CBC and as noted on plans. For pre-manufactured joists, provide bridging in accordance with manufacturer's recommendations.
- D. Provide one row of solid blocking not less than 2 inch nominal thickness and same width of stud at ceiling and floor lines and at spacing not to exceed 8 feet on center vertically. Fit snugly and attach with not less than two 16d nails.
- E. Cutting and Notching: Conform to Section 2308.9.10, CBC.
- F. Bored Holes: Conform to Section 2308.9.11, CBC.
- G. Conform to Section 717, California Building Code for fire blocks and draft stops. Fire blocks and stops at 10-foot intervals and at ceiling level.
- H. Fire-Retardant Wood: Ripping and milling are not permissible. Cross cutting to length, drilling holes, joining cuts and light sanding are permissible. It is not necessary to field treat cut ends to maintain flame spread rating. All cuts on plywood are considered end cuts and is permissible to be cut.

#### 3.02 PLYWOOD SHEATHING

- A. Thickness as indicated on the Drawings.
- B. Boundary Nailing: Not less than 3/8 inch from edge, spaced not more than 6 inches on center, unless noted otherwise on Drawings.
- C. Blocking: Panel edges shall bear on framing members or solid blocking.
- D. Minimum Size Vertical Panel: 16 inches wide.



- E. Minimum Size Horizontal Panel: 24 inches wide.

### 3.03 HORIZONTAL FRAMING

- A. Bearing: 1-1/2 inch minimum on wood or metal, 3 inches on masonry. Lay framing members with crown up. Members with knots at bottom not permitted.
- B. Lateral Support: Use solid blocking, cross bridging or other approved means.
- C. Lap joists a minimum of 3 inches when framed from opposite sides of a beam. Do not run joists continuous beyond one span unless indicated otherwise on Drawings.
- D. Openings: Double joists required for trimmer and headers for openings 4 ft. or larger unless indicated otherwise on Drawings.
- E. Provide ties, purlins and blocking in conformance with Section 2316, CBC.
- F. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

### 3.04 INSTALLATION OF BACKBOARDS

- A. Provide backing panels as indicated on Drawings to support telephone and electrical equipment, fixed equipment, cabinets, grab bars, door stops and plates. Fasten securely to framing. Ensure that backing panels are installed with good side out (whose face side is free of blemishes) side by side, no mix of sides allowed.
- B. Install to extent indicated on the drawings or as required for electrical or communication system installation.
- C. Install with sheet metal screws, No.10 minimum, at 12 inches on center minimum. Drywall screws will not be permitted.
- D. Prime paint exposed faces. Do not cover manufacturer's trade stamps indicating fire treatment.
- E. Final finish per Section 09 90 00, Painting.

END OF SECTION

SECTION 06200  
FINISH CARPENTRY

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section.

Provide and perform finish carpentry as indicated, specified, and required.

A. Work In This Section: Principal items include:

1. Counters and Cabinets shall be WI certified. Finish shall be laminated plastic.
2. Submit WI Certified Compliance Certificates indicating each millwork product for the work and that all products will fully conform to WI grades and other requirements.
3. Telephone and electrical backboards.
4. Installation of hollow metal doors and frames.
5. Installation of wood doors.
6. Installation of finish hardware except as otherwise specified.

B. Related Work Not In This Section:

1. Finish painting.
2. Furnishing hollow metal doors and frames.
3. Furnishing wood doors.
4. Furnishing finish hardware for doors.

1.02 QUALITY ASSURANCE:

Work of this section shall conform to the Manual of Millwork of the Woodwork Institute, *The North American Architectural Woodwork Standards 3.1*. The work shall comply with requirements for grades as specified herein or indicated, except as modified herein. Submit WI Certified Compliance Certificates indicating each millwork product for the work and that all products will fully conform to WI grades and other requirements shown and specified.

1.03 ENVIRONMENTAL REQUIREMENTS:

All wood products shall originate in "certified well-managed" forests as determined by standards endorsed by the Forest Stewardship Council. Timber products shall come from sources adopting environmentally friendly practices in forest management, logging and processing. Acceptable practices shall mean forests that are being managed through professionally administered forestry management and logging plans that assure regeneration of desired

species following harvest. Forest management shall also include protecting rivers and streams from degradation, minimizing damage to the forest when harvesting, protecting biodiversity, operating in concert with the lawful interests of local populations, and maximizing both the yield and value of the forest products.

## PART 2 – PRODUCTS

### 2.01 MATERIALS AND MANUFACTURE:

Conform to WI Manual of Millwork unless otherwise shown or specified. Details on Drawings and requirements specified herein govern the type, arrangement, sizes, construction and fabrication. In all other respects, manufacture work of this section to conform to the WI grades specified.

#### A. Lumber:

1. Douglas Fir: Premium grade, vertical grain where exposed. Where concealed, use flat grain.
2. Pine: Sugar pine or white pine, clear, Custom grain.

#### B. Particleboard: Medium density fiberboard (MDF) conform to ANSI A208.1, Grade 1-M-2 or 2-M-2 or better, minimum density 32 pounds per cubic foot.

#### C. Plywood for Concealed Uses: WI Economy grade, Type 1 adhesive, veneer core, Douglas fir faces.

#### D. Interior Finish and Trim: Match existing. Conform to WI Section 9. Fabricate to profiles shown, in long lengths. End joints of running trim shall be beveled together. Joints shall be mitered, neat and tightly fitted. Sand exposed surfaces to finish and trim with 4/0 sandpaper.

#### E. Exterior frames and trim: WI Sections 6, 7, 8, and 13, Custom Grade. Match existing species and profile.

#### F. Hardwood Plywood Veneer: Conform to WI Section 4, Premium Grade, and as follows:

1. Frames: Water-repellent treated Western Ponderosa pine kiln dried to between 6% and 12% moisture content. Frames shall be completely assembled with operating hardware. Width of frames shall be as detailed.
2. Casings: Provide casings as indicated on drawings.
3. Sash: Clear Western ponderosa pine, kiln-dried, water repellent treated. Sash thickness shall be 1-3/4". Sash corners shall be slot and tenoned, glued and nailed. Sash shall have authentic divided lights in patterns as shown.

#### G. Back Priming: Use a tinted resin sealer on natural finished woodwork with care not to coat exposed surfaces. Back prime Honduras mahogany casework, finish and trim on all concealed surfaces against building walls.

## PART 3 – EXECUTION

### 3.01 GENERAL FINISH WORK:

Provide sizes, materials and designs as indicated and as required to match existing. Apply primer to finish work before installing. Joints shall be tight and constructed in a manner that will conceal shrinkage. Miter trim and moldings at exterior angles and cope at interior angles and at returns. Material shall show no warp after installation. Install millwork and trim in the maximum practical lengths. Fasten finish work with finish nails or pinhead screws. Provide blind nailing where practicable. Set face nails for putty stopping.

- A. Interior Finish Work: After installation, sand exposed surfaces smooth. Provide window and door trim in single lengths.
- B. Telephone and Electrical Backboards: Install Grade B-B Exterior plywood panels, 3/4" thick by 8-feet high. After sizing, fire-retardant pressure treat each piece to flame spread of 25 or less and smoke developed of 5 or less per ASTM E84 test. Secure to walls with stripes of contact adhesive and molly-bolts at 24" centers around perimeter of each panel. Run backboards from top of wall base.

### 3.02 INSTALLATION OF HOLLOW METAL DOORS:

Conform installations to submittals approved under Section 08110 and manufacturer's instructions. Install doors square and plumb with frames with maximum 1/8" clearance at top, edges, and meeting stiles, and 1/4" clearance at sill unless otherwise indicated or required by floor or threshold finish.

- A. Install transom panels and side panels as detailed, and as indicated on approved submittals. Exposed fasteners are not acceptable.

### 3.03 INSTALLATION OF WOOD DOORS:

Install according to NWWDA requirements except as modified herein. Fit doors square and plumb with frames with allowance for possible swelling and shrinking, maximum 1/8" clearance at top, 1/16" on the hinge side, 1/8" on the lock side and between meeting edges of doors in pairs, with 3/8" clearance at sill unless otherwise indicated or required by floor or threshold finish. Round arrises to 1/16" radius. Bevel lock stiles for lock and latch hardware.

### 3.04 INSTALLATION OF FINISH HARDWARE:

- A. Install finish hardware items for wood doors as furnished under Section 08710. Install accurately and securely without marking or defacing hardware or finish work. Items of finish hardware shall be fastened at all points where fasteners are indicated or required. Drill pilot holes for screws and screw home; hammer driving of screws is not permitted.
- B. Finish hardware, except hinges, shall be removed for painting and finishing, and reapplied after painting and finishing are completed and dry. Perform final testing, and adjusting after installation is completed. Doors shall swing smoothly but not loosely,

without sticking, binding, or hinge-bound conditions, with hardware properly adjusted and functioning.

- C. Keys: If supplied with the locks, properly tag keys and deliver to the Owner upon completion.

### 3.05 FIELD QUALITY CONTROL:

At completion of work of this section, obtain inspection by an authorized representative of the Woodwork Institute, perform all remedial work necessitated as a result of said inspection, and upon completion, issue to the Owner a certificate by the Woodwork Institute attesting that all work of this section is manufactured and installed in accordance with their requirements, except for more stringent requirements specified herein.

END OF SECTION

## SECTION 06410

### CASEWORK

#### PART 1 - GENERAL

##### 1.01 SCOPE:

- A. This Section includes the following:
1. Laminate-clad cabinets, including all custom casework and movable furniture shown in the plans (plastic covered casework).
  2. Architectural laminated plastic countertops and splashes.
  3. Casework hardware and accessories. Division 1 applies to this Section
- B. Submit product data for each type of product and process specified in this section and incorporated into items of architectural woodwork during fabrication, finishing, and installation, including finishes, hardware, components, special anchors, etc. Submit manufacturer's sample ring of standard price group laminates available, for initial selection.
- C. Shop Drawings: Submit complete drawings showing location of each item, dimensioned plans, elevations, section and large-scale details, attachment devices, and other components. Comply with Woodwork Institute of California (WI), Sections 1 and 2. Indicate WI grade. Comply with all provisions of Section 01300 and as follows:
1. Show plans, elevations, ends, cross-sections, service run spaces, locations and type of service fixtures with lines thereto.
  2. Show details and location of anchorages and fitting to floors, walls and base. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
  3. Provide drawings for all counter tops, cabinets, etc.
  4. Show all measured field dimensions on shop drawings. Identify those dimensions as field measured. List any conflicts or inconsistencies created as a result of field measurements.
  5. Field measure all rooms and areas to receive casework to verify that all openings, passages, clearances, etc. will function per plan and per all accessibility requirements. Report deficiencies to Architect.
- D. Manufacturer Qualifications: Firm or firms experienced in successfully producing architectural woodwork similar to that indicated for this Project, with sufficient production

capacity of produce required units without causing delay in this Work. Firms to be active members of WI, licensed to build and install the improvement that they are providing.

- E. WI Certification: Enlist the services of the WI certification program, and obtain all stamps, certificates, and labels required as follows:
1. Before delivery to the job site, the millwork supplier shall issue a WI. Certified Compliance Certificate indicating the grade of millwork products to be furnished for this job and certifying that they will fully meet all the requirements of the grade or grades specified.
  2. The Shop Drawings shall bear the WI Certified Compliance Label.
  3. WI Certified Compliance Labels shall be affixed to all casework.
  4. Upon completion of the job, WI Compliance Certificate for installation shall be required.
- F. WI Quality Standard: Comply with applicable-requirements of "Manual of Millwork," published by Woodwork Institute (WI) unless otherwise indicated.
1. Note that the WI standards represent minimum compliance criteria. The Owner may require more stringent standards when specifically listed in the plans or specifications.
- G. Do not deliver casework until painting, wet work, grinding, and similar operations that could damage, soil, or deteriorate woodwork have been completed in installation areas. Protect casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.
- H. Field Measurements: Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.
- I. Extra Materials: Provide additional hardware in the amount of 1% of the numbers used in the project, including pulls, locks, shelf supports, hinges, magnetic catches, elbow catches.

## PART 2 – PRODUCTS

### 2.01 MATERIALS:

Provide materials that comply with requirements of the WI woodworking standard for each type of wood work and WI quality grade indicated, unless otherwise indicated.

- A. High Pressure Decorative Laminate: Refer to drawings for location.  
Custom Administration Reception desk:  
Bottom Base: LaminArt: Canyon Live Oak 3038-Gloss Finish.  
Casework and Countertop: WilsonArt New Age Oak 7938-38 Fine Velvet Finish.

Library Countertop: LaminArt Canyon Live Oak 3038 Velve Tex Finish.

Library Casework: WilsonArt New Age Oak 7938-38 Fine Velvet Finish.

Countertop for Work Office, Work Room, Conference Room, Health office Teacher Lounge, Teacher Workroom, Innovation Lab and Classrooms: WilsonArt Platinum D315-60 Matte Finish.

Casework for Work Office, Work Room, Conference Room, Health office Teacher Lounge, Teacher Workroom, Innovation Lab and Classrooms: WilsonArt New Age Oak 7938-38 Fine Velvet Finish.

- B. Particle Board: Comply with WI and CPA requirements for particleboard materials for cabinet cores, Grade M-2 or M-3. An alternate acceptable core material is formaldehyde-free fiberboard, Medite 11, or approved equal. When formaldehyde-free fiberboards is used with formaldehyde-free adhesives, coating and finishes, formaldehyde emissions barriers may be omitted.
  - 1. Submit certifications from materials manufacturers that all products are formaldehyde-free.
- C. Fillers and Sealants: Where specifically allowed, within the tolerances and quality control measures described per WI, and as designated herein, provide suitable, color-matched fillers for seams and other areas requiring fill within casework. Provide SeamFil and ColorFlex fillers, by Kampel Enterprises, Inc. or approved equal.
  - 1. Damaged surfaces and work exhibiting poor craftsmanship shall be replaced, except for minor repairs as specifically approved by the Architect.

## 2.02 FABRICATION:

- A. Wood Moisture Content: Comply with requirements, of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.
- B. Formaldehyde Emission Barriers for Particleboard and MDF: The Contractor fabricator will apply barriers to all unfinished edges of the manufactured casework to diminish formaldehyde emissions after fabrication. No untreated edges (exposed or not) will be permitted. Comply with the recommendations of the Technical Bulletin prepared on the topic by the Composite Panel Association. The Contractor may utilize any of the following barriers if installed in accordance with this Bulletin.

Category 1: Thick Laminates.

Category 2: Thin Laminates.

Category 3: Finishes. If two coats of finish are utilized.

- C. Complete fabrication, including assembly, finishing and hardware application before shipment to project site to maximum extent possible. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming and fitting.
- D. Factory-cut openings to maximum extent possible to receive hardware sinks, faucets and similar items. Locate openings accurately and use templates or roughing-in



diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and, where located in counter tops and similar exposures, seal edges of cutouts with a water-resistant coating.

- E. Laminate Clad Cabinets: The cabinet designs are indicated with WI design numbers. Refer to WI Manual of Millwork Supplement No. 2 to Sections 14 and 15.
1. Quality Standard: Comply with WI Section 15 "Casework-Laminated Plastic".
  2. Grade: Custom, except as herein modified.
  3. WI Construction Style: Style A Frameless.
  4. WI Construction Type: The following will be supplied:
    - a. Type I multiple self-supporting units rigidly joined together.
    - b. Construct shelving units in storage and custodial rooms of 1/4" min MDF.
  5. WI Door and Drawer Front Style: Flush overlay.
  6. Shelving: Comply with the following, for a load factor of 50 pounds per square foot except as modified below:
    - a. Fixed shelving between vertical members of the cabinet body, and adjustable shelving concealed:
      - 1) Use 3/4" particleboard up to 25' long.
      - 2) Use 1" particleboard up to 34" long.
      - 3) Use 3/4" Douglas Fir veneer core plywood with hardwood veneer 2 sides up to 46" long.
      - 4) Use 1" Douglas Fir veneer core plywood with hardwood veneer 2 sides up to 61' long.
    - b. Adjustable shelving, exposed:
      - 1) Use 3/4", 3 or 5 ply panels, combination core (OSB center with hardwood veneer plies up to 40" long. Also use for wall hung cabinet tops and bottoms with routed-in sliding glass door tracks.
      - 2) Use 3 or 5 ply panels, combination (OSB center with hardwood veneer plies up to 53" long.
  7. Filler Panels: For spaces of 3" or more, use flush-type filler panels, with surfaces and edging to match cabinets.

8. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.
  9. Pre-Cut Openings: Fabricate work with pre-cut openings, wherever possible, to receive hardware and similar items. Locate openings accurately and use templates or rough-in diagrams for proper size and shape. Smooth the edges of cutouts and where located in counter tops and similar exposures, seal the edges of cutouts with a water-resistant coating.
  10. Provide cutouts in casework for electrical service and plumbing fixtures, or access points.
  11. Cabinet Doors: Shall be of M.2 or M.3 particleboard, for small doors. For doors over 20" wide, use medium density fiberboard, with a minimum modulus of elasticity of 525,000.
- F. Construction: In accordance with WI Sections 14 and 15, Supplement 1, the following construction details for Style A – Frameless, shall be acceptable – 1a, 1c, 2b, 2c, 3a, 3b, 4a, 4b, 5a, 6a, 7a, 7b, 8a, 9b, 10a, 11a, 12c, 12d, (13a, 13b @ fixed shelf only), 13c, 14a, 15a, 16a, 17b.
1. In order to comply with CBC, Title 24, Part 2, all wall hung casework shall be constructed using either WI-STC-1 or WI-STC-111, per WI Appendix Section entitled "WI Seismic Casework Fabrication Approvals".
- G. Laminate Cladding: Except where more stringent requirements are specifically called out on the drawings, comply with the following:
1. Laminate Grade for Exposed Surfaces: Regardless of the surface type, provide a minimum thickness of 0.028 inches. Comply with any more stringent WI standards.
  2. Semi-exposed Surfaces: On all cabinets, cubbies, bookcases, cubicles, etc. without doors and in knee spaces provide high pressure decorative laminate for all semi-exposed surfaces. Otherwise, comply with WI standards.
  3. Edge Treatment: Provide colored PVC tape, to match plastic laminate surface.
  4. Self Edge: Provide "Color-Core" material at countertop edges and similar conditions, except where finished hardwood edges are specified.
- H. Cabinet Hardware and Accessory Materials: Cabinet hardware and accessory materials associated with architectural cabinets, shall be furnished and installed for a complete casework installation.
1. Cabinet Hardware Schedule: Provide as listed I the hardware schedule at the end of this section. For items not specifically indicated, but required for complete installation, provide hardware listed in WI Manual of Millwork, "Approved Hardware Listings." Submit all items to be incorporated.

2. Provide U shaped wire pulls at all accessible casework or equally accessible pull hardware.
3. Exposed Hardware Finishes: For exposed hardware, provide a satin chrome finish where available. Where not available, provide satin aluminum.
4. For concealed hardware provide manufacturer's standard finish that complies with product class requirements of ANSI/BHMA A1 56.9.
5. Cabinet Hinges: Provide three hinges for doors over 48" in height, and four hinges for doors 7 feet high and 2 feet wide. No European hinges are allowed in a school installation.
  - a. At each hinge location, cabinet doors must be neatly notched square to accommodate hinge and still meet the requirements of WI Section 15, Table 15-2, items 6.2.215 through 6.2.217, for single and adjacent units (4 mm and 8 mm respectively).
6. Double Swing Hinges: Use 2 per door panel, for door panels up to 48' high.
7. Magnetic Catches: Heavy-duty type. Provide two on doors over 36" in height; one on doors under 36" in height.
8. Elbow Catches: Provide elbow catches on one door of all paired doors where locks are specified (in addition to magnetic catches).
9. Locks: Provide surface mounted pin tumbler type, 3/4" bolt throw, all brass construction complete with strike. Provide two keys per lock. Key different by room, all keyed to a single master. Mark each key (punched). Coordinate markings with Owner.
  - a. Provide locks at all doors and drawers.
10. Shelf Supports: Comply with WI loading criteria listed above. Use heavy duty standards and brackets where indicated - at Media walls, display cases, etc.
  - a. Overhead Cabinets (WI category 300). Use bored hole type shelf supports. Anchor each shelf to resist seismic movement by fastening (with a finish screw) through the front right shelf support, typical at each shelf. Provide 3 rows of holes and 3 shelf supports each side of all shelves over 24" deep or over 36" wide.
  - b. Base and Tall Cabinets (WI categories 100, 200, 400, 500 and 700). Use recessed pilasters and pilaster shelf supports. Anchor each shelf to resist seismic movement by fastening (with a finish screw) through the front right shelf support, typical at each shelf. Provide 3 rows of pilasters and 3 shelf supports each side of all shelves over 24' deep or over 36' deep.
  - c. Heavy Duty Adjustable Shelves (where specifically noted on the plans and details). For attachment of heavy-duty shelf standards within casework, provide

additional backing as required. Provide heavy cabinet backs, hardwood anchor strips, or other approved methods of reinforcing, as approved by DSA, for loads to be carried.

11. Provide clear plastic silencing bumpers on all doors and hardware.
  12. Provide chain stops at all doors with limited swing such as at interior corners, adjacent to units with greater cabinet depth, and next to walls or other obstructions.
  13. Wire Access Grommets: Grommets available through the Doug Mockett & Company (800/523-1260 or 310/318-2491). Provide and install where shown on plans and where needed to access power or signal system outlets above or below casework. Coordinate exact locations with casework or counter top supports and electrical or signal system supply below or above. Secure all wire access grommet sleeves to casework and countertops with adhesive.
  14. Wire Management Tray: Available through the Doug Mockett & Company (800/523-1260 or 310/318-2491). Provide and install where shown on plans. Cut lengths as needed to extend through entire knee spaces, end to end.
  15. Hanger Rods and Flanges: 1-5/16" diameter chrome-lock plated steel, 14 gauge minimum, with chrome plated steel pole sockets. At each wardrobe cabinet, provide (2) sets of flanges and one hanger rod. Place one set of flanges at standard height, and a second at +48" (to accommodate disabled users).
- I. Architectural Laminated Plastic Counter Tops and Splashes: Comply with WI Section 16 "Countertops-Laminated Plastic". Provide high pressure decorative laminate complying with the following:
1. Grade: Custom, except as modified herein.
  2. Laminate Cladding for Horizontal Surface: High pressure decorative laminate complying with the color selections indicated above. Grade: GP-50 (0.050-inch nominal thickness, except 0.042 for post-forming).
  3. Backsplash: Provide at all countertops, whether shown on drawings or not. Provide end splashes where base cabinets meet walls – provide 4" high coved backsplashes, unless noted otherwise.
  4. Overhangs: Provide 1/2" overhang at all countertops, on fronts and sides unless specifically noted otherwise on drawings for special conditions.
- J. Fasteners and Anchors:
1. Screws: Select material, type, size and finish required for each use. Comply with FS FF-S-1 1 1 for applicable requirements. Provide S & G specialty fasteners, QX or approved equal.
  2. Nails: Select material, type, size and finish required for each use. Comply with FS FF-N-1 05 for applicable requirements.

3. Anchors: Select material, type, size and finish required by each substrate for secure anchorage. Provide nonferrous metal or hot-dip galvanize anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed steel expansion bolt devices for drilled-in-place anchors.
4. Provide all necessary blocking, grounds, framing, etc. required for a complete installation.

## PART 3 – INSTALLATION

### 3.01 QUALITY STANDARD:

Install casework and tops to comply with applicable requirements for each type of woodwork involved, except where more stringent requirements are indicated. Installation requirements include WI Appendix Section entitled “WI Casework Installation Requirements”.

- A. Install woodwork plumb, level, true and straight with no distortions. Shim as required with concealed shims. Install to a tolerance of 1/8 inch in 8'-0” for plumb and level (including tops) and with no variations in flushness of adjoining surfaces.
- B. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- C. Anchor woodwork per DSA standards (as adopted by WI) to anchors, steel backing plates, or blocking built in or directly attached to substrates at a maximum spacings as detailed except comply with more stringent requirements in WI Appendix, “WI Casework Installation Requirements”. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Except where prefinished matching fastener heads are required, use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork. Install prior to the installation of carpet, resilient flooring, etc.
  1. At open shelving, cubbies, and other exposed and semi-exposed surfaces, installation screws (Truss head screws at backs of cabinets) shall be covered with 2-piece pop-on-screw covers and bases, color matched to laminate color, Ark-Plas Products POSC, or approved equal.
  2. Also, at exposed conditions, all screws used to interconnect cabinet units shall be flat head Phillips screws, countersunk flush to the surface, and covered with tap-on screw covers, color matched to laminate color, Ark-PI2S Products Tap On Screw Covers, or approved equal.
- D. Cabinets: Install without distortion so that doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.

- E. Furnish fillers, closures, trim and the like as required for a complete installation. Scribe in place wherever required. Provide fillers where casework abuts wall-, allow for final finishes and a minimum of 1/2" from hinge to finish surface.
- F. Tops: Anchor securely to base units and other support systems as indicated.
- G. Install laminated plastic counter tops with 1/2" overhang at exposed ends of base cabinets and finished hardwood edge to match front.
- H. Verify opening requirements and make cutouts for equipment and wire drops.
- I. Completely fill joints between splash or rear edge of countertop and wall with the appropriate sealant.
- J. Complete the finishing work specified in this section to whatever extend not completed at shop or before installation of woodwork.
- K. Repair damaged and defective casework where possible to eliminate defects functionally and visually, where not possible to repair, replace casework. Adjust joinery for uniform appearance. Clean, lubricate and adjust hardware. Clean casework on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

### 3.02 HARDWARE SCHEDULE:

Hardware shall be furnished and installed for a complete casework installation. Provide as follows:

- A. Hinges: Use Rockford Process Control, No. RP374, heavy-duty Wraparound, pin butt hinge, or approved equal. Satin chrome finish.
- B. Double Swing Low Door Hinge: Bommer 3029-5, 7122-6032, Double Action Spring Hinge. Pulls, doors and drawers: Stanley 4484, US26D.
- C. Magnetic Catches: EPCO EP 592, heavy duty.
- D. Elbow Catches: Ives 2A-92 clear, aluminum finish.
- E. Locks:
  - 1. Doors: National Lock No. N 8173-26D.
  - 2. Drawers: National Lock No. N8179-26D.
- F. Drawer Slides:
  - 1. Box Drawers: Fulterer FR 6500, full extension slides, with 150 lb. load capacity. Size to match drawer size.
  - 2. File Drawers: Fulterer FT 720, full extension slides, with 250 lb. load capacity. Size to match drawer box.

- G. Shelf Supports:
1. Overhead Cabinets: 1/4" Knape and Vogt No. 346 Anachrome.
  2. Base and Tall Cabinets: Knape and Vogt KV255 Pilaster (Recessed) with KV256ZC Shelf Supports.
  3. Heavy Duty Adjustable Shelves: Knape and Vogt KV87 Extra Heavy Duty Steel Standards and KV 186 and 187 brackets with locking nut.
- H. Mirrors: 1/4" float glass with polished edges. Provide with mirror clips and 3m double sided, form core tape.
- I. Hanger Rods and Flanges: 1-5/16" diameter chrome plated steel, 14 gauge minimum, with chrome plated steel pole sockets, KV No. 750-5 with no. 766 flanges.
- J. Drawer and door bumpers: Bumper specialties, 1/2" diameter, 0.14 in thick, clear.
- K. Chain Stops: Steel sash, bright zinc finish.
- L. Wire Access Grommets:
1. Doug Mockett LO Series, King Kong Grommet (6-1/2"L x 3"W).
  2. Doug Mockett XG Series, Round Plastic Grommet (3" Diameter).
- M. Wire Management Tray: Doug Mockett WM9 (90), 3" x 3" wireway.
- N. Coat Hooks: Ives No. 581, brass or bronze, satin chrome finish.
- O. Hanging File Supports: Steel Strip, sized per details, zinc finish.
- P. Television Swivel: Selby Furniture Hardware no. XLAZSUSN17AL, (800/244-0059), (or Louis and Co. Model no. SYLS1.7), 17" dia. Extruded aluminum swivel, minimum 700 lb. capacity.
- Q. CD/DVD storage organizers: Rev-a-Shelf No. R372-CD.
- R. Video Cassette Organizers: Rev-a-Shelf No. R371-VCR.
- S. Furniture Glides: ITW Plasticglide, Silencer, Louis & Company, Part # P75001-5541, Nickel finish.
- T. Casters: Provide 8 total at each rolling library hinged bookcase. Use Faultless Ruberex casters FL 121-2.5 (6) casters shall be standard swivel and (2) casters shall be swivel with breaks, at each cabinet.
- U. Piano Hinge at Rolling Bookcases: Use 2" Hettich Continuous Piano Hinge, HE 2NP. Provide continuous at joint between two cabinet halves.

- V. Case Latch at Rolling Bookcases: Use Brainerd Case Latch with Padlock Eye, BR857 (Brass plated). Use two per bookcase.

END OF SECTION



SECTION 07210  
BUILDING INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide batt type thermal and acoustical building insulation, complete.

A. Work In This Section: Principal items include:

1. Thermal batt insulation for exterior walls and under roof decks, per Title 24.
2. Acoustical batt insulation in interior partitions where indicated.

B. Related Work Not In This Section: Insulation for mechanical systems.

1.02 SUBMITTALS:

A. Manufacturer's Instructions: Submit insulation manufacturer's printed specifications and instructions.

B. Certification:

1. Submit certification that insulation material and installation conform to requirements of CBC 707.3.
2. Submit certification that binding agents used in manufacture of batt insulation are formaldehyde free.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

Johns Manville  
717 17<sup>th</sup> Street  
Denver, CO 80202  
(800) 654-3103

Owens Corning  
Toledo, OH  
(800) 438-7465

2.02 MATERIALS:

- A. Thermal Batt Insulation: Conforming to ASTM C665, R-22 in 2" by 8" walls, foil face or foil-scrim-kraft faced, flanged, formaldehyde free, thermal resistance R-19 under roof

decks where required and R-22 in exterior 2x8 walls, flame spread 25, smoke developed 50 (ASTM E-84), unless otherwise indicated.

- B. Acoustical Batt Insulation, Unfaced: Glass fiber batts, conforming to HH-I-521F, Type 1, formaldehyde free, R-30, R-19, R-15 and R-11, flame spread 25, smoke developed 50 (ASTM E-84), manufactured by Johns Manville, Owens-Corning or equal.
- C. Staples: Stainless steel, monel or copper-coated steel, size directed by batt manufacturer or required by Code.
- D. String Wires: Minimum 18 gauge galvanized steel wire.

### PART 3 – EXECUTION

#### 3.01 INSULATION OF BATTS:

- A. Install batts with close fit, free of gaps, holes, or sagging. Maintain nominal 3/4" air space between the insulation and interior wall or ceiling finish. Supplement the installation with wire ties or staples where required to prevent sagging.
- B. Batts In Wall and Roof Framing: Friction fit batts between framing. Provide tightly stretched string wires along center of horizontal or sloping batts where support spacings exceed 16" on centers or where possibility of sagging occurs.

END OF SECTION

SECTION 07220  
ROOF INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide roof insulation, complete.

- A. Work In This Section: Roof insulation:
- B. Related Work Specified Elsewhere:
  - 1. Metal roofing.
  - 2. Metal bitumen roofing.
  - 3. Modified Bitumen sheet roofing.

1.02 SUBMITTALS:

- A. Manufacturer's catalog data for fasteners and insulation.
- B. Samples: Submit 12 inch square samples of insulation, and 2 of each type fastener proposed for use.
- C. Drawings showing wood nailers and tapered roof insulation show location and spacing of wood nailers that are required for securing insulation. Show a complete description of the procedures for the installation of each phase of the system indicating the type of materials, thicknesses, identity codes, sequence of laying insulation, location of ridges and edges, special methods for cutting and fitting of insulation, and special precautions. The drawings shall be based on field measurements.
- D. Manufacturer's Installation Instructions for nails and fasteners, and for roof insulation, including field of roof and perimeter attachment requirements.

1.03 QUALITY ASSURANCE:

Roof insulation shall have a flame spread rating not greater than 25 and a smoke developed rating not greater than 200, exclusive of covering, when tested in accordance with ASTM E 84.

1.04 DELIVERY, STORAGE AND HANDLING:

- A. Deliver materials to site in manufacturer's unopened and undamaged standard commercial containers bearing the following legible information:
  - 1. Name of manufacturer.
  - 2. Brand designation.
  - 3. Specification number, type and class, as applicable, where materials are covered by a referenced specification.

4. Asphalt flashpoint (FP), equiviscous temperature (EVT), and finished blowing temperature (FBT).

- B. Store and handle materials in a manner to protect from damage, exposure to open flame or other ignition sources, and from wetting, condensation or moisture absorption. Store in an enclosed building or trailer that provides a dry, adequately ventilated environment. Store felt rolls on ends. For the 24 hours immediately before application of felts, store felts in an area maintained at a temperature no lower than 50 degrees F. Replace damaged material with new material.

#### 1.05 ENVIRONMENTAL CONDITIONS:

- A. Do not install roof insulation during inclement weather or when air temperature is below 40 degrees F.
- B. Use care to protect adjacent property and the building from contamination during work of this section.

### PART 2 – PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS:

Atlas Roofing Corp.  
1775 The Exchange, Suite 160  
Atlanta, GA 30339  
(770) 952-1442

Firestone Building Products Co.  
525 Congressional Blvd.  
Carmel, IN 46032  
(800) 428-4442

Rmax, Inc.  
13524 Welch Road  
Dallas, TX 75244  
(800) 527-8090

#### 2.02 MATERIALS:

- A. Roof Insulation: Polyisocyanurate foam panels manufactured with pentane blowing agent, conforming to ASTM C 1289, Type II, Class I, Grade 2, 20 psi compressive strength, minimum 92 percent closed cell content. Insulation shall conform to ASTM C 1289, Type II, with 100 percent fiber glass mat membrane both sides, density 2 pounds per cubic foot, minimum compressive strength shall be 20 pounds per square inch, maximum size 4 feet square, type acceptable to roofing materials manufacturer. Where insulation thickness of more than 2 inches is indicated, apply insulation in 2 layers.
- B. Protection Board: "Dens-Glass Gold", manufactured by Georgia-Pacific Corporation, P.O. Box 105605, Atlanta, GA 90348 (800) 225-6119. Glass mat gypsum sheathing

shall conform to ASTM C 79 and ASTM C 1177, with straight edges. Minimum 1/4 inch thick, maximum board size 4 feet square.

- C. Insulation Thickness: As indicated on drawings and as necessary to provide a thermal resistance (R value) of 30 or more at all points. Thickness shall be based on the "R" value for aged insulation.
- D. Tapered Insulation: Use to provide slopes, crickets and other construction indicated. Tapered panels and standard fill panels shall be composed of closed cell, rigid polyisocyanurate foam core material, integrally laminated between glass fiber facers, conforming to ASTM C 1289, Type 2, Class 1, Grade 1. Where more than one layer is required, either the first or second layer may be tapered at Contractor's option. Maintain required R value throughout.
- E. Insulation Fasteners for Metal Decks: No. 12 or No. 14, mechanical self-drilling self-tapping screw type corrosion-resistant fasteners, FM Class 1 Insulated Steel Deck Construction Windstorm Resistance Classifications 1-90 approved, UL approved for use in roof deck construction 360, and bearing an ICBO Research Report approval, Insul-Grip or equal.
  - 1. Fastener Plates: Factory-coated, corrosion-resistant, steel stress-distribution plates, meeting FM 4770. Minimum 24 gauge.
- F. Screws for fastening insulation to wood decks: Johns Manville UltraFast ASAP, preassembled screw and plastic locking plate fastener, FM Class I Insulated Steel Deck Construction Windstorm Resistance Classifications I-90 approved, UL approved for use in roof deck construction 360, and bearing an ICBO Research Report approval.
- G. Cants and Tapered Edge Strips: Except where wood cants are indicated, provide preformed cants and tapered edge strips of the same material as the roof insulation; or, when roof insulation material is unavailable, provide pressure-preservative treated wood, wood fiberboard, or rigid perlite board cants and edge strips are recommended by the roofing manufacturer, unless otherwise indicated. Face of cant strips shall have include of 45 degrees and vertical height of 4 inches. Taper edge strips at a rate of one to 1-1/2 inch per foot down to approximately 1/8 inch thick.

## 2.03 WOOD NAILERS:

Pressure-preservative-treated as specified in Section 06100.

## PART 3 – EXECUTION

### 3.01 EXAMINATION AND PREPARATION:

- A. Surface Inspection: Surfaces shall be clean, smooth and dry. Check roof deck surfaces, including surfaces sloped to roof drains and outlets, for defects before starting work. Inspect the surfaces immediately before starting installation.
- B. Surface Preparation: Correct defects and inaccuracies in roof deck surface to eliminate poor drainage and hollow or low spots and perform the following:

1. Install wood nailers the same thickness as insulation at eaves, edges, curbs, walls and roof openings for securing cant strips, gravel stops, gutters and flashing flanges. On decks with slopes of one inch per foot or more, install wood nailers perpendicular to slope for securing insulation. Space nailers in accordance with approved shop drawings.

### 3.02 INSULATION INSTALLATION:

#### A. General:

1. Apply insulation in two layers with staggered joints. Lay insulation so that continuous longitudinal joints are perpendicular to direction of felts for roofing, as specified elsewhere in Division 7, and end joints of each course are staggered with those of adjoining courses. When using multiple layers of insulation, joints of each succeeding layer shall be parallel and offset in both directions with respect to layer below. Keep insulation 1/2 inch clear of vertical surfaces penetrating and projecting from roof surface.
2. Provide 20 to 35 lbs. of asphalt per 100 square feet of roof deck for each layer of insulation. Apply asphalt when temperature is within plus or minus 25 degrees F of EVT. Do not heat asphalt above asphalt's FBT or 525 degrees F, whichever is less, for longer than 4 consecutive hours. Use thermometers to check temperatures during heating and application.

#### B. Metal Decks:

1. Attach first layer of insulation to the deck using mechanical fasteners at the rate of not less than 15 fasteners per board, in pattern recommended by insulation manufacturer and as required by Factory Mutual. Boards shall be placed in parallel courses with long dimension of boards perpendicular to the direction of roofing felts and cross joints staggered by half the board length.
2. Mop second layer of insulation using 20 to 25 pounds of asphalt per 100 square feet.
3. Protection Board: Set in mopping of asphalt, 20 to 25 pounds per 100 square feet.

- #### C. Cant Strips:
- Where indicated, provide cant strips at intersections of roof with walls, parapets and curbs extending above roof. Wood cant strips shall bear on and be anchored to wood blocking. Fit cant strips flush against vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where cant strips are installed against non-nailable materials, install in heavy mopping of asphalt or set in a heavy coating of asphalt roof cement.

### 3.03 PROTECTION:

- #### A. Protection of Applied Insulation:
- Completely cover each day's installation of insulation with the finished roofing specified elsewhere in Division 7, on same day. Do not permit phased construction. Protect open ends of each day's work with temporary water cutoffs, and remove when work is resumed. Protect open spaces between insulation

and parapets or other walls and spaces at curbs, until permanent roofing and flashing are applied. Do not permit storing, walking, wheeling, or trucking directly on insulation or on roofed surfaces. Provide smooth, clean board or plank walkways, runways, and platforms near supports, as necessary, to distribute weight.

- B. Damaged Work and Materials: Restore work and materials that become damaged during construction to original condition or replace with new materials.

END OF SECTION

## SECTION 07260

### WATER VAPOR TESTING AND CONTROL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. 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, complete.

##### A. Related Work Not In This Section:

1. Resilient flooring.
2. Carpet.
3. Other moisture sensitive floor coverings as indicated or required.

##### B. Related Work Specified Elsewhere:

1. Leveling of existing floor slabs.

##### 1.02 REFERENCES:

ASTM F 710	Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring
ASTM F 1869	Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride

##### 1.03 SYSTEM DESCRIPTION:

The work of this Section consists of 2 parts as follows:

- A. Moisture and pH testing of all on-grade, below-grade and above-grade floor slabs scheduled to receive moisture sensitive floor finishes, including thinset ceramic tile, resilient flooring and carpet.
- B. Remedial measures required to bring moisture content and pH to limits recommended by manufacturers of each floor finish and each adhesive.
- C. The remedial work specified in this Section will be required only if the moisture content and/or pH exceed finish flooring manufacturer's recommendations for each type flooring indicated in the building. Testing of subfloors shall be performed in every case, and reports as specified shall be submitted to Architect. Remedial work on new concrete slabs, if required, shall be performed at no additional charge to District.



#### 1.04 QUALITY ASSURANCE:

- A. **Qualifications of Manufacturer:** Systems and materials shall be product of a manufacturer regularly engaged in engineering and servicing of vapor reduction systems for not less than 10 years. Manufacturer shall supply references of at least 5 satisfactory installations in which specified systems have been in service for at least 5 years.
- B. **Qualifications of Installer:** Installer shall be an employee of manufacturer. Supervisor of crew shall have a minimum 5 years experience in successfully performing moisture testing and remedial work.
- C. **Materials shall comply with current State of California and local Air Quality Management District requirements for volatile organic compounds, (not over 350 grams per liter).**
- D. **Pre-application Conference and Inspection:** After approval of submittals but prior to beginning installation of work of this section, Contractor shall hold a meeting at the site attended by Architect, Contractor, vapor testing and control systems applicator, and the water vapor testing and control systems manufacturer to describe in detail the systems to be installed and to establish agreement, coordination and responsibilities. The Contractor shall prepare a detailed report of this meeting and furnish copies to the Architect and all attendees. The surfaces to receive moisture sensitive floor finishes shall be inspected and all defective conditions shall be corrected before beginning work of this section.

#### 1.05 SUBMITTALS:

- A. **Manufacturer's Experience Qualifications:** Submit evidence, satisfactory to Owner, of manufacturer's experience record as specified.
- B. **Applicator's Experience Qualifications:** Submit list of not less than 5 projects, extending over period of not less than 5 years, indicating applicator's experience record. Submit letter from manufacturer showing manufacturer's approval for installer of the products.
- C. **Data:** Obtain from each manufacturer of moisture sensitive floor coverings, the respective recommended test results, and submit prior to commencing work of this section.
- D. **Moisture Testing Results:** Submit written reports covering all moisture test results. Provide a floor plan, indicating finish flooring for each room or space, floor finish manufacturer's maximum recommended moisture content for each material, location of each test and the moisture release at each location.
- E. **Product Data:** Submit manufacturer's product data including complete testing and control installation instructions.
- F. **Remedial Measures:** Submit data showing proposed remedial work for each location where moisture test exceeds manufacturers recommended maximum moisture release.
- G. **Final Test Reports:** Submit reports of tests of floors following completion of remedial work as required.

- H. Experience Record: Submit a list of at least five installations on which each of the materials and systems proposed for use have been in satisfactory service for at least 3 years.

1.06 JOB CONDITIONS:

Perform testing immediately prior to scheduled installation of moisture sensitive floor finishes.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials: Deliver materials (except bulk material) in manufacturer's unopened containers fully identified with manufacturer's name, trade name, and application instructions.
- B. Storage of Materials: Store materials in unopened containers. Store off ground and under cover, protect from damage.

1.08 WARRANTY:

Furnish to the Owner a manufacturer's written 10 year warranty, against all defects in materials and workmanship. In the event of treatment system failure by concrete moisture or alkalinity over slab surfaces, joints or cracks, manufacturer shall provide materials and labor to repair or replace the damaged floor system. Warranty shall include all materials and equipment necessary to treat the affected subfloor and to replace the finish flooring.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

No substitutions except as noted.

- A. For remedial work:

Floor Seal Technology, Inc.  
2941 MacArthur Blvd., Suite 137  
Santa Ana, CA 92704  
(800) 295-0221  
FAX (714) 641-3664

Dupont Flooring Systems  
Two Town Park Commons, Suite 400  
175 Town Park Dr.  
Kennesaw, GA 31044  
(800) 438-7668  
FAX (770) 792-4223

Koester American Corporation, represented locally by  
Warren Proctor Marketing  
1940 Pepper Dr.  
Altadena, CA 91001  
(626) 797-1424  
FAX (626) 797-2340

B. For testing:

Vaprecision Professional Emission Testing Systems  
2941 West MacArthur Blvd., Suite 138  
Santa Ana, CA 92704  
(800) 449-6190  
FAX (714) 759-6143

Sealflex Industries, Inc.  
2925 College Avenue, Suite B-4  
Costa Mesa, CA 92626  
(714) 708-0850  
FAX (714) 708-2711

C. For underlayment:

Ardex, Inc.  
630 Stoops Ferry Road  
Coraopolis, PA 15108  
(412) 264-4240

2.02 MATERIALS:

- A. Moisture Detection Equipment: Calcium chloride testing system, consisting of pre-packaged anhydrous calcium chloride crystal test kits, and an electronic gram weight scale measurable in 1/10 grams.
- B. pH Testing Equipment: Wide range of pH testing strips with color chart. Water shall be distilled or deionized, furnished in unopened containers with labels intact.
- C. Resin Membrane System, Type 1: MES Penetrant, VOC compliant, low viscosity, anti-microbial chemical formulation, and elastomeric properties to expand and contract with slab movement; formulated to saturate concrete surfaces and mechanically restrict moisture and alkalinity levels, and conforming to the following:

<b>PHYSICAL PROPERTIES</b>		
<b>Physical property, units</b>	<b>Test Method</b>	<b>Acceptable value</b>
Water vapor transmission, grains/hour/sq. ft.	ASTM E 96	1.25
Alkali resistance	ASTM D 1308	pass
Adhesion strength, psi	ASTM D 4541	500, (100% concrete failure)

- D. Resin membrane System, Type 2: MES Penetrant plus MES Coating, VOC compliant low viscosity, anti-microbial chemical formulation and elastomeric properties to expand and contract with slab movement; formulated to saturate concrete surfaces and mechanically restrict higher levels of moisture and alkalinity.

<b>PHYSICAL PROPERTIES</b>		
<b>Physical property, units</b>	<b>Test Method</b>	<b>Acceptable value</b>
Water vapor transmission, grains/hour/sq. ft.	ASTM E 96	1.25
Alkali resistance	ASTM D 1308	pass
Adhesion strength, psi	ASTM D 4541	500, (100% concrete failure)

- E. Material for Concrete Floor Leveling: Self-leveling, self smoothing, cementitious, factory mixed compound requiring only addition of water at the site. Materials shall be Ardex K-15, conforming to the following:

PHYSICAL PROPERTIES		
Physical property, units	Test Method	Acceptable value
Initial set, minutes	ASTM C191	30, at 70 degrees F.
Final set, hours	ASTM C191	2, at 70 degrees F.
Compressive strength, psi: After 24 hours After 28 days	ASTM C109	2,630 4,100
Flexural strength, psi After 24 hours After 28 days	ASTM C348	770 1,000
Flammability Flame spread Smoke developed Fuel contributed	ASTM E84	0 0 0

- F. All Other Materials: Manufacturer's standard for items required or type be suited for intended use.

### PART 3 – EXECUTION

#### 3.01 INSPECTION:

Examine substrate, adjoining construction and conditions under which work is to be installed. Do not proceed with work until unsatisfactory conditions have been corrected. Coordinate this work with floor leveling of existing concrete slabs as specified in Section 01120.

#### 3.02 MOISTURE TESTING:

- A. Test new and old concrete slabs for adequate dryness, as indicated by each manufacturer of moisture sensitive floor finishes.
- B. Testing shall conform to ASTM F 1869 for moisture, and ASTM F710 for pH.
- C. Minimum testing requirements are 3 calcium chloride tests for the first 1,000 square feet of floor area, and one for each additional 1,000 square feet or fraction thereof.
- D. Unless more stringent requirements are recommended by flooring manufacturer, maximum allowable moisture release at time of flooring installation shall be 3.0 pounds per 24 hours per 1,000 square feet.
- E. For each test, perform the following steps:
  - 1. Weigh the sealed dish of crystals immediately prior to exposure. Record starting weight, date and time.

2. Open kit and set crystal dish on clean concrete surface. Immediately install plastic dome over the dish. Mask sure the dome is gasketed to the concrete and is air tight.
3. Leave test to absorb moisture for 60 to 72 hours. Keep room temperature above 55 degrees F. for duration of test.
4. After exposure, remove and discard housing. Replace dish lid and tape shut. Weigh the sample within one hour of removal from floor.
5. Compute the vapor emission in pounds, indicate location of test and vapor emission on report.
6. Delay application of flooring until subfloors are sufficiently dry, or perform remedial measures as specified in this section.

### 3.03 pH TESTING:

Conform to requirements of ASTM F 710. Perform one test per 1,000 square feet or fraction of slab area. Place a few drops of water on the surface of the concrete. Allow to stand approximately 60 minutes. Dip the pH paper into the water and compare to chart. Finish flooring shall not be installed unless pH is 9.0 or less.

### 3.04 MOISTURE VAPOR CONTROL:

- A. Areas where moisture content exceeds 3.0 pounds of water per 24 hours per 1,000 square feet shall be treated as follows:
  1. Moisture content between 3.0 pounds and 8.5 pounds, pH levels above 10: System I.
  2. Moisture content between 8.5 pounds and 12.5 pounds, pH levels above 10: System II.
  3. Moisture content over 12.5 pounds: Consult manufacturer of vapor reduction system for specific requirements.
- B. Preparation of Slabs to be Treated:
  1. Mask and protect walls and equipment.
  2. Shot blast or grind concrete surfaces and clean joints.
  3. Broom and vacuum slabs to remove dust and debris.
  4. Fill cracks, joints and surface irregularities with resin fill.
- C. Application of System I: Roll and squeegee penetrant to entire treatment area until saturation. Apply cementitious underlayment on tacky surface, as specified below.

- D. Application of System II: Over the penetrant, applied as specified above, roll and squeegee the coating until saturation, while penetrant is still tacky. Apply cementitious underlayment on tacky surface, as specified below.

### 3.05 pH CONTROL:

Where pH of slabs exceeds 9.0 or less if required to finish flooring and adhesive manufacturers, reduce the pH by one or a combination of the following methods:

- Abrasive grinding to remove carbonated layer.
- Additional waiting time.
- Application of underlayment.

### 3.06 APPLICATION OF CEMENTITIOUS UNDERLAYMENT:

- A. Preparation: After application of moisture vapor and pH control systems as applicable, apply cementitious underlayment to level and smooth the surface. Apply the underlayment while the resin membrane is still in a tacky state. Install to level the floor, to minimum 1/16 inch thickness.
- B. Mix the material in accordance with manufacturer's instructions, and apply and smooth the material over the floor. Where pumping of the material is feasible, use manufacturer's recommended equipment and methods. Finished surfaces shall be level to within 1/8" 10 feet in any direction, non-accumulative. Texture of finish shall be smooth, as recommended by finish flooring manufacturers.

### 3.07 FINAL TESTS:

Test surfaces for moisture and pH in sufficient quantity to assure that moisture and pH of treaded floors is within finished floor manufacturers acceptable limits.

END OF SECTION

## SECTION 07410

### METAL RIB WALL PANELS

#### PART 1 GENERAL

##### 1.1 SECTION INCLUDES

A. Division 1 applies to this Section. **Aluminum Metal Rib lap-seam wall panels with concealed fasteners, including trim and accessories.**

##### 1.2 RELATED SECTIONS

- A. Section 05400 – Cold-Formed Metal Framing: Wall panel substrates support framing.
- B. Section 06100 – Rough Carpentry: Plywood substrate wall sheathing.
- C. Section 07260 – Weather Barriers: Air and moisture barrier required as part of metal wall panel assembly.
- D. Section 07600 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal work.
- E. Section 07920 – Joint Sealants: Perimeter sealant.

##### 1.3 REFERENCE STANDARDS

A. General: Standards listed by reference form a part of this specification section. Standards listed are identified by issuing authority, abbreviation, designation number, title or other designation. Standards subsequently referenced in this Section are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

1. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM A 653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A 1011 – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.



4. ASTM E 1592 – Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
5. ASTM D 2244 – Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates.
6. ASTM D 4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.

C. Underwriters Laboratories (UL):

1. UL 263 - Fire Tests of Building Construction and Materials.

D. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA): "Architectural Sheet Metal Manual."

#### 1.4 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Conduct preinstallation meeting to clarify Project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

#### 1.5 SUBMITTALS

A. See Section 01300 – Administrative Requirements, for submittal procedures.

B. Product Technical Data: For each type of product required, including manufacturer's preparation recommendations, storage and handling requirements, and recommended installation methods.

C. Shop Drawings: Showing methods of installation, plans, sections, elevations and details wall panels, specified loads, flashings, vents, sealants, interfaces with all materials not supplied by the metal panel system manufacturer, and identification of proposed component parts and their finishes. Do not proceed with fabrication prior to approval of shop drawings.

D. Coordination Drawings: Submit exterior elevations, drawn to scale, that have the following items shown and coordinated with each other, using input from installers of the following items:

1. Rib Metal wall panels and attachments.
2. Girts.
3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.

4. Penetrations of wall by pipes and utilities.

E. Samples: Selection and verification samples for finishes, colors and textures. Submit two complete sample sets of each type of panel, trim, clip and fastener required.

F. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.

G. Maintenance Data: Submit maintenance data for metal plate wall panels. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

H. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

## 1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For installed products including maintenance methods and precautions against cleaning materials and methods detrimental to finishes and performance.

B. Warranty: Warranty documents required in this section.

## 1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Provider of advanced installer training.
2. Minimum of ten years of experience in manufacturing metal wall panel systems.
3. Provider of products produced in a permanent factory environment with fixed roll-forming equipment.

B. Installer Qualifications:

1. At least five years of experience in the installation of metal wall panels.
2. Experience on at least five projects of similar size, type and complexity as this Project that have been in service for a minimum of two years with satisfactory performance of the wall panel system.

3. Employer of workers for this Project who are competent in techniques required by manufacturer for installation indicated and who shall be supervised at all times when material is being installed.

C. Mock-Ups: Install at project site a mock-up using required products and manufacturer's approved installation methods. Obtain Owner and Architect approval of finish, color, texture, pattern, trim, fasteners and quality of installation before proceeding with further work.

1. Size: 4'x4'
2. Maintenance: Maintain mock-up during construction for quality comparison. Remove and lawfully dispose of mock-up construction when no longer required.
3. Incorporation: Mock-up may be incorporated into final construction upon Owner approval.

## 1.8 DELIVERY, STORAGE AND HANDLING

A. General: Comply with manufacturer's current printed product storage recommendations.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage: Store materials above ground, under waterproof covering, protected from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer. Provide proper ventilation of metal panel system to prevent condensation build-up between each panel and trim or flashing component. Tilt stack to drain in wet conditions. Remove strippable plastic film before storage under high-heat conditions. Store products in manufacturer's unopened packaging until just prior to installation.

D. Handling: Exercise caution in unloading and handling metal panel system to prevent bending, warping, twisting and surface damage.

## 1.9 WARRANTY

A. Special Weather Tightness Warranty: Manufacturer's standard form for weather tightness in which manufacturer agrees to repair or replace panels that fail within specified warranty period.

1. Warranty Period: **10** years from date of Substantial Completion.
2. Manufacturer's warranty may exclude failure due to physical damage

B. Special Concealed Fastened Wall Panel Finish Warranty: Manufacturer's standard form PVDF Fluorocarbon System Warranty for film integrity, chalk rating and fade rating in which manufacturer agrees to repair or replace panels that show evidence of deterioration within specified warranty period.

1. Deterioration shall include but is not limited to:
  - a. Color fading of more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling or failure of paint to adhere to bare metal.
2. Warranty Period: Film integrity for 45 years and chalk and fade rating for 35 years from date of Substantial Completion.
3. Manufacturer's warranty may exclude surface deterioration due to physical damage and exposure to salt air environments.

## PART 2 PRODUCTS

### 2.1 METAL RIB WALL PANELS

- A. Metal Sales Manufacturing Corporation  
545 South 3rd Street, Suite 200  
Louisville, KY 40202  
Toll Free: 800.406.7387  
Phone: 502.855.4300  
Fax: 502.855.4200
- B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01250 - "Substitution Procedures".

#### C. Product Options:

1. Panel coverage: **12 or 16 inches (304.8 mm)**
2. Rib Height: **7/8 inch (22.2 mm)**.
3. Rib Configuration: **Asymmetrical**
4. Material: Aluminum-zinc alloy-coated steel sheet, ASTM A 792, structural quality, **Grade 50, [0.0236-inch (0.60-mm)] [0.0296-inch (0.75-mm)]** minimum thickness.
5. Attachment: Concealed clip fastened panel.

6. Application: Designed for application over open framing or solid substrate.
7. Perforation: **None**
8. Surface Finish: **PVDF (Kynar 500) or Multi-pass Kynar 500).**
9. Color: **As selected by Architect refer to Construction Documents**
10. Fire Resistance Rating: Comply with UL 263 Fire Resistance Ratings.
11. Moisture Barrier required for building envelope applications.

## 2.6 SOURCE QUALITY CONTROL

- A. Source: Obtain metal wall panels, trim and other accessories from a single manufacturer.
- B. Quality Control: Obtain metal wall panels, trim and other accessories from a manufacturer capable of providing on-site technical support and installation assistance.

## PART 3 EXECUTION

### 3.2 PREPARATION

- A. Miscellaneous Framing: Install furring, angles, subpurlins, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's recommendations.

### 3.3 THERMAL INSULATION INSTALLATION

- A. Polyethylene Vapor Retarder.
- B. Board Insulation: Comply with installation requirements in Division 07 Section "Thermal Insulation."

### 3.4 METAL WALL PANEL INSTALLATION

- A. General: Comply with panel manufacturer's installation instructions including but not limited to special techniques, interface with other work, and integration of systems.
- B. Fasten metal wall panels to supports with concealed clips at each standing-seam joint at location, spacing, and using proper fasteners as recommended by panel manufacturer.
- C. Tolerances: 1/8"

### 3.5 ACCESSORY INSTALLATION

A. General: Install accessories using techniques recommended by manufacturer and which will assure positive anchorage to building and weather tight mounting. Provide for thermal movement. Coordinate installation with flashings and other components.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and the SMACNA "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and install units to true level. Install work with laps, joints, and seams that will be permanently watertight.

### 3.6 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: If requested by Owner, provide manufacturer's field service consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions:

Site Visits: 2

### 3.7 CLEANING

A. Remove temporary coverings and protection of adjacent work areas.

B. Repair or replace any installed products that have been damaged.

C. Clean installed panels in accordance with manufacturer's instructions prior to Owner's acceptance.

D. Remove and lawfully dispose of construction debris from Project site.

### 3.8 PROTECTION

A. Protect installed product and finish surfaces from damage during construction.

END OF SECTION

## SECTION 07421

### METAL PLATE WALL PANELS

#### PART 1 - GENERAL

##### 1.01 SECTION INCLUDES

- A. Division 1 applies to this section. Metal Plate Wall Panel Assembly: Metal plate wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weather tight wall system based on AAMA CW-RS-1.

##### 1.02 RELATED REQUIREMENTS

- A. Section 05400 – Cold-Formed Metal Framing: Wall panel substrates support framing.
- B. Section 06100 – Rough Carpentry: Plywood substrate wall sheathing.
- C. Section 07260 – Weather Barriers: Air and moisture barrier required as part of metal wall panel assembly.
- D. Section 07600 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal work.
- E. Section 07920 – Joint Sealants: Perimeter sealant.

##### 1.03 REFERENCE STANDARDS

- A. AAMA - American Architectural Manufacturers Association ([www.aamanet.org](http://www.aamanet.org))
  - 1. AAMA CW-RS-1 – The Rain Screen Principle and Pressure Equalized Wall Design; 2012
  - 2. AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2005
  - 3. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems; 2009
  - 4. AAMA 508 – Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems; 2014 [Testing based on 2007 Edition]
  - 5. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014
  - 6. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013 [Testing based on 2005 Edition]
- B. TAS - Testing Application Standards; Florida Building Code, 2010
  - 1. TAS 202 – Criteria for Testing Impact and Non-Impact Resistant Building Envelope Components Using Uniform Static Air Pressure Loading; 1994
  - 2. TAS 203 – Criteria for Testing Products Subject to Cyclic Wind Pressure Loading; 1994
- C. NAAMM – National Association of Architectural Metal Manufacturers

- D. SMACNA – Sheet Metal and Air Conditioning Contractor’s National Association
- E. PS - Voluntary Product Standard; National Institute of Standards and Technology (NIST)
  - 1. PS-1 – Structural Plywood; 2009

#### 1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate panel assemblies with rain drainage, flashing, trim, stud back-up, soffits, and other adjoining work.
- B. Preinstallation Meeting:
  - 1. Attendees:
    - a. Installer.
    - b. Panel manufacturer's representative.
    - c. Structural support installer’s.
  - 2. Review and finalize construction schedule.
  - 3. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
  - 4. Review means and methods related to installation, including manufacturer's written instructions.
  - 5. Examine support conditions for compliance with requirements, including alignment and attachment to structural members.
  - 6. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affects this Work.
  - 7. Review temporary protection requirements for during and after installation of this Work.

#### 1.05 SUBMITTALS

- A. See Section 01300 – Administrative Requirements, for submittal procedures.
- B. Product Data: Submit for each type of product indicated, include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal plate wall panel and accessory.
- C. Shop Drawings: Submit fabrication and installation layouts of metal plate wall panels; including details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
  - 1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.
  - 2. Provide details of following items at full scale.
    - a. Manufacturer’s standard sheet metal trims.
    - b. Components of wall panel construction, anchorage methods, and hardware.
- D. Coordination Drawings: Submit exterior elevations, drawn to scale, that have the following items shown and coordinated with each other, using input from installers of the following items:
  - 1. Metal plate wall panels and attachments.
  - 2. Girts.
  - 3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
  - 4. Penetrations of wall by pipes and utilities.



- E. Samples: Submit for each type of exposed finish required, and prepared on samples of size as follows:
  - 1. Aluminum Metal Plate Wall Panels: At least 2 inch by 3 inch.
- F. Maintenance Data: Submit maintenance data for metal plate wall panels.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer. Submit Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics, criteria and physical requirements.
- H. Test and Evaluation Reports: Showing compliance with specified performance characteristics and physical properties.

#### 1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least five years of documented experience.
- B. Installer: Company specializing in performing work of this section and approved by manufacturer.
  - 1. Install system in strict compliance with manufacturer's installation instructions.
- C. Anodized Finish Applicator: Provide either caustic (traditional) or eco-friendly (acid) etching technologies.
  - 1. Use fully automated, computer-controlled process lines for consistency of finish throughout project.
  - 2. Use documented production line quality control protocols in accordance with AAMA 611 test procedures.
- D. Source Limitations: Obtain each type of metal plate wall panel from single source and from single manufacturer.

#### 1.07 MOCKUPS

- A. Mockups: Provide mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and to establish quality standards for fabrication and installation.
  - 1. Build mockup of typical wall panel assembly 4'x4' including corner, soffits, supports, attachments, and accessories.
    - a. Include at least four panels to represent a four-way panel joint and showing full thickness.
  - 2. Water Spray Test: Conduct water-spray test of mockup metal panel assembly, test water penetration in accordance with AAMA 501.2.
  - 3. Approval of mockups does not constitute approval of deviation from Contract Documents within mockups unless these deviations are approved by Architect in writing.
- B. Preinstallation Meeting:
  - 1. Attendees:
    - a. Installer.
    - b. Panel manufacturer's representative.

- c. Structural support installer's.
2. Review and finalize construction schedule.
3. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
4. Review means and methods related to installation, including manufacturer's written instructions.
5. Examine support conditions for compliance with requirements, including alignment and attachment to structural members.
6. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affects this Work.
7. Review temporary protection requirements for during and after installation of this Work.

#### 1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer's instructions.
- C. Deliver panels, components, and other manufactured items without damage or deformation.
- D. Protect panels during transportation, handling, and installation from weather, excessive temperatures and construction operations.
- E. Handle panels in strict compliance with manufacturer's instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface damage.
  1. Store panels vertically with top of panel down, storage of panels horizontally is not permitted.
- F. Store panels covered with suitable weather tight and ventilated covering.
- G. Provide storage of panels to ensure dryness, with positive slope for drainage of moisture.
- H. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.
- I. Remove strippable protective covering from aluminum panel prior to installation.

#### 1.09 SITE CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work to be performed according to manufacturer's installation instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before panel fabrication and indicate measurements on Shop Drawings.
  1. Coordinate with construction schedule.

## 1.10 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Wall System Warranty: Provide wall panel manufacturer warranty, agreeing to correct defects in manufacturing of materials within a one year period after Date of Substantial Completion.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures, including rupturing, cracking, or puncturing.
    - b. Deterioration: Beyond normal weathering of wall system metals and other materials.
- C. Panel Material Warranty: Provide panel material manufacturer warranty, agreeing to repair finish of metal plate wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
  1. Finish Warranty Period: 10 years from Date of Substantial Completion.
  2. Warranty Coverage: In accordance with AAMA 2605 for 70 percent PVDF resin on aluminum finish requirements.
    - a. Fading, Loss of Color Retention: Loss of 5 Delta E units (Hunter) or less, in accordance with ASTM D2244.
    - b. Chalking, Chalky White Powder on Panel Surface: Chalking at No. 8 or less for colors, or No. 6 for white, in accordance with ASTM D4214.
    - c. Loss of Adhesion: Loss of 10 percent due to cracking, checking or peeling, or failure to adhere to bare metal.
    - d. Gloss Retention: 50 percent or less in accordance with ASTM D523.
    - e. Salt Spray, Accelerated: At least 4,000 hours in accordance with ASTM B117.
    - f. Humidity Testing, Accelerated: At least 4,000 hours in accordance with ASTM D2247.
  3. Warranty Coverage: In accordance with AAMA 611 Class 1 anodized aluminum finish requirements.
    - a. Loss of Adhesion: Resists cracking, crazing, flaking, and blistering when forming and welding completed prior to finishing; post forming or welding voids warranty.
    - b. Fading - Loss of Color Retention: Loss of 5 Delta E units (Hunter) or less, in accordance with ASTM D2244.
    - c. Chalking, Chalky White Powder on Panel Surface: Chalking at No. 8 or less in accordance with ASTM D4214.
    - d. Salt Spray, Accelerated: At least 3,000 hours in accordance with ASTM B117.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

A. Dri-Design – Aluminum Plate Wall Panel System.

Address: 12480 Superior Ct., Holland, Michigan 49424.

P.O. Box 1286 Holland, Michigan 49422-1286.

Phone: (616) 355-2970; Fax: (616) 355-2972; Website: [www.dri-design.com](http://www.dri-design.com).

B. Substitution Limitations: All other manufacturers: Submit substitution request in accordance with Section 01250 - "Substitution Procedures".

### 2.02 PERFORMANCE REQUIREMENTS

- A. Metal Plate Wall Panel Assemblies: Comply with performance requirements without failure due to defective manufacturing, fabrication, installation, or other construction defects.
- B. Design, fabricate, and erect a dry joint, pressure equalized rainscreen aluminum wall panel system without use of sealants, gaskets, or butyl tape, tested as installed in compliance with AAMA 508, and as follows:
1. Cyclic Static Air Pressure Differential: Pass cycled pressure loading at 25 psf in 100 three-second cycles in accordance with ASTM E1233/E1233M.
  2. Air Infiltration: Pass when tested at 1.57 psf (25 mph) in accordance with ASTM E283.
  3. Water Penetration:
    - a. Static: Pass water penetration test under 25.0 psf positive static air pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with ASTM E331.
    - b. Dynamic: Pass water penetration test under 15.0 psf dynamic pressure difference for at least 15 minutes with 5 gallons per sf per hour of water applied in accordance with AAMA 501.1.
  4. Structural: Provide systems tested in accordance with ASTM E330/E330M and certified to be without permanent deformation or failure of structural members.
- C. High Velocity Hurricane Zone (HVHZ): Comply with ASTM E8/E8M test methods and performance requirements of Florida Building Code and Miami-Dade County test protocols TAS-202 and TAS-203 for HVHZ with at least plus 61 psf to minus 80 psf design pressure rating.
1. Application: For aluminum plate thickness of 0.080 inch only.

### 2.03 MATERIALS

- A. Aluminum Plate: Alloy and temper as recommended by manufacturer for application and in compliance with manufacturers design requirements.
1. Aluminum Material: Tension-leveled, flouropolymer PVDF painted finish, 3003-H14 manganese alloy.
  2. Thickness: 0.080 inch.
  3. Weight: Less than 2 lbs per sf.
  4. Finish: Three-Coat Fluoropolymer.

- B. Panel Depth: 1-1/4 inch, nominal.
- C. Panel Size: As indicated on Drawings.
- D. Panel Joints: As indicated on Drawings.

#### 2.04 FABRICATION

- A. Fabricate and finish wall panels within manufacturer's facilities and fulfill indicated performance requirements demonstrated by laboratory testing.
  - 1. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide post-finishing of panels, paint aluminum wall panels only after completion of panel fabrication and ensure exposed edges are coated.
- C. Provide post anodizing of panels, anodize aluminum wall panels only after completion of panel fabrication and ensure exposed edges are anodic coated without crazing of surface at formed edges.

#### 2.05 FINISHES

- A. Comply with NAAMM's - Metal Finishes Manual for Architectural and Metal Products, for recommendations of designating finishes.
- B. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride (PVDF) resin system.
  - 1. Two-Coat Fluoropolymer: AAMA 2605, fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' installation instructions.
  - 2. Three-Coat Fluoropolymer: AAMA 2605, fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' installation instructions.
  - 3. Two-Coat Mica Fluoropolymer: AAMA 2605, fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' installation instructions.
  - 4. Four-Coat Fluoropolymer: AAMA 2605, fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' installation instructions.
- C. Color Anodized Finish: AAMA 611, Architectural Class I, color anodized coating of 0.0007 inch (0.7 mils) minimum thickness.
  - 1. Color: Per Arch. Elevations.
- D. Clear Anodized Finish: AAMA 611, Architectural Class I, clear anodized coating of 0.0007 inch (0.7 mils) minimum thickness.
- E. Field Touch-Up Materials: As recommended by coating manufacturer for field application.

## 2.06 ACCESSORIES

- A. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fascia, mullions, sills, corner units, flashings, and similar items. Match material and finish of panels unless otherwise indicated.
- B. Provide integral drainage system and manufactures standard extrusions at termination of dissimilar materials.
- C. Flashing and Trim: Match material, finish, and color of adjacent wall panels.
  - 1. Thickness: At least 0.040 inch. Refer to Section 07620.
- D. Panel Fasteners: Designed to withstand design loads, with at least 7/16 inch diameter head and neoprene washer.
  - 1. Aluminum Wall Panel Material: Provide stainless steel fasteners, or coated fastener approved by panel manufacturer or project wall consultant.
- E. Sub-Girts: Galvanized, provide size and gage in accordance with project requirements.
  - 1. Furring Channel: Provide Hat, C, U or Z type as recommended by manufacturer.
  - 2. Flat Strap: At least 14 gage, 0.0747 inch (1.90 mm) thick. Refer to Section 05400.
- F. Substrate Wall Sheathing: Plywood, PS 1, Grade C-D, Exposure I, at least 5/8 inch thick. Refer to Drawings and Section 06100 for requirements.
- G. Weather Barriers: Provide climate specific weather barrier with performance characteristics for air penetration, water vapor transmission, and water penetration resistance. Refer to Section 07250 for requirements.
- H. Sealants: As recommended by metal panel manufacturer for openings within wall panels and perimeter conditions.

## PART 3- EXECUTION

### 3.01 EXAMINATION

- A. Examine substrates, and Work areas and conditions with Installer present for compliance with requirements for installation tolerances, wall panel supports, and other conditions affecting performance of this Work.
- B. Examine wall framing to verify that girts, angles, channels, studs, and other structural wall panel support members and anchorage have been installed within alignment tolerances required by wall panel manufacturer.
- C. Verify that weather barrier has been installed over sheathing or substrate to prevent air infiltration or water penetration.
- D. Examine rough-in for components and systems penetrating wall panels to coordinate actual penetration locations relative to wall panel joint locations prior to installation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Miscellaneous Framing: Install sub girt, base angles, sills, furring, and other wall panel support members and provide anchorage in accordance with ASTM C754 for gypsum panel type substrates and panel manufacturer's installation instructions.

### 3.03 INSTALLATION

- A. Install wall panels in accordance with manufacturer's installation instructions, including pressure equalized rainscreen installation method and installation guidelines.
  - 1. Wall panels consist of single sheets of metal formed with interlocking gutter and drainage system integral to the panel with single horizontal attachment for dry-joint rainscreen assembly.
  - 2. Use of secondary drainage channels, brackets, support pins, joint sealants or gaskets to manage the drainage of wall panel system is not permitted.
  - 3. Attach wall panels using progressive interlocking method, engaging bottom of panel in top of previous panel working bottom up, and left to right.
  - 4. Install wall panels with single top attachment in pre-punched holes to allow individual panels to move due to thermal expansion.
  - 5. Do not compromise internal gutter.
- B. Install wall panels for orientation, sizes, and locations as indicated on Drawings.
- C. Install wall panels with proper anchorage and other components for this Work securely in place.
- D. Install wall panels with provisions for thermal and structural movement.
- E. Install shims to plumb substrates as necessary for installation of wall panels.
- F. Install weather tight seals at perimeter of wall panel openings.
  - 1. Test for proper adhesion on small unexposed area of solid surfacing prior to use.
  - 2. Refer to Section 07920.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA - Architectural Sheet Metal Manual.
  - 1. Provide concealed fasteners where possible, and set units true to line and level as indicated.
  - 2. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
  - 3. Install flashing and trim as wall panel Work proceeds.
- H. Install weather tight escutcheons for pipe and conduit penetrating exterior walls.
- I. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by wall panel manufacturer.
- J. Install attachment system to support wall panels and with provisions to provide a complete weather tight wall system, including sub girts, extrusions, flashings and trim.
  - 1. Include attachment to supports and trims at locations using dissimilar materials.

2. Do not apply sealants to joints, unless noted otherwise on Drawings or Shop Drawings.
  3. Install starter extrusion at base course and at cut panel locations.
- K. Install accessories with positive anchorage to building and weather tight mounting and provisions for thermal expansion, and coordinate installation with flashings and other components.
1. Install components required for a complete wall panel assembly including trim, copings, flashings and other accessory items.
- L. Weather Barrier: Install weather barrier behind wall panels and over substrate in accordance with requirements of Section 07250.

### 3.04 TOLERANCES

- A. Shim and align wall panel units with installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level, plumb, and location lines as indicated.

### 3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.(IOR).
- B. Water-Spray Test: After installation and in coordination with Mockup requirements, test area of assembly for water penetration in accordance with AAMA 501.2.
- C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- D. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- E. Perform additional tests and inspections, at Contractor's expense, to verify compliance of replaced wall panels or necessary additional work with specified requirements.
- F. Prepare test and inspection reports.

### 3.06 CLEANING

- A. Upon completion of wall panel installation, clean finished surfaces as recommended by panel manufacturer.
- B. Upon completion of wall panel installation, clear weep holes and drainage channels of obstructions and dirt.

### 3.07 PROTECTION

- A. Protect installed products from damage during subsequent construction.
- B. Replace wall panels damaged or deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION



## SECTION 07525

### MODIFIED BITUMEN SHEET ROOFING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide modified bitumen sheet roofing, as indicated, specified and required.

A. Work In This Section: Principal items include:

1. Modified bitumen roofing on metal roof decks.
2. Cant strips.
3. Built-up bituminous base flashings.
4. Filling pitch pockets.
5. Traffic walkways on roofing.
6. Supervising installation of sheet metal in connection with roofing.

B. Related Work Not In This Section:

1. Furnishing and installing sheet metal.
2. Metal flashing and counterflashing of mechanical and electrical penetrations through roof decks.
3. Membrane waterproofing.

##### 1.02 QUALITY ASSURANCE:

A. Roofing Applicator: Authorized and approved by roofing manufacturer.

B. Requirements of Regulatory Agencies: Conform all work of this section to code.

C. Fire Classification: Roofing systems shall bear UL listing as a Class "A" system. Manufactured materials shall bear the appropriate UL label. Roofing installation shall meet Factory Manual I-60 requirements.

D. Test Cuts: Owner or Architect may order test cuts of roofing, 4" by 36" size, but not more than one test cut per each 2,000 square feet of roof area. Repair test cuts as directed at not extra cost to Owner.

E. Preroofing Conference and Inspection: After approval of submittals but prior to beginning installation of work of this section, Contractor shall hold a meeting at the site attended by representatives of Architect, Contractor, roofing and sheet metal applicators, and the roofing material manufacturer to describe in details the roof systems to be installed and to establish agreement, coordination and responsibilities among involved persons. The Contractor shall prepare a detailed memo of this meeting and furnish copies to the Architect and all involved persons. The roofing applicator and roofing

manufacturer's technical representative shall inspect the substrates to receive work of this section and report defective conditions to Architect and Contractor for correction.

#### 1.03 SUBMITALLS:

- A. Application Recommendations: Submit manufacturer's detailed application instructions for the work, including roofing application, flashing installation, and copies of details of all applicable conditions.
- B. Certificates: Submit a certificate stating that roofing applicator is approved by the roofing manufacturer and, upon completion, submit a certificate stating that roofing systems have been installed in conformance with approved submittals including manufacturer's specifications prepared for the work.
- C. Code Approvals: Submit evidence indicating compliance with local building codes and specified fire ratings.

#### 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver manufactured materials to site in sealed factory packages with manufacturer's label and identification. Store materials at site under cover until used. Stack felt rolls on end.

#### 1.05 JOB CONDITIONS:

- A. Protection: Apply suitable impervious type masking to preclude staining of surfaces to remain exposed wherever roofing abuts or laps on to other finish surfaces, and provide additional protection as necessary to supplement masking; cover entire area of building subject to damage or staining.
- B. Protection During Installation: Roofing applicator shall protect roof decks and roofing during installation of Work of this Section. Place plywood, planks, or similar suitable forms of protection to protect the roofing in place.
- C. Water Cut-Offs: Cover exposed edges of insulation at end of each day's operations, and when rain is imminent, with manufacturer's recommended materials, and remove the water cut-offs when installation is resumed.
- D. Protection of Completed Roofing: Contractor shall protect the completed roofing when surfaces must be used in performance of work of other sections. Place plywood, planks and other protection and to not permit traffic directly on the roofing or membranes. Repair all damage to roofing as approved at no extra cost to Owner.
- E. Weather Conditions: Do not apply work of this section if temperature of roof deck is below 40 degrees F. Do not install any materials when water in any form is present on the deck or materials are wet.

#### 1.06 WARRANTY:

Contractor, materials manufacturer and roofing applicator shall furnish to the Owner a written warranty against all defects in materials or workmanship and to maintain work of this section in

watertight condition for 20 years; warranty shall include connections to roof drainage fittings, sheet metal in connection with roofing, and board type roof walkways.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER:

District standard,

Siplast  
1000 E. Rochelle Blvd.  
Irving, TX 75062  
(800) 922-8800

### 2.02 MATERIALS:

#### A. Roof System over insulation on metal roof decks:

1. Base Ply: Paradiene 20, glass reinforced elastomer sheet, 62 pounds per square.
2. Top Ply Paradiene 30CRFR, glass reinforced asphalt elastomer sheet with synthetic chip surfacing, color white, 75 pounds per square.

#### B. Base Flashings:

1. Irex 30, glass reinforced asphalt sheet, 72 pounds per square.
2. Veral, glass reinforced aluminum faced asphalt elastomer sheet, 96 pounds per square.

#### C. Insulation: Refer to Section 07220.

#### D. Membrane Adhesive: Siplast Cold Adhesive, Para-Stik PA-311M, VOC compliant.

#### E. Flashing Adhesive: Siplast SFT cement.

#### F. Roof Walkway: Siplast Paratread, modified bitumen sheet, granulated surface, protection course, 30" wide by 20 feet long 6 mm thick.

#### G. Accessory Items:

1. Sealant: Neoprene caulking, as recommended by roof system manufacturer.
2. Mineral Granules: Color and size to match membrane.
3. Aluminum powder.
4. Sheet metal flashings, gravel stops and similar items: As specified in Section 07600.
5. Drains and lead flashings: As specified in Division 15.

### 2.03 ROOFING SYSTEMS:

#### A. Roofing and insulation on metal roof decks:

Insulation, first layer mechanically attached, second layer and protection board set in membrane adhesive (refer to Section 07220).

Base ply, set in membrane adhesive.

Top ply, set in membrane adhesive.

### PART 3 – EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS:

Verify that roof decks are clean, dry, smooth and free of sharp projections and depressions, and that sheet metal and drainage fittings are in place before starting installation.

- A. Outlets: Extend lead down the side of the roof drain. Lead shall receive 18" wide strips of Paradiene 20 around its perimeter, then receive field sheet of Veral that shall extend beyond the clamping ring area. Install clamping ring.
- B. Cant Strips: Provide minimum 4" high cant strips at angles between roof deck and vertical surfaces unless otherwise indicated. Fit strips flush at ends and to vertical surfaces, and bevel back from scuppers. Securely fasten strips in place with mechanical fasteners.
- C. Flashing Flanges: Strip-in according to manufacturer's specifications for this Work.
- D. Membrane Protection: All sleepers, pie and equipment supports shall be set on Trafbloc walktread that extends a minimum of 2" in length and width beyond each block.
- E. Sealant: Where membrane terminates at plumbing pipes, and at counterflashings and other flanges contacting the roofing system, apply neoprene caulking in a smooth continuous bead.
- F. The application of the complete roofing system, including insulation and membrane shall be finished in one operation in one day.
- G. The application of roofing shall follow the laying of the insulation by an amount limited by the minimum working space required for the operation.
- H. Complete application of the roofing system shall be without pockets and blisters.

#### 3.02 INSTALLATION:

Conform work of this section to the roofing manufacturer's specifications as submitted and approved for this work and requirements herein.

- A. Insulation: Refer to Section 07220.

- B. Membrane Installation Over Insulation: Lay roofing sheets free of wrinkles, creases or fishmouths. Exert sufficient pressure on the roll during application to eliminate air pockets.
1. Starting at the low point of the roof, apply the full width ply sheets lapping each sheet 3" sides and ends. Set each ply in a full coating of adhesive. Extend ply to top of cant.
  2. Again, starting at the low point of the roof, apply full width cap sheets lapping each sheet 3" wide and ends. Set each ply into a full coating of adhesive. Stagger laps with the layer below. Extend ply to top of cant.
  3. Loose synthetic chips of matching color shall be broadcast over excess bitumen seepage, spillage, etc., while the surface is still tacky to ensure a monolithic surface color.
- C. Flashing: Complete all flashings daily as work progresses. Install flashing in 3' lengths, using selvage edge for laps.
1. Base Flashings: Set stripping ply in a uniform coating of adhesive. Flashing shall extend out 4" on the vertical and horizontal planes. Side laps shall be 3".
  2. Flashings: Off-set flashing plies from the layer below. Extend flashing ply 6" onto horizontal surfaces, and not less than 8" up vertical surfaces, and sufficient height to extend 3" behind counterflashing. Set flashings in cold adhesives.
- D. Expansion Joints: Construct as detailed, and as shown on the approved shop drawings.
- E. Parapet Wall Flashing: Prime surface, apply flashing ply over the wall.
- F. Walkway Areas: Install only on clean dry surface of roofing. Cut roof walkway rolls into straight, uniform, 5 foot lengths, and allow to relax until flat. Do not make cuts on the roof surface. Position sections leaving a uniform distance between sections of 2" for drainage. Adhere to surface of roofing with plastic cement in daubs approximately 5" square, 3/8" thick.

### 3.03 CLEANING:

Clean and repair surfaces to remain exposed that are stained or defaced by Work of this Section. Where cleaning or repairs are not acceptable, remove the defective Work and provide new Work of the same kind as directed, at not extra cost to Owner.

END OF SECTION

## SECTION 07600

### FLASHING AND SHEET METAL

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide flashing and sheet metal items, complete.

##### A. Work In This Section: items include:

1. New sheet metal flashings, counterflashings, collector heads, downspouts and scuppers, as indicated and specified.
2. Drip flashings over doors and windows, unless furnished with the doors and windows.
3. Sheet metal covers on equipment platforms.
4. Prefinished sheet metal copings, edge flashings and gravel stops.
5. Shop priming and field touch-up.
6. Caulking.

##### B. Related Work Not In This Section:

1. Sheet metal in connection with Plumbing, Air Conditioning and Electrical.
2. Metal accessories for drywall, lathing and acoustical treatments.
3. Finish painting.
4. Sleeves for embedded items.

##### 1.02 QUALITY ASSURANCE:

Drawings and requirements specified govern. Conform to the current "Architectural Sheet Metal Manual" published by Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA), 1611 North Kent Street, Arlington, VA 22209 for conditions not indicated or specified and for general fabrication of sheet metal items.

##### 1.03 SUBMITTALS:

- A. Shop Drawings: Submit for fabricated sheet metal showing connections with existing, details, methods of joining, anchoring and fastening, thicknesses and gauges of metals, concealed reinforcement, expansion joint details, sections and profiles.
- B. Samples: Submit samples for materials or assemblies as requested.

- C. Product Data: Submit brochures of manufactured items. Submit methods of cleaning existing sheet metal, and data sheets of products proposed for use.

## PART 2 – PRODUCTS

### 2.01 MATERIALS:

- A. Galvanized steel: ASTM A525, coating G90, mill phosphatized for paint adhesion, 24 gauge unless otherwise shown or specified.
- B. Soft metal: Soft copper, or soft stainless steel, as indicated and as specified.
- C. Solder: ASTM B32, B284.
- D. Solder flux: Standard brand non-corrosive acid-base type.
- E. Fasteners: Zinc or cadmium coated steel or stainless steel.
- F. Felt: ASTM D226, 15-pound type.
- G. Primer: Approved brand of zinc-dust zinc-oxide primer per Section 09900 with manufacturer's pretreatment materials.
- H. Sealant: Single component nonsag polyurethane, conforming to Section 07920.
- I. Building Paper: Fed. Spec. UU-B-790, Style 4, Grade B.

### 2.02 FABRICATION:

- A. Sheet Metal Covering on Equipment Platform: Cover the equipment platforms with galvanized sheet steel, 20 gauge, formed to configuration of deck, with edges folded under and out to form a drip. If fabricated in more than one piece, solder for watertight construction. Provide an underlayment of building paper for the sheet metal covering.
- B. Drip Flashings: Provide at heads of windows and doors. Use material compatible with window and frame materials. Coordinate installation of flashing with that of windows and doors. Provide hemmed exposed edges, 1-piece lengths.
- C. Counterflashing: Except where indicated or specified otherwise, insert counterflashing in reglets and extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inches. Fold the exposed edges of counterflashings 1/2 inch. Provide end laps in counterflashings not less than 3 inches and make weathertight with single component, not-sag urethane sealant, as specified in Section 07920. Lengths of metal counterflashings shall not exceed 10 feet. Form the flashings to the required shapes before installation. Factory-form the corners not less than 12 inches from the angle. Secure the flashings in the reglets with soft metal wedges (no lead) and space not more than 18 inches apart; short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound as covered in Section 07920. Install counterflashing to provide a spring action against base flashing.

- D. Scuppers: Line interior of scupper openings with sheet metal. Extend the lining through and project outside of the wall to form a drip on the bottom edge and form to return not less than one inch against the face of the outside wall at the top and sides. Fold outside edges under 1/2 inch on all sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.
- E. Downspouts: Types, shapes and sizes shall be as indicated, complete, including elbows and offsets. Provide downspouts in approximately 10-foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide wire ball strainers for each gutter outlet. Provide strainers to fit tightly into outlets, of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom and at immediate points not to exceed 5 feet on centers with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.
1. Terminations: Where storm drain lines occur, neatly fit the downspout into the drainage connection and fill the joint with a Portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with prefabricated elbow-type fittings matching profile of downspout.
- F. Collector Head: Of 20 gauge galvanized, top edge beaded for stiffening, outlet flange riveted and soldered. Provide a 1/4" mesh galvanized leaf strainer at top, secured in place but removable. Provide outlet types not less than 4 inches long. Seams shall be flat-lock solder type. Where conductor heads are used in conjunction with scuppers, set the conductor a minimum of 2 inches wider than the scupper. Attach conductor heads to the wall with suitable fasteners.
- G. Prefinished Items:
1. Copings: Prefabricate of not lighter than 20 gauge galvanized sheet metal, in the shapes and sizes indicated and in lengths not less than 8 feet. Provide prefabricated, mitered corners internal and external corners. Corner units shall have maximum 18" long legs and joints locked and soldered watertight, intermediate joints spaced at maximum 8-foot centers and equally spaced. Make intermediate joints of expansion type, edges spaced about 1/4" apart and centered over an 8" long backing plate of the same profile and gauge as the cap, set in a 1/2" wide bead of sealant. Secure both edges of caps with 1-1/2" wide 20 gauge galvanized steel cleats spaced at maximum 32" centers and locked into drip hem.
  2. Gravel Stops: Prefabricate in the shapes and sizes indicated and in lengths not less than 8 feet. Extend flange at least 4 inches onto flooring. Provide prefabricated, mitered corners internal and external corners. Install gravel stops and fascias after all plies of the roofing membrane have been applied, but before the flood coat of bitumen is applied. Prime roof flange of gravel stops and fascias on both sides with an asphalt primer. After primer has dried, set flange on roofing membrane and strip-in as specified in roofing section. Nail flange securely to wood nailer with large-head,



barbed-shank roofing nails 1.5 inches long spaced not more than 3 inches on centers. Leave 1/4" space between ends of lengths of gravel stops and back with a formed flashing plate, mechanically fastened in place and lapping each section end a minimum of 4 inches set laps in plastic cement. Face nailing will not be permitted.

3. Painted Finish: Provide fluorocarbon paint finish based on minimum 70 percent Kynar 400 or Hylar 5000 polyvinylidene resin content in cured paint finish, applied over an epoxy primer, both coats applied and baked according to manufacturer's specifications by manufacturer's licensee, equal to PPG "Duranar".

### PART 3 – EXECUTION

#### 3.01 GENERAL INSTALLATION REQUIREMENTS:

- A. Install new sheet metal items as indicated, according to approved submittals, and as required to complete the entire work. Securely fasten and assemble, and make watertight and weathertight.
- B. Coordinate installation of new sheet metal items in connection with roofing for proper installation, and furnish in sufficient time to avoid delay in roofing construction. Install roofing sheet metal simultaneously with roofing.
- E. Caulking: Provide caulking as indicated and required to seal and complete work if this section. Conform to Section 07920.
- F. Protection from Contact with Dissimilar Materials:
  1. Metal Surfaces: Paint surfaces in contact with mortar, concrete or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.
  2. Wood or Other Absorptive Materials: Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

#### 3.02 COMPLETION:

Examine installed sheet metal, water test if necessary or directed, and correct damaged or defective items.

END OF SECTION

SECTION 07920  
SEALANTS AND CAULKING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. This Section covers the caulking of openings and joints indicated, specified and required to make the buildings weatherproof and watertight, covers caulking requirements for the entire work, and pertains to all sections requiring caulking, unless specified otherwise. Provide sealants of types specified herein, at locations as specified, indicated on drawings and on approved submittals, and at all locations necessary to provide fully watertight construction. Provide sealants at the following locations as applicable:

A. Exterior Sealants:

1. Joints and recesses formed where frames and subsills of windows, panning, door frames, louvers and vents adjoin plaster and metal surfaces. Use sealant at both exterior and interior surfaces of exterior wall penetrations.
2. Voids where items pass through exterior walls.
3. Metal-to-metal joints where sealant is indicated or specified.

B. Interior Sealant:

1. Small voids between walls or partitions and adjacent casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.
2. Perimeter of frames at doors, windows and access panels unless covered by trim.
3. Joints between members for acoustical tile and adjoining vertical surfaces.
4. Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.
5. Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.

C. Floor Joint Sealants:

1. Seats of metal thresholds for exterior doors.
2. Control and expansion joints in floors, slabs, ceramic tile and walkways.

1.02 SUBMITTALS:

- A. Samples and Data: Submit the following:

1. Samples of cured sealants showing full range of designated colors; obtain color instructions prior to submittal.
  2. Technical data by manufacturers of proposed materials.
  3. Material manufacturers' printed preparation and application instructions; when approved, furnish copies to others whose work requires caulking and sealants.
- B. Site Samples: After approval of above samples and data, at site prepare a sample installation of each type of joint in exterior surfaces to be caulked in accordance with this section. Prepare as many samples of each type and size as are required for approval at the locations and of sizes designated. Arrange for sealant manufacturer's technical representative to be present and to assist in correct installation of site samples. Installed caulking and sealants shall conform to the approved site samples.
- C. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each type material and each substrate.
- D. Certification: Provide certification that caulking and sealants installation complies with requirements of Title 24, CCR, Section 5317 for air infiltration limitations.

#### 1.03 PRODUCT HANDLING:

Deliver all caulking and sealant materials to the site in sealed factory-labeled containers, labels bearing statement of conformance to standards specified for each material. Store materials in accordance with manufacturer's instructions and do not use materials for which the shelf life has expired.

#### 1.04 WARRANTY:

Furnish a written warranty against all defects in caulking and sealant materials for 5 years and defects in workmanship for 2 years, covering the following specific conditions, without limitation:

- A. Water leakage through sealed joints.
- B. Adhesive or cohesive failure of sealant.
- C. Staining of adjacent surfaces caused by migration of sealant or primer.
- D. Sealant hardened beyond Shore A hardness indicated in approved submittals.
- E. Chalking or visible color changes of cured sealants.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS:

Dow Corning Corp.  
P.O. Box 994  
Midland, MI 48686  
(800) 248-2481

GE Silicones  
260 Hudson River Road  
Waterford, NY 12188  
(800) 255-8886

Pecora Corporation  
165 Wambold Road  
Harleysville, PA 19438  
(800) 523-6688

Sika Corporation  
201 Polito Avenue  
Lyndhurst, NJ 07071  
(800) 933-7452

Sonneborn  
889 Valley Park Drive  
Shakopee, MN 55379  
(800) 433-9517

Tremco Inc.  
3735 Green Road  
Beachwood, OH 44122  
(800) 562-2728

USG Corporation  
125 South Franklin St., P.O. Box 806278  
Chicago, IL 60680  
(800) 874-4968

WW Henry Co.  
2500 Columbia Avenue  
Lancaster, PA 17604  
(800) 232-4832

### 2.02 MATERIALS:

Furnish sealants meeting following in-service requirements: Normal curing schedules are acceptable; Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required. Furnish only formaldehyde free

products. Furnish the products of only one manufacturer unless otherwise approved, sealant colors as selected to match the adjoining surfaces.

A. Sealants: Types as listed below, no substitutions unless specifically approved in writing for each application:

1. For joints in vertical and sloping metal surfaces, including surrounds of windows and doors: Conform to ASTM C920, silicone based, single component, non-sag, one of the following:

GE Silicones SCS 2000 Series  
Dow Corning 795  
Tremco Spectrum 2

2. For joints in plaster walls and other vertical surfaces: Conform to ASTM C920, Type S, Grade NS, Class 25, Use NT, silicone based, one of the following:

GE Silicones Silpruf  
Dow Corning 790  
Tremco Spectrum 1 or Spectrum 3

3. For joints in interior surfaces of wood and laminated plastic and between these materials and gypsum wallboard walls, ASTM C 834, latex, one of the following:

Tremco 834 Latex  
Pecora AC 20  
Sonneborn Sonolac

4. For joints in horizontal surfaces, including floor slabs and paving, subjected to foot traffic, ASTM C 920, Grade P, Type S, Use T, one of the following:

Sonneborn SL 2  
Vulkem 245  
Tremco THC 900/901

5. Mildew-resistant sealant at ceramic wall tile, plumbing fixtures and other wet areas: ASTM C 920, Grade NS, Type S, Use NT, one of the following:

Dow Corning 786  
GE Silicones SCS 1700, Sanitary Sealant  
Tremco Tremsil 200

6. For joints in galvanized steel: single component nonsag urethane sealant, ASTM C 920, Type S, Grade NS, Class 25, one of the following:

Vulkem 116; Mameco International  
Sikaflex – 1a; Sika Corporation  
NP 1; Sonneborn Building Products Div., ChemRex Inc.

7. For joints in acoustically insulated partitions: Nonhardening polysulphide or elastic water-base sealant, one of the following:

Tremco Acoustical Sealant  
USG Acoustical Sealant  
W.W. Henry Type 313 Acoustical Sealant

- B. Primers: As recommended by sealant manufacturer for each condition of application.
- C. Joint Backing: Closed cell polyolefin, neoprene, polypropylene or polyethylene, conforming to ASTM C 1330, Type B or ASTM D 5249, Type 3, permanently elastic, mildew resistant, nonmigratory, non outgassing, nonstaining and compatible with joint substrates and sealants. Joint backing shall be "SofRod" manufactured by Nomaco, Inc., 501 NMC Drive, Zebulon, NC 27597 (800) 345-7279, Dow "Ethafoam" or Sonneborn "Sonofoarm", types recommended by sealant manufacturer for each type substrate and sealant.
- D. Bond breaker: Polypethylene tape recommended by sealant manufacturer.

### PART 3 – EXECUTION

#### 3.01 INSPECTION:

Inspect all surfaces and joints to be caulked and sealed. Report in writing those conditions that prevent correct preparation, priming and caulking installation.

#### 3.02 PROTECTION:

Protect all adjoining surfaces and apply temporary masking tape on both sides of joints where surface staining may occur. Protect joints until sealant is cured.

#### 3.03 JOINT PREPARATION:

- A. Rake and thoroughly clean joints of mortar and other foreign materials before applying sealant. Remove coatings from metal surfaces following sealant manufacturer's written instruction, before installing metal where possible, using solvent recommended by manufacturer of metal item.
- B. Clean porous surfaces by bead or water blasting as required to provide a clean, sound base surface or sealant adhesion. Remove loose particles present or resulting from blast cleaning by blowing out joints with oil-free compressed air. Wash alkaline seepage from fresh concrete.
- C. Clean non-porous surfaces either mechanically or chemically. Clean with solvent and wipe dry immediately. Do not allow solvent film to accumulate on surfaces.
- D. Conform to instructions from sealant manufacturer where sealants are required to be applied over painted, lacquered or waterproofed surfaces, or surfaces which have been treated with water-repellent or other coatings.

### 3.04 INSTALLATION:

- A. Comply with sealant manufacturer's written instructions, as approved for mixing, preparatory work, priming, application life & procedures, and protection of sealant work.
- B. Prime joints before insertion of sealant back-up or joint filler material.
- C. Roll backing material into joint to avoid lengthwise stretching. Do not twist, braid or puncture.
- D. Sealant shall be bonded to the 2 opposite sides of joint only. Apply bond-breaker between sealant and back of joints where space for back-up material does not exist
- E. Joint spaces and surfaces shall be thoroughly dry before installation of sealant materials. Do not install sealant material during or after rain or fog.
- F. Provide maximum 3/8" sealant depth unless otherwise shown. Minimum joint width shall be 1/8" for metal to metal joints and maximum 3/4" width elsewhere unless otherwise shown. Apply sealant under sufficient pressure to fill voids. Finish exposed joints smooth and flush with adjoining surface unless recessed joints as shown. Remove temporary masking as soon as joint is completed.
- G. Install sealant in manner to provide uniform, continuous ribbons without gaps or air pockets, and with complete wetting of the joint surfaces equally on opposite sides. Fill joints to slightly concave surface just below adjacent surfaces.
- H. Tool surfaces to form smooth, uniform surfaces with slightly concave surfaces. Finish joints straight, uniform and neat. Perform tooling before sealant films over.
- I. Where horizontal joints occur between horizontal and vertical surfaces, fill joints to form a slight cove to prevent trapping moisture and dirt.
- J. Take precautions to prevent leakage or other malfunction at locations where different types of sealants meet.
- K. Do not allow sealants or other compounds to overflow, spill or migrate into voids of adjacent construction.

### 3.05 CURING:

Cure sealants in accordance with sealant manufacturer's printed instructions to obtain high early bond strength, internal cohesive strength and durability.

### 3.06 CLEANING:

Clean material from surfaces not to receive sealant and restore the finish as required. If surfaces adjoining joints are stained and cleaning is not acceptable, remove the affected work and provide new work as directed and approved, at no additional contract cost.

END OF SECTION

## SECTION 07951

### EXPANSION AND SEISMIC JOINT COVERS

#### PART 1 — GENERAL

##### 1.01 Summary

- A. This section includes the following:
  - 1. Expansion and seismic joint systems for building exteriors
  - 2. Expansion and seismic joint systems for roofs

##### 1.02 Related Work

- B. Related work that is specified elsewhere
  - 1. Section 03300: Cast-In-Place Concrete
  - 2. Section 04200: Unit Masonry
  - 3. Section 05120: Structural Steel
  - 4. Section 05400: Light gauge Metal Framing
  - 5. Section 09200: Lath and Plaster
  - 6. Section 09250: Gypsum Wallboard

##### 1.03 Definitions

- A. Nominal Joint Width: The width of the expansion joint opening as specified in the project documents, at which the expansion joint will be constructed and the cover will be installed
- B. Maximum Joint Width: The widest expansion joint width which the joint cover is required to accommodate without damage to its components
- C. Minimum Joint Width: The narrowest expansion joint width which the joint cover is required to accommodate without damage to its components
- D. Movement Capability: The amount of movement in a single direction (open or close), given as a percentage of the nominal joint width, that the joint cover is required to accommodate without damage to its components
- E. Lateral Shear: Movement horizontally and parallel to the expansion joint
- F. Vertical Shear: Movement vertically and parallel to the expansion joint

##### 1.04 Submittals

- A. Submission must be made within fifteen (15) working days of the contract award to avoid project delay.
- B. Submittals shall contain the following as required for each specified system
  - 1. Shop Drawings showing complete fabrication details for all joint covers, including required anchorage to surrounding construction, recesses, blocking, backing, and connections between similar and dissimilar joint cover assemblies
  - 2. Manufacturer's product data including product details, installation instructions, maintenance and cleaning instructions, Safety Data Sheets, and LEED documentation
  - 3. Certificates, copies of independent test reports, or research reports showing compliance with fire resistance rating and other specified performance requirements



4. Two (2) complete sets of color chips representing manufacturer's full range of available colors and patterns
5. Three (3) 6" (152mm) samples of the specified systems

#### 1.05 Quality Assurance

- A. Manufacturer: Obtain joint cover assemblies through one source from a single manufacturer.
  1. Manufacturer shall have a third party certified ISO 9001 quality management system.
    - a. The manufacturer shall have documented management and control of the processes that influence the quality of its products
    - b. The manufacturer shall have documented management and control of the processes that influence the quality of its customer service.
  2. Manufacturer shall have a minimum of ten (10) years of experience in the fabrication of joint cover assemblies.
- B. Installer: All products listed in this section shall be installed by a single installer with demonstrated experience in installing products of the same type and scope as specified. Installer shall be insured and licensed as required by agencies within the project's jurisdiction.

#### 1.06 Coordination

- A. Submittals shall be completed and approved prior to fabrication and shipment of material to the jobsite.
- B. Schedule for the work of this section shall be planned to allow sufficient time for manufacturer's production and delivery scheduling.
- C. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful and proper installation.
- D. Coordinate installation of exterior joint assemblies to ensure that transitions are watertight.
- E. Verify product types, quantities, dimensions, and attachment methods shown on shop drawings against field conditions prior to releasing materials for fabrication by the manufacturer.
- F. Communicate necessary changes on the manufacturer's shop drawings

#### 1.07 Delivery, Storage, and Handling

- A. Provide temporary protective cover on anodized aluminum, stainless steel, and bronze finished surfaces.
- B. Deliver joint covers to jobsite in clean, unopened crates of sufficient size and strength to protect materials during transit.
- C. Store components in original containers in a clean, dry location.

#### 1.08 Warranty

- A. Submit manufacturer's warranty that materials furnished will perform as specified for a period of not less than one (1) year when installed in accordance with manufacturer's recommendations.

## PART 2 — Products

### 2.01 Manufacturers

- A. Furnish and install as noted in specifications and as indicated on drawings as manufactured by Balco, Inc., PO Box 17249, 2626 S. Sheridan, Wichita, KS 67217; phone: 800-767-0082 or (316) 945-0789.
- B. Substitutions: Submit proposed substitutions in writing to the architect not less than 10 days before bids are due. Submit samples and product data to demonstrate acceptability of proposed substitute. Acceptance will be by addendum.

### 2.02 Expansion and Seismic Joint Systems

- A. Exterior Expansion and Seismic Joint Systems
- B. Roof Expansion and Seismic Joint Systems

### 2.03 Materials

- A. Metals
  - 1. Aluminum extrusions: ASTM B221, alloys 6063-T5, 6005A-T6, 6061-T6
  - 2. Aluminum plate and sheet: ASTM B209, alloys 6061-T6, 5052-H32
  - 3. Steel: ASTM A36 Plate
  - 4. Stainless steel: ASTM A666, type 304
  - 5. Bronze extrusions: ASTM B455, alloy C38500
  - 6. Bronze sheet and plate: ASTM B36, C28000 Muntz metal
- B. PVC Vinyl: 90 Shore A, ASTM D2240
- C. Silicone: ASTM D 2000 4GE 709 M
- D. Santoprene
  - 1. 75 shore A durometer, 15 sec, ISO 868
  - 2. Face seals to be installed in exterior conditions shall be UV resistant.
- E. Abrasive: Two (2) part Epoxy combined with aluminum oxide grit
- F. Water Barrier: Flexible EPDM, Class I, ASTM D4637, 45 mils thick (minimum)
- G. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover by an independent, nationally recognized testing entity in accordance with UL 2079, or ASTM E1966, including hose stream test, where applicable, at the full rated period. Assemblies shall be listed with an independent, nationally recognized testing and listing entity.
- H. Standard fasteners required for assembly and installation shall be included
- I. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating.

## 2.04 Finishes

### A. Aluminum

1. Floors:
  - a. Mill finish extrusions, AA-M10 (As fabricated, unspecified)
  - b. Mill finish plate, AA-M30 (Directional textured finish, unspecified)
2. Interior Walls and Ceilings:
  - a. Clear anodized, Class II, AA-M12 C22 A31
  - b. Color anodized, Class II, AA-M12 C22 A34
  - c. Factory prime painted for finish paint in field
3. Exterior Walls and Roofs:
  - a. AA-M10 (As fabricated, unspecified)
  - b. High-Performance Organic Coating (Kynar or Trinar)
4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating

### B. Steel

1. Galvanized steel plate shall meet ASTM 123
2. Galvanized sheet metal shall meet ASTM A65 G90
3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating

### C. Bronze

1. Floors: Clear coated directional textured finish
2. Interior walls: #2 Cold rolled mill finish
3. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating

### D. Stainless Steel

1. Floors: Directional textured finish
2. Interior walls: #3 Finish
3. Exterior walls: #3 Finish
4. All surfaces in contact with masonry or concrete shall be protected by a factory-applied coating

### E. Elastomeric Seals:

1. Color as selected and approved from manufacturer's samples

### F. Foam seals with silicone face:

1. Color as selected and approved from manufacturer's samples

### G. Abrasive:

1. Black (Standard)

## PART 3 — Execution

### 3.01 Examination

- A. Installer shall examine conditions under which work is to be performed and shall notify the contractor in writing of unsatisfactory conditions. Installer shall not proceed until all unsatisfactory conditions have been corrected in a manner acceptable to the installer.

### 3.02 Preparation

- A. Prepare surfaces using methods recommended by the manufacturer for achieving the required results within project conditions.
- B. Corner blockouts should be square, level, free of spalling or laitance, and meet the dimensions shown on shop drawings. Repairs should be made using appropriate materials as recommended by concrete repair material manufacturer, based on project-specific conditions.
- C. Concrete repair material must be applied and allowed to cure in accordance to the manufacturer of the product recommendations and instructions.
- D. Clean dirt, debris, and other contaminants from both the blockout and joint opening
- E. Mask areas adjacent to the joint as required to achieve neat, clean joint lines. Remove masking prior to the curing process.

### 3.03 Installation

- A. Install expansion and seismic joint covers in accordance with the manufacturer's instructions.
- B. Centering bars shall be fully engaged with base members.
- C. Locate fasteners at interval recommended by manufacturer as shown on shop drawings.
- D. Floor systems: Where shimming is required, provide continuous support for base members to prevent vertical deflection when in service.
- E. Heavy-duty floor systems: Repair or grout blockouts as required for continuous frame support. Bring base members to proper level; shimming is not allowed.
- F. Fire-rated joint covers: Install fire rated covers in accordance with requirements of applicable fire rated product. Install fire barriers and flame sealant as shown on shop drawings and in accordance with installation instructions.
- G. Water barrier: Install water barriers at exterior joints and where called for on shop drawings. Provide drainage fittings where called for on shop drawings.

### 3.04 Protection and Cleaning

- A. Protect the installation from damage by work of other sections.
- B. Where required, remove and store cover plates and install temporary protection over joints and re-install cover plates prior to substantial completion of work.
- C. Do not remove protective coverings until finish work in adjacent areas is complete.
- D. Prior to project closeout, clean exposed surfaces with a suitable cleaner as recommended by manufacturer.

END OF SECTION

## SECTION 08110

### HOLLOW METAL DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide hollow metal doors, frames and related work, complete.

A. Work In This Section: Principal items include:

1. Hollow metal doors.
2. Hollow metal frames.
3. Louvers and frames for glazed lights in doors.

B. Related Work Not In This Section:

1. Installation of hollow metal doors.
2. Furnishing finish hardware for hinged metal doors.
3. Glazing in hollow metal.

##### 1.02 QUALITY ASSURANCE:

- A. Tolerances: Provide door and frame assemblies having maximum 3/32" gap between top and side edges of door face and frame after installation, and maximum 1/4" clearance above finish floor except as otherwise required by floor finish material; provide maximum 3/32" gap between door edges at meeting stiles of pairs of doors.
- B. Conform to SDI 100 for details not specified herein.
- C. Doors shall be extra heavy duty, unless otherwise specified.

##### 1.03 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings fully detailing materials, finishes, sizes, profiles, moldings, location of hardware items with reinforcement and methods for anchoring, assembly and erection.
- B. Samples: Submit the following samples:
1. Frame door construction.
  2. Door panel and edge construction.
  3. Door louvers & rated door louvers.
- C. Certification: Provide certification that the doors, frames and related hardware complies with requirements of Title 24 CCR, Section 5317 for air infiltration limitations.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER:

- A. Steelcraft , (800) 243-9780
- B. Curries Mfg., Inc. (909) 593-2100
- C. Door Components, Inc. (866) 989-3667

### 2.02 MATERIALS:

- A. Exterior: 16ga Polyurethane core, galvanized, seamless/welded/Beveled edge, capped flush top, 4 channel construction to minimize thermal bow conditions and with galvanized 14ga frames. With reinforcement on frame and door for closer, lock and continuous hinges.
- B. Interior: 16ga Polystyrene for insulation purposes. 16ga Honeycomb core for general use, seamless/welded/Beveled edge, capped top with galvanized 14ga. With reinforcement on frame and door for closer, lock and continuous hinges.

### 2.03 FABRICATION:

- A. Verify sizes required and specified with existing conditions prior to installation. Make all necessary alterations to fit frames into existing openings as required to fit openings at not additional cost to the Owner.
- B. Types: Sizes, types, thicknesses, profiles, details and features shown for doors and frames govern. In all other respects, provide doors and frames as standard with manufacturer except as specified herein.
- C. Hollow Metal Doors: Flush panel seamless type Top and bottom of the doors shall be closed with 14 gauge steel channel welded to door stiles. Reinforce the top, bottom and both edges according to manufacturer's standards. Finish both face panels and all edges smooth and free of seams and distortion. Provide 1-3/4" by 12 gauge full-height astragal on active leaf of pairs of doors.
  - 1. Glazed Lights in Doors: Manufacturer's standard steel assembly, one side integral with door and the other side equipped with applied steel stops of minimum 20 gauge steel, one piece lengths, secured within 3" of ends and at 9" centers with flat-head countersunk screws.
  - 2. Louvers: Inverted chevron steel louver units for interior doors, stormproof blade profile type with removable framed bronze or aluminum insect screens on interior side for exterior doors.
  - 3. Fire rated Louvers: Z-blade steel louver units with adjustable fusible link as needed to isolate the room whenever fire is present. When exposed to heat at 165 degrees Fahrenheit, the fusible link trips and the spring loaded louver blades shut, to form an air tight fire and smoke seal. Maximum 24" x 24" louver size, bottom of door is required for rated louver door assembly.

- D. Hollow Metal Frames: Form stops integral with frames. Reinforce heads over 42" side with a full-length 12 gauge channel. Provide steel plaster guards back of cutouts for hinges or mortised hardware for frames to be installed in plaster.
1. Fabricate frames of following gauges unless otherwise shown or specified:  
  
Interior openings – minimum 16 gauge steel.  
Exterior openings – minimum 14 gauge steel.
  2. Fabrication: Fabricate all frames with welded joints, all exposed welds ground smooth and flush.
  3. Fabricate new transom bards and new mullions for existing frames where indicated. Match profile of existing. Use material of gauge specified herein or heavier. Continuously weld new members to existing, and grind welds smooth.
- E. Frame Anchors: Provide steel anchors of proper type for wall construction and 18 gauge minimum, each anchor prepared for not less than two fasteners where connected to wall studs, not less than three anchors per jamb except, if frame height exceeds 84", add one additional anchor for each additional 18" of frame height or fraction thereof. Provide anchors welded into frames except provide adjustable type frame anchors for frames installed in masonry. Provide floor anchors where mortar setting beds or concrete floor fill occurs.
1. Where new frames are anchored to existing construction, secure with flat head screws in dimpled holes at not over 18" o.c. Tackwell fasteners to frame, grind smooth, fill with bondo and prep for painting.
  2. Where new frames are anchored to new construction, secure with flat head screws in dimpled holes at not over 18" o.c. Tackwell fasteners to frame, grind smooth, fill with bondo and prep for painting.
- F. Hardware Preparation: Prepare, reinforce, mortise, drill and top doors and frames according to templates specified in Section 08710, reinforcing as standard with door and frame manufacturer except minimum 10 gauge steel behind butts and 12 gauge steel for mortised or surface-applied hardware. Conform to ANSI A 115 Series as applicable to the hardware specified in Section 08710 unless otherwise indicated.
- G. Finish:
1. Exterior doors and frames and toilet room doors and frames: Thoroughly clean metal surfaces and chemically treat. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply galvanized finish, after fabrication, on exterior doors and frames. Galvanizing shall conform to coating class G90.
  2. Interior: Thoroughly clean metal surfaces and chemically treat for paint adhesion. Paint inaccessible surfaces before assembling. Sand exposed surfaces of hollow metal and accessories and make smooth with mineral filler as required. Apply a

backed-on coat of manufacturer's standard rust inhibitive primer; include all concealed surfaces of door frames and anchors.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION OF DOOR FRAMES:

- A. Set frames as shown on approved shop drawings.
- B. Plumb, align and brace frames securely until permanent anchors are set. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint. Use wood spreaders at bottom of frame if the shipping spreader is removed. Protect frame from accidental abuse. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.
- C. Floor Anchors: Anchor the bottom of door frames to floor with two 1/4-inch diameter expansion bolts.
- D. Jamb Anchors: Secure anchors to sides of wood studs with 3 wood screws through anchor tabs.
- E. Grouting: Frames in plaster walls shall be solidly filled with plaster. Frames in gypsum wallboard walls shall be spot grouted as recommended by gypsum wallboard manufacturer.
  - 1. Exterior doors frames shall have the bottom filled with a minimum of 8 inches of grout. Two No. 3 rebar shall be at the base of each side of door. Where no access occurs, provide an access opening in frame for grout installation. Weld opening with plate of frame thickness, flush, grind smooth, bondo and prep for paint.

#### 3.02 INSTALLATION OF DOORS:

Refer to Section 06200.

END OF SECTION



## SECTION 08210

### WOOD DOORS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide wood doors as indicated, specified and complete.

A. Work In This Section: Principal items include:

1. Solid core, flush face plastic laminate veneer doors.
2. Louvers in wood doors.
3. Frames for glazing in wood doors.

B. Related Work Not In This Section:

1. Installation of wood doors.
2. Hollow metal door frames.
3. Wood door frames.
4. Furnishing finish hardware for wood doors.
5. Glass and glazing.
6. Finish painting.

##### 1.02 QUALITY ASSURANCE:

A. Reference Standards: Window and Door Manufacturers Association (WDMA) Industry Standard I.S. 1A, "Wood Flush Doors", and the Woodwork Institute "Manual of Millwork", 11<sup>th</sup> edition. In addition, doors shall meet AWI Standard, Section 1500, System No. 5 (5-ply doors) and System No. 7 for 7 ply doors.

B. Allowable tolerances for fabrication of doors:

1. Size:  $\pm 1/32$ " overall dimensions.
2. Maximum warp: 1/4".
3. Squareness: Length of diagonal measured on face of door from upper right corner to lower left corner between length of diagonal measured on upper left corner to lower right corner: Maximum difference of 1/4".
4. Prefitting and premachining for hardware: WDMA Standard Procedures.
5. Show-through (photographing): 1/100" deviation from true plane in any 3" span on door face.

C. Each door shall bear in identifying label indicating the manufacturer, door number and order number.

- D. Rejected Doors: Furnish replacement door conforming to this section for doors rejected for damaged surfaces, improper fitting or hardware preparation or other cause, at no additional contract cost. Patching is not permitted for correction of defects.

#### 1.03 SUBMITTALS:

- A. Samples: Submit samples of the following:
  - 1. Face veneers for each type door.
  - 2. Door construction.
  - 3. Baked enamel finish colors for various specified items.
- B. Product Data: Submit detailed technical information for each product specified in this section.
- C. Shop Drawings: Prepare and submit drawings showing all relevant information, including:
  - 1. Door schedule: Indicate opening identifying symbol, location, sizes, door type and grade.
  - 2. Elevation for each distinct door configuration.
  - 3. Construction details for each distinct product type.
  - 4. Indicate light and louver cutout sizes and locations.
  - 5. Dimensions and location of blocking for hardware.
- D. Certificates:
  - 1. Submit certificate by door manufacturer that doors supplied conform to or exceed requirements of these specifications.
  - 2. Provide certification that the doors, frames and related hardware comply with requirements of California Building Code Section 5317 for air infiltration limitations.

#### 1.04 PRODUCT HANDLING:

- A. Delivery: Deliver doors individually packaged to site after finishes are dry and building has reached average prevailing relative humidity of locality. Deliver doors in manufacturer's original unopened protective materials or container, clearly marked with manufacturer's name, brand name, size, thickness and identifying symbol on covering.
- B. Storage: Stack doors flat, in an area where there will be no great variation in heat, dryness and humidity.
- C. Handling: Do not drag doors across one another.

## 1.05 WARRANTY:

Furnish a written warranty, subject to provisions of the NWMA "Standard Door Guarantee" except as modified herein, covering interior solid corer wood doors against defects in materials and workmanship, including cup, bow, warp, twist and delamination, for the life of original installation. Warranty shall include all rehanging and refinishing costs.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER:

Haley Brothers  
6291 Orangethorpe Avenue  
Buena Park, CA 90620  
(714) 670-2112

Buell Door Company (800) 556-0155  
Algoma Hardwoods, Inc. (800) 678-8910  
Marshall Door Systems (949) 363-7249  
VT Industries, (800) 827-1615

### 2.02 EXISTING CONDITIONS:

Verify sizes required and specified with existing conditions prior to installation. Make all necessary alterations to fit frames into existing openings as required at no additional cost to the Owner.

### 2.03 SOLID CORE WOOD DOORS:

Conform to WI Manual of Millwork Section 12, solid core, conforming to above reference standard and to requirements herein, 5-ply or 7-ply. Nine-ply doors are not acceptable.

- A. Core: Staved glued low-density lumber core, or solid particleboard core with minimum 32 pcf density conforming to ANSI A208.1, Grade 1-LD-2 or better, hot press resin bonded.
- B. Edges:
  - 1. Stiles shall be 1-3/8" wide (before prefitting), structural composite lumber (SCL) with the outer stile to be the same species as the face veneer. The nominal 1/16" outer stile shall be applied prior to beveling doors. Drill 5/32" diameter pilot holes for all hinges.
  - 2. Rails shall be structural composite lumber (SCL), minimum 1-1/8" wide before prefitting.
  - 3. Stiles and rails shall be securely glued to the core, and the entire assembly sanded flat as a unit to ensure minimal telegraphing of core components through face veneers.

4. Provide 5" top-rail wood blocking for door closer installation.
  5. Provide 5" bottom-rail wood blocking for doors indicated to have kick, mop or armor plates and where automatic door bottoms are required.
- C. Crossbanding: For 5-ply doors, minimum 1/16" thick hardwood extending to four door edges. For 7-ply doors, premanufactured 3-ply hardwood skins, extending to four door edges.
- D. Face Veneer: Minimum 1/50" thick before sanding, Grade A, WI Custom, birch, stain grade.
- E. Adhesives: Type I or II for cores, crossbanding, and Type I for face veneers.

#### 2.04 FRAMES FOR GLAZED LIGHTS:

Similar and equal to "Anemostat-West FGS-75" steel glass tops, finished with factory baked-on metal primer finish.

#### 2.05 DOOR LOUVERS:

Inverted chevron units with straddle type frames, minimum 20 gauge steel, of welded construction, Air Louvers Ltd. 600-A, Anemostat-West CHDL-2F, or equal, finished with factory baked enamel finish, special designated color.

#### 2.06 SEALING:

Seal all door edges with clear resin sealer at the factory or mill.

#### 2.07 FACTORY PREPARATION OF DOORS:

- A. Prefitting: Prefit doors in accordance with referenced standard except as otherwise detailed, lock stiles beveled to conform to the hardware. Apply clear resin sealer on edges after sizing.
- B. Hardware Preparation: Prepare doors to receive finish hardware, including mortises for butts, lock and latchsets, concealed closers, and all other door hardware furnished under Section 08710. Obtain required templates. Coordinate placement with the metal frame supplier so that doors and frames are properly fitted and equipped when installed, 3/64" maximum tolerance allowed in placing hardware.
- C. Sealing: Seal all mortises and cutouts with clear resin sealer.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION:

Refer to Division 6, Section 06200.

END OF SECTION

## SECTION 08305

### ACCESS PANELS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. This section covers the access panels for the entire work, and pertains to all sections for which access panels are furnished or required, unless specified otherwise.

##### A. Work in this Section:

1. Access panels in walls and ceilings required for service of mechanical, electrical and other equipment.

##### 1.02 SUBMITTALS:

- A. Provide complete shop drawings and manufacturer's brochures for review. Provide complete list of access panels required for project showing location, size, surface on which installed and type of panel for wall application.
- B. Layout Drawings: Determine all required access panels in finished surfaces, whether furnished under this section or as part of the work of Divisions 15 and 16. Provide layout drawings, using contract drawings as background, and show dimensioned locations of all proposed access panels, the size of each panel and installation detail of each panel. Obtain approval of locations prior to framing openings for panels.

#### PART 2 – PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURERS:

Karp Associates, Inc  
54-54 43<sup>rd</sup> Street  
Maspeth, NY 11378  
(800) 888-4212

Larsen's Manufacturing Co.  
7421 Commerce Lane N.E.  
Minneapolis, MN 55432  
(800) 527-7367

Milcor  
1225 Corporate Drive Suite B  
Holland, OH 43538  
(800) 861-6452

## 2.02 GENERAL:

- A. Provide access panels in finish construction, where indicated on the architectural drawings, and wherever required for access to concealed plumbing, mechanical and electrical equipment. Panels shown on architectural drawings shall be furnished under this section. Those required for access to equipment, but not shown on architectural drawings, shall be furnished as part of the work requiring the access. All access panels shall conform to the following requirements.
- B. Wherever access is required by code or maintenance at smoke or heat detectors, plumbing or electrical, contractor is to provide access panels. Access panels shall be hinged and built by access panel manufacturer. Contractor site built access panels are not acceptable. Panel shall be sized accordingly to allow a person to service equipment where necessary. Provide shop drawings for review prior fabrication and installation. Refer to electrical and mechanical specification.

## 2.03 TYPES:

- A. Plaster Construction:
  - 1. Walls and ceilings: 24" x 24" cam lock type manufactured by Karp Associates, Inc. DSC-214PL, or Larsen's L-PSW, screw-driver operated.
  - 2. Ceramic tile (mortar set), sizes as indicated on drawings or as required, manufactured by Karp Associates, Inc., DSC-214M, or Larsen's L-MPSS stainless steel, screw-driver operated.
- B. Gypsum Wallboard Construction:
  - 1. For non-rated walls and ceilings, except as otherwise specified: Factory prime coated steel door and frame assembly, standard flush screwdriver operated cam latch and fitted with stainless steel flush hinges. Unless otherwise indicated, Karp Associates, Inc. KDW, or Larsen's L-DWA.
  - 2. For acoustic tile surfaced gypsum wallboard: Karp KSTC/CAD, or Larsen's L-CPA, screwdriver lock.

## 2.04 FINISHES:

Access panels in painted walls and ceilings shall be furnished with factory-applied prime coat, unless otherwise indicated. Access panels in tile walls shall be stainless steel, or shall have polished chrome finish, unless otherwise indicated.

## PART 3 – EXECUTION

### 3.01 INSTALLATION:

Install access panels in accordance with manufacturer's recommendations. Provide channel framing for panels, and securely attach panels to frames. Align panels so that finish surface of panels is in same plane as finish material. Panels shall be plumb and level.

END OF SECTION

## SECTION 08347

### SOUND CONTROL DOOR ASSEMBLIES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes: Sound rated doors with door panels, doorframe, threshold, seals, and all associated hardware as indicated on the drawings and as specified.
- B. Related Sections:
  - 1. Section 08710 – Door Hardware.
  - 2. Section 08800 – Glazing
  - 3. Section 09900 - Painting

##### 1.2 QUALITY ASSURANCE

- A. Unless noted otherwise, all materials specified (i.e., door, doorframe, and all necessary hardware including thresholds and seals) in this section shall be furnished from a single door manufacturer, who has been engaged in the manufacture of sound rated doors for at least 5 years.
- B. Doors shall have been laboratory tested for acoustical performance. The acoustical test and report shall be as follows
  - 1. Acoustical tests shall be performed in accordance with the latest version of ASTM Standard E90.
  - 2. Sound Transmission Class ratings (STC) shall be determined according to the latest version of ASTM E413.
  - 3. Acoustical test shall be conducted for the entire door assembly including doorframe.
  - 4. The test shall be conducted in a certified acoustical testing laboratory, acceptable to the District Representative.
  - 5. Acoustical reports shall be prepared by an engineer/technician qualified in the work of this nature. The reports shall provide the laboratory name, date of test, test report number, STC rating, and sound transmission loss (dB) values in 1/3 octave band frequencies from 100 to 5000 Hz.
- C. Door manufacturer shall provide post-construction acoustic test for a selected (selected by the Owner Representative) STC50 rated door. Test report shall be provided for review and approval. In the event that the doors do not pass the acoustic test, Contractor shall take any remedial action, approved by the Owner

Representative, as necessary to improve door acoustic rating to the specified acoustic performance.

### **1.3 REFERENCE**

- A. ASTM E90 Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- B. ASTM E413 Classification for Rating Sound Insulation.
- C. ASTM E336 Standard Test Method for Measurement of Airborne Sound Insulation in Buildings.

### **1.4 SUBMITTALS**

- A. Product Data: Submit a schedule of items to be provided under this section along with specifications, installation recommendations, and construction details including seal types and arrangements, jointing, and assembly of various members, anchorage, and supports.
- B. Shop Drawings: Show elevations of doors and full-size details showing thickness, gages, glass type (where viewing glass is specified), fixing details, and seal types and arrangements.
- C. Submit laboratory prepared acoustical test report, as defined in Quality Assurance Section, showing that the doors meet the acoustic performance requirements.
- D. Statement verifying that all Quality Assurance requirements can and shall be met by the manufacturer.
- E. After installation, submit field report from qualified manufacturer's representative confirming that door assemblies have been installed and adjusted in accordance with the manufacturer's printed recommendations.

### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle doors and frames in manner to prevent damage or deterioration.



## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Overly Manufacturing Company, 574 West Otterman Street, Greensburg, PA 15601, (www.overly.com).
- B. Krieger Specialty Products – 4880 Gregg Road, Pico Rivera, CA 90660, (www.kriegerproducts.com)
- C. Jamison Door Company – P.O. Box 70, Hagerstown, MD 21740, (www.jamisondoors.com)

### **2.2 PERFORMANCE REQUIREMENTS**

- A. Acoustical door assemblies shall provide laboratory measured acoustic performance as follows.

Sound Transmission Class Rating	Minimum Sound Transmission Loss (dB re 20 micropascal) at Octave Band Center Frequency, <sup>1</sup> Hz					
	125	250	500	1000	2000	4000
STC 50	27	39	46	49	50	55
Note: 1. Energy average over the 1/3 octave band center frequencies following ASTM E90.						

### **2.3 MATERIAL**

- A. Doors shall be 1-3/4 inch thick,
- B. Seals: As supplied by door manufacturer to meet the door assembly performance requirements specified. Seals to be adjustable so as to account for building movement.
- C. Shop-Applied Paint: Rust-inhibitive primer, either air dried or baked on, suitable as a base for specified finish paints.
- D. Finish: to be selected by Architect. Architect to verify if door need to be wood laminated,

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification of Conditions: Examine sub-surfaces and conditions under which steel doors and frames are to be installed and report any detrimental conditions in writing to Architect.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work.
- C. Examine and verify openings sizes prior to delivering doors to site. Provide backing and any standoffs required to provide flush installation.

### 3.2 INSTALLATION

- A. Wall and ceiling panels to be installed per manufacturer's installation.
- B. Mount wall panels using mechanical clips. Predetermine location of the mounting points for consistency from panel to panel.
- C. Install sufficient number of clips to ensure that panels are secure in their final locations and are held flat with no deviation of the edge or deflection of the face.
- D. Field cutting to be performed by tradesmen familiar with this procedure using factory approved trims, adhesives and methods.
- E. When panel installation has been completed, make minor adjustments to ensure that joints are in true alignment and panels secure. Spot clean panels to remove finger marks or soil.

### 3.3 POST-CONSTRUCTION ACOUSTICAL TEST

- A. After installation of doors is complete, door manufacturer shall provide acoustic test for one (1) STC 50 doors, as selected by the Owner Representative. Test shall be witnessed the by Owner Representative and test report shall be provided for review and approval. In the event that the doors do not pass the acoustic test, Contractor shall take any remedial action, approved by the Owner Representative, as necessary to improve door acoustic rating to the specified acoustic performance.
- B. Acoustical door assemblies shall provide field measured acoustic performance (FSTC) after installation as follows.

Sound Transmission Class Rating	Minimum Sound Transmission Loss (dB re 20 micropascal) at Octave Band Center Frequency, <sup>1</sup> Hz					
	125	250	500	1000	2000	4000
FSTC 45 (STC 50 Rated Door)	24	34	41	44	46	50
Note: 1. Energy average over the 1/3 octave band center frequencies following ASTM E90.						

- 1. Acoustical tests shall be performed on the doors in accordance with the latest version of ASTM Standard E336.
- 2. Sound Transmission Class ratings (Field STC, FSTC) shall be determined according to the latest version of ASTM E413.
- 3. Test shall be conducted by engineers/technicians qualified in work of this nature.
- 4. The District Representative shall be given a minimum 5-day advance notice of the scheduled time for testing the doors, so that he/ she may witness the test.

Acoustical reports shall be prepared by an engineer/technician qualified in the work of this nature. The reports shall include the engineer/technicians name, date of test, FSTC rating, and field transmission loss (dB) values in 1/3 octave band frequencies from 100 to 5000 Hz.

**END OF SECTION**

## SECTION 08410

### ALUMINUM WINDOW FRAMING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this section. Provide aluminum window framing, including aluminum panning, as indicated, specified and required.

##### A. Related Work Not In This Section:

1. Glass and glazing.
2. Insulated opaque panels in window framing.

##### 1.02 QUALITY ASSURANCE:

A. Quality Standards: In addition to code, provide aluminum framing system designated so that glass installations conform to ANSI Z97.1, as applicable, and with Federal Safety Standard 16 CFR 1201.

B. Performance Standards: Provide framing so designated that when installed and glazed, the construction conforms to following performance criteria:

1. Thermal Movement Clearance: System shall provide for thermal movement within a surface temperature range of + 20 to + 180 F, with additional clearance allowed for erection tolerance, slab and beam deflections, and long term creep of the building structural frame.
2. Air Infiltration: When system is tested according to ASTM E283, tested at 1.56 psf pressure differential, air infiltration from fixed windows, not exceeding 0.06 CFM per square foot of wall area, except more restrictive requirements of CCR Title 24, Division 4, Section 4.1.6 govern maximum allowable infiltration.
3. Water Infiltration: Water infiltration is defined by ASTM E331 as penetration of water into the plane of the innermost face of the test specimen. System design includes provisions to drain to exterior face of the wall any leakage of water occurring at joints and/or condensation taking place within wall system construction.
  - a. Static Pressure: No water infiltration under static pressure when wall is tested per ASTM E331 at differential static pressure of 15 PSF.
  - b. Dynamic Pressure: No water infiltration under dynamic pressure when wall is tested per AAMA A501.1, with minimum 15 PSF pressure for paragraph 4.5.4 and minimum 100 MPH slip stream velocity.
  - c. Wind Load and Deflection: The window wall system shall be designed to withstand Code required wind loadings without buckling, distortion or distress,

and with maximum deflection of  $1/175$  of the unsupported length, except minimum 20 pounds per square foot wind loading where Code allows lesser load.

- d. The deflection of any horizontal member supporting glass, when carrying its full design dead load, shall not exceed  $1/360$  of the clear span of the member, or  $1/8$ " whichever is less.

#### 1.03 SUBMITTALS:

- A. Shop Drawings: Submit for all work of this section, prepared by the manufacturer of the work of this section, and approved prior to fabrication. Show complete details for all materials, finishes, sizes, profiles, moldings, dimensioned locations of hardware items with reinforcement, methods of anchoring, assembly, erection, internal drainage, isolation, glazing and reglazing procedures and materials and caulking. Include the manufacturer's technical and structural data.
- B. Calculations: Provide complete structural calculations showing that materials proposed for use conform to wind load and deflection requirements specified. Calculations shall bear the stamp of a civil or structural engineer licensed to practice in the State of California.
- C. Samples and Product Data: Submit the following if required:
  1. Framing sections, sloped section, corner and intersecting joint construction, fasteners and accessories.
  2. Cured sealant colors.
- D. Test Reports: Provide test reports from a qualified independent testing laboratory that show compliance of the manufacturer's stock glazed aluminum curtain wall system with performance requirements indicated based on comprehensive testing of the system by the laboratory within the last 3 years current production of the system by the manufacturer.
- E. Installation Instructions: Provide complete, at time of submittal of shop drawings and test reports.

#### 1.04 JOB CONDITIONS:

- A. Job Measurements: Verify field measurements pertaining to this section. Report all detrimental differences between drawings and field dimensions to the Architect before fabricating work of this section.
- B. Protection: Protect all work of this section until completion and final acceptance. Repair or replace damaged or defective work to original specified condition, at no additional contract cost. Damaged or defective work includes surfaces which cannot be acceptably cleaned or repaired.

#### 1.05 WARRANTIES:

- A. Window Framing: Warranty fixed framing for 5 years. Warranty shall agree to repair or replace defective materials and workmanship during the entire warranty period. Defective materials and workmanship include abnormal deterioration, again or weathering of the work, leakage of water or air exceeding specified limits, structural failure of any components resulting from exposure to pressures and forces up to specified limits, failure of operating parts of function normally, deterioration or discoloration of finishes in excess of allowable limits, glass breakage and secondary glass damage or breakage due to falling glass fragments, failure of sealants, and failure of window walls to fulfill other specified performance requirements. The warranty does not include damage caused by vandalism or to natural conditions exceeding the performance requirements. However, the warranty does include failures or defects for which the cause cannot be determined. This warranty and its enforcement shall not deprive the Owner of other action, right, or remedy available to the Owner.
- B. Caulking and Sealing: Warranty in accordance with Section 07920.

#### PART 2 – PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURERS:

- A. Named Manufacturers: Details shown are from U.S. Aluminum and establish required sizes, types and appearance. Window framing may be furnished by any one of the following, subject to compliance with specification requirements. Except for incidental materials, all work of this section shall be products of one manufacturer. Additional substitutions are not acceptable.
  - 1. U.S. Aluminum
  - 2. Torrance Aluminum
  - 3. VistaWall Arch. Products
  - 4. Kawneer Co.
- B. Acceptable Variations: Minor modifications in non-essential details to accommodate the use of manufacturer's standard sections of same sizes, profiles and glazing features indicated are acceptable, subject to approval.

##### 2.02 SYSTEM DESCRIPTION:

The glazed aluminum wall systems shall consist of individual members erected separately. Major components consist of aluminum vertical exterior mullions, horizontal rails, and matching glazed insulated spandrel panels and vision glass. System shall be U.S. Aluminum Series FF 600, Flush Out Framing.

##### 2.03 GENERAL FABRICATION REQUIREMENTS:

- A. General: Work shall be fabricated in conformity with applicable provisions of specified references and tolerances, shall match tested units, and as indicated and as specified herein.

- B. Work shall be fabricated and assembled with provision for noiseless thermal expansion and contraction, fabrication and erection tolerances, adjoining building component tolerances and dynamic movements.
- C. Welding operations shall be done prior to finishing.
- D. Work shall be true to detail with sharp, clean profiles, straight and free from defects, dents, marks, indentations, waves or flaws of any nature impairing strength or appearance; fitted with proper joints and intersections and with specified finishes.
- E. Removable members such as glass stops, fillers or closures, shall be extruded and shall be securely engaged into the adjacent components; extrusions to be tolerated to eliminate any edge projection or misalignment at joints.
- F. Expansion joints shall be so designed and constructed that they will be and remain, permanently watertight and accommodate weather and building dynamics.
- G. Joints In Metal Work:
  - 1. Exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise shown or required for thermal movement, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight.
  - 2. Where two or more sections of metal are used in building up members, the surface in contact shall be brought to a smooth, true and even surface and secured together so that the joints are tight without the use of any pointing materials. Exposed fasteners and sealants, except where shown, shall not be permitted. Extrusions shall be tolerated to eliminate any edge projection or misalignment at joints.
  - 3. Metal-to-metal joints between elements shall be thoroughly cleaned and sealed by buttering joints with sealant immediately prior to final assembly of abutting sections, as described in approved installation instructions. Clean all excess sealant from exposed surfaces.
  - 4. Install sleeves, lugs and related items in a full bed of sealant and seal perimeter when component is in final installed position. Clean all excess sealant from exposed surfaces.
  - 5. Seal all joint per sealant manufacturer's recommendations. Clean all excess sealant from exposed surfaces.
  - 6. Unless otherwise noted, seal and tool all fasteners penetrating watertight or airtight assemblies.

#### 2.04 SPECIFIC REQUIREMENTS:

- A. Members: Provide complete as indicated and required, including all glass setting bars, transom bars, trim, mullions and door frames. Provide necessary setting accessories, including screws, fittings and anchors. Design all joints and connections for flush

watertight hairline fitting and to allow for structure and thermal movement and deflections without loss of glass edge clearance, grip or watertight integrity.

- B. Construction: Provide aluminum members of section thickness and structural properties as required to meet structural properties and deflection limitations as specified. Do not increase section sizes without specific approval. Provide additional bent plate or rolled steel internal stiffeners where necessary to meet deflection requirements. Pre-coat stiffeners with heavy bituminous coating to electrically isolate from aluminum. Conform glass edge bearings, laps and clearances to code, but minimum 1/2" glass bite in any case for glass retained by metal stops.
  - C. Fasteners: Use stainless steel fasteners. Locate fasteners only on concealed surfaces, unless specifically approved on the shop drawings, where approved, use flat Phillips head and finished to match adjoining surface. Use stainless steel fasteners.
  - D. Internal Gutters and Drainage: Provide minimum 0.050" thick 5052 alloy internal aluminum flashings and gutters to drain leakage and condensation and leakage to exterior, coordinated with weep holes. Detail in shop drawings.
  - E. Foam Tape: Closed cell polyvinyl chloride foam with pressure sensitive adhesive on both sides, in rolls with protective release paper, comply with AAMA 810.1, Type 1; maximum water absorption by volume of 2 percent; 15 pcf density when measure in accordance with ASTM D 1667; 1/2" wide by thickness required to achieve 30 to 60 percent compression; Norseal V980/V990, manufactured by Norton Performance Plastics Corporation (800) 724-0883, or equal.
  - F. Drainage: Provide inconspicuous weep holes or an equal method to ensure positive drainage of internal moisture or condensation to exterior, weep holes protected from blow-back with 45 PPI inch open cel reticulated foam filters compressed 50% to 60% of loose volume. Detail in shop drawings.
  - G. Slip Pads: Provide Teflon or equivalent non-combustible slip pads between moving parts at expansion connections, minimum 1/8" thick. Show and define on submittals.
  - H. Miscellaneous Items: Provide extruded aluminum drywall adapter trims, ceiling and wall trims, sills, covers and like items as indicated or required for complete installations; fully detail in shop drawings.
- 2.06 ALUMINUM FINISH:
- A. Concealed Aluminum: Mill finish only where not in contact with silicone type sealants. Aluminum surfaces contacting sealant: Alodined or primer finish as specified.
  - B. Exposed Surfaces: Fluorocarbon paint finish based on minimum 70 percent Kynar 500 or Hylar 5000 polyvinylidene resin content in cured paint finish, applied over an epoxy primer, both coats applied and baked according to manufacturer's specifications by manufacturer's licensee, equal to PPG "Duramar", color 2618M100012 Sandy Bronze.

## PART 3 – EXECUTION

### 3.01 GENERAL INSTALLATION REQUIREMENTS:

Conform to approved submittals and the other requirements herein.

- A. Aluminum Isolation: Isolate aluminum from dissimilar metals and materials other than non-magnetic stainless steel. At metals, apply on both contacting surfaces a heavy brush coat of zinc primer made with a synthetic resin vehicle, followed by two heavy brush coats of spar varnish based aluminum metal and masonry paint; or apply a heavy coat of alkali-resistant bituminous paint; or separate surfaces with non-absorptive exterior quality vinyl tape or gasket, or coat surfaces with two coats of a fluid-applied neoprene membrane material. Coat both contact surfaces with alkali-resistant bituminous paint at concrete, masonry, plaster, tile and like cementitious materials. Conceal all isolation in finished work.
- B. Caulking: Provide caulking and sealants as shown and required to make all work of this section watertight and properly finished, including joints between window wall frames and adjoining work. Install sealant of selected or approved colors. Conform to Section 07920 including warranty.

### 3.02 INSTALLATION:

- A. Provide all blocking, trim members, demolition, etc., necessary for a complete window installation. Where existing plaster or gyp. bd. is required to be removed for window and flashing, remove as required and patch to match adjacent finishes unless noted otherwise.
- B. Erection: Member or miter joints with hairline sealed joints. Securely anchor to the building structure. Set frames level, plumb and in true alignment. Construct completely waterproof assemblies.
- C. Perimeter Sealing: Install foam tape around perimeter of framing system. Install framing members to compress tape between 30 and 60 percent to achieve air and vapor seal. At irregularities in adjacent surfaces, provide additional layers of tape to obtain required compression.

### 3.03 FIELD QUALITY CONTROL:

- A. Inspection: Shop and field materials and workmanship may be inspected at all times. Such inspection does not relieve Contractor from the obligation to provide materials and construction conforming to contract documents and approved submittals, and Contractor shall correct all deficiencies reported and shall effect quality control measures and procedures for materials, whether or not inspected.
- B. Field Water Tests: To the extent directed, perform a minimum of 3 field water tests on completed portions of window walls in accordance with AAMA 501.2 field hose test. If tests result in uncontrolled leakage, eliminate the causes of the leakage at no extra cost to Owner. Remedial measures shall maintain the quality and performance standards



and are subject to approval. Furnish powered scaffolds, hoses and personnel to perform the tests.

#### 3.04 COMPLETION:

Wash all soiled surfaces with mild soap solution, rinse with clear water and wipe dry. Do not use any harsh cleaning agents, abrasives or caustics for cleaning. Leave free of dirt, streaks and labels.

END OF SECTION

## SECTION 08411

### ALUMINUM STOREFRONT SYSTEM

#### **PART 1 - GENERAL**

##### *1.1 SUMMARY*

- A. Related Documents: Conditions of the Contract, Division 1 - General Requirements, and Drawings apply to Work of this Section.
- B. Section Includes:
  - 1. Entrances and Storefront Systems complete with reinforcing, fasteners, anchors, and attachment devices.
  - 2. Aluminum doors complete with hardware, and welded corners.
  - 3. Accessories necessary to complete work.
- C. Related Sections:
  - 1. Section 8410 – Aluminum Window Framing.
  - 2. Section 8710 - Door Hardware.
  - 3. Section 8800 - Glazing.

##### *1.2 REFERENCES*

- A. Aluminum Association (AA):
  - 1. DAF-45 Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA):
  - 1. 503.1 Test Method for Condensation Resistance of Windows, Doors and Glazed Wall Systems.
  - 2. 605.2-92 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
  - 3. 607.1 Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
  - 4. 608.1 Specification and Inspection Methods for Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.
  - 5. 701.2 Specifications for Pile Weatherstripping.
  - 6. Manual #10 Care and Handling of Architectural Aluminum From Shop to Site.
  - 7. SFM-1 Aluminum Storefront and Entrance Manual.
- C. American National Standards Institute (ANSI):
  - 1. A117.1 Safety Standards for the Handicapped.
- D. Federal Specifications (FS):

1. TT-P-645A Primer, Paint, Zinc Chromate, Alkyd Type.
- E. Steel Structures Painting Council (SSPC):
1. Paint 12 Cold-Applied Asphalt Mastic (Extra Thick Film).

### *1.3 SYSTEM REQUIREMENTS*

- A. Design Requirements:
1. Provide concealed fastening.
  2. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
- B. Performance Requirements:
1. Air infiltration: Air leakage through fixed light areas of storefront shall not exceed 0.06 cfm per square foot (0.0003 m<sup>3</sup>/sm<sup>2</sup>) of surface area when tested in accordance with ASTM E283 at differential static pressure of 6.24 psf 300 Pa.
  2. Water infiltration: No uncontrolled water penetration when tested in accordance with ASTM E 331 at test pressure of 8.0 psf 380 Pa.
- C. Thermal Requirements:
1. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees Fahrenheit (82 degrees Celsius) without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.
  2. Ensure doors function normally within limits of specified temperature range.
- D. Structural Requirements, as measured in accordance with ANSI/ASTM E330:
1. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures shall not exceed L/175 of its clear span.
- E. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.

### *1.4 SUBMITTALS*

- A. General: Submit in accordance with Section 01300.
- B. Product Data:

1. Submit manufacturer's descriptive literature and product specifications.
  2. Include information for factory finishes, hardware, accessories and other required components.
  3. Include color charts for finish indicating manufacturer's standard colors available for selection.
- C. Shop Drawings:
1. Submit shop drawings covering fabrication, installation and finish of specified systems.
  2. Include following:
    - a. Fully dimensioned plans and elevations with detail coordination keys.
    - b. Locations of exposed fasteners and joints.
  3. Provide detailed drawings of:
    - a. Composite members.
    - b. Joint connections for framing systems and for entrance doors.
    - c. Anchorage.
    - d. System reinforcements.
    - e. Expansion and contraction provisions.
    - f. Hardware, including locations, mounting heights, reinforcements and special installation provisions.
    - g. Glazing methods and accessories.
    - h. Internal sealant requirements as recommended by sealant manufacturer.
  4. Schedule of finishes.
- D. Samples:
1. Submit samples indicating quality of finish, in required colors, on alloys used for work, in sizes as standard with manufacturer.
  2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
- E. Test Reports:
1. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of re-testing. Include other supportive data as necessary.
- F. Certificates:
1. Submit manufacturer's certification stating that systems are in compliance with specified requirements.
- G. Qualification Data:
1. Submit installer qualifications verifying years of experience.
  2. Include list of projects having similar scope of work identified by Brand name, location, date, references, contact, and phone number.

- H. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

#### *1.5 QUALITY ASSURANCE*

- A. Single Source Responsibility:
  - 1. To ensure quality of appearance and performance, obtain materials for each system from either a single manufacturer or from manufacturer approved by each system manufacturer.
- B. Installer Qualifications: Certified in writing by Contractor as qualified for installation of specified systems.
- C. Perform Work in accordance with AAMA SFM-1 and manufacturer's written instructions.
- D. Conform to requirements of ANSI A117.1 and local amendments.

#### *1.7 DELIVERY, STORAGE AND HANDLING*

- A. Comply with requirements of Section 01600.
- B. Protect finished surfaces as necessary to prevent damage.
- C. Do not use adhesive papers or sprayed coatings that become firmly bonded when exposed to sun. Do not leave coating residue on any surfaces.
- D. Replace damaged units.

#### *1.8 WARRANTY*

- A. Provide warranties in accordance with Section 01770.
- B. Provide written manufacturer's warranty, executed by company official, warranting against defects in materials and products for 2 years from date of Substantial Completion.
- C. Provide written installer's warranty, warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components that fail within 2 years from ship date.
  - 1. Warranty shall cover following:
    - a. Complete watertight and airtight system installation within specified tolerances.

- b. Completed installation will remain free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
  - c. System is structurally sound and free from distortion.
  - d. Glass and glazing gaskets will not break or "pop" from frames due to design wind, expansion or contraction movement.
  - e. Glazing sealants and gaskets will remain free from abnormal deterioration or dislocation due to sunlight, weather or oxidation.
- E. Provide a written thermal integrity warranty for 2 years from ship date against thermal barrier system failure resulting from the following:
- 1. Longitudinal and transverse thermal barrier shrinkage.
  - 2. Thermal barrier cracking.
  - 3. Structural failure of the thermal barrier material.
  - 4. Loss of adhesion or loss of prescribed edge pressure on glazing material resulting in excessive air and water infiltration.

## **PART 2 - PRODUCTS**

### *2.1 MANUFACTURERS AND PRODUCTS*

- A. Subject to compliance with requirements indicated, provide products by one of the following:
- 1. **U.S. Aluminum**, [www.usalum.com](http://www.usalum.com)  
2450 E. Vernon Ave Los Angeles, California 90058-1802  
Toll Free Phone: (800) 262-5151 Phone: (323) 268-4230
  - 2 Kawneer Co. (770) 449-5555
  - 3 Graham Architectural Products (800) 755-6274
  - 4 Wausau Window and Wall Systems (800) 678-2983
- B. Substitutions: Submit under provisions of Section 01600.
- C. Acceptable Entrance Doors:
- 1. Standard Duty Doors: Series 400 available for panic devices or standard locking hardware consult factory for options available.
  - 2. All doors provided with Life-Time Warranty on Door Corner Construction.

SERIES	STILES	TOP RAIL	BOTTOM RAIL	GLAZING INFILL
250 Narrow Stile	2" (50.8)	2-1/8" (54)	3-3/16" (81)	1/4" (6) or 1" (25)
400 Medium Stile	3-1/2" (88.9)	3-3/16" (81)	6-1/2" (165.1)	1/4" (6) or 1" (25)
550 Wide Stile	5" (127)	5-1/2" (139.7)	6-1/2" (165.1)	1/4" (6) or 1" (25)
A.D.A. Bottom Rail Option for Any Series			9-1/2" (241.3)	

D. Acceptable Storefront Framing Systems:

1. Framing System: Series 451
2. All Storefront Systems must be provided with ***E.P.D.M. Top Load Gasketing.***

Center Glazed Systems feature screw race joinery and panel type installation.

SERIES	FACE WIDTH	DEPTH	GLAZING INFILLS	GLAZING METHOD
400	1-3/4" (44.5)	4" (101.6)	1/4" (6) or 3/8" (10)	Exterior/Interior
450	1-3/4" (44.5)	4-1/2" (114.3)	1/4" (6) or 3/8" (10)	
451	2" (50.8)	4-1/2" (114.3)	1" (25)	

2.2 FRAMING MATERIALS AND ACCESSORIES

A. Aluminum:

1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H34 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.

B. Internal Reinforcing:

1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
2. Shapes and sizes to suit installation.
3. Shop coat steel components after fabrication with alkyd type zinc chromate primer complying with FS TT-P-645.

C. Anchorage Devices:

1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.

D. Fasteners:

1. Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with components being fastened.
2. Do not use exposed fasteners, except where unavoidable for application of hardware.

3. For exposed locations, provide countersunk Phillips head screws with finish matching items fastened.
  4. For concealed locations, provide manufacturer's standard fasteners.
  5. Provide nuts, washers of design having means to prevent disengagement; deforming of fastener threads is unacceptable.
- E. Expansion Anchor Devices: Lead-shield or toothed-steel, drilled-in, expansion bolt anchors.
- F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil (0.77 mm) thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.
- G. Glazing Gaskets:
1. Compression type design, replaceable, molded or extruded, of neoprene or ethylene propylene diene monomer (EPDM).
  2. Conform to ASTM C509 or C864.
  3. Profile and hardness as required to maintain uniform pressure for watertight seal.
  4. Provide in manufacturer's standard black color.
- H. Weatherstripping:
1. Wool pile conforming to AAMA 701.2; or extruded EPDM elastomeric conforming to ASTM C509 or C864.
  2. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
- I. Internal Sealants: Types recommended by sealant manufacturer.
- J. "Anti-Walk" Edge Blocking: "W" shaped EPDM blocks for use in keeping glazing material stationary under vibration or seismic loading.
- K. Baffles (at weep holes): Type as recommended by system manufacturer and shown in published installation instructions.

### *2.3 GLASS AND GLAZING ACCESSORIES*

- A. Refer to Section 08810.

### *2.5 FABRICATION*

- A. Coordination of Fabrication:
1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
  2. Fabricate units to withstand loads that will be applied when system is in place.



B. General:

1. Conceal fasteners wherever possible.
2. Reinforce work as necessary for performance requirements and for support to structure.
3. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or pre-formed separators that will prevent contact and corrosion.
4. Comply with Section 08 81 00 for glazing requirements.

C. Aluminum Framing:

1. Supply size of members, shape, and profile designed to provide for glazing from exterior
2. Fabricate frame assemblies with joints straight and tight fitting.
3. Reinforce internally with structural members as necessary to support design loads.
4. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
5. Seal horizontals and direct moisture accumulation to exterior.
6. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
7. Provide manufacturer's extrusions and accessories to accommodate expansion and contraction due to temperature changes without being detrimental to appearance or performance.
8. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and FGMA Glazing Manual.
9. Provide tight fitting, injection molded, water deflectors at all intermediate horizontals.

D. Entrance Doors:

1. Fabricate with mechanical joints using internal reinforcing plates and shear blocks attached with fasteners and by welding.
2. Provide extruded aluminum glazing stops of square design.

E. Hardware:

1. Receive hardware supplied in accordance with Section 08710 and install in accordance with requirements of this Section.
2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
3. Comply with hardware manufacturer's templates and instructions.
4. Use concealed fasteners wherever possible.

F. Welding:

1. Comply with recommendations of the American Welding Society.
  2. Use recommended electrodes and methods to avoid distortion and discoloration.
  3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.
- G. Flashings: Form from sheet aluminum with same finish as extruded sections. Apply finish after fabrication. Material thickness as required to suit condition without deflection or "oil-canning".

## *2.6 FINISH*

- A. Clear Anodized:
1. Conforming to AA-M12C22A31 and AAMA 607.1.
  2. Architectural Class II, etched, medium matte, clear anodic coating, 0.4 mil (0.010 mm) minimum thickness.

## **PART 3 - EXECUTION**

### *3.1 EXAMINATION*

- A. Examine conditions and proceed with Work in accordance with Section 01400.
- B. Verify dimensions, tolerances and method of attachment with other Work.

### *3.2 INSTALLATION*

- A. Erection Tolerances:
1. Limit variations from plumb and level:
    - a. 1/8 inch (3 mm) in 10 feet (3 M) vertically.
    - b. 1/8 inch (3 mm) in 20 feet (6 M) horizontally.
  2. Limit variations from theoretical locations: 1/4 inch (6 mm) for any member at any location.
  3. Limit offsets in theoretical end-to-end and edge-to-edge alignment: 1/16 inch (2 mm) from flush surfaces not more than 2 inches (51 mm) apart or out-of-flush by more than 1/4 inch (6 mm).
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or pre-formed separators to prevent contact and corrosion.
- F. Seal perimeter members as shown on manufacturer's installation instructions or as required for unique job conditions. Set other members with internal

sealants and baffles as called for in manufacturer's installation instructions.  
Use sealants as recommended by sealant manufacturer.

- G. Coordinate installation of perimeter sealant and backing materials between assemblies and adjacent construction in accordance with requirements of Section 07920.
- H. Glazing: Refer to requirements of Section 08 81 00. Utilize "anti-walk" edge blocking on all vertical edges of glazing.

### *3.3 ADJUSTING*

- A. Test door operating functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

### *3.4 CLEANING*

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

**END OF SECTION**

SECTION 08710  
FINISH DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door hardware, including electric hardware.
2. Storefront and entrance door hardware.
3. Gate Hardware.
4. Battery-powered electronic credential access control locks and panic hardware lever trim.
5. Card Access control system.
6. Power supplies for electric hardware.
7. Door position switches.
8. Padlocks.

B. Related Divisions:

1. Division 07 – sealant at exterior thresholds
2. Division 08 – metal doors and frames, interior aluminum frames, wood doors, integrated security systems, specialty doors, storefront and glazed curtainwall systems.
3. Division 16215 – Operational electronic access control system.

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.
8. Folding partitions, except cylinders where detailed.
9. Sliding aluminum doors, except cylinders where detailed.
10. Access doors and panels, except cylinders where detailed.
11. Corner Guards.
12. Welded steel gates and supports.

1.2 REFERENCES:

- A. Use date of standard in effect as of Bid date.

1. American National Standards Institute
    - a) ANSI 156.18 – Materials and Finishes.
    - b) ICC/ANSI A117.1 - 1998 – Specifications for making buildings and facilities usable by physically handicapped people. [omit for CA work – not applicable]
  2. BHMA – Builders Hardware Manufacturers Association
  3. 2016 California Building Code
    - a) Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing
  4. DHI – Door and Hardware Institute
  5. NFPA – National Fire Protection Association
    - a) NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
    - b) NFPA 105 – Smoke and Draft Control Door Assemblies
    - c) NFPA 252 – Fire Tests of Door Assemblies
  6. UL – Underwriters Laboratories
    - a) UL10C – Positive Pressure Fire Tests of Door Assemblies.
    - b) UL 305 – Panic Hardware
  7. WHI – Warnock Hersey Incorporated State of California Building Code
  8. Local applicable codes
  9. SDI – Steel Door Institute
  10. WI – Woodwork Institute
  11. AWI – Architectural Woodwork Institute
  12. NAAMM – National Association of Architectural Metal Manufacturers
- B. Abbreviations
1. Manufacturers: see table at 2.1.A of this section
  2. Finishes: see 2.7 of this section.

### 1.3 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:
1. Type, style, function, size, quantity and finish of hardware items.
  2. Use BHMA Finish codes per ANSI A156.18.
  3. Name, part number and manufacturer of each item.
  4. Fastenings and other pertinent information.
  5. Location of hardware set coordinated with floor plans and door schedule.
  6. Explanation of abbreviations, symbols, and codes contained in schedule.
  7. Mounting locations for hardware.
  8. Door and frame sizes, materials and degrees of swing.
  9. List of manufacturers used and their nearest representative with address and phone number.

10. Catalog cuts.
  11. Point-to-point wiring diagrams.
  12. Manufacturer's technical data and installation instructions for electronic hardware.
- B. Bid and submit manufacturer's updated/improved item if scheduled item is discontinued.
  - C. Deviations: Highlight, encircle or otherwise identify deviations from "Schedule of Finish Hardware" on submittal with notations clearly designating those portions as deviating from this section.
  - D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
  - E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
  - F. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.
  - G. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers' installation, adjustment and maintenance information, and supplier's final inspection report.

#### 1.4 QUALITY ASSURANCE:

- A. Qualifications:
  1. Hardware supplier: direct factory contract supplier who employs a certified architectural hardware consultant (AHC), available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.
    - a) Responsible for detailing, scheduling and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.
- E. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

- F. Pre-Installation Meetings: Initiate and conduct with supplier, installer and related trades, coordinate materials and techniques, and sequence complex hardware items and systems installation. Include manufacturers' representatives of locks, panic hardware and door closers in the meetings. Convene prior to commencement of related work.

#### 1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
  - 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

#### 1.6 PROJECT CONDITIONS AND COORDINATION:

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
  - 1. Location of embedded and attached items to concrete.
  - 2. Location of wall-mounted hardware, including wall stops.
  - 3. Location of finish floor materials and floor-mounted hardware.
  - 4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
  - 5. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.
  - 6. Coordinate: low-voltage power supply locations.
  - 7. Coordinate: back-up power for doors with automatic operators.
  - 8. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.

9. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

#### 1.7 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.
- B. Include factory order numbers with close-out documents to validate warranty information, required for Owner in making future warranty claims:
- C. Minimum warranties:
  1. Locksets: Three years
  2. Exit Devices: Three years mechanical  
One year electrical
  3. Closers: Thirty years mechanical
  4. Hinges: One year
  5. Other Hardware Two years

#### 1.9 REGULATORY REQUIREMENTS: code citations are CBC 2016)

- A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per-2016 California Building Code, Section 11B-404.2.7.
  1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.
- B. Handles, pull, latches, locks, other operable parts:
  1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2016 California Building Code Section 11B-309.4.
  1. Force required to activate the operable parts: 5.0 pounds maximum, per 2016 California Building Code Section 11B-309.4.
- C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2016 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
  1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.



- D. Low-energy powered doors: comply with ANSI/BHMA A156.19. Reference: 2016 California Building Code Section 11B-404.2.9, Exception 2.
1. Where powered door serves an occupancy of 150 or more, provide back-up battery power or stand-by generator power, capable of supporting a minimum of 100 cycles.
  2. Actuators, vertical bar type: minimum 2-inches wide, 30-inches high, bottom located minimum 5-inches above floor or ground, top located minimum 35-inches above floor or ground. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7.
  3. Actuators, plate type: use two at each side of the opening. Minimum 4-inches diameter or 4-inches square. Displays International Symbol of Accessibility, per 2016 California Building Code Section 11B-703.7. Locate centerline of lower plate between 7- and 8-inches above floor or ground, and upper plate between 30- and 44-inches above floor or ground.
  4. Actuator location: conspicuously located, clear and level floor/ground space for forward or parallel approach.
- E. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2016 California Building Code Section 11B-404.2.8.
1. Spring hinges: adjust for 1.5 seconds minimum for 70 degrees to fully-closed.
- F. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2016 California Building Code Section 11B-404.2.10.
1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges.
  2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.
- G. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2016 California Building Code Section 11B-404.2.3.
1. Exception: In alterations, a projection of 5/8 inch (15.9 mm) maximum into the required clear width shall be permitted for the latch side stop.
  2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2016 California Building Code 11B-307.4.
- H. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2016 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2016 California Building Code Section 11B-303.2 & ~.3.

- I. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).
- J. Pairs of doors with independently-activated hardware both leaves: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2016 California Building Code Section 11B-703.4.2.
- K. Door and door hardware encroachment: when door is swung fully-open into means-of-egress path, the door may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2016 California Building Code, Section 1005.7.1.
  - 1. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height, per 2016 California Building Code, Section 1005.7.1 at Exception 1.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers: these will be considered; submit for review products with equivalent function and features of scheduled products.

ITEM:	MANUFACTURER:	ACCEPTABLE ALTERNATE:
Hinges	(IVE) Ives	Bommer
Continuous Hinges	(IVE) Ives	Select
Key System	(SCH) Schlage	School District Standard
Mechanical Locks	(SCH) Schlage	School District Standard
Electronic Locks	(SCE) Schlage Electronics	School District Standard
Exit Devices	(VON) Von Duprin	School District Standard
Closers	(LCN) LCN	School District Standard
Auto Flush Bolts	(IVE) Ives	DCI
Coordinators	(IVE) Ives	DCI
Silencers	(IVE) Ives	Rockwood, Trimco
Push & Pull Plates	(IVE) Ives	Rockwood, Trimco
Kickplates	(IVE) Ives	Rockwood, Trimco
Stops & Holders	(IVE) Ives	Rockwood, Trimco
Overhead Stops	(GLY) Glynn-Johnson	ABH
Thresholds	(ZER) Zero	NGP, Reese
Seals & Bottoms	(ZER) Zero	NGP, Reese

## 2.2 HINGING METHODS:

- A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.
- B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices; notify Architect of deviation from scheduled hardware.
- C. Conventional Hinges: Steel or stainless-steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
- D. Continuous Hinges:
  - 13. Pinned steel/stainless steel type: continuous stainless steel, 0.25-inch diameter stainless-steel hinge pin.
    - a) Use engineered application-specific wide-throw units as needed to provide maximum swing degree of swing; advise architect if required width exceeds 8 inches.

## 2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

- A. Mortise Locksets and Latchsets: as scheduled.
  - 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
  - 2. Universal lock case – 10 functions in one case.
  - 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
  - 4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
  - 5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.
    - a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
    - b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.
    - c) Levers rotate up or down for ease of use.
    - d) Vandalgard locks: locked lever freely rotates down while remaining securely locked. This feature prevents damage to internal lock components when subjected to excessive force.
  - 6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
  - 7. Turnpieces: accessible offset turn-lever design not requiring pinching or twisting motions to operate.
  - 8. Deadbolts: stainless steel 1-inch throw.
  - 9. Electric operation: Manufacturer-installed continuous duty solenoid.
  - 10. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

11. Scheduled Lock Series and Design: Schlage L series, 06A design.
12. Certifications:
  - a) ANSI A156.13, 1994, Grade 1 Operational, Grade 1 Security.
  - b) ANSI/ASTM F476-84 Grade 31 UL Listed.
13. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2016 11B-404.2.7 and 11B-309.4.
14. Accepted substitutions: None. School District Standard.

## 2.4 EXIT DEVICES / PANIC HARDWARE

### A. General features:

1. Independent lab-tested 1,000,000 cycles.
2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
3. Deadlocking latchbolts, 0.75 inch projection.
4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
5. No exposed screws to show through glass doors.
6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
7. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.
8. Exterior doors scheduled with XP-series devices: Static load force resistance of at least 2000 pounds.
9. Accessibility: Require not more than 5 lb to retract the latchbolt, per CBC 2016 11B-404.2.7 and 11B-309.4.
  - a) Mechanical method: Von Duprin "AX-" feature, where touchpad directly retracts the latchbolt with 5 lb or less of force. Provide testing lab certification confirming that the mechanical device is independent third-party tested to meet this 5 lb requirement.
  - b) Electrical method: Von Duprin's "RX-QEL-", where lightly pressing the touchpad with 5 lb or less of force closes an electric switch, activating quiet electric latch retraction.

### B. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.
2. Lever Trim: breakaway type, forged brass or bronze escutcheon min. 0.130 inch thickness, compression spring drive, match lockset lever design.
3. Fire-Labeled Devices: UL label indicating "Fire Exit Hardware". Vertical rod devices less bottom rod (LBR) unless otherwise scheduled.
4. Electrically Operated Devices: Single manufacturer source for electric latch retraction devices, electrically controlled trim, power transfers, power supplies, monitoring switches and controls.
5. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

6. Accepted substitutions: None. School District Standard.

## 2.6 CLOSERS

### A. Surface Closers:

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized and adjustable. Place closers inside building, stairs and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Advanced Variable Backcheck (AVB): where scheduled, these units commence backcheck at approximately 45 degrees.
7. Adjustable to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per California Building Code, Section 1133B.2.5 and 1008.1.3, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
8. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2016 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
  - a) Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leaves or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.
9. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
10. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units. EDA arms: rigid main and forearm, reinforced elbow.
11. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
12. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
13. Non-flaming fluid, will not fuel door or floor covering fires.
14. Pressure Relief Valves (PRV) not permitted.
15. Accepted substitutions: None. School District Standard.

## 2.7 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design.
- B. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

- C. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- D. Door Stops: Provide stops to protect walls, casework or other hardware.
  - 1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
  - 2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.
- E. Thresholds: As scheduled and per details. Comply with CBC 2016 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
  - 1. Saddle thresholds: 0.125 inches minimum thickness.
  - 2. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25 inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. Zero International's #226, National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL".
  - 3. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, include a 0.25in high 5in wide saddle in the bid, and request direction from Architect.
  - 4. Fire-rated openings, 3-hour duration: Thresholds, where scheduled, to extend full jamb depth.
  - 5. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.
  - 6. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
  - 7. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full-thread. Sleeve nuts: full length to prevent door compression.
- F. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
  - 1. Exception: surface-mounted overhead stops, holders, and friction stays.
- G. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent: door bears against silencers, seals make minimal contact with minimal compression – only enough to effect a seal.

- H. Where gate closers are required. Gate hinges shall provide "positive Force" for closing gates as required.
- I. Where FIRE/LIFE WALL MAG hold opens are required. Contractor is required to provide additional wall backing to secure the WALL MAG fastened due to excessive door force.

## 2.8 FINISH:

- A. Generally: BHMA 626 Satin Chromium.
  - 1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

## 2.9 KEYING REQUIREMENTS:

- A. Key System: Schlage keyway, interchangeable core. For estimate use factory GMK charge. Initiate and conduct meeting(s) with Owner and Supplier representatives to determine system requirements and keybow styles. Furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Owner will receive permanent cores. Contractor will install permanent cores.
- B. Keys
  - 1. Existing factory registered master key system.
  - 2. Construction keying: furnish temporary keyed-alike cores. Remove at substantial completion and install permanent cores in Owner's presence. Demonstrate that construction key no longer operates.
  - 3. Furnish 10 construction keys.

Furnish 2 construction control keys.

- C. Key Cylinders: furnish 6-pin solid brass construction.
- D. Cylinder cores: furnish keyed at factory of lock manufacturer where permanent records are maintained. Locks and cylinders same manufacturer.
- E. Permanent keys: use secured shipment direct from point of origination to Owner.
  - 1. For estimate: 3 keys per change combination, 5 master keys per group, 5 grand-master keys, 3 control keys.
  - 2. For estimate: VKC stamping plus "DO NOT DUPLICATE".
- F. Bitting List: use secured shipment direct from point of origination to Owner upon completion.



## PART 3 - EXECUTION

### 3.1 ACCEPTABLE INSTALLERS:

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

### 3.2 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- A. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
  - 1. Notify Architect of code conflicts before ordering material.
  - 1. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.
  - 2. Locate panic hardware between 36 inches to 44 inches above the finished floor.
  - 3. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.
- B. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

### 3.3 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
  - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
  - 2. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.
  - 3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.
  - 4. Replace fasteners damaged by power-driven tools.

- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.
- C. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.
- D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.
- E. Drill pilot holes for fasteners in wood doors and/or frames.
- F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

### 3.4. ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
  - 1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
  - 2. Adjust doors to fully latch with no more than 1 pound of pressure.
    - a) Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.
  - 3. Adjust delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.
  - 4. Adjust door closers per 1.9 this section.
- B. Inspection of fire door assemblies and means-of-egress panic-hardware doors: Per 2016 NFPA-80 5.2.1: hire an independent third-party inspection service to prepare a report listing these doors, and include a statement that there are zero deficiencies with the fire-rated assemblies and the openings with panic hardware.
- C. Fire-rated doors:
  - 1. Wood doors: adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.
  - 2. Steel doors: adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.
  - 3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.
- D. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:
  - 1. Has re-adjusted hardware.
  - 2. Has evaluated maintenance procedures and recommend changes or additions, and instructed Owner's personnel.
  - 3. Has identified items that have deteriorated or failed.
  - 4. Has submitted written report identifying problems.

3.5 DEMONSTRATION:

- A. Demonstrate mechanical hardware and electrical, electronic and pneumatic hardware systems, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE

- A. See door schedule in drawings for hardware set assignments.
- B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.
- C. Manufacturers and their abbreviations used in this schedule:

GLY	Glynn-Johnson Hardware	TRM	Trimco
HAG	Hager Hinge	IVE	H.B. Ives
LCN	LCN Closers	MAR	Markar
PEM	Pemko	LOX	Locinox

HEADING 01  
( NO LONGER BEING USED )

HEADING 02

1	SGL	Door 120B	EXTERIOR / TEACHER WORKROOM
1	SGL	Door 121A	PATIO / TEACHER LOUNGE
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS X ETAP (EL12)	630	MAR
1	EA	PANIC HARDWARE	RX LD-PA-AX-99-EO	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-300-993R-50-MT-RHO-J 12/24 VDC	626	SCE
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	CONST. CORE	23-030 ICX		SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	1209	BLK	TRI
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

MOUNT HEAD SEAL BEFORE CLOSER ARM.

HEADING 03

1	SGL	Door 206A	EXTERIOR / STORAGE
1	SGL	Door 311	EXTERIOR / JAN.
1	SGL	Door 312	EXTERIOR / FIRE RISER
1	SGL	Door 313	EXTERIOR / PLAYGROUND EQUIP. STORAGE
1	SGL	Door 401	EXTERIOR / FIRE RISER
1	SGL	Door 416	EXTERIOR / MACHINE ROOM
1	SGL	Door 506	EXTERIOR / MACHINE ROOM
1	SGL	Door 510	EXTERIOR / FIRE RISER
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS	630	MAR
1	EA	STOREROOM LOCK	L9080T LLL 06A L283-150	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

HEADING 04

1	SGL	Door 122	EXTERIOR / MEN
1	SGL	Door 123	EXTERIOR / WOMEN
1	SGL	Door 406B	EXTERIOR / BOYS RESTROOM
1	SGL	Door 407B	EXTERIOR / GIRLS RESTROOM
1	SGL	Door 508B	EXTERIOR / BOYS RESTROOM
1	SGL	Door 509B	EXTERIOR / GIRLS RESTROOM
1	SGL	Door 515B	EXTERIOR / BOYS RESTROOM
1	SGL	Door 516B	EXTERIOR / GIRLS RESTROOM

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	CLASSROOM HOLDBK	L9463 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	1209HO	630	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

HEADING 05

1 PR Door 101 EXTERIOR / LOBBY / WAITING AREA  
72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP x SEC STUDS X ETAP (E-12)	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	ELEC PANIC HARDWARE	RX2-PA-AX-99-EO QEL	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	272	A	ZER
6	EA	WIRE HARNESS	CON-(LENGTH AS REQUIRED)		SCH
1	EA	MULTITECH READER	MT15 12 VDC	BLK	SCE
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902/9002RS/900BBK Battery back up kit		VON
1	EA	MULLION SEAL	8780 NBK PSA	BLK	ZER

ONE SIDE OF RX-2 SWITCH USED WHEN TOUCHBAR IS DEPRESSED IT ELECTRONICALLY RETRACTS LATCHBOLT TO MEET 5LBS RELEASING FORCE REQUIRED BY CODE.

CARD READER AND WIRING BY SECURITY CONTRACTOR.

DOOR CONTACT(S) AND WIRING BY SECURITY CONTRACTOR.

REFER TO SPECIFICATION 16215 REGARDING LOCK DOWN SWITCH.

HEADING 06

1	SGL	Door 118	EXTERIOR / FIRE RISER
1	SGL	Door 119	EXTERIOR / JAN.
1	SGL	Door 125	EXTERIOR / I.T.
1	SGL	Door 308	EXTERIOR / DATA / ELECT. RM.
1	SGL	Door 321	EXTERIOR / ELECT. RM.

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS	630	MAR
1	EA	STOREROOM LOCK	L9080T LLL 06A L283-150	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900 LLP	630	IVE
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	110AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

HEADING 07

( NO LONGER BEING USED )

HEADING 08

1	SGL	Door 302	EXTERIOR / STAFF UNISEX
1	SGL	Door 402	EXTERIOR / STAFF UNISEX
1	SGL	Door 511	EXTERIOR / STAFF UNISEX

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	FACULTY RESTROOM	L9485T 06A L283-711	626	SCH
1	EA	PERMANENT CORE	30-120	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	110AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

HEADING 09

( NO LONGER BEING USED )

HEADING 10  
( NO LONGER BEING USED )

HEADING 11

1	SGL	Door 315	EXTERIOR / UNISEX
1	SGL	Door 317	EXTERIOR / UNISEX
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS	630	MAR
1	EA	CORRIDOR LOCK	L9456T 06A L583-363 L283-722	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	110AA	AA	ZER
1	EA	THRESHOLD	2749	A	ZER

HEADING 12

1	PR	Door 206B	EXTERIOR / STORAGE
1	PR	Door 207D	EXTERIOR / KITCHEN/SERVING
1	PR	Door 501A	EXTERIOR / STORAGE
72.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP x SEC STUDS x ETAP (E-12)	630	MAR
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	STOREROOM LOCK	L9080T LLL 06A L283-150	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900	630	IVE
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	FLOOR STOP	1209 HO	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
2	EA	ASTRAGAL	55/155AA	AA	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM



HEADING 13

1	SGL	Door 301A	EXTERIOR / CLASSROOM
1	SGL	Door 301B	EXTERIOR / CLASSROOM
1	SGL	Door 306A	EXTERIOR / CLASSROOM
1	SGL	Door 306B	EXTERIOR / CLASSROOM
1	SGL	Door 307A	EXTERIOR / CLASSROOM
1	SGL	Door 307B	EXTERIOR / CLASSROOM
1	SGL	Door 314A	EXTERIOR / CLASSROOM
1	SGL	Door 314B	EXTERIOR / CLASSROOM
1	SGL	Door 320A	EXTERIOR / CLASSROOM
1	SGL	Door 320B	EXTERIOR / CLASSROOM
1	SGL	Door 404B	EXTERIOR / SECOND GRADE
1	SGL	Door 405B	EXTERIOR / SECOND GRADE
1	SGL	Door 408B	EXTERIOR / FIRE RISER
1	SGL	Door 409B	EXTERIOR / FIRST GRADE
1	SGL	Door 411B	EXTERIOR / FIRST GRADE
1	SGL	Door 412B	EXTERIOR / FIRST GRADE
1	SGL	Door 417B	EXTERIOR / SECOND GRADE
1	SGL	Door 418B	EXTERIOR / SECOND GRADE
1	SGL	Door 502B	EXTERIOR / INNOVATION LAB
1	SGL	Door 507B	EXTERIOR / SIXTH GRADE
1	SGL	Door 513B	EXTERIOR / SIXTH GRADE
1	SGL	Door 514B	EXTERIOR / SIXTH GRADE
1	SGL	Door 517B	EXTERIOR / GIRLS LOCKER
1	SGL	Door 518A	EXTERIOR / BOYS RESTROOM

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS	630	MAR
1	EA	PANIC HARDWARE	CDSI-PA-AX-99	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	MORTISE CYLINDER	26-091 ICX XQ11-948 (DOGGING)	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM

HEADING 14

1	SGL	Door 517A	EXTERIOR / GIRLS LOCKER
1	SGL	Door 518B	EXTERIOR / BOYS RESTROOM
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	MORTISE CYLINDER	26-091 ICX XQ11-948 (DOGGING)	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	DOOR STOP / HOLDER	1209 HO	BLK	TRI

HEADING 15

1	SGL	Door 205	EXTERIOR / DATA/ELECT.RM.
1	SGL	Door G16	EXTERIOR / TRASH ENCLOSURE
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	STOREROOM LOCK	L9080T LLL 06A L283-150	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	ZER

HEADING 16

( NO LONGER BEING USED )

HEADING 17

( NO LONGER BEING USED )

HEADING 18

( NO LONGER BEING USED )

HEADING 19  
( NO LONGER BEING USED )

HEADING 20  
( STAFF RESTROOMS )

1	SGL	Door 108	HALLWAY / UNISEX
1	SGL	Door 109	HALLWAY / UNISEX
1	SGL	Door 129	LIBRARY / UNISEX
1	SGL	Door 130	LIBRARY / UNISEX
1	SGL	Door 224	HALLWAY / UNISEX
1	SGL	Door 225	HALLWAY / UNISEX
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	PRIVACY LOCK	L9485T 06A L583-363-L283-722	626	SCH
1	EA	30-120 I/C CORE		626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 21

1	SGL	Door 102	LOBBY / WAITING AREA / TOILET
1	SGL	Door 106	HEALTH OFFICE / UNISEX
1	SGL	Door 305	CLASSROOM / UNISEX
1	SGL	Door 310	CLASSROOM / UNISEX
1	SGL	Door 316	CLASSROOM / UNISEX
1	SGL	Door 318	CLASSROOM / UNISEX
36.000 X 84.000 X 1.750 X HMD X HMF X --			
1	SGL	Door 303	CLASSROOM / UNISEX
36.000 X 84.000 X 1.750 X WD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	PRIVACY LOCK	L9040 06A L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 22

1	SGL	Door 115	HALLWAY / DATA/ELECT.RM.
1	SGL	Door 116	HALLWAY / SUPPLY RM.
1	SGL	Door 210	LOBBY / OFFICE / FIRE RISER
1	SGL	Door 213	LOBBY / MACHINE ROOM
1	SGL	Door 221	LOBBY / FIRE RISER
1	SGL	Door 222	HALLWAY / FIRE RISER
1	SGL	Door 403	HALLWAY / JANITOR
1	SGL	Door 410	HALLWAY / DATA / ELECT.
1	SGL	Door 420	HALLWAY / JANITOR / FIRE RISER
1	SGL	Door 432	HALLWAY / DATA / ELECT. RM.
1	SGL	Door 512	HALLWAY / JANITOR
1	SGL	Door 526	HALLWAY / JANITOR / FIRE RISER
1	SGL	Door 534	HALLWAY / DATA / ELECT. RM.
1	SGL	Door 552	HALLWAY / DATA / ELECT. RM.

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EPA	689	LCN
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 23

1	SGL	Door 208	LOBBY / GIRLS RESTROOM
1	SGL	Door 209	LOBBY / BOYS RESTROOM
1	SGL	Door 406A	HALLWAY / BOYS RESTROOM
1	SGL	Door 407A	HALLWAY / GIRLS RESTROOM
1	SGL	Door 428	HALLWAY / BOYS RESTROOM
1	SGL	Door 429	HALLWAY / GIRLS RESTROOM
1	SGL	Door 508A	HALLWAY / BOYS RESTROOM
1	SGL	Door 509A	HALLWAY / GIRLS RESTROOM
1	SGL	Door 515A	HALLWAY / BOYS RESTROOM
1	SGL	Door 516A	HALLWAY / GIRLS RESTROOM
1	SGL	Door 529	HALLWAY / BOYS RESTROOM
1	SGL	Door 530	HALLWAY / GIRLS RESTROOM

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	PUSH PLATE	8200 8" X 16"	630	IVE
1	EA	PULL PLATE	8303 10" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	PROTECTION PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	PROTECTION PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 24

1	SGL	Door 301C	CLASSROOM / CLASSROOM
1	SGL	Door 314C	CLASSROOM / CLASSROOM
1	SGL	Door 405C	SECOND GRADE / SECOND GRADE
1	SGL	Door 408C	FIRST GRADE / FIRST GRADE
1	SGL	Door 412C	FIRST GRADE / FIRST GRADE
1	SGL	Door 417C	SECOND GRADE / SECOND GRADE
1	SGL	Door 431A	THIRD GRADE / THIRD GRADE
1	SGL	Door 433A	THIRD GRADE / THIRD GRADE
1	SGL	Door 513D	SIXTH GRADE / SIXTH GRADE
1	SGL	Door 519B	FOURTH GRADE / FOURTH GRADE
1	SGL	Door 525B	FIFTH GRADE / FIFTH GRADE
1	SGL	Door 527B	FIFTH GRADE / SPECIAL ED
1	SGL	Door 533B	SPANISH / FOURTH GRADE

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	INSTITUTION LOCK	L9082T 06A	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE

HEADING 25

1	PR	Door 220A	HALLWAY / STAIR
1	PR	Door 450	HALLWAY / STAIR
1	PR	Door 453	HALLWAY / STAIR
1	PR	Door 454	HALLWAY / STAIR
1	PR	Door 455	HALLWAY / STAIR
1	PR	Door 550A	HALLWAY / STAIR
1	PR	Door 550B	HALLWAY / STAIR
1	PR	Door 552A	HALLWAY / STAIR
1	PR	Door 552B	HALLWAY / STAIR

72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	PANIC HARDWARE	PA-AX-99-L-BE-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	SILENCER	SR64	GRY	IVE

HEADING 26

1	SGL	Door 413	HALLWAY / STAFF UNISEX
1	SGL	Door 414	HALLWAY / STAFF UNISEX
1	SGL	Door 436	HALLWAY / STAFF UNISEX
1	SGL	Door 437	HALLWAY / STAFF UNISEX
1	SGL	Door 521	HALLWAY / STAFF UNISEX
1	SGL	Door 522	HALLWAY / STAFF UNISEX

36.000 X 84.000 X 1.750 X HMD X HMF X --

1	SGL	Door 503	HALLWAY / STAFF UNISEX
1	SGL	Door 504	HALLWAY / STAFF UNISEX

36.000 X 84.000 X 1.750 X WD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	FACULTY RESTROOM	L9485T 06A L583-363 L283-722	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 27  
( NO LONGER BEING USED )

HEADING 28

1	SGL	Door 304A	CLASSROOM / WORK RM.
		36.000 X 84.000 X 1.750 X WD X HMF X --	
1	SGL	Door 304B	CLASSROOM / WORK RM.
1	SGL	Door 319A	CLASSROOM / WORK RM.
1	SGL	Door 319B	CLASSROOM / WORK RM.
		36.000 X 84.000 X 1.750 X HMD X HMF X --	

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	EA	CLASSROOM SECURITY	L9071T 06A L283-711	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 29

1	PR	Door 204A	MULTIPURPOSE ROOM / STORAGE
1	PR	Door 204B	MULTIPURPOSE ROOM / STORAGE
1	PR	Door 227	BAND/ORCHESTRA / STORAGE
1	PR	Door 229	CHORUS / STORAGE
		72.000 X 84.000 X 1.750 X HMD X HMF X --	

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP X	630	MAR
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP1/DP2 AS REQUIRED	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
2	EA	ASTRAGAL	55/155AA	AA	ZER
2	EA	SILENCER	SR64	GRY	IVE
2	EA	DOOR STOP / HOLDER	1209HO	BLK	TRI



HEADING 30  
( HALF DOOR )

1	SGL	Door 103A	LOBBY / WAITING AREA / RECEPTION OPEN WORK AREA
1	SGL	Door 103B	HALLWAY / RECEPTION OPEN WORK AREA
1	SGL	Door 128	LIBRARY / CIRCULATION DESK
1	SGL	Door 217A	KITCHEN / SERVING
1	SGL	Door 217B	KITCHEN / SERVING

36.000 X 34.000 X 1.750 X WD X HMF X --

Each Assembly to have:

1	EA	HINGE-CLOSURE\	TIGER		LOX
1	EA	HINGE	PUMA		LOX
1	EA	PASSAGE SET	ND10 L9010 06A	626	SCH
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HEADING 31

1	SGL	Door 104	RECEPTION OPEN WORK AREA / RECORD / FILES
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36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X ETAP EL12	630	MAR
1	EA	ELEC OFFICE LOCK	AD-300-MS-50-MT-RHO-J 12/24 VDC	626	SCE
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	CONST. CORE	23-030 ICX		SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

ELEC LOCK TO BE PROVIDED BY DIV. 16.

ELEC LOCK LISTED FOR TEMPLATING PURPOSES ONLY.

HEADING 32

1	SGL	Door 309	CLASSROOM / WORK RM.
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36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	IVE
1	EA	CLASSROOM SECURITY	L9071T 06A L283-711	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 33

1 SGL Door 127 CIRCULATION DESK / WORKROOM  
36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	CLASSROOM SECURITY	L9071T 06A L283-711	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 34

1 PR Door 201A LOBBY / MULTIPURPOSE ROOM  
1 PR Door 201D STAIR / MULTIPURPOSE  
72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-L-DT-06	626	VON
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-L-NL-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
4	EA	PERMANENT CORE	23-030	626	SCH
2	EA	MORTISE CYLINDER	26-091 ICX XQ11-948 (DOGGING)	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	SILENCER	SR64	GRY	IVE

HEADING 35

1 SGL Door 215 KITCHEN/SERVING / RESTROOM  
36.000 X 84.000 X 1.750 X HMF X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	PRIVACY LOCK	L9040 06A L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 36

( NO LONGER BEING USED )

HEADING 37  
( RATED DOOR WITH HOLD OPEN DEVICE )

1 SGL Door 207C KITCHEN/SERVING / MPR  
36.000 X 84.000 X 1.750 X HMF X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	CLASSROOM LOCK	L9071T 06A	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV AS REQ'D	630	IVE
1	EA	GASKETING	488SBK PSA	BK	ZER
4	EA	SILENCER	SR64	GRY	IVE
1	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES	689	LCN

HEADING 38  
( NO LONGER BEING USED )

HEADING 39

1 SGL Door 216 RESTROOM / JANITOR  
36.000 X 84.000 X 1.750 X HMF X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP	630	MAR
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
3	EA	SILENCER	SR64	GRY	IVE
1	EA	DOOR STOP / HOLDER	1209HO	BLK	TRI

HEADING 40  
( GATES )

1	PR	Door G01	EXTERIOR / EXTERIOR
		96.000 X 96.000 X 1.750 X MTL X MTL X --	
1	PR	Door G03	EXTERIOR / EXTERIOR
		96.000 X 96.000 X 1.750 X CLG X CLF X --	
1	PR	Door G04	EXTERIOR / EXTERIOR
		96.000 X 96.000 X 1.750 X UNK X UNK X --	

Each Assembly to have:

2	EA	HINGE	DINO-		LOX
2	EA	HINGE-CLOSURE	MAMMOTH180-		LOX
2	EA	PANIC HARDWARE	CDSI LD-PA-AX-99-L-2SI-06-WH	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PRIMUS CORE	22-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	DOOR PULL	VR910 DT	630	IVE

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.  
PROVIDE REINFORCEMENT AND MOUNTING PLATES FOR DOOR HARDWARE.

HEADING 41  
( GATES )

1	SGL	Door G10	EXTERIOR / EXTERIOR
1	SGL	Door G11	EXTERIOR / EXTERIOR
		36.000 X 72.000 X 1.750 X CLG X CLF X --	

Each Assembly to have:

2	EA	HINGE	DINO-		LOX
2	EA	HINGE-CLOSURE	MAMMOTH180-		LOX
1	EA	PANIC HARDWARE	CDSI LD-PA-AX-99-L-2SI-06-WH	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	FLOOR STOP	1209 HOHA	BLK	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	DOOR PULL	VR910 DT	630	IVE

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.  
PROVIDE REINFORCEMENT AND MOUNTING PLATES FOR DOOR HARDWARE.

HEADING 42  
( GATES )

1	PR	Door G05	EXTERIOR / EXTERIOR
		144.000 X 72.000 X 1.750 X CLG X CLF X --	
1	PR	Door G07	EXTERIOR / EXTERIOR
		144.000 X 72.000 X 1.750 X UNK X UNK X --	

Each Assembly to have:

2	EA	CANE BOLT - LOCKABLE	0524.00021 x 0524.00024		RIC
2	EA	PADLOCK L/CYL-FSIC	KS43F3200	606	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.  
VERIFY IF EXISTING GATES ARE OPERABLE, REPLACE IF REQUIRED.

HEADING 43  
( GATES )

1	PR	Door G12	EXTERIOR / EXTERIOR
1	PR	Door G13	EXTERIOR / EXTERIOR
		96.000 X 96.000 X 1.750 X MTL X MTL X --	

Each Assembly to have:

1	EA	HINGE	DINO-		LOX
1	EA	HINGE-CLOSURE	MAMMOTH180-		LOX
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL-OP110MD-WH	626	VON
3	EA	PERMANENT CORE	23-030	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
3	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	DOOR PULL	VR910 DT	630	IVE

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.  
PROVIDE REINFORCEMENT AND MOUNTING PLATES FOR DOOR HARDWARE.

HEADING 44

1	SGL	Door G06	EXTERIOR / EXTERIOR
1	SGL	Door G08	EXTERIOR / EXTERIOR
1	SGL	Door G18	EXTERIOR / EXTERIOR
		36.000 X 72.000 X 1.750 X CLG X CLF X --	

Each Assembly to have:

1	EA	PADLOCK L/CYL-FSIC	KS43F3200	606	SCH
1	EA	PERMANENT CORE	23-030	626	SCH

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.

HEADING 45  
( GATES )

1	PR	Door G15	EXTERIOR / TRASH ENCLOSURE
1	PR	Door G17	EXTERIOR / TRASH ENCLOSURE
120.000 X 84.000 X 1.750 X MTL X MTL X --			

Each Assembly to have:

1	EA	CANE BOLT - LOCKABLE	0524.00021 x 0524.00024		RIC
1	EA	PADLOCK L/CYL-FSIC	KS43F3200	606	SCH
1	EA	PERMANENT CORE	23-030	626	SCH

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.

HEADING 46  
( PATIO GATE )

1	SGL	Door 124	EXTERIOR / PATIO
36.000 X 72.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	HINGE / CLOSURE	TIGER		LOX
1	EA	HINGE	PUMA		LOX
1	EA	PASSAGE SET	ND10 L9010 06A	626	SCH
1	EA	WELDABLE GATEBOX	K-BXMOR1		KEE

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.

HEADING 47  
( GATE )

1	SGL	Door G02	EXTERIOR / EXTERIOR
48.000 X 96.000 X 1.750 X MTL X MTL X --			

Each Assembly to have:

1	EA	HINGE	DINO-		LOX
1	EA	HINGE-CLOSURE	MAMMOTH180-		LOX
1	EA	PANIC HARDWARE	CDSI-PA-AX-99-NL-OP-110MD-WH	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 (DOGGING)	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE

BALANCE OF HARDWARE PROVIDED BY GATE MANUFACTURER.

PROVIDE REINFORCEMENT AND MOUNTING PLATES FOR DOOR HARDWARE.

HEADING 48  
( CARD READER ACCESS DOORS )

1	SGL	Door 100	EXTERIOR / RECEPTION OPEN WORK AREA
1	SGL	Door 133	EXTERIOR / HALLWAY
1	SGL	Door 134A	EXTERIOR / HALLWAY
1	SGL	Door 134B	EXTERIOR / HALLWAY
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300 WEP X SEC STUDS X ETAP (EL-EPTL)	630	MAR
1	EA	POWER TRANSFER	EL-EPTL		MCK
1	EA	PANIC HARDWARE	RX LD-PA-AX-99-EO	626	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-300-993R-70-MT-RHO-J 12/24 VDC	626	SCE
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	CONST. CORE	23-030 ICX		SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	ZER

ELEC EXIT DEVICE TRIM TO BE PROVIDED BY DIV. 28.  
ELEC EXIT DEVICE TRIM LISTED FOR TEMPLATING PURPOSES ONLY.  
INCLUDE SECURITY ACCESS SWITCH/BUTTON AT ADMINISTRATION BUILDING  
RECEPTION DESK FOR DOOR #100.

HEADING 49  
( CARD READER ACCESS DOORS )

1	PR	Door 131	EXTERIOR / LIBRARY
1	PR	Door 132	EXTERIOR / LIBRARY
1	PR	Door 201B	EXTERIOR / MULTIPURPOSE ROOM
1	PR	Door 451A	EXTERIOR / HALLWAY
1	PR	Door 451B	EXTERIOR / HALLWAY
1	PR	Door 452	EXTERIOR / LOBBY
1	PR	Door 551A	EXTERIOR / HALLWAY
1	PR	Door 551B	EXTERIOR / HALLWAY
1	PR	Door 551C	EXTERIOR / HALLWAY

72.000 X 84.000 X 1.750 X A/G X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP X SEC STUDS X ETAP (EL-12)	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	ELEC PANIC HARDWARE	LD-RX-PA-AX-99-EO	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-300-993R-70-MT-RHO-J 12/24 VDC	626	SCE
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	CONST. CORE	23-030 ICX		SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA (AS REQ'D.)	689	LCN
2	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	2749	A	PEM
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	AD300	993DT RHO	626	JD

MOUNT HEAD SEAL BEFORE CLOSER ARM.

RETRACTS LATCHBOLT TO MEET 5 LBS RELEASING FORCE REQUIRED BY CODE.

CARD READER AND WIRING BY SECURITY CONTRACTOR.

DOOR CONTACT(S) AND WIRING BY SECURITY CONTRACTOR.



HEADING 50

1	PR	Door 203	EXTERIOR / STAIR
1	PR	Door 211	EXTERIOR / LOBBY
1	PR	Door 214	EXTERIOR / STAIR

72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP X SEC STUDS X ETAP (EL-12)	630	MAR
2	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	ELEC PANIC HARDWARE	LD-RX-PA-AX-99-EO	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	ELEC EXIT DEVICE TRIM	AD-300-993R-70-MT-RHO-J 12/24 VDC	626	SCE
1	EA	AD300	993DT RHO	626	JD
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	CONST. CORE	23-030 ICX		SCH
1	EA	CONST. CORE	23-030 ICX		SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	1209	BLK	TRI
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

ONE SIDE OF RX-2 SWITCH USED WHEN TOUCHBAR IS DEPRESSED IT ELECTRONICALLY RETRACTS LATCHBOLT TO MEET 5LBS RELEASING FORCE REQUIRED BY CODE.

CARD READER AND WIRING BY SECURITY CONTRACTOR.

DOOR CONTACT(S) AND WIRING BY SECURITY CONTRACTOR.

HEADING 51  
( PAIR OF DOORS ON HOLD OPEN DEVICE )

1	PR	Door 207A	EXTERIOR / KITCHEN/SERVING
1	PR	Door 207B	EXTERIOR / KITCHEN/SERVING

72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	PANIC HARDWARE	CDSI-PA-AX-98-EO	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
2	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 (DOGGING)	626	SCH
4	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FIRE/LIFE WALL MAG	SEM7800 SERIES	689	LCN
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
2	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER

MOUNT HEAD SEAL BEFORE CLOSER ARM.

HEADING 52  
( ACOUSTICAL DOOR - STC 50 )

5	SGL	Door 228A	HALLWAY / CHORUS
5	SGL	Door 228B	HALLWAY / CHORUS
5	SGL	Door 438	HALLWAY / MUSIC ROOM

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CLASSROOM SECURITY	L9071T 06A	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	THRESHOLD	164A-223	A	ZER

HINGES AND SEALS BY DOOR AND FRAME MANUFACTURER AS TESTED.

PEMCO GASKET 350-SR & DOOR BOTTOM 434-RL OR DOOR MANUFACTURER EQUAL.

HEADING 53

1	SGL	Door 404A	HALLWAY / SECOND GRADE
1	SGL	Door 405A	HALLWAY / SECOND GRADE
1	SGL	Door 408A	HALLWAY / FIRST GRADE
1	SGL	Door 409A	HALLWAY / FIRST GRADE
1	SGL	Door 411A	HALLWAY / FIRST GRADE
1	SGL	Door 412A	HALLWAY / FIRST GRADE
1	SGL	Door 417A	HALLWAY / SECOND GRADE
1	SGL	Door 418A	HALLWAY / SECOND GRADE
1	SGL	Door 421	HALLWAY / I.B.
1	SGL	Door 430	HALLWAY / THIRD GRADE
1	SGL	Door 431	HALLWAY / THIRD GRADE
1	SGL	Door 433	HALLWAY / THIRD GRADE
1	SGL	Door 434	HALLWAY / THIRD GRADE
1	SGL	Door 502A	HALLWAY / INNOVATION LAB
1	SGL	Door 507A	HALLWAY / SIXTH GRADE
1	SGL	Door 513A	HALLWAY / SIXTH GRADE
1	SGL	Door 514A	HALLWAY / SIXTH GRADE
1	SGL	Door 519	HALLWAY / FOURTH GRADE
1	SGL	Door 520	HALLWAY / FOURTH GRADE
1	SGL	Door 524	HALLWAY / FIFTH GRADE
1	SGL	Door 525A	HALLWAY / FIFTH GRADE
1	SGL	Door 527A	HALLWAY / FIFTH GRADE
1	SGL	Door 528	HALLWAY / SPECIAL ED
1	SGL	Door 531	HALLWAY / SPANISH
1	SGL	Door 533A	HALLWAY / FOURTH GRADE
1	SGL	Door 540	HALLWAY / OFFICE
1	SGL	Door 541	HALLWAY / OFFICE

36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300	630	MAR
1	EA	CLASSROOM SECURITY	L9071T 06A	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 54  
( NO LONGER BEING USED )

HEADING 55  
( STORE FRONT SYSTEM )

1 PR Door 201C EXTERIOR / MULTIPURPOSE ROOM  
72.000 X 84.000 X 1.750 X A/G X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300 WEP X-SEC	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	PANIC HARDWARE	CDSI-PA-AX-99-EO	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
2	EA	MORTISE CYLINDER	20-061 ICX XQ11-948 (DOGGING)	626	SCH
4	EA	PERMANENT CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	PA MOUNTING PLATE	4040XP-18PA (AS REQ'D.)	689	LCN
2	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER
1	EA	THRESHOLD	164A-223	A	ZER
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	DOOR PULL	VR910 DT	630	IVE

HEADING 56

1 SGL Door 107A HALLWAY / HEALTH OFFICE  
1 SGL Door 107B LOBBY / WAITING AREA / HEALTH OFFICE  
1 SGL Door 120A HALLWAY / TEACHER WORKROOM  
1 SGL Door 121B HALLWAY / TEACHER LOUNGE  
1 SGL Door 439 HALLWAY / STAFF  
1 SGL Door 440 HALLWAY / RSP  
36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	CONT. HINGE	FM300	630	MAR
1	EA	OFFICE/ENTRY LOCK	L9050T 06A L583-363	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 57

1	SGL	Door 105	RECEPTION OPEN WORK AREA / OFFICE MANAGER
1	SGL	Door 110	HALLWAY / COMMUNITY ROOM
1	SGL	Door 111B	HALLWAY / ASSISTANT PRINCIPAL
1	SGL	Door 112	HALLWAY / COUNSELOR OFFICE
1	SGL	Door 113	HALLWAY / CONFERENCE
1	SGL	Door 114B	HALLWAY / PRINCIPAL
1	SGL	Door 117A	HALLWAY / CONFERENCE
1	SGL	Door 117B	HALLWAY / CONFERENCE
1	SGL	Door 422	HALLWAY / INTERVENTION
1	SGL	Door 423	HALLWAY / COACH
1	SGL	Door 424	HALLWAY / PSYCH
1	SGL	Door 425	HALLWAY / SPEECH
1	SGL	Door 426	HALLWAY / OFFICE
1	SGL	Door 427	HALLWAY / OFFICE
1	SGL	Door 540	HALLWAY / I.T. OFFICE
1	SGL	Door 541	HALLWAY / P.E. OFFICE
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300	630	MAR
1	EA	OFFICE/ENTRY LOCK	L9050T 06A L583-363 L283-711	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HEADING 58

1	SGL	Door 111A	EXTERIOR / ASSISTANT PRINCIPAL
1	SGL	Door 114A	EXTERIOR / PRINCIPAL
36.000 X 84.000 X 1.750 X HMD X HMF X --			

Each Assembly to have:

1	EA	CONT. HINGE	FM300	630	MAR
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	110AA	AA	ZER
1	EA	THRESHOLD	2749	A	ZER

HEADING 59  
( NO LONGER BEING USED )

HEADING 60

1 PR Door 220B STAIR / HALLWAY  
72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

2	EA	CONT. HINGE	FM300	630	MAR
1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
2	EA	PANIC HARDWARE	PA-AX-99-L-BE-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
1	EA	MORTISE CYLINDER	20-061-ICX (MULLION)	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	SET	ADJ. JAMB WEATHERSTRIP	350CSR (@ HEAD & JAMBS)	AL	PEM
1	EA	MULLION SEAL	8780NBK PSA	BK	ZER

HEADING 61

( ACOUSTICAL DOOR – STC 50 )

5 SGL Door 226A HALLWAY / BAND/ORCHESTRA  
36.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	PANIC HARDWARE	LD-PA-AX-99-L-2SI-06	626	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
2	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	THRESHOLD	164A-223	A	ZER

HINGES AND SEALS BY DOOR AND FRAME MANUFACTURER AS TESTED.

PEMCO GASKET 350-SR & DOOR BOTTOM 434-RL OR DOOR MANUFACTURER EQUAL.

HEADING 62  
( ACOUSTICAL DOORS – STC 50 )

5 PR Door 226B HALLWAY / BAND/ORCHESTRA  
72.000 X 84.000 X 1.750 X HMD X HMF X --

Each Assembly to have:

1	EA	REMOVABLE MULLION	KR4954 STAB	689	VON
1	EA	PANIC HARDWARE	LD-PA-AX-98-EO	626	VON
1	EA	PANIC HARDWARE	LD-PA-AX-99-L-2SI-06	626	VON
1	EA	MULLION STORAGE KIT	MT54	689	VON
2	EA	RIM CYLINDER	20-057 ICX	626	SCH
3	EA	PERMANENT CORE	23-030	626	SCH
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
2	EA	FLOOR STOP	FS436/438 AS REQ'D	626	IVE
1	EA	THRESHOLD	164A-223	A	ZER

HINGES AND SEALS BY DOOR AND FRAME MANUFACTURER AS TESTED.

PEMKO GASKET 350-SR & DOOR BOTTOM 434-RL OR DOOR MANUFACTURER EQUAL.

HEADING 63  
( NO LONGER BEING USED )

HEADING ALT24

Each Assembly to have:

1	EA	STOREROOM LOCK	L9080T LLL 06A 626 L283-150	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR900	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA SRI TBSRT	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA SRI (AS REQUIRED)	689	LCN
1	EA	PA FLUSHTRANSOM BRKT	4040XP-419 SRI (AS REQUIRED)	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	CYLINDER GUARD	K-24	630	KEE
1	EA	WELDABLE GATEBOX	K-BXMOR1		KEE

HEADING ALT25

Each Assembly to have:

1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	SURFACE CLOSER	4040XP EDA SRI TBSRT	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA SRI (AS REQUIRED)	689	LCN
1	EA	PA FLUSHTRANSOM BRKT	4040XP-419 SRI (AS REQUIRED)	689	LCN
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	WELDABLE GATEBOX	K-BXMOR1		KEE

HEADING MISC.

Each Assembly to have:

1	EA	WALL KEY CABINET	1205-B		LUN
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HEADING XROW027  
( NOT USED )

Each Assembly to have:

1	EA	CONT. HINGE	700 EPT	630	MAR
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	ELEC PANIC HARDWARE	RX2-PA-AX-99-EO	626	VON
1	EA	RIM CYLINDER	20-057 ICX	626	SCH
1	EA	PERMANENT CORE	23-030	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	FLOOR STOP	FS18L	BLK	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)	AA	ZER
1	EA	SET SEAL	429AA-S (@ HEAD & JAMBS)	AA	ZER
1	EA	DOOR SWEEP	8192AA	AA	ZER
1	EA	THRESHOLD	102A-NH-223	A	ZER
1	EA	CYLINDER GUARD RING	K-24A	626	KEE
1	EA	MULTITECH READER	MTK15 12 VDC	BLK	SCE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS902 900-4RL		VON

ONE SIDE OF RX-2 SWITCH USED WHEN TOUCHBAR IS DEPRESSED IT ELECTRONICALLY RETRACTS LATCHBOLT TO MEET 5LBS RELEASING FORCE REQUIRED BY CODE.

CARD READER AND WIRING BY SECURITY CONTRACTOR.

DOOR CONTACT(S) AND WIRING BY SECURITY CONTRACTOR.

END OF SCHEDULE



## SECTION 08800

### GLAZING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide glass and glazing, complete.

###### A. Work Specified in this Section:

1. Glass and glazing, shop glazed and field glazed.
2. Insulated panel.
3. Tempered glass
4. Wired glass
5. Replace existing glass which is damaged or broken during construction.

###### B. Related Work Specified Elsewhere:

1. Windows.
2. Framed entrance doors.
3. Hollow metal frames.
4. Framed mirrors in toilet rooms.

##### 1.02 QUALITY ASSURANCE:

- ###### A. Quality Standards:
- In addition to code, glass installations shall comply with ANSI Z97.1, as applicable and Federal Safety Standard 16 CFR 1201.

##### 1.03 SUBMITTALS:

- ###### A. Submit shop drawings showing details of each type glazing system indicating sizes, shapes, material and quantity. Show details indicating sealant thickness and profile, bite on glass, glass edge clearance, depth of rabbet and thickness of glass. Identify gasket materials, side spacer blocks and setting blocks. Show weepage system in glass pockets. Details shall be full size.
- ###### B. Product Data:
- Submit manufacturer's technical data on the following:
1. Glass except clear float and sheet.
  2. Glazing channels.
  3. Glazing beads and compounds.
  4. Glazing tape.
  5. Insulated metal panels.
- ###### C. Samples:
- Submit the following:

1. Glass, each type, not smaller than 12" by 12" with smooth edges. Submittals shall identify thickness and type of glass. For exterior glass, indicate on the label the maximum design wind load it can accommodate based upon the maximum sizes required for that glass type. At least one sample of glass shall bear required markings, such as tempered glass indicators, manufacturer's name, and code required marks. Show color match between tinted glass and tinted laminated glass with tinted laminating sheet.
2. Insulated metal panels: Color samples of each available exterior finish color. After selection, submit 12" square sample showing interior and exterior finish and colors.
3. Glazing channels, gaskets, spacers, setting blocks, each type.
4. Sealants: Two 4" long beads, 1/4" to 3/8" diameter. Provide each type and color required in the project. Identify areas of use.
5. Glazing tape: Two 12" long pieces.

D. Certificates:

1. Submit from manufacturer stating the quality, thickness and type of unlabeled glass delivered to the site for field cutting.
2. Provide certification that the glazing used conforms to the referenced standards.
3. Provide certification of applicator's qualifications.

1.04 DELIVERY, STORAGE AND HANDLING:

Deliver products to the site in unopened containers, labeled plainly with manufacturer's names and brands. Store glass and setting materials in safe, dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

1.05 JOB CONDITIONS:

Protect glazing until completion and final acceptance. Repair or replace damaged or defective glazing to the original specified condition, at no additional contract cost. Damaged or defective glazing includes glass that cannot be properly cleaned.

1.06 WARRANTY:

Furnish written warranties covering products and workmanship under this section as follows:

- A. Exterior glazing: Against loosening, air or water leakage, glass pop-outs and other defect for 5 years.
- B. Glazing gaskets and channels: Against defective material or deterioration including without limitation, shrinkage, loss of seal, exposure to ozone, elements, smog and other air pollution, and commercial glass cleaners for 5 years.

- C. Metal panels: 25 year guarantee against crazing, cracking and fading of exterior finish.

#### 1.07 EXTRA STOCK:

Provide extra material of each type glass equal to not less than one percent of amount used on the project. Provide gaskets, sealants, reglazing beads, and other setting materials in amounts required to install the extra stock. Sizes of extra glass material will be selected by the Architect from a list of all sizes of glass furnished for the project. List shall be compiled by the Contractor.

#### 1.08 WARRANTY:

In addition to warranty specified in Section 01740:

- A. Provide 10 year warranty on fluorocarbon paint finish.
- B. Provide 10 year warranty on laminated glass against delamination or degradation of appearance by bubbling or other defects.

### PART 2 – PRODUCTS

#### 2.01 GENERAL:

Glass furnished for the project shall match approved samples, be uniform in appearance, free from irregularities and differences in appearance with viewed from exterior as approved. Glass not complying with this requirement to be replaced with conforming glass without additional contract cost.

#### 2.02 ACCEPTABLE MANUFACTURERS AND FABRICATORS:

To maximum extent possible provide domestically manufactured and fabricated glass, and provide glass from one manufacturer. Specific types of glass specified or indicated shall be of manufacturers noted.

- A. Primary Glass Manufacturers:

Vitro Achitectural Glass  
400 Guys Run Road  
Pittsburgh, PA 15024  
(855) 887-6457, (855) VTRO-GLS

PPG Glass Technology  
One PPG Place, 31N  
Pittsburgh, PA 15272  
(415) 434-2858; (800) 377-5267  
FAX (412) 434-3675

Visteon Float Glass Operations  
17333 Federal Drive, Suite 230  
Allen Park, MI 48101

(310) 318-9211; (909)792-0126

Viracon  
800 Park Drive  
Owatonna, MN 55060  
(800) 533-2080  
www.viracon.com

B. Glass Fabricators:

Southwest Technologies  
1029 Corporation Way  
Palo Alto, CA 94303  
(800) 365-8974  
FAX (650) 967-0182

ACI Distribution  
10234 4<sup>th</sup> Street  
Rancho Cucamonga, CA 91730  
(800) 303-4224  
FAX (800) 694-4224

C. Glass fabricators:

TECHNICAL GLASS PRODUCTS  
FireLite NT – Fire Rated Safety Glass  
1-800-426-0279  
SNOQUALMIE, WA  
UL R13377

2.03 GLASS MATERIALS:

A. General: All glass shall be fully tempered.

1. Domestic manufacture, conforming to ASTM C1036 and ASTM C1048, as applicable, except total distortion tolerances in this section shall govern, and to ANSI Z97.1. Label factory cut panes and do not remove labels until directed. Do not cut unlabeled glass delivered to site as material for field cutting until approval of material is obtained.
2. Furnish glass with straight smooth-finished edges where edges remain exposed or are secured with structural silicone sealant.
3. Refer to drawings for insulated glass thicknesses and assemblies of glazing.

B. Tempered Glass (TG): Type I (transparent glass flat) Class 1 (clear), Quality q3, (glazing select) Kind FT, fully thermal tempered, heat strengthening is not acceptable. Perform tempering by horizontal oscillating roller hearth or high speed roller hearth process. Do not use processes making gripper or tong marks. Handle and size glass according to manufacturer's instructions.

- C. Tinted Tempered Glass: Type I, Class 2 (tinted heat absorbing and light reducing), quality q3, manufactured by Vitro, Solargray, 6 mm (1/4 inch) thick unless otherwise indicated, fully tempered as specified for clear glass.
- D. Obscure Glass (G5): Fabricate obscure glass using laminated glass process, but meets all requirements for exterior insulated glass thickness and assembly. Edges of laminated glass shall be treated with Ardis "500", or equal, edge protection to prevent contact of laminating sheet with sealants. Obscure glass shall be used at all restrooms.
- E. Fire Rated Safety Glass: FireLite NT glass is a 3/16" thick glazing material consisting of fire-rated glass with a surface applied fire – rated and impact-safety rated film. FireLite is listed and meets all building code requirements for use in doors, sidelites, transoms and borrowed lites. Provide sample for architects approval.

#### 2.04 INSULATED METAL PANELS:

Manufactured by Mapes Industries, Inc., P.O. Box 80069, 2929 Cornhusker Highway, Lincoln, NE 68504, (800) 228-2391, FAX (800) 737-6756. Panels shall be thickness as indicated. Exterior surface shall be aluminum with stucco embossed finish. Interior surface shall be aluminum. Both sides of panels shall be given fluorocarbon paint finish, custom colors.

#### 2.05 SETTING AND SEALING MATERIALS:

- A. Provide as specified in the GANA GM, SIGMA TM-3000, SIGMA TB-3001, and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted shall be gray or neutral color.
- B. Glazing Compound: ASTM C669. Use for face glazing metal sash.
- C. Elastomeric Sealant: ASTM C920, Type S or M, Grade NS, Class 12.5, Use G. Use for channel or stop glazing wood and metal sash. Sealant shall be chemically compatible with setting blocks, edge blocks, and sealing tapes. Color of sealant shall match frames.
- D. Preformed Channels: Neoprene, vinyl or rubber, as recommended by the glass manufacturer for the particular condition.
  - 1. Channels shall be chemically compatible with plastic sheet.
- E. Sealing Tapes: Preformed, semisolid, polymeric-based material of proper size and compressibility for the particular condition. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes shall be chemically compatible with the product being set.
- F. Setting Blocks and Edge Blocks: Neoprene of 70 to 90 Shore "A" durometer hardness, chemically compatible with sealants used, and of sizes recommended by the glass manufacturer.

- G. Accessories: Provide as required for a complete installation, including glazing points, clips, shims, angles, beads and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

## PART 3 – EXECUTION

### 3.01 PREPARATION:

- A. Clean joints, gutters and glass pockets, to remove foreign matter such as dirt, oil, grease, fireproofing, surface dust, debris and frost.
- B. Remove loose particles present or resulting from cleaning. Remove protective coatings and fabrication oils and residue on metallic surfaces with solvents that leave no residue. Do not allow solvent to air dry without wiping. Use only clean lint free towels for wiping of surfaces.
- C. Do not glaze when the ambient temperature and weather conditions cause frost or moisture or condensation on framing, or during damp weather unless approved measures to eliminate these conditions are used.
- D. Cut glass accurately to sizes required to the openings and in such a way that edges are smooth and straight. Clean glass free from dust, oil, etc., and wipe clean immediately before installation.
- E. Set, remove and later reset glazing stops so as to avoid marking or defacing any portion of the frames, stops, settings, etc. Prime surfaces of openings properly where recommended by the sealant manufacturer.
- F. Glazed openings shall be checked prior to glazing to ensure that openings are square, plumb and secure in order that uniform face and edge clearances can be maintained. Inspect framing joint intersections to ensure that the offset in the jointery will not inflect undue edge pressure on the glass.
- G. Maintain minimum face distances on both sides of glass as per GANA guidelines.
- H. Laminated Glass: Sashes which are to receive laminated glass shall be weeped to the outside to allow water drainage into the channel.

### 3.02 GLASS SETTING:

- A. Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, shall conform to applicable recommendations in the GANA GM, GANA SM, SIGMA TB-3001, SIGMA TB-3000, and manufacturer's recommendations.
- B. Aluminum windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with

no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place.

- C. Set glass with glass markings, such as manufacturer's name, tempered glass designations, or code required indicators, right side up, level and straight. Locate markings in accordance with approved submittals, or in lower left-hand corner as directed.

### 3.03 PROTECTION AND CLEANING:

- A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.
- D. Remove and replace glass which is broken, chipped, cracked abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- E. Wash glass on both faces not more than 4 days prior to date scheduled for final acceptance of project. Wash glass by method recommended by glass manufacturer. Do not use any harsh cleaning agents, caustics, abrasives or acids for cleaning. Polish glass both sides and leave free of soiling, streaks, and labels.

END OF SECTION

SECTION 09200  
LATH AND PLASTER

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide lath and plaster, complete.

A. Work In This Section: items include:

1. Exterior lath and plaster.
2. Plaster accessories as required.
3. Lath and scratch coat backing for mortar-set wall tile.

B. Related Work Not In This Section:

1. Wood framing.
2. Access panels.
3. Finish painting.

1.02 SUBMITTALS:

A. List and Brochures: Submit a complete list of all items proposed for use under this section. Submit descriptive brochures and manufacturer's recommended installation instructions for each item.

B. Samples: Submit the following:

1. Exterior plaster texture and finish, 24" square, prepared at site.
2. Each type and size of plaster trim and accessory..

PART 2 – PRODUCTS

2.01 LATH AND ACCESSORY MATERIALS:

Each bundle of lath shall be sealed with a metal tag bearing the lath designation, weight and manufacturer's name.

A. Metal Lath with Paper Backing: Western Lath Black Asphalt Mesh D.

B. Expanded Metal Lath: ASTM C841, small diamond mesh expanded metal lath, 3.4 pounds per square yard, expanded from steel sheets having hot dip galvanized coating G60 in accordance with ASTM A525. Lath shall be self-furring type for use over sheathing, flat type for use over spaced framing; and 3/8" ribbed lath for soffits and ceilings.



- C. Corner and Strip Reinforcing Lath: Flat or shaped lath reinforcing units, metal or galvanized wire lath types, no less than 2.5 pounds per square yard, outstanding legs minimum of 2" wire lath and 3" for metal lath when formed for angle reinforcing. Use galvanized type for use with galvanized metal lath.
- D. Gypsum Lath: ASTM C37, plain, Type X, foil-backed gypsum lath 1/2-inch thick.
- E. Plastering Accessories: Minimum 26 gauge galvanized steel with expanded wings. PVC and zinc alloy are not acceptable. Include casing beads, expansion screeds, foundation screeds, ventilating screeds and other items as shown or specified.
  - 1. Exterior Expansion Screeds: Sizes and profiles indicated or directed, with expanded wings unless otherwise shown or required by installation.
  - 2. Drip Screed: Similar to Superior No. 10.
  - 3. Casing Beads: Milcor, Superior, USG or equal, similar to Milcor Type 66 by 7/8" high for exterior plaster.
  - 4. Exterior Corner Reinforcement: Woven wire type with longitudinal wires, zinc coated, per Detail 15-A, Section 2 of Ref Spec.
  - 5. Ventilating Screeds: Alabama Metal Industries or equal, soffit vent screed, perforated web type, with integral plaster grounds.
- F. Access doors and panels: Refer to Section 08305.
- G. Screws: USG Type S and Type S 12, "ClimaSeal" finish.
- H. Nails: 11 gauge roofing nails, 7/16-inch head, barbed, diamond point, zinc-coated, 1-1/2 inch long for horizontal application; 1-inch long for vertical application. Use watered furring nails for attaching lath to wood framing.

## 2.02 PLASTER MATERIALS:

- A. Exterior Stucco: Conforming to general requirements of "Specifications and Standards for Manufactured Stucco Finishes" issued by Stucco Manufacturers Association by California Stucco, LaHabra, Highland Stucco, Merlex Stucco, Inc., or equal, delivered in manufacturer's sealed containers, requiring only addition of water for use. Sand shall pass the No. 20 sieve. Mix and sand shall be suitable for the finish specified. Furnish integrally-colored stucco in color as selected and matching the approved sample.
- B. Portland Cement: ASTM C150, Type II, low alkali.
- C. Hydrated Lime: ASTM C206, Type S.
- D. Finish Coat Plaster: La Habra X 86 Sandstone, Base 200, factory formulated blend of Portland cement, hydrated lime, aggregates and color, requiring addition of water only at the site.

- E. Gypsum Plaster: ASTM C28, Types as follows:
  - 1. For base coats over metal lath: Wood fibered plaster.
  - 2. For finish coats: USG Structo-Gauge Gauging Plaster.
- F. Keene's Cement Finish: USG Red Top Keene's Cement.
- G. Water: Clean, potable and from domestic source.
- H. Waterproofing Admix: Red Label Suconem by Super Concrete Emulsions Ltd., AntiHydro, or approved equal.
- I. Plaster Bonding Agent: "PlasterWeld", manufactured by Larsen Products Co., 8264 Preston Court, Jessup, MD 20794 (800) 633-6668, Upco Bonding Adhesive No. 705, or Merlex Stucco "Acrylex".
- J. Sand: Washed natural sand conforming to ASTM C144, except gradation of sand shall conform to Section 6 of Ref Spec.
- K. Base Coat Reinforcement: Alkali resistant fiberglass shorts, 1/2" chopped strands, Type AR, manufactured by OCF or PPG Industries.

## 2.03 PROPORTIONS:

- A. Portland Cement Plaster:
  - 1. Scratch coat on metal lath:
    - 1 part Portland cement
    - 1/2 to 1 part hydrated lime
    - 4 parts sand
    - 2 pounds fiberglass shorts per sack of cement
  - 2. Brown coat over metal lath:
    - 1 part Portland cement
    - 1/2 to 1 part hydrated lime
    - 4-1/2 parts sand
    - 2 pounds fiberglass shorts per sack of cement
  - 3. Finish coat: Mix with water only, no field additions.
- B. Gypsum Plaster for Typical Applications:
  - 1. Scratch coat: 100 pounds of gypsum neat plaster  
2 cubic feet of damp loose sand
  - 2. Brown coat: 100 pounds of gypsum neat plaster  
3 cubic feet of damp loose sand

3. Finish coat: 100 pounds of gypsum gauging plaster  
200 pounds of hydrated lime

#### 2.04 MIXING:

Use mechanical mixers. Measure ingredients accurately; avoid oversanding. After mixing is complete, and just before application, add fiberglass shorts to basecoats. Use a factory prepared stucco for finish coat. Apply plaster within 1/2 hour of mixing. Do not retemper or use material that has partially set, or is caked or lumpy.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION OF METAL LATH AND PLASTER ACCESSORIES:

Conform to Ref Spec Sections 4 and 5 except as exceeded by building code or requirements specified herein.

- A. Lathing: Conform to ASTM C841, as applicable, and to requirements herein. Use expanded metal lath for horizontal plaster and for interior Portland cement plastering. Use lath with integral paper backing for vertical or sloping exterior plaster and to receive scratch coats behind ceramic tile.
  1. Expanded Metal Lath: Apply lath with long dimension across bearings. Lap sides 1/2" and ends 1". Break lath continuity at expansion screeds. Screw attach lath 6" centers. Tie each lap with 18-gauge wire midway between supports at sides and 6" intervals on ends. Lap upper sheets over lower sheets. Over masonry, attach lath with approved fasteners. Power driven fasteners will not be approved.
    - a. At all interior angles of wall construction, form lath into the corner and carry out on the abutting surface. Lath recesses for electric panels, fire hose cabinets, and other recessed equipment. Lath the inside face of all duct and pipe spaces.
    - b. Construct ceilings by "floating method", extending wall lath above ceiling, and after wall plastering is completed, terminating ceiling lath 3/8" from surface of wall plaster in a casing bead. After ceiling plaster is completed, caulk the space between the wall plaster and the casing bead with sealant specified in Section 07920.
    - c. Wire-tie cornertie along edges at not more than 12" intervals, or secure along edges with equal attachments.
    - d. Use ribbed lath for ceilings and soffits.
  2. Expanded Metal Lath With Paper Backing: Install, lap paper backings, handle and screw fasten in strict conformance with lath manufacturer's printed instructions and Code approvals. In all cases, install the waterproofed paper backings "shingle" fashion to ensure positive drainage of water to the outside, including proper "shingling" with flanges of accessories and metal joints. Do not run paper backing

- continuous behind expansion joints, control joints, and like fittings and flashings. At vertical expansion joints, cut lath, overlap paper backings and wire tie lath to expanded wings of joints. Maintain full waterproofing continuity. Maintain lath-to-lath contact between sheets.
3. Gypsum Lath: Apply face out with long dimension of lath across supports, and with end joints staggered between courses. Cut lath accurately to slip easily into place without forcing, and fit neatly around electrical outlets, openings and frames. Ends of lath shall bear on supports, or bridging clips shall be installed. Locate fasteners 3/8" from edges and ends of lath. Nail lath to wood supports at not over 5" centers.
- B. Lathing Accessories: Set metal accessories plumb, level and true and shim where necessary. Miter accessories at corners, and accurately and tightly fit exposed joints. Install sections in longest practicable length with minimum splicing. Fasten at not more than 12" centers.
1. Control Joints in Exterior Plaster: Locate as indicated, or if not indicated, at not over 10 feet on center each way in large plaster areas. Obtain approval of control joint locations prior to proceeding.
  2. Exterior Corner Reinforcing: Install for the full length of external angles of exterior Portland cement plastering.
  3. Casing Beads and Plaster Stops: Install at free edges of plaster, wherever plaster abuts against other finish material, and elsewhere as shown.
  4. Plaster Expansion Joints: Install types as shown and approved, joints and connections coped and shingled to prevent entry of water. Where directed or necessary, seal connections with sealant conforming to Section 07920 at not additional contract cost. Apply safin insulation, as specified in Section 07210, behind expansion joints in fire rated construction. Where not shown, provide expansion joints for exterior plaster at maximum 10-foot intervals and as required to divide plaster into maximum 100 square foot areas, located as directed.
  5. Metal Casing Bead for Floating Angle Construction: Install casing beads where ceilings butt into or are penetrated by walls, columns, beams, and similar elements so as to provide floating angle (unrestrained) construction in accordance with ASTM C841.
  6. Cornerties: Install at interior corners of walls, partitions and other vertical surfaces to be plastered, except where metal lath is carried around angle. Fasten only as necessary to retain position during plastering.

### 3.02 APPLICATION OF PORTLAND CEMENT PLASTER:

Conform to ASTM C926 except as otherwise specified. Apply plaster on metal lath to minimum 7/8" total thickness measured from face of studs, for exterior plaster, 1" thick where required by code, and 3/8" thick, fully enclosing lath for scratch coats below ceramic tile.

- A. Measuring and Mixing Plaster: Conform mixing, materials measuring and proportions to Ref Spec Sections 7 and 8. Apply either Portland cement plaster or Portland cement-lime plaster for base coats. Use a factory prepared stucco for finish coat. Apply plaster within 1/2 hour of mixing. Do not retemper or use material that has partially set, or is caked or lumpy.
- B. Waterproofing Additive: Add to all exterior cement plaster scratch and brown coats in conformance with manufacturer's directions.
- C. Base Coat Reinforcement: Include 2 pounds of alkali-resistant fiberglass shorts per each 94 pounds of Portland cement in base coats for exterior plaster.
- D. Exterior Plaster: Scratch and brown coat of Portland cement plaster or Portland cement-lime plaster, and minimum 1/8" thick finish coat of texture specified plaster.

1. Application of Base Coats on Lath:

- a. Scratch Coat: Apply scratch coat not less than 1/2" thick from face of supports to crest of scores, completely embedding wire fabric lath and forming good key on metal lath. Thoroughly scratch in direction perpendicular to supports and keep at minimum at optimum moisture content with fog spray for 48 hours minimum before second coat is applied.
  - b. Brown Coat: Set temporary wood or metal spot or strip grounds and bring plaster to true planes between metal joints. Apply brown coat plaster not less than 3/8" thick. Use long rigid darbies controlled by grounds and bring surfaces to a straight, plumb and true condition about 1/8" back of metal trim edges and flanges. As each are is applied, check surface with stringlines or equivalent, and immediately correct all low or high areas. After straightening, remove temporary grounds and fill the voids with plaster. Wood float the surface to correct texture and to improve bond for finish coat. Keep brown coat moist for 72 hours and allow to air cure for 14 days before applying finish coat.
  - c. Curing: Apply a fine fog spray of water as soon as plaster base coats are adequately set to prevent injury and continue to apply not less than 3 times per day for 3 days. Do not let plaster dry out between water applications.
2. Application of Finish Coat: Retest brown coat surfaces for straight and true before applying the finish coat and correct defects. Dampen surface of brown coat for uniform suction. Lay out all finish coats to permit completion of an entire area between joints and screeds, or carry to a natural break point. Work the top and bottom of walls and areas within screeds at same time with no dry laps, producing uniform finish and appearance, free of lap and tool marks, crazing, checking, waviness, low or high spots, offsets or other defects. Finish texture shall match existing.

3.03 GYPSUM PLASTER APPLICATION:

- A. Proportion, mix and apply plaster in accordance with ASTM C842.

### 3.04 FOG COAT:

- A. Requirements: Fog coat will not be required if repairs to existing plaster results in uniform color and texture, to the satisfaction of the District.
- B. If finish plaster is not uniform, fog seal shall be applied as part of this work, without additional contract cost.
  - 1. Material: Cementitious spray consisting of white Portland cement, lime and pigments, of same manufacture as finish coat, color to match finish coat.
  - 2. Application: Mix to consistency required for spray application, and apply to cured plaster to achieve uniform color.

### 3.06 PLASTER LEVELING COATS:

Where new finish materials, such as tackboards, casework or other items are required to be installed over existing walls, provide bonding agent and new plaster to provide level finish. Use appropriate bonding agent and plaster, gypsum plaster or Portland cement plaster as applicable for each condition.

### 3.07 PLASTER PATCHING:

Plaster containing cracks, blemishes, blisters, pits, checks, discoloration or other defects is not acceptable. Remove defective plaster and replace with conforming plaster as approved. Restore all surfaces damaged, stained or defaced by plastering as approved at no additional contract cost.

END OF SECTION

SECTION 09250  
GYPSUM WALLBOARD

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide gypsum wallboard, complete.

A. Work In This Section: Principal items include:

1. Gypsum wallboard finish on walls and ceilings.
2. Joint, edge, corner and fastener finishing.
3. Acoustic insulation in gypsum wallboard partitions.
4. Acoustic and airsealing work of this section.
5. Moisture Resistant gypsum board.(green board) in toilet rms. And other wet areas.

B. Related Work Not In This Section:

1. Wood support framing.
2. Metal support framing.
3. Thermal insulation.
4. Painting and wall coverings.
3. Access panels in gypsum wallboard construction.

1.02 QUALITY ASSURANCE:

- A. Finishes: Gypsum wallboard finish shall conform to requirements of GA 214, and as specified herein. Levels used on the project are described as follows:

<b>LEVELS OF GYPSUM BOARD FINISH</b>					
Level	Joints	Interior Angles	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface. Surface free from tool marks and ridges. *

\* At completion of specified taping and finishing apply one coat of high solids primer as specified hereafter.

1.03 SUBMITTALS:

- A. Product Data: Submit product data covering wallboard installations, including finish accessories, finishing materials, sealing and wallboard manufacturer's written installation instructions, with copies of code approvals, for each material and for each wall, ceiling and shaft condition. Data shall be clearly annotated to indicate products to be furnished.

1.04 JOB CONDITIONS:

Make a detailed inspection of areas and surfaces to be enclosed or covered by gypsum wallboard and arrange for correction of defective workmanship or materials. Ascertain that other work enclosed by gypsum wallboard has been inspected and approved before starting installation; otherwise, uncover as directed at no additional contract cost.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

USG Corporation  
125 South Franklin St.  
P.O. Box 806278  
Chicago, IL 60680  
(800) 874-4968

BPB Celotex  
5301 Cypress Street, Suite 300  
Tampa, FL 33607  
(800) 235-6839

National Gypsum Company  
2001 Rexford Road  
Charlotte, NC 28211  
(800) 628-4662

G P Gypsum Corporation  
133 Peachtree Street NE, 21<sup>st</sup> Floor  
P.O. Box 105065  
Atlanta, GA 30303  
(800) 225-6119

2.02 MATERIALS:

- A. Use products of one of the manufacturers named above. All materials, as applicable, shall be products of one manufacturer. Products of USG are specified hereafter to establish standard of quality.
- B. Gypsum Wallboard: ASTM C36, except as otherwise noted, types as listed below, 5/8" thick, except where especially shown otherwise.



For walls and ceilings unless otherwise specified	5/8" Sheetrock Brand Firecode Type "X" or Firecode "C" Gypsum Panels
For walls subject to abuse including exposed walls of classrooms	USG Abuse Resistant Fiberock
For walls subject to high impact including corridors and other student occupied spaces	USG Abuse Resistant VHI Fiberock
Moisture Resistant gypsum board. (green board) in toilet rooms. And other wet areas.	USG Mold Tough AR Firecode C

C. Fasteners:

1. Screws for gypsum wallboard on wood and metal framing: ASTM C954, Type S and Type W, corrosion-resistant, self-tapping bugle-head spiral threaded type, minimum 1" long for steel, 1-1/4" long for wood, and 1-5/8" long for double layer walls, lengths to penetrate all supporting construction at least 3/8". Furnish hardened type screws for metal supports heavier than 25 gauge.
  2. Screws for metal framing heavier than 20 gauge: 1-1/4" bugle head with S-12 point, with self embedding head specially designed for use with board. Fasteners shall be stainless steel or shall have non-corrosive finish.
- D. Metal Trim and Corner Beads: ASTM C1047, hot dip galvanized steel with tapping flanges, as manufactured or recommended by gypsum wallboard manufacturer, corner beads at outside corners and "J" shaped trim members where abutting other materials. Trim manufactured by Flannery Inc., 300 Parkside Drive, San Fernando, CA 91340 (818) 837-7585 FAX (818) 837-1155 is acceptable.
- E. Control Joints: USG Control Joint No. 093, zinc alloy, V-shaped, 1/4" wide, 7/16" deep, with removable plastic tape protection.
- F. Adhesive for Application of Wallboard to Wood Framing: Miracle DSA-20 Structural Drywall Adhesive, or Tec Inc. "Max Bond TA-195", conforming to ASTM C 557.
- G. Finishing Materials: ASTM C475, joint tape, bedding compound, finishing compound, adhesive and laminating compounds supplied by wall board manufacturer.
- H. High Solids Primer: USG Sheetrock "First Coat".
- I. Skim Coat: USG "Sheetrock All Purpose Joint Compound".
- J. Acoustical Sealant: Nonhardening polysulphide or elastic water-base sealant, one of the following:

1. Inmont Company "Prestite 579.64".
  2. Treco Acoustical Sealant.
  3. United States Gypsum Acoustical Sealant.
  4. W.W. Henry Type 313 Acoustical Sealant.
- K. Fire Rated Acoustical Form Tape: Compressible, closed cell polyvinyl chloride foam with pressure sensitive adhesive, in rolls with protective release liner on non-adhesive face, 6 pcf density, 1" wide by not less than 1/4" thick, self extinguishing, UL 94 recognized, Norseal V740FR, manufactured by Norton Performance Plastics Corporation (800) 724-0883, or equal.
- L. Acoustic Insulation: Friction fit incombustible fibrous glass batts, of types required for acoustic and fire ratings, minimum 3-1/2" thickness unless otherwise indicated, nominal 0.65 to 2.50 pcf density, flame spread 25, smoke developed 50, when tested in accordance with ASTM E 84.
- M. Access doors and panels: Refer to Section 08305.

## PART 3 – EXECUTION

### 3.01 INSTALLATION OF GYPSUM WALLBOARD:

- A. Metal Framing: Perform all wallboard installation and finishing according to ASTM C840 and the wallboard manufacturer's instructions. Do not install wallboard until building is weathertight. Conform to fire-rating requirements, building code approvals and requirements herein.
- B. Wood Framing: Perform all wallboard installation and finishing according to ASTM C840 and the wallboard manufacturer's instructions. Do not install wallboard until building is weathertight. Conform to fire rating requirements, building code approvals and requirements herein. Apply 1/8" continuous beads of adhesive on faces of studs and joists to receive wallboard. Use Type W screws for attaching wallboard to wood supports. Nails will not be permitted.
- C. Temperature: Maintain temperature between 55 degrees F and 70 degrees F within building during installation. Furnish ventilation to eliminate excessive moisture.
- D. Fasteners: Install screws so heads are below wallboard surface without breaking surface paper or stripping the steel framing member around the screw. Space screws according to code approvals.
- E. Openings: Accurately cut and fit the wallboard at openings. At door and other openings, cut wallboard to continue across area above opening head; do not cut wallboard to both jambs and fill in area over openings with separate pieces. Make the dimension from the joint over head of an opening to jamb of openings 6" minimum. Stagger joints on opposite side of partition.
- F. Walls: Place wallboard horizontally with the long dimension across the studs or in one-piece vertical heights, vertical joints centered on supports and staggered on walls so as not to occur on opposite sides of the same stud. Secure to each stud and track with

screws keeping screws 3/8" from edges. Where required to accommodate deflection, or where required by building code, omit screws on top rack.

- G. Suspended Ceilings: Apply wallboard with long dimension at right angles to furring channels. Use wallboards of maximum practical length to minimize end joints and properly support around cutouts and openings. Secure with screws.

### 3.02 ACOUSTIC INSULATED PARTITIONS:

Install acoustic insulation continuously between studs from finish floor to top of wall in which it occurs. Where cutouts are made for J-boxes, conduit, piping and like items, back wall insulation with insulation so that one additional layer of insulation at least 24" wide and high is placed in back of cutout. Snugly fit in place free of gaps or holes.

- A. Where ducts penetrate acoustically insulated partitions, partitions shall be framed leaving 1" clear all around. Space between duct and partition framing shall be filled with acoustic insulation, held back behind face of wallboard. Install backer rod, and fill gap between duct wallboard with acoustic sealant as specified below. Provide firestopping as required for rated construction.

### 3.03 JOINT TREATMENT AND FINISHING:

Conform to GA 214-M and the following:

- A. All Levels: Apply tape bedding compound, tape and finishing cement on joints in wallboard as required for specified levels of finish.
- B. Levels 2 through 5:
  - 1. Apply joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape and finishing cement. Treat outside corners with corner beads and finishing cement.
  - 2. Provide metal casing beads at all edges of gypsum wallboard which abut ceiling, wall or column finish, and elsewhere as required, such as openings, offsets, etc. Make all exposed joints, trims and attachments non-apparent following application of paint or other finishes; if the joints and fasteners are apparent, correct defects as directed with no additional contract cost.
  - 3. Seal the raw edges of plumbing openings and of boards that have been cut to fit with sealing compound brushed on.
  - 4. When entire installation is completed and prior to installation of finish materials by other trades, correct and repair broken, dented, scratched or damaged wallboard.
- C. Level 3 and 4: Apply one coat of high solids primer over entire surface.
- D. Level 5: Apply one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface.

### 3.05 REQUIRED LEVELS OF FINISH:

Unless otherwise indicated or specified, levels of finish required shall be as follows:

- A. Level 1: Plenum areas above ceilings, insides of shafts and other concealed areas.
- B. Level 4: Backing for vinyl wall covering.
- C. Level 5: Exposed, painted wallboard.

### 3.06 AIR SEALING:

Seal connections between shaft walls, ducts, plenums and building structure airtight with specified caulking compound or tape and cement, including vertical shafts.

### 3.07 CAULKING:

Caulk between wallboard edges and floors, walls and at structure above other than acoustical ceilings with acoustical sealant, forming a complete perimeter seal. Caulk both layers at multi-layer walls. Caulk around outlet boxes and other penetrations in same manner. Caulk space between ducts and wallboard.

### 3.08 ADJUST AND CLEAN:

Inspect the completed installation. Fill all cracks or depressions with compound and finish smooth and flush with adjacent surfaces. Check all trim for accurate alignment, neat joints between trim and other materials, and repair all defects.

END OF SECTION

SECTION 09300

CERAMIC TILE

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide ceramic tile finish, complete.

A. Work In This Section: Principal items include:

1. Glazed ceramic tile walls and bases.
2. Unglazed ceramic mosaic tile floors / Quarry Tile.
3. Expansion joints.
4. Marble thresholds at tile floors.

B. Related Work Not In This Section:

1. Cement plaster scratch coat backing for tile walls and bases.
2. Concrete subslabs.
3. Bituminous membrane waterproofing.
4. Metal thresholds.

1.02 QUALITY ASSURANCE:

A. Reference Standards: Conform to the following standards unless otherwise required herein:

1. American National Standards Institute (ANSI):

A108.1 Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile  
Installed With Portland Cement Mortar

A108.5 Ceramic Tile Installed With Dry-Set Portland Cement Mortar

A108.10 Installation of Grout in Tile Work

A137.1 Standard Specifications for Ceramic Tile

2. Tile Council of America (TCA):

2018 Edition, Handbook for Ceramic Tile Installation

1.03 SUBMITTALS:

A. Shop Drawings: Submit showing dimensioned layouts for all tiled wall and floor surfaces. Show locations of tile joints, cuts and trimmers. Identify trimmers and accessory units by type number stated in the approved product data.

- B. Product Data: Submit the following:
  - 1. Tile manufacturer's printed data identifying each field tile unit and each trimmer and shaped unit by manufacturer's model or type number.
  - 2. Manufacturer's printed directions for Portland cement grout.
- C. Samples: Submit the following for selection and approval:
  - 1. Each type, shape and trimmer of tile in each color proposed for use.
  - 2. Grout colors for each type of tile.
  - 3. Cured sealant colors for expansion joints in tile.
  - 4. Marble thresholds, 12" lengths, with one end cut and finished to fit typical door jamb.
- D. Master Grade Certificates: Submit for each lot of tile before installing.
- E. Test Data: Submit records of test for dryness of subfloors to receive thinset floor tile.
- F. Certificate: Submit certificate from independent testing laboratory attesting to non-slip characteristics of floor tile as specified.
- G. Extra Material: Furnish the Owner with one unopened box or bundle of each type, size and color of tile used on the project. Label each box with the type, size, color and location in the building. Deliver to Owner's on-site storage area as directed.

#### 1.04 PRODUCT DELIVER AND STORAGE:

Deliver tile materials to site in unopened factory containers sealed with Grade Seals bearing printed name of manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

#### 1.05 JOB CONDITIONS:

- A. Conditions: Inspect and verify conditions and substrates and report defects for correction before proceeding. Walls shall be leveled and plumbed square.
- B. Protection: Install temporary protection as required. Do not use lumber or other material likely to strain or deface installed tile. Close tile floors to traffic completely for 72 hours after tile installation; thereafter, permit traffic only over protective covering of heavy paper or equivalent.

### PART 2 – PRODUCTS

#### 2.01 BASIC MATERIALS:

- A. Portland cement: ASTM C150, Type I or II, low alkali.

- B. Hydrated lime: ASTM C207, Type S.
- C. Mortar sand: ASTM C144, at least 4% passing No. 100 sieve.
- D. Joint sand: Same as mortar sand except all passing the No. 30 sieve.
- E. Water: From domestic potable source.
- F. Waterproofing admix: Anti-Hydro, Sika Red Label Suconem, or equal.
- G. Fiberglass tape: Approved brand of glass reinforced tape, 2" wide minimum.
- H. Latex liquid: Styrene-butadiene rubber liquid latex, by the same manufacturer as above latex mortar mix.
- I. Color pigments: Pure ground mineral oxides, non-fading, alkali and lime proof, factory weighed and packaged.
- J. Sealer: Custom Building Products "Tilelab Surfacegard Sealer", water soluble, polymer type, low VOC.
- K. Portland Cement Grout: Custom Building Products Polyblend 145, colors as directed.

## 2.02 TILE MATERIALS:

### A. General Requirements:

1. Mesh mounted or perforated paper backed tile is not acceptable where the mesh or paper remains as a permanent part of the installation.
2. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body of any unit remains exposed after tile is installed. Provide matching tile trimmers of all types required to prevent such condition.

B. Glazed Wall Tile: Dal Tile, District standard, colors and sizes as selected or scheduled, dust pressed and white body, square edged, two integral joint spacing lugs on edges with matching integral cove base, integral surface bullnose for external angles and exposed edges.

C. Unglazed Mosaic Floor Tile: Dal Tile, District standard, colors, sizes and patterns as scheduled, porcelain unglazed ceramic mosaic tile, cushion or all-purpose edges, 2" square unless otherwise shown or specified. Minimum coefficient of friction 0.71 dry, 0.60 wet, as tested in accordance with ASTM C1028.

## 2.03 SETTING BED MORTAR:

Machine mix mortar after first dry mixing materials. Mix all mortar not less than 5 minutes after water is first added. Accurately measure materials using calibrated measuring boxes; shovel

measurement is not permitted. Discard mortar that is not placed and compacted before initial set is reached. Measure all materials by volume.

- A. For Wall Tile: Quantity ranging from 1-part Portland cement, 1/2-part hydrated lime, and 5-parts damp sand to 1-part Portland cement, 1-part hydrated lime and 7-parts damp sand.
- B. For Floor Tile: Quantity of 1-part Portland cement, 1/10-part hydrated lime and 6-parts damp sand, mixed to consistency and workability that allows maximum compaction during tamping of mortar bed.

#### 2.04 BOND COAT:

White or gray Portland cement mixed with latex admix to creamy consistency. For glazed wall tile, gray or white dry-set Portland cement mortar mixed in the same manner may be used. Do not add water or cement after initial mixing, and discard material not used prior to initial set.

#### 2.05 MARBLE THRESHOLDS:

Group "A" marble as classified by the Marble Institute of America, 1-piece units and honed finish and rounded edges, accurately cut to profile of door jambs, color as selected, matching approved Sample.

#### 2.06 EDGING ANGLES:

Extruded aluminum or stainless steel of minimum 1/8" leg thickness, as approved.

#### 2.07 ACCEPTABLE MANUFACTURE:

Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. Tel.: (800) 472-4588. Fax: (800) 477-9783

#### 2.08 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

- A. Schluter®-DECO
  - 1. Description: profile with 1/4" (6 mm) wide visible surface and integrated trapezoid-perforated anchoring leg.
  - 2. Anchoring Leg:
    - a. Provide with straight anchoring leg
  - 3. Material and Finish:
    - a. AE - Satin Anodized Aluminum
  - 4. Height as required



## 2.09 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS

### A. Schluter®-RONDEC

1. Description: bullnose-type profile with symmetrically rounded visible surface with 1/4" (6 mm) radius, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

2. Corners:

- a. Provide with matching inside corners
- b. Provide with matching outside corners
- c. Provide with internal connectors

3. Material and Finish:

- a. Satin Anodized Aluminum

## PART 3 – EXECUTION

### 3.01 PREPARATION:

Clean substrates of dust, dirt, oil, grease and deleterious substances. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used.

- A. Concrete Slabs to Receive Mortar Setting Beds: Keep concrete damp for at least 8 hours and scrub with a neat Portland cement slurry just before placing setting bed mortar.
- B. Tile Wetting: Soak mortar-bed set glazed tile in clean water according to Reference Standard. Dampen other tile according to Reference Standards or tile manufacturer's instructions.
- C. Screeds: Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

### 3.02 TILE SETTING METHODS:

Unless more stringent requirements are indicated or specified, tile setting methods shall conform to the following TCA Handbook Methods:

Walls, mortar set, wood framing	W231
Floors, mortar set, bonded	F112

### 3.03 TILE INSTALLATION:

Arrange tile surfaces according to patterns detailed or approved.

- A. Accurately set all tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required. Neatly cut and fit the tile close against abutting surfaces. Construct joints of uniform width. Form corners, returns and exposed tile edges with

approved trimmers. Drill and cut tile without marring. Carefully grind tile edges and cuts smooth. Fit tile close around outlets, pipes and fixtures so that escutcheons or collars overlap tile. Arrange tile surfaces so that not less than half-size tile occurs. Drill holes for pipe penetrations through wall tile; do not cut or split tile and set with tight ungrouted joint.

- B. Pea Gravel: Prior to installing mortar setting beds at floor drains, provide pea gravel at base of drain over weep holes to insure positive drainage and prevent mortar from clogging weep holes.
- C. Mortar Bed Set Tile: Apply specified setting bed mortar, tamp and screed to required planes. Spread no more mortar than can be covered with tile before mortar initially sets. Do not use retempered mortar. When mortar has stiffened sufficiently, sharp trowel cut through entire setting bed at corners and angles and vertically at nominal 24" centers in the field. Place tiles to avoid small or unsightly cuts and set with uniform joint width. Trowel 1/32" to 1/16" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile as placed; use white bond coat where tile joints occur. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and proper plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding use of excess water. At this time adjust all out-of-line or out-of-level tile.
- D. Joint Sizes: Install tile with uniform joint widths as follows:
  - 1. Glazed wall tile, 1/16".
  - 2. Floor tile, 1/16".
- E. Ceramic Tile Joint Grouting: Grout tile joints full. Mix grout with water to a thick creamy consistency and force into joints for entire joint depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Provide dampness for minimum 3-day curing and polish with clean dry cloths.
- F. Caulking: Caulk penetrations through wall tile with latex mortar or sealant conforming to Section 07920, concealed by collars or escutcheons.

### 3.04 SEALING:

Tile and grout joints shall be cleaned, allowed to dry and sealed with one coat of sealer.

### 3.05 CLEANING:

Remove stains, cement, grout and foreign matter after grouted joints are fully set. Do not use any acid for cleaning. Repair all defective joints as approved.

END OF SECTION

SECTION 09300

CERAMIC TILE

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide ceramic tile finish, complete.

A. Work In This Section: Principal items include:

1. Glazed ceramic tile walls and bases.
2. Unglazed ceramic mosaic tile floors / Quarry Tile.
3. Expansion joints.
4. Marble thresholds at tile floors.

B. Related Work Not In This Section:

1. Cement plaster scratch coat backing for tile walls and bases.
2. Concrete subslabs.
3. Bituminous membrane waterproofing.
4. Metal thresholds.

1.02 QUALITY ASSURANCE:

A. Reference Standards: Conform to the following standards unless otherwise required herein:

1. American National Standards Institute (ANSI):

A108.1 Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile  
Installed With Portland Cement Mortar

A108.5 Ceramic Tile Installed With Dry-Set Portland Cement Mortar

A108.10 Installation of Grout in Tile Work

A137.1 Standard Specifications for Ceramic Tile

2. Tile Council of America (TCA):

2018 Edition, Handbook for Ceramic Tile Installation

1.03 SUBMITTALS:

A. Shop Drawings: Submit showing dimensioned layouts for all tiled wall and floor surfaces. Show locations of tile joints, cuts and trimmers. Identify trimmers and accessory units by type number stated in the approved product data.

- B. Product Data: Submit the following:
  - 1. Tile manufacturer's printed data identifying each field tile unit and each trimmer and shaped unit by manufacturer's model or type number.
  - 2. Manufacturer's printed directions for Portland cement grout.
- C. Samples: Submit the following for selection and approval:
  - 1. Each type, shape and trimmer of tile in each color proposed for use.
  - 2. Grout colors for each type of tile.
  - 3. Cured sealant colors for expansion joints in tile.
  - 4. Marble thresholds, 12" lengths, with one end cut and finished to fit typical door jamb.
- D. Master Grade Certificates: Submit for each lot of tile before installing.
- E. Test Data: Submit records of test for dryness of subfloors to receive thinset floor tile.
- F. Certificate: Submit certificate from independent testing laboratory attesting to non-slip characteristics of floor tile as specified.
- G. Extra Material: Furnish the Owner with one unopened box or bundle of each type, size and color of tile used on the project. Label each box with the type, size, color and location in the building. Deliver to Owner's on-site storage area as directed.

#### 1.04 PRODUCT DELIVER AND STORAGE:

Deliver tile materials to site in unopened factory containers sealed with Grade Seals bearing printed name of manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

#### 1.05 JOB CONDITIONS:

- A. Conditions: Inspect and verify conditions and substrates and report defects for correction before proceeding. Walls shall be leveled and plumbed square.
- B. Protection: Install temporary protection as required. Do not use lumber or other material likely to strain or deface installed tile. Close tile floors to traffic completely for 72 hours after tile installation; thereafter, permit traffic only over protective covering of heavy paper or equivalent.

### PART 2 – PRODUCTS

#### 2.01 BASIC MATERIALS:

- A. Portland cement: ASTM C150, Type I or II, low alkali.

- B. Hydrated lime: ASTM C207, Type S.
- C. Mortar sand: ASTM C144, at least 4% passing No. 100 sieve.
- D. Joint sand: Same as mortar sand except all passing the No. 30 sieve.
- E. Water: From domestic potable source.
- F. Waterproofing admix: Anti-Hydro, Sika Red Label Suconem, or equal.
- G. Fiberglass tape: Approved brand of glass reinforced tape, 2" wide minimum.
- H. Latex liquid: Styrene-butadiene rubber liquid latex, by the same manufacturer as above latex mortar mix.
- I. Color pigments: Pure ground mineral oxides, non-fading, alkali and lime proof, factory weighed and packaged.
- J. Sealer: Custom Building Products "Tilelab Surfacegard Sealer", water soluble, polymer type, low VOC.
- K. Portland Cement Grout: Custom Building Products Polyblend 145, colors as directed.

## 2.02 TILE MATERIALS:

### A. General Requirements:

1. Mesh mounted or perforated paper backed tile is not acceptable where the mesh or paper remains as a permanent part of the installation.
2. Under no circumstances will glazed tile installations be accepted if any part of unglazed tile body of any unit remains exposed after tile is installed. Provide matching tile trimmers of all types required to prevent such condition.

B. Glazed Wall Tile: Dal Tile, District standard, colors and sizes as selected or scheduled, dust pressed and white body, square edged, two integral joint spacing lugs on edges with matching integral cove base, integral surface bullnose for external angles and exposed edges.

C. Unglazed Mosaic Floor Tile: Dal Tile, District standard, colors, sizes and patterns as scheduled, porcelain unglazed ceramic mosaic tile, cushion or all-purpose edges, 2" square unless otherwise shown or specified. Minimum coefficient of friction 0.71 dry, 0.60 wet, as tested in accordance with ASTM C1028.

## 2.03 SETTING BED MORTAR:

Machine mix mortar after first dry mixing materials. Mix all mortar not less than 5 minutes after water is first added. Accurately measure materials using calibrated measuring boxes; shovel

measurement is not permitted. Discard mortar that is not placed and compacted before initial set is reached. Measure all materials by volume.

- A. For Wall Tile: Quantity ranging from 1-part Portland cement, 1/2-part hydrated lime, and 5-parts damp sand to 1-part Portland cement, 1-part hydrated lime and 7-parts damp sand.
- B. For Floor Tile: Quantity of 1-part Portland cement, 1/10-part hydrated lime and 6-parts damp sand, mixed to consistency and workability that allows maximum compaction during tamping of mortar bed.

#### 2.04 BOND COAT:

White or gray Portland cement mixed with latex admix to creamy consistency. For glazed wall tile, gray or white dry-set Portland cement mortar mixed in the same manner may be used. Do not add water or cement after initial mixing, and discard material not used prior to initial set.

#### 2.05 MARBLE THRESHOLDS:

Group "A" marble as classified by the Marble Institute of America, 1-piece units and honed finish and rounded edges, accurately cut to profile of door jambs, color as selected, matching approved Sample.

#### 2.06 EDGING ANGLES:

Extruded aluminum or stainless steel of minimum 1/8" leg thickness, as approved.

#### 2.07 ACCEPTABLE MANUFACTURE:

Schluter Systems, L.P., 194 Pleasant Ridge Road, Plattsburgh, NY 12901-5841. Tel.: (800) 472-4588. Fax: (800) 477-9783

#### 2.08 EDGE-PROTECTION AND TRANSITION PROFILES FOR FLOORS

- A. Schluter®-DECO
  - 1. Description: profile with 1/4" (6 mm) wide visible surface and integrated trapezoid-perforated anchoring leg.
  - 2. Anchoring Leg:
    - a. Provide with straight anchoring leg
  - 3. Material and Finish:
    - a. AE - Satin Anodized Aluminum
  - 4. Height as required

## 2.09 FINISHING AND EDGE-PROTECTION PROFILES FOR WALLS

### A. Schluter®-RONDEC

1. Description: bullnose-type profile with symmetrically rounded visible surface with 1/4" (6 mm) radius, integrated trapezoid-perforated anchoring leg, and integrated grout joint spacer.

#### 2. Corners:

- a. Provide with matching inside corners
- b. Provide with matching outside corners
- c. Provide with internal connectors

#### 3. Material and Finish:

- a. Satin Anodized Aluminum

## PART 3 – EXECUTION

### 3.01 PREPARATION:

Clean substrates of dust, dirt, oil, grease and deleterious substances. Conform to applicable Reference Standards and to recommendations of manufacturers of materials used.

- A. Concrete Slabs to Receive Mortar Setting Beds: Keep concrete damp for at least 8 hours and scrub with a neat Portland cement slurry just before placing setting bed mortar.
- B. Tile Wetting: Soak mortar-bed set glazed tile in clean water according to Reference Standard. Dampen other tile according to Reference Standards or tile manufacturer's instructions.
- C. Screeds: Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

### 3.02 TILE SETTING METHODS:

Unless more stringent requirements are indicated or specified, tile setting methods shall conform to the following TCA Handbook Methods:

Walls, mortar set, wood framing	W241
Floors, mortar set, bonded	F112

### 3.03 TILE INSTALLATION:

Arrange tile surfaces according to patterns detailed or approved.

- A. Accurately set all tile with flush well-fitted joints, finished in true planes, plumb, square, sloped or level as required. Neatly cut and fit the tile close against abutting surfaces. Construct joints of uniform width. Form corners, returns and exposed tile edges with

approved trimmers. Drill and cut tile without marring. Carefully grind tile edges and cuts smooth. Fit tile close around outlets, pipes and fixtures so that escutcheons or collars overlap tile. Arrange tile surfaces so that not less than half-size tile occurs. Drill holes for pipe penetrations through wall tile; do not cut or split tile and set with tight ungrouted joint.

- B. Pea Gravel: Prior to installing mortar setting beds at floor drains, provide pea gravel at base of drain over weep holes to insure positive drainage and prevent mortar from clogging weep holes.
- C. Mortar Bed Set Tile: Apply specified setting bed mortar, tamp and screed to required planes. Spread no more mortar than can be covered with tile before mortar initially sets. Do not use retempered mortar. When mortar has stiffened sufficiently, sharp trowel cut through entire setting bed at corners and angles and vertically at nominal 24" centers in the field. Place tiles to avoid small or unsightly cuts and set with uniform joint width. Trowel 1/32" to 1/16" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile as placed; use white bond coat where tile joints occur. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and proper plane. Complete all beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding use of excess water. At this time adjust all out-of-line or out-of-level tile.
- D. Joint Sizes: Install tile with uniform joint widths as follows:
  - 1. Glazed wall tile, 1/16".
  - 2. Floor tile, 1/16".
- E. Ceramic Tile Joint Grouting: Grout tile joints full. Mix grout with water to a thick creamy consistency and force into joints for entire joint depth, flush with surface. Clean off all excess and fill skips and gaps before grout sets. Provide dampness for minimum 3-day curing and polish with clean dry cloths.
- F. Caulking: Caulk penetrations through wall tile with latex mortar or sealant conforming to Section 07920, concealed by collars or escutcheons.

### 3.04 SEALING:

Tile and grout joints shall be cleaned, allowed to dry and sealed with one coat of sealer.

### 3.05 CLEANING:

Remove stains, cement, grout and foreign matter after grouted joints are fully set. Do not use any acid for cleaning. Repair all defective joints as approved.

END OF SECTION



SECTION 09510  
ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide acoustical ceilings as indicated, specified and required.

A. Work In This Section: items include:

1. Suspended exposed grid acoustical unit ceilings.
2. Metal trims and moldings.
3. Adhesive-applied acoustical units.

B. Related Work Not In This Section:

1. Air conditioning grilles and fixtures.
2. Lighting fixtures and wiring.

C. Description of Ceilings:

1. Exposed grid, 24" x 48" & 48" x 48" acoustical units, non-rated.
2. Adhesive-applied 12" square acoustical units.

1.02 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings showing fully dimensioned reflected ceiling plans, grid system details, seismic bracing, hanger wire connections to supports and connection to other materials including light fixtures and diffusers and grilles.
- B. Samples: Submit samples of acoustical units and of each grid component with metal trims and moldings.
- C. Installation Instructions: Submit grid manufacturer's complete installation instructions.
- D. Maintenance Material: Deliver, in unopened cases, at least 1 percent of total quantities of each type of acoustical unit installed in the work.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver materials to the site in manufacturer's original unopened containers. Keep all materials dry, clean and protected from deterioration.

1.04 JOB CONDITIONS:

- A. Verify the locations of various electrical and mechanical fixtures and equipment items installed above ceilings and the required access to dampers, valves, controls and similar items. Coordinate locations of hanger wires and ceiling installations with all such fixtures and equipment to obtain neat symmetrical result with minimum cutting or patching of acoustical units.
- B. Building shall be enclosed, with all windows and exterior doors in place and glazed, and the roof watertight before installation of suspension system. Permanent HVAC systems shall be complete and operational.
- C. Maintain interior temperatures between 60 degrees F and 85 degrees F, and relative humidity of 70 percent or less for 7 days prior to installation of ceilings, and continuously thereafter until final acceptance.

1.05 QUALITY CONTROL:

Finished ceiling shall be level within a tolerance of 1/8" in 12' in any direction, non-accumulative.

1.06 WARRANTY:

Furnish warranty against defects in materials or workmanship including sagging or disconnection of grid systems or disintegration of acoustical units, for a period of 3 years.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

District Standard for types indicated. No substitutions.

Armstrong World Industries, Inc.  
150 N. Queen St.  
P.O. Box 3001  
Lancaster, PA 17603  
(888) 234-5464

Chicago Metallic Corp.  
4849 S. Austin Avenue  
Chicago, IL 60638  
(800) 323-7164

USG Corporation  
3633 E. Inland Empire Blvd., Suite 450  
Ontario, CA 91764  
(310) 479-2125

## 2.02 ACOUSTICAL UNITS:

- A. Flame Spread Rating: Furnish incombustible acoustical units rated 0 to 25 flame spread rating (Class I) per ASTM E84 Tunnel Test.
- B. Acoustic Tile: Armstrong
  - 1. Optima, 48" by 24", 1" thick. T-BAR ACOUSTIC TILE CEILING SYSTEM W/ .95 NRC
  - 2. Ultima, 24" by 48", 3/4" thick. T-BAR ACOUSTIC TILE CEILING SYSTEM W/ .75 NRC
  - 3. Cirrus Second look, 24" by 48", 3/4" thick. T-BAR ACOUSTIC TILE CEILING SYSTEM W/ .65 NRC
  - 4. Clean Room VL, 24" by 48", 5/8" thick. T-BAR ACOUSTIC TILE CEILING SYSTEM W/ 40 CAC

## 2.03 GRID SUSPENSION SYSTEMS:

Designed to support acoustical ceiling loads with deflections not over 1/360 of spans, manufactured of zinc-coated steel, size punching and finish to match and be compatible with existing.

- A. Manufacturer: as recommended by tile and panel manufacturer for each condition, unless specified otherwise hereafter.
- B. Exposed Grid System: Manufacturer and type indicated on drawings. Conform to ASTM C635, heavy-duty grid bearing UL label or listing as a 4-pound grid. Provide bulb-top main tees at least 1-1/2" high, cross tees of same type except may be 1" high, tees with nominal 15/16" wide bottom flanges. Factory finish exposed grid surfaces with baked low-luster enamel of color to match acoustical units.
- C. Trims and Moldings: Of minimum 0.024" thick zinc-coated steel, exposed surfaces factory painted with low luster enamel in color to match grid.
- D. Hanger Wires: Minimum 12 gauge galvanized annealed steel wires. Furnish heavier gauge if required by code or UL Design Approval for ceiling grid system furnished.
- E. Splay Wires and Compression Struts: Of approved manufacturers, acceptable to manufacturer of ceiling grids, gauges and types as required by building codes for ceiling types and weights specified.
- F. Splines: Approved metal or plastic types.

## 2.04 ADHESIVE:

One of the following:

Franklin International "Titebond Solvent Free Acoustical Ceiling Adhesive".  
MacklanBurg "Duncan/Acoustical Ceiling Tile Adhesive".  
TACC "Miracle Water Based Ceiling Tile Adhesive".

## PART 3 – EXECUTION

### 3.01 GENERAL INSTALLATION REQUIREMENTS:

Install ceilings in accordance with approved submittals, the grid and tile or panel manufacturer's printed instructions, and details shown on drawings and DSA IR M-3. Coordinate installation of all items specified under other sections in and above ceilings. Install suspended ceilings level within specified tolerance in all directions. Conform to approved submittals. Inspect and verify existing conditions.

- A. Pattern: Unless otherwise indicated or specified, install ceilings in a regular pattern without border, joint lines parallel to walls. Install units symmetrically about centerlines of each room or space, avoiding narrow units at walls. Cut and closely fit units to ceiling penetrations.
- B. Framing for Lighting and Mechanical Equipment: Coordinate all work installed in ceilings, and provide additional hanger wires, framing members and supports in grids as required for lighting and mechanical fixtures, equipment and all other loadings imposed on grids, with a safety factor of 4.0 minimum. Provide main grid tees along edges of mechanical and lighting fixtures bearing on the grids.
- C. Seismic Bracing: Provide splayed seismic bracing wires as indicated and required by code.

### 3.02 SUSPENDED GRID CEILINGS:

Conform to the UL Design Approval for the grid.

- A. Hanger Wires: Space hanger wires at maximum 48" centers along main tees and connect to structure above as shown in approved submittals.
- B. Grid Members: Space main tees at maximum 48" centers and install cross tees to complete the grid. Lock suspension members together to form joints that resist 100 pounds tension and compression. Cope bottom flanges of tees, where exposed, for flush tight connections with metal trims at vertical surfaces. All attachments shall be concealed. Pop rivets or other exposed fasteners will not be acceptable.
- C. Exposed Grid Acoustical Units: Install units with edges bearing on tees and secured with hold-down clips. Closely fit units to ceiling penetrations.
- D. Trims and Moldings: Provide painted metal trims and moldings at walls and other vertical surfaces and penetrations, joints closely butted, mitered at angles and flush. Lapped joints are not permitted. All attachments shall be concealed. Pop rivets or other exposed fasteners will not be acceptable.
- E. Ceiling Offsets: Provide framing, trims and other finishing materials as indicated or required to properly finish at offsets or ceiling breaks, types as indicated, directed and approved.

- F. Leveling: After lighting fixtures and lenses are in place, adjust to level within tolerances specified above. After leveling is complete, neatly twist ends of hanger wires around suspended sections and cut off loose ends.

### 3.03 ADHESIVE-APPLIED ACOUSTICAL UNITS:

Remove dust, dirt, greases, oil and other deleterious substances from solid backing, and apply primer if recommended by the adhesive manufacturer. Secure each unit with not less than four pats of adhesive, each pat at least 2" diameter. Place units in position with a forward and backward sliding motion while pressing the units against the solid backings. Install splines between edges of units that are not self-aligning type. Install painted metal trims or moldings at walls or other vertical surfaces. Accurately scribe units to penetrations. Install units in a true plane, free of offsets at joints or improper jointing.

### 3.04 REPAIR, CLEANING AND COMPLETION:

Remove and replace discolored, broken or damaged materials. Completed ceilings shall present a smooth plane surface free of edge or corner offsets or breaks, cupping, scratches, gouges stains or hand marks, or other defects. Clean exposed surfaces and remove foreign matter.

END OF SECTION

SECTION 09650  
RESILIENT FLOORING

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide resilient flooring and base, complete.

A. Work In This Section: Principal items include:

1. Vinyl composition tile (VCT) flooring.
2. Rubber base.
3. Reducer strips.
4. Rubber Flooring Stair Covering
5. Eternal vinyl sheet resilient floor covering (MPR Platform flooring)

B. Related Work Not In This Section:

1. Testing of concrete substrates for moisture and pH and performing required remedial work and floor leveling. Refer to Section 01400.
2. Raised metal thresholds.

1.02 SUBMITTALS:

A. Samples: Submit the following:

1. Chip samples showing the full range of flooring and base colors and patterns for selection.
2. After selection, submit 12" square samples of flooring and 12" long samples of base in each selected color or pattern.
3. Reducer strips and trims.

B. Data: Submit the following:

1. Flooring manufacturer's recommended standard dryness testing and required test results.
2. Installation instruction for each type of flooring and base.

C. Moisture Testing Results: Submit written reports covering all moisture test results for record purposes only and not for approval. Provide a floor plan, indicating location of each test and the moisture release at each location.

D. Maintenance Materials: At completion, deliver the following maintenance materials in unopened factory containers or in sealed cartons with labels identifying the contents,

matching installed materials. Include unopened cans of adhesives adequate to install the maintenance materials.

1. Vinyl composition tiles, 1 unopened box of each color and pattern.
2. Rubber base, at least 50 lineal feet with 5 end stop units, 5 outside corner units, and 5 inside corner units, of each color used.

#### 1.03 PRODUCT DELIVERY AND STORAGE:

Deliver materials to site in manufacturer's original unopened labeled containers. Store all resilient flooring at minimum 70 degrees F for 48 hours before installing.

#### 1.04 JOB CONDITIONS:

Do not start flooring installation until satisfactory moisture testing results are obtained and work of other trades is substantially completed, including painting. Keep the areas of installation and materials at minimum 70 degrees F during and for 10 days after installation is completed. Maintain adequate ventilation for the removal of moisture and fumes.

#### 1.05 WARRANTY:

Submit manufacturer's 5 year warranty against defects and wear-through for heat welded sheet vinyl.

### PART 2 – PRODUCTS

#### 2.01 ACCEPTABLE MANUFACTURERS:

Furnish products by the following manufacturers or equal:

Vinyl Composition Tile:

Armstrong World Industries  
P.O. Box 3001  
2500 Columbia Avenue  
Lancaster, PA 17604  
(800) 448-1405

Forbo Flooring (MPR Platform flooring):  
8 Maplewood Drive  
Humboldt Industrial Park  
Hazleton, PA 18202  
800-842-7839

Base:

Burke Mercer Flooring Products  
2250 S. Tenth Street

San Jose, CA 95112  
(800) 669- 7010  
(408) 297-3500

Rubber Stair Tread:

Nora Systems, Inc  
800-332-NORA

## 2.02 FLOORING MATERIALS:

- A. General: Resilient flooring shall have minimum coefficient of friction of 0.05 in accordance with ASTM D 2047.
- B. Vinyl composition tile: Armstrong Imperial Texture Standard Excelon, conforming to ASTM F1066, Composition 1, asbestos free, Class 2 (through pattern) 12" by 12" by minimum 1/8". Tile shall have minimum coefficient of friction of 0.6 in accordance with ASTM C 1028.
- C. Rubber base: Burke Mercer, conforming to ASTM F 1861; Group 1, solid (homogeneous); Type TS, thermoset vulcanized rubber; Style A, straight; and Style B; 4" high unless otherwise indicated, colors as selected, non-shrinking, 1/8" thick, with matching molded outside corners and end stops. Where available and subject to approval, base may be furnished in rolls, and outside corners formed by wrapping the material around the corner.
- D. Rubber Stair Tread: Nora Systems, Round 0882- Color : Platinum Grey
- E. Eternal vinyl sheet resilient floor covering (MPR Platform flooring): Color & model: 10452 dark oak, thickness: 0.08 in

## 2.03 APPLICATION MATERIALS:

- A. Crack filler: Type as recommended by flooring manufacturer.
- B. Leveling compound: Latex type, Merkote Products "Mer-Ko Underlay L" or Crossfield Products "Dex-O-Tex G-26 Underlayment". Verify that the compound is compatible with floor adhesive.
- C. Primer: Non-staining type as recommended by flooring manufacturer.
- D. Setting materials: Adhesives, primers and fillers of type and composition recommended by materials manufacturers, factory labeled as to the substrates and maximum moisture content for which application is approved by the manufacturer.
- E. Metal edging strips: Stainless steel cap strip, Johnson Rubber Co. SCC-XX, or equal.
- F. Reducer strips: 0.080" thick, butting gauge, Johnson Rubber Co. CB-XX-B, or equal.

## PART 3 – EXECUTION



### 3.01 PREPARATION:

#### A. Concrete Subfloors:

1. Moisture testing and remedial work:
  - a. Arrange for new and existing slabs to be tested for dryness and pH as specified in Section 07260, and coordinate remedial work as required to bring slabs to dryness level acceptable to resilient flooring and adhesive manufacturers. Review moisture testing and pH reports and report unsatisfactory conditions.
  - b. Install flooring on concrete only after results of moisture testing, including such remedial measure as may be necessary, are completed and approved by the Architect and the flooring materials manufacturer.
2. Leveling: Check subfloors for level, and make floor slabs true to level and plane within a tolerance of 1/8" in 10-feet. Test floor areas both ways with a 10-foot straightedge and repair high and low areas exceeding allowable tolerance. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with leveling compound, or equivalent method. Fill low areas with leveling compound. Repair and level the surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within the allowable tolerance. Again clean areas where repairs are performed.
3. Cleaning: After leveling, if required, clean substrates of all deleterious substances and foreign matter. Fill cracks or depressions with latex leveling compound of the type recommended by flooring manufacturer for the specific job conditions.
4. Priming: Prime concrete floor slabs on grade; prime other slabs if so recommended by flooring manufacturer.

### 3.02 INSTALLATION:

- A. Install flooring on concrete only after results of moisture testing, including such remedial measures as may be necessary, are completed and approved by the Architect and the flooring materials manufacturer.
- B. Conform to the flooring manufacturer's recommended installation procedures and to requirements herein. Extend flooring into cabinets and casework without bottoms.
- C. Vinyl Composition Tile Installation: Mix sufficient quantity of tiles to complete each area before laying to avoid color variations. Install flooring with tight joints, pattern direction as approved. Lay flooring square with axis of rooms, starting on center lines with tile joint or tile center so that border tiles are not less than 4" wide, accurately aligned. Install reducer strips at exposed edges of flooring and where shown. Cut flooring mechanically to produce square true edges. Closely trim to pipes, jambs, outlets and like conditions. Adhesive application rate shall be as required to avoid telegraphing trowel lines to the surface after maintenance coatings are applied. Adjust tile "runoff" during installation if necessary.

D. Base Installation:

1. Use cove base at all hard floors, including resilient flooring, concrete and wood. Use straight base at carpet and other soft floors, unless otherwise directed.
2. Verify that wall surfaces to receive base are free from irregularities, adhesives, joint compounds and other materials which would telegraph through the material. Remove such materials and sand wall surfaces smooth prior to installing base.
3. Securely cement base to backing in long lengths. Lay out lengths so that not less than 18" long filler pieces are provided. Assure that top and toe continuously contact the wall and floor, and that all joints are tight. Install factory formed external corners and end stops where cove base ends at jambs and offsets. Miter cut inside corners.
4. Base and outside corners shall be rolled with a seam roller before adhesive sets.

- E. Installation of Trim Shapes: Provide reducer strips to cover all exposed edges of resilient flooring. Use carpet-to-tile strips at junctions with carpet.

3.03 CLEANING AND COMPLETION:

Keep all flooring and base surfaces clean as installation progresses. Clean flooring and base when sufficiently seated and remove foreign substances. Clean adjacent surfaces of adhesive or other defacement. Replace all damaged or defective work to the original specified condition.

END OF SECTION

## SECTION 09680

### CARPET

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section.

- A. Work In This Section: Carpet and accessories, complete.
- B. Related Work Specified Elsewhere: Testing and leveling subfloors to received carpet.

##### 1.02 QUALITY ASSURANCE:

- A. Requirements of Regulatory Agencies: Carpeting shall meet requirements of Federal, State and Local Regulatory Agencies for flammability, static control or other properties as required and as specified herein.
- B. Carpet Installation: Comply with Carpet and Rug Institute "Standard for Installation of Textile Floorcovering Materials, CRI-104. Firm performing the installation shall be certified by the Floor Covering Installation Board. At least one of the installation crew shall have Master Installer certification of the International Certified Floorcovering Installers Association.

##### 1.03 SUBMITTALS:

- A. Layout Shop Drawings: Submit showing dimensioned layout of all seams in carpet and cushion, location of dye lot changes and details for binder bars. Indicate doorways, enclosing walls or partitions, built-in cabinets and locations where cutouts are required in carpet. Approval does not relieve the Contractor of responsibility for the satisfactory installation of carpet.
- B. Samples:
  - 1. Submit three labeled minimum 18" square samples from each dye lot of carpet required for the work. Samples shall demonstrate that dye lots acceptable match and there will be no apparent color change between carpet pieces of different dye lots.
  - 2. Sample installations: Prepare as many sample installations as are required for approval. Use the preparation techniques, installation materials conforming to approved submittals and installation methods proposed for the work. Installations will be closely examined for workmanship, appearance, alignment and preservation of carpet pattern, non-detectibility of seams when viewed from any direction or distance at the height of a standing or sitting person, and freedom from manufacturing or installation defects of any kind. Finally approved sample

- installations establish the quality required for all carpet installations, shall be identified and recorded, and shall remain in place.
3. Trim and accessories: Submit 12" long samples of each type trim proposed for the work.
- C. Product Data: Submit the following:
1. Carpet manufacturer's published technical data fully describing carpet materials, construction and recommended installation directions. Indicate special procedures and perimeter conditions requiring special attention.
  2. Technical data and usage instructions for each adhesive and sealer material.
  3. Carpet manufacturer's published instructions for maintenance care, cleaning and repair of carpet.
- D. Certificates:
1. Submit independent laboratory reports showing compliance with following requirements as specified:
    - a. ASTM E-662: Smoke Density
    - b. AATCC 134: Electrostatic Propensity
    - c. CRI TM-102: Fluorine Analysis
    - d. ASTM D-3936: Delamination
  2. Recycling Program: Provide certification by independent testing agency of manufacturer's capability to recycle the carpet, as specified below.
  3. Indoor Air Quality: Submit report showing CRI Green Label Certification Number for carpet (inclusive or adhesive).
- E. Test Reports: Submit test reports showing compliance with performance characteristics specified hereafter.
- F. Maintenance Materials: Provide 5 percent of carpet, in rolls, for maintenance purposes. Deliver to Owner's on site storage location as directed. Deliver all unused carpet and large scraps to Owner. Dispose of scraps less than 2 square foot in area or less than 8 feet in width.
- 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:
- A. Deliver materials in original unbroken packages, containers or bundles bearing name of manufacturer, complete material identification, brand and grade.
  - B. Store in a dry location, between 60 degrees F and 80 degrees F and a relative humidity below 65 percent. Protect from damage and soiling. Stack carpet rolls horizontally on a flat surface, stacked not higher than two rolls.

- C. Handle by methods that prevent damage, soiling and contamination. On delivery of carpet material, bale ticket on each roll shall be recorded by Contractor. Carpet shall not be folded for more than 4 hours.
- D. Store materials in area of installation for minimum period of 48 hours prior to installation.

1.05 JOB CONDITIONS:

- A. Ventilation and Temperature: Verify areas to be carpeted are ventilated to remove fumes from installation materials, and areas are within temperature range recommended by the various material manufacturers for site installation conditions.
- B. Protection: Keep traffic and personnel off carpet until at least 12 hours after installation. Cover carpet with heavy non-staining kraft paper or equal in areas where the work of other trades is to be performed and passage areas. Protect carpet from damage or soiling. Keep protection in place until ready for final clean-up operations.

1.06 ENVIRONMENTAL REQUIREMENTS:

- A. Carpet shall meet FTC guides for recyclability and shall be 100 percent closed-loop recyclable back into carpet. No portion of the product may be landfilled or incinerated (including waste-to-energy).
- B. Recycling Program: Manufacturer shall have a collection and recovery system for product and a fully established, currently operational recycling program in accordance with FTC guides Section 260.7 (d). Manufacturer shall be able to reclaim and recycle 100% of existing carpet of similar composition back into carpet. Manufacturer shall have a product take-back program and shall be able to reclaim and recycle 100% of installed product back into carpet at the end of its service life.
- C. Indoor Air Quality: Carpet shall have low VOC, factory applied, dry adhesive. Carpet, inclusive of floor covering adhesive, shall meet CRI's IAQ requirements for carpet only. Environmental chamber testing per ASTM D-5116. Emission Rates determined at 24 hours. Carpet, inclusive of pre-applied adhesive shall off gas less than:

0.5 mg/sq. meter per hour of Total Volatile Organic Compound (TVOC)

0.05 mg/sq. meter per hour of formaldehyde

0.4 mg/sq. meter per hour of styrene, and

0.05 mg/sq. meter per hour of 4-Phenyl Cyclohexene (4-PC)

1.07 WARRANTY:

- A. Extended Warranty: Provide warranty for non-prorated period of 25 years, against the following:
  - 1. Excessive Surface Wear: More than 15% loss of pile fiber weight
  - 2. Excessive Static Electricity: More than 1.5 kV per AATCC 134
  - 3. Resiliency Loss of the Backing: More than 10% loss of backing resiliency
  - 4. Delamination
  - 5. Edge ravel

6. Zippering

- B. Warranty required under Division 1 shall include trimming, relaying, restretching or replacement as necessary, at no additional contract cost.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

A. Kinetics by JJ Flooring Group  
PO Box 1287  
Dalton GA, 30722-1287  
800-241-4586

- B. Or equal as approved in accordance with Division 1, General Requirements for Substitutions.

2.02 CARPET:

Refer to Finish Schedule for type, pattern and color.

- A. Provide glue-down or firm cushion installation that complies with CBC Section 1119A.2.
- B. Carpet shall have a level loop, textured loop, level-cut or level-cut/uncut pile texture and maximum pile height of 1/2" per CBC Section 1119A.2
- C. Carpet edges shall comply with CBC Section 1121A.

2.03 BACKING CHARACTERISTICS:

- A. Primary Backing: Synthetic woven or non-woven.
- B. Pre-Coat (Fusion Coat): Sealant vinyl.
- C. Secondary Backing: Closed-cell, vinyl cushion backing system.
1. Density (ASTM D-1667): 18.5 lbs/cu. ft. +/- 5%.
  2. Compression Set (ASTM D-1667): Max 10%.
  3. Compression Deflection (ASTM D-1667): Min. 7 psi @ 25%; max. 25 psi @ 25%.
  4. Impermeable to moisture and airflow.
  5. Provide for a chemically welded seam that is also impermeable to moisture and airflow.
  6. 6 foot width roll goods.

- D. Adhesive: Low VOC, factory applied dry adhesive applied to backing and cured during manufacturer. Adhesive system shall comply to ADA guidelines, Section 4.5.3.

#### 2.04 PERFORMANCE CHARACTERISTICS:

- A. Flooring Radiant Panel: ASTM E-648 / NFPA 253: Class 1 (CRF: 0.45 watts per square centimeter or greater).
- B. Federal Flammability: CSC FF 1-70: Passes.
- C. Smoke Density: ASTM E-662 / NFPA 258: < 450 Flaming Mode.
- D. Electrostatic Propensity: AATCC 134 (Step & Scuff): 1.5 kV or less.
- E. Static Coefficient of Friction: ASTM C-1028: Passes ADA Guidelines for Accessible Routes (Minimum 0.60).
- F. Delamination of Secondary Backing of Pile Floor Coverings: ASTM D-3936: Minimum 5 lbs.
- G. Lightfastness: AATCC 16E: > 4 @ 100 hours.
- H. Vetterman Drum: ASTM D-5417: Minimum 3 @ 22,000 cycles.
- I. Moisture Barrier: Moisture Penetration by Impact @ 10 psi: No penetration of backing and seam after 10,000 impacts.
- J. Air Flow Barrier: Air Permeability of Textile Fabrics: No air flow, 0.0 cubic feet minimum, through backing and seam.
- K. Seam Integrity: Seam to remain intact after 50,000 cycles per Phillips Chair Test.
- L. VOC Chamber Testing: ASTM D-5116: Carpet inclusive of dry adhesive system shall meet criteria established by the State of Washington Indoor Air Quality Specifications for Carpet and/or Carpet & Rug Institute (CRI) Indoor Air Quality Carpet Testing Program.

#### 2.05 RELATED MATERIALS:

Use following adhesive and seam sealer materials unless other products are specifically recommended and named in carpet manufacturer's technical data.

- A. Leveling Compound: Latex type, Merkote Products "Mer-Ko Underlay L" or Crossfield Products "Dex-O-Tex G-26 Underlayment". Verify that the compound is compatible with floor adhesive.
- B. Reducer Strips: Burke Mercer No. 701 "Imperial Reducer", and No. 150 "Joiner" at resilient flooring, solid rubber, colors as selected by Architect.

- C. Binder Bars: Aluminum tackless binder edging by B&T Metals, Roberts Co., or Trimedge.

## 2.06 WALK-OFF TILES AT DOORS:

Provide Triad Mat Series Geo Tile, manufactured by Collins & Aikman, rubber reinforced construction, anti-static, solution dyed polypropylene fiber, 1/4" pile height, 24 ounce/square yard face weight, 135 ounce/square yard total weight, size 18" square. Tiles shall have geometric pattern. Provide manufacturer's recommended pressure sensitive releasable adhesive for installation.

## PART 3 – EXECUTION

### 3.01 INSPECTION:

Inspect concrete floor slabs prior to start of carpet installation and shall report, in writing, all conditions which will adversely affect installation of carpeting. Do not begin carpet installation until all reported conditions are corrected.

### 3.02 PREPARATION:

Do not start preparation until new concrete floor slabs are at least 90 days old.

- A. Arrange for slabs to be tested for dryness and pH as specified in Section 07260, and coordinate remedial work as required to bring slabs to dryness level acceptable to carpet and adhesive manufacturers. Review moisture testing and pH reports and report unsatisfactory conditions.
- B. Cleaning and Drying: Clean new and existing concrete floor slabs of all oil, grease, waxes, curing compounds, dust, dirt, debris, paint and other deleterious substances. Use a commercial vacuum cleaner to remove dust and dirt. Damp mop to remove dust that may remain after first vacuuming, allow surface to dry and again vacuum; repeat procedure if necessary to eliminate all dust. Do not use oiled or chemical treated sawdust or any similar product for dust removal.
- C. Leveling: Make floor slabs true to level and plane within a tolerance of 1/8" in 10 feet. Test floor areas both ways with a 10-foot straightedge and repair high and low areas exceeding allowable tolerance. Remove high areas by power sanding, stone rubbing or grinding, chipping off and filling with leveling compound, or equivalent method. Fill low areas with leveling compound. Repair and level the surfaces having abrupt changes in plane, such as trowel marks or ridges, whether or not within the allowable tolerance. Again clean areas where repairs are performed.
- D. Conditioning of Materials: Carpet shall be conditioned at the site at not less than 65 degrees F and relative humidity between 10 percent and 65 percent for 48 hours prior to installation.

### 3.03 CARPET INSTALLATION:



- A. General: Install carpet in accordance with requirements of CRI 104, except where more stringent requirements are specified herein or recommended by carpet materials manufacturers.
- B. Install carpet rolls in each dye lot in the number sequence as furnished by manufacturer. Roll out carpet in one direction and do not reverse direction at any locations. Align carpet with centerline of room or space, and adjust at edges for wall variations.
- C. Color Control: Plan dye lot change locations to prevent shading problems and rejection. Use only one dye lot for each area of building unless otherwise approved; if more than one dye lot is used, obtain prior approval of color match between dye lots.
- D. Carpet Runs: Install carpet in one-piece lengths between permanent walls unless otherwise approved. Seams are permitted only where shown on the approved layout shop drawings. Install corridor carpet in 1-piece sizes for full length and width, cross seaming only where corridors change direction.
- E. Laying and Seaming: Follow the highest quality professional installation procedures outlined by the National Association of Floor Covering Installers and the carpet manufacturer's directions as to workmanship. Cut carpet for seams between tuft rows by methods that prevent damage to tufts or loops, prevent edge raveling, and preserve uniform tuft row alignment and spacing on both sides and across seams. Lay carpet with tuft or loop rows in straight lines both ways, free of offsets, waviness, distortion or misalignment. Cut seam edges straight and square with backing. Trim carpet at walls, columns and penetrations for a compressed fit.
- F. Doorways: Extend carpet into doorways without piecing in and seam to the carpet on other side of door under door centerline except where metal thresholds occur; no small filler pieces of carpet will be permitted at doorways.
- G. Install carpet tight and flat on sub-floor, well fastened at edges, with a uniform appearance.
- H. Seams: Double-cut carpet seams with accurate pattern match. Make cuts serpentine, true and unfrayed. Chemically weld all seams with manufacturers recommended seam sealer as stated in installation instructions. Make sure the seam is fully sealed.
- I. Roll with appropriate roller for complete contact of carpet with mill-applied adhesive to sub-floor.
- J. Trim carpet neatly at walls and around interruptions.
- K. Completed carpet shall be smooth and free of bubbles, puckers and other defects.
- L. Binder Bars: Provide bars at all edges of carpet not abutting walls or other construction, securely fastened in place. Precisely align splices and tightly miter angles.

#### 3.04 PROTECTION:

Use non-staining building paper to protect carpet from damage by subsequent work. Do not use plastic sheeting. Keep traffic off newly installed carpet for 48 hours.

### 3.05 CLEAN-UP:

As each carpet area is completed, clean up all dirt and debris, remove spots and soiling with proper cleaner, trim off loose threads with sharp scissors and vacuum entire area clean.

### 3.06 INSTRUCTION:

After all installations are complete, carpet manufacturer's technical representative shall instruct Owner's personnel in maintenance of carpeting. Give instruction at time and location designated by Owner.

### 3.07 COMPLETED INSTALLATIONS:

Clean and free of loose carpet, defective or apparent seams, scallops, puckers, ripples, distortion or other defects, and matching the quality of the approved sample installation. Carpet installations not complying with these requirements, as determined, will be rejected. Contractor shall remove rejected carpeting and install new conforming carpeting at no additional contract cost.

END OF SECTION

SECTION 09780  
CONCRETE FLOOR SEALER

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide concrete floor sealer, complete, as shown and specified.

A. Work In This Section: Principal items include:

1. Inspection of surfaces.
2. Protective sealer on existing concrete surfaces as indicated.
3. Cleaning and preparation of existing concrete floor surfaces.

1.02 QUALITY ASSURANCE:

- A. Qualification of Applicator: The applicator shall be qualified and certified by the sealer manufacturer.

1.03 SUBMITTALS:

- A. Samples and Data: Submit samples of sealer accompanied by manufacturer's technical data, application instructions and recommended coverage rates for types of surfaces to be treated.
- B. Certificate and Summary Statement: Prior to completion of Work, submit a certificate stating that sealers applied conform to approved submittals and all requirements specified; in the certificate include a summary statement giving following information:
1. Number of square feet of each surface treated with sealer, classified as to the kind of material treated, and open pore or closed pore type.
  2. The quantity of sealer, per coat, actually applied to the surface.

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 sealers.

1.05 PRODUCT DELIVERY:

Deliver all sealer materials to the site in containers bearing name and batch number of manufacturer, with seals intact.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS:

Thoro System Products, 7800 N.W. 38<sup>th</sup> Street, Miami, FL 33166.

### 2.02 COATING TYPES:

- A. General: Sealer shall be water based, SCAQMD approved, clear urethane coating, Thoro “Thoroshield”, designed for use on interior and exterior traffic surfaces. Sealer shall be designed to penetrate the pore surface of the concrete and inhibit moisture migration.

### 2.03 SHEEN:

Completed sealer shall have semi-gloss sheen, as specified in Section 09900.

## PART 3 – EXECUTION

### 3.01 PREPARATION:

- A. Work includes preparation of existing surfaces to remove all old finishes, stains, oil, grease, bitumen, penetrated mastics and adhesives including primers and substances deleterious to concrete floor sealer, and to expose clean uniform, sound surfaces. Employ grinding, wet beadblasting, or other suitable processes, and to prevent creation of dust or other nuisance or required by Code.
- B. Following removal of existing materials, prepare surfaces in accordance with the coating manufacturer’s printed instructions. Remove contaminants including loose mortar, rust and other products of corrosion, disintegrated concrete, and other substances that could interfere with adhesion of the coating system to the substrate.

### 3.02 APPLICATION:

By experienced mechanics using methods and spray or roller equipment recommended by coating manufacturer, after surfaces to be treated are dry.

- A. Mix the 2 components and apply floor sealer in accordance with manufacturer’s recommendations. Apply evenly over the surface in 2 coats at approximately 200 square feet per gallon per coat.
- B. Keep traffic from treated surfaces until the material is thoroughly dry.

END OF SECTION

## SECTION 09810 ACOUSTICAL INSULATION

### PART 1 - GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Acoustical insulation and sealants.
- B. Related Requirements:
  - 1. Division 01 - General Requirements.
  - 2. Section 07210 - Thermal Insulation.

#### 1.02 SUBMITTALS

- A. Product Data:
  - 1. Provide manufacturer's printed Product Data for each product.
  - 2. Provide manufacturer's printed installation instructions.

#### 1.03 QUALITY ASSURANCE

- A. Fire Ratings: Comply with fire-resistance and flammability ratings specified.
- B. Acoustic Performance: Acoustic Insulation shall be tested in accordance to ASTM C423, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method, with Type A (#4) mounting.

#### 1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation from physical damage and from becoming wet or soiled.
- B. Comply with manufacturer's recommendations for handling, storage and protection during installation.

### PART 2 - PRODUCTS

#### 2.01 ACOUSTICAL INSULATION

- A. Unfaced Mineral/Glass Fiber Blanket/Batt Acoustical Insulation: Acoustical insulation produced by combining mineral/glass fibers with thermosetting resins to comply with ASTM C665, Type I.
  - 1. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50 when tested in accordance with ASTM E84.

2. Manufacturers: Johns Manville "Sound Control Batts", Owens Corning "Sound Attenuation Batts", or equal.
3. Thickness: 3-inch unless otherwise indicated.

## 2.02 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Concealed Joints: Non-drying, non-hardening, non-skinning, non-staining, gunnable, synthetic rubber sealant recommended for sealing interior concealed joints to reduce transmission of airborne sound:
  1. Pecora Corp. "BA-98".
  2. Tremco Inc. "Tremco Acoustical Sealant".
  3. Hilti, Inc. "CP 572".
  4. Equal.
- B. Acoustical Sealant for Exposed Joints: Non-oxidizing, skinnable, paintable, gunnable sealant recommended for sealing interior exposed joints to reduce transmission of airborne sound.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Comply with manufacturer's instructions for installation conditions.
- B. Do not install insulation until building is sufficiently enclosed or protected against absorption of moisture by the insulation, and do not install insulation unless supporting framing and construction is in a thoroughly dry condition.
- C. Install snugly between framing members with ends snugly fitted between units and against adjacent construction.
- D. Carefully cut and fit insulation around pipes, conduit, and other obstructions and penetrations.
- E. Where door and window frames occur in framing; cut additional strips of insulation and hand-pack as required to fill voids in and around such frames.
- F. Acoustical Sealant Application Standard: Comply with recommendations of ASTM C919 for use of joint sealants in acoustical applications as applicable to materials, applications and conditions indicated. Install sealants in accordance with manufacturer's instructions.

### 3.02 CLEANUP

- A. Remove rubbish, debris and waste materials and legally dispose off of Project site.

### 3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 09840  
ACOUSTICAL PANELS

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**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Acoustical wall and ceiling panels as shown on the project Architectural Drawings/ Schedules.

**1.2 REFERENCE**

- A. ASTM C423 Test method (Type "A" Mounting) for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- B. ASTM E795 Practices for Mounting Test Specimens during Sound Absorption Tests.
- C. ASTM E-84 Practices for Surface Burning Characteristics

**1.3 SUBMITTALS**

- A. Product Data: Submit manufacturer's specifications, and installation instructions.
- B. Shop Drawings: Submit shop drawings showing layout, dimensions and construction/ installation details.
- C. Samples: Submit samples showing manufacturer's complete range of standard fabrics and wood finishes. Samples shall be in sufficient size capable of clearly demonstrate dimensions, textures, colors, attachments. Product samples will not be returned unless arrangements, including packing and shipment costs are made by the contractors.
- D. Certificates: Submit manufacturer certification that products furnished meet specification requirements.
- E. Test report verifying acoustic performance; Noise Absorption Coefficients, sound diffusion coefficient per standard octave band frequencies of 125 Hz to 8000 Hz.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Packing and Shipping: Deliver materials to site in manufacturer's original unopened packaging with labels intact. Protect finished surfaces with removable wrapping or coating which will not bond when exposed to sunlight.
- B. Storage: Adequately protect against damage while stored at the site.
- C. Handling: Comply with manufacturer's instructions.



## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Kinetics Noise and Vibration Control, 6300 Irelan Place, Dublin, OH 43018  
(www.kineticsnoise.com).
- B. RPG Acoustical Systems, Inc., 99 South Street, Passaic, NJ 07055  
(www.rpgacoustics.com).

### **2.2 PERFORMANCE REQUIREMENTS**

- C. Performance Requirements: Wall and ceiling panel assembly and all components of acoustical panels, to have a Class "A" flame spread rating of 25 or less when tested in accordance with ASTM E-84.

- D. Acoustics Requirements:

Octave Band Frequency Acoustical Performances; Sound Absorptions (Noise Reduction Coefficient, NRC), from 125 Hz to 2000 Hz shall be equal to or greater than values indicated in the Tables below.

Acoustics Panels	Noise Reduction Coefficient	125 Hz	250Hz	500Hz	1000 Hz	2000Hz
ACP-1 A Mounting	NRC 0.1	0.48	0.12	0.10	0.05	0.03
AWP-1	NRC 0.1	0.48	0.12	1.0	0.09	0.03
AWP-2	NRC 0.15	0.9	0.3	0.1	1.0	1.0
AWP-3	NRC 1.0	0.29	0.82	1.0	1.0	1.0
AWP-4	NRC 0.1	0.48	0.12	0.1	0.05	0.03

### **2.3 ACOUSTICAL PANELS**

- A. Types:

- 1. ACP-1: ceiling mounted sound diffusers panels.
  - a. 2'x4' panels, mounted on lay-in ceiling systems of 15/16" suspension grid.
  - b. Kinetics Noise Control; Model, Geometric Diffusers.
  - c. Or approved equal.
- 2. AWP-1: Wall Mounted Sound Diffusive Panels.
  - a. 2'x2' wall mounted, using Z Clip and Angel brackets.
    - a. Kinetics Noise Control; Model, Geometric Diffusers.
    - b. Or, approved equal.

2. AWP-2: Wall Mounted fabric wrapped Low Frequency (LF) Sound Absorptive Panel.
  - a. 5-1/8" thick, 6-7 pcf density fiberglass core.
  - b. Finish: to be selected by Architect.
  - c. RPG Model Modeex LF.
  - d. Or, approved equal.
3. AWP-3: Wall Mounted Sound Abortive Fabric Wrapped Panels.
  - a. Material: 2" thick 6-7 PCF density fiberglass board.
  - b. Fabric to be FR-701 collection from Guilford of Maine.
  - c. Finish: to be selected by Architect.
  - d. Kinetics Noise Control Model HardSide Acoustical Wall Panels.
  - e. Or, approved equal.
4. AWP-4: Wall Mounted Pyramidal sound Diffuser Panel.
  - a. 2'x2' wall mounted sound diffusive panels using Z- Clip and angel brackets.
  - b. Kinetics Noise Control; Model, Geometric Diffusers.
  - c. Or, approved equal.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verification of Conditions: Examine sub-surfaces to receive Work and report detrimental conditions in writing to Architect. Surfaces to receive panels to be flat, true and dust free. Commencement of Work will be construed as acceptance of sub-surfaces.
- B. Coordination: Coordinate with other work which affects, connects with, or will be concealed by this Work. Provide backing and any standoffs required to provide flush installation.

### **3.2 INSTALLATION**

- A. Wall and ceiling panels to be installed per manufacturer's installation.
- B. Mount wall panels using mechanical clips. Predetermine location of the mounting points for consistency from panel to panel.
- C. Install sufficient number of clips to ensure that panels are secure in their final locations and are held flat with no deviation of the edge or deflection of the face.

- D. Field cutting to be performed by tradesmen familiar with this procedure using factory approved trims, adhesives and methods.
- E. When panel installation has been completed, make minor adjustments to ensure that joints are in true alignment and panels secure. Spot clean panels to remove finger marks or soil.

**END OF SECTION**

## SECTION 09900

### PAINTING

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide and perform painting, complete.

A. Work In This Section: Principal items include:

1. Preparation of surfaces.
2. Painting of new interior surfaces, except as otherwise specified.
3. Painting of new exterior surfaces, except as otherwise specified.

B. Related Work Not In This Section:

1. Shop prime coats and factory finishes.
2. Painting specified as work of other sections.
3. Caulking and sealants.

C. Surfaces Not To Be Painted:

1. Non-ferrous metal work (other than zinc-coated surfaces) and plated metal, unless particular items are specified to be painted.
2. Exterior concrete walls and surfaces.
3. Surfaces concealed in walls and above solid ceilings.
4. Non-metallic walking surfaces unless specifically shown or specified to be painted.
5. Factory finished surfaces.
6. Ceramic tile and plastic surfaces.
7. Resilient flooring and base.
8. Galvanized metals including fencing, gratings and railings.
9. Surfaces indicated not to be painted.
10. Surfaces specified to be finish painted under other sections.

D. Extent of Painting: All existing normally painted surfaces, whether painted or not as existing, shall be painted or repainted. All new surfaces, normally painted, shall be painted. All surfaces, specifically indicated on drawings, shall be painted. Exteriors of all buildings on campus shall be painted, whether modified under this contract or not.

##### 1.02 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.

##### 1.03 SUBMITTALS:

- A. List of Paint Materials: Prior to submittal of samples, submit a complete list of proposed paint materials, identifying each material by manufacturer's name, product name and number, including primers, thinners and coloring agents, together with manufacturers' catalog data fully describing each material as to contents, recommended usage, and preparation and application methods. Identify surfaces to receive various paint materials. Do not deviate from approved list.
  - B. Color Samples: Prior to preparing samples, obtain color and gloss selections and instructions. Using materials from approved list, prepare and submit 8-1/2" by 11" samples of each complete opaque paint finish.
  - C. Natural or Stain Finish Samples: Prepare samples on 12" squares of the same species and appearance of wood as sued in the work.
  - D. Job Samples: Apply minimum 100 square foot samples on site, on actual surfaces to be finished with each material, color and gloss in locations as directed. Prime and intermediate coats shall extend one foot beyond finish coat on each sample in at least 2 directions. Obtain approval of each sample prior to proceeding with the work. Leave the samples in place with removable tags until completion of the work. All work shall match approved samples.
  - E. Certificates: Submit certificate showing that all produces meet the requirements of paragraph "Compliance with Regulations" above.
- 1.04 JOB CONDITIONS:
- A. Protection: Protect all painting while in progress and cover and protect adjoining surfaces and property of others from damage. Exercise care to prevent paint from contacting surfaces not to be painted. During painting of exterior work, cover windows, doors, concrete and other surfaces not to be painted.
  - B. Examination of Surfaces: Examine surfaces to be painted or finished under this Section and verify satisfactory condition. Unsatisfactory conditions shall be corrected before application of the first coat of paint.
  - C. Weather Conditions: Apply paint to clean, dry, prepared surfaces. Do not apply exterior paint during rainy, damp, foggy or excessively hot and/or windy weather. Arrange for temporary heat and ventilation for interior painting.
  - D. Precaution: Place oily rags and waste in self-closing metal containers, removed from site at the end of each day. Do not let rags and waste accumulate.
- 1.05 EXTRA STOCK:
- A. Provide a one gallon container of each paint color and surface texture to Owner at acceptance.
  - B. Label each container with color, texture and original application locations, in addition to the manufacturer's label.

## PART 2 – PRODUCTS

### 2.01 MATERIALS:

Use the paint products of only one paint manufacturer unless otherwise specified or approved. In any case, primers, intermediate and finish coats in each painting system must all be the products of the same manufacturer, including thinners and coloring agents, except for materials furnished with shop prime coat by other trades. To the maximum extent feasible, factory mix paint materials to correct color, gloss and consistency for application. Vista Paint Kaleidoscope or Dunn Edwards products as District standard. No substitutions.

- A. Specific paint and minimum number of coats shall be as indicated on Tables I through IV at the end of this section.
- B. Special finishes specified hereinafter shall be products of one of the named manufacturers in each case.
- C. Liquid Paint Preparation Materials:
  - 1. Liquid surface preparation: ESP Easy Surface Preparation, manufactured by The Flood Company, P.O. Box 2535, Hudson, OH 44236 (800) 321-3444.
  - 2. Liquid sander: PASO Liquid Sander, manufactured by Charles Paint Research, Inc., 2401 East 85<sup>th</sup> Street, Kansas City, MO 64132 (816) 523-7466.

## PART 3 – EXECUTION

### 3.01 WORKMANSHIP:

Apply painting materials in accordance with manufacturer's instructions by brush or roller; spray painting is not allowed without specific approval in each case. Apply each coat at the proper consistency, free of brush or roller marks, sags, runs or other evidence of poor workmanship. Do not lap paint on glass, hardware or other surfaces not to be painted; apply masking as required. Sand between enamel coats.

- A. Interior paint materials are zero VOC products. Contractor shall not add solvents, thinners, diluents or other materials to the paint.

### 3.02 PREPARATION:

Properly prepare surfaces to receive finishes.

- A. Exterior Plaster: Fill hairline cracks with Portland cement patching material; report larger cracks for correction. Test and ensure plaster is sufficiently dry to receive the paint finish.
- B. Interior Plaster: Fill small cracks with spackle or equal. Report large cracks and unsightly defects for correction. Test plaster to receive oil or alkyd based paint and verify plaster is sufficiently dry.

- C. Gypsum Wallboard: Touch-up minor defects with spackle and sand smooth and flush. Report other defects as specified. Verify that skim coat specified in Section 09250 is properly applied. If not, apply one heavy coat of skim coat material specified in Section 09250, over entire surface by brush or roller.
- D. Acoustic Tile: Clean acoustic tile to be painted.
- E. Shop Coated Metal: Degrease and clean of foreign matter. Clean and spot paint field connections, welds, soldered joints, burned or abraded portions with same material used in shop coats. After complete hardening, sand entire surfaces for coat to follow.
- F. Uncoated Ferrous Metal: Degrease and clean of dirt, rust, mill scale and all other foreign matter using power tool rotary brushes to achieve a clean surface consistent with SSPC-SP3. Remove pits and welding slag, and clean surfaces to bright metal before priming. Apply metal primer not more than three hours after preparation.
- H. Metal to receive High Performance Coatings: Provide SSPC-SP 6-63 (NACE No. 3), Commercial Blast Cleaning. All oil, grease, dirt, rust scale and foreign matter shall be removed, and all rust, mill scale, and old paint shall be removed except for slight shadows, streaks or discolorations.
- I. Enameled Woodwork: Remove handling marks and effects of exposure to moisture with a thorough sanding over all surfaces of the exposed portions, using at least 150 grit or finer sandpaper and thoroughly clean all surfaces before applying sealer. After priming, putty nail holes, cracks or other defects with putty matching color of finish paint. Cover knots and sappy areas with shellac or approved knot sealer. Sand each base coat smooth when dry.
- J. Transparent Finished Woodwork: Remove handling marks and effects of exposure to moisture with a thorough sanding parallel to the grain of the wood, over all surfaces of the exposed portions, including interiors of cases and drawers, using at least 150 grit or finer sandpaper and thoroughly clean all surfaces before applying sealer. Repair all defects with filler tinted to match stain or wood color, as required, after first coat of sanding sealer and remove all smears.
- K. Fixtures, Equipment and Hardware Items: Coordinate with the work of other sections, and coordinate removal of fixtures, equipment and hardware as required to perform painting. Items to be removed include, without limitation: signs and graphics; switch and receptacle plates; escutcheons and plates; all surface-mounted equipment; free-standing equipment blocking access; grilles and louvers at ducts opening into finished spaces; and other items as required and directed.
- L. Surfaces Not Mentioned: Prepare surfaces according to recommendations of the paint manufacturer and as approved.
- M. Liquid Surface Preparation Materials: Use in lieu of sanding where lead exists, and where directed.

N. Moisture Content: Measure moisture at surfaces using an electronic moisture meter. Do not apply finishes unless moisture is below the following maximums:

- |   |   |
|---|---|
| 1. Exterior Plaster and Concrete:         | 15 percent  |
| 2. Exterior Wood:                         | 19 percent  |
| 3. Interior Plaster and Gypsum Wallboard: | 12 percent  |
| 4. Interior Wood:                         | 15 percent measured in accordance with ASTM D2016 |

### 3.03 SURFACE PREPARATION, EXISTING EXTERIOR SURFACES:

- A. Metal surfaces shall be washed with an approved cleaner, using hydro-blasting equipment to remove all grease, dirt and foreign material, then rinsed with clean water to remove all residue. Care shall be taken to prevent water from entering buildings.
- B. Remove checked, cracked, blistered, scaled, loose and alligatored paint on all wood (except doors) and metal surfaces by machine sanding to a smooth solid surface and dust clean. Doors shall be stripped down to original wood surface.
- C. After surfaces have been prepared as specified above, checked and cracked portions of wood work shall be smoothed with an approved exterior spackling compound and sanded smooth.
- D. Concrete, stucco and plaster surfaces shall be cleaned with an approved cleaner, using hydro-blasting equipment, to remove dirt, loose particles, water base paint, foreign materials, grease and oil, then rinsed with clean water to remove all residue. Efflorescence shall be brushed off and the surface neutralized with a strong solution of muriatic acid and then thoroughly rinsed with clean water. Allow to dry completely.
- E. Where the finish plaster coat is loose it shall be removed to a solid surface. Surfaces that are broken, cracked or damaged, and areas where the finish plaster coat has been removed shall be coated with Weld-Crete as manufactured by Larsen Products Corporation or equal, then shall be given a cement plaster finish coat consisting of one part plastic Portland cement to three parts sand to match the existing finish. Cracks shall be "V-ed" out, filled, finished flush with, and of texture to match the adjoining surface.
- F. Wood: Remove dust, grit and foreign material from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks and sappy sections with pigmented stain sealer. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

### 3.04 SURFACE PREPARATION, EXISTING INTERIOR SURFACES:

- A. Remove exposed nails, hooks, tacks, screws, staples and pins in surfaces to be painted, and putty the holes.



- B. Wood, plaster, and metal surfaces shall be washed with a strong solution of trisodium phosphate and water, to remove dirt, grease and other foreign materials, rinsed with clean water, and then sandpapered and dusted off. All surfaces shall have wax completely removed and then washed.
- C. Casework to be refinished shall be stripped to original surface, sanded smooth and refinished as specified for new surfaces. Refinishing shall include insides of cabinets and drawers.
- D. Checked, cracked, blistered, scaled, loose and alligatored paint on all wood and metal surfaces shall have the paint removed down to original unfinished surface, then hand sanded and dusted clean.
- E. Stained and varnished, and varnished wood surfaces which are checked, alligatored, cracked, blistered and are indicated to be refinished with stain and varnish, or varnish, or enamel, shall have the existing finish removed down to the original unfinished surface, then hand sanded and dusted clean.
- F. Plastered surfaces shall have cracks, holes and imperfections filled with patching plaster properly prepared and applied, finished flush with, and of texture to match, adjoining surface. Neutralize walls showing effect of alkali. Kill water stains with shellac undercoat, or approved equal. Large cracks shall be V-ed out before being filled.
- G. Existing painted masonry and concrete surfaces shall be washed with a strong solution of approved cleaner to remove dirt, grease and other foreign materials and then rinsed with clean water.
- H. Unpainted masonry and concrete surfaces which are indicated to be painted shall have all traces of alkali removed by washing with a solution compound of dilute muriatic acid. Allow surfaces to dry a minimum of 48 hours prior to painting.
- I. Wood: Remove dust, grit and foreign material from wood surfaces. Sand surfaces and dust clean. Spot coat knots, pitch streaks and sappy sections with pigmented stain sealer. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.
  - 1. Existing painted cabinets shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

### 3.05 COATS:

The number of paint coats specified to be applied are minimum. Apply additional coats if required to obtain complete hiding and approved results. Ensure acceptable paint finishes of uniform color, free from cloudy or mottled areas and evident thinness on arrises. "Spot" or undercoat surfaces as necessary to produce such results. Tint each coat a slightly different shade of finish color to permit identification. Conform to the approved Samples. Obtain approval of each coat before applying next coat; otherwise, apply an additional coat over entire surface involved at no additional contract cost.

### 3.06 COLORS:

The numbers given in the following schedule indicate the types of paints required for each surface, identified by their number in white. The actual paint to be applied on each surface shall be the same material in the color or colors as selected, and as approved on submitted samples. Allow for the use of several colors in each room or space, and for doors, frames, dados, trim and other items to be finished in different colors.

### 3.07 DEGREE OF GLOSS:

Degrees of gloss shown on drawings and herein specified are approximate only. The exact degree of gloss required for each surface will be determined. Materials shall meet the following requirements for degree of gloss, when tested according to ASTM D523, using Garner Laboratory 60 degree glass meter after 14 days.

<b>NOMENCLATURE</b>	<b>PERCENTAGE OF GLOSS</b>
Suede or eggshell	25 – 55
Satin or semi-gloss	55 – 70
Gloss or high gloss	More than 70

### 3.08 MISCELLANEOUS PAINTING:

- A. Duct Interiors: Paint with flat black fire-retardant paint to the extent visible through grilles and registers in finished rooms and spaces.
- B. Fire Extinguisher and Fire Hose Cabinets: Apply 2 coats of paint finish, inside and out, matching finish and color of adjoining areas, unless otherwise noted or directed.
- C. Color Coding: In mechanical and electrical equipment rooms and spaces, paint all ducts, piping, conduit, equipment and machinery, except such items having a complete factory finish, as specified for interior metal, colors as directed. Not more than 8 colors will be required.
- D. Weatherstripping and Sound Seals: Paint exposed metal surfaces to match the door frame, whether or not unfinished, furnished with factory prime coat, or factory treated for paint adhesion.
- E. Access Doors and Panels: Generally, paint same color as surrounding walls and ceiling.
- F. Registers and Grilles: Paint interiors of ducts showing through registers and grilles black. Paint interior surfaces of plenums visible through return air grilles, slotted return air inlets and other open construction flat black unless otherwise directed. This includes ducts, pipes, fireproofing, conduits, the structure and other construction in plenum areas. Painting shall extend to include all surfaces visible from any angle.
- G. Doors: Seal top and bottom edges after cleaning with coat of primer. Where the faces of the doors differ in color finish, finish the edges to match the face visible when the door

is open. Coat cutouts for hinges, edges of lockset holes and strikes same as for first coat.

- H. Door Trim and Prime Coated Hinges: Paint trim to match door and paint hinges to match frame.
- I. Speaker Grilles: Paint to match surrounding surfaces.
- J. Miscellaneous: For any items not specifically indicated or specified that require a paint finish, apply 3 coats of paint as directed.

### 3.09 CLEANING AND TOUCH-UP WORK:

Make a detailed inspection of paint finishes after all painting is completed, remove splatterings of paint from the adjoining surfaces, and make good all damage that may be caused by cleaning operations. Carefully touch-up all abraded, stained or otherwise disfigured painting, as approved, and leave entire painting in first-class condition.

Paint schedules continue on next page.

<b>TABLE I EXTERIOR PAINTING SCHEDULE (NEW)</b>	
<b>Surface, Coats</b>	<b>Dunn-Edwards</b>
<b>Plaster &amp; Concrete</b>	
100% Acrylic Emulsion	
First Coat	W709 Effstop
Second Coat	W901V Permasheen
Third Coat	W901V Permasheen
<b>Concrete Unit Masonry</b>	
(Only Where Indicated)	
First Coat	W305 Blocfil
Second Coat	W901V Permasheen
Third Coat	W901V Permasheen
<b>Ferrous Metal</b>	
First Coat	43-5 Corrobar
Second Coat	10 Synlusto
Third Coat	10 Synlusto
<b>Galvanized Metal</b>	
Pretreatment	GE123 Galva-Etch
First Coat	43-7 GlavAlum
Second Coat	10 Synlusto
Third Coat	10 Synlusto

<b>TABLE II INTERIOR ENAMEL MATERIALS (NEW) – 0 VOC</b>	
<b>Surface, Coats</b>	<b>Dunn-Edwards</b>
<b>Enamel Finish</b>	
Eggshell Latex, walls & Ceilings only	W602 Ecoshield Lo Sheen
Semi-Gloss Latex, door & windows	W603 Ecoshield Semi Gloss

<b>TABLE III INTERIOR PAINTING SCHEDULE (NEW) – 0 VOC</b>	
<b>Surface, Coats</b>	<b>Dunn-Edwards</b>
<b>Gypsum Board, Plaster and Concrete</b>	
Eggshell enamel finish	
First Coat	W600 Ecosheild Primer
Second Coat	W602 Ecoshield Lo Sheen
Third Coat	W602 Ecoshield Lo Sheen
<b>Gypsum Board, Plaster and Concrete</b>	
Semi-gloss enamel finish	
First Coat	W600 Ecosheild Primer
Second Coat	W603 Ecoshield Semi Gloss
Third Coat	W603 Ecoshield Semi Gloss
<b>Concrete Masonry</b>	
Eggshell Finish	
First Coat	W305 Block Fil
Second Coat	W602 Ecoshield Lo Sheen
Third Coat	W602 Ecoshield Lo Sheen
<b>Acoustic Tile</b>	
First Coat	W615 Acoustikote
Second Coat	W615 Acoustikote
<b>Wood, Modified Urethane</b>	
Transparent Finish	
Stain	V109 Stainseal
Second Coat	MC80-6841
Third Coat	MC80-6841
<b>Ferrous Metal</b>	
First Coat	43-5 Corrobar
Second Coat	Enamel Finish
Third Coat	Enamel Finish
<b>Galvanized Metal</b>	
Pretreatment	GE123 Galva-Etch
First Coat	43-7 GlavAlum
Second Coat	Enamel Finish
Third Coat	Enamel Finish

\*W715 Ultra Grip Primer to dry overnight before applying top coats.

SECTION 09970  
PREFINISHED WALL PANELS

PART 1 - GENERAL

1.01 SCOPE:

Division 1 applies to this Section. Provide prefinished wall panels, complete.

1.02 SUBMITTALS:

- A. Brochures and Instructions: Submit complete manufacturer's brochures, clearly annotated to indicate each type of paneling and trim proposed for use. Submit complete installation instructions. Submit list of all adhesives, sealants and fasteners proposed for use.
- B. Samples: Submit 12" square samples of each type and color of paneling, and 12" long samples of each type of molding and trim.

1.03 PRODUCT HANDLING:

Protect materials before, during and after installation and until completion of the project.

1.04 JOB SITE CONDITIONS:

Interior of building shall be above 60 degrees F prior to installation of panels, and shall be kept at 60 degrees F or higher following installation.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Marlite  
202 Harger Street  
Dover, OH 44622  
(330) 343-6621  
FAX (330) 343-7296
- B. Or equal as approved in accordance with Division 1, General Requirements for Substitutions.

2.02 MATERIALS:

- A. Fiberglass Reinforced Polyester Panels shall be Marlite Surface System Ten or equal. Panels shall be 3/4 inch thick by 24" square, with square cut horizontal edges, vertical edges kerfed to accept cross splines. Colors and textures shall be as scheduled.

B. Construction: Prefinished wall panels shall be fabricated of fiberglass reinforced plastic composed of modified polyester copolymer and inorganic fillers and pigment, reinforced with random chopped fiberglass roving.

C. Performance: Panel material shall have not less than the following characteristics:

PHYSICAL PROPERTIES		
Physical Property, units	Test Method	Acceptable Value
Rockwell "R" hardness	ASTM D 785	130
Flexural strength, psi	ASTM D 790	9,400
Tensile strength, psi	ASTM D 638, D 651	4,800
Flexural modulus, psi	ASTM D 790	420,000
Tensile modulus, psi	ASTM D 638	710,000
IZOD impact strength Foot-pounds/inch	ASTM D 256	6
Coefficient of thermal expansion inches/inch/° F	ASTM D 696	2.1 x 10 <sup>-5</sup>
Gardner impact at 0° F, inch-pound		20, surface damage 30, puncture damage

D. Trim:

1. Edge trim: Narrow line inside and outside corner and edge trim, fabricated of aluminum with satin anodized finish.
2. Rails and splines: Fabricated of aluminum, designated for fully concealed installation.
3. Vinyl-covered Aluminum Moldings M451-AW, M460-AW, M465-AW and M470-AW for 1/4" Marlite paneling.

E. Sealants: Marlite #CS-100 clear sealant.

### PART 3 – EXECUTION

#### 3.01 SURFACE CONDITIONS:

Prior to any work of this section, inspect the installed work to receive paneling, and verify that all such work is complete and in satisfactory condition for installation of paneling.

#### 3.02 PREPARATION OF SURFACES:

Wall surfaces shall be thoroughly dry.

3.03 INSTALLATION:

- A. Cut with fine tooth saw, with face side up. Cut neatly around pipes or boxes.
- B. Wall panels shall fit against and on top of base, or as shown on details; cut neatly to fit.
- C. Edge trim shall be used at perimeter, on inside and outside corners, but not between panels.
- D. Install bottom and side perimeter trim, then install panels using concealed main rail at horizontal joints and concealed cross splines at vertical joints, fully locking all edges of panels together. Main rails shall be securely anchored to each wall stud. Top trim shall be anchored as recommended by panel manufacturer.

3.04 CLEANING:

Clean all smudges or adhesive from the face of the panels of moldings and all adjacent surfaces. Remove all excess material.

END OF SECTION



SECTION 10110  
MARKER BOARDS

PART 1 - GENERAL

1.01 SCOPE:

Division 1 applies to this section. Provide marker boards, complete. Tackable wall panels are specified in Section 10120.

1.02 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings and samples for marker boards, mounting hardware and adhesive. Show materials, finish, characteristics, construction, and fabrication details and procedures, layout and erection diagrams, methods of anchorage to building construction, templates for backing or anchorage and other criteria.
- B. Product Data: Submit data and catalogs for marker boards and adhesives.
- C. Samples: Submit samples of marker board and aluminum trim. Submit full color ranges for selection.

1.03 WARRANTY:

Provide written warranty against porcelain fading, chipping, cracking or peeling, or becoming slick, shiny or warped for 20 years.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

- A. Claridge Products & Equipment, Inc (870) 743-2200
- B. PolyVision Corp. (909) 340-2800
- C. ABC School Equipment Inc. (800) 498-2990
- D. Platinum Visual Systems (951) 817-9992
- E. Tri-Best Visual Display (909) 980-9982

2.02 BASIC MATERIALS:

- A. Steel Sheet: ASTM A424, Type I and commercial quality.
- B. Aluminum Extrusions: ASTM B221, 6063 alloy, T5 temper.
- C. Cork: Fine grain natural cork, homogeneous composition.
- D. Particle Board: ANSI A208.1; wood shavings set with waterproof resin binder, sanded faces.

- E. Fiberboard: Industrial insulation board, ironed and prime coated, ASTM C208, cellulosic, 3/8 inch thick, 4 foot wide x required length.
- F. Foil Backing: Aluminum foil sheets.
- G. Adhesives: Type recommended by manufacturer.

#### 2.03 FABRICATION:

- A. Marker Boards: Factory built units of sizes indicated on drawings, consisting of whiteboard, designed for use with chalkless markers, 24 gauge steel with white porcelain enameled marker or projection surface. Core shall be 1/2" thick particle board or fiberboard. Backing shall be 0.005-inch aluminum foil. Trim shall be manufacturer's standard narrow line aluminum trim with map rail and implement rail.
- B. Mounting Hardware and Adhesives: Furnish concealed fasteners and wall mounting devices, complete for each application, as shown on approved submittals.

#### 2.04 ACCESSORIES:

Provide 2 metal map hooks for each marker panel up to 6 feet long and 4 hooks for each panel over 6 feet long. Provide map rail ends on each side of map rail. Provide hangers and brackets for installation of units.

### PART 3 – EXECUTION

#### 3.01 INSTALLATION:

Conform to approved submittals and manufacturers installation directions. Attach marker boards with concealed fasteners into backing plates.

#### 3.02 CLEANING:

Clean markerboard and chalkboard surfaces in accordance with manufacturer's instructions. Cover cleaned surfaces with protective cover, taped to frame. Remove protective cover at date of substantial completion, or when directed.

END OF SECTION

## SECTION 10120

### VINYL COVERED TACKABLE PANELS

#### PART 1 - GENERAL

##### 1.01 SCOPE:

Division 1 applies to this Section. Provide vinyl covered tackable panels, as indicated, specified and required.

- A. Related work not in this Section: Substrates to receive vinyl covered tackable panels.

##### 1.02 QUALITY ASSURANCE:

- A. Fire Resistance: Panel components shall have the following fire resistance ratings when tested in accordance with ASTM E84.

Flame Spread:	less than 25
Smoke Developed:	less than 25

##### 1.03 SUBMITTALS:

- A. Shop Drawings: Submit shop drawings showing fully dimensioned wall elevations, sizes and locations of framing, trim, locations and methods of seaming vinyl fabric, mounting details, cutouts for new and existing electrical outlets, items to be surface-mounted over panels, and all other conditions.
- B. Samples: Submit the following:
  - 1. 6" square samples of fabric, showing full range of colors and textures, neatly bound.
  - 2. Panel core, 6" square, and each fastener and accessory.
  - 3. Cutaway section of finished panel, 24" square, showing construction and method of attachment.
- C. Fire Ratings: Submit certified copies of complete test reports, performed by a recognized testing laboratory, and showing compliance with required fire resistance ratings.
- D. Installation Instructions: Provide panel manufacturer's installation instructions.
- E. Maintenance Instructions: Furnish recommended cleaning procedures.

##### 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver materials to the site in manufacturer's original unopened containers. Keep all materials dry, clean and protected from deterioration.

#### 1.05 JOB CONDITIONS:

Do not install wall systems until all other work in the space is completed and the temperature is maintained at 70 degrees F constantly.

#### PART 2 – PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURER:

- A. Koroseal Interior Products (855) 753-5474
- B. Claridge Products & Equipment, Inc (870) 743-2200
- C. PolyVision Corp. (909) 340-2800
- D. ABC School Equipment Inc. (800) 498-2990

##### 2.02 MATERIALS:

- A. Core: 1/2" thick NCFR Homasote manufactured by Homasote Co. (800) 257-9491, or NACO or BP Celotex industrial insulation board, UL labeled with specified fire resistance, in largest sizes available to fit the conditions shown with minimum number of joints.
- B. Vinyl fabric: PolyVision series, Koroseal Chant N0. 8821-71 Delta
- C. Trim: Vinyl fabric wrapped, to match vinyl panels, fabricated of extruded aluminum at bottom and exposed sides, J-profile for perimeters, H beads for adjoining panels.
- D. Adhesive: Lamvin Pro Series SW-325 heavy duty construction and shear adhesive, latex based, non-flammable, VOC compliant.

##### 2.03 FABRICATION:

- A. Fabricate panels in largest available size or as indicated, with square corners, and joints only in locations indicated on approved submittals. Use continuous panels wherever possible.
- B. Where penetrations occur, make accurate openings and securely return fabric under openings, without visible fabric edges or fraying on panel surface.
- C. Laminate fabric facing to core; adhesive may be used at the Contractor's option but shall not change the flame spread nor smoke developed ratings.
- D. Eliminate air pockets between vinyl covering and backing surface.
- E. Vinyl covering shall be secure, smooth, clean, without wrinkles, bubbles, gaps, overlaps, tears or other imperfections.

## PART 3 – EXECUTION

### 3.01 INSPECTION:

Verify conditions and measurements affecting the work of this section at site. Assure that electrical outlets in area to receive panels have been installed and that boxes are at proper plane. Make sure that detrimental conditions are corrected before proceeding with installation.

### 3.02 INSTALLATION:

Installation of wall system shall be by manufacturer, authorized distributor or other firm recommended by manufacturer, as approved.

- A. Install panels in compliance with their manufacturer's printed instructions and as shown on drawings. Coordinate the installations with related work.
- B. Install panels plumb, level, with hairline joints, undamaged edges, and in alignment with other panels, scribed to fit adjacent work accurately at borders and at penetrations.
- C. Apply adhesive over entire back surface of panels at rate recommended by the adhesive manufacturer.
- D. Position panels and drive fasteners, spaced at 12 inch centers, at perimeter of panels.
- E. Coordinate installation of existing and new electrical outlets and other items to be surface-mounted over finished panels so that openings are completely covered, leaving no visible gaps or raw fabric edges.
- F. Clean and replace damaged components at no additional contract cost.

### 3.03 CLEAN UP:

At completion of the work, remove all debris resulting from the installation from the site. Deliver extra material to Owner at location directed. Vacuum tackable walls clean to remove all lint, dust and other deleterious material.

### 3.04 PROTECTION:

Cover walls with plastic film until final acceptance. All damage, including dirt which cannot be readily removed, which occurs to completed fabric panels, prior to final acceptance, shall be replaced or repaired by the Contractor.

END OF SECTION

## SECTION 10165

### SOLID PLASTIC TOILET COMPARTMENTS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide solid plastic toilet compartments, complete.

- A. Work in this Section: Principal items include:
  - 1. Floor mounted overhead-braced toilet compartments.
  - 2. Privacy screens.
- B. Related work not in this Section:
  - 1. Concealed backing or blocking in walls.
  - 2. Toilet accessories.

##### 1.02 SUBMITTALS:

- A. Shop Drawings: Submit dimensioned layouts, with the required location of backing in walls, preparation and reinforcing of panels to receive various toilet accessories, grab bars and erection diagrams. Indicate elevations of partitions, fastenings, proposed method of anchoring, size and spacing of anchors, details of construction, hardware, fittings, mountings, and other related items and installation details.
- B. Product Data: Submit catalog data for each hardware item and fitting, including construction details, material descriptions, dimensions for individual components and profiles and finishes.
- C. Samples: Submit samples of plastic finishes in all available colors for selection. After color selection has been made, submit samples of each color for verification.
- D. Maintenance Instructions: Provide manufacturer's recommended procedures for care of finished surfaces.

##### 1.03 ACCESSIBILITY COMPLIANCE:

- A. Layouts of compartments designated as enclosures for persons with disabilities and hardware provisions therefore shall comply with current disabled accessibility requirements in the California Code of Regulations, Title 24 and 2010 ADA Standards for Accessible Design.
- B. Toilet compartments for persons with disabilities shall be provided with the following, together with all other applicable requirements:

1. Toilet stalls for persons with disabilities shall have slide bolt door latch, U-shape or wire pulls on both sides of the door and self-closing hinges. Door hardware shall be centered between 30" to 44" above finished floor.
2. Doors at front entry stalls shall have 32" minimum clear width when the door is open 90 degrees.
3. Doors at side entry stalls shall have 34" minimum clear width when the door is open 90 degrees.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER:

- A. Scranton Products, (800) 445-5148
- B. Santana Toilet Partitions, (800) 368-5002
- D. Capitol Toilet Partitions. (800) 445-5148

#### A. Substitutions:

- B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

### 1.2 MATERIAL

- A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface;

### 1.3 SOLID PLASTIC TOILET COMPARTMENTS

- A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.

1. Style: Floor mounted overhead-braced toilet compartments.

- B. Doors, panels, and pilasters shall be 1 inch (25 mm) thick with all edges rounded to a radius. Doors and dividing panels shall be mounted based on height of specified system.

1. Door and Panel Height: 66 inches high (1676 mm) (requires a modular panel).

2. Door Design: Flat

3. Door & Pilaster Edge: Standard.

- C. Panel Color: Metallic Series:

1. Stainless - Grip Ex.

2. Pilaster shoes shall be 3 inches (76 mm) high stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.

- D. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.  
Headrail brackets shall be 20 gauge stainless steel with a satin finish and secured to the wall with a stainless steel tamper resistant Torx head screws.
- E. Wall Brackets:
1. Stainless Steel Brackets: Wall brackets shall be made of stainless steel type 304.
  2. Bracket Type: Stirrup stainless steel double ear.
- F. Door Hardware:
1. Hinges: 71 inches (1803 mm) continuous stainless steel helix.
  2. Vault Hinge: Heavy-duty diecast vault zamac hinge shall have gravity-acting cams and are fabricated from a die cast aluminum alloy with a brushed finish and wrap around flanges. The cam is constructed from  $\frac{3}{4}$ " diameter nylon rod and a  $\frac{3}{8}$ " stainless steel pin.
  3. Integral Hinges (Stealth): Hinges shall be integral, fabricated in the door and pilaster with no exterior exposed metal parts. Hinges operate with field adjustable nylon cams. Cams can be field adjusted to any degree.
  4. Wrap-Around Hinges: Hinges shall be 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum wrap-around hinges through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
  5. Wrap-Around Hinges (Regal): Hinges shall be fabricated from heavy-duty cast aluminum, wrap around flanges through bolted to doors and pilasters. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 90-degree increments.
  6. Door strike/keeper shall be made of heavy-duty extruded aluminum (6436-T5 alloy) with a bright dip anodized finish and secured to the pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
    - a. Style: 3 inches (76 mm) stainless steel emergency access
  7. Stainless Steel Paddle Latch and housing shall be made of heavy-duty stainless steel type 304. The latch housing and paddle shall have a bright finish.
  8. Each door shall be supplied with door pull made of chrome plated Zamak.
  9. Equip outswing handicapped doors with second door pull and door stop.

#### 1.4 SOLID PLASTIC PRIVACY SCREENS

- A. Provide plastic privacy screens in urinal and entry toilet room applications as indicated or scheduled.
- B. Panels, and pilasters, if required, shall be 1 inch (25 mm) thick with all edges rounded to a



radius. Screens shall be mounted at 14 inches (356 mm) above the finished floor. Color as selected by Architect from manufacturer's full line of current colors.

C. Type: Wall mounted screen.

2. Screen: Urinal screens shall be 24 inches (610 mm) wide by 42 inches (1067 mm) high.

C. Type: Pilaster supported screen.

1. Configuration: Floor pilaster supported screen.
2. Screen: Urinal screens shall be 24 inches (610 mm) wide by 42 inches (1067 mm) high.
3. Pilaster: Pilaster screens shall be 82 inches (2083 mm) high.
4. Headrail shall be made of heavy-duty extruded aluminum (6463-T5 alloy) with anti-grip design and integrated curtain track. The headrail shall have a clear anodized finish and shall be fastened to the headrail bracket by a stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws
  - a. Pilaster sleeves shall be stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.
5. Pilaster sleeves shall be 3 inches (76 mm) high secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.
  - a. Pilaster sleeves shall be stainless steel (type 304, 20 gauge) secured to the pilaster with a stainless steel tamper resistant Torx head sex bolt.

A. Wall brackets shall be made of extruded PVC plastic. Brackets are fastened to the panel/pilaster with stainless steel tamper resistant torx head screws and fastened to the wall with stainless steel tamper resistant torx head sex bolts.

1. Wall brackets shall be 54 inches (1327 mm) long.

D. Wall brackets shall be 1-1/2 inches (38 mm) stirrup type made of heavy-duty aluminum (6463-T5 alloy). Stirrup brackets shall be fastened to panel/pilaster with stainless steel tamper resistant Torx head sex bolts.

2.02 MATERIALS:

- A. Door, Panel and Pilaster Construction: Solid High-density polyethylene (HDPE) panel material, seamless with eased edges and with homogenous color and pattern throughout thickness of material, containing minimum of 30% recycled material manufactured under high pressure forming a single component section which is waterproof, non-absorbent and has a self-lubricating surface that resists marking with pens, pencils or other writing utensils. The material shall conform to the following:

PHYSICAL PROPERTIES		
Physical Property, units	Test Method	Acceptable Value
Density, g/cc	ASTM D 1505	0.962
Tensile strength	ASTM D 638	4,600
Elongation @ break	ASTM D 638	>600
Vicat softening point	ASTM D 1525	131
Low temperature Brittleness, F50	ASTM D 747	< -76
Hardness, Shore D	ASTM D 2240	67
Flexural modulus	ASTM D 790	225,000
Interior finish PP / HDPE	NFPA 286	

- B. Aluminum: Alloy 6364-T5, clear anodized unless otherwise specified
- 2.03 TOILET COMPARTMENTS:
- A. Type: Floor Mounted Overhead Braced system, no sight, integral hinge, flush front solid plastic compartments, Color: As noted and indicated on the Finish Schedule.
- B. Construction: Panels, stiles and doors shall be formed of solid HDPE plastic. Stiles, panels and doors shall have a finished thickness of 1". Edges shall be machined to a radius of 1/4". Headrails and headrail returns of overhead braced toilet compartments shall be anodized aluminum with satin finish.
1. Bottom edges of doors shall have aluminum edging strips attached with stainless steel fasteners.
- C. Hardware:
1. Integral hinges shall be continuous type, heavy aluminum extrusion with stainless steel pin and nylon spacers between hinge knuckles. Door shall be self closing to accommodate accessibility requirements.
  2. Door latch housing shall be fabricated from heavy aluminum with clear anodized finish, surface mounted and through bolted to the door with one way bolts. Slide bolt and button shall be heavy aluminum with black finish.
  3. Keeper: 4" long extruded aluminum strike with clear anodized finish, surface mounted, fastened to pilaster in alignment with door latch with stainless steel one-way screws.

- D. Latch and Keeper: Surface mounted latch unit designed for physical disability accessibility, with combination rubber-faced door strike and keeper.
- E. Coat Hook: Combination hook and rubber-tipped bumper, sized to prevent door from hitting compartment-mounted accessories.
- F. Door Bumper: Rubber-tipped bumper at out-swinging doors.
- G. Door Pull: Pulls for compartments for persons with disabilities shall be ADA approved and fabricated of stainless steel. Provide on both sides of doors at compartments for persons with disabilities.
- H. Attachment Devices:
  - 1. Pilaster shoes shall be solid color as selected, plastic, anchored to finish floor with wedge anchors with a minimum embedment of 2" into the concrete slab.
  - 2. Full length continuous plastic wall brackets, color as selected, weighing not less than 0.822 pounds per lineal foot, shall be used to attach panels to pilaster, pilasters to wall and panels to wall. Wall brackets shall be through bolted to panels and pilasters with one way bolts. Attachment to wall shall be as required by the wall construction, using stainless steel fasteners with a minimum 2" embedment into wood blocking.
- I. For overhead braced partitions, headrail shall be heavy aluminum extrusion in anti-grip configuration, weighing not less than 1.188 pounds per lineal foot. Headrail shall be fastened to tops of pilasters and headrail brackets by through bolting with stainless steel screws / bolts with theft-resistant-type heads. Headrail brackets shall be stainless steel, mill finish.
- J. At unsupported panels, provide floor to ceiling pilasters.

## PART 3 – EXECUTION

### 3.01 EXAMINATION:

- A. Before covering wall and ceiling framing with finish materials, examine framing to ensure that backing plates and structural framing have been installed in such position as to receive all attachment screws.
- B. Verify spacing of plumbing fixtures to ensure compatibility with installation of compartments.
- C. Do not start the work of this section until all deficiencies have been corrected.

### 3.02 INSTALLATION:

- A. General: Install toilet compartments as shown on the shop drawings and in accordance with the manufacturer's specifications and printed installation instructions. Install toilet

compartments and doors in a rigid and substantial manner, straight and plumb, with horizontal lines level.

- B. Pilasters: Secure pilasters to supporting members and level, plumb and tighten the installation with leveling nuts and lock washers. Anchor floor to ceiling pilasters rigidly to ceiling or roof structure as applicable.
- C. Panels: Secure panels and doors to pilasters so that exterior faces are flush. Provide clearances of not more than 1/2 inch between pilasters and panels and 1 inch between panels and walls. Secure panels to walls with 2 stirrup brackets located near the top and bottom of each panel. Fasten brackets with wood screws into wood studs or blocking fastened directly to the studs.
- D. Pilaster shoes: Provide 15/16 inch x 3 inch stainless steel bracket anchored to finished floor with #14-16 plastic anchors and No. 14, 1-1/2 inch long stainless steel Torx Pan head screws.
- E. Headrail of overhead braced units shall be fastened to tops of pilasters and headrail brackets by thru-bolting with one-way stainless steel sex bolts. Cadmium plated sex bolts will not be acceptable.

### 3.03 ADJUSTING AND CLEANING:

- A. Adjust brackets to provide uniform clearances not exceeding:

Pilaster and wall:	1 inch (25mm)	Pilaster and panels:	1/2 inch (13mm)
Panels and walls:	1 inch (25mm)	Pilaster and doors:	3/16 inch (4.76mm)

- B. Remove all dented, punctured, defaced, stained or scratched material and provide new material. Refinish marred, abraded and lightly scratched material only when written approval provided. Leave the entire installation clean and free of oil, grease, handmarks or other foreign matter, and with hardware adjusted for correct operation.
- C. Set hinges on in-swinging doors to hold open at approximately 30 degrees from closed position when unlatched.
- D. Set hinges on out-swinging doors to return doors to fully closed position.
- E. Shoes at floor shall completely cover all installation brackets, holes and fasteners. Evidence of drilling, cutting or patching shall not be visible in the finished work. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 1/4 inch.

END OF SECTION

## SECTION 10260

### PROTECTIVE WALLCOVERING AND CORNER GUARDS

#### PART 1 - GENERAL

##### 1.01 SCOPE:

Division 1 applies to this Section. Provide protective wallcovering, and 3" x 3" vinyl corner guards, complete.

##### 1.02 SUBMITTALS:

- A. Protective Wallcovering: Submit complete manufacturer's brochures, clearly annotated to indicate each type of wall covering and trim proposed for use. Submit complete installation instructions. Submit list of all adhesives, sealants, fasteners, trim, and accessories proposed for a complete installation.
- B. Corner Guards: Submit complete manufacturer's brochures, clearly annotated to indicate each type of corner guard proposed for use. Submit complete installation instructions. Submit complete list of fasteners, trim, and accessories proposed for a complete installation.
- C. Shop Drawings: Submit shop drawings showing components, dimensions, and anchorage details.
- D. Samples: Submit 12"x12" sample of each type and color of protective wallcovering material, including 12" samples of each proposed trim piece; Submit 12" long sample of each type, size, and color of corner guard, including end caps, for Architect's approval.
- E. Certification: Submit manufacturer's certification indicating compliance with ADA requirements.
- F. Maintenance Instructions: Submit manufacturer's maintenance instructions for all materials specified, herein.

##### 1.03 PRODUCT HANDLING:

Product delivery, storage, and handling shall be in strict accordance with manufacturer's specifications, instructions, and recommendations. Protect materials before, during and after installation and until completion of the project.

##### 1.04 JOB SITE CONDITIONS/ENVIRONMENTAL REQUIREMENTS:

- A. Maintain constant minimum air temperature of 65 degrees Fahrenheit for a minimum of 48 hours before and during installation.

- B. Maintain wall temperature between 65 and 85 degrees Fahrenheit during installation.
- C. Do not expose walls to direct sunlight during or after installation.
- D. Do not install if relative humidity is greater than 80%.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS:

Koroseal Wall Protection Systems, RJF International Corporation, (855) 753-5474  
C/S Group, (888),834-4455  
InPro Corporation, (800) 222-5556

or approved equal.

### 2.02 PROTECTIVE WALLCOVERING:

- A. Koroseal “Traffic Patterns” protective wall covering: decorative high-impact rigid vinyl sheet with polyvinyl fluoride film. Colors and textures shall be as scheduled.
- B. Adhesives: As approved by Protective Wallcovering manufacturer.
- C. Accessories: Moldings: Furnish accessory molding by Protective Wallcovering manufacturer. Moldings shall be of a complementing solid color from manufacturer’s standard selection; Caulking: furnish colored caulk from Protective Wallcovering manufacturer. Caulk shall be of a complementing solid color from manufacturer’s standard selection.

### 2.03 CORNER GUARDS:

- A. Koroseal “Korogard” G200 3” x 3” Corner Guard mounted over continuous aluminum retainer. End caps shall have color and texture to match corner guard. Exposed surfaces shall be free of wrinkling, chipping, discoloration, or other imperfections. Install at all hall/corridor wall corners.

## PART 3 – EXECUTION

### 3.01 EXAMINATION:

Prior to any work of this section, inspect the installed work to receive paneling, and verify that all such work is complete and in satisfactory condition for installation of specified materials.

### 3.02 SURFACE PREPARATION:

Prepare walls in accordance with manufacturer's written instructions. Remove dust, dirt, grease, oil, loose paint, and scale. Resurface uneven wall surfaces.

### 3.03 INSTALLATION:

- A. Install materials and products in accordance with manufacturer's written instructions .
- B. Allow protective wallcovering and adhesive to precondition for a minimum of 24 hours at a temperature between 65 degrees and 85 degrees Fahrenheit before installation.
- C. Install protective wallcovering sheets with texture running in the same uniform direction.
- D. Install corner guards accurately in location, alignment, and elevation.

### 3.04 CLEANING:

Clean installed materials and products in accordance with manufacturer's instructions. Clean all smudges or adhesive from the exposed surfaces of all installed materials and from all adjacent surfaces. Remove all excess material.

END OF SECTION

## SECTION 10350

### FLAGPOLES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

##### 1.2 SUMMARY

- A. Section includes ground-mounted flagpoles made from aluminum and aluminum alloy seamless Pipe and Seamless Extruded Tube.
- B. Owner-Furnished Material: Flags.
- C. Related Sections:
  - 1. Division 7 Sections for base flashing at roof-mounted flagpoles.
  - 2. Division 7 Section "Sheet Metal Flashing and Trim" for counterflashing at roof-mounted flagpoles.
  - 3. Division 13 Section "Lightning Protection" for connecting wall- and roof-mounted metal flagpoles to lightning protection system.
  - 4. Division 16 Section "Exterior Lighting" for site lighting fixtures.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
  - 1. Seismic Loads: Mapped spectral acceleration  $S_s=1.741g$ ,  $S_1=0.60g$ ; Site Class=D; Spectral response coefficients  $S_{ds}=1.161g$ ,  $S_{d1}=0.60g$ ; Seismic design category = D according to ASCE 7-05.
  - 2. Wind Loads: 85 MPH, Exposure "B" according to ASCE 7-05
  - 3. Base flagpole design on polyester or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.



- B. Shop Drawings: For flagpoles. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
  - 1. Include section, and details of foundation system for ground-mounted flagpoles.
- C. Samples for Verification: For each type of exposed finish required, provide two samples representing actual color and finish of installed product in manufacturer's standard sizes.
- D. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.
- E. Qualification Data: For qualified professional engineer.
- F. Operation and Maintenance Data: For flagpoles to include manufacturer's operation and maintenance manuals.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.
- B. Protect flagpole and accessories from damage or moisture.

## 1.7 WARRANTY

- A. Manufacturer's Warranty: Furnish flagpole manufacturer's standard warranty against defects in product workmanship and materials.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
  - 1. Interstate Pole industries (800) 832-7707
  - 2. American Flagpole Co. (800) 368-7171
  - 3. Pole-Tech, Inc., (800) 633-6733
  - 4. Concord Industries, Inc., (800) 527-3902

- B. Or equal as approved in accordance with Division 1, General Requirements for Substitutions.

## 2.2 FLAGPOLES

- A. Flagpole Construction,
  - 1. Shaft: Seamless cone-tapered aluminum tubing conforming to ASTM B241 Alloy 6063, Temper T6 with minimum wall thickness of .156 inches, with 6" butt diameter and 6.5 top diameter.
  - 2. Finish: Polished to a deep luster sheen; clear anodized finish conforming to AA M32-C22-A41.
- B. Exposed Height: 30 – 35 feet.
- C. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
  - 1. Provide flashing collar of same material and finish as flagpole.
  - 2. Provide steel ground protectors extending 12 inches (300 mm) aboveground and 6 inches (150 mm) belowground for steel flagpoles where flashing collars are not provided.
- D. Sleeve for aluminum Flagpole: PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.
  - 1. Provide flashing collar of same material and finish as flagpole.

## 2.3 FITTINGS

- A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
  - 1. 14 gauge wall thickness, flush seam, spun aluminum with gold anodic finish, diameter matching butt diameter of shaft.
- B. Internal Halyard, Cam Cleat System 5/16-inch- (8-mm-) diameter, (number 10) braided white waterproof polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
  - 1. Halyard Flag Snaps: Provide two **brass** swivel snap hooks per flag halyard.
    - a. Provide with neoprene or vinyl covers.
- C. Truck: Cast Aluminum housing and spindle, revolving mounting with 26 stainless steel ball bearings, non-fouling.

## 2.4 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- C. Sand: ASTM C 33, fine aggregate.
- D. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Division 7 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, **AA-M12C22A31, Class II, 0.010 mm** or thicker.
- B. Gold Anodic Finish: AAMA 611, AA-M32C22A43 Class I, 0.018 mm or thicker; gold color.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

- B. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- C. Place concrete, as specified in Division 3 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.
- D. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

### 3.3 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.
- B. Ground Set: Place foundation tube center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.
  - 1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
- D. Mounting Brackets and Bases: Anchor brackets and bases securely through to structural support with fasteners as indicated on Shop Drawings.

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 Section 1143A
- 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 11B-703.3 and 1143A.

#### 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. Panels 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, not 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; lag 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 10522  
FIRE EXTIGUISHERS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this section. Provide cabinet & fire extinguishers, complete.

1.02 SUBMITTALS:

- A. Shop Drawings: Submit showing installation details and required backing locations.
- B. Samples: Submit such samples as may be requested, which will be returned to Contractor. Approved samples may be installed in the work.
- C. Manufacturer's Data: Submit complete manufacturer's data for each product, clearly annotated to show exact products and options proposed for use.

1.03 QUALITY ASSURANCE:

- A. Comply with CBC Standard Section 10-1.
- B. Comply with Title 19.
- C. Mounting locations: For semi-recessed mounted extinguishers, as indicated on floor plans.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

- A. JL Industries, Inc.(800) 554-6077
- B. Potter-Roemer (800) 366-3473

2.02 MATERIALS:

- A. Extinguishers: JL Industries Cosmic 5E, UL rating 2A:10B:C, 5" diameter, 16" high, Type ABC multi-purpose dry chemical type and red glossy polyester coated steel cylinder with pressure gauge, semi recessed Steel cabinet in wall.
- B. Cabinet: Fire Extinguisher Cabinet: Potter-Roemer cabinets are listed as the standard of quality, products by other listed manufacturers are acceptable.
  - 1. Fully recessed cabinet: Provide fully recessed, square trim edge cabinet with ½ inch projection:
    - a. Potter-Roemer Fire Extinguisher Cabinet 1036:

- 1) Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.
- 2) Cabinet Door and Frame: Cold rolled steel electrostatically applied, thermally fused polyester coating with recoatable white finish.
- 3) Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXTINGUISHERS" in contrasting color to cabinet finish, and either vertical or horizontal lettering depending upon door style.

#### 2.03 QUANTITY:

In addition to quantity shown, review requirements with Fire Marshal and provide all required. Coordinate locations of extinguishers and cabinets.

#### PART 3 – EXECUTION

##### 3.01 INSTALLATION:

Exact locations shall be as indicated or directed. Mount brackets rigidly to wall using appropriate fasteners for each type construction. Install extinguishers on brackets.

END OF SECTION

SECTION 10810  
TOILET ACCESSORIES

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this section. Provide accessories for toilet rooms, complete.

- A. Where District-furnished accessories are indicated on the drawings, they shall be installed by Contractor. Refer to Division 1.

1.02 SUBMITTALS:

- A. Shop Drawings: Submit showing installation details and required backing plate locations.
- B. Manufacturer's catalog cuts and data sheets, complete parts list, and installation requirements for each accessory item specified.
- C. Maintenance data, operating instructions and keys required for each type of locked accessory.
- D. Samples: Submit such samples as may be requested, which will be returned to Contactor. Approved samples may be installed in the work.
- E. Certificates:
  - 1. Report of test by independent laboratory of grab bar strength & installation methods.
  - 2. Certificate of mirror guarantee.

1.03 WARRANTY: Furnish 10 year warranty for all mirrors against silver spoilage.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver items in manufacturer's original unopened packaging and store under protective cover until installed. Where accessories are furnished with strippable coatings, leave coatings intact until final acceptance.

1.05 COMPLIANCE WITH DISABLED ACCESS LAWS:

- A. Accessories and other items specified herein and hardware provisions therefore shall comply with current requirements for access for the disabled, in the California Building Code.
- B. Toilet accessories required to be accessible shall be mounted at heights according to CCR, T-24, Section 11B-604. Toilet paper and feminine napkin dispensers located on the grab bar of an accessible toilet room or stall shall not project more than 3 inches from the finished wall surface nor be located closer than 1-1/2 inch clear of the tangent point of the grab bar.

## PART 2 – PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS:

Products of Bobrick are indicated on drawings. Equivalent products of other manufacturers listed herein may be substituted for approval:

Bobrick Washroom Equipment, Inc.  
1611 Hart Street  
North Hollywood, CA 91605  
(818) 764-1000

Bradley Corp.  
W142 N9101 Fountain Blvd.  
Menomonee Falls, WI 53051  
(262) 251-6000

World Dryer Corp.  
5700 McDermott Drive  
Berkeley, IL 60163  
(800) 323-0701

Accessories, except where specified otherwise, shall be products of a single manufacturer. All accessories specified or furnished with key locks, shall be keyed alike.

### 2.02 BASIC MATERIALS:

Accessories as scheduled on drawings, stainless steel products of one of the above listed manufacturers or equal. All accessories, insofar as possible, shall be products of a single manufacturer. All accessories specified or furnished with key locks, shall be keyed alike.

- A. Stainless Steel: ASTM A 167, Type 302 or 304, with No. 4 finish.
- B. Steel: ASTM A366, commercial quality, cold rolled.
- C. Zinc Coating: ASTM A 123, Class G-90.
- D. Chromium Plating: ASTM B456, Type SC2.
- E. Aluminum:
  - 1. Extrusions: 6063 T5, satin anodized finish.
  - 2. Sheet: 5005 H14.
- F. Brass: FS WW-P-541, cast or forging quality alloy.
- G. Fasteners: Stainless steel where exposed, stainless or galvanized steel where concealed. Provide theft resistant types where exposed.
- H. Mounting Devices: ASTM A386, galvanized steel.

## 2.03 FABRICATION:

- A. Recessed accessories shall have seamless one piece flange on exposed face. Weld all corners, leave no open miters.
- B. All receptacles and storage containers shall be fabricated of Type 302 or 304 stainless steel. Series 400 stainless steel is not acceptable.
- C. All edges, both exposed and concealed, shall be ground smooth. Rough edges on any part of the accessories will be cause for rejection.
- D. Use continuous piano hinges on doors.
- E. Accessories specified or furnished with key locks, shall be keyed alike, except that key coin boxes of coin operated dispensing units shall be keyed differently from the locks on the units.

## PART 3 – EXECUTION

### 3.01 INSPECTION:

Verify that openings to receive accessories are constructed to correct size, and are plumb, level, and in alignment with other items so indicated. Verify that surfaces to receive accessories are in alignment, so that installed accessories will be flat, level, plumb, fitted snugly against adjoining surface without gaps.

### 3.02 INSTALLATION:

- A. Regulatory Requirements: Accessories shall be located to comply with ADA requirements and CBC Section 11B-604. Toilet paper and feminine napkin dispensers located on the grab bar side of an accessible toilet room or stall shall not project more than 3 inches from the finished wall surface nor be located closer than 1-1/2 inch clear of the tangent point of the grab bar.
- B. Install all accessories square, plumb and level. Securely anchor by mechanical means only using stainless steel fasteners. Conform to rough-in and installation templates. Exact locations shall be as indicated or directed.
- C. Installation shall be in accordance with manufacturer's specifications and recommendations.
- D. Drill holes to correct size and application so that it is concealed by item with 1/4" tolerance.
- E. Mount recessed accessories into wall openings with sheet metal screws into metal frames.
- F. Mount surface mounted accessories to backing plates with machine screws, plumb and align.



- G. Install manufacturer's recommended anchorage system for all grab bars.
- H. Fit flanges of accessories snug to wall surfaces. Caulk gaps between flanges and finish wall surfaces after accessories are installed.

3.03 ADJUSTMENT AND CLEANING:

At completion, adjust all accessories for smooth operation, and clean and polish all surfaces. Deliver keys and maintenance instructions to the Architect.

3.04 Bobrick Product Schedule:

Surface-Mounted Roll-Paper Towel Dispenser	B-2860
Recessed Toilet-Seat Cover Dispenser, Sanitary Napkin Disposal and Toilet Tissue Dispenser	B-3574
Recessed Toilet-Seat Cover Dispenser and Toilet Tissue Dispenser	B-3474
Partition-Mounted Toilet-Seat Cover Dispenser Sanitary Napkin Disposal and Toilet Tissue Dispenser	B-3571
Partition-Mounted Toilet-Seat Cover and Toilet Tissue Dispenser	B-347
Contura Series Surface-Mounted Paper Towel Dispenser and Waste Receptacle	B-43949
Contura Series Surface-Mounted Soap Dispenser For Antibacterial Soaps	B-4112
Contura Series Surface-Mounted Multi-Roll Toilet Tissue Dispenser	B-4288
Contura Series Recessed Multi-Roll Toilet Tissue Dispenser	B-4388
Recessed Toilet-Seat Cover and Toilet Tissue Dispenser	B-3474

END OF SECTION

## SECTION 10995

### PLUMBING FIXTURE PIPE INSULATION

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION:

Division 1 applies to this Section. Provide plumbing fixture pipe insulation on all exposed plumbing fixture pipes and traps where accessible to the disabled, and wherever required by ADA regulations, complete.

- A. Work in this section: Principal items include plumbing fixture pipe insulation systems for disabled access compliance.
- B. Related work not in this section: Plumbing fixtures, pipes and traps.

##### 1.02 QUALITY ASSURANCE:

Plumbing fixture pipe insulation shall be factory fabricated devices manufactured specially for the purpose of protecting the disabled from contact with plumbing fixture pipes, valves and traps. Field assembled devices are not acceptable.

##### 1.03 SUBMITTALS:

Submit shop drawings and one full size sample of each type of insulation. Show materials, finish, characteristics, construction and fabrication details and procedures. Submit product data and catalogs.

#### PART 2 – PRODUCTS

##### 2.01 ACCEPTABLE MANUFACTURERS:

Trubro Inc.  
P.O. Box 429  
Ellington, CT 06029  
(800) 340-5926  
FAX (203) 872-0300

Brocar Products, Inc./American Granby  
P.O. Box 68024  
Cincinnati, OH 45026  
(800) 827-1207  
(800) 776-2266

## 2.02 PLUMBING FIXTURE INSULATION FOR DISABLED:

Exposed handicap lavatory P-trap and angle valve assemblies shall be insulated with Trubro "Lav-Guard" or Brocar "Trap-Wrap", molded antimicrobial insulation kit. Provide manufacturers snap clip flush fasteners for attachment and flap cap access covers to allow access to valve handles and P-trap cleanout. The insulating material shall be 1/8" thick molded closed cell vinyl, shall conform to all ADA requirements, and shall be self extinguishing. Color shall be light grey or white as selected by Architect. Thermal conductivity (K) of the material shall be 1.17 BTU in/hr/sf/degree F. The assemblies shall be designed to fit snugly over the pipes, valves and trap, shall cover the units completely, and shall extend to the back wall. Units shall meet or exceed the following requirements:

<b>PHYSICAL PROPERTIES</b>		
<b>Physical Property, units</b>	<b>Test Method</b>	<b>Acceptable Value</b>
Anti-bacterial	ASTM G21	No measurable growth
Anti-fungal	ASTM G22	No measurable growth
Burning	ASTM D635	Less than 5 seconds
Thermal conductivity, BTU, in/hr/ft <sup>2</sup> /deg F	ASTM C177	1.02

## PART 3 – EXECUTION

### 3.01 INSTALLATION:

Conform to approved submittals and manufacturers directions. Fit the molded insulation snugly over the pipes, valves and trap, extended completely to the back wall, and trimmed neatly against the fixture escutcheon. Secure with snap clips. Install flap caps over each stop handle.

END OF SECTION

## SECTION 11005

### MISCELLANEOUS EQUIPMENT

#### 1. PART 1 GENERAL

##### 1.1 SECTION INCLUDES

- A. TV mounts.
- B. Lockers benches.
- C. MPR Projection screen & Projection Mount.
- D. Teacher Lounge Garbage disposal.
- E. Play yard equipment (see site plan for quantity).
  - MFG: Playworlds, Model: PlayCubes 4.0, Age Group: 5-12
  - MFG: Playworlds, Model: Heavy Duty Swings 4 – Seats, Age Group: 2-12
  - MFG: Playworlds, Model: Challengers 350-1738, Age Group 5-12

##### 1.2 REFERENCES

- A. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.
- B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

##### 1.3 SUBMITTALS

- A. Submit product data and manufacturer's installation instructions for each item under provisions of Section 01330.

#### 1.4 REGULATORY REQUIREMENTS

- A. Conform to CBC, California Building Code, (CCR), Title 24, Part 2 and ADAAG for accessibility.

#### 1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01770.

### 2. PART 2 PRODUCTS

#### 2.1 PRODUCTS

- A. TV Mount: Peerless-AV model ST660(P) The SmartMount Tilt Wall Mount.
- B. Lockers Benches: Wabash Valley models: SG304(6'), SG316D(8'), and
- C. Accessible lockers bench & backrest: Penco Products 9624 800-562-1000
- D. Garbage Disposal:
- E. Play Yard Equipment: As indicated on the drawings
- F. Substitutions: Under provisions of Section 01630.

### 3. PART 3 EXECUTION

#### 3.1 INSTALLATION

- A. Install equipment in accordance with manufacturer's printed instructions and as indicated on the drawings.
- B. Furnish all necessary hardware, anchors, inserts, connections, and embedded items necessary for proper installation. Coordinate with work of other sections.

END OF SECTION

SECTION 11132  
PROJECTION SCREENS

PART 1 - GENERAL

1.01 DESCRIPTION:

Division 1 applies to this Section. Provide wall mounted, motor operated projection screens, as indicated, specified and required.

- A. Related Work Specified Elsewhere: Blocking in walls for mounting brackets.

1.02 SUBMITTALS:

- A. Submit shop drawings for each different screen. Show materials, finish, characteristics, location of horizontal seams where required, construction, and fabrication details and procedures, methods of anchorage to building construction, templates for backing or anchorage, and other criteria.
- B. Submit product data and catalogs.
- C. Submit 12" sample of screen surface indicating one seam if seams are required.
- D. Installation instructions: Provide complete installation instructions for each type unit.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING:

Deliver material in manufacturers original packaging. Identify contents, manufacturer, brand name and applicable standards. Store and handle in manner to prevent damage and marring of finish. Protect finished surfaces from damage. Store units on pallets or other approved devices. Store materials inside building, under protective covering, and protect from weather, moisture, open flames and sparks.

1.04 WARRANTY:

Provide written warranty covering materials and workmanship of all work of this section for a period of 2 years, and repair or replace all material which becomes defective during warranty period. Continued use of defective equipment shall be available until replacement equipment is delivered.

PART 2 – PRODUCTS

2.01 ACCEPTABLE MANUFACTURER:

Da-Lite Screen Co., Inc.

P.O. Box 137  
3100 N. Detroit Street  
Warsaw, IN 46581  
(800) 622-3737

## 2.02 MANUALLY OPERATED PROJECTION SCREENS:

Da-Lite "Model Large Advantage Deluxe", 106" x 188" size, unless otherwise indicated. See detail for full specification.

## 2.03 PROVISIONS FOR MOUNTING SCREENS:

Arrange for solid blocking in walls behind brackets. Mounting brackets and pulls shall accommodate angling of screens. Provide pull extenders and No. 6 wall bracket, non-adjustable, to extend screen 6" from wall surface.

## 2.04 PULLROD:

Provide zinc plated pull rod with black plastic handle grip to allow easy access to screen when mounted out of reach.

## PART 3 – EXECUTION

### 3.01 INSTALLATION:

Conform to approved submittals and manufacturers directions. Install by manufacturer's representative. Space supports not over 24-inch centers. Install screens level, to operate smoothly, without binding, and in perfect alignment at all times when in motion.

END OF SECTION

SECTION 11400  
FOOD SERVICE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. The work referred to in this section consists of furnishing all labor and material required to provide and deliver all food service equipment hereinafter specified into the building, uncrate, assemble, hang, set in place, level, and completely install, exclusive of final utility connections. Final utility connections to all equipment, shall be part of the work under additional appropriate sections of the work and not part of the food service work.
1. The equipment and its component parts shall be new and unused. All items of standard manufactured equipment shall be current models at the time of delivery. Parts subject to wear, breakage, or distortion shall be accessible for adjustment, replacement and repair.
  2. The materials or products specified herein by trade names, manufacturer's name or catalog number shall be provided as specified. Substitutions will not be permitted unless approved by owner's representative in writing no later than 10 days prior to bidding. This stipulation applies to all equipment and materials.
    - a. Any request for substitution or alternate must include documentation supporting that the requested substitution/alternate will perform in all aspects as well as the original specification. Alternative exhaust hood manufacturers are required to provide heat load based design exhaust volume calculations prior to alternate being considered. Request must include the following:

Grease filtration performance data and manufacturer's own airflow calculations based on convective heat load of cooking equipment beneath the hood.

Efficiency comparison data performed in accordance with ASTM Standard F1704-96 for a standard 24" high exhaust hood.

A written guarantee of compliance with Title 24 Part 6 with Kitchen Ventilation acceptance tests NA7.11.1.2 and NA7.11.1.3.
    - b. Should no request for substitution be received and approved as stated above, the project is to be provided as specified.
  3. The food service equipment contractor shall be responsible for all costs associated with the acceptable alternate or approved alternate items, if the item



requires additional space or specific utilities that differ from specifications or drawings. The FSEC is responsible for all coordination, documentation and costs associated with any alternate item that was not submitted for approval and accepted by the consultant prior to bid. The FSEC shall be responsible for any costs associated with building changes, utility changes and drawings changes.

- B. Coordinate Owner and Vendor-supplied equipment noted on the drawings or in the specifications as NIFSEC, "not in food service equipment contract". Show on roughing in Plans and sizes, utilities, and other requirements as furnished in the specifications, by owner or appropriate supplier in submittals as if the equipment is contractor furnished.
- C. Bidders shall carefully examine the specifications and the project site including location and condition of existing equipment to determine cost for each "Existing-Reset" and "Existing-Modify" item to cover removal, modification (including materials), cleaning, inspection for damage, repair and resetting.
- D. Field measurements shall be made prior to fabrication or installation of any equipment item.
- E. The cutting of holes in equipment for pipe, drains, electrical outlets, etc., required for this installation, shall be part of this work. Work shall conform to the highest standards of workman-ship and shall include welded sleeves, collars, ferrules and escutcheons.
- F. Repair of all damage to the premises as a result of the equipment installation as well as the removal of all debris left by the work of this section.
- G. Food service equipment and fixtures shall be cleaned and ready for operation at the time the facility is turned over to the Owner for final inspection by the Owner's Representative.
- H. Food Service Equipment Contractor shall be responsible for coordinating with the Architect and Contractor in submitting all applicable documents.
- I. All bidders shall submit with their costing a list of the subcontractors that are included in their bids and a complete "schedule of values" for all equipment and labor.

## 1.2 RELATED SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Work In Other Sections by appropriate trades include the following:
  - 1. Division 5 Section "Metal Fabrications" for equipment supports.
  - 2. Division 6 Section "Interior Architectural Woodwork" for wood casework and plastic laminate substrates.
  - 3. Refer to Division 23 Sections for supply and exhaust fans; exhaust ductwork; demand control ventilation requirements; service roughing-ins; drain traps;

atmospheric vents; valves, pipes, and fittings; fire extinguishing systems; and other materials required to complete food service equipment installation.

4. Refer to Division 26 & 28 Sections for connections to fire alarm systems, wiring, disconnects, and other electrical materials required to complete food service equipment installation.
- C. All electric services including wiring to, and final connections to, the fixtures except, as specified differently in the specifications, drawings, or herein.
- D. All water, waste and gas services to the fixtures including shut-off valves, trim, traps, etc., and final connections to the fixtures, except as specified differently in the specifications, drawings, or herein.
- E. All hood or ventilator duct work above the connection position on such exhaust hoods or exhaust ventilators, except as specified differently in the specifications, drawings, or herein. Final welded connections at the junction point of exhaust hoods or exhausts ventilators, shall be part of the food service work.
- F. Floors, quarry tile, concrete bases, walls, ceilings, finishes and related building work, except as specified differently in the specifications, drawings or herein.

### 1.3 DEFINITIONS

- A. Terminology Standard: Refer to NSF 2, "Food Equipment", NSF 4, Heated Cabinets, NSF 7, Refrigerated Equipment, or other applicable NSF standards for definitions of food service equipment and installation terms not otherwise defined in this Section or in other referenced standards.
- B. FSEC: Food Service Equipment Contractor
- C. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment items.
- D. Vendor-Furnished Equipment: Where indicated the Owner's or operator's vendor will furnish equipment items.
- E. NIFSEC: Not Included in Food Service Equipment Contract.

### 1.4 SUBMITTALS

- A. Regardless of drawing formats provided it will remain the responsibility of equipment supplier to develop submittals in accordance with the Specific Conditions and assume all required responsibilities there to. The consultant is not to be liable for errors or omissions by the FSEC's use of electronic data provided by the Consultant or the development of data used in the submittal approval process. Checking product data, rough-in drawings, wall backing drawings, shop drawings, and refrigeration drawings by Designer is for design concept only, and does not relieve the Food Service Equipment Contractor of responsibility for compliance with Contract Documents, verification of

utilities with equipment requirements for conformity and location, verification of all dimensions of equipment and building conditions or reasonable adjustments due to deviations.

- B. The Food Service Equipment Contractor shall review and provide an affidavit with each submittal that such review has been completed by an authorized agent of the contractor.
- C. Product Data: For each type of food service equipment indicated. Include manufacturer's model number and accessories and requirements for access and maintenance clearances, water and drainage, power or fuel, and service-connections including roughing-in dimensions.
- D. Shop Fabrication Drawings: For food service equipment not manufactured as standard production and/or catalog items by manufacturers the fabricator of the equipment shall prepare and submit through the Food Service Equipment Contractor one electronic file or two bond or original prints of all shop drawings showing all information necessary for the fabrication and installation of the work of this section. Include plans, elevations sections, material schedule, roughing-in dimensions, fabrication details, service requirements and attachments to other work. All drawings to be fully detailed and dimensioned to a minimum scale of  $\frac{3}{4}$  inch to the foot for plan and elevation views and  $1 \frac{1}{2}$  inch to the foot for section views. Reduced or enlarged drawings are not acceptable. Drawings not submitted in the proper format will not be reviewed.
  - 1. Wiring Diagrams: Details of wiring for power, signal, and control systems and differentiating between manufacturer-installed and field-installed wiring.
  - 2. Piping Diagrams: Details of piping systems and differentiating between manufacturer-installed and field-installed piping.
- E. Coordination Drawings: For locations of food service equipment and service utilities. Key equipment with item numbers and descriptions indicated in Contract Documents. Include plans and elevations of equipment, access- and maintenance-clearance requirements, details of concrete, masonry or metal bases and floor depressions, and service-utility characteristics. Ventilation requirements for refrigerated equipment shall be identified in these drawings.
- F. Contract Document Drawings:
  - 1. Drawings furnished, constitute a part of these specifications and show locations of equipment and general arrangement of mechanical and electrical services. Necessary deviation from the illustrated arrangements to meet structural conditions, shall be considered a part of the work of this section. Such deviations shall be made without expense to the owner. Equipment drawings are definitive only and should not be used as construction documents or shop details.
  - 2. The drawings are for the assistance and guidance of the Food Service Equipment Contractor. Exact locations shall be governed by the building configuration. The

Food Service Equipment Contractor shall accept his contract with this understanding.

3. Should there be a conflict between the drawings and the specifications, the FSEC shall submit a "Request for Information" (RFI) for clarification.

G. Utility Roughing-in Drawings:

1. The Food Service Equipment Contractor shall prepare and submit one electronic file or two bound sets of a valid prints, of all roughing-in drawings, showing information necessary for the roughing-in of refrigerant lines, syrup/beer lines, plumbing, steam, mechanical and electrical utility requirements. Drawings shall also include construction requirements necessary for all equipment including floor depressions, raised bases, wall blocking, wall recesses and any critical dimensions for specific equipment requirements. Acceptance will be made upon the electronic file or one print which will be returned to the Food Service Equipment Contractor for reproduction purposes. Drawings not properly submitted in this format, will not be reviewed. Drawings without an "Accepted" or "Accepted as noted" stamp, will not be considered an authorized shop drawing and will not be allowed on the job site.
  - a. Furnish four (4) sets "Accepted" and/or "Accepted as Noted" shop drawings, for distribution to the field, as directed.

H. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for exposed products with color finishes.

I. Samples for Verification: Of each type of exposed finish required, minimum 4-inch- (100-mm-) square or 6-inch- (150-mm-) long sections of linear shapes and of same thickness and material indicated for work. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

J. Product Certificates: Signed by manufacturers of refrigeration systems, refrigerated equipment or their authorized agents certifying that systems furnished comply with NSF 7 requirements and will maintain operating temperatures indicated in the areas or equipment that they will serve.

K. Maintenance Data: Operation, maintenance, and parts data for food service equipment to include in the maintenance manuals specified in Division 1. Include a product schedule as follows:

1. Product Schedule: For each food service equipment item, include item number and description indicated in Contract Documents, manufacturer's name and model number, and authorized service agencies' addresses and telephone numbers.

1.5 QUALITY ASSURANCE AND LAWS AND ORDINANCES

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing food service equipment, who has completed installations similar in design and extent to that indicated for this Project, and who has a record of successful in service performance.
- B. Manufacturer Qualifications: Engage a firm experienced in manufacturing food service equipment similar to that indicated for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain each type of food service equipment through one source from a single manufacturer.
- D. Product Options: Drawings indicate food service equipment based on the specific products indicated. Other manufacturers' equipment with equal size and performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
- E. Regulatory Requirements: Comply with the following National Fire Protection Association (NFPA) and California Electrical Codes (CEC) codes:
  1. NFPA 17, "Dry Chemical Extinguishing Systems."
  2. NFPA 17A, "Wet Chemical Extinguishing Systems."
  3. NFPA 54, "National Fuel Gas Code."
  4. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."
  5. CEC, California Electrical Code, 2016
  6. The FSEC shall certify that all work and materials comply with Federal, State and Local laws, ordinances, and regulations and is confirmed by the local inspector having jurisdiction.
    - a. US PUBLIC HEALTH SERVICE
    - b. LOCAL HEALTH DEPARTMENT
    - c. NATIONAL BOARD OF FIRE UNDERWRITERS
    - d. OSHA
    - e. UL
    - f. HACCP
    - g. NFPA 96 – Current
    - h. ADA

- i. OSHPD
  - j. DSA
- F. Listing and Labeling: Provide electrically operated equipment or components specified in this Section that are listed and labeled.
- 1. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- G. AGA Certification: Provide gas-burning appliances certified by the American Gas Association (AGA).
- H. ASME Compliance: Fabricate and label steam-generating and closed steam-heating equipment to comply with ASME Boiler and Pressure Vessel Code.
- I. ASHRAE Compliance: Provide mechanical refrigeration systems complying with the American Society of Heating, Refrigerating and Air-Conditioning Engineers' ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- J. Food Service Equipment: Where provided, check-out aisles, sales counters, service counters, food service lines, queues, and waiting lines shall comply with CBC Sections 11B-227 and 11B-904. The top of tray slides shall be 28" minimum and 34" maximum above finish floor. Space and elements within food service employee work areas shall meet the requirements of CBC Section 11B-203.9. Food service equipment required to be accessible shall conform to all reach requirements in CBC Figures 2016, 11B-403.5.1, 11B-227.4, 11B-904.5, 11B-904.5.1, and 11B-904.5.2.
- K. NSF Standards: Comply with applicable NSF International (NSF) standards and criteria and provide NSF, UL Sanitation or ETL Sanitation Certification Mark on each equipment item, unless otherwise indicated.
- L. ANSI Standards: Comply with applicable ANSI standards for electric-powered and gas-burning appliances; for piping to compressed-gas cylinders; and for plumbing fittings, including vacuum breakers and air gaps, to prevent siphonage in water piping.
- M. SMACNA Standard: Where applicable, fabricate food service equipment to comply with the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Food Service Equipment Fabrication Guidelines," unless otherwise indicated.
- N. Seismic Restraints: Provide seismic restraints for food service equipment according to the Sheet Metal and Air Conditioning Contractors National Association's (SMACNA) "Food Service Equipment Fabrication Guidelines," appendix 1, "Guidelines for Seismic Restraints of Kitchen Equipment," unless otherwise indicated.

- O. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
- P. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Review methods and procedures related to food service equipment including, but not limited to, the following:
  - 1. Review access requirements for equipment delivery.
  - 2. Review equipment storage and security requirements.
  - 3. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
  - 4. Review structural loading limitations.
  - 5. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- Q. Walk-in cooler and/or freezer shall comply with CBC Figures 2016, 11B-404.2.4, 11B-404.2.4.4, 11B-404.2.7 and 11B-309.4.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver food service equipment as factory-assembled units with protective crating and covering.
- B. Store food service equipment in original protective crating and covering and in a dry location.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions of food service equipment installation areas by field measurements before equipment fabrication and indicate measurements on Shop Drawings and Coordination Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish required dimensions and proceed with fabricating equipment without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.
  - 2. Food service aisles shall be a minimum 36" wide and tray slides shall be mounted at 34" maximum above the floor. Insure compliance with paragraphs 1.5.J and 1.5.Q.
  - 3. Pass-thru windows for food service shall conform to the reach and access requirements of paragraphs 1.5.J and 1.5.Q. Accessible pass-thru shelves shall

not exceed 34-inch height above interior finished floor surface or exterior pavement.

## 1.8 COORDINATION

- A. Coordinate equipment layout and installation with other work, including light fixtures, HVAC equipment, and fire-suppression system components.
- B. Coordinate location and requirements of service-utility connections.
- C. Coordinate size, location, and requirements of concrete bases, positive slopes to drains, floor depressions, and insulated floors. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."
- D. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."

## 1.9 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Warranty period: 1 year from date of completion.
- B. Refrigeration Compressor Warranty: 5 years from date of completion. Submit a written warranty signed by manufacturer agreeing to repair or replace compressors that fail in materials or workmanship within the specified warranty period.

## PART 2 - PRODUCTS

### 2.1 MATERIALS - METAL

- A. Submit a certified copy of the mill analysis of materials if requested by the Architect.
- B. Finish for exposed surfaces to be #4 polished, unless otherwise specified.
- C. Protective covering shall be provided on all polished surfaces of stainless steel sheet work, and retained and maintained until time of final testing, cleaning, start-up and substantial completion.
- D. Stainless-Steel Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304, stretcher leveled, and in finish specified in "Stainless-Steel Finishes" Article.
  - 1. Stainless steel finishes
    - a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.



- 1) Remove or blend tool and die marks and stretch lines into finish.
  - 2) Grind and polish surfaces to produce uniform, directional textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- b. Concealed surfaces: No. 2B finish (bright, cold-rolled, unpolished finish).
  - c. Exposed surfaces: No. 4 finish (bright, directional polish).
  - d. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
  - e. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- E. Stainless-Steel Tube: ASTM A 554, Grade MT-304, and in finish specified in "Stainless-Steel Finishes" Article.
- F. Zinc-Coated Steel Sheet: ASTM A 653, G115 (ASTM A 653M, Z350) coating designation; commercial quality; cold rolled; stretcher leveled; and chemically treated.
- G. Zinc-Coated Steel Shapes: ASTM A 36 (ASTM A 36M), zinc-coated according to ASTM A 123 requirements.
- H. Sealant: ASTM C 920; Type S, Grade NS, Class 25, Use NT. Provide elastomeric sealant NSF certified for end-use application indicated. Provide sealant that, when cured and washed, meets requirements of Food and Drug Administration's 21 CFR, Section 177.2600 for use in areas that come in contact with food.
1. Color: As selected by Architect from manufacturer's full range of colors.
  2. Backer Rod: Closed-cell polyethylene, in diameter larger than joint width.
- I. Sound Dampening: NSF-certified, nonabsorbent, hard-drying, sound-deadening coating. Provide coating compounded for permanent adhesion to metal in 1/8-inch (3-mm) thickness that does not chip, flake, or blister.
- J. Gaskets: NSF certified for end-use application indicated; of resilient rubber, neoprene, or PVC that is nontoxic, stable, odorless, nonabsorbent, and unaffected by exposure to foods and cleaning compounds.
- K. Casters: NSF-certified, heavy duty, stainless-steel, swivel stem casters with 5-inch- (125-mm-) diameter wheels, polyurethane tires with 1-inch (25-mm) tread width, and 200-lb (90-kg) load capacity per caster. Provide brakes on 2 casters per unit.

## 2.2 MATERIALS – CASEWORK/MILLWORK

- A. Cabinet Hardware: Provide NSF-certified, stainless-steel hardware for equipment items as indicated. Pulls, Handles and Catches to be included.
- B. All wood to be thoroughly seasoned and kiln dried prior to being used for fabrication of custom casework. All wood to be free from knots, pitchy seams, or other imperfections. All exposed wood to be grade A pine.
- C. All plywood to be thoroughly seasoned and kiln dried prior to being used. All plywood to be free from knots, pitchy seams, and other imperfections. All plywood to be glued with water resistant resin. Particle board may not be substituted for plywood panels. "W.I. - Custom Grade" marine grade plywood is required on all fixtures to be installed in high humidity environments.
- D. All wood to have less than 12% moisture content and be a species listed by the national hardwood association.
- E. Plastic laminates shall be 1/16th thick, general purpose grade GP-50 as manufactured by Wilson Art or equal. Patterns, textures, and colors as specified under individual items. Semi ex-posed and cabinet liners shall be CL-20. Countertops, backsplashes and edges shall be grade GP-50 on exposed and grade BK-20 on underside of tops. Exposed vertical surfaces and cabinet liners shall be grade CL-20. Sides and edges of shelving shall be grade 50. Adhesive shall be waterproof and low VOC.
- F. Hardware that is furnished and installed shall be of solid material unless specified otherwise. The hardware shall be provided with the necessary mechanisms for locking. All locks shall be furnished with two (2) keys.
- G. Solid Surface Material (SSM) shall be Caesarstone, Silestone or approved equal and installed over 3/4" plywood per manufacturer's instructions. Provide air space, trim and /or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

## 2.3 FABRICATION, GENERAL, METAL,

- A. Fabricate food service equipment according to NSF (standards 2, 4 & 7) requirements. Factory assemble equipment to the greatest extent possible.
- B. STAINLESS-STEEL EQUIPMENT: for all parts of custom tables, tops, benches, sinks, cabinets, etc., as drawn or as specified, shall be AICI type 304 (18-8 Austenitic). All gauges called for shall be U.S. Standard Gauges, "S/S" or "S.S." as shown in the drawings or specifications, shall indicate stainless steel.
  - 1. Edges and Backsplashes: Provide equipment edges and backsplashes indicated complying with referenced SMACNA standard, unless otherwise indicated.
  - 2. Apply sound dampening to underside of metal work surfaces, including sinks and similar units. Provide coating with smooth surface and hold coating 1 inch (25 mm) back from open edges for cleaning.

3. Tables: Fabricate with reinforced tops, legs, and reinforced undershelves or cross bracing to comply with referenced SMACNA standard, unless otherwise indicated, and as follows:
  - a. Tops: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.
  - b. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stain-less steel with stainless-steel gusset and adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.
  - c. Undershelves: Minimum #16 gauge / 0.625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.
  - d. Top and Undershef Reinforcement: Provide minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick, stainless-steel reinforcing, unless otherwise indicated.
  - e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.
4. Sinks: Fabricate of minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel with fully welded, 1-piece construction. Construct 2 sides and bottom of sink compartment from 1 stainless-steel sheet with ends welded integral and without overlapping joints or open spaces between compartments. Provide double-wall partitions between compartments with 1/2-inch- (13-mm-) radius rounded tops that are welded integral with sink body. Cove horizontal, vertical, and interior corners with 3/4-inch (19-mm) radius. Pitch and crease sinks to waste for drainage without pooling. Seat wastes in die-stamped depressions without solder, rivets, or welding.
  - a. Wastes: 2-inch (50-mm), stainless steel ball valve, rotary-handle waste assembly with stainless-steel strainer plate, rough chrome plated body.
  - b. Drainboards: Minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, pitched to sink at 1/8 inch/12 inches (3 mm/300 mm) of length. Reinforce drainboards with minimum #14 gauge / 0.0781-inch- (1.984-mm-) thick stainless steel, unless otherwise indicated.
  - c. Legs: 1-5/8 inch (41.3 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stain-less steel with stainless-steel gusset welded to #12 gauge / 0.1094-inch- (2.779-mm-) thick, stainless-steel support plate. Provide adjustable insert bullet-type feet with minimum adjustment of 1 inch (25 mm) up or down without exposing threads, unless otherwise indicated.

- d. Drainboard Braces: 1 inch (25 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588- mm-) thick stainless steel, unless otherwise indicated.
    - e. Cross Bracing: 1-1/4 inch (31.75 mm) OD, minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, unless otherwise indicated.
  5. Wall Shelves and Overshelves: Fabricate to comply with referenced SMACNA standard, unless otherwise indicated, and with minimum #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel shelf tops.
  6. Drawers: Provide lift-out type, 1-piece, die-stamped drawer pan fabricated from #18 gauge / 0.050-inch- (1.27-mm-) thick stainless steel with inside corners radiused. Support drawer pan with #16 gauge / 0.0625-inch- (1.588-mm-) thick, stainless-steel channel frame welded to drawer front. Provide 1-inch- (25-mm) thick, double-wall front fabricated from #16 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel and with integral recessed pull. Fill void in drawer front with semi rigid fiberglass sound dampening. Mount drawers on NSF-certified, full-extension, stainless-steel drawer slides that have minimum 100-lb (45-kg) load capacity per pair, ball-bearing rollers, and positive stop. Mount drawer slides for self-closing on drawer housing as indicated.
  7. Refrigerated Bases: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.
    - a. Top: 18 gauge galvanized sub-top or 14 gauge stainless steel top.
    - b. Exterior: Front and Sides to be 18 gauge number 4 finish type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).
    - c. Interior liner: 20 gauge number 4 finish type 304 stainless steel with 3/8" radius corners.
    - d. Insulation: Minimum 2" thick polyurethane foam in place insulation (CFC free).
    - e. Doors: 18 gauge front and 20 gauge door pan number 4 finish type 304 stainless steel with 2" polyurethane foam in place insulation, long-life press in place gasket.
    - f. Drawers: 300 lb. capacity with 14 gauge stainless steel track system, tandem 2" all stainless steel skate wheels, each drawer accommodates two 6" deep, 12" x 20" pans side by side.
    - g. Shelving: Each door section shall have stainless steel wire racks.
  8. Refrigerated Pan Rails: Unit to be all welded construction and fabricated in accordance with NSF Standard 7.

- a. Top: 16 gauge number 4 finish type 304 stainless steel top and inner liner.
  - b. Outer liner: To be 18 gauge type 304 stainless steel; bottom and back to be 18 gauge galvanized (unless otherwise noted).
  - c. Insulation: Minimum 2" thick polyurethane foam in place insulation (CFC free).
  - d. Drain: Provide with 1" stainless steel drain
  - e. Control: Provide with on/off control to be field installed.
- C. Welding: Use welding rod of same composition as metal being welded. Use methods that minimize distortion and develop strength and corrosion resistance of base metal. Provide ductile welds free of mechanical imperfections such as gas holes, pits, or cracks.
1. Welded Butt Joints: Provide full-penetration welds for full-joint length. Make joints flat, continuous, and homogenous with sheet metal without relying on straps under seams, filling in with solder, or spot welding.
  2. Grind exposed welded joints flush with adjoining material and polish to match adjoining surfaces.
  3. Where fasteners are welded to underside of equipment, finish reverse side of weld smooth and underpressed.
  4. Coat unexposed stainless-steel welded joints with suitable metallic-based paint to prevent corrosion.
  5. After zinc-coated steel is welded, clean welds and abraded areas and apply SSPC Paint 20, high-zinc-dust-content, galvanizing repair paint to comply with ASTM A 780.
- D. Fabricate field-assembled equipment prepared for field-joining methods indicated. For metal butt joints, comply with referenced SMACNA standard, unless otherwise indicated.
- E. Where stainless steel is joined to a dissimilar metal, use stainless-steel welding material or fastening devices.
- F. Form metal with break bends that are not flaky, scaly, or cracked in appearance; where breaks mar uniform surface appearance of material, remove marks by grinding, polishing, and finishing.
- G. Sheared Metal Edges: Finish free of burrs, fins, and irregular projections.
- H. Provide surfaces in food zone, as defined in NSF 2, free from exposed fasteners.
- I. Cap exposed fastener threads, including those inside cabinets, with stainless-steel lock washers and stainless-steel cap (acorn) nuts.

- J. Provide pipe slots on equipment with turned-up edges and sized to accommodate service and utility lines and mechanical connections.
- K. Provide enclosures, including panels, housings, and skirts, to conceal service lines, operating components, and mechanical and electrical devices including those inside cabinets, unless otherwise indicated.
- L. Seismic Restraints:
  - 1. Fabricate to comply with referenced "SMACNA Guidelines for Seismic Restraint of Kitchen Equipment" in any State, province, or jurisdiction that has legislated this requirement as necessary for acceptance. This shall include:
    - a. Identifying these items on his submittal drawings, Plans, Elevations, and Sections.
    - b. Showing required SMACNA methods of restraint on his submittal drawings.
    - c. Referencing the appropriate detail(s).
    - d. Obtain regulatory approval for all seismic engineering details

## 2.4 FABRICATION, MILLWORK/CASEWORK

- A. Fabricate food service equipment according to the "Manual of Millwork, current edition" of the Woodwork Institute, including all amended printed revisions, and NSF Standards. All composite wood products shall meet the latest California Air Resources Board (CARB) Composite Wood Products Regulations. Factory assemble equipment to greatest extent possible. All specially fabricated equipment must be by one manufacturer/fabricator per specialty acceptable to Consultant and the Owner.
- B. Solid Surface Material (SSM) shall be Caesarstone, Silestone or approved equal and installed over 3/4" plywood per manufacturer's instructions. Provide air space, trim and /or insulation around any heat or cold producing equipment to guard against discoloration and cracking.

## 2.5 EXHAUST HOOD FABRICATION

- A. Definitions:
  - 1. Listed Hood: A hood, factory fabricated and tested for compliance with UL-710 by a testing agency acceptable to authorities having jurisdiction.
  - 2. Type I Hood: A hood designated for grease exhaust applications.
  - 3. Type II Hood: A hood designed for heat and steam removal and for other non-grease applications.
  - 4. Non-listed Hoods are not acceptable for this project.

- B. General: Provide listed hoods with dual wall construction and manufactured from minimum #18 gauge / 0.050-inch- (1.27-mm-) thick type 304 stainless steel, unless otherwise indicated. FSEC shall verify size and location of all connections required before fabrication.
1. Exhaust hood performance tests shall be in accordance with ASTM F1704-05. Manufacturer, upon request, shall be required to submit validation that full capture and containment of appliance thermal plume and smoke can be accomplished at specified/design air volumes without modifications to duct size, filter velocity or hood/system static pressure.
  2. Hoods shall comply with current NFPA 96, NSF, ASHRAE 90.1, ASHRAE 154, CA-Title 24 (CA Based Projects Only), Local Applicable Codes and Manufactures Recommendations.
  3. Product/system must meet the design, construction, performance and operational intent of the project. It is the responsibility of the FSEC to verify interface of the system with all associated trades including, but not limited to; electrical, mechanical, sheet metal, plumbing and controls per Division 23.
  4. Design exhaust volume shall be based on hood manufacturers heat load based design calculations and not estimated CFM/linear foot or minimum UL-710 listed volume.
- C. Grease Removal: Provide removable, stainless-steel, single stage, baffle-type grease filter. Provide minimum #18 gauge / 0.0781-inch- (1.984-mm-) thick, stainless steel filter frame and removable collection basins or troughs. Filters/baffles shall be UL 1046 Classified and tested according to ASTM Standard F 2519-05 "Standard Test Method for Grease Particle Capture Efficiency of Commercial Kitchen Filters and Extractors" by a nationally recognized testing laboratory acceptable to authorities having jurisdiction. The filters/baffles must be single stage and have a minimum extraction rate of 93% at 5 microns and 98% at 15 microns.
- D. Sound Level Criteria: Isolated grease filter sound levels shall not exceed an NC rating of 55 at full design exhaust volume.
- E. Light Fixtures: Provide NSF, UL, CSA AND CE-certified LED fixtures, vapor-tight sealed lenses, to provide 3500K with 50 foot candles at the cooking surface. Any exposed wiring shall be concealed in stainless-steel.
- F. Appliance Interlock: Hoods to be provided with Appliance Interlock Temperature Sensor to comply with IMC 2006 requirement, section 507.2.1.1.
- G. Exhaust-Duct Collars: Minimum #18 gauge / 0.0625-inch- (1.588-mm-) thick stainless steel, FSEC shall provide all stainless steel duct collars and make final connections to hood, welded 100% grooved smooth and painted.

- H. Fires suppression system: Hoods to be provided with factory pre-piping for connection to wet chemical fire suppression system, model R102 as manufactured by "Ansul" or equal in accordance with UL300 standards.

- 1. Surface drop exposed piping shall be stainless steel.

## 2.6 FIRE SUPPRESSION SYSTEM

- A. Provide complete fire suppression system conforming to NFPA and UL300. System to be connected to factory pre-piping provided as part of the exhaust hood.
- B. Automatic actuation shall be by means of fusible link with no visible conduit. Manual activation shall be made possible with remote pull stations.
- C. System shall be furnished and installed by an Ansul certified distributor in accordance with manufacturer's instructions and the authority having jurisdiction.
- D. Microswitches shall be furnished as part of the system for "tie in" of building alarm and for make-up air/fire/fuel/shutdown.
- E. Gas valves shall be electric solenoid type and support simultaneous activation.

## 2.7 WALK-IN COOLERS/FREEZERS

- A. Panel Construction:

- 1. Panels shall be pre-fabricated, sectional construction (minimum 5-inches thick for Coolers and Freezers), of tongue and groove design with foamed-in-place "double bubble" PVC gaskets (not glued, stapled, or nailed) on the male side of all interior and exterior panels and rigid urethane frame. Every panel shall be NSF and UL factory approved and bear the certifying labels. Walk-in box height to be 108"; Interior Height, except freezers with pre-fab floor in combination with cooler without floor to be 104" or unless otherwise specified.
  - 2. Gaskets shall be impervious to stains, greases, oils, and mildew and be resistant to chemical corrosion and ultraviolet radiation. Gasket operating temperature shall be -30 degrees F to 160 degrees F (-34 degrees C to +71 degrees C).
  - 3. Corner panels shall be 90-degree angles with coved corners; interior partition walls shall utilize `T' panels with coved corners. All panels shall be manufactured in accordance NSF approved standards.
  - 4. Panels shall be completely filled with rigid 100% foamed-in-place non-CFC urethane between interior and exterior metal `skins' which have been die-formed and gauged for uniformity in size. Rigid polyurethane blowing agents shall comply with current US EPA SNAP program listings. Slab urethane or polystyrene are not acceptable. In addition, wood shall not be acceptable in any panel including doors, walls, floor, and ceiling.



5. Insulation shall have a 95% closed cell structure with an average in-place density of 2.2 lbs. per cubic foot, and compression strength at yield point of 19 lbs. per square inch. The R-Values of the floor, ceiling and wall panels meet the requirements under the Energy Independence and Security Act of 2009 (EISA).
  6. Floor panels: Floor panels shall be die stamped with 3/8-inch radius NSF covered corners. All plane intersections shall be drawn, not cut and welded. Panels shall be fabricated similar to other panels and designed to readily withstand uniformly distributed loads, point loads for stationary shelving, rolling loads from hand truck and mobile food racks. Where noted, pre-fabricated floors shall withstand rolling loads from either manual pallet jacks or electric pallet jacks.
- B. Door Construction: Walk-in coolers and freezers shall have entry and exit door hardware that complies with all of the requirements of CBC Section 11B-404.2.8.1 and maneuvering clearances at the exterior side per CBC Section 11B-404.2.7 & 11B-309.4. Doors shall be flush (in-fitting) type, self-closing, 36-inches by minimum 80-inches high, 20-gauge stainless steel interior and exterior.
1. Doors shall be mounted with three adjustable cam-lift hinges (Kason 1245) and hydraulic adjustable automatic hold-open (rack and pinion) door closers. Door hardware shall be chrome plated Kason model 27C. Mounting height of latching hardware shall be 34 to 44 inches above finish floor. All hardware shall meet the requirements of CBC 11B-404.2.7 & 11B-309.4.
  2. Door latches shall lock and have a safety release to prevent entrapment (one quarter turn of the release handle unlocks the door from the inside).
  3. All freezer door will be provided with a Department of Energy approved heater strip, heated sweep gaskets, and a heated pressure relief port.
  4. All door sections to have raised casings. Light fixtures to be wired through digital controllers, refer to para. 2.7.E.5 for controller requirements. Provide additional switches as required for light activation from multiple locations.
  5. The doorjamb, frames, and thresholds shall be made of durable Fiberglass Reinforced Plastic (FRP) or polyvinyl chloride (PVC).
- C. Assembly: Panels shall be assembled by Posi-Locs or equal which shall be foamed-in-place and activated by a hex wrench. Floor panels shall utilize post tension construction within the floor panels. Access ports to locking devices shall be covered by snap caps and shall be located in interior of walk-in.
- D. Finishes: Refer to the finishes shown and the Foodservice Equipment Schedule paragraph 3.5.
1. Surfaces (walls, ceiling and closure panels):

- a. Exposed exterior 20-gauge Type 304 stainless steel, #4 finish, Rimex Windsor pattern.
- b. Unexposed exterior surfaces to be 20 gauge smooth galvanized steel.
- c. Interior finishes: minimum 20 gauge type 304 stainless steel on walls and white stucco aluminum on ceiling.
- d. Interior floor: verify on finish schedule and item specification, paragraph 3.5.

E. Accessories:

1. Provide interior and exterior doors with 14 gauge (stainless steel) kickplates to 36-inches high.
2. Provide (s/s) closure panels to interior ceiling and all adjacent walls, finished with 90- degree angles at the box and the ceiling/wall; no raw edges will be accepted.
3. Provide vinyl strip curtains.
4. Include LED light fixtures to provide 20 ft. candles of light throughout compartment.
5. Refrigerated compartments fabricated and standard, shall be fitted with flush mounted digital temperature controllers. Thermometers on such controllers shall be adjustable and calibrated after installation. All thermometers shall have an accuracy of 2 degrees. Controller shall be Modularm 75 LC, or equal, and include frame mounted door magnets for door ajar alarm, interior panic alarm button and motion detector activated automatic panic alarm. All controllers are to be programmable and have the capability of being connected to remote monitoring systems or building management systems.
6. Per document drawings, provide 14-inches by 24-inches view port - unheated for cooler door, heated for freezer door.
7. Freezer Door Fan Switches (at ambient facing freezer door only)
8. When Anthony doors are specified: include Optimax Pro LED Lighting.

F. Insulated Floor Depressions: The FSEC shall provide styrofoam insulation for cooler and freezer floors. Insulation shall be a minimum of 3 layers Dow high load 60 extruded polystyrene, 2-inch thick. Overall R-value to meet DOE requirements for freezer floors with vertical compressive strength of 69 psi and maximum water absorption of 0.1% by volume.

G. Approvals: Fire hazard classification according to ASTM E-84 (UL723) shall be a flame spread rating of 25 or less with a certifying UL label attached to every panel showing the meeting of the fire code. Smoke development rating to be 450 or less; NSF-listed with an approved toxicity rating.

- H. Walk-in coolers and freezers shall have level maneuvering clearances at the exterior side (CBC 118-404.2.4.1) and accessible entry and exit door hardware (CBC 11B-404.2.7, 11B-309.4 & 11B-404.2.8.1).
- I. Installation: Equipment identified under this section shall be erected by individuals approved by the manufacturer who qualify as “factory certified” installers.

## 2.8 REMOTE REFRIGERATION SYSTEMS

- A. Furnish and install mechanical refrigeration work as indicated and specified, complete and ready for use. All systems shall comply with the latest edition of Title 24, 2016 Building Efficiency Standards. Principal items of work include:
  - 1. Mechanical refrigeration systems, including compressor units, condensers, refrigerant piping, evaporator coils, control valves, compressor racks, weather covers and required miscellaneous items. Refrigeration equipment shall consist of two major assemblies. One is the condensing unit assembly with all necessary components, factory installed and wired including single point electrical control panel, circuit breakers and contactors, OSHA approved fan guards, aluminum flexible conduit for internal wiring, suction filter, sight glass, drier, adjustable dual pressure control, flexible pressure hoses, Rotolock compressor adaptors and necessary tubing. The other is the refrigeration coil assembly/heat exchanger with expansion valve, electronic thermostat temperature control with electronic defrost time clock and on/off power switch, completely factory mounted and factory pressure tested with dry nitrogen.
    - a. Utilize refrigerant with an ozone depleting potential of 0
    - b. R-407A Low to Medium Temperatures
    - c. Other refrigerant approved by the Department of Energy for use in remote systems after December 31, 2017.
    - d. Glycol – Food Grade
  - 2. Furnishing of motor starters and walk-in refrigerator/freezer thermostats for installation under Electrical Section.
  - 3. Sleeves, inserts, hangers, supports and other incidental items necessary to complete the work.
  - 4. Cutting and patching of non-structural and other incidental items necessary to complete the work on this section.
  - 5. Testing, charging, adjusting, operational testing and cleaning of equipment. Conduct all tests as required by local inspecting agencies concerned with this project. Each refrigeration items specification is written to provide minimum specifications and scope of work.

6. Refrigeration equipment shall be designed and installed to maintain the following general temperature unless otherwise specified.
- |    |                            |                 |
|----|----------------------------|-----------------|
| a. | Walk-In Refrigerators      | 1.7°C / 35°F    |
| b. | Walk-In Freezers           | -23.2°C / -10°F |
| c. | Reach-In Refrigerators     | 1.7°C / 35°F    |
| d. | Reach-In Freezers          | -23.2°C / -10°F |
| e. | Undercounter Refrigerators | 1.7°C / 35°F    |
| f. | Undercounter Freezers      | -23.2°C / -10°F |
| g. | Cold Pan                   | 4°C / 39°F      |
- B. Compressors and Condensing Unit: Factory assembled, scroll compressors with air cooled condensers operating at such speed within recommended range of section and discharge pressures for economical operation and with required BTU rating per hour, sizes and capacities in accordance with specifications. Provide units of same manufacturer and type throughout, new standard cataloged, to operate with refrigerant R-407A. 100 degrees ambient air, capacities selected on 16 hour running time basis for medium temperature fixtures and 18 hour running time basis for low temperature fixtures. For locations where the ambient exceeds 100 degrees Fahrenheit, the system is to be engineered for the maximum recorded ambient temperature. Additionally, all parallel systems shall include a minimum of one digital scroll compressor and be designed with 75% redundancy minimum.
- C. Condensing units shall be scroll air cooled condensing unit with rigid structural bases, 20 gauge weather covers, OSHA-approved fan guards and shrouds and waterproof electrical systems. Include internal inherent motor protection, suction line, shut off valves, liquid line shut off valves, oil pressure safety switches when required, adjustable dual pressure control, crank case heaters and oil separators on systems with longer than 100 lin. ft. run from condensing unit to the evaporator coil. Any outdoor installation within 20 miles of the salt air environment shall be provided with coated condenser coils.
- D. Medium temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide copper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be provided with evaporator controller system capable of providing evaporator fan control, remote monitoring and diagnostics. Control system shall be interconnected to the local area network and be capable of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate above 34 degrees Fahrenheit.
- E. Low Temperature evaporators shall be equipped with Electronically Commutated Motors (ECM). Coils shall be low profile UL/NSF approved units with inline fans and cross fins staggered. Provide cooper tubing, aluminum cased, permanently lubricated motors with thermal overload protection. Unit shall be equipped with electric demand defrost

controller system. Controller system shall provide on-demand defrost, remote monitoring and diagnostics and be interconnected to the local area network with the capability of sending alarm alerts via mobile telephone or e-mail. Water proof electrical system pre-wired to a single connection. Coils are designed to operate in a range from 30 degrees above Fahrenheit to -20 degrees Fahrenheit.

- F. Refrigerant lines shall be type "L" ACR copper tubing with wrought copper fittings assembled by silver soldering joints.
- G. Coil drains shall be 1" IPS copper. Route and pitch 1/2" per foot to drain. Provide electrical heaters on freezer drains.
- H. Refrigeration lines insulation shall have a minimum 3/4" Armstrong Armaflex AP Pipe insulation sealed with adhesive foam insulation. For glycol systems the minimum insulation shall be 3/4". Tape fittings to be sufficient thickness to prevent condensation. Lines ran externally shall include a hard white PVC cover.
- I. Installation of this refrigeration equipment shall be performed by individuals approved by the manufacturer who qualify as "factory certified" installers.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Unless expressly stipulated, and in a timely manner, no additional allowances will be made for Contractors or Manufacturers for errors, omissions or ambiguities not reported at time of bidding. Carefully review and compare the Contract Documents and at once report to Owner and/or Designer any errors, ambiguities, inconsistencies or omissions. Unless expressly stipulated, and in a timely manner, Kitchen Equipment Contractor shall be liable to Owner or Designer for any damage resulting from such errors, inconsistencies or omissions in the Contract Documents. Work shall not be done without approved Drawings, Specifications and/or Modifications and without receiving prior written receiving authorizations from Owner or Designer. Drawings and equipment specifications are intended to complement each other. Therefore, neither should be considered complete without the others.
- B. Examine areas and conditions, with Installer present, for compliance with requirements or installation tolerances, service-utility connections, and other conditions affecting installation and performance of food service equipment. Do not proceed with installation until unsatisfactory conditions have been corrected.
- C. Examine roughing-in for piping, mechanical, and electrical systems to verify actual locations of connections before installation.
- D. Verify all conditions at the building, particularly door openings and passageways for large equipment. Coordinate with General Contractor access to insure delivery of equipment to the required areas. Coordination shall include, but not be limited to, early delivery,

hoisting, window removal and/or delay of wall construction. All special equipment, handling charges, window removal, etc. shall be paid for by the Food Service Equipment Contractor.

- E. Any and all food service equipment and equipment systems noted as “by owner/operator”, “by purveyor”, or “existing” in the food service construction documents are presented for reference only. These representations must be verified in writing by the food service equipment contractor, owner, operator, and/or general contractor prior to the release of “for construction” documentation. It will be the general contractor’s responsibility to further verify and coordinate all necessary information pertaining to this equipment or systems making up, or relating to, this equipment including, but not limited to, local health department regulations, local sanitation code requirements, mechanical, structural, plumbing and electrical requirements prior to commencement of construction. Consultant or Architect take no responsibility for design, intent, function, performance, utility requirements, or code compliance of non-specified equipment.

### 3.2 INSTALLATION, GENERAL

- A. Install food service equipment level and plumb, according to manufacturer's written instructions, original design, and referenced standards.
- B. Complete equipment field assembly, where required, using methods indicated.
  - 1. Provide closed butt and contact joints that do not require a filler.
  - 2. Grind field welds on stainless-steel equipment smooth, and polish to match adjacent finish. Comply with welding requirements in "Fabrication, General" Article.
- C. Install equipment with access and maintenance clearances according to manufacturer's written instructions and requirements of authorities having jurisdiction.
- D. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections. Cut holes and provide sleeves for pipes on equipment, for drains, electrical, plumbing, etc., as required for proper installation. Verify sizes with Owner on the following items before ordering or fabrication: steam pans, sheet pans, trays, glass and cup racks.
- E. Except for mobile and adjustable-leg equipment, securely anchor and attach items and accessories to walls, floors, or bases with stainless-steel fasteners, unless otherwise indicated.
- F. Install hoods to comply with NFPA 96 requirements and to remain free from vibration when operating.
- G. Install seismic restraints according to referenced SMACNA standard.
- H. Install trim strips and similar items requiring fasteners in a bed of sealant. Fasten with stainless-steel fasteners at 48 inches (1200 mm) o.c. maximum.

- I. Install sealant in joints between equipment and abutting surfaces with continuous joint backing, unless otherwise indicated. Provide airtight, watertight, vermin-proof, sanitary joints.
- J. Prohibit cold storage rooms from being used by any other trade for storage or work areas. Repair or cause replacement to any damaged areas on the interior of the cold storage rooms, if the damage was caused due to the cold storage rooms being used for storage or work areas.

### 3.3 PROTECTING

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer that ensure food service equipment is without damage or deterioration at the time of Substantial Completion.

### 3.4 START-UP, TESTING AND COMMISSIONING

- A. Startup Services: Engage factory-authorized service representatives to perform startup services for all equipment.
  - 1. Coordinate food service equipment startup with service-utility testing, balancing, and adjustments. Do not operate steam lines before they have been cleaned and sanitized. Provide demonstrations for both operations and maintenance personnel.
  - 2. Remove protective coverings and clean and sanitize equipment, both inside and out, and re-lamp equipment with integral lighting. Where applicable, comply with manufacturer's written cleaning instructions.
  - 3. Test each equipment item for proper operation. Repair or replace equipment that is defective in operation, including units that operate below required capacity or that operate with excessive noise or vibration.
    - a. Start up and testing for ice making equipment to be performed by the Original Equipment Manufacturer's authorized representative after substantial completion by the FSEC prior to final testing. All issues of installation hook-up and operational conditions are to be addressed. Any conditions not meeting operational needs will be identified and reviewed with the FSEC and/or GC.
    - b. Type I grease hoods and fire protection systems are to be reviewed by the Original Equipment Manufacturer's authorized representative after substantial completion and prior to final testing. This review shall also take place prior to the start-up and demonstration of any cooking equipment under the hood. All issues of installation hook-up and operational conditions will be addressed. Any conditions not meeting operational needs will be identified and reviewed with the FSEC and/or GC. A field

inspection report will be provided as part of the Owner's equipment manual and submitted to the GC and local fire marshal when required by code.

4. Provide maintenance and proper operations training to both the client maintenance and operations staff.
  5. Provide maintenance manuals, service parts manuals and product schedule in accordance with paragraphs 1.4.K and 1.4.K.1
- B.* Demonstration and Commissioning: Representatives of authorized service agencies, manufacturer or original equipment supplier shall provide these services with FSEC in attendance.
1. Demonstrate in the presence of the owner, owner's designated representative and owner's maintenance and operations personnel the proper initial start-up, operation clean-up, preventative maintenance safety procedures of each item of equipment.
  2. FSEC is to provide a signed log or record of all demonstrations, training and start-ups conducted to the owner with equipment operations manuals.

### 3.5 FOOD SERVICE EQUIPMENT SCHEDULE

SIS# W010

ITEM # 1-01            AIR CURTAIN

Quantity:            One (1)  
Manufacturer:        Mars Air Systems  
Model:                NH272-2UD-TS

1. One (1) Model NH272-2UD-TS High Velocity Series 2 Air Curtain, for NSF Certified 72" wide door, Unheated, 208-230v/60/1-ph, Titanium Silver powder coated cabinet (Standard Production Color) cETLus, CE, NSF, Dimensions 14.00(h) x 72.00(w) x 15.62(d)
2. One (1) 5 year parts warranty, standard
3. One (1) 99-014 Steel Mechanical Universal Surface-mounted Plunger/Roller Switch
4. One (1) 99-014 Additional Steel Mechanical Universal Surface-mounted Plunger/Roller Switch, for use with double doors
5. One (1) MCPB-2U Motor Control Panel for two motors, 1 HP, Unheated, supplied with NEMA 1 Cabinet with HOA selector switch on the cover and are remote mounted

ITEM # 1-31            PRE-RINSE ASSEMBLY



Quantity: One (1)  
Manufacturer: T&S Brass  
Model: B-0133-B08C

1. One (1) Model B-0133-B08C EasyInstall Pre-Rinse Unit, spring action gooseneck, 8" wall mount, JeTSpray low flow valve (0.65 gallons per minute), wall bracket

ITEM # 1-02 BUMPER RAILS

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL (LOT) Provide 14 ga. stainless steel bumper rails guards mounted at 34" above the finished floor. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-03 EMPLOYEE LOCKERS <NIC>

Quantity: Two (2)  
Manufacturer: NIFSEC  
Model: REFER TO ARCH. SECT.

1. Two (2) Model REFER TO ARCH. SECT. Employee Lockers - Refer to arch. sect.

ITEM # 1-04 DRY STORAGE SHELVING UNITS

Quantity: Six (6)  
Manufacturer: Cambro  
Model: CAMSHELVING

1. Six (6) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher, with solid plates on bottom shelf, and louvered on all other shelves. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide dunnage stands for all traverses 54" or longer and at corners where corner connectors are used.

Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-05            CORNER GUARDS

Quantity:            Four (4)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1.        Four (4) Model STAINLESS STEEL (LOT) Provide 16 ga. stainless steel corner guards at 6'-6" in height. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-06            WALK-IN REFRIGERATOR (REMOTE)

Quantity:            One (1)  
Manufacturer:        RMI Refrigerator Manufacturers Inc.  
Model:                CUSTOM

1.        One (1) Model CUSTOM Combo Cooler/Freezer unit 7'-10" x 10'-10" x 9'-0" OA height  
4,325 Lbs, 298cu. ft.  
Floor detail: depression w/ insulation (freezer only)  
Wall thickness: 5" freezer  
Ceiling thickness: 5" freezer  
Exterior exposed: Stainless 20g 304 #4 pvc  
Exterior unexposed: Galvanized 20g  
Interior walls: Antimicrobial 24g SM White, Interior Ceiling: Antimicrobial 24g SM White  
Swing door: Qty: (1) 36" x 80" h - 20 Legacy Door w/ Positive Latch 20 ga s/s - RC  
Window: Qty: (1) 15" x 20" viewport w/ heat  
Kick plate: Qty: (2) 36" High Kickplate  
Trim: enclosure trim as needed  
Light Fixtures: Qty: (2) 4' LED light fixture w/ 18w lamps  
Strip Curtain: Qty (1) Strip curtain 36" x 78"

ITEM # 1-07            EVAPORATOR COIL (COOLER)   <Included>

Quantity:            One (1)  
Manufacturer:        Airdyne Refrigeration Inc.  
Model:                ADT052AEK

1. One (1) Model ADT052AEK Evaporator coil provided as an integral part of the remote refrigeration system.

ITEM # 1-08            WALK-IN FREEZER (REMOTE)   <Included>

Quantity:            One (1)  
Manufacturer:        RMI Refrigerator Manufacturers Inc.  
Model:                CUSTOM

1. One (1) Model CUSTOM Part of item # 1-06

ITEM # 1-09            EVAPORATOR COIL (FREEZER)   <Included>

Quantity:            One (1)  
Manufacturer:        Airdyne Refrigeration Inc.  
Model:                LET047BEK

1. One (1) Model LET047BEK Evaporator coil provided as an integral part of the remote refrigeration system.

ITEM # 1-10            FREEZER STORAGE SHELVING UNITS

Quantity:            Three (3)  
Manufacturer:        Cambro  
Model:                CAMSHELVING

1. Three (3) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher, with solid plates on bottom shelf, and louvered on all other shelves. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide dunnage stands for all traverses 54" or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-11            REFRIGERATOR STORAGE SHELVING UNITS

Quantity: Two (2)  
Manufacturer: Cambro  
Model: CAMSHELVING

1. Two (2) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher, with solid plates on bottom shelf, and louvered on all other shelves. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide dunnage stands for all traverses 54" or longer and at corners where corner connectors are used. Verify evaporator coil location, shelving units below coil to have 3 shelves. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.

ITEM # 1-12 CLASS K FIRE EXTINGUISHER <NIC>

Quantity: One (1)  
Manufacturer: NIFSEC  
Model: SEE ARCH. SECT

1. One (1) Model SEE ARCH. SECT Class K Fire Extinguisher - NIFSEC, See Architectural Section.

ITEM # 1-13 MOBILE HEATED CABINET

Quantity: One (1)  
Manufacturer: Cres Cor  
Model: H-137-SUA-12D

1. One (1) Model H-137-SUA-12D Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handles, magnetic latch, (12) sets chrome plated wire universal angle slides for 12" x 20" thru 18" x 26" pans on 4-1/2" centers, adjustable 1-1/2" centers, reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, anti-microbial latches, stainless steel construction, NSF, cCSAus, ENERGY STAR®
2. One (1) Standard Warranty: 1 year labor with 3 year parts warranty
3. One (1) 120v/60/1-ph, 1500 watts, 12.0 amp, 10 ft power cord, NEMA 5-15P, standard
4. One (1) Right-hand door swing, standard

5. One (1) Model 1405-159 Perimeter Bumper, add 2" to OA dimensions, non-marking, gray

ITEM # 1-14                      EXHAUST HOOD (TYPE I)

Quantity:                      One (1)  
Manufacturer:                Accurex  
Model:                         XXDW-96.00-S

1. One (1) Model XXDW-96.00-S Performance: Dimensions:

Section 1:

Exhaust (CFM): 1,800  
MUA (CFM): 1,400  
Hood: 96" L x 48" W x 24" H  
Supply Plenum (Front): 96" L x 14" W x 10" H

Collar(s):

Exhaust:(1) 12" W x 14" L  
MUA: (2) 10" W x 20" L

Configuration:

Performance Enhancing Lip (P.E.L.) for up to 31% Lower Exhaust Rates  
Sloped Grease Trough with Enclosed Grease Cup per NFPA 96 Requirements  
Material - 300 Series SS 100% Construction  
UL 710 Listed w/ out Exhaust Fire Damper  
Filter - X-Tractor - Stainless Steel  
Lights - Recessed LED Light Fixtures (2)  
Shipped Loose Exhaust Collar(s)  
Factory Mounted Supply Collar(s)  
Zero Clearance Top  
Zero Clearance Front  
Factory Mounted 3" Back Airspace

Accessories:

Air Supply Plenum (ASP) on Front

Kitchen Ventilation hood(s) shall be of the Type I, exhaust only wall canopy suitable for all types of cooking applications. The hood(s) shall be U.L. 710 Listed without a fire damper (with optional) for 400°F, 600°F, or 700°F rated cooking appliances. Please visit

www.ul.com for U.L. 710 listing for performance and size options. Make-up air shall be independently provided.

The hood(s) exterior shall be constructed of a minimum of 18 gauge 400 series stainless steel (300 series optional). The hood(s) shall be constructed using the standing seam method for optimum strength and with a Performance Enhancing Lip (PEL) to improve capture efficiency by turning air back into the hood. Front panels shall be of double wall construction with 1 inch insulation to add additional strength and rigidity. An integral 3 inch air space is provided to meet NFPA® 96 clearance requirements against limited combustible walls. Integral 3 inch air space may be omitted for non-combustible construction. All seams, joints and penetrations of the hood enclosure shall be welded and/or liquid tight. Lighter material gauges, alternate material types and finishes are not acceptable. All unexposed interior surfaces shall be constructed of a minimum 18 gauge corrosion resistant steel including, but not limited to ducts, plenum, and brackets.

The hood(s) shall include a filter housing constructed of the same material as the hood. The Grease-X-Tractor high efficiency stainless steel filters shall be U.L. 1046 Classified and NSF Certified as manufactured by Accurex, in sufficient number and size to ensure optimum performance. Grease-X-Tractor filters shall direct the exhaust airflow through individual cyclone chambers, utilizing centrifugal impingement grease extraction technology. The filter housing shall terminate in a pitched, full length grease trough which shall drain into a removable grease container. These filters shall have a grease removal efficiency of 69% at 8 microns (51% from 3-10 microns) and static pressure drop of 0.7-0.8 in WC.

Vapor proof, U.L. Listed incandescent (recessed, fluorescent and LED optional, restrictions apply) light fixtures shall be pre-wired to a junction box located at the top of the hood for field connection. Wiring shall conform to the requirements of the NFPA® 70.

The canopy hood(s) shall be constructed by Accurex. They shall be built in accordance with the NFPA® 96, IMC, UMC, and bear the NSF Seal of Approval. The hood manufacturer shall provide, on request, the necessary data that confirms compliance with the code authorities listed above.

ITEM # 1-15                      EXHAUST HOOD TRIM AND CLOSURE PANEL

Quantity:                      One (1)  
Manufacturer:                Custom  
Model:                         STAINLESS STEEL

1.        One (1) Model STAINLESS STEEL Approximately 9'-0" l x 10'-0" w. Provide 18 ga stainless steel exhaust hood trim and closure panels with #4 finish. Provide all

necessary closure, louvers and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-16            FIRE PROTECTION SYSTEM

Quantity:            One (1)  
Manufacturer:        Ansul Fire Protection  
Model:                R102

1.     One (1) Model R102 Provide One (1) each Fire Protection System complete with nozzles, fusible links, piping, pull box, and actuators, utilizing a wet chemical extinguishing agent fabricated and installed by an approved Ansul system installer. Provide in accordance with complete drawings, details, and specifications section 114000. System to be an R-102 automatic type and be manufactured and installed per the current NFPA guidelines and be U.L. approved. Cylinders shall be mounted on wall in a stainless steel enclosure, or mounted in a stainless steel cabinet attached to the exhaust hood. All piping to be concealed with the exception of drops which shall be chrome sleeved and of as minimal exposure as possible. Size, number, and location of nozzles or fusible links to be in accordance with U.L. limits for this particular system. Fire system contractor shall provide engineered drawings, acquire permit, coordinate start-up and testing with the appropriate Fire Officials, and obtain final certification. Provide as-built drawings at completion of install. Fire System installer to provide adequate job site visits to coordinate installation of un-exposed pipe and installation of system. Include the appropriately sized and approved electronic gas shut-off valve(s).

ITEM # 1-17            FIRE PULL BOX   <NIC>

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                PART OF ITEM #1-16

1.     One (1) Model PART OF ITEM #1-16 Fire Pull Box - Box by electrician, Mechanism part of item #1-16 Fire Protection System.

ITEM # 1-18            WALL FLASHING

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1. One (1) Model STAINLESS STEEL (LOT) Approximately 19'-9" I. Provide 20 ga. stainless steel wall flashing from floor to exhaust hood with 6" fluting (vertical) and a #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-19 SPARE NO.

ITEM # 1-20 SPARE NO.

ITEM # 1-21 CONVECTION OVEN

Quantity: One (1)  
Manufacturer: Montague Company  
Model: 2-115A

1. One (1) Model 2-115A Vectaire Convection Oven, gas, double-deck, bakery depth, thermostatic controls, single speed fan, vertical opening doors with windows, stainless steel top, front & sides, 3" high flue deflector with stainless steel front trim, 6" adjustable legs, 115,000 BTU per deck, NSF, CSA Star
2. One (1) Dormont Model 16125KIT2S48 Dormont Blue Hose™ Moveable Gas Connector Kit, 1-1/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, coiled restraining cable with hardware, 449,000 BTU/hr minimum, limited lifetime warranty
3. One (1) Standard warranty: one year parts and labor warranty
4. One (1) Extended one year warranty, per section
5. One (1) Natural gas
6. One (1) (2) 120v/60/1ph, 3/4 hp, cord with 3-prong plug
7. One (1) 2-Speed fan motor, per deck
8. One (1) Total of 6 oven racks per deck, std. (8#)
9. One (1) Rack glides, 11-position
10. One (1) Casters with 5" wheel 6" OA (set of 4)
11. One (1) Model PILOT RE-LIGHT SYSTEM Pilot Re-light system
12. One (1) Model THERMOSTAT Throttling-type gas thermostat (add G suffix)
13. One (1) Model DOOR HANDLES Door Handle with Shrink Wrapped Grips
14. One (1) Model SEISMIC Seismic Plates between decks
15. One (1) Model SEISMIC Seismic Feet, two minimum
16. UNITS TO BE SHIPPED STACKED AND CRATED.

ITEM # 1-22 HD RANGE, 36", 6 OPEN BURNERS



Quantity: One (1)  
Manufacturer: Montague Company  
Model: 36-5

1. One (1) Model 36-5 Legend™ Heavy Duty Range, gas, 36", (6) 12" 30,000 BTU open burners, open cabinet base with stainless steel front & 4" flue riser, black sides with black intermediate & bottom shelves, 6" high adjustable stainless steel legs, 180,000 BTU, NSF, cETLus, CE
2. One (1) Dormont Model 16125KIT2S48 Dormont Blue Hose™ Moveable Gas Connector Kit, 1-1/4" inside dia., 48" long, covered with stainless steel braid, coated with blue antimicrobial PVC, 1 SnapFast® QD, 2 Swivel MAX®, 1 full port valve, coiled restraining cable with hardware, 449,000 BTU/hr minimum, limited lifetime warranty
3. One (1) Standard warranty: one year parts and labor warranty
4. One (1) Natural gas
5. One (1) 1" Left rear manifold with pressure regulator (up to 500,000 BTU/hr)
6. One (1) Cap & stainless steel manifold cover, left
7. One (1) Cap & stainless steel manifold cover, right
8. One (1) Guard rail finished end
9. One (1) Back, stainless steel for range
10. One (1) Casters with 5" wheel 6" OA (set of 4)

ITEM # 1-23 WALL FLASHING

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL (LOT) Approximately 9'-0" l. Provide 20 ga. stainless steel wall flashing from floor to exhaust hood with 6" fluting (vertical) and a #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-24 WORK TABLE

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 4'-0" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, lower and/or mid shelves, 6" high back and end splash (where required). Top shall be 14 ga stainless steel, and legs

shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-25            WALL SHELF (KNIFE BRACKETS)

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1.     One (1) Model STAINLESS STEEL Approximately 4'-0" l x 1"-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4 finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-26            MOBILE DRYING RACK

Quantity:            Two (2)  
Manufacturer:        Cambro  
Model:                CAMSHELVING

1.     Two (2) Model CAMSHELVING (LOT) 4 tier, 24" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher, with solid plates on bottom shelf, and louvered on all other shelves. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide with CSRDB donut bumper and CSCTL casters with brake. Verify sizes for shelves and posts by field measuring prior to ordering.

ITEM # 1-27            3 COMPARTMENT POT SINK

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1.     One (1) Model STAINLESS STEEL Approximately 13'-0" l x 2'-6" w. Provide stainless steel pot sink assembly with 1-5/8" legs with adjustable bullet feet, under and/or mid shelves, 10" high back and end splash (where required). Top shall be 14 ga stainless

- steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) CSS Model SCRAP SINK Provide 16 ga stainless steel sink tub measuring approximately 20" l x 18" w x 8" d. Welded in place with polished seams. Provide with rotary waste valve.
  3. One (1) CSS Model SCRAP BASKET Provide 16 ga stainless steel scrap basket measuring 19 1/2" l x 19 1/2" w x 7 3/4" d. Scrap basket to be constructed with coved corners, perforated holes, welded 1/4" x 1/4" h round solid stainless steel rod feet, and rack glide. Perforated holes to be 3/16" at 1/2" on center on all four sides and bottom of basket. Rack glide with lift out handles, to be square tubing and fully welding.
  4. Three (3) CSS Model SINKS Provide 16 ga stainless steel sink tub measuring approximately 24" w x 26" d x 14" h. Welded in place with polished seams.
  5. Three (3) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-28            SPARE NO.

ITEM # 1-29            SPARE NO.

ITEM # 1-30            SPARE NO.

ITEM # 1-32            SPLASH MOUNTED HI-FLO UTENSIL SINK FAUCET

Quantity:            Two (2)  
Manufacturer:        T&S Brass  
Model:                B-0291

1. Two (2) Model B-0291 Kettle & Pot Sink Faucet, Big-Flo, wall mounted 8" centers, 3/4" IPS model LL street EL inlets with locknuts, 18" swing nozzle, 175°F four arm handles, 1-1/4" dia. holes required in backsplash

ITEM # 1-33            WALL SHELF (KNIFE BRACKETS)

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 2'-0" l x 1'-0" w. Provide stainless steel wall shelf with knife brackets. Wall shelf shall be: 16 ga stainless steel with #4

finish, bracket shall be 14 ga stainless steel. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-34            UTENSIL RACK

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 6'-0" l x 1/4" w x 2" d. Provide stainless steel flatbar utensil rack with integral 1/4" x 2" mounting bracket. Include sliding hooks 8" on center. Stainless steel shall be type 304 with #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-35            WALL FLASHING

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1. One (1) Model STAINLESS STEEL (LOT) Approximately 13'-0" l. Provide 20 ga. stainless steel wall flashing from floor to exhaust hood with 6" fluting (vertical) and a #4 finish. Provide all necessary closure and trim strips for a complete installation. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-36            HAND SINK

Quantity:            One (1)  
Manufacturer:        Eagle Group  
Model:                HSAP-14-ADA-FW

1. One (1) Model HSAP-14-ADA-FW Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, PHYSICALLY CHALLENGED, NSF
2. One (1) Model -LRS Left & right side splashes

ITEM # 1-37            HAND SINK FAUCET, SPLASH MOUNT

Quantity: One (1)  
Manufacturer: T&S Brass  
Model: B-1146-04

1. One (1) Model B-1146-04 Faucet Workboard, splash mounted, 4" centers, swivel gooseneck, 4" wrist action handles
2. One (1) 4" wrist action handle, standard
3. One (1) Model B-0199-01F-15 Aerator, non-splash, flow control, 1.40 gpm, 55/64"-27 UNS female threads

ITEM # 1-38 SPARE NO.

ITEM # 1-39 SPARE NO.

ITEM # 1-40 MOBILE WORK TABLE

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 4'-0" l x 2'-0" w x 2'-10" h. Provide stainless steel mobile work table with 1-5/8" legs, and lower and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Provide 5" dia. heavy-duty, non-marking casters, all with brakes. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-41 ADA MOBILE WORK TABLE

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 4'-0" l x 2'-0" w x 2'-10" h. Provide stainless steel mobile work table with 1-5/8" legs, and lower and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Provide 5" dia. heavy-duty, non-marking casters, all with brakes. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-42 MOBILE DRY STORAGE SHELVING UNITS

Quantity: Two (2)  
Manufacturer: Cambro  
Model: CAMSHELVING

1. Two (2) Model CAMSHELVING (LOT) 4 tier, 21" deep shelving units, posts to be 72" high, shelving units shall have a smooth surface without any welding or crevices. Posts and traverses shall be made of steel metal core with thick polypropylene covers. Shelf plates shall have a smooth surface without any welding or crevices, be of a structural web design and removable to be washed manually or in a commercial dishwasher, with solid plates on bottom shelf, and louvered on all other shelves. Shelf plates shall contain CamGuard, antimicrobial that inhibits the growth of mold, fungus and bacteria. Posts shall have dovetails that allow shelves to be adjusted in 4" increments. Provide dunnage stands for all traverses 54" or longer and at corners where corner connectors are used. Provide in the configuration shown on plans, verify final sizes of shelves and posts by field measuring prior to ordering.
2. One (1) Model CPMCHD000 Caster, 5", includes high density donut bumper, for high density Camshelving, gray

ITEM # 1-43 WORK TABLE W/2 COMPARTMENT PREP SINKS

Quantity: One (1)  
Manufacturer: Custom  
Model: STAINLESS STEEL

1. One (1) Model STAINLESS STEEL Approximately 9'-0" l x 2'-6" w. Provide stainless steel work table with 1-5/8" legs with adjustable bullet feet, and under and/or mid shelves. Top shall be 14 ga stainless steel, and legs shall be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.
2. One (1) CSS Model 2 COMP SINK Provide 16 ga stainless steel with 2 compartment sink tub measuring approximately 18" w x 24" d x 12" h each. Welded in place with polished seams.
3. Two (2) Fisher Model 29033 DrainKing Waste Valve, flat strainer, overflow body, chrome finish

ITEM # 1-44 SPLASH MOUNTED PREP SINK FAUCET

Quantity: One (1)  
Manufacturer: T&S Brass  
Model: B-0231-CR

1. One (1) Model B-0231-CR Faucet, 12" swing nozzle, 8" wall mount base, 1/2" NPT female Inlets, ceramas cartridges

ITEM # 1-45            SPARE NO.

ITEM # 1-46            TRASH RECEPTACLE W/DOLLY

Quantity:            Two (2)  
Manufacturer:       Rubbermaid Commercial Products  
Model:                FG262000GRAY

1. Two (2) Model FG262000GRAY ProSave® BRUTE® Container, without lid, 20 gallon, 19-1/2"D x 22-7/8"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF
2. Two (2) All-plastic, professional-grade construction will not rust, chip or peel; resists dents.
3. Two (2) Reinforced rims add strength and durability
4. Two (2) Built-in handles allow easy, non-slip lifting and anti-jam nesting
5. Two (2) Double-ribbed base increases stability and dragging capacity
6. Two (2) USDA Meat & Poultry Equipment Group listed and assist in complying with HACCP guidelines.
7. Two (2) Certified to NSF Standard #2 and Standard #21
8. Two (2) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking blue casters, black

ITEM # 1-47            CAN OPENER

Quantity:            One (1)  
Manufacturer:       Edlund  
Model:                S-11

1. One (1) Model S-11 Can Opener, manual, stainless steel, with cast stainless steel base, NSF certified
2. One (1) 5 year limited warranty, standard
3. One (1) Model ST-93 Rustproof Can Opener Cleaning Tool, stainless steel bristles and stainless scraper

ITEM # 1-48            SPARE NO.

ITEM # 1-49            SPARE NO.

ITEM # 1-50            SPARE NO.

ITEM # 1-51            SPARE NO.

ITEM # 1-52            WATER FILTRATION SYSTEM, FOR ICE MACHINES

Quantity:            One (1)  
Manufacturer:        Manitowoc  
Model:                AR-10000

1.     One (1) Model AR-10000 Arctic Pure® Primary Water Filter Assembly, includes head, shroud, hardware, mounting assembly, & (1) filter cartridge, 14,000 gallon capacity, 0-600 lbs./ice per day

ITEM # 1-53            ICE CUBER

Quantity:            One (1)  
Manufacturer:        Manitowoc  
Model:                IYT0450A

1.     One (1) Model IYT0450A Indigo NXT™ Series Ice Maker, cube-style, air-cooled, self-contained condenser, 30"W x 24"D x 21-1/2"H, production capacity up to 490 lb/24 hours at 70°/50° (378 lb AHRI certified at 90°/70°), DuraTech™ exterior, half-dice size cubes, R410A refrigerant, NSF, cULus, CE, ENERGY STAR®
2.     One (1) Model WARRANTY-ICE-SC 3 year parts & labor (Machine), 5 year parts & labor (Evaporator), 5 year parts & 3 years labor (Compressor), standard
3.     One (1) (-161) 115v/60/1-ph, 11.9 amps
4.     One (1) Model X Factory Built-In LuminIce II Growth Inhibitor, comes pre-installed in ice machine (Add "X" to end of Indigo model number)
5.     One (1) Model WARRANTY-LUMINICE 3 year parts & labor warranty, standard

ITEM # 1-54            ICE BIN FOR ICE MACHINES

Quantity:            One (1)  
Manufacturer:        Manitowoc  
Model:                D570



1. One (1) Model D570 Ice Bin, 30"W x 34"D x 50"H, with side-hinged front-opening door, side grips, AHRI certified 532 lb ice storage capacity (17.9 cu. ft.), for top-mounted ice maker, Duratech exterior, NSF
2. One (1) Model WARRANTY-BIN/DISP 3 year parts & labor warranty, standard
3. One (1) Legs, 6" adjustable stainless steel, standard

ITEM # 1-73           MILK COOLER

Quantity:           Two (2)  
Manufacturer:       Beverage Air  
Model:              ST49N-S

1. Two (2) Model ST49N-S School Milk Cooler, normal temperature, 49" W, 31-1/2" D, 20.0 cu. ft., dual access, flat top carton capacities, (12) 13" x 13" x 11" or (8) 19" x 13" x 11 case capacities, stainless steel interior & exterior, 4" heavy duty casters, (2) with brakes, 1/4 hp, UL, cUL, UL EPH, NSF, MADE IN USA
2. Two (2) 3 years parts & labor warranty (excludes maintenance items)
3. Two (2) Additional 2 yr compressor warranty, standard
4. Two (2) 115v/60/1-ph, 7.5 amps, standard
5. Two (2) Model 00C01-005A Wrap around bumper, for SM/ST49 series (field installation required)
6. Two (2) 4" Heavy duty casters, (2) with brakes, standard

ITEM # 1-55           FLOOR TROUGH

Quantity:           One (1)  
Manufacturer:       IMC/Teddy  
Model:              FT-1236-PFG-ADA

1. One (1) Model FT-1236-PFG-ADA FT Floor Trough, 36"W x 12"D, 4" deep receptacle, (1) 6-1/2" waste outlet with perforated waste basket & 4" OD tailpiece, includes anchor straps, 14/304 stainless steel construction, brushed satin finish, (PFG-ADA) pultruded fiberglass grating, blue, NSF, Made in USA

ITEM # 1-56           WALL CAPS

Quantity:           Two (2)  
Manufacturer:       Custom  
Model:              STAINLESS STEEL

1. Two (2) Model STAINLESS STEEL (LOT) Provide 16 ga. stainless steel wall caps at 6'-6" in height. Stainless steel shall have a #4 finish. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-57 REACH-IN FREEZER

Quantity: One (1)  
Manufacturer: Traulsen  
Model: G22010

1. One (1) Model G22010 Dealer's Choice Freezer, Reach-in, two-section, 46.0 cu. ft., self-contained refrigeration with microprocessor control, stainless steel front & full height doors (hinged left/right), anodized aluminum sides & interior, (3) epoxy coated shelves per section (factory installed), LED interior lights, 6" high casters, unit can be programmed to operate at -10 degrees Fahrenheit, 3/4 hp, cULus, NSF, ENERGY STAR®
2. One (1) 3 year parts & labor and 5 year compressor warranty, standard
3. One (1) 115v/60/1ph, 11.2 amps, NEMA 5-15P, standard

ITEM # 1-58 SPARE NO.

ITEM # 1-59 SPARE NO.

ITEM # 1-60 SPARE NO.

ITEM # 1-61 REACH-IN REFRIGERATOR

Quantity: One (1)  
Manufacturer: Traulsen  
Model: G2000-

1. One (1) Model G2000- Dealer's Choice Refrigerator, Reach-in, two-section, 46.0 cu. ft., self-contained refrigeration with microprocessor control, stainless steel front & half height doors (hinging to be determined), anodized aluminum sides & interior, (3) epoxy coated shelves per section (factory installed), LED interior lights, 6" high casters, 1/3 HP, cULus, NSF
2. One (1) 3 year parts & labor and 5 year compressor warranty, standard
3. One (1) 3 year parts & labor and 5 year compressor warranty, standard
4. One (1) 115v/60/1ph, 7.4 amps, NEMA 5-15P, standard

ITEM # 1-62            WORK COUNTER

Quantity:            One (1)  
Manufacturer:        Custom  
Model:                STAINLESS STEEL

1.     One (1) Model STAINLESS STEEL Approximately 12'-0" l x 2'-6" w. Provide stainless steel work counter with undershelf and/or mid shelf, galvanized metal base, and 6" high back and end splash (where required). Top shall be 14 ga stainless steel, body to be 16 ga. Fabricate and install per complete drawings, schedules, elevations, and details.

ITEM # 1-63            SPARE NO.

ITEM # 1-64            HAND SINK

Quantity:            One (1)  
Manufacturer:        Eagle Group  
Model:                HSAP-14-ADA-FW

1.     One (1) Model HSAP-14-ADA-FW Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, PHYSICALLY CHALLENGED, NSF
2.     One (1) Model -LRS Left & right side splashes

ITEM # 1-65            HAND SINK FAUCET, SPLASH MOUNT

Quantity:            One (1)  
Manufacturer:        T&S Brass  
Model:                B-1146-04

1.     One (1) Model B-1146-04 Faucet Workboard, splash mounted, 4" centers, swivel gooseneck, 4" wrist action handles
2.     One (1) 4" wrist action handle, standard
3.     One (1) Model B-0199-01F-15 Aerator, non-splash, flow control, 1.40 gpm, 55/64"-27 UNS female threads

ITEM # 1-66 TRASH RECEPTACLE W/DOLLY

Quantity: One (1)  
Manufacturer: Rubbermaid Commercial Products  
Model: FG262000GRAY

1. One (1) Model FG262000GRAY ProSave® BRUTE® Container, without lid, 20 gallon, 19-1/2"D x 22-7/8"H, round, reinforced rims, built in handles, double rimmed base, high-impact plastic construction, gray, NSF
2. One (1) All-plastic, professional-grade construction will not rust, chip or peel; resists dents.
3. One (1) Reinforced rims add strength and durability
4. One (1) Built-in handles allow easy, non-slip lifting and anti-jam nesting
5. One (1) Double-ribbed base increases stability and dragging capacity
6. One (1) USDA Meat & Poultry Equipment Group listed and assist in complying with HACCP guidelines.
7. One (1) Certified to NSF Standard #2 and Standard #21
8. One (1) Model FG264043BLA BRUTE® Quiet Dolly, 18-1/4"D x 6-5/8"H, non-marking blue casters, black

ITEM # 1-67 AIR CURTAIN

Quantity: Two (2)  
Manufacturer: Mars Air Systems  
Model: LPV272-1UD-TS

1. Two (2) Model LPV272-1UD-TS LoPro Series 2 Air Curtain, for 72" wide door, Unheated, (1) 1/6 HP motor, 208-230v/60/1-ph, Titanium Silver powder coated cabinet (Custom Production Color), cETLus
2. Two (2) 5 year parts warranty, standard
3. Two (2) Options WITHOUT time delay
4. Two (2) Model 99-014 Steel Mechanical Universal Surface-mounted Plunger/Roller Switch

ITEM # 1-68 SPARE NO.

ITEM # 1-69 SPARE NO.

ITEM # 1-70 SPARE NO.

ITEM # 1-71            CASH REGISTER STAND

Quantity:            One (1)  
Manufacturer:        Multiteria  
Model:                CS30 CUSTOM

1.     One (1) Model CS30 CUSTOM CS30 Essence In-line Cashier Station, 30"L x 34"W x 34"H, includes cash drawer with insert tray, grommet hole, receptacle and empty data box, on 6" casters
2.     One (1) - Modify counter to 42"L to achieve 30"L u/c clearance requirement for ADA
  - Modify cash station with no cash drawer or insert tray for ADA height clearance
  - 14 Gauge Stainless Steel Top
  - Tray Slide, stainless steel with inverted "V" runners
  - Laminate Front Panel
  - (2 ) each, Laminate End Panel

ITEM # 1-72            CASH REGISTER   <NIC>

Quantity:            Two (2)  
Manufacturer:        NIFSEC

1.     Two (2) Cash Register - NIFSEC

ITEM # 1-74            SERVING COUNTER, COLD FOOD

Quantity:            One (1)  
Manufacturer:        Multiteria  
Model:                CLS60 CUSTOM

1.     One (1) Model CLS60 CUSTOM CLS60 Essence Cold Food Counter 60"L x 34"W x 34"H, with welded 1" stainless steel tubular base, removable 18 gauge stainless steel undershelf and 6" casters
2.     One (1) - 14 Gauge Stainless Steel Top
  - Cold food well for (4) pans, drop-in, CWB-4 with 1" ball valve
  - Condensate evaporator. Note: this requires additional electrical requirements
  - FS-Food shield with convertible 2-position front glass and glass shelf. Verify black powder coat or stainless steel brushed finish
  - Modify food shield to single tier style with pivot front glass that ends 6" above counter top when in vertical position
  - (2) each, Food shield glass end panel
  - Receptacle with cord and plug

- Tray Slide, stainless steel with inverted "V" runners
- Laminate Front Panel
- Laminate End Panel
- Stainless steel hinged louvered doors on operator side at cold well compressor with open storage at remaining length of counter

ITEM # 1-75                   SERVING COUNTER, UTILITY

Quantity:                   Two (2)  
Manufacturer:             Multiteria  
Model:                     ULSS66 CUSTOM

1.     Two (2) Model ULSS66 CUSTOM ULS66 Essence Utility Counter, 66"L x 34"W x 34"H, with welded 1" stainless steel tubular base, removable 18 gauge stainless steel undershelf and 6" adjustable stainless steel legs
2.     Two (2) - 14 Gauge Stainless Steel Top
  - Tray Slide, stainless steel with inverted "V" runners
  - Laminate Front Panel
  - Laminate End Panel
  - Standard corner with removable panels
  - Open storage on operator side
  - Tight Link
  - Seismic legs with flanged feet in lieu of standard legs with bullet feet

ITEM # 1-76                   SERVING COUNTER, HOT FOOD, ELECTRIC

Quantity:                   One (1)  
Manufacturer:             Multiteria  
Model:                     HLS66 CUSTOM

1.     One (1) Model HLS66 CUSTOM HLS66 Essence Hot Food Counter, 66"L x 34"W x 34"H, with welded 1" stainless steel tubular base, removable 18 gauge stainless steel undershelf and 6" casters
2.     One (1) - 14 Gauge Stainless Steel Top
  - Recess top for sheet pans at drop-in
  - Hot well for (4) full size pans, drop-in, 1,200 watts per well, with manifolded drains, HWBI-4M with bottom exit to 3/4" ball valve
  - Modify hot wells with sealed wells, no drains, HWBI-4
  - FS-Food shield with convertible 2-position front glass and glass shelf. Verify black powder coat or stainless steel brushed finish
  - Modify food shield to single tier style with pivot front glass that ends 6" above counter top when in vertical position

- (2) each, Food shield glass end panel
- J-box with cord and plug
- Tray Slide, stainless steel with inverted "V" runners
- Laminate Front Panel
- Open storage on operator side
- Tight Link

ITEM # 1-77            REMOTE REFRIGERATION RACK AND SYSTEM

Quantity:            One (1)  
Manufacturer:        Airdyne Refrigeration Inc.  
Model:                WP-2

1.        One (1) Model WP-2 Refer to Section 114000, paragraph 2.8 and FS drawings.

END OF SECTION

## SECTION 14240

### MODULAR HYDRAULIC ELEVATORS – PASSENGER

#### PART 1 – GENERAL

##### 1.01 SECTION INCLUDES

- A. Modular Hydraulic elevator system: Including jacks, as per drawings, car, wiring, pump unit, oil storage tank, controller, guide rails, entrances, and modular equipment room (if applicable). Pre-manufactured hoistway structure, plywood roof with removable lifting eyes. All construction to be mold resistant construction. Modular equipment, where applicable, wired and ready for electrical hook-up. Interior will be unfinished. Aluminum transition thresholds (manufactured by Modular Elevator Manufacturing, Inc) shall be installed after modular elevator has been set, plumbed, anchored, and grouted to provide a smooth transition from landing floors to elevator sills at applicable entrances.
- B. Passenger cab with doors and frames; hoistway entrance doors and frames.
- C. Motor and pump, controllers, hoistway, equipment, and accessories.
- D. Related sections:
  - 1. Division 2 Sections; Earthwork.
  - 2. Division 3 Sections; Concrete form work.
  - 3. Division 5 Sections; Structural steel framing.
  - 4. Division 7 Sections; Flashing and sheet metal roof specialties.
  - 5. Division 07512 Modified Bitumen Sheet Roofing.
  - 6. Division 16 Sections;
    - a. Providing electrical service to elevators.
    - b. Heat and smoke sensing devices.
    - c. Providing electrical service for outlets and illumination in equipment room, hoistway, pit, and cab lighting.
    - d. Telephone service.
  - 7. Section 09
    - a. Resilient Flooring.

##### 1.02 REFERENCES

- A. CAS/CAR – California Accessibility Statutes And California Accessibility Regulations, 2016 California Building Code.
- B. ASME A17.1 – 2004 – Safety Code For Elevators And Escalators.



- C. ASME A17.1 – 2005 Handbook – Handbook Safety Code For Elevators And Escalators.
- D. AWD D1.1 – Structural Welding Code, Steel. 2004
- E. CEC – California Electrical Code.
- F. NFPA 80 – Fire Doors and Windows.
- G. UL 10B – Fire Tests of Door Assemblies.
- H. APA – American Plywood Association.
- I. ASTM A36 – Structural Steel.
- J. ASTM A1008/A1008M – Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
- K. ASTM A139 – Electric-Fusion (ARC)-Welded Steel Pipe (NPS 4-in. and Over).
- L. ASTM A167 – Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- M. ASTM B221 – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
- N. NEMA LD3 – High Pressure Decorative Laminates.
- O. NEMA MG1 – Motors and Generators.
- P. Steel Structures Painting Council (SSPC) – Steel Structures Painting Manual.
- Q. California Elevator Safety Regulations, Part 7, Title 24, CCR, 2004
- R. ASTM D1785, PVC Plastic Pipe, Schedules 40, 80, and 120.
- S. Chapters 11B, 16A and Chapter 30, California Building Code. CBC 1116B and 3001.1.1 with exception, and 3001.3
- T. California Building Code, Section 1117B.5 for Signage.
- U. ASTM A500 Grade B (Fy=46ksi) – HSS Structural Steel Tube.
- V. A307 – Carbon Steel and Galvanized Steel Machine Bolts.
- W. FA36 – Hardened Steel Washers.
- X. AISC 360-OS- Structural Steel Design Manual.
- Y. California Code of Regulations, Title 8.

### 1.03 SYSTEM DESCRIPTION

- A. Hydraulic Elevator System; twin jack holeless or buried cylinder and casing with motor and pump adjacent.
- B. Characteristics of each elevator are as follows for Modular Elevator Manufacturing, Inc. Chatsworth, CA.
  - 1. Rated Net Capacity: 3500 lbs.
  - 2. Rated Speed: 100ft/min.
  - 3. Operating System: Single automatic.
  - 4. Clear Car Inside: 80 x 63 inches.
  - 5. Platform Size: 82 ½ x 72 inches
  - 6. Cab Height: 96 inch.
  - 7. Door Type: Single-speed, side.
  - 8. Door Size: 42 x 84 inches
  - 9. Door Operation: Automatic, direct current powered.
  - 10. No. of Stops: 2
- C. Door Control Features:
  - 1. Program door control to open doors automatically when car arrives at floor.
  - 2. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.
  - 3. If doors are prevented from closing for approximately twenty seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared, Section 1116B.1.5. Sound buzzer.
  - 4. Door Safety Devices: Equip with photo-electric light rays or object proximity detector device capable of sensing an object or person in the path of a closing door without requiring contact for activation at minimum 5 inches and 29 inches above the floor, Section 1116B.1.5.
- D. Interconnect elevator control system with building fire alarm.
- E. Seismic Design: In accordance with Section 1613A, 1614A, California Building Code and California Elevator Safety Regulations Code, Part 7, Title 24, CCR.

### 1.04 SINGLE AUTOMATIC OPERATION – SINGLE CAR

- A. Set system operation so that upon momentary pressure of a hall button from another landing dispatches car to that landing.
- B. Allow call registered by momentary pressure of hall button at any time to remain registered until car stops in response to that call at that landing.
- C. If hoistway door is not opened within a short interval after car has stopped at registered landing, allow car to respond to any call from the other landing.

### 1.05 FIREFIGHTER'S SERVICE

- A. Provide "Firefighter's Operation" in accordance with ASME A17.1. 2004
- B. Designated Landing: Main floor.
- C. Alternate Landing: 2<sup>nd</sup> Floor.

#### 1.06 INDEPENDENT SERVICE (Optional)

- A. Provide key operated "Independent Service" in car operating panel, or in service cabinets, if provided. Key activation will remove that car from normal operation and cancel all pre-registered car and hall calls. Operation shall be from car buttons only.
- B. Car will respond to selected floor. Car will not respond to any calls from hall call buttons. Car will only respond to calls placed on the car operating panel. Doors will remain open at last landing requested. Doors will close with a constant pressure on "DOOR CLOSE" button.
- C. Key cannot be removed during independent service operation. Key activation to normal operation will return car to normal operation.

#### 1.07 LIMITED ACCESS SERVICE

- A. Keyed Hall Call Control Switch: Incorporate in each floor key call switch feature to register a hall call. Keyed to Adams standard AE102 key. When activated, calls the elevator to that designated floor.

#### 1.08 SUBMITTALS

- A. Shop Drawings: Indicate the following information:
  - 1. Dimensioned plan of hoistway and machine room and full height section through hoistway.
  - 2. Motor and hydraulic pump, valve, controller, selector, governor and other component locations.
  - 3. Car, guide rails, buffers, and other components in hoistway.
  - 4. Rail bracket spacing; maximum loads imposed on guide rails.
  - 5. Clearances and over travel of car.
  - 6. Location of components in machine room.
  - 7. Location in hoistway and machine room of connections for car light and telephone.
  - 8. Location and sizes of access doors, doors, and frames.
  - 9. Electrical characteristics and connection requirements.
  - 10. Show suggested arrangement of equipment in machine room so moving elements and other equipment can be removed for repairs and replaced without disturbing other components. Arrange equipment for clear passage through access door.
  - 11. Signal and operating fixtures, operating panels, indicators.

- B. Product Data:
    - 1. Cab design, dimensions, layout, and components.
    - 2. Cab and hoistway door and frame details.
    - 3. Electrical characteristics and connection requirements.
  - C. Samples shall be provided, illustrating cab interior finishes, car and hoistway door and frame finishes.
- 1.09 OPERATION AND MAINTENANCE DATA

- A. Include a parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
- B. Provide technical information for servicing operating equipment.
- C. Include legible schematic of hydraulic piping and wiring diagrams of installed electrical equipment, and changes made in the Work. List symbols corresponding to identify or markings on machine room and hoistway apparatus.
- D. Provide one copy of master electric and hydraulic schematic.

1.10 QUALITY ASSURANCE

- A. Perform Work in accordance with ASME A17.1, AWS D1.1, CEC, AISC, and as supplemented in this section.
- B. Fabricate and install door and frame assemblies in accordance with NFPA 80 and UL 10B
- C. Maintain one copy of each document on site.

1.11 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified.
- B. Installer: Elevator Company specializing in performing the work of this section, with 5 years experience installing modular elevator systems and approved by modular elevator system manufacturer.

1.12 REGULATORY REQUIREMENTS

- A. Conform to Title 24, Part 7 and Title 8, 2016 California Code of Regulations for manufacture and installation of elevator system.
- B. Conform to CAS/CAR for provisions for the physically disabled.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., or a testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

D. Conform to the following Chapter 11B, 2016

E. CBC:

1. Cab, and control locations to accommodate persons with disabilities
2. Provide the following requirements:
  - a. Two way self-leveling device that will bring the car to the floor landings within a tolerance of  $\frac{1}{4}$  inch under normal loading and unloading conditions.
3. Clearance between the car platform sill and the edge of the hoistway landing: No greater than  $1\frac{1}{2}$  inches (1116B.1.2).
4. Minimum clear width for elevator doors shall be 36 inches. (1116B.1.4).
5. Minimum acceptable time from notification that a car is answering a call (lantern and audible signal) until the doors of the car start to close 5 seconds.
6. The minimum acceptable time for the doors to remain open: not less than 5 seconds.
7. Car inside shall allow for the turning of a wheelchair. Minimum clear distance between walls or between wall and door, excluding return panels; not less than 68 inches by 59 inches for side-slide opening doors. The centerline of elevator floor buttons shall be no higher than 54 inches above the finish floor for side approach and 48 inches for front approach. (1116B.1.13).
8. Control buttons shall be illuminated, shall have square shoulders, and shall be activated by a mechanical motion that is detectable. All control buttons shall be designated by a  $\frac{5}{8}$  inch minimum Arabic numeral, standard alphabet character, immediately below the numeral or character. A minimum clear space of  $\frac{3}{8}$  inch of separation shall be provided between rows of control buttons. The raised characters shall be white on black background.
9. Controls and emergency equipment identified by raised symbols shall include but not be limited to door open, door close, alarm bell, emergency stop and telephone. The call button for the main entry floor shall be designated by a raised star at the left of the floor designation.
10. The centerline of the hall call button: within 42 inches of the floor. Buttons: minimum of  $\frac{3}{4}$  inch in size, raised  $\frac{1}{8}$  inch plus or minus  $\frac{1}{32}$  inch above surrounding surface. Visual indication shall be provided to show each call registered an extinguished when answered. Objects adjacent to, and below, hall call buttons shall not project more than 4 inches from the wall.
11. Minimum illumination at the car controls, threshold and the landing when the car and landing doors are open not be less than 10 foot-candles.
12. A visual and audible signal shall be provided at each hoistway entrance indicating to the prospective passenger the car answering the call and its direction of travel as follows:
  - a. The visual signal for each direction shall be a minimum of  $2\frac{1}{2}$  inches high by  $2\frac{1}{2}$  wide and be visible from the proximity of the hall call button. The audible signal shall sound once

- for the up direction or of a configuration that distinguishes between up and down elevator travel.
  - b. The centerline of the fixture shall be located a minimum of 6 feet in height from the floor of the lobby.
  - c. The use of in-car lanterns, located in or on the car door entrance columns, visible from the proximity of the hall call buttons and conforming to the above requirements shall or will be acceptable.
13. The use of arrow shapes is preferred for visible signals. Passenger elevator landing jambs on all elevator floors shall have the number of the floor on which the jamb is located designated by raised Arabic numerals which are a minimum of 2 inches in height and raised Braille symbols which conform to Section 1117B.5.3 located at approximately 5 feet above the floor on the jam panels on both sides of the door so that they are visible from within elevator. Raised Braille symbols shall be placed directly below the corresponding Arabic numerals. The raised characters shall be on a contrasting background.
14. Passenger elevators shall be located near a major path travel and provisions shall be made to ensure that they remain accessible and useable at all times the building is occupied.

#### 1.13 SCHEDULING

- A. Schedule work under the provisions of Division 1, General Requirements.

#### 1.14 WARRANTY

- A. Provide one year manufacturer's warranty
- B. Warranty: Include coverage for elevator operating equipment and devices.

#### 1.15 MAINTENANCE SERVICE

- A. Warranty: Provide special project warranty, signed by the Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of elevator work during warranty period. "defective" is hereby defined to include, but not by way of limitation, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
  - 1. The warranty period is for 12 months starting on date of acceptance by the State of Elevator inspector or 13 months from delivery of modular elevator unit, whichever is the least.
- B. Maintenance Service: Separate Contract for minimum oil and lubrication by skilled competent employees of Elevator Installer for a period of 12 months following date of acceptance by DOSH and District Inspectors. Include monthly preventative maintenance, performed during normal working hours. Include repair/replacement of worn or defective parts or components and lubrication, cleaning and adjusting as required for proper elevator operation in

conformance with specified service. Exclude only repair/replacement due to misuse, abuse, accidents for neglect cause by persons other than Installer's personnel.

## **PART 2 – PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Products of the following manufacturers from the basis for design and quality intended.
  - 1. Modular Elevator Manufacturing, Inc., Chatsworth, CA
  - 2. Distributed and installed by T.L. Shield & Associates, Inc., San Fernando, CA. 818-509-8228.
- B. Or equal as approved in accordance with Division 1, General Requirements for Substitutions.

### **2.02 MATERIALS**

- A. Rolled Steel Sections, Shapes, Rods: ASTM A36
- B. Casing: ASTM A139, Grade A Steel or ASTM D1785 Schedule 80 PVC Pipe.
- C. Sheet Steel: ASTM A1008 with commercial bright finish.
- D. Stainless Steel: ASTM A167, Type 304, No. 4 finish
- E. Aluminum: ASTM B221, extruded.
- F. Particle Board: ANSI 208.1, 47 lbs/cu.ft
- G. Plastic Laminate: NEMA LD3, 0.050 inch thick; color/pattern and surface finish as selected.

### **2.03 FINISH MATERIALS**

- A. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.
- B. Primer for Wood Surfaces; Alkyd primer sealer.
- C. Finish Paint (for Metal Surfaces); Alkyd enamel, semi-gloss color as selected.
- D. Finish Paint (for Wood Surfaces); Alkyd enamel, semi-gloss color as selected.

### **2.04 EQUIPMENT**

- A. Motor, Pumps, Valves, Regulators, Fluid Tank, Hydraulic Fluid, Controller, Controls, Buttons, Wiring and Devices, Indicators: Required by CEC.

- B. Guide Rails, Cables, Spring Buffers, Attachment Brackets and Anchors:  
Purpose designed, sized according to code with safety factors.

## 2.05 ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Electrical Characteristics
  1. 208 volts or 480 volts, 3 ph, 60 hertz
  2. Lighting 120 volts, 1ph, 60 hertz, 20 amps.
  3. Refer to Electrical Division Sections for electrical service for elevators to and including disconnect switch, transfer switch, and connection from auxiliary contacts in transfer switch to controller.
- B. Motor: NEMA MG1.
- C. Disconnect Switch: Factory mount disconnect switch on control panel.

## 2.06 ELECTRICAL COMPONENTS

- A. Boxes, Conduit, Wiring, and Devices: Required by CEC.
- B. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.
- C. Spare Conductors: Include 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.
- D. Do not use armored flexible metal conduit as a grounding conductor.
- E. Include wiring and connection to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.
- F. Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, cycle their doors, and shut down with the doors closed. Cars that are between floors are lowered to a field programmable floor, cycle their doors, and shut down with the doors closed. Cars that are below the field programmable floor are lowered to the next lower floor, cycle their doors, and shut down with the doors closed. System includes rechargeable battery and automatic recharging system.

## 2.07 LUBRICATION

- A. Grease Fittings: For lubricating bearings requiring periodic lubrication.
- B. Grease Cups: Automatic feed type.
- C. Lubrication Points: Visible and easily accessible.

## 2.08 CAR FABRICATION



- A. Frame: Structural steel members
  - B. Platform: Steel frame, with fireproofed plywood sub flooring assembly, ready to receive underlayment and floor finish.
- 2.09 CAB FABRICATION
- A. Flooring: Resilient tile flooring, of type specified in Section 09651 (by others)
  - B. Roof: 12 gauge galvaneal painted white panels.
  - C. Walls: Vertical flat panel plastic laminate laminated to 14 gauge galvaneal panels. Plastic laminate colors and patterns to be selected by architect from manufacturers standard selection.
  - D. Front return Panel: Plastic laminate on 14 gauge galvaneal steel.
  - E. Base: Type specified in Section 09653 (By Others).
  - F. Ceiling: Suspended ceiling with baked enamel frame, aluminum egg crate panels.
  - G. Light Fixtures: 4' Guarded Fluorescent fixtures (Do not install 3' fixtures).
  - H. Hand Rail: Stainless steel, 1¼ inches diameter, spaced from wall 1½ inches at rear wall or side walls, 32 inches above finish floor.
  - I. Ventilation: Single speed fan above ceiling; perforations in base.
- 2.10 FIXTURES
- A. Control Panel and Face Plate: Stainless steel with illuminating call buttons.
  - B. Indicator Panel: Above control panel with illuminating position indicators.
- 2.11 CAB ENTRANCES
- A. Cab Doors: Prime painted steel; 16 gauge thick metal, of insulated sandwich panel construction, flush design, rolled profiles, rigid construction.
  - B. Cab Door Frames: Stainless steel; 16 gauge thick metal, bolted corner design.
  - C. Thresholds: Extruded aluminum type.
- 2.12 HOISTWAY ENTRANCES
- A. Hoistway Door (Main Floor): Prime painted steel; 16 gauge thick metal, of insulated sandwich panel construction, flush design, rolled profiles, rigid construction. Single Slide Side.

- B. Hoistway Door Frames (Main Floor): Prime painted steel; 16 gauge thick metal, of rolled profiles, bolted with smooth invisible joints. Single side UL "B" labeled.
- C. Hoistway Door (Other Floor): Prime painted steel; 16 gauge thick metal, of hollow sandwich panel construction, flush design, rolled profiles, rigid construction. Single slide side.
- D. Hoistway Door Frames (Other Floor): Prime painted steel; 16 inch thick metal, or rolled profiles, bolted with smooth invisible joints.
- E. Door and Frame Construction: UL 1½ hour fire rating; insulated sandwich panel door construction 1¼ inch thick, minimum.
- F. Sills: Extruded aluminum.

### 2.13 FINISHES

- A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; and painted.
- B. Machine Room Components: Clean and degrease; paint prime one coat.
- C. Galvanized Surfaces: Clean with neutralizing solvent.
- D. Aluminum: Clear anodized.
- E. Stainless Steel: No. 4 brushed.

### 2.14 MACHINE ROOM INTERFACING MONITOR PROVISIONS

- A. Fabricate one multiple terminal block in controller relay panel or selector, in location indicated, for connection of monitoring devices for:
  - 1. Hall and car registration circuits.
  - 2. Load weighing circuits.
  - 3. Up and down peak programming circuits.
  - 4. Independent service switches (Optional).

### 2.15 CAR OPERATING PANEL

- A. Provide one flush mounted operating panel per car with applied faceplate; containing illuminated call buttons, minimum ¾ inches and raised 1/8 inch above surrounding surface corresponding to floors served, in-car alarm button, and DOOR OPEN DOOR CLOSE buttons.
- B. Position alarm button and emergency stop where it is unlikely to be accidentally actuated; not more than 54 inches above cab floor and must be 35 inches above finish floor, located minimum 24 inches clear from center line of panel from cab corner.

- C. Include service cabinet or fire cabinet, with hinged door and lock in each car (optional).
- D. Certificate Frame and Glazing: Metal frame, clear plastic attached with tamper proof screws.
- E. Car Position Indicators: Illuminated.
- F. Emergency Light.
- G. Telephone Speaker: Hands-free telephone speaker no higher than 4 feet above floor.

## 2.16 LANDING CONTROLS

- A. Landing Keyed Call Controls: Illuminating type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows, including indications required by CAS/CAR and CBC 1116B.8.
- B. Landing Position Indicators: Illuminating white.
- C. Car Direction Indicators: Illuminating white.

## 2.17 PROVISION FOR DISABLED

- A. Comply with CAS/CAR.
- B. Provide indicators near controls in conformance with CAS/CAR.
- D. Landing Keyed Call Controls: Illuminating type, one for originating UP and one for originating DOWN calls, one button only at terminating landings; marked with arrows, including indications required by CAS/CAR and CBC 1116B.8.
- C. Locate highest button in elevator cab control panel and the center of the telephone handset, not more than 40 inches above floor level.
- D. Sound audible tone signal in car when car is stopping at a floor, once at first floor twice at second floor.
- E. Include with illuminated landing indicators, audible tone signals; once for UP stops and twice for DOWN stops.
- F. In each cab provide Arabic numerals 2 inches height raised 1/32 inch and Contracted Grade 2 Braille symbols immediately to left of floor buttons to identify each floor. Dots shall be 1/10 inch (2.54 mm) on centers in each cell with 2/10 inch (0.635 mm) above the background. Minimum separation of 5/8 inch between rows of buttons.

- G. At each floor landing provide 2 inch in height floor landing Arabic numerals raised 1/32 inch and Contracted Grade 2 Braille symbols immediately to the left of the numeral per CBC Section 3003.4.16a and 1117B.5.2. Install 60 inches above finish floor. The raised characters shall be on a contrasting background.

2.18 Hydraulic Suspension means:

- A. Manufacturers standard twin jacks, or in-ground direct plunger systems.

2.19 Hydraulic Driving means:

- A. Fully integrated pump unit, including motor, pump, valve and overload protection.

### **PART 3 – EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that pit, and equipment room slab are ready for work of this section.
- B. Verify that electrical power is available and of the correct characteristics.
- C. Verify that low voltage service including, as applicable, telephone, smoke detectors, and heat sensors are available and of correct characteristics.

#### **3.02 INSTALLATION**

- A. Install in accordance with ASME A17.1
- B. Install modular elevator structure plumb and aligned with landings within 1/2". Secure in place, grout, install hydraulic piping between elevator and pump unit, connect all elevator electrical.
- C. Provide conduit, boxes, wiring, and accessories.
- D. Mount motor and pump unit on vibration and acoustic isolators, on bed plate and concrete pad. Place unit on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.
- E. Accommodate equipment in space indicated or modular equipment room.
- F. Install guide rails using threaded bolts.
- G. Accurately machine and align guide rails. Form smooth joints with machined splice plates.
- H. Weld brackets directly to structural steel hoistway framing.
- I. Field Welds: Chip and clean away oxidation and residue, wire brush; spot prime with two coats.

- J. Install hoistway door sills, frames, and headers in hoistway modular walls. Set entrances in vertical alignment with car openings and aligned.
  - K. Adjust equipment for smooth and quiet operation.
- 3.03 TOLERANCES
- A. Guide Rail Alignment: Plumb and parallel to each other within 1/8 inch in accordance with ASME A17.1 and ASME A17.2
  - B. Cab Movement on Aligned Guide Rails: Smooth movement, with no objectionable lateral or oscillating movement or vibration.
- 3.04 FIELD QUALITY CONTROL
- A. Field inspection and testing will be performed under provisions of Division 1, General Requirements.
  - B. Perform tests required by ASME A17.2
  - C. Supply instruments and execute specific tests.
  - D. Perform the following test in the presence of the Owner and Architect.
    - 5. Test elevator system by transporting at least 5 persons provided by owner up from main floor during a five minute period.
- 3.05 TESTS BY REGULATORY AGENCIES
- A. Testing by regulatory agencies will be performed at their discretion; documented by the Contractor.

END OF SECTION

SECTION 14420  
WHEELCHAIR LIFT

PART 1 - GENERAL

1.01 DESCRIPTION: Division 1 applies to this section. Provide electric motor driven, self-contained vertical platform wheelchair lift, as indicated, specified, and required.

A. Work In This Section: Principal items include furnishing and installing the wheelchair lift, complete.

B. Related Work Not In This Section:

1. Rough openings in walls.
2. Depressed floor slab for level platform access.
3. Cutting and patching of floors and walls.
4. Electrical power connection to building system.

1.02 SUBMITTALS:

A. Shop Drawings: Submit complete shop drawings of the wheelchair lift and accessories, including anchorage to concrete floor.

1. Show typical details of assembly, erection and anchorage.
2. Include wiring diagrams for power, control, and signal systems.
3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Manufacturer's installation instructions, including preparation, storage and handling requirements.
2. Include complete description of performance and operating characteristics.
3. Show maximum and average power demands.

C. Furnish name, address and telephone number of nearest service organization authorized by the manufacturer.

D. Certification: Provide certification of approval after installation from DSA.

E. Samples: For each finish product specified, provide 2 complete sets of color chips representing manufacturer's full range of available colors and patterns. After selection, provide 2 samples, minimum size 6 inches square, representing actual product, color, and patterns.

1.03 QUALITY ASSURANCE:

A. Wheelchair lift shall conform to the requirements of CBC 2016 11B and ANSI A 17.1 for elevator devices for the disabled.

B. The wheelchair lift shall be designed and manufactured in accordance with ASME A 17.1, Part XX.

- C. Manufacturer Qualifications: Firm with minimum 10 years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.
- D. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.
- E. Performance:
  - 1. Rated load: 850 pounds.
  - 2. Speed: 5 feet per minute

#### 1.04 REGULATORY REQUIREMENTS

- A. Provide platform lifts in compliance with:
  - 1. ASME A 18.1 -Safety Standard for Platform Lifts and Stairway Chairlifts.
  - 2. ASME A 17.1 - Safety Code for Elevators and Escalators.
  - 3. ASME A 17.5- Elevator and Escalator Electrical Equipment.
  - 4. NFPA 70- National Electric Code.
  - 5. CBC Requirements: Wheelchair lifts shall comply with the applicable sections of 2016 CBC Sections 11B-408, 11B409, 11B-410,1124A.11, 11B-221 and 11B-802.
    - a. Provide a clear landing at each level (60 inches by 60 inches), see drawings.
    - b. Gates and doors serving lifts shall meet the requirements of 11B-404, 11B-408, 11B409, 11B-410, 1124A.11.6,
    - c. Provide a smooth and solid platform enclosure.
    - d. Upper landing and lift doors 42 inches high. Doors shall be self-closing.
    - e. Provide and indicate location of "call/send" controls and access, minimum 24 inches away from any moving part. See CBC 11B-407.
    - f. Provide a wand or other reaching device attached to a chain on the side opposite the controls or provide accessible controls on both sides-of the car. CBC 11B-407.
    - g. Provide pit for flush access at lower landing.
    - h. Provide battery backup power or standby power at lift per CBC 11B-207.2
    - i. Provide signage as required by CBC Section 11B-410.8

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

- 1.06 PROJECT CONDITIONS: Do not use wheelchair lift for hoisting materials or personnel during construction period.
- 1.07 WARRANTY: Provide manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and workmanship 2 years beyond the initial one year warranty specified in Division 1.

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURER:

- A. Ascension Protégé Model 5442F Model Series vertical wheelchair lift, manufactured by Ascension, 3526 E. Fort Lowell Rd., Tucson, AZ, 85716, Tel: 800-459-0400 or 520-881-3993, Fax: 520-881-4983, WebSales@ascension-lift.com.
- B. The National Wheel-O-Vator Co, Inc., (800) 968-5438
- C. Inclinator Co. of America, (800) 343-9007

### 2.02 PHYSICAL CHARACTERISTICS:

- A. Lifting capacity: 900 pounds [408 kg].
- B. Weight of lift: 850 pounds maximum [386 kg].
- C. Vertical speed: five (5) feet per minute [1.5 meters per minute].
- D. Vertical travel: 4" [102 mm] to 42" [1067 mm], infinitely adjustable.
- E. Standard platform gate configuration: the upper platform gate or upper landing gate shall be left-hinged when facing the lift from the upper landing; the lower platform gate shall be right-hinged when facing the lift from the lower landing.  
Contact Ascension for custom platform gate configurations.

### 2.3 DIMENSIONS

- A. Platform size: 36" x 54" [914 mm x 1372 mm].
- B. Platform size (upper landing gate version): 36" x 58" [914 mm x 1473 mm].
- C. No part of the lift shall stand over 49" [1245 mm] high when the platform is on the ground (except when equipped with optional stage guard).

### 2.4 MATERIALS

- A. The platform frame, base frame, and lifting device shall be constructed from ASTM A 36, AISI 1018, or AISI 1020 Steel.
- B. The windows shall be fabricated from 1/4" [6 mm] thick high impact strength clear thermoplastic.
- C. The platform sheet metal and under-platform safety pan shall be aluminum alloy.

### 2.5 FINISH

- A. All metal components shall be thoroughly cleaned to remove any foreign substance. Exposed lift platform metal surfaces shall be finished with an oven-baked powder coating. Exposed base frame metal surfaces shall be hot-dip galvanized.
- B. Standard color is black; contact Ascension for custom color selection.

### 2.6 DRIVE CONFIGURATION

- A. Drive shall be direct-acting hydraulic.
- B. Both sides of lift platform shall be supported evenly by means of synchronized hydraulic cylinders.



C. Hydraulic power unit shall be mounted on vibration-isolating supports designed to minimize vibration transmission and reduce frame-borne noise.

## 2.7 ELECTRICAL REQUIREMENTS

- A. Electrical contractor shall provide a 120VAC, 60 hertz, single phase, 15 amp service line (option: international electrical configurations available).
- B. Motor shall be 1/2 hp, 115V AC single phase (international configurations available).
- C. Control circuits shall be 24 VDC.
- D. Electrical components shall be UL listed and CSA registered.
- E. Electrical system shall be certified to ASME A17.5 by an independent testing laboratory.

## 2.8 SAFETY DEVICES

The lift shall include the following safety features for protection of the passenger and general public.

- A. Grounded electrical system.
- B. 24 VDC operating controls.
- C. Constant pressure operating switches.
- D. Emergency stop button at passenger control station.
- E. Electro-mechanical interlock to prevent accidental opening of lower platform gate, and if provided, the upper landing gate.
- F. Gate switches to prevent platform movement if either platform gate is open.
- G. Lift platform stop height sensor.
- H. Under-platform safety pan that protects the area under the lift platform.
- I. 48" [1220 mm] high sidewalls and platform gates.
- J. Unobstructed view through transparent sidewalls and platform gates.
- K. Grab bar extending full length of inside wall.
- L. Slip resistant surfaces on platform floor.
- M. Structural safety factors as specified in ASME A18.1.
- N. Self-closing platform gates.
- O. Alarm and lighted alarm switch on platform.
- P. Upper landing gate (where required by code) – Ascension Protégé Model 5442FG.

## 2.9 OPERATING CHARACTERISTICS

- A. Lift shall include three (3) constant pressure "UP/DOWN" switches, two (2) for remote mounting outside of the platform and one (1) located inside the platform.
- B. The passenger control station shall be provided with a separate "PUSH TO STOP" emergency button. The emergency stop button shall prevent any operation of the lift when actuated.

## 2.10 COMPRESSION CAPABILITY

- A. The lift shall be capable of being compressed to 33" [838 mm] wide to facilitate relocation through a 36" [914 mm] wide doorway. An additional tool kit from Ascension is recommended to facilitate compression of the lift.

### PART 3 – EXECUTION

3.01 EXAMINATION: Do not begin installation until substrates have been properly prepared. Verify shaft and machine space are of correct size and within tolerances. Verify required landings and openings are of correct size and within tolerances. Verify electrical rough-in is at correct location.

3.02 INSTALLATION: Conform to approved submittals and manufacturer's recommendations. Attach lift to concrete slab to meet CBC seismic restraint criteria with fully loaded platform at upper landing. Install system components and connect to building utilities. Accommodate equipment in space indicated.

- A. Startup equipment in accordance with manufacturer's instructions.
- B. Adjust controls for smooth operation.

3.03 TESTING: Load platform to full rated capacity and operate lift continuously for two hours, with no more than 10 second stops at landings. Temperature rise of motor shall not exceed nameplate allowable rise as determined by thermometer. Correct all defects disclosed. Again check and adjust controls.

3.04 PROTECTION: Protect installed products until completion of project. Touch-up, repair or replace damaged products before final acceptance.

#### 3.05 SERVICE

- A. Provide 6 months service on the lift. Service shall include two periodic checks of the equipment, lubrication, adjustment, replacement of parts, and all other work to keep the equipment in proper operating condition.
- B. Prior to the expiration of the service period, furnish a trained representative of the manufacturer, for not less than 4 hours, at time acceptable to the Owner, to instruct the Owner's personnel in maintenance of the equipment.

END OF SECTION

**SECTION 15010**  
**GENERAL PROVISIONS**

**PART 1 - GENERAL**

**1.01 WORK INCLUDES**

- A. This section provides the basic mechanical requirements that apply to the work of Division 15.

**1.02 RELATED SECTIONS**

- A. Section 15020: Equipment and Systems Tests
- B. Section 15030: Identification
- C. Section 15050: Basic Materials and Methods
- D. Section 15160: Vibration Isolation and Seismic Restraints
- E. Section 15180: Insulation
- F. Section 15410: Drainage System
- G. Section 15420: Domestic Water System
- H. Section 15430: Fuel Gas System
- I. Section 15470: Plumbing Fixture
- J. Section 15800: Heating, Ventilating and Air Conditioning Equipment
- K. Section 15840: Air Transmission and Distribution System
- M. Section 15995: Mechanical Commissioning

**1.03 SYSTEMS DESCRIPTION**

- A. All mechanical system shall be complete, tested, and demonstrated to be in perfect operating condition.
- B. In the event the Owner should choose to enter upon and use any portion of the work (beneficial occupancy) prior to the completion of operational testing, capacity testing, air balance testing and the giving of operating instructions on any of the Mechanical Systems, but after the passing of the established completion date, the contractor shall adequately staff the project to operate (manually, if necessary) and maintain the equipment and systems until such time as they have been demonstrated to the Owner to acceptably meet all the contract requirements.

**1.04 EQUIPMENT AND MATERIALS, GENERAL**

- A. Submittals Required:
  - 1. Prior to the start of any work, six (6) copies of a list of all materials and equipment covered by Division 15 shall be submitted by the Contractor in conformance with the requirements of Division 1 and reviewed by the Architect. Contractor shall allow ample time for checking and processing and

shall assume all responsibility for delays incurred due to rejected items. No installation of materials and equipment shall be made until stamped submittals have been obtained from the Architect. Acceptance of material and equipment submittals shall in no way deviate from compliance with the plans and specifications.

2. Additionally, each item proposed shall be referenced to the section, page, and paragraph of the specifications. For each item proposed, give name of manufacturer, trade name, and the catalog performance data for all equipment, including all applicable optional items as specified. Lists shall be complete for the project and shall be submitted at one time, bound in sets in three ring loose leaf stiff covered binders, indexed, with tabs for easy reference. All sets shall be identical.
3. Additional items to be included in submittals:
  - a. Test and air/hydronic balancing report.
  - b. List of proposed optional materials and equipment.
  - c. Valve Charts.
  - d. Control diagrams and sequence of operation.
  - e. Scheme for identification of Mechanical equipment, piping, ductwork and apparatus.
  - f. Sterilization test reports.
  - g. Test data & reports.

B. Requirements of equipment, which increases the scope of the work.

1. The contract plans indicate the installation of the equipment of one set of manufacturers. Other acceptable manufacturers are named in these specifications.
2. If the installation of the particular equipment the Contractor has submitted under Division 15 requires changes in material or labor from that required in the contract plans and specifications, such drawings shall be submitted as shop drawings.
3. Any changes in piping, wiring, controls, or installation procedures required by the equipment shall be made at no additional cost to the Owner, and with no reduction in scope.

C. Equipment Layout Shop Drawings:

1. The Contractor shall submit "Equipment Layout Drawings" for each area containing items of equipment furnished under this section.
2. Layout drawings shall consist of a plan view, drawn to scale, showing the projected outline of all equipment, complete with indication of all required clearances including those needed for removal of service. The location of all floor drains, piping, ductwork, electrical, plumbing, supports and other equipment shall be indicated. Sectional views shall be furnished as required to show overhead clearances.
3. Submit dimensioned drawings of ductwork and related accessories and equipment with sizes and location of ducts, diffusers, grilles, registers, automatic fire dampers, access panels, and other pertinent information.

4. Mechanical and plumbing drawings (construction document drawings), or part thereof shall not be used for shop drawing submittals. Contractor shall prepare and draw their own shop drawings on Contractor's paper with company's title block on 36" x 24" (min) sheets, and submit for review and approval.
5. Contractor shall review the drawings thoroughly including construction document drawings by other disciplines prior to preparation of shop drawings and coordinate equipment, ductwork and piping layout with any obstructions.
6. Request for information (RFI) generated by the contractor will not be entertained unless shop drawings are submitted.

D. Operation and Maintenance Manuals:

1. Manual shall be indexed with tabs for easy reference bound in 3 ring binders and shall include valve charts, piping diagrams, control diagrams, cleaning reports, test reports, service instructions and parts list of all machinery.
2. This manual shall be submitted for approval at least 30 days before final inspection. Failure to submit the diagram and service manual will delay final inspection and acceptance of the work.
3. Four (4) copies of the manual shall be delivered to the Architect on or before the date of the final inspection, and each copy of the service manual shall be identical.
4. After review by the Architect, the control diagrams shall be mounted in a neat frame with suitable backing, under clear glass and installed where directed.
5. Where applicable, the following specified information, together with any pertinent data, shall be included in the service manual.
  - a. Part numbers of all replaceable items.
  - b. Manufacturer's cuts and rating data or curves.
  - c. Lubrication and other maintenance data.
  - d. Test reports.
  - e. ASME data sheets for each pressure vessel.
  - f. Serial numbers of all principal pieces of equipment.
  - g. Supplier's names, addresses and phone numbers.
  - h. Control diagrams, electrical interlock wiring diagrams and descriptive sequence of operation, for both package equipment and field installed controls and interlocks.
  - i. Valve chart indicating location on job.
  - j. Refrigerant type and charge (lbs.).
  - k. Cleaning report.
  - l. Warranty information and certificates of each equipment and installation.

- m. Domestic water sterilization certification.

#### **1.05 REFERENCES**

- A. References made herein, or in any of the Mechanical Sections listed above, to standards, codes specifications, or recommendations of various technical societies, trade organizations, or governmental agencies are to the edition in effect at the time of the proposal, including all addenda.
- B. Furnish, for the use in the Construction field office, one copy of each field installation standard referred to in these specifications. Government codes excepted.
- C. Code changes: If code changes occur between time of proposal and date of permit issue, and the Contractor has unnecessarily delayed the acquisition of his permits, the Contractor shall hold the Owner free from additional expense resulting from such code changes.

#### **1.06 RECORD DRAWINGS**

- A. Two complete sets of mechanical drawings will be provided as record drawings, which shall be separate, clean, black line prints reserved for the purpose of showing a complete picture of the work as actually installed.
- B. These drawings shall also serve as work progress report sheets and the Contractor shall make any notations, neat and legible, thereon daily as the work proceeds. These drawings shall be available for inspection at all times and shall be kept at the job at a location designated by the Architect.
- C. All buried service piping and indicated future connections outside of any building shall be located both by depth and by accurate measurement from a permanently established landmark such as a building or structure. Measurements shall be verified by the Architect prior to backfilling.
- D. At completion of the work, these record drawings shall be signed by the Contractor, dated and returned to the Architect.

#### **1.07 SURVEY OF SITE**

- A. Before submitting proposals for this work, each bidder shall become familiar with plans and specifications and shall have examined the premises and understand the conditions under which he will be obliged to operate in performing his contract. No allowance will be made subsequently in this connection for any error through negligence on the part of the Contractor.

#### **1.08 CODES**

- A. All work performed under this section of the specification is under the following listed jurisdictional agencies and will be so inspected for code compliance.

ADA	Americans with Disabilities Act.
ANSI	American National Standards Institute.
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers.
ASME	American Society of Mechanical Engineers.

ASTM	American Society of Testing Materials.
AWS	American Welding Society.
AWSC	American Welding Society Code.
AWWA	American Water Works Association.
CEC	California Energy Commission.
DSA	Division of the State Architect
NFPA	National Fire Protection Association.
OSHA	Occupational Safety & Health Administration
OSHPD	Office of Statewide Health Planning and Development
SFM	State Fire Marshall
SMACNA	Sheet Metal & Air Conditioning Contractor National Association.
UL	Underwriters Laboratories, Inc.
CBC	California Building Code
CMC	California Mechanical Code
CPC	California Plumbing Code
CCR	State of California Code of Regulations
ETL	Electronic Testing Laboratories
B.	Materials, equipment and their installation shall comply with the requirements of the General Safety Orders, Department of Industrial Relations, State of California.
C.	All reference codes and standards shall be the latest edition.

#### **1.09 PERMITS, LICENSES AND INSPECTIONS**

- A. Refer to the "General Conditions" of these specifications regarding these items. The Contractor shall pay for all permits, licenses and inspections required by work under this section. All work shall be regularly inspected and certificates of approval shall be delivered to the representative of the Owner.
- B. Obtain and pay for a State Industrial Safety "Permit to Operate" for each pressure vessel.
- C. Contractor shall arrange with public utility agency, or private utility companies, and pay for all required fees for all utility services for this project, such as gas, sewer, water, storm drain, industrial waste, etc.

#### **1.10 DRAWINGS/SPECIFICATIONS**

- A. For purposes of clarity and legibility, the drawings are essentially diagrammatic and although size and location of equipment is drawn to scale wherever possible, Contractor shall make use of all data in all of the contract documents and verify this information at building site. Contractor shall fully inform himself regarding the peculiarities and limitations of the spaces available for the installation of work and materials furnished under this Division.
- B. Drawings indicate required size and termination of pipes and ducts and suggest proper routes of piping and duct to conform to the structure, to avoid obstructions and to preserve clearance. However, it is not the intention to indicate all necessary offsets and it shall be the responsibility under this section to install ductwork and piping in such a manner as to conform to structure, avoid obstructions, preserve headroom, keep openings and passageways clear and make all equipment requiring inspection, maintenance and repair, accessible without further instructions or extra cost to the Owner.
- C. Check with other divisions of the work so that no interferences shall occur and in order that grade lines may be established for the work. No extras will be allowed for changes made necessary by interference with the work of other trades.
- D. Drawings and Specifications: Specifications are intended to cover all labor, materials, equipment and standards of mechanical workmanship to be employed in work shown on drawings, called for in these Specifications, or reasonably implied by terms of same. Drawings and specifications are intended to supplement one another and part of work that may be mentioned in one and not represented in other, shall be done the same as if it has been mentioned or represented in both. Large scale drawings shall take precedence over layouts and shall scale details. Omission from specifications or drawings of any minor details of construction, installation, materials, or essential specialties shall not relieve Contractor from furnishing same to complete the installation.

#### **1.11 WARRANTY AND DAMAGE RESPONSIBILITY**

- A. Furnish to the Owner a written warranty against defects in parts, materials, equipment (except as noted), and workmanship for one year after acceptance of the project. Warranty shall include labor to remove and replace damaged or defective parts, materials, or equipment.
- B. The Contractor shall be responsible for damage to the grounds, buildings, or equipment, and the loss of refrigerants, fuels, or gases caused by leaks or breaks in pipes or equipment new or existing resulting from the work of this Division.

#### **1.12 ABBREVIATIONS**

A.	Abbreviations:
AC	Alternating Current
AABC	Associated Air Balance Council
ACFM	Actual Cubic Feet per Minute
ADA	American with Disability Act
ADC	Air Diffusion Council
AFD	Automatic Fire Damper
AFI	Air Filter Institute



AGA	American Gas Association
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AISC	American Institute of Steel Construction
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	Air Conditioning and Refrigeration Institute
ASA	American Standards Association
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association
BTU/HR	British Thermal Unit per Hour
C	Centigrade
CAC	California Administrative Code
CBC	California Building Code
CDA	Copper Development Association
CMC	California Mechanical Code
CPC	California Plumbing Code
CFM	Cubic Feet per Minute
CGA	Compressed Gas Association
CI	Cast Iron
CISPI	Cast Iron and Soil Pipe Institute
dbA	Decibels
DC	Direct Current
DEG	Degree

DSA	Division of the State Architect
DSP	Dry Standpipe
EFF	Efficiency
EPA	Environmental Protection Agency
ETL	Electronic Testing Laboratory
F	Fahrenheit
Fig	Figure
FIA	Factory Insurance Association
FCV	Flow Control Valve
FM	Factory Mutual Association
FS	U.S. Government, Federal Specification
FT	Feet
HOA	Hand-Off-Automatic
HP	Horsepower
HVAC	Heating Ventilating and Air Conditioning
LB	Pounds
IBR	Institute of Boiler and Radiator Manufacturers
I.D.	Inside Dimension
IPS	Inside pipe size
LWCO	Low water cut off
MIL	U.S. Government, Military Specification
MIN	Minimum
NBS	National Bureau of Standards
NC	Noise Criteria
NCPI	National Clay Pipe Institute
NEBB	National Environmental Balancing Bureau
NEMA	National Electrical Manufacturers Association
NEC	National Electric Code

NFPA	National Fire Protection Association
NFC	National Fire Codes
NO <sub>x</sub>	Nitrous Oxide
NSF	National Sanitation Foundation
O.B.D.	Opposed Blade Damper
O.D.	Outside Dimension
OFE	Owner Furnished Equipment
OSHA	Occupational Safety and Health Administration
OSHPD	Office of Statewide Health Planning and Development
OS & Y	Outside Screwed and Yoke
PCR	Pumped Condensate Return
P.D.	Pressure Drop
PDI	Plumbing and Drainage Institute
ph	Acid Concentration Level
PPIC	Plumbing and Piping Industry Council
PPM	Parts per Million
PSI	Pounds per Square Inch
PSIG	Pounds per Square Inch, Gauge
PVC	Polyvinyl Chloride
RPM	Revolution per Minute
SAMA	Scientific Apparatus Makers Association
SCFM	Standard Cubic Feet per Minute
SEER	Seasonal Energy Efficiency Ratio
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SWP	Standard water pressure
TAB	Test, Adjusting and Balancing
UL	Underwriters Laboratories
USDA	United States Department of Agriculture

USS	United States Steel
VAC	Volts Alternating Current
VVT	Variable Volume-Variable Temperature
WG	Water Gauge
WOG	Water, Oil, Gas
WSP	Wet Standpipe

### 1.13 DEFINITIONS

- A. Definitions: Terms used herein and in the individual mechanical sections of the specification are defined as follows:
1. This Division: The Mechanical Division of the Specifications; a portion of the specifications that includes all the Sections of the specifications listed herein under "Work of This Section".
  2. Individual Mechanical Section: Any one of the sections of the specifications listed under "Work of This Section", herein.
  3. Other Divisions: The portion of the specifications that does not include the Mechanical Division.
  4. Similar to: An alternative item of material or equipment which, in the opinion of the Architect, matches the named item as to arrangement, materials, function and performance. The performance shall match or exceed that scheduled or advertised for the named item.
  5. Utility Services: Those existing active, functioning systems, both primary and secondary, which provide a facility and its occupants with heating, cooling, ventilating and sanitary functions.
  6. Concealed: Hidden from sight as in trenches, chases, hollow construction or above furred spaces, or exposed to view in tunnels, attics, shafts, crawl spaces or other unfinished areas.
  7. Accessible: Possible for a 6'-0", 180 pound person to approach adequately and with sufficient work room to service, repair or replace concealed equipment.
  8. Exposed: Not concealed as defined above except machinery and fan rooms.
  9. Riser: A vertical pipe or duct having a vertical length greater than one story height.
  10. Drop: A vertical pipe or duct that does not penetrate a floor.
  11. Up-Feed Connection: A vertical pipe or duct that penetrates a floor, but has a vertical length of less than one story height.
  12. Main: A pipe or duct which branches.
  13. Branch: A pipe or duct which does not rebranch.
  14. Header: A pipe or duct of constant size that serves a battery of closely spaced inlet or outlet connections.

15. Piping: Includes pipe, fittings, valves, hangers, and all pipe mounted devices that make up a system.
16. Unfinished space: A room or space that is ordinarily accessible only to building maintenance personnel. A room listed in the finish schedule as having exposed and unpainted construction for walls, floors and ceiling. A room specifically mentioned as "Unfinished".
17. Finished Space: A room or space that is not Unfinished as described above. Any space ordinarily visible to a regular occupant, including exterior spaces.
18. Owner: Pasadena Unified School District.

#### **1.14 SAFETY PROVISIONS**

- A. All equipment and piping with temperatures above 140-degrees F or temperature below 25-degrees F, so located as to endanger personnel or create a fire hazard, shall be properly guarded or covered with insulation of the type specified. All bolts, gears, chains, pulleys, couplings, projecting setscrews, keys, and other rotating or reciprocating parts shall be enclosed or properly guarded. Guard rails, etc., required for the safe operation and maintenance of the equipment shall be provided.

#### **1.15 CERTIFICATION OF WELDERS**

- A. Where welding is required by work of this Division, such work shall be performed only by welders qualified and certified by a recognized, approved agency. Such certification shall bear date not more than twelve months prior to date of starting work under this Division, unless welder has been constantly employed by Contractor since last certification.
  1. Pipe welding shall comply with the latest revision of applicable code, ASME Boiler Construction Code, American Welding Society Processes, ASME Code for pressure piping, and State and Federal requirements. Before welding is performed, contractor shall submit to Architect evidence of compliance of welding procedure and operators's qualifications according to provisions of governing codes. Standard procedure Specifications and operations qualified by National Certified Pipe Welding Bureau shall be considered as conforming to requirements of these Specifications.
  2. Welders shall have State of California C-60 License.

#### **1.16 PRODUCT DELIVERY STORAGE AND HANDLING**

- A. During loading, transporting and unloading, exercise care to prevent damage to materials. Use padded or strap slings as appropriate for handling materials. Lift equipment by lift points provided or recommended by manufacturer. Do not drop pipe, fittings, valves and specialties. Upon receipt, inspect materials for defects or for compliance with Contract Documents. Tag, stencil or permanently identify materials to adequately identify specialty items. Do not allow stainless steel to contact carbon steel during delivery, storage, handling or during or after installation.
  1. Store all materials on site in enclosures or under protective covering to keep clean and dry. Do not store materials directly on ground. Store stainless steel on wood.
  2. Store loose materials such as fittings, gaskets, bolts, nuts, small valves, traps, and specialties in bins of sufficient number to provide proper separation. Protect ends of large fittings, valves and pipe from weather and abuse. Properly grease all machined surfaces.
  3. Remove rust spots from stainless steel by brushing with stainless steel brush.

#### **1.17 OWNER FURNISHED EQUIPMENT**

- A. Where items are called for to be Owner Furnished Equipment (OFE) and installed by the Contractor; the Contractor, for the purpose of bidding, may assume that all items will be available to the contractor at the site (installation location) and their delivery by the Owner will be timed so as not to delay the normal construction progress.
- B. The Contractor shall be responsible for exercising due care in the handling of any OFE items; the installation, operation instructions and warranty conditions. Unless otherwise noted, all OFE shall be considered new and in operable condition.
- C. The Contractor shall be responsible for any damage to any new OFE once the item is accepted by him. The Contractor shall not be held liable for damage to any OFE that occurred prior to the Contractor accepting it for installation, this includes obvious and hidden damage.

#### **1.18 SEISMIC RESTRAINTS**

- A. Contractor shall be responsible for all anchors and connections of mechanical work to the building structure to prevent damage as a result of an earthquake, including piping, manufactured equipment, and the integrity of shop fabricated and field fabricated materials and equipment. Reference details per "Seismic Restraint Manual Guidelines for Mechanical Systems", latest edition.
- B. Ductwork, piping, and equipment shall be seismically braced in accordance with the guidelines for seismic level "A". Connections, hangers, braced member, anchorage must meet SMACNA requirements for seismic level "A"

### **PART 2 - PRODUCTS**

#### **2.01 GENERAL**

- A. The products, assemblies, and methods shall be as described in the pertinent Mechanical Sections of the work.
- B. Materials: New and of recent manufacturer, and of quality as specified herein and consistent with building design and intent.
- C. Appliances, Fixtures and Equipment: Current models for which replacement parts are available.
- D. Manufacturer: Unless otherwise provided, all mechanical items shall be substantially the same as the specified item manufacturer, which on date of opening of bids, have been in successful commercial use and operation for not less than one year in projects and units of comparable size.

#### **2.02 MANUFACTURED PRODUCTS**

- A. Manufacturer's names and model numbers on the drawings are to establish type and class of material and equipment and, except for "or equal" requirements of the general conditions, products shall be by one of the manufacturers named by the specifications which shall include the names on the drawings as if therein written. When no names are listed in the specifications, any manufactured product equal to the manufacturer named on the drawings and which complies with the specifications may be acceptable.
- B. The scheduled capacity requirements take precedence over the listed manufacturer's equipment size.
- C. Wherever possible, all materials and equipment used in the installation of this work shall be of the same brand or manufacturer throughout for each class of material or equipment.
- D. All rotating equipment shall operate in perfect dynamic balance.

- E. Each item of manufactured equipment shall bear the manufacturer's non-ferrous metal nameplate. The manufacturer's name, model number, serial number and capacity ratings shall be permanently stamped or etched thereon.
- F. No item of material or equipment shall be installed for any purpose in any manner not recommended by the manufacturer in his published literature. If recommended manufacturer installation requires additional pipe, ductwork or accessories it shall be installed by the contractor without additional cost to the Owner.
- G. Every vessel not uninterruptedly vented to atmosphere is a pressure vessel and shall be ASME code constructed to the system test pressure. Furnish a registration certificate from the National Board of Boiler and Pressure Vessel Inspectors for each vessel.

### **2.03 ALTERNATE EQUIPMENT**

- A. Equipment layout, piping connections, etc., are based on units as scheduled on the Drawings. If alternate or substitution equipment is used, it is the responsibility of this Contractor to make necessary modifications to provide an operating installation, including installation, electrical requirements, controls, all service clearances around the equipment and shall be in complete conformance with the California Mechanical and Plumbing code and all specifications and recommendations of the manufacturer without any additional cost to the Owner.

## **PART 3 - EXECUTION**

### **3.01 CONFERENCE**

- A. Immediately upon award of the contract and before any work is started, the Contractor shall arrange for a meeting with the Architect or his representative and with a representative of the Owner concerning the work under these sections.

### **3.02 SUPERVISION**

- A. The Contractor shall furnish the services of a competent superintendent experienced in the work of each section, who shall be constantly in charge of the progress of the work, together with all necessary journeymen, helpers, and laborers required to properly unload, erect, connect, adjust, start and operate and test the work involved. Quality workmanship shall be performed by competent mechanics skilled in their trades.

### **3.03 PROTECTION, CARE AND CLEANING**

- A. The premises shall be maintained as required by Division 1.
- B. Materials and Equipment:
  - 1. Effectively protect materials and equipment to be installed on the project against moisture, dirt, and damage during the construction period, to the satisfaction of the Owner. Special care shall be taken to provide protective covering of bearings, open connections to pumps and tanks, coils, and similar equipment that are particularly vulnerable to grit and dirt.
  - 2. Keep interior of all ductwork free of dirt, grit, dust, insulation, and other foreign materials at all times. Do not operate air distribution equipment until building is cleaned and air filters installed in order to prevent soiling of diffusers, ducts, air handling equipment and buildings.

3. Drain and flush piping to remove grease and foreign matter. Thoroughly clean out valves, traps, strainers and boilers and demonstrate the cleanliness to the Owner. See Section 15750 for cleaning of piping system.
4. At the time of rough installation, or during storage on the construction site and covering of duct openings and protection of mechanical equipment during construction until final startup of the HVAC equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in the system. Per California Green Building Standards Section 4.504.1
5. The HVAC Contractor will purchase and install District Specified Pad Locks on each HVAC disconnect that will be in the OFF position.
6. The HVAC Contractor will purchase, install and connect color coded 14 Gage stranded THHN, or the Supplier specified thermostat/temperature sensor wire to run from the HVAC unit to the thermostat.
7. The thermostat/temperature sensor will be installed by the HVAC Contractor with an insulation pad on the back of the unit to ensure isolation from the wall temperature.
8. The HVAC Contractor will schedule a job walk with the Construction Project Manager and the District Maintenance Personnel after the systems are ready for, but, prior to, system balancing.

### **3.04 EXCAVATION AND BACKFILL**

#### **A. General:**

1. Do all excavation and backfill required to install the work of this Division both inside and outside.
2. Perform all excavation and backfilling in accordance with that specified under Division 2 Earthwork.

B. Excavation: Bury piping outside the building to a depth as specified in specific section of specifications. Minimum width between trench wall and edge of conduit shall be 6".

C. Backfilling: Do not backfill until after final inspection and approval of the piping installation by all legally constituted authorities.

### **3.05 FORMING, CUTTING AND PATCHING**

- A. Provide all sleeves, inserts and openings necessary for the installation of the Mechanical Work.
- B. Special forming, recesses, chases, curbs, etc., as necessary for the proper reception and installation of the mechanical equipment will be provided in the structure under another section. The contractor shall examine all drawings to ascertain that proper provisions have been made for the work. If such provisions are not made in time, the Contractor shall bear all extra costs incurred in later cutting and patching to accommodate this work.

### **3.06 INSTALLATION OF EQUIPMENT**

- A. All concrete floor mounted equipment located in machinery rooms shall be set on housekeeping pads. For bases located on roofs, flashing shall be as detailed on the Architectural drawings. See Structural drawings for details of equipment bases, pads and platforms.



- B. Equipment shall be secured in place using fasteners as recommended by SMACNA's "Seismic Restraint Manual Guidelines for Mechanical Systems" latest edition. Bolt sizes as a minimum shall be per the following schedule, except as noted on the drawings:

<u>Bolt Size</u> <u>Inches</u>	<u>Equipment Weight</u> <u>per Bolt, Pounds</u>
3/8	50
1/2	120
5/16	225
3/4	300
7/8	950

- C. All concrete work unique to the work of this Division and not a part of the structure shall be done in complete accordance with the requirements of Division 3 "Cast in Place concrete". Work shall include furnishing all dimensioned drawings for bases, pads, openings, etc., and finishing and installing all anchor bolts, inserts, etc. Coordinate with General Contractor.

### **3.07 EXISTING UTILITIES AND SERVICES**

- A. Location and character of principal existing utilities, including dimensions as shown on the drawings for convenience only, are believed complete and correct, but shall be subject to verification by the Contractor, as the Architect assumes no responsibility for their correctness.

### **3.08 SEISMIC RESTRAINT CODE REQUIREMENTS**

- A. California Code of Regulations, Title 17 and 24; NFPA.

### **3.09 ELECTRICAL SCHEMATIC DIAGRAMS**

- A. Furnish a complete electrical interlock wiring diagram and describe sequence of operation to show all field wiring for operating the particular equipment the contractor proposes to install. The diagram shall identify the wire color and the connection terminals of each item of equipment furnished for complete operating systems.
- B. Any additional line or low voltage electrical wiring and conduit required over that shown in the Electrical Division of the work as required for complete and perfectly operating systems shall be furnished under this Division in complete conformance with the requirements of the Electrical Division.

### **3.10 PAINTING**

- A. Painting:
1. All finish painting of mechanical equipment will be as specified in Division 9, Painting, unless otherwise indicated.
  2. All equipment shall be provided with factory applied prime finish, unless otherwise specified.
- B. Touch-Up:

1. If the factory finish on any equipment furnished by the Contractor is damaged in shipment or during construction of the building, the equipment shall be refinished by the Contractor to the satisfaction of the Owner.
  2. One can of touch-up paint shall be provided for each different color factory finish which is to be the final surface of the product.
- C. Concealed Materials: All uncoated cast iron or steel that will be concealed or will not be accessible when installations are completed, shall be given one heavy coat of black asphalt before concealment.

### **3.11 OPERATING INSTRUCTIONS**

- A. After all systems have been completely installed, verified to be operating perfectly and all tests completed and accepted, arrangements shall be made to operate all systems for a period of one week. Ten (10) days advance written notification of this period shall be given the Owner. During this period, the Contractor may make necessary minor but not interruptive adjustments. At this time, he shall instruct the Owner's operating personnel in the operation and maintenance of the various items of equipment.
- B. The Contractor shall furnish, without additional cost to the Owner the services of competent instructors who will give full instruction to the Owner's designated personnel in the adjustment, operation and maintenance, including pertinent safety requirements of the equipment or system specified.
- C. Each instructor shall be thoroughly familiar with all parts of the installation and shall be trained in operating theory as well as practical operation and maintenance work. The number of man-hours of instruction shall be a minimum of 8 hours in increments, as scheduled by the owner's Representative.

### **3.12 EMERGENCY REPAIRS**

- A. The Owner reserves the right to make temporary repairs as necessary to keep equipment in operating condition which shall neither void the Contractor's guarantee bond nor relieve the Contractor of his responsibility during the bonding period.

### **3.13 INTERRUPTION OF EXISTING UTILITIES OR SERVICES**

- A. The Contractor shall submit to the Architect for approval a written schedule for the shutdown, removal, installation and connection of materials. Any shutdown of utility services shall be coordinated with the Owner. Prior written notification of seventy-two (72) hours minimum shall be given for any such shutdowns.

### **3.14 INITIAL LUBRICATION, ADJUSTING AND FILLING OF SYSTEM**

- A. Before operating any of the mechanical systems, lubricate equipment bearings and check belts, pulleys, and other moving parts of alignment and tolerances in accordance with equipment manufacturer's operating instructions. Flush piping and liquid systems and fill with operating fluids. After tests, adjust valves and other parts of the work for quiet operation. Clean strainers by removing and washing basket or screen. Change lubricating oil in compressors. Suppress all vibration and noise.

### **3.15 STARTUP**

- A. Startup of all major equipment, including chillers, boilers, air handling equipment, variable speed drives, and other special equipment shall be performed by manufacturer's start-up technicians. Contractor shall be responsible for procuring such service.

### **3.16 WATER STERILIZATION**

- A. The entire domestic water piping system shall be sterilized before being turned on for use by the Owner. The Plumbing Contractor shall request an inspection by the Board of Health Department and shall deliver certification to the Owner. Contractor shall be responsible for procuring such service.
- B. See Section 15050, paragraph 3.14 for related Section.

### **3.17 TESTING AND BALANCING COORDINATION**

- A. The mechanical contractor shall complete the installation and start all HVAC systems to ensure they are working properly, and shall perform all other items as described hereinafter to assist the balancing agency in performing the testing and balancing of the HVAC systems.
- B. Air Distribution Systems.
  - 1. Verify installation for conformity to design.
  - 2. Terminate all supply, return, and exhaust ducts, and pressure test them for leakage, as required by specification.
  - 3. Ensure that all volume, splitter, extractor, and fire dampers are properly located and functional. Dampers serving requirements of minimum and maximum outside, return relief and exhaust air shall provide tight closure and full opening, with a smooth and free operation.
  - 4. Verify that all supply, return, exhaust, and transfer grilles, registers, and diffusers are installed and operational.
  - 5. Ensure that HVAC units and associated ductwork are sealed to eliminate excessive by pass or leakage of air.
  - 6. Ensure that all HVAC units and exhaust fans are operating and free of vibration. All fans and drives shall be checked for proper fan rotation and belt tension. Overload protection shall be of proper size and rating. A record of motor current and voltage shall be made to verify that the motors do not exceed nameplate rating.
  - 7. Make any necessary changes to the sheaves, belts, and dampers, as required by the balancing agency, at no additional cost to the owner.
    - 8. Install clean filters.
- C. Water Circulating Systems
  - 1. Verify Installation for conformity to design.
  - 2. Check all pumps to verify pump alignment and rotation.
  - 3. Ensure that systems are clean, with the proper strainer screen installed for normal operation.
  - 4. Check all pump motors for current and voltage, to ensure that motors do not exceed nameplate rating.
  - 5. Provide overload protection of proper size and rating.

6. Ensure that all water circulating systems shall be full and free of air; that expansion tanks are set for proper water level; and that all air vents were installed at high points of systems and are operating.
  7. Check and set operating temperatures of heat exchangers to design requirements.
- D. See also Section 15995, Mechanical Commissioning for related work.

**END OF SECTION 15010**

## **SECTION 15020**

### **EQUIPMENT AND SYSTEMS TESTS**

#### **PART 1 - GENERAL**

##### **1.1 WORK INCLUDES**

- A. This section includes the requirements for equipment and systems test including air balancing of HVAC system.

##### **1.2 RELATED SECTIONS**

- A. Section 15410: Drainage System
- B. Section 15420: Domestic Water System
- C. Section 15430: Fuel Gas System
- D. Section 15800: Heating, Ventilating and Air Conditioning Equipment
- E. Section 15840: Air Transmission and Distribution System
- F. Section 15995: Mechanical Commissioning

##### **1.3 QUALITY ASSURANCE**

- A. Qualifications of Agency and Personnel: Obtain the services of a qualified independent testing, adjusting and balancing (TAB) agency, acceptable to the Architect, to test, adjust and balance the HVAC system work as herein specified. The testing agency shall submit proof that it meets the technical standards for membership in the AABC as published in the AABC; or, the agency is a member of the Associated Air Balance Council. Testing agency shall be American Air Balance Co., Inc., Los Angeles Air Balance Co., Inc., San Diego Air Balance Co., Inc., Winaire, Inc. and Penn Air Control Inc..
- B. Performance Criteria: Work shall be performed in accordance with the approved Testing, Adjusting and Balancing (TAB) Agenda.
- C. Test Equipment Criteria: The basic instrumentation requirements and accuracy / calibration required by AABC Section II.

##### **1.4 THE TESTING, ADJUSTING AND BALANCING AGENDA:**

- A. Definition: The proposed procedures and proposed forms, diagrams and reports for documenting the testing, adjusting and balancing work.
- B. Preparation: By the testing, adjusting and balancing agency for review and approval by the Architect.
- C. The Agenda shall include one complete set of the AABC publications listed in Paragraph 1.06 C.

- D. The agenda shall also include the following detailed narrative procedures, system diagrams and forms for test results.
1. Specific standard procedures required and proposed for each system.
  2. Specified test forms for recording each procedure and for recording sound and vibration measurements. Additional test forms for any variable flow systems shall be developed by TAB agency and submitted for review and approval.
  3. Systems diagrams for each air, water and steam system. Diagrams may be single line. In addition to the information recorded by standard AABC, report the following information.
    - a. Air handling units: Prepare pressure profile and show design and actual CFM (outside air, return air, supply air). Measure and record each mode (minimum outside air and 100% outside air) where economizer cycle is specified. Record pressure drops of all components (coils, heat recovery devices, filters, sound attenuators, louvers, dampers, fans) and compare with design values. Pressure profile drops are performance indicators and are not to be used for flow measurements.
    - b. Duct distribution systems: Prepare pressure profiles from the air handling unit to the extremities of the system. As a minimum, show pressures at each floor, main branch, and air flow measuring device. Make pitot tube traverses of all trunk lines and major branch lines where required for analysis of distribution system. Air flow measuring devices installed in ductwork, if available, may be utilized. Record residual pressures at inlets of volume controlled terminals at ends of system. Show actual pressures at all static pressure control points utilized for constant or variable flow system.

## 1.5 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
1. Descriptive Data:
    - a. Statement of qualifications of independent testing agency.
    - b. Air flow measuring devices.
    - c. Pressure gauges.
    - d. Thermometers.
    - e. Other testing instruments.
    - f. Certificates of calibration of test instruments.
  2. Sample Forms:

- a. Complete forms proposed for use in compiling and recording test data including hoods and paint spray booth face velocity readings.
- B. Work Certification: Submit the name of the TAB agency proposed to perform the work described in the Section for review within 35 days after contract award. Include in the submittal the certified qualifications of all persons responsible for supervising and performing the actual work.
- C. Upon approval of the testing, adjusting and balancing agency, submit agenda for approval.
- D. After completion of tests submit complete test reports for approval. Where test results differ from specified design conditions, indicating a contract deficiency, include explanatory comments in report. Contractor shall submit final reports prior to requesting the final inspection for the project.

**1.6 APPLICABLE PUBLICATIONS**

- A. The following publications form a part of this specification to the extent indicated by the reference thereto. In text the publications are referred to by the initials of the organization.
- B. American Society of Heating Refrigerating and Air Conditioning Engineers, Inc. (ASHRAE) Latest Edition.
- C. Associated Air Balance Council (AABC):
- D. National Standards for Field Measurement and Instrumentation Total System Balance, Fourth Edition.
- E. American Society of Mechanical Engineers (ASME):
- F. American Society for Testing and Materials (ASTM):
  - B4486-74 Paste Solder
  - B88-78 Seamless Copper Water Tube,
  - B280-76 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
  - D635-50 Rate of Burning and/or Extent and Time of Burning of Self-supporting Plastics in a Horizontal Position,
  - D1693-70 Environmental Stress-Cracking of Ethylene Plastics,
- G. National Fire Protection Association (NFPA):
  - 13-1996 Installation of Sprinkler System

- 70-1996 National Electric Code
- 90A-1996 Installation of Air Conditioning and  
Ventilating Systems

- H. Scientific Apparatus Makers Association (SAMA): Standard PMC 20, 1-1973. Process Measurement and Control Terminology
- I. Underwriters Laboratories (UL)

### **1.7 PRODUCT HANDLING**

- A. Protection: Protect installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements at no additional cost to the Owner.

### **1.8 COORDINATION**

- A. Coordinate all activities in accordance with provisions of Section 15010.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS**

- A. General: Products and materials shall be described in the pertinent Sections of the Mechanical Specifications.

## **PART 3 - EXECUTION**

### **3.1 REQUIREMENTS**

- A. General
  - 1. Contractor shall notify the Architect at least 48-working day hours in advance of the time when any test is to be performed.
  - 2. As required hereinafter, the Contractor will arrange and pay for special testing agencies. The Contractor shall provide, install and remove on completion of tests all special fittings, openings and other devices as needed to perform the tests. Furnish all labor as necessary to start, operate, adjust and modify all equipment and systems for both testing and the verification of tests.
  - 3. For tests not requiring a testing agency, provide all equipment and instruments required for testing, including fittings for additional openings.
  - 4. Verification. All test shall either be observed by or the tests rerun and the results verified in the presence of, and approved by a representative of the Architect, at their option as required herein.



5. Prepare a formal report as required herein.
- B. At least fourteen (14) days before specified occupancy or date of completion of overall contract, the Contractor shall put all heating, ventilating, and air conditioning equipment into operation and shall continue the operation of same during each work day, for not less than 5-eight-hour periods, until all adjusting, balancing, testing, demonstrations, and instructions on the systems have been completed. Final instructions and demonstrations and preparation of reports shall be done during the two week period. When an individual building is ready for occupancy, all above equipment relative to that portion of the work shall be put into service, tested and adjusted.
- C. Coordinate testing, adjusting and balancing procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing.
- D. Conduct final procedures after system has been completed and is in full work order. Put all HVAC systems into full operation and continue operation of the systems during each working day. Accomplish testing, adjusting and balancing procedures in accordance with the agenda approved by Architect.

### **3.2 PIPING PRESSURE TEST**

- A. Perform engineering tests required to demonstrate that the operation of the mechanical systems and their parts are in accordance with the Specifications covering each item or system, and furnish materials, instruments and equipment necessary to conduct such tests. Tests shall be made in the presence of the Inspector, the Architect or the Engineer, and the representatives of any governmental agency having jurisdiction. Work shall not be concealed or covered until required approvals are obtained.
- B. Should the Contractor refuse or neglect to perform any test required by the Specifications, the Owner may perform such tests and the Contractor shall pay charges in connection therewith.
- C. Pressure gages used in testing shall have one pound graduations; vacuum gages shall have one inch mercury graduations. Air shall be bled from lines requiring hydrostatic or water tests.
- D. Systems shall be pressure tested in accordance with the Pipe Test Schedule in paragraph 3.03. Pipe test shall show no loss in pressure after a minimum duration of four hours at the test pressures indicated. Where local codes require higher test pressures than specified herein for Fire Sprinkler Systems, the local codes shall be followed.
- E. Fuel gas lines shall be tested twice: first with piping exposed, before backfilling trenches or lathing; second with pipe in finished arrangement, ground backfilled (paved where require) and wall finished. Test each joint with soap suds.
- F. Refrigerant piping may be tested using a halide detector or calibrated electronic testing equipment.
- G. Piping systems may be tested as a unit or in sections as directed by the Engineer, but the entire system shall successfully meet the requirements specified herein, before acceptance by the Engineer.
- H. Repair of damage to the pipes and their appurtenances, or to any other structures resulting from or caused by these tests, shall be performed by the Contractor.

- I. Provide a pressure gauge located at the highest point of the system being tested with a shut-off valve and bleeder valve so arranged to check gauge operation.
- J. Test welded joint on piping under 100 psi air pressure with soap suds prior to hydrostatic test.
- K. Subject all welded joints on high pressure systems to hammer test while under hydrostatic pressure.

### 3.3 PIPE TESTING SCHEDULE

System Tested	Test Pressure (psig)	Test With:
Waste, vent, Storm drain, acid waste, and acid vent, condensate drain from air conditioning equipment.	Fill with water to top of highest opening, allow to stand 24 hours. Minimum head required for any joint shall be 10-feet.	Water
Hot water heating, piping	150	Water
Domestic water piping (metallic)	150	Water 5 hours.
Standpipes, wet or dry	300	Water
Fire Sprinkler piping	200	Water
Gas piping (steel threaded or plastic)	60 (both tests)	Air/ 24 hours
Gas piping (steel welded)	100 (both tests)	Air/ 24 hours
Compressed Air piping	175	Air/ 5 hours
Refrigeration Suction	150	Nitrogen
Refrigeration Liquid	300	Nitrogen

### 3.4 PROJECT COMPLETION TEST

- A. Upon completion of the mechanical work, or such a time prior to completion as may be determined by the Owner, all mechanical equipment and systems shall be operated and tested for a period of at least five consecutive, 8-hour days to demonstrate the satisfactory overall operation of the building or project as a completed unit. The tests shall include the operation of the heating, ventilating, and air conditioning equipment and systems for a period of not less than two, 8-hour, days at not less than 90% of full specified heating and cooling capacities.

- B. The tests shall commence after preliminary balancing and adjustments to equipment and systems have been completed, and all running equipment have been checked and thoroughly lubricated.
- C. Immediately before starting tests all air filter media shall be replaced.
- D. An accurate means of measuring air flow and temperatures shall be used to balance the air supply, return, and exhaust systems, so that uniform temperatures occur in every room and design air flow is obtained through the registers, diffusers, and grilles.
- E. Systems shall be adjusted to provide air flows shown including maximum fresh air and maximum return air. Dampers shall be checked for proper settings and operation. Air and water inlet and leaving temperatures at coils shall be checked. Complete operational data including air flows, room temperatures, fan speeds, motor currents, plenum and duct static pressures shall be tabulated.
- F. Welding done on this project may be subject to radiographic inspections at random in accordance with requirements specified in Section 15050.

### **3.5 POST CONTRACT TESTS**

- A. If the required full load operating conditions cannot be obtained at the time of project completion test, due to unfavorable outdoor temperatures or conditions, the Contractor shall return to the job site when requested by the Architect and operate and test the equipment and systems at such times of the year when proper loading of the system can be accomplished. Such tests shall be conducted within a one-year period from the completion date. The Contractor will be notified at least 10 days prior to the start.

### **3.6 AIR AND WATER BALANCE; DUCT AND PLENUM PRESSURE TESTING**

- A. All testing and balancing shall be performed in complete accordance with AABC National Standards for Field Measurements and Instrumentation, Form No. 12173, Volume Two, as published by the Associated Air Balance Council. All methods and procedures listed in and applicable to Sections on Air and Hydronic Balancing, shall be included and performed, and recorded as though repeated herein.
- B. All instruments used for air and water balancing shall be furnished and operated by a representative of the testing agency. Provide for the continuous, uninterrupted operation of all systems during the test period.
- C. Make adjustments to valves, dampers, etc.; change drives, add or modify work for compliance with Plans and Specifications. Systems with VFD or ECM, provide VFD Min/Max settings for both cooling and heating conditions to EMS Contractor.
- D. Make all air volume adjustments by using the manual dampers provided at each branch takeoff. Leave face dampers at inlets and outlets in the full open position unless it is impossible to provide a branch duct of sufficient length to permit the installation of manual dampers. Furnish artificial resistance, equal to dirty filters to the clean filter bank by partially blanking off the filter face area.
- E. Duct Pressure Test.

1. Test for leaks, all plenum and ductwork from fan discharge to the point of connection to control boxes or devices including flexible ducts, using a portable high pressure blower and necessary instruments. Conduct tests as follows:
  2. Procedure:
    - a. Seal openings in duct and plenum section to be tested.
    - b. Connect test apparatus to test section using a flexible duct connection or hose.
    - c. Close damper on blower suction side, to prevent excessive buildup of pressure.
    - d. Start blower and gradually open damper on suction side of blower.
    - e. Buildup pressure in test section to 3" W.G.
    - f. Determine amount of air leakage by make-up air flow measurements and make repairs as required.
    - g. Allowable leakage of 1% of the total operating CFM of system under test is permitted. Total leakage may be determined by addition of leakage of each section of a system tested.
    - h. Visually mark with certification sticker and initials of field test inspector. Make tests before the sections are concealed.
- F. Adjust air flow at each inlet and outlet to within 5% of that shown on the Drawings. If volumes within 5% are impossible and with the engineers written approval, the systems may be balanced so that all outlets read within 5% of a fixed percentage of the required air volume.

Procedure shall be as follows:

1. For variable air volume (VAV) reheat, exhaust and return air systems, make a single series of tests.
2. Set all zone thermostats for full cooling except where thermostats are not part of the system.
  - a. For VAV systems, set the automatic volume dampers to full open position on supply, return and exhaust systems. Record the air temperature for one outlet per zone.
  - b. For single zone systems, record the air temperature of one outlet for each zone.
3. Set all manual dampers to the full open position including fire dampers and the face dampers at registers and diffusers. Face dampers shall not be utilized for balancing to control air volume unless no other means is possible.
4. All supply, return and exhaust fans shall be running.
5. Measure the total air volume for each fan. Obtain a rough measurement of the total air volume by measuring the average face velocity through the cooling coils or the filters and

- calculating the CFM. Wherever possible, provide a temporary plenum and/or straight duct section for exhaust fans discharges.
6. Change fan speeds as necessary to obtain approximately 5% above design air volumes. Replace belts and drives as required to obtain required results. Air balance contractor shall inform mechanical contractor to replace belts and drives as necessary.
  7. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across fan. Make allowances for 50% loading filters. Provide proper set point to EMS Contractor.
  8. Adjust and readjust the manual balancing dampers and fan speeds until all supply, return and exhaust inlet and outlets are within the required percentage of the design air volumes. Readjust fan speed until at least one series of manual dampers from fan to outlet is in the full open position. Provide damper(s) min/max settings for both heating and cooling conditions along with damper(s) min/max setting to EMS Contractor.
  9. Adjust the fan volume automatic controls and dampers to start to close with any sensed decrease in air flow or increase in static as required by the control system.
  10. Set all room thermostats for full heating except where thermostats are not a part of the system.
  11. Return thermostats to their normal setting as required by the controls.
  12. For variable air volume system, set automatic dampers at minimum position to start heating mode. Minimum position shall be as indicated on the VAV box schedule or set at 50% of maximum supply air. Make readings of minimum supply air CFM.
  13. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries. Provide proper set points to EMS Contractor.
- G. Adjust and record the outside air volume for systems equipped with return-air-exhaust fans. Set outside air to minimum requirements. Verify that supply and return total air volumes remain unchanged when operating on either 100% outside air and exhaust or on minimum outside air.
- H. Record and check the following items at each coil.
1. Temperature of inlet air or water.
  2. Temperature of leaving air, water or refrigerant.
  3. Air and water pressure drop of each coil.
- I. Paint or otherwise permanently indicate the final or permanent position of each manual damper handle.
- J. Record all fan motor nameplate voltages and amperes and the final actual voltage and amps. Record all pulley and belt sizes for belt driven units.
- K. For closed circuit water circulating systems:

1. Read and record the water volume for each coil, both heating and cooling, either by means of the flow measuring device installed or by installing pressure taps on either side of each coil control valve and utilizing pressure drop and the Cv of the valve, record the gallons per minute. With all automatic valves full open to by-pass, adjust by-pass so that the most physically remote valves pass the minimum flow required by the chiller manufacturer, the boiler manufacturer or the pump manufacturer, whichever is greater.
2. Read and record pump operating suction and discharge pressure, motor nameplate volts and amperes measured voltage and amperes, chiller pressure drop, pump curve, chiller, GPM from pressure drop curves or tables. Attach copies of curves or tables.

### **3.8 OPERATIONAL TEST**

- A. Before starting or operating any equipment systems, make a thorough check to determine that all systems have been flushed and cleaned as required and that all equipment has been properly installed, lubricated and serviced. Check factory instructions to see that recommended lubricants have been used in all bearings, gearboxes, crankcases, and similar equipment. Use particular care in lubricating bearings to avoid damage by over-lubrication and blowing out seals. Check equipment for any damage that may have occurred during shipment, after delivery, or during installation. In the event of any damage, replace the equipment or renew or repair to the complete satisfaction of the Owner.
- B. Test the performance of all components of equipment under all possible variations of loads, flow conditions, temperatures, etc., which can be simulated on the job by utilizing any of the heating or cooling equipment which is furnished as part of the contract work.
- C. Replace or revise any equipment, systems or work found deficient during tests as required, to the entire satisfaction of the owner. The Contractor shall be responsible for the complete coordination of the piping, wiring diagrams, or control diagrams with the equipment requirements.
- D. Make any final adjustments or balancing found necessary to be made to the equipment or systems, to place them in acceptable operating condition and to the specified performance during any or all of the tests.
- E. Provide, maintain, and pay all costs for equipment, instruments, and operating personnel as required for all tests.
- F. Operate each chiller at steady rate, at full rated capacity for one hour and at minimum required capacity for one half hour. Provide an artificial load by means of portable heaters, temporary heat exchangers, piping, valves, etc., as necessary to accomplish this.

### **3.9 REPORTS**

- A. After tests have been approved on the entire system or any portion thereof, the Contractor or the testing agency, as applicable, shall certify in writing the time, date, name and title of the person approving the test. This rough field data shall also include the description and what portion of the system has been approved. The person making the inspection shall sign the certification.
- B. Maintain a complete record of the rough field data of all testing that has been approved, and make available at the job site to all authorities concerned.

- C. The testing company or contractor shall prepare a formal typewritten report, indexed, with stiff covers to contain all the required test data.
- D. The report shall identify and reference all readings from all outlets, devices, HVAC equipment, pumps, etc., along with a numbering system corresponding to report unit identification.
- E. Deliver copy to the Architect for review.
- F. After review, verification and acceptance, one copy of each of these test reports will be furnished to the Contractor for inclusion in each operating instruction manual.

### **3.10 SOUND TESTING**

- A. Perform and record sound measurements as required.
  - 1. Take readings in rooms as designated by the Architect.
- B. Take measurements with a calibrated sound level meter and octave band analyzer of the accuracy required by AABC.
- C. Sound reference levels, formula and coefficients shall be according to ASHRAE handbook, Systems Volume; Chapter: Sound and Vibration Control, latest edition.
- D. Where measured sound levels exceed specified level, the installing Contractor or equipment manufactures shall take remedial action approved by the Architect and the necessary sound tests shall be repeated.

### **3.11 PERFORMANCE GUARANTY**

- A. The TAB agency, shall submit an AABC "Project Performance Guaranty" assuring that the project systems were tested, adjusted and balanced in accordance with the project specifications and AABC standards.

**END OF SECTION 15020**

## SECTION 15030

### MECHANICAL IDENTIFICATION

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDES

- A. This section includes the requirements for marking and identification of mechanical piping systems, valves, equipment, duct, apparatus, air filter section, etc., as specified.

##### 1.2 RELATED SECTIONS

- A. Section 15050: Basic Materials and Methods
- B. Section 15410: Drainage System
- C. Section 15420: Domestic and Industrial Water System
- D. Section 15430: Fuel Gas system
- E. Section 15470: Plumbing Fixtures
- F. Section 15800: Heating, Ventilating and Air Conditioning Equipment

##### 1.3 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
  - 1. Descriptive data.
    - a. Valve tags.
    - b. Apparatus nameplates.
    - c. Equipment nameplates.
    - d. Stencils.
    - e. Pipe identification.
    - f. Chart frames.
  - 2. Shop drawings
    - a. Identification charts.

#### PART 2 - PRODUCTS

##### 2.1 PRODUCTS

- A. Tags for pipe trim.



1. Tags for all other service valves and other pipe devices such as strainers, flex connections, etc., shall be 22 ga. min. thick by 2" diameter brass inscribed with a 3/4 inch high identification number with No. 18 brass jack chain.
  2. Tags for all other service valves and other pipe devices as strainers, flex connections, etc., shall be 22 ga. Min. thick by 2" diameter brass inscribed with a 3/4 inch high identification number with No. 18 brass jack chain.
  3. Numbers identifying trim shall be engraved or stamped or a combination.
- B. Apparatus identification.
1. Nameplates for apparatus not installed inside control electrical cabinets shall be black Lamacoid nameplates with beveled edges and white lettering engraved through the black layer.
  2. Nameplates for apparatus installed inside control or electrical cabinets shall be with beveled edges and 1/8" minimum high letters and numerals embossed on aluminum or plastic tape labels.
- C. Equipment identification: Equipment identification shall be black phenolic nameplates with 1/2-inch high white cut letters.
- D. Warning signs for hazardous equipment or materials shall be red phenolic plates with 1/2" high white cut letters and beveled edges.
- E. Pipe identification:
1. Piping markers shall be snap-on- outdoor grade acrylic plastic. Snap-on pipe markers shall be Setmark as manufactured by Seton Nameplate Corporation, Westline Products or equal. Markers shall be printed on background colors, with arrows for direction of flow. Each marker shall completely band the diameter of the pipe with or without insulation.

Size of Legend Letters and  
Length of Color Field

Outside Diameter of Pipe or Covering	Length of Color Field	Size of Letters and Arrows
Inches	Inches	Inches
3/4 to 1-1/2	8	1/2
1-1/2 to 2	8	3/4
2-1/2 to 6	12	1-1/4
8 to 10	24	2-1/2
Over 10	32	3-1/2

- F. Chart Frames: Self-closing satin finished extruded aluminum valve chart frames with glass window.
- G. Underground Pipe Markers:
1. Gas: Pipe markers shall be furnished to grade at each horizontal change in direction for all non-metallic underground pipe. Markers shall be concrete plaque inscribed with the appropriate word "gas". An electrically continuous # 14 plastic covered copper tracer wire, Type TW, shall be run in trench along pipe. Wire shall be fastened to pipe at not greater than 20'-0" intervals. Wire shall terminate above ground with 12" lead taped around each

riser. Straight line transitions of metallic to non-metallic pipe shall have lead brought to grade under a marker. Tracer wires for non-metallic gas pipe shall be color-coded yellow.

2. Domestic and Fire Protection Water: All plastic piping including fire protection shall be wrapped with single conductor, 16 gauge insulated, underground tracer wire. The ends of the wire shall be extended up through the valve boxes, at the terminal end of each plastic main piping run and connected to a brass tag. The brass tag shall be stamped with the pipe size and type of service (i.e. "Tracer 6 inch, water").

### **PART 3 - EXECUTION**

#### **3.1 PIPE TRIM IDENTIFICATION**

##### **A. General**

1. All valves and pipe mounted devices shall have numbered identification tags.
2. Secure tags to valves and devices. Secure around insulation for cock, ball valves and other fully insulated devices.
3. For valves that are equipped with chain operators, provide an additional tag and secure to the hook or clip that supports the swagged chain.

#### **3.2 APPARATUS IDENTIFICATION**

##### **A. General**

1. Provide nameplates for the following types of apparatus:
  - a. Each starter, disconnect switch provided under the work of Division 15.
  - b. Each panel or cabinet mounted instrument.
  - c. Each panel or cabinet mounted control and item of electrical interlock equipment.

#### **3.3 EQUIPMENT IDENTIFICATION**

##### **A. General**

1. Provide nameplates for, but not limited to, the following types of equipment:
  - a. Damper motors.
  - b. Automatic valves.
  - c. Flow switches.
  - d. Pressure switches.
  - e. Fans.
  - f. Filter banks.
  - g. Pumps.
  - h. Split System

- i. Water heaters.
  - j. Expansion tanks.
  - k. Rooftop Package Units
  - l. Pump controller.
  - m. Tanks.
2. Mechanically secure nameplates in place next to the manufacturer's nameplate wherever possible.
  3. Identify equipment out of view behind plenum or other access doors in equipment and other unfinished rooms on the face of the access door.

**3.4 PIPE IDENTIFICATION**

A. General

1. Identify all exposed and concealed but accessible piping whether insulated or not by content, size of pipe, and the direction of flow indicated, with snap-on markers. As a minimum, identification shall be the abbreviations scheduled in the legend or shall be as scheduled hereinafter.
2. Install identifying markers adjacent to all valves on each piping system.

B. Furred spaces: Piping installed in inaccessible furred spaces will not require identification except at valve access panels where valves and piping shall be identified.

C. Locate piping identification markers so as to be readily visible from any reasonable point of observation. Where two (2) or more pipes run parallel, the printed legend and other markers shall be applied in same relative location. All identification at eye level, shall be along center line of pipe, above eye level on the upper quarter of pipes. Where view is unobstructed from two directions, two sets of identification shall be applied visible from each direction. Apply the legend, flow arrow, etc., at all valve locations, or at all points where piping enters and leaves a partition, walls, floor, or ceiling and at intervals of 20 feet or less.

D. Schedule

1. Legend

<u>CONTENTS OF PIPE</u>	<u>LEGEND</u>	<u>COLOR</u>	<u>NOTE</u>
<u>FUEL SYSTEM</u>			
<u>FUEL GAS</u>	Fuel Gas	Y	#
<u>PLUMBING &amp; SANITARY SYSTEMS</u>			
Domestic Cold Water	Cold Water	G	#
Domestic Hot Water	Hot Water	Y	#
Domestic Hot Water Return	Hot Water Return	Y	#
Emergency Drain	Emergency Drain	G	#

Indirect Drains	Drain Water	G	#
Industrial Cold Water	Industrial Cold Water	G	#
Return	Return	Y	#
Sanitary Vent	Vent	-	-
Sanitary Soil or Waste	Sanitary Sewer	G	#
Storm Drain or Downspout	Storm Sewer	G	#

FIRE SYSTEMS

Drains	Drain Water	R	#
Wet Fire Protection	Fire Protection Water	R	#

AIR CONDITIONING SYSTEM

Condensate drain	Condensate Drain	G	#
Hot Water Supply	Heating Supply	Y	#
Hot Water Return	Heating Return	Y	#
Make-up Cold Water	Make-up Water	G	#

2. Notes on schedule.

a. Symbol # indicates Flow Arrow required.

3. Colors.

- a. Symbol G indicates green background color with white letters and arrows.
- b. Symbol R indicates red background color with white letters and arrows.
- c. Symbol Y indicates yellow background color with white letters and arrows.

**3.5 HAZARD IDENTIFICATION**

A. Identify each outlet of industrialized or non-potable water with a warning sign reading "NON-POTABLE WATER", or "DANGER - DO NOT DRINK".

**3.6 CEILING TILE IDENTIFICATION**

Above removable ceiling tile, provide colored tape or ribbon marking to indicate location of all valves, dampers, damper motors, air filter section, or other equipment. Install on ceiling 1/2" diameter colored buttons to indicate and identify these items, after ceiling installation is completed.

Note: Use single color scheme.

**3.7 IDENTIFICATION CHARTS**

A. General

1. Permanently identify all piping systems, controls, valves, air filter section, apparatus, etc.

B. Valve charts

1. Prepare charts and diagrams for each piping system, indicating by identifying the number of each valve and other pipe mounted device in the system, and it's location

and function.

C. Pipe charts

1. Prepare identification charts for piping systems in accordance with the pipe identification schedule.

D. Mounting of charts

1. Mount one of each chart in wood or aluminum frame with clear glass front and mechanically secure on wall where designated by the Architect.

E. Binding of charts

1. Bind copies of each chart in Operating Instructions Manual.

**END OF SECTION 15030**

## SECTION 15050

### BASIC MECHANICAL MATERIALS & METHODS

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDES

- A. This section prescribes basic materials and methods generally common to the work of Division 15.

##### 1.2 RELATED SECTIONS

- A. All other sections in Division 15.
- B. Electrical: Division 16.

##### 1.3 QUALITY ASSURANCE

- A. Standards: Comply with applicable national or local codes and standards.
- B. Qualifications of Manufacturer: Products used in the work of this section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a 5 year history of successful production acceptable to the Architect.
- C. Qualifications of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this section. All contractors shall have California State License as follows: HVAC and process piping installer including chilled water, heating hot water, boiler and accessories (C-4); Plumbing Contractor (C-36); Fire Protection Contractor (C-16); and Welders (C-60). Proof of licenses shall be submitted to the Owner's representative and a copy shall be provided at the jobsite construction office.

##### 1.4 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
  - 1. Complete material list of all items proposed to be furnished and installed under this section.
  - 2. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.
  - 3. Shop Drawings Showing:
    - a. Complete system layout and description of components and all piping work.
    - b. Schedule and description of pipes, fittings, and valves.
    - c. Special valves of all types.
    - d. Specialty fittings.
    - e. Prior to commencing any underground utility installation or starting foundation excavations, the Contractor shall produce a comprehensive coordination drawing of the proposed system installations with proposed piping locations and proposed depth of piping installation. Crossing points of piping systems shall indicate

separation distances for full coordination and maintenance of gravity operated drainage and waste systems. In addition to piping systems, underground electrical encased conduit runs shall also be indicated with crossing points and separations identified. All underground utilities shall be coordinated and adjusted with the concrete foundation layout and depths. To comply with all separation requirements between utility installations and footing locations. This coordination will require adjustment in the depth of utility installation, locations of utility runs, and depth of concrete foundations. There will be not additional costs to the project for this required coordination adjustment work scope.

4. Manufacturer's Recommended Installation Procedures: The manufacturer's recommended installation procedures, when accepted by the Architect/Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.

## 1.5 COORDINATION

- A. Coordinate all activities in accordance with the provisions of Section 15010.

## PART 2 - PRODUCTS

### 2.1 PIPING SCHEDULES

- A. General.
  1. Refer to individual mechanical section for piping schedule required for each particular piping system.
- B. Requirements.
  1. Requirements of this section are in addition to any similar or more comprehensive requirements in other sections of this Division.
  2. Requirements of this section apply to all sections in this Division, except as may be specifically modified in those sections.
  3. Standards & Specifications: Conform to the current edition of the following:

Cast iron soil pipe & fittings	CS188
Steel Pipe:	ASTM A120
Drainage fittings:	ANSI B16.12.
Hard drawn copper tubing:	ASTM B88
Hard-drawn Medical gas tube:	ASTM B819
150# malleable-iron screwed fittings and couplings:	ANSI B16.3
300# malleable-iron screwed fittings and couplings:	ANSI B16.19
Cast iron screwed fittings:	ANSI B16.4
Cast-iron flanged fittings:	ANSI B16.1
Rubber ring cast-iron fittings:	ANSI A21.10
Wrought copper	

fittings and couplings:	ANSI B16.22
Bell & Spigot cast-iron pipe:	ANSI B21.8
Cast-iron Class "D" fittings:	AWWA C100

C. Piping schedule "A".

1. Service: Heating hot water.
2. Pipe: Schedule 40 black steel pipe ASTM A-53 or A-120, Grade A or B.
3. Type "L" hard drawn copper tubing, ASTM B-88 may be used in lieu of Schedule 40 black steel pipe for heating hot water piping and chilled water piping, 2" and smaller.
4. Fittings:
  - a. 2" and smaller: 12 lb WOG black cast iron screwed or 2000 lb. WOG socket weld ASTM Grade II and ASTM B16.3.
  - b. 2-1/2" and larger: Standard weight seamless carbon steel, long radius where necessary, butt welding fittings, ANSI B16.9 and ASTM A234. Grade A.
  - c. Manufactured weld-to-weld, weld-to-screw type "tap-in" reinforced fittings.
  - d. Wrought copper fitting with 15% silver brazing alloy joints for type "L" copper. See paragraph 3.5 of this section for brazing joints.
5. Unions: 150 lb. screwed malleable iron ground joint with brass to iron seating on piping 2" and smaller. Galvanized or black to suit service. Stockham Fig. 894 or equal.
6. Flanges:
  - a. 150 lb.: Steel, 1/16 inch raised face or to match equipment, slip-on or weld-neck, ASA B26.5 on piping 2-1/2" and larger.
  - b. Gasket: 1/16" thick Garlock 7021, Crane 333, Manville 960, or equal.
7. Service valves:
  - a. Gate valves 2" and smaller: Class 125, 200 lbs. WOG, ASTM B-62 bronze body and bonnet, solid wedge, gland packed rising stem and union bonnet.  
  
Recommended Manufacturers: (or equal)

Threaded	Solder
Milwaukee 1152	Milwaukee 1169
Stockham B-120	Stockham B-124
Nibco T-134	Nibco S-134
  - b. Ball valve 2" and smaller except for copper piping with silver brazing joints: two piece construction 600 lbs. WOG, 150 lbs. SWP, ASTM B-584 bronze body, hard chrome plated solid ball, threaded gland follower, reinforced Teflon seat, virgin teflon packing, blow out proof stem, full flow.



Recommended Manufactures: (or equal)

Threaded

Solder

Milwaukee BA-100  
Apollo 77-100  
Stockham S-217

Milwaukee BA-150  
Apollo 77-200  
Stockham S-227

- c. Ball valve 2" and smaller for copper piping with 15% silver brazing alloy joints: Three piece construction, 600 lbs. WOG, 150 lbs. SWP, ASTM B-584, bronze body, hard chrome plated solid ball, reinforced Teflon seat, virgin Teflon packing, blow out proof stem, full port; swing-out. The three piece construction swing-out design will allow the ends to be soldered into place separately with the center section installed later to prevent any damage to the Teflon seat that might occur during soldering, brazing or welding.

Recommended Manufactures: (or equal)

Threaded

Solder

Nibco T-595-Y-70  
Milwaukee BA-300  
Apollo 82-100

Nibco S-595-Y-70  
Milwaukee BA-350  
Apollo 82-200

- d. 2-1/2" and larger.

(1) Butterfly Valves.

- (a) 200 lb. WWP for maximum 250 F. service, tight closing with cast iron body of the lug type with two piece fastenerless type 316 stainless steel stem and disc, replaceable EPT (EPDM) liner and "O" rings.

Recommended Manufactures: (or equal)

Lever

Gear

Milwaukee ML-224-E  
Stockham LG-712

Milwaukee ML-224-E  
Stockham LG-722

- (b) Valves shall be selected for installation between 125 lbs., flat faced or 150 lbs. Raised face steel flanges. Lug holes shall be threaded.
- (c) Valves 4" and smaller shall be provided with lockable lever operator with ten minimum setting positions..
- (d) Valves larger than 4" shall be provided with gear operator with position indicator and wheel operator.
- (2) Gate Valves:
- (a) 200 lb. WOG, iron body bronze trim, wedge disk, OS & Y flanged. Stockham F-612, Milwaukee F-2885-M or equal.

8. Balancing valves:

- a. Sizes 4" and larger butterfly type only. Sizes 3" and smaller, bronze cocks, or ball valves as scheduled.

Type	Size	Description
Cock	1" and Less	Bronze, 125 lb., 250 deg. F, WOG, Square head screw. Rockwell or equal.
Cock	1-1/2" & 2"	Cast iron, 175 lb., 250 deg. F, WOG, lubricated plug, lever handle, screwed. Rockwell or equal.
Cock	2-1/2" & 3"	Cast iron, 125 lb., 250 deg. F, WOG, lubricated plus, flanged. lever handle, Rockwell or equal.
Ball	2" and Less	Same as specified under service valves.
Butterfly	Over 3"	Same as specified under service valves.

- b. Lubricated type plug valves, fully serviced with suitable lubricant before being placed in operation. Furnish one box of each size of lubricant stick required for each 15 valves or fraction thereof.
- c. Ball and butterfly valves. Shall be same as for service valves except shall be fitted with an adjustable stop plate to limit the valve opening.
- d. Globe valves 2" and smaller shall be Class 150, ASTM B-62 bronze body and union bonnet, gland packed, Teflon seats.

Recommended Manufacturers: (or equal)

Threaded		Solder	
Milwaukee	590-T	Milwaukee	1590-T
Nibco	T-235-Y	Nibco	S-235-Y
Stockham	B-22	Stockham	B-24

9. Check valves:

a. Swing Checks.

- (1) 2" and smaller: Class 125 SWP ASTM B-62 bronze body and cap with regrinding Teflon disc and screw-in cap.

Recommended Manufacturers: (or equal)

Threaded		Solder	
Stockham	B-310-T	Stockham	B-320-T

Milwaukee 509T Nibco	T-413Y	Milwaukee Nibco	1509T S-413Y
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- (2) 2 ½" and larger: 150 lb. SWP iron body, bronz trim with regrinding bronze disc and seat ring and bolted cover.

Recommend Manufacturers: (or equal)

Stockham G-931, Milwaukee F-2974-M, Nibco F-918-B.

- b. Silent type checks (non-slam) (NSCV).

- (1) 2" and smaller: 125lb. SWP bronze body, screwed guided bronze disc, bronze ring with Conical Stainless Steel, Type 302 spring.

Recommended Manufacturers: (or equal)

Threaded

Solder

Milwaukee 548 W/Spring  
Nibco T-480

Nibco S-480

- (2) 2-1/2" and larger shall be class 125 globe type, semi-steel body with bronze trim, flanged.

Recommended Manufacturers: (or equal)

Milwaukee Series 1800, Nibco F-910-B.

10. Strainers.

- a. 2" and smaller: 250 lb. Y-pattern bronze, screwed, with machined and gasketed strainer screen retainer cap.

Recommended Manufacturers: (or equal)

Bailey 100A, Mueller H-9330.

- b. 2-1/2" and larger: 125 lb. Y-pattern cast iron, flanged with bolted strainer screen cap with offset blow-down connection.

Recommended Manufacturers: (or equal)

Sarco Type CI-125, Jenkins 100A.

- c. Strainer screen shall be stainless steel with perforation 200 min. 260 max. per square inch and open area of the pipe.

11. Automatic air vents: 75 psi Hoffman #79 with brass body and trim or 150 psi Hoffman #78 with cast iron or bronze body with stainless steel trim and float, as required to match the pressure rating of the systems service valves.

12. Refer to paragraph 2.02 "Valves General".

- D. Piping schedule "B". (not used)

- E. Piping schedule "C" (not used)
- F. Piping schedule "D".
  - 1. Service: Potable water (hot and cold) and Industrial water (hot and cold).
  - 2. Pipe.
    - a. Above ground. Seamless Type "L", hard drawn, copper tubing, ASTM B-88.
    - b. I.P.S. red brass nipples for rigid connections.
    - c. Underground: Seamless Type "K", hard drawn copper tubing, ASTM B-88.
  - 3. Fittings.
    - a. Wrought copper solder sweat type, ANSI B-16.22.
    - b. Cast bronze solder sweat type, ANSI B-16.18, shall be used only where wrought copper fittings are not available.
    - c. Manufactured braze-to-sweat type reinforced "tap-in" fittings.
  - 4. Unions.
    - a. Tubing: 2" and smaller, 150 lb. cast bronze or copper, ground joint, non-ferrous seat with sweat ends.  
  
Recommended Manufacturers: (or equal)  
  
Walseal, Nibco, Mueller, Flag-Flo.
    - b. Pipe: 2" and smaller, 150 lb. cast brass ground joint, brass to brass seat, threaded ends.
  - 5. Flanges: 150 lb. cast brass, flat faced, solder sweat type, ASA B-16.4, on piping 2-1/2" and larger.
  - 6. Gaskets: 1/16" thick rubber, Manville 107, Garlock 22, or Crane 555, full faced.
  - 7. Service valves.
    - a. Ball valves 2" and smaller: Class 150 SWP/600 WOG, two piece construction, reinforced teflon seats, separate adjustable packing gland, blow out proof stem, chrome plated bronze ball, full port, lead free, extended cup solder end valves. Valves shall meet or exceed Federal Specification, WW-V-35, Type II, Class A, Style A, Style 3 or MSS-SP 110.  
  
Recommended Manufacturers: (or equal)  
  
NIBCO                      S-685-80LF Full Port-Solder  
                                    T-685-80LF Full Port Threaded  
  
Milwaukee                UPBA400 Full Port-Threaded  
Milwaukee                UPBA450 Full Port-Solder

- |  |       |  |
|--|-------|--|
|  | Watts | LF86080 Full Port-Threaded<br>LFB6081 Full Port-Solder |
|--|-------|--|
8. Check valves.
- a. Swing checks.
- (1) 2" and smaller: Class 125 SWP/200 WOG, swing-pattern, threaded bonnet, replaceable teflon disc. Valves shall meet or exceed MSS-SP 80.
- Recommended Manufacturers: (or equal)
- |  |           |  |
|--|-----------|--|
|  | Nibco     | T-413-YLF Threaded<br>S-413-YLF Solder |
|  | Milwaukee | UP509-T Threaded<br>UP1509-T Solder    |
- (2) 2-1/2" and larger: Class 125, SWP/200, WOG, swing-pattern, bolted bonnet, bronze disc, ASTM A-126, Class B, cast iron.
- Recommended Manufacturers: (or equal)
- |  |           |        |
|--|-----------|--------|
|  | Nibco     | F-918  |
|  | Milwaukee | F-2974 |
|  | Stockham  | G-931  |
9. Strainers.
- a. 2" and smaller: 250 lb. Y-pattern bronze, screwed, with machined and gasketed strainer screen retainer cap.
- Recommended Manufacturers: (or equal)
- |  |       |         |
|--|-------|---------|
|  | Watts | LF777SI |
|--|-------|---------|
- G. Piping schedule "E" (not used):
- H. Piping schedule "F".
1. Service: Fuel gas.
2. Above ground:
- a. Piping: Schedule 40 black steel, ASTM A-53, Grades A or B.
- b. Fittings:
- (1) 2" smaller 15 lb. black malleable iron screwed fittings, ASA B16.3.
- (2) 2-1/2" larger: Standard weight seamless carbon steel, long radius, butt welding fitting, ASTM AA-106, Grade A.
- (3) Manufactured weld-to-weld or weld-to-screw typer enforced  
"tap-in" fittings.

- (4) Medium Pressure Gas to be welded.
  3. Below ground (outside building):
    - a. Polyethylene plastic pipe, ASTM D1248 and D2513 standard dimension riation 11, rated at 80 PSI working pressure at 73° F for 3" and above, butt or socket type fittings, joined by heat fusion, color yellow, Plexco PE 2406. Transition to anodeless steel riser at meter, regulator, or building wall.
    - b. Underground polyethylene piping shall be installed by personnel certified by the pipe manufacturer as having received instructions directly from the pipe manufacturer's field representative. Contractors not having certified personnel will be required to have factory representative of the pipe manufacturer visit the site at the time of underground pipe installation and provide the required instructions. The Contractor shall pay for all required cost for training and certification.
    - c. Upon completion of the gas piping underground installation, Contractor shall submit a written report to the Architect stating that all materials installed are specified and approved, and that installation was done by factory certified personnel and tested to 60 PSI.
  4. Unions: 150 lb. black malleable iron screwed with brass to iron ground seating o piping 2" and smaller.
  5. Flanges: 150 lb. forged steel, slip-on or weld-neck, ASA B-15.5 on piping 2-1/2" and larger.
  6. Service valves.
    - a. 2" and smaller: Bronze straightway, threaded plug cock, 150 psi WOG. Nordstrom No. 142 or Lunkenheimer Fig. 456.
    - b. 2-1/2" and larger: Flanged iron body lubricated plug cock, 175 psi WOG. Walworth No. 1797F.
    - c. 5" and larger: Flanged iron body lubricated plug cock, 200 psi WOG, Walworth No. 1718F.
    - b. Furnish one box of each size lubricant stick for each fifteen or fraction of valves.
    - c. For buried valves provide a head extension with lubricant fitting to 6" below grade.
    - d. Refer to paragraph 2.02, "Valves General".
- I. Piping schedule "G".
  1. Service: Sanitary soil, waste and vent piping.
    - a. Piping: Standard weight no-hub cast iron soil pipe conforming to CISPI Standard 301-90.
    - b. Fitting: Standard weight no-hub cast iron soil pipe conforming to CISPI Standard 301-90. "Husky" series SD 2000 no-hub couplings with neoprene and series 300 stainless steel clamp for above ground. "Husky" series SD 4000 no-hub coupling for below ground. Above ground vent piping may be made with "ANACO" or "TYLER" two band stainless steel coupling.
- J. Piping schedule "H"

1. Service: Storm Drainage.
  - a. Piping: Standard weight no hub cast iron soil pipe conforming to CISPI Standard 301-90.
  - b. Fitting: Standard weight no-hub cast iron soil pipe conforming to CISPI Standard 301-90. "Husky" series SD 2000 no-hub couplings with neoprene gasket and series 300 stainless steel clamp for above ground. "Husky" series SD 4000 no-hub couplings for below ground.
- K. Piping schedule "I". (not used)
- L. Piping Schedule "J". (not used)
- M. Piping Schedule "K".
  1. Service: Equipment drains and indirect drains, laboratory vacuum, vent and relief.
  2. Pipe: Type "M" seamless hard drawn copper tubing with 95-5 solder wrought copper fitting.
- N. Piping schedule "L". (not used)
- O. Piping schedule "M". (not used)
- P. Piping Schedule "N".
  1. Service: Fluorocarbon Refrigerant.
  2. Pipe: Seamless copper tubing, type "L", hard drawn, ASTM B280 factory cleaned, sealed and delivered to the site in full lengths.
  3. Fittings: Wrought copper sweat type, ANSI B16.22. Couplings shall be wrought copper staked stop type, silver solder joints.
  4. Valves: Globe or ball type seamless or seal cap. Packed valves shall be backseating for repacking under pressure.
  5. Expansion Valves: Sporlan, Alco or Flo-Gon, diaphragm type with built in strainer and distributor.
  6. Filter driers: Cartridge catch all type, Sporlan, Henry or Mueller.
  7. Sight Glass: Double port type with moisture indicator, Sporlan or Henry.

## 2.2 VALVES GENERAL

- A. Each valve shall have the manufacturer's name or brand, the figure or list number and the rated working pressure cast or stamped on the body or bonnet or other equivalent means of easy identification.
- B. Valves without specified materials or working pressure shall be selected to match materials and pressure ratings of the fittings as a minimum.
- C. All gate and globe valves shall be back seating type suitable for repacking under pressure.
- D. The minimum working pressure is 200 PSI. See class rating for each application.
- E. Globe valves shall have composition discs suitable for the temperature and pressure of the service.

- F. Ball and butterfly valves on insulated piping shall have the neck extended two inches above the outside diameter of the flange to accommodate the full thickness of the insulation. Extension shall be of same valve manufacturer.
- G. Automatic Valves:
  - 1. Solenoid valves:
    - a. Solenoid valves shall be 125 lb. WOG, brass bodied, screwed, stainless steel trim, resilient seated, normally closed 2-way, and 120 volts, 60 hertz, ADSCO Bulletin 8210 for sizes 3/8" to 3"; Bulletin 8222 for 125 lb. steam, sizes 3/8" to 3"; General Controls, ALCO, Magnetrol or equal.

### 2.3 STRAINERS

- A. Strainers shall have machined and gasketed caps either straight threaded or bolted.
- B. Strainer open area of screen shall be at least three times the cross-sectional area of the pipe in which installed based on iron pipe size (IPS) and may be either woven wire or perforated with equivalent openings as specified in pipe schedules.

### 2.4 VALVE BOXES

- A. Precast concrete or cast iron with cast iron locking type covers, lettered to suit service, Brooks No. 3-TL, Christie No. B3, Fraser No. 3, Alhambra A-3004 or A-3005, Alabama E-2202 or E-2702, with extensions to suit conditions. Cast iron boxes, screw type or slip type, similar to those specified herein, will be acceptable. Use only cast iron boxes in traffic areas.
- B. Minimum inside dimension or diameter of box, 4" for valve sizes 3" and smaller, and 5" and larger for valve sizes 4" and larger.
- C. Where several valves or other equipment are grouped together, provide larger boxes of rectangular vault type, adequately sized for conditions and similar in construction to those specified above.
- D. Service for the particular box shall be properly marked with a permanent identification, i.e., "WATER", etc.

### 2.5 DIELECTRIC ISOLATORS

- A. General.

Isolators shall be provided between ferrous and non-ferrous materials.

Isolators shall be so constructed that the two pipes being connected are completely insulated from each other with no metal-to-metal contact, and suitable for service on which used. Insulating couplings are not acceptable.
- B. Unions.
  - 1. For piping 2" and smaller, unions shall be brass solder sweat with ground-joint and micarta sleeving.
- C. Flanges.
  - 1. For piping 2-1/2" and larger, flanges shall be flanged sets with neoprene gasket for flat face flanges with bolt hole punches to receive bolt sleeves of 1/32" micarta with 1/8" thick micarta washers.



2. All others: Insulating flanges or unions, suitable for 125 psig WSP.
- D. Manufacturer.
1. Dielectric isolator shall be as manufactured by F.H. Maloney, EPCO, Cathodic Protection Service, Corro Ban Products, W.C. Vallett, or equal.

## 2.6 FLEXIBLE PIPING CONNECTIONS

- A. Flexible connections for copper piping; corrugated seamless bronze flexible hose with bronze wire braid.
- B. Flexible connections for steel piping: Corrugated stainless steel with stainless steel wire braid.
- C. Designation and length as recommended by manufacturer for system's test and operating pressures and temperatures.
- D. Recommended Manufacturers: (or equal)
- Metraflex, U.S. Flex, Flex-Hose Co., or Unisource

## 2.7 WATER FLOW MEASUREMENT

- A. Automatic Flow Control Valve.
1. Flow Control Valves (FCV) shall automatically control flow rates with +/- 5% accuracy. Valve control mechanism shall consist of a stainless cartridge with a port cup and coil/helical spring to avoid corrosion. Four operating ranges shall be available with the minimum range requiring less than 2-PSIG to actuate the mechanism. Manufacturer shall provide independent laboratory tests verifying accuracy of performance. All FCV shall be of one manufacturer and conform to the above specification. FCV shall be protected by a five year warranty on all materials and workmanship. Flow control valve shall be Griswold, Nutech, or equal.
  2. Flow control valve for flow rates from 0.5 gpm to 14 gpm shall be Griswold miniature threaded iron valve rated at 450 PSI/200° F; with NPT end connections, supplied with pressure/temperature test valves with 5-1/2" extensions, permanently marked to show direction of flow, and provided with body tag to indicate model number, flow rate and PSID control rate.
  3. Flow control valve for flow rates from 14 gpm to 75 gpm shall be Griswold threaded flange valves grey iron body rated at 300 PSI/275°F, with female NPT threaded flange and connections, plated steel studs and nuts, supplied with pressure/temperature test valves with 5-1/2" extensions, permanently marked to show direction of flow, and provided with body tag to indicate model number, flow rate and PSID control range.
  4. Flow control valve for flow rates 75 gpm and above, shall be Griswold class 150 wafer valves grey iron body rated at 200 PSI/250°F, mechanically compatible with cast iron flanges, or MSS-SP-44 150 lb. steel flanges, supplied with pressure/temperature test valves with 5-1/2" extensions, permanently marked to show direction of flow, shall have single or multiple, parallel-installed stainless steel cartridge assemblies to provide rate flow, with all plated steel studs required for installation and provided with body tag to indicate model number, flow rate and PSID control range.

## 2.8 INSTRUMENTS

- A. General.
  - 1. Pipe mounted thermometers and pressure gauges shall be as scheduled herein and shown on the plans.
  - 2. Where panel mounted instruments are scheduled they need not be duplicated by pipe mounted instruments.
- B. Panel Mounted Instruments.
  - 1. Instruments shall be flush mounted type with chrome rings, 3-1/2" diameter minimum.
  - 2. Features shall be as specified herein for thermometers and pressure gauges.
- C. Instruments.
  - 1. Liquid sensing thermometers.
    - a. Red reading mercury column type or magnified mercury column type with wide angle of vision and high magnifications of mercury column.
    - b. Thermometers shall have one piece heavy extruded or cast aluminum or brass case with glass front. Thermometers mounted over 8 ft. high shall have multi-angle hinge with a positive locking device.
    - c. Scale shall be black numerals and divisions of light color background accurate to plus or minus one of the smallest scale divisions throughout the entire range. Scale shall have maximum of two degrees between graduations and 20 degrees between figures.
    - d. Minimum scale length shall be nine inches.
    - e. Provide extended necks for insulated pipes, tanks and equipment. Provide steel bulb chamber and brass separable socket for each thermometer. Fill the void between bulb chamber and bulb with a conductive grease.
    - f. Thermometers shall be Marsh Instrument Co., Trerice, Miljoco or equal.
  - 2. Pressure gauges.
    - a. Gauges shall be of the Bourdon tube type, March Instrument Co., Trerice, Miljoco or equal.
    - b. Gauges shall have 3-1/2" minimum dial face, white with black numbers and graduations, steel or aluminum case with double strength glass, nickel plated ring and built in or add on pulsation dampeners.
    - c. Movement shall be of the phosphor bronze seamless Bourdon tube type with recalibrating based rotary gear movement and link fitted with a black aluminum pointer with means for face calibration.
    - d. Accuracy in the middle third of dial range shall be plus or minus 1% of total dial range.

## 2.9 PIPE SUPPORTS

A. General.

1. Supports shall be defined as hangers, brackets, framing, guides and anchors.
2. Supports shall be factory fabricated units with published load limits.
3. Supports fabricated of steel shapes and installed in weather exposed locations, in equipment rooms or regularly occupied areas shall be hot dip galvanized after fabrication.

B. Horizontal piping.

1. Hangers shall be of the following types:
  - a. For piping 4" and smaller adjustable malleable iron split ring type, Grinnel Fig. No. 104, or Fig. 174, B-line Fig. B3171, Super Strut, or equal.
  - b. For piping larger than 4" and all insulated pipe fitted with inserts and shields, adjustable steel clevis type Anvil Fig. No. 260, B-Line Fig. B3100, Super Strut or equal.
  - c. Rod lengths shall be adjustable.
  - d. Trapeze hangers may be used for parallel piping arrangements. Submit detail drawings and calculations for approval. For four or less pipes 2-inches and smaller, framing manufactured by Unistrut selected to accept five times the weight or thrust of the pipe per manufacturer's ratings, are acceptable. Framing finish shall be a light colored polyester paint. Submit calculations.
  - e. Hang rods for both single and trapeze hangers from suitable clips, beam clamps or self-drilling expansion type or from 3/8" diameter rods and percussive driven studs. Verify with Structural Engineer.
2. Brackets shall be Anvil 194 or 195, B-Line Fig. B3063 or B3066, Super Strut or equal.
3. Roll stands shall be Anvil Fig. 271, B-Line Fig. B3117SL or equal.

C. Vertical piping.

1. Clamps shall be Anvil Fig. No. 261, B-Line Fig. B3373, Super Strut or equal.

D. Rods.

1. Solid mild steel minimum size as follows:

PIPE SIZE	ROD SIZE
2" and smaller pipe	3/8" diam. rod
2-1/2" to 3-1/2" pipe	1/2" diam. rod
4" to 5" pipe	5/8" diam. rod
6" pipe	3/4" diam. rod
8" to 12" pipe	7/8" diam. rod

E. Insulated piping.

1. Provide shields between supports and the pipe insulation.
  2. Shields shall be 16 gauge-galvanized steel for all piping and shall be preformed to proper radius, and shall extend up to the centerline of the pipe. Lengths shall be 4" for pipe sizes 2-1/2" and smaller, and 7" for larger pipes. Pipes 4" and larger at rollers, guides and supports shall have 14 gage shields. All shields at rollers, guides, and supports shall be securely strapped in place.
  3. Insert sections of insulation shall be Type P-4 at each support as specified in Section 15180: Insulation.
- F. Vibration isolation.
1. Vibration isolation shall be as specified in Section 15160: Vibration Isolation and Seismic Restraints.
  2. Where isolation elements are required on hangers provide 2 piece rods.
  3. Pipe Isolators:
    - a. Manufactured hair felt pad enclosed in corrosion resistant metal shield with end flanges to assure the pads proper retention between the support and the pipe, Trisolator S-100 or equal.
    - b. Provide plastic isolating suspension clamp on all water piping to prevent contact between the pipe and the structural framing. "Flexi-Fin" isolating suspension clamp or equal (L.A.R.R. 3850).
- G. Concrete fasteners.
1. Percussion driven studs shall be Ramset No. 2049, Drivet Remington, or equal.
  2. Self drilling anchors shall be Rawl Philips Red Head, Wej-it or equal.
- H. Hot water lines shall have roller type hangers. Grinnell Figure 171, B-Line Fig. B3114 or equal.
- I. Fire protection - (DSP & WSP): Comply with NFPA No. 14 for dry standpipe and NFPA 12 for automatic fire sprinklers.
- J. Floor Supports: Anvil Figure 264, B-Line Fig. B3093 or equal.
- K. Wall Supports: Anvil Figure 168, 195, B-Line Fig. B3153 or equal.
- L. Riser clamps for copper piping: Super Strut CT-720-F copper plated, plastic coated, B-Line Fig. B3373CT or B3373CTC or equal.
- M. Riser clamps for other piping: Super Strut C-720, B-Line Fig. B3373 or equal.
- N. Beam clamps: Super Strut U-520, B-Line Fig B318 or Fig. B3050 or equal.

## **2.10 SLEEVES, CORE DRILLING AND ESCUTCHEONS**

- A. General.
1. Sleeves shall be permanently installed type where waterproofing is required cast-in-place or dry-packed in core drilled hole.

2. Escutcheons shall be prime coated steel type except for escutcheons specified in Section 15470 - Plumbing Fixtures.
- B. Sleeves shall be as follows:
1. Exterior walls below grade and floor slabs on grade: Concrete pipe dry-packed in place with annular space caulked watertight.
  2. Floor slabs inside partitions, furred spaces and interior concrete walls: Core drill as necessary.
  3. Roof slab: Cast iron sleeve with integral flashing clamp, Smith No. 1722 or equal by Josam, Zurn or Wade.
  4. Floor slab with waterproof membrane: Cast iron sleeve with integral flashing clamp, Smith No. 1722 or equal by Josam, Zurn or Wade.
  5. Cast concrete beams: Core drill as necessary.
- C. Escutcheons shall be as follows:
1. 6" and smaller: Prime coated steel with set screw, Beacor No. 13 or equal by F & S Manufacturing Co.
  2. Larger than 6": Prime coated brass with set screw, Beacor No. 3 or equal by F & S Manufacturing, Fig. 605 or equal.
  3. Raised sleeves in floor slabs: Deep drawn prime coated steel or brass, F & S Manufacturing Fig 605, or equal by Beacor.
- D. Caulking shall be as follows:
1. Watertight: Projects Research Co. "Rubber Caulk" No. 150 heavy type DAP, Dow Corning W-DRBK, , General Electric, or equal.
  2. Fireproofing: Caulked glass fibrous rope.
  3. Sound attenuating: Caulk with a compressible polyurethane foam strip saturated with polybutylene, Poly-Tite Compriband, or equal.

## 2.11 ROOF FLASHING AND VENT CAPS

- A. General.
1. Roof penetration flashing shall be 4 lb. seamless lead flashing assembly with 10 in. skirt, steel reinforcing boot and caulk type cast iron counter flashing sleeve.
    - a. Manufacturer: Flashing assembly shall be Stoneman 1100-4 series, or equal.
  2. All vent pipe penetrations at all roof areas shall be fitted with a Stoneman 1550 cast iron counter flashing vandal-resistant vent cap.

## 2.12 ACCESS PANELS

- A. General.
1. These specifications cover prefabricated wall and ceiling access panels normally required to provide access to equipment requiring servicing and adjustment.
  2. The types of wall and ceiling access panels required are similar to Milcor Styles A, L, K, and M, Potter-Roemer No. 265 and 275, Zurn Series Z-1376, Carey Styles HP, HP HPE, and AT, or Karp #214, for the appropriate locations and with hinge, metal gauge, latch, and other modifications necessary to conform to requirements specified hereinafter. Panels shall be U.L. labeled to match wall or ceiling rating requirements.
- B. Location.
1. Furnish for installation by the pertinent trade, access panels wherever fans, air handlers, air filters, valves, balance valves, damper operating mechanisms, fire damper access doors and similar items normally requiring adjustment or servicing are installed in concealed spaces.
  2. Where furred ceilings are of the removable panel type of construction, the removable panels will be used for access to small equipment such as valves, dampers and controls.
- C. Sizes.
1. Access panels shall be of a size to permit removal of equipment for servicing, but not less than 12" x 12" minimum opening.
  2. Where proper servicing of the equipment requires the entrance of a serviceman, the access opening shall be sized accordingly with minimum opening not less than 18" x 24".
  3. Where access panels are to be located in acoustic tile ceilings, size of access panel shall be increased, when required, to next nearest full tile size so that access panel can be installed integral with tile pattern without cutting into tiles.
- D. Construction.
1. Access panels shall be neatly constructed and substantially made of steel complete with frame and with necessary grounds for attaching to metal lath, tile walls or other construction, as required. Hinges shall be of concealed type. Minimum door and frame gauges shall be USS No. 16 and USS No. 18, respectively. Panels and frames shall be furnished with a factory-applied prime coat, except panels in tile walls shall be chrome plated and polished or satin finish Type 304 stainless steel.
  2. Panels to be installed in acoustical tile ceilings shall be as specified in paragraph one (1) above except that the door panels shall be recessed and faced with acoustical tile to match the ceiling tile so the frame will be concealed. The depth of the door recess shall be such that door facing tile are flush with ceiling tile.
- E. Exceptions.
- Normally, access doors to large attic spaces and large pipe spaces behind toilet batteries will be furnished under another section, and when so furnished will be shown on the architectural plans. Examine all plans carefully and furnish any access panels or doors to equipment in these spaces where they are not to be furnished under the other section.

## 2.13 CHANNEL FRAMING

- A. General.
  - 1. Channel combinations and accessories shall be of compatible design in arrangements and combinations as shown on the drawings. Channels and accessories shall have a hot dipped galvanized finish.
  - 2. Manufacturer: Channel framing shall be as manufactured Superior Strut and Hanger Company, Unistrut, B-Line Systems Inc. or equal.

## 2.14 PIPE WRAPPING

- A. Buried piping.
  - 1. Underground copper or steel piping buried directly in the soil shall be coated and machine wrap as follows:
- B. Apply one (1) coat of primer similar to Conway Coating, Concoat #3.
  - a. Apply wrapping coat of enamel similar to Conway Coating, Concoat #1 to 1/8" thickness.
  - b. Wrap a layer of 50 lb. Kraft paper as per manufacturers recommendation.
- 1. Field joints wrapping:
  - a. Tear off 4" Kraft paper from each end, clean pipe, apply 1/2" thick enamel similar to Papco No. 240 and wrap with felt similar to Pabco No. 190, using a minimum of 2" overlap.
  - b. Spiral wrap saturated cloth strip similar to Pabco No. 276 over hot enamel using 1/2" overlap. Flood coat the entire joint with enamel.
  - c. Wrapped pipe and fittings shall be inspected over proven sound with Tinker Razor "Holiday Spark tester".

## 2.15 SEISMIC EXPANSION LOOP

- A. Seismic expansion loop shall be Metraloop as manufactured by Metraflex Company with sized noted on the drawings, or equal by Unisource or FlexHose, Inc.
- B. The loop shall consist of two flexible sections of hose and braid, two ninety degree elbows and a 180 degree return.
- C. Loops shall be installed in a neutral, pre-compressed, or pre-extended condition as required for the application.
- D. Loops installed hanging down shall have a drain plug. Loops installed straight-up shall be fitted with an automatic air release valve at the highest point of the loop. Follow manufacturer's installation instructions.
  - 1. Hose and braid material shall be Series 300 stainless steel.
  - 2. Hose and braid material for 2" and smaller copper pipe shall be bronze.

## PART 3 - EXECUTION

### 3.1 INSTALLATION OF PIPING

A. General.

1. Furnish and install all piping, equipment trim, etc., including all work necessary to make complete and properly operating systems, whether or not all details are mentioned in these specifications or indicated on the drawings.
2. Rough-in work: Pipe sizes shown on the drawings are nominal inside diameter except copper tubing for refrigerant service which is outside diameter. Wherever five inch size pipe is shown, six inch may be substituted. Unless noted otherwise, make all pipe trim full line size.
3. Proceed as rapidly as the building construction will permit, so as to be completed, tested and approved before being enclosed.
4. Carefully inspect each piece of pipe and each fitting to see that there is no defective workmanship on the pipe or obstructions or dirt in the pipes and fittings. Material having burrs, slag intrusions, cracks, eccentricity, excessive roughness, damage due to rough handling, etc., will be rejected and shall be removed from the job site.
5. Whenever work is not in progress and at the end of each workday, cap or plug all openings in completed piping to prevent the entrance of materials that would obstruct the pipes. Leave in place until removal is necessary for completion of installation.
6. No piping shall be permanently closed up, furred in, or covered over before it has been tested and inspected as specified herein and is accepted by the Architect.
7. Install piping parallel to walls and to present a neat appearance both as to workmanship and grouping.
8. Piping shall clear all obstructions, preserve headroom and keep openings and passageways clear whether shown on the plans or not.
9. Should structural difficulties prevent the running of pipes or the setting of equipment at the point indicated by drawings, the necessary minor deviations therefrom, as determined by the Architect will be allowed, but must be made without additional cost.
10. Locate piping to clear steel reinforcing bars in beams. Offset reinforcing bars in walls to clear piping and sleeves. Get approval from Structural Engineers.
11. Joists, girders, beams, columns or reinforcing steel shall not be cut or weakened.
12. Conceal all piping within the building wherever possible, unless otherwise noted on drawings. Exposed piping, wherever necessary, shall if possible be run in unfinished rooms.
13. Do not use couplings except where required pipe runs between fittings that are longer than a standard length of the type of pipe being used and except where their use is specifically approved by the Architect.
14. Copper, bronze, and brass solder type fittings, including unions and flanges, shall have sockets of proper diameters to suit outside diameters of copper and brass pipe and copper tubing with which they are being used. The expanding or swaging of tubing to fit IPS fitting sockets will not be permitted.
15. Cut pipe accurately to measurements established at the site. Work into place without springing or forcing. Properly clear all windows, doors and other openings. Excessive



- cutting or other weakening of the building structure to facilitate piping installation will not be permitted.
16. Pipe damage: Show no tool marks or threads on exposed plated, polished or enameled connections to fixtures. Tape finished surfaces to prevent damage during plastering. Brass and copper piping shall have no tool marks wherever installed.
  17. Make all changes in direction with fittings and changes in main size with reducing fittings. Unless otherwise noted, for pipe size change on all horizontal pump circulated water supply and return piping, use eccentric couplings flat on top.
  18. Grooved end pipe shall be installed only outside (weather exposed).
  19. Dielectric insulation.
    - a. Provide dielectric insulation at all points where copper water piping including brass nipples in same, is connected to ferrous metal such as steel piping, tanks, water heaters, etc.
  20. Pitch pipe lines to be free of sags, traps or unnecessary bends as required for proper drainage. Provide a gate valve of same size as line but 3/8" minimum and 3/4" maximum size at each low point.
  21. For expansion and contraction of heated or cooled piping, provide sufficient swing joints, ball joints, expansion loops, and devices necessary for a flexible piping system, whether shown or not shown on drawings. Anchors shall be constructed of structural shapes. Submit details to the Architect.
  22. Support piping independently at pumps, coils, tanks, and other equipment so that its weight will not be supported by the equipment.
  23. Thrust block and anchors.
    - a. On all buried ductile iron, schedule 40 PVC domestic water, C-900 PVC domestic water, furnish and install anchors, clamps and rods, or thrust blocks at all elbows, at all connections or branches from the mains 2" and larger, and at capped connections.
    - b. From anchor or thrust blocks by pouring concrete between pipe and the undisturbed trench wall. Thrust blocks to be of adequate size and placed to take all thrusts created by the maximum internal water pressure.
    - c. Size and place thrust blocks for concrete pipe in accordance with Division 3.
  24. Unions and Flanges.
    - a. Provide unions or flanges suitably located to facilitate maintenance and removal of all equipment or automatic pipe mounted apparatus.
    - b. Faces of flanges to be connected shall, in all cases, be alike.
    - c. Provide two unions at threaded three way mixing valves.
  25. Shop or field fabricated fittings, bushings, street ells, and long screw nipples are not acceptable and shall not be used. Reducer couplings, tees or ells shall not be used.

26. Equipment by others: For rough-ins and final connections to equipment furnished by others, ascertain exact sizes, type, services and locations before starting work.
  27. Springing, bending or forcing of pipe into place shall not be allowed. Use fittings for all offsets or changes in alignment of piping.
  28. Flexible Pipe Connections.
    - a. Provide flexible piping connection on each pipe connection to equipment mounted on or suspended from isolators with one half inch or more static deflection or where such connections are shown on plans.
  29. Install piping outside of building at not less than 30" below finish grade in landscaped, unpaved areas or finished subgrade surface in paved areas. Natural gas piping outside of buildings shall have 24" of cover or as recommended by Southern California Gas Co.
  30. Isolate all domestic and industrial water piping with approved isolating suspension clamps. Piping shall not come in contact with building structure.
  31. Undergrade Pipe Markers.
    - a. Gas.
      1. Pipe marker shall be furnished to grade at each horizontal change in direction for all non-metallic underground pipe. Markers shall be concrete plaque inscribed with the appropriate word "gas". An electrically continuous #14 plastic covered copper tracer wire, Type TW, shall be run in trench along pipe. Wire shall be fastened to pipe at not greater than 20'-0" intervals. Wire shall terminate above ground with 12" lead taped around each riser. Straight line transitions of metallic to non-metallic pipe shall have lead brought to grade under a marker.
- B. Pipe schedules "A" and "D".
1. Pitch pipe lines to be free of sags, traps or unnecessary bends as required for proper drainage and/or elimination of air as follows:
    - a. Circulated chilled water, heating hot water and other closed circulating systems: Upwards in direction of flow at 1/4" in 10'-0". Where supply and return lines are parallel on the same supports they may be run level.
    - b. Provide 3/4" plugged gate type drain valves at all low points and air vent valves at all high points where horizontal flow turns downward. Vents are not required on potable water systems inside buildings. Fit auto vent valves with a gate or ball valve on the inlet. Pipe all auto valve vents 3/8-inch minimum size to approved receptor.
- C. Pipe schedules "D" and "E".
1. Wherever domestic water lines are not shown and not sized on drawings, sizing shall conform with Appendix "A" of the California Plumbing Code and in addition be sized to hold the velocity in branches to not over 7 feet per second as calculated by the table entitled "Demand weight of fixtures in fixture units", and charts A-2 through A-7. Building water supply pipe shall not be smaller than the largest branch. Submit layout piping diagram for review.

2. Pitch pipe lines so as to be free of sags, traps, or unnecessary bends as required for proper drainage and elimination of air as follows:
    - a. Potable water systems shall be drainable. Provide plugged date type drain valves at all low points.
  3. Rough-in cold water outlets to all fixtures on the right hand side.
  4. In water piping systems for which copper tubing is specified, use IPS red brass pipe for all connections to faucets, flush valves, hose bibs, compression stops, or similar items requiring rigid piping.
  5. Shock Absorbers.  
Install shock absorbers at the downstream end of each header serving a battery of fixtures and near the shut off valve for each item of equipment with quick closing automatic valves. Size and location of shock absorbers shall be as recommended by Plumbing and Drainage Institute Standard P.D.I. WH201, latest edition.
- D. Pipe schedules "F and "K".
1. Pitch pipe lines so as to be free of sags, traps or unnecessary bends as required for proper drainage and elimination of air as follows.
- E. Pipe schedules "G, and "H".
1. Wherever drainage lines are not shown or are not sized on the drawings, arrangement and sizing shall conform to the requirements of the current edition of the California Plumbing Code as a minimum. Submit layout piping diagram for review.
  2. Pitch pipe lines to be free of sags, traps or unnecessary bends as required for proper drainage and elimination of air as follows:
    - a. 3" and smaller: 1/4 inch per foot downwards towards main.
    - b. 4" and larger: 1/4 inch per foot downwards towards main, unless it is impractical due to the depth of the main sewer, structural conditions or to the arrangement of any building or structure to obtain a slope of 1/4 inch per foot, then slope at 1/8 inch per foot.
    - c. Vents: Slope upwards away from fixture trap, storage tank or equipment.
  3. Install vent piping to provide proper ventilation of the plumbing and grade to provide for its drainage. Buried sewer, waste and drain piping shall be continuously supported along the full length of the pipe
  4. Set rough outlets for all fixtures exactly to the measurements furnished by the manufacturer or as indicated. Fixtures set in batteries shall have their rough outlets set in straight lines at equal spacing.
  5. Terminate sanitary plumbing vents 7" above the roof.
  6. Downspouts or storm drainage leaders.
- F. Pipe schedule "K".
1. Pitch pipe lines so as to be free of sags, traps or unnecessary bends as required for proper drainage and elimination of air as follows:

- a. Waste and drains:  $\frac{1}{4}$  in. /ft. downward toward mains so laid and fitted to have a smooth and uniformly graded invert.
2. Water and gas piping shall not be embedded in concrete or concealed below floor slab within the building, except where piping is installed in a continuous sleeve extending from outside of the building to where the pipe emerges above the floor.
- G. Pipe schedules "D" and "F".
  1. Water and gas piping shall not be embedded in concrete or concealed below floor slab within the building, except where piping is installed in a continuous sleeve extending from outside of the building to where the pipe emerges above the floor.
- H. Pipe schedules "D", and "N".
  1. Use thread-to-sweat adapters wherever a threaded connection to copper tubing is required.

### 3.2 INSTALLATION OF VALVES

- A. General.
  1. Valves shall be full line size. Automatic valves are excepted.
  2. All valves shall have proper clearances for handle operation, and shall close tight at the specified test pressure.
  3. All pump discharge check valves shall be non-slam.
  4. On 3-piece construction ball valves, remove center section of the valve prior to soldering to prevent any damage to the teflon seats. Reinstall center section after soldering.
  5. All valved shall be accessible with an access panel where required.
- B. Arrangement.
  1. Install valves in the systems so located, arranged and operated as to give complete regulation of all apparatus, equipment, and fixtures.
  2. Install valves for accessibility and easy maintenance.
  3. Install valves with stems horizontal or vertically upright.
  4. Install globe valves in refrigerant gas lines with stems horizontal.
  5. Chain operators: Provide valves 4" and larger installed 7 feet and higher in equipment rooms with chain operators with chains swagged to 5-6" above the floor and hooked up out of the way.
  6. Wrenches: Plug valves (cocks): Provide 12" wrench for valves 2" and smaller, 18" wrench for 4" valves, and 36" wrench for valves 5" and larger.
  7. Provide valve box at each valve or cock in ground. Set cover flush with finished grade except in planted areas set 1" above ground.

8. Balance valves. Install balance valves where shown and on each circulating return branch where two or more branches occur on domestic hot water system.
9. Gas valves. Provide lubricated gas shut-off valve in gas supply to each building, so arranged that gas supply can be turned on or off to any individual or separate building. Locate valve outside the building it supplies so that it will be readily accessible at all times.
10. Provide readily accessible lubricated gas shut-off valve in gas supply to each gas burning appliance an ahead of union connection thereto, and in addition to any valve on appliance.
11. Install stop valve or compression stop on water supply lines to each plumbing fixture, including hose faucets and showers, installed under this contract, to permit repairs adjacent to compression stops.
12. Hose bibs. Mount with outlet 18" above floor or finished grade, unless shown otherwise.

C. Location.

1. In all branches and headers of water piping serving a group of two or more plumbing fixtures.
2. On both inlet and outlet of all apparatus and equipment.
3. For shutoff of branch mains.
4. For flushing and sterilizing the systems.
5. Where shown on the drawings.
6. Ahead of each automatic valve for water service.

### 3.3 PIPE SUPPORTS

A. Installation.

1. Securely support all piping from building construction with manufactured iron hangers, brackets, trapezes, guides, anchors and sway braces to maintain pipe alignment and prevent sagging, noise and excessive strain due to uncontrolled movement under operating conditions.
2. Relocate any hangers as necessary to correct unsatisfactory conditions that may become evident when system is put into operation.
3. Supporting of pipe by wire, rope, wood or other makeshift devices will not be permitted.
4. Burning of holes in beam flanges or narrow members will not be permitted.
5. Where calculated maximum travel exceeds one inch, provide rollers at all non-suspended type supports and on all but one of the largest pipes on trapeze supports.
6. Where rods exceed 12" in length for pipes 2" and larger and all trapezes, provide lateral sway bracing at every third hanger. Equip each with a longitudinal sway brace. Sway brace rods shall either be two hanger rods set at 45 degrees on both sides without a vertical hanger or 1-1/2" x 1-1/2" x 1/8" angle iron to 2" pipe size and 2"x 2" x 1/4" for larger pipe, set on 45 degrees. Secure bracing to pipe an structure as for hangers. Fit all hanger rods not sway braced at the top with a swivel.

7. Fasten hanger rods to structural steel members with beam clamps with retaining clips; to concrete with steel or malleable iron inserts.
8. Sheet lead, lead wool or wood plugs will not be accepted as a substitute for cinch anchors as a means of attaching materials and equipment to concrete.
9. Support cast iron and plastic drainage pipe at each floor.
10. Supports for insulated pipe shall be outside the insulation. Protect pipe insulation at every hanger, support or guide with inserts and shields. The galvanized steel shield shall be applied between the hanger or support and the pipe insulation. Provide saddles at all rollers for insulated pipe not equipped with inserts and shields.
11. Equip all piping not otherwise vibration isolated with pipe isolators at all supports in contact with pipe.
12. When poured-in-place construction is employed, deliver inserts or other hanger devices to be cast in slabs for installation under the Concrete Section. Provide complete layout information in ample time for casting in slabs and without delaying project.
13. Support of larger pipe shall be as detailed on the drawings.

B. Manifolding:

1. Parallel runs of piping, except for fire protection, may be supported on trapeze hangers, spaced as required for the smallest pipe carried.
2. Support piping in chases on channel framing.
3. For piping over 2" construct framing of welded assemblies of steel shapes. Provide calculations that the design will carry five times the weight of thrust of the pipe.

C. Support spacing:

1. Maximum spacing for horizontal piping supports shall be as follows:

Material	Size	Spacing
Steel or Brass pipe	3/4" and smaller	6 ft.
Steel or Brass pipe	1" and 1-1/4"	8 ft.
Steel or Brass pipe	1-1/2" to 3"	10 ft.
Steel or Brass pipe	4" and larger	14 ft.
Copper tubing	1" and smaller	6 ft.
Copper tubing	1-1/4" and larger	8 ft.
C.I. Soil pipe	All sizes	5 ft. & ea. joint
Plastic Pipe	All sizes	4 ft.

2. Where building structure does not permit the specified spacing, provide additional adequate struts or blocking. Location and details shall be submitted to the Architect for approval.
3. Support piping at each change of direction, at ends of branches, at base and top of riser pipes and drips, and wherever necessary to prevent sag, bending, or vibration, in addition to above listed hanger spacing.

**3.4 PIPE ANCHORS**

- A. Shot driven anchors.
  - 1. Supports may be secured to the concrete structure by shore anchors as long as the pin does not penetrate the concrete more than 3/4 inch and it is rated for the load it will carry, if approved by the Structural Engineer. Submit calculations.
  - 2. For loads that exceed the shore anchor rating, use drilled anchors.
- B. Drilled anchors.
  - 1. Drilled anchors shall be of the self-drilling expansion type with self-cutting annular broaching grooves, or they may be of the non-drilled type with expansion tip.
  - 2. Anchors shall have a recommended load with a minimum of safety factor of four. Submit calculations.

### 3.5 PIPE JOINTS

- A. General.
  - 1. Remake any leaky joints with new materials. The use of thread cement, caulking or patch welding to make the old joint tight is absolutely prohibited.
- B. Solder and brazed joints.
  - 1. Cut square; remove burrs and clean both the pipe or tubing and inside of female fitting to a bright finish with steel wool, wire brush, sandpaper or emery cloth. Apply solder flux with brush to tubing. Remove internal part of solder-end valves prior to soldering.
  - 2. Joining for copper tubing and brass pipe shall be as follows:
    - a. Domestic piping 3" and smaller: 95-5 Tin-Antimony Grade 5A. NSF 61 Certification required.
    - b. Drainage piping: 95-5 Tin Antimony.
    - c. For all reinforced non-ferrous piping connections, water piping larger than 3", all chilled water and heating hot water using type "L" copper, or type "K" copper, and all refrigerant piping: Use over 1100 DEG F brazing alloy, ASTM B250, Class BCUP-5. Sil-FOS 15% silver brazing alloy, Harris Stay-Silv 15 or equal.
- C. Screwed Piping.
  - 1. Cut square and clean with machine cutter, hack saw or carborundum pipe wheel. Wheel cutters are not acceptable. Deburr with file or pipe reamer. Do not ream to exceed I.D. of pipe and thread to ANSI B2.1 requirements.
  - 2. Use Teflon tape, Armitite #250, "Tyte-Unite" or Enterprise "Threadseal" sealing compound on outside threads for joining all services, except refrigerant piping, and Acorn #3500 for cleanouts.
  - 3. Litharge and glycerin may be used for sealing threads of compressed air piping and shall be used for refrigerant piping.

4. No more than two full threads shall remain exposed after making up joints.
  5. Do not wrap pipe threads and slip joints with string, paper, putty or similar fillers. Threaded joints must be made tight with tongs or wrenches. Piping in finished areas shall bear no tool marks. Caulking of any kind will not be permitted.
- D. Welded Piping.
1. Oxyacetylene or electrical arc process.
  2. Weld in accordance with and by welders who have qualified under the latest Edition, American National Standard Code for pressure piping ANSI/ASME B31.1, Chapter 5, and subsequent Addenda. Welder qualifications shall be issued by an independent testing laboratory.
  3. Remove foreign matter from pipe ends before tacking or welding.
  4. Align ends concentric and tack weld.
  5. Weld and reinforce to full thickness of pipe. Welds shall be continuously fused to pipe and to prior pass weld, shall have full penetration with out slag inclusions or porosity. Fillet type welds for flanges and socket fittings shall have a throat dimension not less than the pipe wall thickness.
  6. Welding rods: Oxwall No. 1-HT Class EG010, or equal.
  7. Fabricated fittings are not acceptable
  8. Connections:
    - a. Slip-on flanges shall be both face and back welded.
  9. Hammer each pass clean of slag and scale.
  10. The Owner reserves the right to inspect and to x-ray test any welds per latest Edition, American National Standard Code for Pressure Piping ANSI/ASME 3.1 Chapter 6, and subsequent Addenda.
- E. Cast Iron Drainage Pipe. Joints for hubless pipe and fittings shall conform to the manufacturer's installation instructions and local code requirements. Hubless couplings shall be composed of a elastomeric sealing sleeve conforming to CISPI 310.
- F. Grooved pipe couplings:
1. Housing fabricated in two or more parts of malleable or ductile iron castings. Coupling gasket or molded synthetic rubber, ASTM D735, Grade No. R615BA. Coupling bolts, oral neck track heavy type with hexagonal heavy units, ASTM A183.
  2. Cut pipe square and ream full size. Grooving and installation shall be in accordance with the coupling manufacturers latest published recommendations.

### **3.6 ACCESS TO EQUIPMENT**

- A. General.
1. Install all piping, equipment and accessories to permit access for maintenance.



2. Any relocation of piping, equipment and accessories required to provide maintenance access shall be accomplished at no additional cost to the Owner.

B. Access.

1. Provide access doors where any valves, motors and equipment requiring access for servicing, repairs, or replacement are located in walls, chases or above ceilings.
2. The location of access doors shall be coordinated with and installed by the applicable trade installing walls or ceiling.
3. Contractor shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

### 3.7 INSTRUMENTS

A. Installation of thermometers.

1. Immediately prior to installation, demonstrate accuracy and calibration by placing all thermometer bulbs in a common media for fifteen minutes minimum.
2. Locate thermometers for ease of reading and removing. Locate in such a way that bulb projects into the flowing fluid stream. Increase pipe size as necessary to accomplish this without increasing flow resistance.
3. Install thermometers with separate sockets. Fill space between bulb and socket with conductive grease.
4. Where thermometers are required but are not readily visible to view, install remote reading instruments.
5. Pipe mounted thermometer schedule:

Location (whether shown on plans or not)	Range (Deg. F)
Boiler: In both Water inlets and both water outlets.	30 to 240 deg.
Water inlet and outlet connections.	0 to 100 deg.

B. Installation of pressure gauges.

1. Install pressure gauges installed on insulated pipe or equipment with extension nipples.
2. Locate gauges for ease of reading and removing.
3. Install all gauges with shut-off needle valves, Crane No. 88, for steam and liquids; seal cap valves for refrigerant service.
4. Install gauges on steam lines with siphons.
5. Mount gauges on reciprocating machinery on a resiliently mounted gauge board.
6. Install one gauge between the suction and discharge lines of pumps and inlet and outlet of heat exchangers, coils and control valves with shut-off valve on each side and

interconnecting piping made up flexibly. Gauge connections shall be at the connection to equipment and for pumps shall use the manufacturers connection when provided.

7. The pressure gauge shall be selected with the actual operating pressure of the system is at the middle third of the dial range.

### 3.8 SLEEVES, CORE DRILLING AND ESCUTCHEONS

#### A. Sleeves.

##### 1. General.

- a. Provide pipe sleeves where each pipe or prefabricated pipe conduit passes through floors, walls, or ceilings, whatever the construction.
- b. Provide minimum of 1/2" clearance around all sides of pipe and extend full thickness of the construction. Where piping is to be insulated, allow for full thickness of insulation, plus 1/2" clearance all around.
- c. Cast iron sleeves: Secure waterproofing membrane under flashing clamp. Caulk annular space watertight.
- d. Steel or concrete sleeves: Dry pack in place and caulk annular space.
- e. Extend sleeves in equipment room floors 2" above finish floor with annular space caulked watertight.
- f. Extend sleeves in waterproofed floors 1 inch above floor. Use fire retardant material in sleeves through fire separations.

##### 1. Locations and types.

- a. For walls below grade or floor slabs on grade, provide permanent sleeves of clay pipe, concrete pipe or cement asbestos pipe. Where sleeves can not be installed, such as at connections to floor drains, take necessary precautions to assure that drains or pipes are not in contact with reinforcing steel. Caulk space between pipes and pipe sleeves with oakum and mastic and make watertight.
- b. For all other walls, ceilings, roof and floor slabs provide USS No. 24 gauge steel or fiberboard sleeves, as made by Miracle Can Company, or metal deck and wall sleeves as made by Adjustor-Crete Manufacturing Company, or Sperzel "CreteSleeves."
- c. Secure sleeves to metal or wood forms so that they will not become displaced during pouring of concrete. Fill sleeves on decks with sand.
- d. Remove sleeves from openings after forms have been removed from concrete.
- e. Cut proper sized holes in concrete to replace metal sleeves that are crushed or knocked out of position during pouring of concrete.
- f. Provide sleeves through all other (non-concrete) construction of the same materials as pipe of size and length as hereinbefore required.
- g. Where piping must pass through floor beams or footing walls, fasten sleeves in the forms. Locate these in the middle third of the beam and as near the center as practical. The inside diameter shall not be more than 1/2" larger than the outside

diameter of the pipe and the Contractor shall be responsible for setting each sleeve at the exact location and elevation required, and at the correct angle to conform with the grade of the piping.

- B. Core Drilling.
  - 1. Size core drilling holes adequately to allow for dry packing sleeves in place; to allow for insulation to extend through holes; to allow for fireproof caulking of clearance around pipes to prevent direct contact between pipes and structures.
  - 2. Locations of core drilling shall be approved by the Architect prior to drilling.
- C. Escutcheons.
  - 1. Provide chromium plated escutcheons with screw or spring clamping device on all piping that penetrates floors, walls and ceilings where exposed to view. Escutcheons shall completely cover opening.

### **3.9 STRAINERS**

- A. General.
  - 1. Strainers shall be full line size.
  - 2. Valve blow-down connection with a gate or ball valve sized same as the connection. Plug valves not piped to drain.
- B. Location.
  - 1. Ahead of each automatic control valve for water service.
  - 2. Where shown on the drawings.
  - 3. At each pump inlet.

### **3.10 ROOF FLASHINGS AND VENT CAPS**

- A. Flash each pipe passing through the roof with 4-pound sheet lead with full length sleeves or with vari-pitched one-piece flashing with steel reinforcing boots. Joints shall be lead burned with smooth, neat finish, and bases shall extend 8" away from the sleeves or boots.
- B. Seal water tight tops of flashings and counter flash with cast iron counter flashing units having permanently fastened lead caulked or threaded joints.
- C. Install cast iron vandal-resistant vent cap on the top of each open vent pipe and secure in place with Allen set screws.

### **3.11 EQUIPMENT SUPPORTS**

- A. General.
  - 1. Provide all necessary steel framing supports for equipment for a complete and satisfactory installation.
  - 2. Fit suspended equipment with minimum of three steel rods and bolt base mounted equipment without isolators to floor or platform with one rod or bolt per weight of equipment

not to exceed the following. Provide minimum of four sway brace rods at 45 degrees for each item of suspended equipment. Securing rods to the structure shall be as required for pipe hangers.

<u>Rod or Bolt Size</u>	<u>Equipment Weight</u>
3/8"	50 pounds
1/2"	120 pounds
5/16"	225 pounds
3/4"	300 pounds
7/8"	950 pounds

B. Approval.

1. Submit drawings of miscellaneous supports for approval.

### 3.12 PIPE WRAPPING

A. Cleaning and wrapping all underground steel piping.

1. Piping shall be machine coated and wrapped as follows:
  - Clean
  - Prime
  - Coal tar enamel
  - Fiberglass inter wrap .020"
  - Coal tar enamel
  - Kraft paper

### 3.13 STERILIZING POTABLE WATER PIPING

A. After the hot and cold water systems are complete, all fixtures connected, the system flushed out completely and filled with water, the shut-off valve to the water main shall be closed, all fixture outlets opened slightly and a solution of sodium hypochlorite introduced at the tee located near the water service shut-off valve. The solution shall consist of one gallon of 5 percent sodium hypochlorite to 200 gallons of water or the equivalent thereof. Introduce solution by means of a pump until an Orthotolidin test at each outlet shows residual chlorine. The solution shall be allowed to remain in the system 24 hours, after which, flush the entire system of water piping. Deliver a certificate of performance, signed by the person who did the work and the Contractor, to the Architect.

1. Chlorination to be performed by a contractor independent from the plumbing contractor.
2. Post signage at outlets stating water is not potable until system has been flushed and complies with the minimum requirements for potable water.
3. Chlorination to be performed in the presence of the Inspector.
4. Provide certificate that chlorination was performed in accordance with the specification and all governing agencies.
5. Provide laboratory test results indicating compliance with all governing agencies.
6. If water does not meet minimum requirements, repeat chlorination and retest until water complies.

**END OF SECTION 15050**

## SECTION 15160

### VIBRATION ISOLATION & SEISMIC RESTRAINTS

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDES

- A. This Section includes the reduction or elimination of excessive noise or vibration within the building due to the operation of equipment and machinery, piping and ductwork.

##### 1.2 RELATED SECTIONS

- A. Section 15050: Basic Materials and Methods
- B. Section 15420: Domestic and Industrial Water System
- D. Section 15800: Heating, Ventilating and Air Conditioning Equipment
- E.. Section 15995: Mechanical Commissioning

##### 1.3 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, MECHANICAL, the submittal material shall include six (6) copies of descriptive data for all products and material including, but not limited to, the following:
  - 1. Catalog Cuts and data sheets on specific vibration isolators and seismic restraints to be used showing compliance with the specifications.
  - 2. List showing items of equipment, piping, etc., to be isolated and seismically restrained, the isolator type and model number selected, isolator loading and deflection, and reference to specific drawing showing frame construction where applicable. Also provide seismic restraint details.
  - 3. Dimensioned drawings showing equipment frame construction for each machine including dimensions, structural frame sizes, support point locations, etc.
  - 4. Written approval of the frame design to be used, obtained from the equipment manufacturer.
  - 5. Dimensioned drawings showing methods for suspension, support, restraint, guides, etc., for piping and ductwork, etc.
  - 6. Dimensioned drawings showing methods for isolation of pipes, etc., piercing slabs, beams, etc.
  - 7. Seismic restraint calculations.

##### 1.4 CODE REQUIREMENTS

- A. As a minimum, seismic restraints shall be in accordance with State and Local Code requirements. Specified requirements which exceed code shall govern.
- B. The "Seismic Restraint Manual Guidelines for Mechanical Systems" Latest Edition, as published by

SMACNA are acceptable as meeting the requirements of Title 24, State of California, latest edition.

## 1.5 MANUFACTURER'S RESPONSIBILITY

### A. General

1. Vibration isolation and seismic control manufacturer shall have the following responsibility.
  - a. Determine vibration isolation and seismic restraint sizes and locations.
  - b. Provide piping and equipment isolation systems and seismic restraints as scheduled or specified.
  - c. Guarantee specified isolation system static deflection.
  - d. Provide installation instructions and drawings.
  - e. Provide calculations by a licensed structural engineer substantiating seismic restraint capability to comply with Title 17, Table T-17-23J, State of California.
  - f. Provide approved resilient restraining devices as required to limit equipment and piping motion in excess of 3/8".
  - g. Provide installation instructions, dimensioned drawings, and field supervision to assure proper installation and performance.

## 1.6 DESIGN REQUIREMENTS

- A. Design requirements: It is the intent of this Specification to provide the necessary design for the avoidance of excessive noise or vibration in the building due to the operation of machinery or equipment, or due to interconnected piping, ductwork, or conduit and to seismically restrained piping, ductwork and equipment per State of California Code of Regulations T-24, Part 2 against seismic force in any direction.
  1. All vibration isolators shall have either known undeflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is provided according to the design.
  2. All isolators shall operate in the linear portion of their load versus deflection curve. Load versus deflection curves shall be furnished by the manufacturer, and must be linear over a deflection range of not less than 50 percent above the design deflection.
  3. The ratio of lateral to vertical stiffness shall be not less than 0.9 nor greater than 1.5.
  4. All neoprene mountings shall have a shore hardness of 40 to 65, after minimum aging of 20 days or correspondence oven aging.
  5. Design isolators to suit vibration frequency to be absorbed and the load imposed. Isolator units to have adequate area distribution to obtain proper resiliency under machine load and impact without permitting excessive movement when started.
  6. Wave motion through the isolator shall be reduced to the following extent: Isolation above the resonant frequency shall follow the theoretical prediction based upon an undamped single degree of freedom system with a minimum isolation of 50 decibels above 150 cycles per second.

7. Vibration isolation spring diameter shall be no less than their deflected height. Select spring with a 50 percent overload safety factor.
8. Unless otherwise specified, all equipment mounted on vibration bases shall have a minimum operating clearance of 1" between structural steel base and floor or support base beneath. Check clearance space to ensure that no scrap of hardware has been left to possibly short circuit isolation base.
9. Where necessary because of height limitations, provide structural steel bases with height saving brackets. Isolators shall have a method for leveling and where spring isolators are used and shall have gussets on both sides of the isolator.
10. Design isolators for positive anchorage against uplift and overturning.
11. Provide and install under this Section of the Specification structural steel required to properly support and seismically restrain equipment.

## **PART 2 - PRODUCTS**

### **2.1 VIBRATION ISOLATION**

#### **A. General**

1. Whether shown, scheduled, or not, all mechanical equipment of two or more horsepower shall be isolated from the structure by means of resilient vibration and noise isolators supplied by a single manufacturer. Equipment installed on slab on grade shall be isolated with noise pads only. The isolator manufacturer's submittal shall include the complete design data on the isolators, including O.D., free, operating, and solid heights of the springs, free and operating heights of the neoprene or fiberglass isolators. Cast iron will not be acceptable in isolators.
2. All hardware shall be cadmium or zinc plated. All bases installed outdoors shall be either hot dip galvanized, cadmium plated, or neoprene coated.
3. Seismic restraints. All isolated equipment shall be equipped with seismic restraints. Restraints shall be capable of withstanding a force of 1g in all directions. Seismic restraints shall be supplied by isolator manufacturer. Restraints and snubber equipped isolator shall be bolted to the floor and to the equipment with full hole size bolts.
4. Springs shall be designed so that they will not fail when they are compressed to solid. At solid, the springs shall not exceed 85% of its theoretical yield point.
5. Unless otherwise specified herein, free standing, stable, open springs shall provide the scheduled static deflection and have the capacity to provide an additional 40% travel without coils becoming solid.
6. Manufacturer: Vibration isolation equipment shall be manufactured by M.W. Sausse, as scheduled on the drawings, or equal.

## **PART 3 - EXECUTION**

### **3.1 INSTALLATION OF VIBRATION ISOLATION DEVICES**

#### **A. General**

1. Install in accordance with manufacturer's written instructions. Vibration isolators must not cause any change of position of equipment or piping resulting in piping stress of misalignment.
  2. Mechanical equipment shall be isolated from the building structure by means of noise and vibration isolators as scheduled on the drawings.
  3. All piping and vertical risers shall be isolated from the building structure by means of noise and vibration isolation guides and supports.
  4. All piping and ductwork to be isolated shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork and maintain 3/4" to 1 1/4" inches clearance around the outside surfaces. This clearance space shall be tightly packed with fiberglass, and caulked air tight after installation of piping or ductwork.
  5. All piping 1-1/4" and over located in mechanical equipment rooms, and for a minimum of fifty (50) feet or 100 pipe diameters, whichever is greater, from connection to vibrating mechanical or electrical equipment, shall be isolated from the building structure by means of noise and vibration isolation hangers.
  6. No rigid connections between equipment and building structure shall be made that degrades the noise and vibration isolation system herein specified.
  7. Electrical circuit connection to isolated equipment shall be looped to allow free motion of isolated equipment.
  8. The contractor shall not install any equipment, piping or conduit which makes rigid contact with the "building", unless permitted in this specification. Building included, but is not limited to slabs, beams, columns, studs and walls.
  9. Coordinate work with other trades to avoid rigid contact with the building. Inform other trades following work, such as plastering, or electrical, to avoid any contact which would reduce the vibration isolation.
  10. Bring to the Architect's attention prior to installation any conflicts with other trades which will result in unavoidable rigid contact with equipment or piping as described herein, due to inadequate space or other unforeseen conditions. Corrective work necessitated by conflicts after installation shall be at the responsible contractor's expense.
  11. Bring to the Architect's attention any discrepancies between the specifications and field conditions or changes required due to specific equipment selection, prior to installation. Corrective work necessitated by discrepancies after installation shall be at the contractor's expense.
  12. Obtain inspection and approval of any installation to be covered or enclosed, prior to such closure.
  13. Diagonal thrust restraints shall consist of spring hangers with the same deflection as specified for the spring mountings. Diagonal restraints shall be attached at the centerline of thrust.
  14. Correct at no additional costs, all installations which are deemed defective in workmanship or materials.
- B. Equipment Isolators



1. Mount equipment on steel equipment platform on roof or mechanical room as indicated on drawings.
  2. Each fan and motor assembly shall be supported on a single structural steel frame. Flexible duct connections shall be provided at inlet and discharge ducts.
  3. The machine to be isolated shall be supported by a structural steel frame, as scheduled on the drawings.
  4. Brackets shall be provided to accommodate the isolator. The vertical position and size of the bracket shall be specified by the isolation manufacturer.
  5. The minimum operating clearance between the equipment frame or rigid steel base frame and the equipment platform pad shall be 1 inch.
  6. The equipment structural steel shall be placed in position and supported temporarily by blocks or shims, as appropriate, prior to the installation of the machine or isolators.
  7. The isolators shall be installed without raising the machine and frame assembly.
  8. After the entire installation is complete and under full operational load, the isolator shall be adjusted so that the load is transferred from the blocks to the isolator. When all isolators are properly adjusted, the blocks or shims shall be barely free and shall be removed.
  9. Isolation mounting deflection shall be (minimum) as specified or scheduled on the drawings.
  10. Position all seismic restraints with equipment in operation for proper operating clearance and bolt seismic restraints to housekeeping pad.
  11. Install equipment with flexibility in wiring connections.
  12. Verify all installed isolator and mounting systems that permit equipment motion in all directions. Adjust or provide additional resilient restraints to flexibly limit start-up equipment lateral motion to 1/4 inch.
  13. Prior to start-up, clean out all foreign matter between bases and equipment. Verify that there is no isolation short circuits in the base, isolators or seismic restraints.
- C. Piping Isolators
1. All piping except fire standpipe system are included under this Section.
  2. Isolate all water piping outside the shafts, in Mechanical Room and with in 50 feet of rotating equipment and pressure reducing stations.
  3. The isolators shall be installed with the isolator hanger box attached to, or hung as close possible to, the structure.
  4. The isolators shall be suspended from substantial structural members, not from slab diaphragm unless specifically permitted.
  5. Hanger rods shall be aligned to clear the hanger box.
  6. Horizontal suspended pipe 2 inches and smaller shall be suspended by Vibrex

type "HSS isolator with a minimum 0.25" static deflection. Pipe larger than 2 inch shall be supported by Vibrex type "RMXA" isolators with a minimum 1.0 inch static deflection.

7. Pipe anchors, where required shall utilize resilient pipe anchors, Vibrex type "RPA" or equivalent, to avoid direct contact of piping with building.
  8. Pipe Extension and Alignment connectors: Provide connectors at pump suction and discharge, riser takeoffs, cooling and heating coils, and elsewhere as required to accommodate thermal expansion and misalignment.
- D. Position Isolators:
1. Close to building structure.
  2. Between building structure and supplementary steel if required.
  3. Suspend isolators from rigid and massive support points.
  4. Supplementary steel to be sized for a maximum deflection of 0.08 inch at center span.
  5. Seismic restraint spacing shall be in accordance with hanger spacing.
  6. Provide seismic restraints for all piping in equipment rooms on roof, in shafts and in ceilings of occupied spaces.
  7. Support water piping in shafts and floor supports entering shafts with Vibrex type "RC" isolators. (2 layers)
  8. Guide and anchor piping in shafts as required with approved mounting designs incorporating "RC" pad to prevent direct contact with building structure.

### 3.2 INSTALLATION OF SEISMIC RESTRAINTS

- A. Equipment
1. Position all seismic restraints with equipment in operation for proper operating clearances.
  2. Weld or bolt seismic restraints to seismic anchor plate.
  3. Seismic restraints.
    - a. Each corner or side restraints shall incorporate minimum 1/4" thick resilient pad limit stops.
    - b. Restraint shall be made of plate, structural members or square metal tubing in a welded assembly incorporating resilient padding.
- B. Piping
1. Seismic restraints spacing and details shall be in accordance with "Seismic Restraint Manual Guidelines for Mechanical Systems" as published by SMACNA, and as indicated below.

2. Provide seismic restraint for all piping in equipment rooms, in shafts, and in ceilings of occupied spaces.
3. Seismic restraints not covered by SMACNA shall be as follows:
  - a. Suspended cast iron soil, waste, vent and storm water piping shall have transverse bracing at 20 ft. maximum spacing and longitudinal bracing at 40 feet maximum spacing.

### **3.3 INSPECTION**

- A. Contractor shall arrange and pay for the services of a certified representative of the vibration isolation manufacturer to visit the jobsite for the purpose of checking the installation of the devices. In the event that the isolators do not meet specified requirements in the opinion of the above representative, or the equipment fails to meet specified requirements, the Contractor shall make revisions to the vibrations isolators as required with no additional cost to the Owner.
- B. Submit a certified written report to the Architect, signed by the above isolation manufacturer representative indicating that all devices have been installed properly and are operating as specified.

**END OF SECTION 15160**

## SECTION 15180

### HVAC AND PLUMBING INSULATION

#### PART 1 - GENERAL

##### 1.1 WORK INCLUDES

- A. This Section includes the furnishing and installation of insulation. The insulation furnished and installed shall meet the minimum legal requirements of the Building Energy Efficiency Standards adopted and incorporated in the California Energy Commission, Title 24 part 2 Chapter 2 thru 53, unless otherwise noted in the specification to be over and above these requirements.

##### 1.2 RELATED SECTIONS

- A. Section 15050: Basic Materials and Methods
- B. Section 15420: Domestic Water System
- C. Section 15800: Heating, Ventilating and Air Conditioning Equipment
- D. Section 15840: Air Transmission and Distribution System

##### 1.3 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
  - 1. Descriptive data:
    - b. Ductwork insulation.
    - c. Equipment insulation.
    - d. Insert sections.
    - e. Adhesives.
    - f. Fasteners.
    - g. Sound ratings.
  - 2. Shop drawings:
    - a. Removable type insulation.
  - 3. Requirements of this section apply to all sections in this Division, except as may be specifically modified in those sections.
  - 4. Requirements of this section are in addition to any similar or more comprehensive requirements in other sections of this Division.

##### 1.4 INSPECTION OF CONDITIONS

- A. Examine related work and conditions before starting work of this section. Report in writing to Architect conditions which will prevent proper execution of this work. Starting work in this section without reporting unsuitable conditions to Architect constitutes acceptance of conditions by the Contractor. Any required removal, repair, or replacement of this work caused by unsuitable conditions shall be done at no additional cost to Owner. Particular attention to be applied to ready service access to balancing dampers, etc.

**1.5 CODES AND STANDARDS**

- A. ASTM E84 - "Test for Surface Burning Characteristics of Building Materials".
- B. NFPA 255 - "Test for Surface Burning Characteristics of Building Materials".
- C. California Building Code, California Mechanical Code and California Plumbing Code.

**1.6 QUALITY ASSURANCE**

- A. Identification of Materials. All packages or standard containers of insulation, jacket material, cements, adhesives, and coating delivered for use, and all samples required for approval shall have a manufacturer's stamp or label attached giving the name of the manufacturer and brand and a description of the material.
- B. Fire Hazard Rating. Insulation materials, adhesives, coatings, and other accessories shall have a fire hazard rating, not to exceed 25 for flame spread and 50 for fuel contributed and smoke developed in accordance with ASTM E84, NFPA 225, or UL 723.
- C. Applicator Qualifications. The application of all insulation materials, accessories and finishes shall be in accordance with the manufacturer's recognized installer, with State of California C-2 License. Submit proof of license to Owner's Representative.

**1.7 COORDINATION**

Coordinate with other Sections in this Division for installation of the work under this Section.

**PART 2 - PRODUCTS**

**2.1 INSULATION**

- A. General:
  - 1. Refer to the individual Mechanical Sections of specifications for location and type of insulating system required.
  - 2. If not specifically required otherwise in the individual sections, service and type shall be as follows:

<u>Piping Service</u>	<u>Thickness</u>	<u>Type</u>
Domestic Hot Water Supply & Return	1"	P-1
Refrigerant	3/4"	P-5
Condensate Drains Indoors	3/4"	P-5
Hangers, Supports, Guides, etc.	*	P-4

All valves, strainers, flanges, unions P-3

\*Insert thickness shall match pipe insulation.

Equipment Service

Hot Water Storage Tanks & Heaters 2" E-1

Duct Service, Wrapped

Supply Air Ducts - Concealed 2" D-1  
Return Air Ducts - Concealed 2" D-1  
Kitchen Hood Exhaust Duct 2" D-3

Duct and Plenum Service, Lined

Supply Air and Return Air Duct  
Expose Outdoors and Indoors 2" DL-1\*  
Plenums downstream of coils, mixed  
air and for all fan coil units for office area. \*\* PL-1

\* All ducts within ten feet of any fan, outdoors or indoors, or as indicated on the drawings shall be lined.

\*\* Thickness same as height of plenum seams, or 2", whichever is thicker.

3. Installed products shall be in accordance with the requirements of NFPA Standards No. 90A and No. 90B and UL classification with maximum of flame spread 25, fuel contribution 50, and smoke development 50.

**2.2 PIPE INSULATION**

A. Type P-1 Insulation

1. Insulation shall be one-piece preformed glass fiber insulation with integral all-purpose fire retardant, glass yarn scrim laminated, white jacket, "K" factor shall be 0.23 maximum at 75 degrees F. mean temperature.
2. Manufacturer: Insulation shall be Manville Micro-Loc AP-T, Owens-Corning Fiberglass, P.P.G., CTM, Certain-Teed, Armstrong or equal. Adhesive shall be Benjamin Foster 85-20.

B. Type P-2, (not used)

C. Type P-3, Removable/Reusable Insulation, All Temperatures

1. Inner layer fabric: 17.5 oz/sq. yd. Silicone coated fiberglass cloth.
2. Insulation filler: 1" thick Type "E" needled fiberglass mat insulation. 11.25 lbs./CF density, rated up to 1200 deg F.
3. Outer layer fabric: 17.5 oz/sq. yd. Silicone coated fiberglass cloth.
4. Sewing thread: 0.018" diameter Teflon coated fiberglass sewing thread.
5. End closure draw cord: 3/16" diameter braided Nomex cording.

6. Securement: 14 gauge, 1 ½" 304 stainless steel lacing anchors and washers at approximately 5" o.c.
  7. Insulation shall be double sewn lock stitched interior seams except for closure. Stitching shall be 10 to 14 stitches per inch are 1/4" spacings between seams.
  8. Insulation shall be designed by manufacturer with a minimum number of pieces to eliminate water penetration.
  9. Manufacturer: Thermal Energy Product, Inc. (TEP), "Energy Wrap" or equal.
- D. Type P-4, Hanger Insert Sections, All Temperatures:
1. Sections shall be six pounds per cubic foot polyisocyanurate foam insulation, Dow Trymer 1800 or equal in half sections, 2" longer than protection shield being used. Provide jacketing to match joining pipe insulation.
  2. Insert for chilled water and condensate drain piping shall be provided with vapor barrier between insulation and piping. White vapor barrier jacket shall be provided around insulation.
- E. Type P-5 Insulation
1. Insulation shall be self-seal type flexible elastomeric thermal insulation with "K" factor of 0.27 maximum at 75 degrees F mean temperature.
  2. Manufacturer: Insulation shall be AP Armaflex SS or equal.

### 2.3 DUCT AND PLENUM INSULATION

- A. General:
1. Pins for securing insulation shall be either percussion welding type or shall be cemented in place type by Sticklips Type B, Goodlow E. Moore, Omark-Graham or S.K.M. Pins shall be 1-1/2" diameter or 1-1/2" square with beveled corners type washer for securing insulation. Pressure sensitive type adhesives are not acceptable.
- B. Type D-1 Insulation - Ductwork Concealed:
1. Insulation shall be inorganic glass fiber flexible blanket with facing of aluminum foil reinforced with fiberglass yarn scrim laminated to 40-5016 Kraft. Insulation shall have a "K" factor of 0.29 maximum at 75 degrees F. mean temperature, 0.75 PCF, density. Min R value = 8.0.
  2. Manufacturer: Insulation shall be Manville R series Microlite, with FSK aluminum foil facing, CTM, Owens-Corning Fiberglass, Certain-Teed, or equal. Adhesive shall be Benjamin Foster 81-99.
  3. Insulation shall be extended over the point of connection on flexible duct to maintain vapor barrier continuity.
- C. Type D-2 Insulation – (not used)
- D. Type D-3 Insulation
1. Manufacturer
    - a. 3M Fire Barrier duct wrap 615+, thru 3M authorized distributors.

- b. Complies with NRPA 96, California Mechanical Code.
- 2. Fire resistive duct wrap: 3M fire barrier duct wrap 615+, 1 ½" thick, 24" or 48" wide x 20' long rolls, foil encapsulated with logo identification.
- 3. Tapes: High performance filament tape: Minimum 3" wide to seal cut blanket edges.
- 4. Banding Material: Carbon steel banding: Minimum ½" wide x 0.015" thick.
- 5. Insulation pins/washers: pins: 10gauge, 4 to 5 inches long, copper coated steel; washers: 1 ½" x 1 ½" diameter, galvanized steel speed cups or cup head pins.
- 6. Through-penetration fire stop materials.
  - a. Packing material: scrap pieces, 3M firemaster duct wrap.
  - b. 3M FB-2000 + silicone sealant.
- 7. Grease Duct Access Door:
  - a. Steel angle opening frame.
  - b. Access cover, minimum 16 gauge.
  - c. Insulation pins.
  - d. Speed clips, minimum 1 ½" x 1 ½" diameter round galvanized steel.
- 8. Hardware:
  - a. Threaded rods: 4" to 5" long, ¼" diameter galvanized steel with ¼" wing nuts and ¼" metal washers.
  - b. Four-inch long, hollow tubing to fit threaded rods.
  - c. ¼" wing nuts.
- E. Type DL-1 Lining:
  - 1. Lining shall be 1-1/2 lb. density semi-rigid fiber glass blanket coated one side with a fireresistant acrylic water base containing a biocide that will not support microbial growth.
  - 2. Lining shall have a "K" fiber factor of 0.25 maximum at 75 degrees F. mean temperature and noise reduction coefficient of 0.70 or higher based on Type "A" mounting. Min. R value = 8.0.
  - 3. Manufacturer: Lining shall be Manville Permacote, Owens-Corning Fiberglass, Certain-Teed or Pittsburgh Plate Glass, or equal.
- D. Type PL-1 Lining:
  - 1. Plenum lines shall be semi-rigid board insulation 3 lbs./cu. Ft. density semi-rigid fiberglass blankets, coated one side with fire resistant water base containing a biocide that will not support microbial growth.
  - 2. Liner shall have a maximum "K" factor of 0.26 at 75 degrees F. mean temperature and fire hazard classification of 25-50-50, with noise reduction coefficient of 0.70 or higher based on Type "A" mounting. MIN R value = 8.0.
  - 3. Liner shall be Manville Permacote, Owens-Corning Fiberglass, Certain-Teed or Pittsburg Plate Glass, or equal.

## 2.4 EQUIPMENT INSULATION:

- A. General:
  - 1. All equipment surfaces shall be cleaned of dirt, grease and other foreign matter.



- B. Type E-1 Insulation – Equipment, High Temperature:
  - 1. Insulation shall be preformed sectional asbestos free hydrous calcium silicate molded block insulation 14 lb./cu. Ft. density minimum with maximum “K” factor of 0.42 at 200 degrees F. mean temperature, ASTM C-344.
  - 2. Manufacturer: Insulation shall be Manville Thermo-12, Owens-Corning Fiberglass, Certain-Teed, or equal. Adhesives shall be Benjamin Foster 30-36.
- C. Type E-2 Insulation – Equipment, Low Temperature:
  - 1. Insulation shall be closed cell foamed plastic or flexible neoprene rubber insulation with a tough skin surface on one side, 6 lb./cu. Ft. glass fiber rigid insulation, with maximum “K” factor of 0.26 at 70 degrees F. mean temperature.
  - 2. Manufacturer: Insulation shall be Rubatex, Ensolite by Uniroyal, Owens-Corning, Certain-Teed, Armstrong, or equal.

## 2.5 ADHESIVES

- A. Pipe: Benjamin Foster, Permacel, 3M Co., Swift Chicago Mastic, or equal.
- B. Ducts and Plenums: Benjamin Foster, "Tuff Bond No. 6", Permacel No. PA-310, 3M Co. "Insulation Adhesive" Swifts No.7228 for brush, 7336 for spray or Chicago Mastic 17-461 or equal.

## 2.6 WEAR PROTECTIVE JACKETING FOR PIPING IN MECHANICAL ROOM

- A. Canvas jacketing shall be eight ounces per square foot weight, fire resistant treated and UL labeled for flame spread less than 25 and smoke development less than 50.
- B. Fiberglass jacketing shall be 7.8 ounces per square foot in weight.
- C. Lagging adhesive shall be Arabol 60-89-05, Foster 30-36 Tuff Bond 21 W or 21 C, or equal.

## 2.7 WEATHERPROOFED PIPE JACKETING

- A. Jacketing shall be corrugated aluminum type with 3/16” deep corrugation and an integrally bonded vapor barrier over the entire surface in contact with insulation.
- B. Thickness shall be 0.016” for piping and 0.020” for tanks, equipment and heat exchanger.
- C. 90 degree and 45 degree elbows shall be provided with preformed aluminum jacketing, 0.024” thick.
- D. Fittings shall be jacketed with factory formed aluminum two piece as recommended by the manufacturer.
- E. Jacketing shall be Pabco “Metal Systems,” Owens-Corning “Kaylo-Klad,” Childers, or equal.
- F. Weatherproofed pipe jacketing shall be installed for all insulated piping exposed outdoors, above the roof, and other areas noted on drawings.

## PART 3 - EXECUTION

### 3.1 APPLICATION OF PIPING INSULATION

A. General:

1. All piping shall be insulated. Unions which are integral with valves shall be insulated. All flanges, union, fittings and valves shall be insulated with removable preformed insulation section with PVC pre-molded one piece fitting cover. Manville Zeston 2000.
2. All insulation seams shall be placed on top or opposite to exposed or visible side of insulation.
3. Pipe surfaces shall be cleaned of dirt, grease and other foreign substances and be dry.
4. All insulation for pipe temperatures under 450 degrees and located in equipment rooms or otherwise exposed to view inside the building shall be canvas jacketed.
5. All insulation for pipe temperatures 450 degrees F. or higher and located in equipment rooms or otherwise exposed to view inside the building shall be glass cloth jacketed.
6. All weather exposed piping and equipment insulation shall be protected with weatherproof pipe jacketing.
7. Take special care, where glass fiber insulation butts flanges, or is discontinued, to taper insulation to pipe to allow for the finish jacket to completely seal off the end of the insulation. Extend insulation on valve bodies up to the valve bonnet. Protect insulation at supports or hangers by means of pipe saddles or with steel shields. Fill the void in saddles with insulation and seal all joints.
8. Insulation materials in return air plenum above ceiling shall be non-combustible material or Class I rating 25-50-50 for flame spread and smoke developed.

B. Type P-1 Insulation shall be applied as follows:

1. All joints shall be tightly butted together.
2. Adhere longitudinal laps and butt strips of jacket with factory applied pressure sensitive tape system, Manville AP-T.
3. Insulate all fittings and elbows with preformed mitered sections of same insulation as piping with PVC premolded, one piece fitting cover, Manville Zeston 2000, with jacket.
4. Strainer bodies, valves, flanges, unions and pressure reducing valves shall be insulated with readily removable Type P-3 insulation, for easy removal of insulation when servicing.
5. Provide Type P-4 insert section and shield or a saddle at each support.
6. Provide vapor barrier mastic coating to form an isolating vapor seal between the piping insulation jacket and the pipe at butt joints of insulation at fittings, flanges, valves, hangers and at 21-foot intervals on continuous pipe run.
7. For all exposed piping and piping in Mechanical Rooms, all insulation shall be covered with 8-oz. canvas jacket pasted in place with silicate of soda. Lap of canvas jacket shall be next to wall or ceiling. Canvassed piping shall be sized with Benjamin Foster or Arabol lagging adhesive. Ends shall be canvassed and sealed. Canvas and adhesive shall comply with NFPA 90A.

C. Type P-3 Insulation shall be applied as follows:

1. Follow manufacturer's installation instructions.

2. End closures with drawcord tie down shall extend onto adjacent pipe insulation.
  3. Provide overlap flaps for all outdoor installation to provide for watershed.
- D. Type P-4 Rigid Insert Sections:
1. Install insert sections on insulated piping centered under each hanger. Vapor barrier and jacketing shall be continuous over insulation. Insulation shield shall be provided per Section 15050, para. 2.09, E.
- E. Type P-5 Insulation shall be applied as follows:
1. Insulation shall be snapped over piping that is already connected or installed.
  2. Fitting covers shall be pre-fabricated miter cut type tube insulation.
  3. Butt joints shall be sealed with Armaflex 520 adhesive. Both joints shall be coated with adhesive.
  4. Insulation outdoors or exposed to weather shall be applied with WB Armaflex weather resistant protective finish.
  5. Aluminum weatherproofed pipe jacketing shall be provide on all insulation exposed to weather as here-in specified in paragraphs 2.07 and 3.02.

### **3.2 APPLICATION OF JACKETING**

- A. Canvas Jacketing.
1. Apply jacketing soaked with lagging adhesive for a shrink tight fit. Lap ends 1-inch with a 1-inch longitudinal lap of 1-inch located out of sight. When dry, apply one brush coat of lagging adhesive.
- B. Glass Cloth Jacketing.
1. Apply jacketing with adhesive stretched tight. Lap 1-inch. Longitudinal lap shall be 1-inch and located out of sight. Apply one brush coat on lagging adhesive.
- C. Metal Jacketing.
1. Butt the jacket end joints with aluminum sealing bands over sealing compound, and secure with aluminum strapping. Secure an additional aluminum strap at center of each section. The distance between a joint sealing band and a securing band shall not exceed 18-inches. The longitudinal seam shall be of Pittsburgh-loch type. At ells and tees, insulation and jacket shall be factory fabricated fittings or shall be mitered and butted to form a 90 degree turn, or tee, secured with additional aluminum bands, as required.

### **3.3 APPLICATION OF DUCT AND PLENUM INSULATION**

- A. General:
1. Clean all duct surfaces of dirt, grease and other foreign substances.
  2. Cement for stick-in-place type pins shall be an adhesive especially manufactured for the purpose by the pin manufacturers.

B. Type D-1 (Concealed):

1. Cut insulation long enough to avoid the reduction of insulation thickness at the duct corners.
2. Butt edges tightly together.
3. Adhere insulation to ductwork with fire resistant adhesive spot applied on 1-foot centers with insulation conforming to duct surfaces uniformly and firmly.
4. In addition to adhesive, secure insulation on ducts 24-inches and wider on the bottom side with mechanical fasteners on maximum 18-inch centers. Clip protruding pin ends flush with the washers.
5. Vapor seal pins and clips with vapor barrier mastic or 3-inch wide pressure sensitive tape which match the insulation facing.
6. Secure insulation in place with No. 16 gauge galvanized wire ties spaced not over 12-inches on center. Wire ties shall be placed within 2-inches on both sides of each standing seam and reinforcement.
7. Seal all joints with minimum 3-inch wide vapor barrier pressure sensitive tape or 3-inch wide tapes and fire resistant adhesives.
8. Patch all cuts and tears same as the sealing of the joints.
9. Wrap insulation entirely around duct with all joints lapped at least 3-inches.

C. Type D-2 (not used)

D. Type D-3 Insulation

1. Remove dirt and dust, and clean surfaces of openings and items penetrating rated floors and rated walls.
2. Install 3M Fire Barrier Duct Wrap 615A system in accordance with manufacturer's instruction and referenced standards.
3. Install 3M Fire Barrier Duct Wrap 615A in direct contact with the duct it encloses. Protect every portion of duct with no less than 2 layers for 1 or 2 hour commercial kitchen grease duct applications and 1 layer for 1 hours air ventilation duct enclosures and 2 layers for 2 hour air ventilations duct enclosures. Overlap both perimeter and longitudinal joints a minimum of 3" per layer of material.

E. Type DL-1 Lining.

1. Adhere duct liner to interior metal surface with 100% coverage of liberally applied fire resistant adhesive.
2. On ducts over 20-inches in width or depth, additionally secure the liner with either bolts and washers or pins with washer, on 16-inch maximum centers. Locate fasteners within 2-inches of lining leading edge of each section and within 3-inches of all cross joints. Bolts shall be 1/8-inch diameter.
3. Heavily coat all edges of the liner with fire resistant adhesive. Recoat all butt joints.

4. Accurately cut the liner to assure closing corners and tightly butting joints.
  5. Coated surface shall face the air stream.
  6. Repair breaks and abrasions with adhesive and mechanical fastening to assure a continuity of the surface.
  7. Install insulation in square turns so as to cover all interior surfaces before the duct turns are installed.
- F. Type PL-1 Lining.
1. Adhere plenum liner to metal surface with 100% coverage of liberally applied adhesive and bolts or pins with clips, on 16-inch centers.
  2. Locate mechanical fasteners within 2-inches of lining edges.
  3. Heavily coat all edges with fire resistant adhesive. Relocate all butt joints.
  4. Accurately cut the liner to assure closing corners and tightly butted joints.
  5. Coated surface shall face air stream.
  6. Repair minor breaks and abrasions with adhesive and mechanical fasteners to assure a continuity of the surface. Cut-out major breaks or tears and replace with new liner.
  7. Insulate hot and cold plenums separated by a single metal partition on both sides of the partition.

### 3.4 APPLICATION OF EQUIPMENT INSULATION

- A. Type E-1:
1. Apply insulation blocks with edges tightly butted, joint broken, and secured with No. 16 gauge galvanized annealed steel wire or ½-inch X .015-inch galvanized steel bands on 12-inch maximum centers for large areas. Provide welded studs, clips or angles as anchors for wires and bands.
  2. Over the insulation, tightly stretch ½-inch hexagonal mesh wire in place and secure by wiring to anchors, with edges laced together. Finish shall be insulating and finishing cement, applied ¼" thick in one coat, trowled to a smooth finish. Reinforced all corners with corner bead.
  3. Over the insulating and finishing cement, apply heavy weight glass cloth smoothly adhered with lagging adhesive.
  4. Insulate sections of equipment requiring periodic servicing with removable sections of insulation or hollow (double walled) sheet metal casings filled with shredded fiberglass or granulated Styrofoam.
  5. Make accessible manholes and handholes by beveling off the permanent insulation around the manhole and covering the manhole plate with a removable insulating glass cloth blanket, 1-1/2" thick.

6. Insulation exposed to the weather shall be covered with corrugated weatherproof aluminum jacketing.
- B. Type E-2:
1. Flexible Insulation.
    - a. Clean all surfaces to be insulated. Cut insulation accurately so that all edges make a continuous contact with butting sheets.
    - b. After testing that cement, as recommended by the insulation manufacturer, will bond to equipment surface, apply insulation cement to all surfaces to which insulation is to be bonded. Press insulation firmly to make a continuous bond without stretching the insulation. Apply a strip in insulation tape over all butt joints to reinforce them. Omit strips where insulation is in two or more layers when joints are lapped.
    - c. Insulation exposed to weather shall be covered with corrugated aluminum jacketing.

**END OF SECTION 15180**

**SECTION 15410**  
**DRAINAGE SYSTEM**

**PART 1 - GENERAL**

**1.1 WORK INCLUDES**

- A. This Section includes the furnishing and installation of drainage system specified in Division 15.

**1.2 RELATED SECTIONS**

- A. Section 15020: Equipment and Systems Tests
- B. Section 15030: Identification
- C. Section 15050: Basic Materials and Methods
- D. Section 15420: Domestic Water System
- E. Section 15470: Plumbing Fixtures

**1.3 SUBMITTALS**

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to the following:
  - 1. Descriptive data.
    - a. Drains.
    - b. Cleanouts.
    - c. Piping materials.
    - d. Pipe hangers and supports.
    - e. Access panels.
    - f. Air Gap Fitting.

**PART 2 - PRODUCTS**

**2.1 MATERIALS**

- A. General.
  - 1. Piping systems shall be as specified in Section 15050 Basic Materials and Methods.
  - 2. Piping materials shall be as follows:
    - a. Waste and vent piping: Schedule "G".

## 2.2 DRAINS AND FLOOR SINKS

### A. General

1. Drains where installed in construction with waterproof membrane, shall be provided with flashing clamp device with corrosion resistant clamping bolts.
2. Drains requiring trap primer connection shall be provided with auxiliary inlet fitting.
3. Drains shall be as specified or equal by J.R. Smith, Zurn, or Josam.

### B. Floor drains

1. FD-1: J.R. Smith 2005-AU complete with flashing collar with nickel bronze adjustable strainer head, vandal proof screws and trap primer connection.

### C. Floor sinks

1. FS1: J.R. Smith 3430-Y. 12" sq. x 8" deep, complete with seepage flange, acid resistant coated interior, acid resistant coated cast iron grate and aluminum dome bottom strainer.

### D. Air Gap Fitting (AG-1): J.R. Smith 3951T/3955S fixed air gap fitting.

## 2.3 CLEANOUTS

### A. General.

1. Cleanouts shall be provided in the system located to provide accessibility to all runs of pipe.
2. All cleanout bodies shall be cast iron. Each cleanout plug assembly shall consist of a cadmium plated cast iron plug with untapered thread and a tapered portion which makes a watertight seal against tapered brass plug which screws into a cast iron collar.
3. Cleanouts shall be as specified by J.R. Smith or equal by Zurn or Josam.

### B. Cleanouts

1. Outside Areas: J.R. Smith 4263L, cast iron and double flanged housing with heavy duty secured scoriated cast iron cover with lifting device, and taper thread, bronze plug. Provide flashing flange at waterproof membranes.
2. Finished Walls: J.R. Smith 4434C, cast iron spigot ferrule with cast bronze taper threaded plug and chrome plated bronze square frame and secured cover.
3. Finished Floors: J.R. Smith 4033L, cast iron with round adjustable scoriated secured nickel bronze top. Provide flashing flange at waterproof membranes.
4. Unfinished Floors: J.R. Smith 4223L, cast iron with round adjustable extra heavy duty cast iron top. Provide flashing flange at waterproof membranes.

## PART 3 - EXECUTION



### 3.1 INSTALLATION OF PIPING

A. General.

1. Piping installation shall be made in accordance with Section 15050 Basic Materials and Methods.

B. Testing.

1. Pressure test shall be in accordance with Section 15020 Equipment and Systems Tests.

### 3.2 INSTALLATION OF DRAINS

A. Floor drains.

1. Provide floor drains with cast iron "P" traps.
2. Vent all floor drains.
3. Provide clamping rings for drains installed in floors with membranes.
4. Set flush with finish floor.

### 3.3 INSTALLATION OF CLEANOUTS

A. General.

1. Cleanouts shall be provided in accordance with CAC Title 24 and the Uniform Plumbing Code and in accordance with the following requirements.

B. Horizontal runs.

1. Provide every horizontal run of soil and waste piping with a cleanout at its upper terminal and at intervals of 100 ft., and at end of line serving battery of 3 or more fixtures.
2. Provide sewer cleanouts by means of combination "Y" and 1/8 bend at intervals of 100 feet.
3. All cleanouts shall be made accessible.

C. Floor cleanouts.

1. Cleanouts in floors shall have an adjustable cast iron housing with bronze or nickel bronze frame and cover appropriate to surrounding finishes; or cast iron frame and cover in unfinished cement floors.

D. Wall cleanouts.

1. Cleanouts in walls shall be set with centerline or opening perpendicular to wall within 3" of finish line wherever possible and covered with cover plates as specified.
2. Where distance from surface of wall to cleanout exceeds 3", install 8" x 8" access

doors for cleanouts up to 2" and 12" x 12" access doors for cleanouts larger than 2" or any cleanout set at an angle behind the wall.

3. Install a cleanout in the vent above the fixture tee at each urinal.

E. Header cleanouts.

1. Offset cleanouts serving a header for more than one fixture above the overflow rim of highest fixture.

**END OF SECTION 15410**

**SECTION 15420**  
**DOMESTIC WATER SYSTEM**

**PART 1 - GENERAL**

**1.01 WORK INCLUDES**

- A. Complete domestic water supply system including:
  - 1. Valved connection to fixtures and equipment.

**1.02 RELATED SECTIONS**

- A. Section 15020: Equipment and Systems Tests
- B. Section 15030: Identification
- C. Section 15050: Basic Materials and Methods
- D. Section 15180: Insulation
- E. Section 15410: Drainage System
- F. Section 15470: Plumbing Fixtures

**1.03 SUBMITTAL DATA**

- A. Prior to commencing any underground utility installation or starting foundation excavations, the Contractor shall produce a comprehensive coordination drawing of the proposed system installation with proposed piping locations and proposed depth of piping installation. Crossing points of piping systems shall indicate separation distances for full coordination and maintenance of gravity operated drainage and waste systems. In addition to piping systems, underground electrical encased conduit runs shall also be indicated with crossing points and separations identified. All underground utilities shall be coordinated and adjusted with the concrete foundation layout and depths to comply with all separation requirements between utility installations and footing locations. This coordination will require adjustment in the depths of utility installations, locations of utility runs, and depths of concrete foundations. There will be no additional costs to the project for this required coordination and adjustment work scope.
- B. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to the following:
  - 1. Descriptive data.
    - a. Piping.
    - b. Backflow devices.
    - c. Trap primer valves.
    - d. Water hammer arrester.

- e. Valves.
- f. Hose Bibs
- g. Water Heater
- h. Circulating Pump

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. Water piping.
  - 1. Piping shall be Schedule "D" as specified in Section 15050 Basic Materials and Methods.
  - 2. Hot water pipe insulation shall be Type P-1 as specified in Section 15180 Insulation.

### **2.02 BACKFLOW PROTECTION**

- A. Backflow protection devices shall be provided and installed where required by code whether shown on the plans or not.
- B. Backflow prevention devices shall be approved for use by L.A. County Department of Health Services, Cross-Connection Control Guide B-132 - June 1987. Prior to ordering verify that approval is current.
  - 1. Reduced Pressure Backflow Preventer.
    - a. Bronze body valves and trim, 2 spring loaded check valves differential pressure relief valve, 2 resilient wedge gate valves, strainer and test cocks, as manufactured by Wilkins. Model 975 or approved equal by Watts.
- C. Verify that devices are currently acceptable to both the Building & Safety Code authority having jurisdiction and to the serving utility company.

### **2.03 TRAP PRIMER**

- A. Trap Primer (TP-1):
  - 1. MIFAB all brass valve with adjustment screw for high or low pressure.
  - 2. Use M2-500 for 1 drain.
  - 3. Use M2-500 with MIDU supply tube and distribution unit for 2 drains.
  - 4. Entire installation shall be as recommended by the manufacturer.

### **2.04 WATER HAMMER ARRESTER**

- A. General
  - 1. Precision Plumbing Products, Inc. (PPP, Inc.) ASTM B 88, Type "K" hard drawn copper body, brass piston and threaded connector. Seal lubricant shall be Federal Food and Drug Administration approved for use in potable water systems.
  - 2. Contractor shall provide water hammer arrestors at cold water header/branch line serving

water closet and urinal valves, each hot and cold water header serving lavatory faucets. Installation and size shall be per manufacturer's recommendations.

## 2.05 HOSE BIBBS

### A. General

1. Hose bibbs shall be cast bronze body with integral vacuum breaker protected cartridge operated hose valve with lockshield bonnet and removable key handle.
2. Wall hydrants shall be recessed aluminum box with plaster ground and aluminum door. Hose valve shall be tamper resistant lockshield bonnet and replaceable cartridge with vacuum breaker, removable loose key wheel handle with screwdriver operated stop.

### B. Types

1. HB-1: Wall hydrant, vacuum breaker, screwdriver stop, door with recessed cam lock. Acorn No. 8104.
2. HB-2: Free standing, vacuum breaker, loose key, rough chrome plated finish. Acorn No. 8131.

## 2.06 WATER HEATERS

### A. Gas-Fired Water Heater (As indicted on the drawings)

1. Size and capacity: As indicted on the drawings.
2. Type: State of California approved energy efficient, C.E.C. listed and AGA approved gas-fired water heater.
3. Quality: PVI
4. Accessories
  - a. Nickelshield Tank 300 psi tested tank 150 psi working pressure.
  - b. Thermostat: Adjustable with automatic overheat safety control with manual reset.
  - c. Thermometer.
  - d. Combination pressure and temperature relief valve.
  - e. Drain valve.

## 2.07 CIRCULATING PUMP

### A. Circulating Pump (CP-1):

1. Hot water pump for the domestic hot water systems. All parts of pump shall be bronze construction. Pump shall be installed with shut-off valves and union on each side of the pump with a check valve in the pump discharge. Pump shall be manufactured by Bell & Gossett, or Grundfos.
2. Install each unit for domestic hot water service with a immersion aquastat with adjustable

differential to start and stop the pump and time clock.

3. Furnish motors for these pumps of the single phase type with built-in thermal overload protection.

## **2.08 THERMOSTATIC MIXING VALVE**

- A. Rough bronze body with wall support union angle checkstops with removable strainers on inlets, color coded scale and bi-metal corrosion resistant element, lead free.
- B. Maximum temperature stop set at 115°F.
- C. Provide in-line thermostat downstream of volume control/shut-off valve.
- D. Thermostatic mixing valve shall be as manufactured by Bradley or equal.

## **PART 3 - EXECUTION**

### **3.01 INSTALLATION**

- A. Install piping in accordance with Section 15050 Basic Materials and Methods.
- B. Pressure test in accordance with Section 15020, Equipment and Systems Test.
- C. Install equipment in accordance with the manufacturer's recommendations.
- D. Provide valves at each piece of equipment to provide isolation of the equipment from its connected system.

### **3.02 BACKFLOW PROTECTION**

- A. All plumbing fixtures and all other equipment having domestic water connections shall be protected against all possible back siphonage or backflow. Backflow preventers shall be the double check, reduced pressure or pressure type as required by the Los Angeles County, Department of Health Services.
  1. An air gap fitting with type "L" copper drain pipe shall be piped to the nearest floor sink, service sink or landscaped area as required for each reduced pressure type backflow preventer.

**END OF SECTION 15420**

## SECTION 15430

### FUEL GAS SYSTEM

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDES

- A. Complete gas system with:
  - 1. Connection to gas fired equipment.
  - 2. Low pressure (8" water column) gas piping.
  - 3. Medium pressure (5 psi) gas piping.

##### 1.02 RELATED SECTIONS

- A. Section 15020: Equipment & System Test
- B. Section 15030: Identification
- C. Section 15050: Basic Materials & Methods

##### 1.03 SUBMITTAL DATA

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
  - 1. Descriptive data.
    - a. Pipe and fittings.
    - b. Valves.

#### PART 2 - PRODUCTS

##### 2.01 MATERIALS

- A. General: Piping and valves shall be Schedule "F" as specified in Section 15050, Basic Materials and Methods.
- B. Earthquake Valve.
  - 1. Earthquake shut-off valve shall be as manufactured by Pacific Seismic Products or approved equal, U.L. listed with aluminum body, check valve type with stationary post supporting ball, reacting cylinder, rolling latch, manual reset, position indicator, sight window and bonnet.
- C. Gas Pressure Regulator.
  - 1. Natural gas regulators shall be Fisher, Reliance or Equimeter, equipped with full capacity relief valve, low pressure safety shut-offs, weather proof and bugproof vents for outside installation. Complete with dirt leg, gas valve and fittings. Location and capacities shown on drawings.

#### PART 3 - EXECUTION

### **3.01 INSTALLATION**

- A. General:
  - 1. Make piping installation in accordance with Section 15050, Basic Material and Methods.
  - 2. Piping shall be free of traps with drain pocket consisting of nipple and cap at low points.
  - 3. Install union or right and left nipple and coupling on equipment side of each individual gas cock.
  - 4. Install gas cocks at the connection to each piece of equipment.
- B. Testing: Pressure test shall be in accordance with Section 15020, Equipment and Systems Tests.

**END OF SECTION 15430**



**SECTION 15470**  
**PLUMBING FIXTURES**

**PART 1 - GENERAL**

**1.01 WORK INCLUDES**

- A. Plumbing fixtures
- B. Plumbing brass
- C. Fixture supports

**1.02 RELATED SECTIONS**

- A. Section 15050: Basic Materials and Methods
- B. Section 15410: Drainage System
- C. Section 15420: Domestic Water System

**1.03 SUBMITTAL DATA**

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to, the following:
  - 1. Descriptive data.
    - a. Plumbing fixtures.
    - b. Plumbing brass and trim.

**PART 2 - PRODUCTS**

**2.01 PLUMBING FIXTURES**

- A. General:
  - 1. Fixtures shall be free from imperfections, true to line, angles, curves and color; smooth, water-tight, and quiet in operation. Fixtures shall be installed complete with trim.
  - 2. Fixtures shall be stock items listed in the manufacturer's current catalogue sheets.
  - 3. All fixtures specified to be of vitreous ware, shall be non-absorbent and fired so that the whole mass is thoroughly fused and vitrified producing a material white in color. The fixtures shall be white, thoroughly fused without discoloration, chips, or flaws and free from cracks. Warped or otherwise imperfect fixtures will not be acceptable.
  - 4. Plumbing brass: All brass and exposed piping and trim shall be institutional grade, chromium plated unless specified otherwise. Provide brass escutcheons on supplies and wastes. Trim shall be identical for each category of fixture.
  - 5. Plumbing supplies shall be rough-in ready preformed type "L" copper tube stub outs, with spun

closed ends. Do not use red brass or galvanized nipples.

6. Flush valves shall be chromium plated brass, diaphragm type with vacuum breaker and screwdriver stops. Water closet flush valves shall be provided with resilient seat bumpers.
7. Trap installations, exposed above the floor, shall have chromium plated brass escutcheons plates, casings and Uniform Code Pattern traps.
8. Where stop valves are required in exposed piping, they shall be short stem, polished chromium plated type.

B. Fixtures:

1. Refer to Plumbing Fixture Schedule on drawings.

### **PART 3 - EXECUTION**

#### **3.01 PLUMBING FIXTURES**

A. Fixture installation.

1. Installation of fixtures, faucet or other plumbing item, shall be as recommended by the manufacturer except as specified herein or indicated on the drawings.
2. Set fixtures level, in contact with the floor or wall and equally spaced when installed in battery of more than two.
3. Rough-in supplies level, equally spaced and symmetrical with the fixture.
4. Rough-in wastes in alignment with the fixture drain. Offsetting trap and waste is not acceptable.

B. Grouting.

1. Grout all wall and floor mounted fixtures water tight where fixture is in contact with wall or floors. Caulking similar to "Polyseamseal" by Interpace is acceptable.

C. Caulking.

1. Caulk all deck mounted trim at the time of assembly, including fixture and casework mounted.
2. Caulk all self-rimming sinks installed in casework.

D. Trim.

1. Makeup trim will be installed with care and with the proper tools in order that no tool marks show after installation.
2. Porcelain plaster caps shall be securely cemented in place over floor flange bolts entirely covering washer and bolt hole.

**END OF SECTION 15470**

## SECTION 15800

### HEATING, VENTILATING AND AIR CONDITIONING EQUIPMENT

#### PART 1 - GENERAL

##### 1.01 WORK INCLUDES

- A. Air conditioning and air handling equipment as indicated on the drawings and as specified. Air conditioning and air handling equipment shall include but not limited to the following:

##### 1.02 RELATED SECTIONS

- A. Section 15020: Equipment and Systems Tests
- B. Section 15030: Identification
- C. Section 15160: Vibration Isolation and Seismic Restraints
- D. Section 15840: Air Transmission and Distribution System
- E. Section 15900: Energy Management System
- F. Section 15995: Mechanical Commissioning

##### 1.03 SUBMITTALS

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISION, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to the following:
  - 1. Descriptive data.
    - a. Published fan performance curves.
    - b. Published sound power levels based on actual test data.
    - c. Finishes.
    - d. Certified dimension drawings.
  - 2. Shop drawings.
    - a. Installation details.

##### 1.04 STANDARDS

- A. Tests.
  - 1. Test all units and rate in accordance with the standard test code of the AMCA.
  - 2. Centrifugal type fans shall bear the AMCA certified rating seal.

##### 1.05 FACTORY FINISH

- A. All fans shall have factory prime coat and factory enamel coat finish unless otherwise noted or

specified.

- B. Repair any finish damaged in shipment or in installation to equal factory finish.

## **PART 2 – PRODUCTS**

### **2.01 ROOFTOP PACKAGE UNITS**

- A. Capacities of air conditioning equipment indicated on Drawings are net capacities actually required. Standard catalog ratings shall be adjusted to actual Project site environmental conditions  
Manufacturers: Carrier, Trane, York, Lennox, American Standard Heating & Air Conditioning, or equal.
1. Basis of Design: York
- B. Furnish packaged air conditioning unit with gas heating for roof top installation. Unit shall be self-contained, completely factory assembled, with complete internal wiring and controls. Unit shall also be provided with a fully piped refrigerant circuit, fully charged with an environmentally friendly refrigerant that is not scheduled for phase out. Unit shall be field configurable for down-flow or horizontal discharge. Cooling and heating capacities, electrical characteristics, and operating conditions shall be as indicated on Drawings.
- C. Quality Assurance:
1. Units shall be CSA certified for outdoor installation.
  2. Cooling capacity shall be rated in accordance with current ANSI/AHRI Standard 210/240.
  3. Unit shall be UL listed and designed to conform to ANSI/ASHRAE Standard 15 Safety Code for Mechanical Refrigeration and ANSI Z21.47-2016/CSA 2.3-2016 Gas
  4. ANSI/NFPA 70: National Electrical Code.
  5. Unit cooling efficiency EER/SEER ratings shall comply with CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
  6. Unit heating efficiencies AFUE ratings shall comply with current CCR, Title 24, Building Energy Efficiency Standards for Residential and Nonresidential Buildings, and shall not be less than ratings indicated on drawings.
  7. Unit shall comply with California Maximum Oxides of Nitrogen (NOX) Emission Regulations and current SCAQMD regulations.
  8. The unit roof curbs shall conform to NRCA standards.
  9. Insulation and adhesive shall meet NFPA 90A and 90B requirements for flame spread and smoke generation.
  10. Unit casing shall be capable of withstanding ASTM B117 500-hour salt spray test.
  11. Each unit shall be run tested at factory per ANSI/ASHRAE 37 and provided with a certificate indicating tested pressures, amperages, dates, and inspector.
- D. Unit Cabinet:
1. Galvanized steel with baked enamel finish on external surfaces that are exposed to weather.

2. Interior surfaces exposed to conditioned and return air streams shall be insulated with a minimum ½-inch thick, 1 pound density foil-faced cleanable insulation.
3. Cabinet top cover shall be of one piece construction or where seams exist, shall be double hemmed and gasket sealed.
4. Cabinet panels shall be hinged access panels for filter, compressors, evaporator fan, control box and heat section areas. Each panel shall use multiple quarter-turn latches. Each major external hinged access panel shall be permanently attached to rooftop unit. Panels shall also include tiebacks.
5. Return air filters shall be accessible through a hinged access panel and be on a slide-out track using standard size filters.
6. Holes shall be provided in base rails (minimum 16 gage) for rigging shackles and level travel and movement during overhead rigging operations.
7. Unit shall have a factory-installed internally sloped condensate drain pan, providing a minimum ¾-inch-14 NPT connection to prevent standing water from accumulating. Pan shall be fabricated of high impact polycarbonate material, epoxy powder coated steel or stainless steel and shall slide out for cleaning or maintenance. An alternate vertical drain (¾-inch NPT) connection shall also be available. Drain pans shall conform to ASHRAE 62 self-draining provisions.

E. Compressors:

1. Unit shall be furnished with single or multiple fully hermetic scroll compressors with internal vibration isolators.
2. Dual electrically and mechanically independent refrigerant circuits for 7.5 tons and above.
3. Compressors shall be provided with service access valves.
4. Compressor motors shall be cooled by refrigerant passing through motor windings.
5. Compressors shall be provided with line break thermal and current overload protection.
6. Compressors shall be provided with crankcase heaters, internal high-pressure and temperature protection.
7. Compressors on unit rated 90,000 BTU and below shall be of two stage types.

F. Refrigerant circuit components:

1. Thermostatic expansion valve (TXV) with removable power element.
2. Refrigerant strainer.
3. Service gage connections on suction, discharge, and liquid lines.
4. Solid core refrigerant filter driers.

G. Evaporator and Condenser Coils: Standard Evaporator and condenser coils shall be furnished with:

1. Acceptable Condenser Coils:

- a. Copper-tube, Aluminum-fin coil, with liquid subcooler. Internally enhanced OD seamless copper tubing mechanically bonded to aluminum fins in combination with a factory applied Corrosion-Resistant Epoxy Coating. Provide Protective Hail Guard.
  - b. Spine Fin condenser coil shall be continuously wrapped, corrosion resistant aluminum with minimum brazed joints. This coil is 3/8 inch OD seamless aluminum tubing glued to a continuous aluminum fin. Coils are lab tested to withstand 2,000 pounds of pressure per square inch. The outdoor coil provides low airflow resistance and efficient heat transfer. The coil is protected on four sides by louvered panels.
  - c. Coil shall be air-cooled Micro-Channel Heat Exchanger Technology (MCHX) and shall have a series of flat tubes containing a series of multiple, parallel flow microchannels layered between the refrigerant manifolds. Coils shall consist of a two-pass arrangement. Coil construction shall consist of aluminum alloys for fins, tubes, and manifolds in combination with a factory applied Corrosion-Resistant Epoxy Coating. Provide protective Hail Guard.
2. Evaporator coils
- a. Aluminum plate fins mechanically bonded to enhanced copper tubes with joints brazed.
  - b. Tube sheet openings shall be belled to prevent tube wear.
  - c. Evaporator coil shall be of full-face active design.
  - d. Dual circuit models shall have face-split type evaporator coil.
- H. Evaporator and Condenser Coils shall be furnished with copper plate fins mechanically bonded to enhanced copper tubes with copper tube sheets and brazed joints with a factory applied Corrosion-Resistant Epoxy Coating utilizing dipping process. Provide protective Hail Guard.
- I. Fans and Motors:
1. Evaporator fan shall be a dynamically balanced, double width, double inlet, forward curved centrifugal type, fabricated of steel with a corrosion resistant finish that was tested and rated in accordance with AMCA requirements.
  2. Evaporator fans shall be belt-driven or as indicated on Drawings.
  3. Direct drive fans shall be provided with minimum two speeds taps adjustment or ECM motor.
  4. Evaporator blower and motor shall have permanently lubricated, factory-sealed ball bearings and automatic-reset thermal overload protection.
  5. Belt drive shall include an adjustable-pitch motor pulley. Belt drive fans shall accommodate from 0.6 inch to 1.6-inch external static pressure without changing drives or motors.
  6. Condenser fan shall be a dynamically balanced, propeller type, fabricated of aluminum blades riveted to corrosion resistant steel spiders and direct-driven by a totally enclosed motor. Condenser air shall be discharged vertically. Condenser fan motor shall be high efficiency or ECM type motor and provide cooling operation down to 25 degrees F outdoor temperature with automatic-reset thermal overload protection.
- J. Heating Section:

1. Induced draft combustion type with energy saving direct spark ignition system, redundant main gas valve, and 2-stage heat.
  2. The heat exchanger shall be of tubular section type fabricated of a minimum of 20 gage steel coated with a nominal 1.2 mil aluminum-silicone alloy or 20 gage type 409 stainless steel, including stainless steel tubes, vestibule plate.
  3. Burners shall be of in-shot type fabricated of aluminum coated steel or stainless steel.
  4. Gas piping shall enter unit cabinet at a single location.
  5. Integrated Controls shall provide following:
    - a. Timed control of evaporator fan functioning and burner ignition,
    - b. Anti-cycle protection for gas heat operation (after one cycle on high temperature limit switch and one cycle on flame rollout switch).
    - c. Diagnostic information.
  6. Induced draft motor shall be provided with permanently lubricated, sealed bearings and inherent automatic reset thermal overload protection.
- K. Controls, Safeties and Diagnostic Points:
1. Unit Controls: Unit shall be furnished with self-contained, network capable and ready direct digital controls.
    - a. Controls shall be factory-installed.
    - b. Controls shall operate with zone control systems.
    - c. Controls shall furnish built-in diagnostics for thermostat commands for staged heating and cooling, evaporator-fan operation, and economizer operation.
    - d. Controls shall be furnished with a 5-minute time delay between modes of operation.
    - e. Control circuit shall be protected by a fuse on 24-V transformer side.
    - f. Control shall incorporate passive infrared detection for sensing occupancy in space serve.
  2. Compressor high temperature, high current, internal overloads, internal thermostat.
    - a. Compressor reverse rotation protection.
    - b. Loss-of-charge/low-pressure switch.
    - c. Freeze-protection thermostat, evaporator coil.
    - d. High-pressure switch. The lockout protection shall be easily disconnected at control board, if necessary.
    - e. Internal relief valve.

- f. Anti-recycle relay, or time cycle device to prevent rapid cycling of compressor after any off cycle.
3. Heating section shall be provided with following minimum protections:
  - a. High-temperature limit switches.
  - b. Induced draft motor speed sensor.
  - c. Flame rollout switch.
  - d. Flame proving controls.
  - e. Redundant main gas valve.
  - f. Heating controls shall consist of:
    - 1) 2-stage automatic combination gas valve.
    - 2) Pressure regulator.
    - 3) Electric spark intermittent ignition system or hot surface ignition system.
    - 4) Time delay fan control.
4. Operating Characteristics:
  - a. Unit shall be capable of starting and operating at 125 degrees F ambient outdoor temperature, meeting maximum load criteria of AHRI Standard 210/240 or 360 at plus or minus 10 percent voltage.
  - b. Compressor with standard controls shall be capable of operation down to 25 degrees F ambient outdoor temperature.
5. EMS Diagnostic Points: Provide diagnostic points for units, including those at projects with no EMS.
  - a. Supply air temperature.
  - b. Return air temperature.
  - c. Space temperature.
  - d. Outdoor air temperature.
  - e. Filter status.
  - f. Fan status.
  - g. Compressor status.
  - h. Economizer damper current position.
  - i. Other diagnostic point required by current Title 24, automated fault detection and diagnostics (FDD).



L. Filter Section:

1. Provide filter section with factory-installed low-velocity, throwaway 2-inch thick high capacity, MERV 8 Class 2, or equal, filters of commercially available sizes unless noted otherwise on the drawings.
2. Filter face velocity shall not exceed 300 fpm at nominal airflows.
3. Filter section shall allow installation of standard size air filter.
4. Return air filters shall be accessible through a hinged access panel using standard size filters.

M. 100 Percent Outdoor Air Economizer:

1. Provide 100 percent outdoor air economizers as indicated on drawings.
2. Gear-driven integrated economizers.
3. Integrated integral-modulating type capable of simultaneous economizer and compressor operation.
4. Furnish hardware and controls to provide cooling with outdoor air.
5. Low-leakage dampers not to exceed 3 percent leakage, at one inch wg pressure differential (variable sliding economizer).
6. Barometric relief damper. Damper shall close upon unit shutoff.
7. Differential temperature and enthalpy controller unless indicated otherwise on drawings.
8. Provide units with centrifugal power exhaust controlled by a pressure sensor in space or outdoor air measurement and tracking as indicated on drawings. The controller shall modulate VFD in centrifugal power exhaust to maintain a pressure differential of 0.03 inch of water between indoor and atmospheric pressure. Furnish field wiring to power exhaust and install tubing in space. Provide other accessories as required to comply with UL or ETL requirements.
9. Base Rail: Factory installed on both horizontal and down-flow units.
10. Dampers Using Electronic Actuators:
  - a. Manufacturer: Belimo, Honeywell, Invensys, Johnson Controls, or equal.
  - b. Size for torque required for damper seal at load conditions.
  - c. Coupling: V-bolt dual nut clamp with a V-shaped, toothed cradle.
  - d. Overload Protection: Electronic overload or digital rotation-sensing circuitry without the use of end switches to prevent damage to the actuator during a stall condition.
  - e. Fail-Safe Operation: Mechanical, spring-return mechanism.
  - f. Power Requirements: Maximum of 10 VA at 24 VAC or 8 W at 24 VDC.
  - g. Proportional Actuators shall be fully programmable. Control input, position feedback and running time shall be factory or field programmable by use of external computer software. Diagnostic feedback shall provide indications of hunting or oscillation,

mechanical overload and mechanical travel. Programming shall be through EEPROM without the use of actuator mounted switches.

- h. Actuators shall be listed by ISO 9001, ULC, and CSA C22.2.
- N. Furnish programmable digital thermostat with following features for single zone units that are not provided with variable volume and variable temperature type controls:
  - 1. 7-day time clock.
  - 2. Heat, cool, automatic changeover.
  - 3. Occupied/unoccupied modes.
  - 4. Dry contact switch for input from an external device such as a central time clock, occupancy sensor or a telephone activated device.
  - 5. Remote sensors. School Areas that could be subject to vandalism or accidental impact damage such as Gymnasiums, Auditoriums, Multipurpose Rooms, Corridors, and Lobbies shall be provided with thermostats with remote return air duct or room sensors. Verify remote location of sensors and thermostats with Architect.
  - 6. Robertshaw, Honeywell, Johnson Controls, Carrier, Schneider Electric, Viconics, or equal with built-in occupancy sensor.
- O. Demand Controlled Ventilation:
  - 1. Units with 100 percent outdoor air economizers shall be provided with Indoor Air Quality (CO<sub>2</sub>) Sensor and Accessory Electronic Expansion Boards.
  - 2. The unit shall have ability to provide demand ventilation indoor-air quality (IAQ) control through economizer when provided with an indoor air quality sensor and accessory expansion board.
  - 3. The IAQ sensor shall be wall mounted unless otherwise indicated on Drawings. The set point shall be adjustable.
  - 4. The IAQ sensor shall be powered through unit. If not, required control transformer shall be provided by manufacturer. Coordinate power requirements and location with Division 26.
  - 5. The IAQ sensor shall provide a 4 to 20 mA signal to expansion board.
- P. Parts Availability: Submit proof in writing that majority (minimum 80 percent) of the replacements parts are commonly available and not proprietary. Also, submit proof in writing that a local parts sales and service facility exists, where replacement parts will be warehoused in quantity. Guarantee timely availability for parts that are proprietary.

### **2.03 Exhaust Fan (Ventilating Sets)**

- a. Fans shall be Backward Inclined or single width centrifugal fans, as manufactured by Greenheck or equal.
- b. Fans shall be tested in accordance with AMCA 211 and AMCA 311 test codes for air moving devices and shall be guaranteed by the manufacturer to deliver rated published performance levels. Fans shall be licensed to bear the AMCA certified ratings seal for both sound and air. Fans shall be

licensed to bear the AMCA certified ratings seal for air.

- c. Fan housings shall be heavy gauge, continuously welded construction *coated with 2-4 mils of polyester urethane*. Housings with lock seams or partially welded construction are not acceptable. Housings shall be suitably braced to prevent vibration or pulsation. Housings shall have tapered spun, aerodynamically designed inlet cones or shrouds providing stable flow and high rigidity. Housings shall be of the rotatable design, convertible to eight standard discharge configurations.
- d. Backward inclined wheels shall be single thickness plate type designed for maximum efficiency and quiet operation and shall be of the non-overloading type. Class I wheels, sizes 122 through 270, shall be constructed of aluminum, with blades riveted and welded to the spun wheel cone and backplate. All wheels shall be statically and dynamically balanced. Fan wheels shall be coated with 2-4 mils of polyester urethane.
- e. Shafts shall be AISI 1040 or 1045 hot rolled steel, accurately turned, ground, polished, and ring gauged for accuracy. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed.
- f. Bearings shall be heavy duty, grease lubricated, anti-friction ball, self-aligning, pillow block type and selected for a minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum fan RPM.
- g. Motor sheaves shall be cast iron, and supplied as either variable pitch or fixed pitch. Drives and belts shall be rated for a minimum of 120% of the required motor HP.
- h. The entire fan assembly, excluding the shaft, shall be thoroughly degreased and deburred before application of a rust-preventative primer. After the fan is completely assembled, coat with minimum 2-4 mils of polyester urethane to the entire assembly. The fan shaft shall be coated with a petroleum-based rust protectant.
- i. Accessories such as belt guards, weather covers and access doors shall be provided by Greenheck to maintain one source responsibility.
- j. All fans prior to shipment shall be completely assembled and test run as a unit at operating speed or maximum RPM allowed for the particular construction type. Each wheel shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-96 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.
- k. Exhaust fans for corrosive air as noted on the schedule shall be coated on airstream with Sanitile, Hi-Pro polyester.
- l. The manufacturer shall guarantee the workmanship and materials for at least one year from startup or eighteen months from shipment, whichever occurs first.

## **2.04 SPLIT SYSTEM AIR CONDITIONING UNIT (MITSUBISHI or EQUAL)**

### **A. General**

- 1. The air conditioning system shall be a Mitsubishi Electric as indicated in the drawing. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven air conditioner design. Units shall be as scheduled on the drawings.

2. The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
3. All wiring shall be in accordance with the National Electrical Code (N.E.C.).
4. The units shall be rated in accordance with Air-conditioning Refrigeration Institute's (ARI) Standard 210 and bear the ARI Certification label.
5. The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
6. A dry air holding charge shall be provided in the indoor section.
7. System efficiency shall meet or exceed 16 SEER when part of a 1:1 (indoor/outdoor) system.
8. Delivery, Storage and Handling
  - a) Unit shall be stored and handled according to the manufacturer's recommendations.
  - b) The wireless controller shall be shipped inside the carton with the indoor unit and able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

B. Warranty

1. The units shall have a manufacturer's parts and defects warranty for a period one (1) year from date of installation. The compressor shall have a warranty of 6 years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.
2. Manufacturer shall have over 25 years of continuous experience in the U.S. market.

C. Products

1. General:
  - a. The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit shall be charged with dry air before shipment from factory.
  - b. Unit Cabinet:
    1. The casing shall have a white finish.
    2. Multi directional drain and refrigerant piping, offering three (3) direction pipe alignment for all refrigerant piping and two (2) direction pipe alignment for condensate draining shall be standard.
    3. There shall be a separate back plate that secures the indoor unit firmly to the wall.
  - c. Fan:

1. The evaporator fan shall be an assembly with a line-flow fan direct driven by a single motor.
  2. The fan shall be statically and dynamically balanced and run on a motor with permanently lubricated bearing.
  3. A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
  4. A integral, motorized air sweep flow louver shall provide for uniform air distribution.
  5. The indoor fan shall consist of three (3) speeds: High, Medium and Low.
- d. Filter:
1. Return air shall be filtered by means of easily removed, washable, Catechin, Antioxidant Pre-filter and an Anti-allergy enzyme filter – blue bellows type.
- e. Coil:
1. The evaporator coil shall be of nonferrous construction with smooth plate fins on copper tubing.
  2. The tubing shall have inner grooves for high efficiency heat exchange.
  3. All tube joints shall be brazed with phoscopper or silver alloy.
  4. The coils shall be pressure tested at the factory.
  5. A condensate pan and drain shall be provided under the coil.
- f. Electrical:
1. The unit electrical power shall be 208-230 volts, 1-phase, 60 hertz.
  2. The system shall be equipped with A-Control – a system allowing the indoor unit to be powered directly from the outdoor unit using a 3-wire connection plus ground.
  3. The indoor unit shall not have any supplemental electrical heat elements.
  4. The outdoor unit shall be equipped with Pulse Amplitude Modulation (PAM) control for efficiency.
- g. Control:
1. The unit shall have a wireless controller to perform input functions necessary to operate the system.
  2. The indoor unit shall have the option of a field installed hard-wired remote controller.
  3. The controller shall consist of a Power On/Off switch, Mode Selector, Temperature Setting, Timer Control, Fan Speed Select and Auto Vane selector.
  4. The indoor unit shall perform Self-diagnostic Function, Test Run switching and Check Mode switching.
  5. Temperature changes shall be by 1°F increments with a range of 65-87°F.

6. The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or wired controller, providing emergency operation and controlling the outdoor unit.
7. The indoor units shall be capable of working with single-zone or multi-zone outdoor units.
8. The system shall be capable of automatically restarting when the power is restored after power interruption.
9. Control system shall control the continued operation of the air sweep louvers, as well as provide On/Off, System/Mode function..

## 2. Outdoor Units

- a. The outdoor units are specifically designed to work with the MSY indoor units. The units must have a powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.
- b. Unit Cabinet:
  1. The casing shall be fabricated of galvanized steel, bonderized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection.
- c. Fan:
  1. The unit shall be furnished with a direct drive propeller type fan.
  2. The condenser fan motor shall be a direct current (DC) motor and have permanently lubricated bearings.
  3. The fan motor shall be mounted for quiet operation.
  4. The fan shall be provided with a raised guard to prevent contact with moving parts.
  5. The outdoor unit shall have horizontal discharge airflow.
- d. Coil:
  1. The condenser coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
  2. The coil shall be protected with an integral metal guard.
  3. Refrigerant flow from the condenser shall be controlled by means of a metering orifice.
- e. Compressor:
  1. The compressor motor shall be direct current (DC).
  2. The compressor shall be of a high performance hermetic; inverter driven, variable speed, rotary type.
  3. The outdoor unit shall have an accumulator.

4. The compressor will be equipped with an internal thermal overload.
  5. The outdoor unit must have the ability to operate with a maximum height difference of 35 feet and have refrigerant tubing length of 65 feet between indoor and outdoor units without the need for line size changes, traps or additional oil.
  6. The compressor shall be mounted to avoid the transmission of vibration.
- f. Electrical:
1. The unit electrical power shall be 208/230 volts, 1-phase, 60 hertz.
  2. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.
  3. The outdoor unit shall be controlled by the microprocessor located in the indoor unit and outdoor unit.

## **2.05 CURB MOUNTED EXHAUST FAN**

- a. Curb mounted exhaust fan shall be belt driven centrifugal exhauster as scheduled on the drawings.
- b. Unit shall be complete with aluminum air foil impeller, (with backward curved, backward inclined single thickness) blades dynamically balanced; heavy gauge aluminum hood housing and base and backdraft dampers.
- c. Motor and drive assembly shall be located out of the exhaust air system supported by a rugged galvanized steel frame. Motors shall be factory wired and installed with safety switches.
- d. Fan shall be Greenheck, Cook or equal.

## **2.06 In-Line Fan**

- A. Fan shall be duct mounted direct driven in-line type. The fan housing shall be of the square design constructed of heavy gauge galvanized steel and shall include square duct mounting collars.
- B. Fan construction shall include two removable access panels located perpendicular to the motor mounting panel. The access panels must be of sufficient size to permit easy access to all interior components.
- C. The fan wheel shall be centrifugal backward inclined, constructed of aluminum and shall include a wheel cone carefully matched to the inlet cone for precise running tolerances. Wheels shall be statically and dynamically balanced.
- D. Motors shall be heavy duty ball bearing type, carefully matched to the fan load and furnished specified voltage, phase and enclosure. Motors and drives shall be mounted out of the airstream.
- E. Precision ground and polished fan shafts shall be mounted in permanently sealed, lubricated pillow block ball bearings. Bearings shall be selected for a minimum (L10) life in excess of 100,000 hours at maximum cataloged operating speed.
- F. Drives shall be sized for a minimum of 150% of driven horsepower. Pulleys shall be of the fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.

- G. Motor pulleys shall be adjustable for system balancing. A NEMA 1 disconnect switch shall be provided as standard, except with explosion resistant motors, where disconnects are optional. Factory wiring shall be provided from motor to the handy box.
- H. All fans shall bear the AMCA Certified Ratings Seal for both sound and air performance.
- I. Each fan shall bear a permanently affixed manufacturer's nameplate containing the model number and individual serial number for future identification.
- J. Fans shall be Model BSQ as manufactured by Greenheck, as scheduled on drawings or equal by Cook.

**2.07 VRF System (See Mechanical Schedule)**

**2.08 Air Curtain (See Food Service Drawings)**

**2.09 Make-up Air Unit (See Food Service Drawings)**

**PART 3 – EXECUTION**

**3.01 GENERAL**

- A. Examine areas under which Work of this Section will be performed. Correct conditions detrimental to proper and timely completion of Work. Do not proceed until unsatisfactory conditions have been corrected.

**3.02 EQUIPMENT FOUNDATIONS**

- A. Provide foundations (housekeeping pads, level platforms or curbs) for mechanical equipment whether indicated on drawings or not. Equipment foundations shall be of sufficient size and weight, and of proper design to preclude shifting of equipment under operating conditions, or under abnormal conditions imposed upon equipment.
- B. Provide foundations (housekeeping pads, level platforms or curbs) for mechanical equipment whether indicated on drawings or not. Foundations shall meet requirements of equipment manufacturer and, when required by Architect, obtain from equipment manufacturer, approval of foundation design and construction, for equipment to be installed. Equipment vibration shall be maintained within design limits, and shall be dampened and isolated. Isolators shall be bolted to a structural member so as to be readily removable.

**3.03 EQUIPMENT DESIGN AND INSTALLATION**

- A. Uniformity: Unless otherwise specified, equipment of same type or classification shall be product of same manufacturer.
- B. Application: Only provide equipment as reviewed by Architect.
- C. Equipment Installation: Equipment installation shall be in strict accordance with these Specifications, and installation instructions of manufacturers. Equipment installed on concrete foundations shall be grouted before piping is installed. Piping shall be installed in such a manner as not to place a strain on equipment. Flanged joints shall be adequately extended before installation. Piping shall be graded, anchored, guided and supported, without low pockets.
  - 1. Install equipment in a neat and skillful manner, properly aligned, leveled, and adjusted for satisfactory operation.



2. Install so connecting and disconnecting of piping and accessories can be readily accomplished, parts are readily accessible for inspection, service and repair. Space shall be provided to readily remove filters, coils, compressors and fan wheels. Access doors shall be hinged with cam lock door handles.
3. Provide flexible connections for duct, pipe and conduit connections at moving equipment.

**3.04 ROOFTOP EQUIPMENT MOUNTING**

- A. Downflow Packaged Units: Install unit on a prefabricated mounting frame or curb secured directly to roof. Follow manufacturers recommended installation manuals. Submit Shop Drawings for review by Architect.
- B. Horizontal Flow Packaged Units: Install unit on platform or prefabricated mounting frame or curb secured directly to roof designed to suit roof conditions and requirements of provided unit. Submit Shop Drawings for review by Architect.

**3.05 FAN INSTALLATION**

- A. General.
  1. Mount base mounted fans on vibration isolation bases secured to equipment support.
  2. Hanging suspended fans with vibration isolation hangers.
- B. Installation.
  1. Set fans in place, level and adjust vibration isolation elements for proper clearances prior to fitting and attaching flexible connections.
  2. Security bolt bases and vibration isolation elements in place and block until system is ready for testing.
- C. Electric motors.
  1. Make final motor and belt drive alignments prior to operating fans.

**3.06 NOISE AND VIBRATION**

- A. Operation of Equipment: Mechanical equipment and piping systems shall operate without exceeding specified noise and/or vibration levels.
- B. Corrective Measures: If specified noise and/or vibration levels are exceeded, provide necessary changes to reduce noise and/or vibration levels to within specified levels.

**3.07 FIELD TESTS AND INSPECTION**

- A. General: Perform field inspections, field tests, and trial operations as specified in Section 23 0500: Common Work Results for HVAC. Provide labor, equipment and incidentals required for testing. The Project Inspector will witness field tests and trial operations as specified in Section 23 0500: Common Work Results for HVAC.
- B. Equipment and Material: Equipment and material certified as being successfully tested by manufacturer, in accordance with referenced Specifications and standards, will not require re-testing

before installation. Equipment and materials not tested at place of manufacture will be tested before or after installation, as applicable or necessary, to determine compliance with reference Specifications and standards.

- C. Start-Up and Operational Test: System shall be started up and initially operated with components operating. During this test, various strainers or filters shall be periodically cleaned until no further accumulation of foreign material occurs. Adjust safety and automatic control instruments as required to provide proper operation and control sequence. Refer to Section 23 0500: Common Work Results for HVAC.
- D. Extent of Field Tests: After installation and before completion, Work of this Section shall be subjected to required field tests, including those specified here and in Section 23 0500: Common Work Results for HVAC.
- E. Operation and Maintenance Data: Provide required operation and maintenance data as specified in Section 23 0500: Common Work Results for HVAC.

### **3.08 REFRIGERANT PIPING**

- A. Unless otherwise indicated, main liquid and suction lines from condensing unit to evaporator coil shall be of sizes specified by manufacturer.
- B. Refrigeration piping shall be refrigeration grade copper tubing, type L hard-drawn. In instances where refrigeration lines are installed in an inaccessible location and must be snaked through conduit or a trench, that portion of tubing required to complete connections through conduit or trench may be soft drawn. Maintain entire system clean and dry during installation. Pipe shall be sealed until installed.
- C. Refrigeration piping, both hard and soft-drawn, shall be straight and free from kinks, restrictions and horizontal runs shall be sloped towards compressor one inch to 10 feet wherever possible. Vapor line oil traps shall be installed on bottom of vertical risers and inverted oil trap shall be installed on top of vertical risers.
- D. Joints shall be installed with Sil-Fos 15, Silvaloy 15, or equal.
- E. Flare nuts required on suction lines shall be of short forged or frost-proof type. Other fittings shall be standard sweat-soldered type. Ells and return bends shall be long radius type. Install leak lock material.
- F. Refrigeration Piping: Joints shall be silver brazed and leak tested. Field fabricated lines shall be thoroughly flushed and cleaned before connection. Bleed nitrogen through lines during silver brazing, and cap and seal lines when not completed and connected to equipment.
- G. Sleeve penetrations of floors, walls and ceiling to allow for free motion of piping. Provide 24 gage galvanized iron pipe and chrome-plated escutcheon plates. Pack annular space between pipe and sleeve with incombustible material such as fiberglass and seal each end with mastic to provide a waterproof seal.
- H. Install insulated couplings at points of connection between dissimilar metals for cathodic protection. Insulate copper tubing from ferrous materials and hangers with 2-inch thickness of 3-inch wide strip, 10 mil polyvinyl tape wrapped around pipe.
- I. Support piping by iron hangers and supports. Hydra-Zorb cushion clamps, LSP Products Group Acousto Clamp, or equal, on non-insulated piping, and Klo-Shure coupling clamp on insulated piping, or equal.
- J. Provide saddles to protect pipe insulation.

- K. Provide connections of copper, copper plated steel, steel, and brass pipe and tubing with Harris Products Group Safety-Silv 56, Lucas-Milhaupt, Inc., or equal, complying with ANSI/AWS A5.8 and NSF 51.
- L. Insulate refrigerant suction lines.
- M. On split heat pump systems, insulate both vapor and liquid lines. For insulation materials, refer to Section 23 0700: HVAC Insulation.

**3.09 ALL OTHER EQUIPMENT**

- A. Install in accordance with manufacturer's installation instruction, UBC, UMC, UPC & NEC.

**3.10 CLEANUP**

- A. Remove rubbish, debris and waste materials and legally dispose of off Project site.

**3.11 PROTECTION**

- A. Protect Work of this Section until Substantial Completion.

**END OF SECTION 15800**

## **SECTION 15840**

### **AIR TRANSMISSION AND DISTRIBUTION SYSTEM**

#### **PART 1 - GENERAL**

##### **1.01 WORK INCLUDES**

- A. Ductwork and related accessories required for a complete air transmission and distribution system for the HVAC systems indicated on the drawings and as specified.

##### **1.02 RELATED SECTIONS**

- A. Section 15020: Equipment and System Tests
- B. Section 15030: Identification
- C. Section 15050: Basic Materials and Methods
- D. Section 15160: Vibration Isolation and Seismic Restraints
- E. Section 15180: Insulation
- F. Section 15800: Heating, Ventilating and Air Conditioning Equipment

##### **1.03 SUBMITTALS**

- A. Requirements: In addition to the requirements of Section 15010, GENERAL PROVISIONS, the submittal material shall include six (6) copies of descriptive data for all products and materials including, but not limited to the following.
  - 1. Descriptive data.
    - a. Grilles, registers and diffusers.
    - b. Dampers.
    - c. Air Filters.
    - d. Rigid and Flexible ducts.
    - e. Ductwork accessories.
    - f. Access panels.
    - g. Sound traps.
    - h. Automatic fire dampers.
    - i. Combination fire/smoke dampers.
    - j. Special Exhaust System.
  - 2. Shop Drawings.

- a. Ductwork typical construction.
- b. Ductwork layout.
- c. Tabulation of all air supply grilles, registers and diffusers listing location, size, air volume, flow and sound generated.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS**

- A. General.
  1. Galvanized steel sheets shall be first quality cold rolled, galvanized, open hearth soft steel, capable of double seaming without fracture, meeting ASTM 526-64T.
  2. Steel shapes shall be hot rolled, galvanized.
  3. Screws and bolts shall be cadmium plated.
  4. Materials and fabrication shall comply with 2016 California Mechanical Code Chapter 6.
- B. Materials, Application.
  1. Low pressure ductwork shall be galvanized steel.
  2. Medium pressure ductwork except for special exhaust system shall be galvanized steel.
  3. Transverse joints in rectangular ducts may be manufactured type similar to Ductmate Industries, Inc.
- C. Circular ducts.
  1. Circular (across section) ducts shall be galvanized steel of spiral seam construction, fittings shall have continuous, welded, stamped construction both manufactured by United Sheet Metal, Omniduct, Spiromatic, Spiro-Duct, Casco, or equal.
  2. Make joints between two ducts with beaded sleeve joint, with duct sealer applied to make end, mechanically fastened with sheet metal screws or pop rivets. Sealing of ductwork shall be as specified hereinafter.
  3. Radius of elbows shall be minimum of 1-1/2 times diameter or maximum width of duct. Gored ells are not acceptable.
  4. Tee fittings shall be of conical type changing in shape from round to rectangular with transformation joint with minimum of 1 to 7 taper.
  5. Corrugated or flexible metal duct, or shop fabricated circular ducts will not be acceptable.
  6. Circular ducts with liner shall be lined with 1" thick insulation. Circliner as manufactured by Casco, or equal, and shall meet the requirements of NFPA 90A as a duct liner.
    - a. Insulation shall have the following Underwriter's rating:  
Flame Spread less than 25

Fuel Contributed less than 20  
Smoke Development less than 25

- b. Insulation density shall be 4 PCF with thermal conductivity of 0.23 BTU @ 75°F "R" value =8.0
  - c. Duct liner shall be coated with neoprene to prevent erosion of insulation.
- D. Access doors.
- 1. For square ducts.
    - a. Access doors shall be of size to permit inspection and adjustment and replacement of fire damper links, fan bearings, etc. through access opening. The minimum size shall be 12" x 12" x 26 gauge in furred spaces and 18" x 22 gauge in equipment rooms and areas, wherever possible. Demonstrate adequacy of size as required by the Engineer.
    - b. Door shall be double wall type with felt or foam rubber gasket seal and shall have butt hinges and sash locks on 2-opposite sides, at a maximum spacing of 9". Use sash locks on both sides where hinged door swings may be obstructed.
    - c. Door in insulated ducts shall contain a full thickness of insulation between the door panels.
  - 2. Access doors for circular ducts shall be United Sheet Metal, Omniduct, Pottorff, Spiro-Duct, or equal. Access door shall have same requirements as items 1a and 1b above.

## 2.02 INSULATED FLEXIBLE DUCTWORK

- A. General.
- 1. Insulated flexible ductwork where shown on drawings, shall be factory preinsulated, spiral helix spring permanently bonded to an interior liner, and sheathed in an exterior foil scrim vapor barrier jacket.
  - 2. Manufacturer: Glenflex SLS-DS, Casco Silent Flex II, Thermaflex or approved equal.
  - 3. Insulated flexible ductwork shall be installed for low pressure duct application only.
- B. Low pressure ductwork.
- 1. Low pressure ductwork shall have precut lengths with continuous inner liner, factory installed female collars and fastening devices at each end, a factory installed manual balancing damper assembly complete with a level position indicator and a positive locking device.
  - 2. Provide all round duct takeoffs from low pressure ducts with aluminum draw band, or Spin-In Twist-Lok fittings, approved for installation in return air plenum.
  - 3. Maximum length 7'-0".
- C. UL requirements.
- 1. The entire flexible duct assembly shall be labeled in accordance with UL-181 Class I air duct requirements and not have a flame and smoke spread rating in excess of 25/50.
  - 2. Installation must conform with factory supplied and UL approved print installation instruction

sheets.

3. Submittals will be required to include product data sheets and installation instruction sheets in order to assure awareness of the proper installation technique.

D. Thermal conductance.

1. Insulation must achieve a minimal thermal conductance (c) rating of 0.23 and must be completely shielded from the airstream at all times.

## 2.03 ACCESS PANELS

A. General.

1. These Specifications cover prefabricated wall and ceiling access panels normally required to provide access to equipment requiring servicing and adjustment.
2. The types of wall and ceiling access panels required are similar to Milcor Styles A, L, K and M, Potter-Roemer No. 265 and 275, Zurn Series Z-1376, Carey Styles HP, HM, HPE, and AT, or Karp #214, for the appropriate locations and with hinge, metal gauge, latch, and other modifications necessary to conform to requirements specified hereinafter. Panels shall be UL labeled to match wall or ceiling rating requirements.

B. Location.

1. Furnish for installation by the pertinent trade, access panels wherever fans, air handlers, air filters, valves, balance valves, damper operating mechanisms, fire damper access doors and similar items normally requiring adjustment or servicing are installed in concealed spaces.
2. Where furred ceilings are of the removable panel type of construction, the removable panels will be used for access to small equipment such as valves, dampers and controls.

C. Sizes.

1. Size access panels to permit removal of equipment for servicing, and in no case shall be less than 12" x 12" clear in usable openings.
2. Where proper servicing of the equipment required the entrance of a serviceman, size the access opening accordingly with minimum net clear opening not less than 18" x 24".
3. Where access panels are to be located in acoustic tile ceilings, increase size of access panel, when required, to next nearest full tile size so that access panel can be installed integral with tile pattern without cutting into tiles.

D. Construction.

1. Construct access panels neatly and substantially of steel, complete with frame and with necessary grounds for attaching to metal lath, tile walls or other construction, as required. Hinges shall be of concealed type. Minimum door and frame gauges shall be USS No. 16 and USS No. 18 respectively. Furnish panels and frames with a factory-applied prime coat, except panels in tile walls shall be chrome plated and polished or satin finish Type 304 stainless steel.
2. Panels to be installed in acoustical tile ceilings shall be as specified in paragraph (1) above except that the door panels shall be recessed and faced with acoustical tile to match the ceiling tile so the frame will be concealed. The depth of the door recess shall be such that door facing tile are flushed with ceiling tile.

E. Exceptions.

Normally, access doors to large attic spaces will be furnished under another section, and when so furnished will be shown on the Architectural plans. Examine all plans carefully and furnish any access panels or doors to equipment in these spaces where they are not to be furnished under the other section.

## 2.04 CONTROL DAMPERS

A. Manual volume dampers.

1. Dampers installed in ductwork, in furred ceiling spaces or in roof spaces with less than 30" of clearance below beams, joints or other construction, and where access panels are not provided shall have MAT Electro-Balance Damper System and wired to single connector remote location unless otherwise noted or approved equal.
2. Damper blades shall not exceed 10" in width and shall be a minimum of 16-gauge stainless steel, or galvanized steel. All dampers shall be frame mounted. The damper frame shall be of minimum 13-gauge steel channel. Except that dampers less than 18" maximum size may have 16-gauge by 1-1/4" minimum flat bar stock frames. Multi blade dampers shall be arranged for opposed blade operation.
3. Steel parts shall be galvanized or factory-finished with a metal primer and enameled finish. All parts of dampers in outside air intakes shall be galvanized. Bearings shall be precision sleeve type of oil-impregnated bronze, Teflon or Nylon.
4. Dampers and hardware for stainless steel ducts shall be stainless steel to match duct.
5. Provide locking and indicating quadrants, Ventlok or Duro-Dyne, installed in accessible locations. For wrapped ducts, quadrants shall be bracket mounted with a recessed flange.
6. Where dampers are inaccessible for adjustments, provide MAT Electro-Balance Damper System and wired to single connector remote location unless otherwise noted or approved equal.

B. Gravity dampers or backdraft dampers. Gravity dampers shall have aluminum blades with felt seals mounted in a 16-gauge steel frame. Bearings shall be precision machined oil-impregnated bronze, Teflon or Nylon of the sleeve type. The steel frame shall be factory-finished with metal primer and enamel finish, American Venting, Inc., Pottorff, or equal.

C. Motor operated dampers.

1. Dampers and operators shall be furnished under Section 15900, Energy Management and Temperature Control System.

## 2.05 FIRE AND SMOKE DAMPERS

A. General.

1. Fire and smoke dampers shall be designed and constructed with NFPA standard 90A and UL Standard 555 and 555S or the California State Fire Marshall, and shall be so labeled with permanent identification.
2. Ducts with a width or height dimension of 12-inches or less shall be a type or so arranged that the damper's free area opening is the same as the connecting duct.



3. NFPA or UL approved installation instructions shall be shipped with each and smoke damper.
  4. Provide access doors in ducts on the fusible link side of each fire and smoke damper.
- B. Automatic Fire Dampers (AFD).
1. Dampers shall be rated for use in 2-hour, (4-hour) separation walls.
  2. Damper blades shall be out of the airstream, interlocking shutter type, 16 gauge steel, minimum.
  3. Fusible link shall be rated for 165-degrees F.
  4. Complete assembly shall be galvanized or for stainless steel ducts shall be stainless steel, all riveted construction.
  5. For stainless steel or aluminum duct, complete assembly shall be stainless steel all riveted construction.
  6. Manufacturer.
    - a. Square or rectangular duct horizontal AFD shall be Pottorff VFD-10-IS-AB for concrete application and Pottorff CFD-20 for non-concrete application..
    - b. Round duct, horizontal AFD shall be Pottorff CFD-20 for non-concrete application and VFD-101S-AB for concrete application.
    - c. Installation instructions shall be provided for each unit.
- C. Automatic Smoke Dampers (ASD).
1. Damper shall be 1-1/2 hour rated and motor operated.
  2. Frame shall be minimum 16 gauge galvanized steel formed from a continuous channel section. Bearings shall be formed in the frame and shall match the contour of the blade. Blades shall be roll formed single-thickness galvanized steel and shall overlap adjacent blades and minimum of 3/4". Blade edge and jamb seals shall be low friction type non-degradable steel-to-steel and shall withstand 350°F with a minimum leakage of 10 cfm/ft at 1" w.g., stainless steel flexible metal compression type jamb seals.
  3. The torque required to maintain the rating in the closed position shall be 0 in. lbs. Blade linkage shall be interconnected to the damper jackshaft on both ends.
  4. Each damper shall be classified by Underwriters Laboratories as a Leakage Rated damper for use in smoke control systems under the latest version of UL 555S. The leakage rating under UL 555S shall be no higher than leakage class II (10 cfm/ft. @ 1" w.g. and 20 cfm/ft. @ 4" w.g.).
  5. Dampers shall be tested in HVAC systems to ensure operation with pressures of at least 4" w.g. in the closed position, and 3500 fpm in the open position.
  6. Actuators shall be fail closed upon loss of power and shall be rated to an elevated temperature of 350°F, depending upon the actuator, solenoid motor only, no stall motor allowed.

7. Actuators shall be factory installed, electric type and shall provide a minimum of 75 in-lbs of torque at the damper shaft. Actuator bracket shall be designed to allow for the installation of ductmate without realignment or alterations. Motor actuator shall be Belimo and shall be by ISO 9000 recognized control manufacturer and certified by ETL laboratories for one year continuous power applications, and must have been tested for 20,000 cycles in accordance with UL standard 555S, 4<sup>th</sup> edition, June 1, 1999.
  8. Actuators shall be tested for functionality at 350°F per UL 555S and must be certified by the manufacturer for use in “continuous power on” applications, and should not require maintenance.
  9. Damper and actuator assembly shall be factory cycled to ensure proper operations. Damper shall be installed in accordance with manufacturer’s installation instructions. Damper shall be Pottorff Model FSD142 or equal.
  10. Damper assembly shall include dual position indicator switch package capable of positively indicating each dampers status as being full-open or full-closed at remote central control panel.
  11. Smoke detector shall be furnished by Electrical contractor to match fire alarm system and installed on ducts by mechanical contractor.
- D. Combination Fire and Smoke Dampers (CFSD).
1. Dampers actuator and smoke detector shall be as specified for automatic smoke dampers, above.
  2. Each damper assembly shall be equipped with a UL 33 listed melting fusible link that provides for fail closed fire and smoke operation independent of the actuator position, electric sensing stats (fire stat) will not be accepted. Fusible link shall disengage damper linkage from actuator and mechanically lock damper in a closed position when duct temperature exceeds 165°F.
  3. The design shall only allow damper to be reopened when the smoke detector signal is clear and the duct temperature is at a safe level, as per NFPA 92A.
- E. Refer to Section 15900, for automatic dampers.

## **2.06 AIR DISTRIBUTION EQUIPMENT**

- A. General.
1. Refer to submittals, Paragraph 1.03.
  2. Equipment shall provide required air flow, throw and spread without drafts or noise.
  3. Size of supply, return, exhaust outlets and inlets as indicated on the drawings are approximate only. Sizes shall be as recommended by the manufacturer to meet the noise criteria requirements of the area served as recommended by the ASHRAE Guide as a minimum, with drafts (air velocities) at the occupancy level not in excess of 50 FPM.
  4. Provide all accessories required to effect these conditions.
  5. Replace all grilles, registers, dampers or diffusers causing excessive drafts or noise at no additional cost to the Owner.

6. Performance ratings shall be certified by the ADC.
  7. Noise level ratings shall be in accordance with ADC Test Code No. 1062RI and ASHRAE Standards 36-62 and 36B-63.
  8. Test room and test instruments shall be ADC approved.
  9. Manufacturer: Air distribution equipment shall be of specified types manufactured by Anemostat, Titus, Krueger, Price or equal.
- B. Air distribution equipment types.
1. For lay-in T-bar ceiling diffuser shall be perforated face plate, modular core diffuser with removable hinged perforated face plate with 24" x 24" nominal panel size, ODB and flexible duct adapter, applicable to the ceiling it is installed. Anemostat PREO, PRCO, PRTO, or equal.
  2. For lay-in T-bar ceiling, return air registers and grilles shall be removable hinged perforated face plate with 24" x 24" nominal panel size, ODB and flexible duct adapter, applicable to the ceiling it is installed, Anemostat 3PR, 3PC, 3PT or equal.
  3. Floor mounted return air for Auditorium shall be Steel Crest Model MS-8 with radial damper. Assembly shall be 11 gauge steel construction. Radial damper shall be adjusted from the top thru damper adjustment hole. Return air shall be thru mesh screen around the circumference of the return air assembly. Finish with flat black paint. Size to match existing floor opening. Supplier to verify in field.
  4. Exhaust air and return air registers in rooms without lay-in T-Bar ceiling and sidewall application, shall be Anemostat S3HOD, with horizontal face bars set at an angle of 45-degrees with OBD.
  5. Ceiling diffusers in rooms without lay-in T-Bar ceiling shall be Anemostat RMD-S or approved equal. Modular ceiling diffuser with OBD and flexible duct adapters as needed.
  6. Sidewall supply registers shall be double deflection grille with opposed blade damper attached. Grilles shall have two sets of individually adjustable louvers, Anemostat S2H0.
  7. Ceiling diffusers with automatic fire dampers, where diffusers are installed in fire rated ceilings, shall be State Fire Marshal approved type. Rated enclosure between rated ceiling and fire dampers shall be provided by the Contractor under this Section.
  8. Screened opening shall be No. 16 ga. wire 1/2" mesh galvanized mounted in a metal frame.
  9. Opposed blade dampers (OBD) will not be required in all ceiling diffusers, return air registers, supply air registers and exhaust air registers if an accessible manual volume damper (MVD) is installed upstream of diffusers or registers.
  10. All perforated diffusers and registers shall be steel construction, equipped with volume controls and adjustable baffles where required for pattern control and shall have factory applied off-white prime coat finish.

## **2.07 SOUND ATTENUATORS (SOUND TRAPS)**

- A. General.
  - 1. Sound attenuators shall be factory assembled unit, tested and certified by an independent acoustic testing laboratory.
  - 2. Manufacturer: Sound traps shall be Dynasonics, Industrial Acoustics Company, Vibro-Acoustics, or equal.
- B. Construction.
  - 1. Casings shall not be lighter than 22 gauge galvanized steel and baffling shall not be less than 26 gauge perforated galvanized steel in accordance with ASHRAE Guide recommended construction for height pressure ductwork. Seams shall be locked form and mastic filled.
  - 2. Acoustical fill shall be inorganic long fiberglass or mineral fiber packed under not less than 5% compression, and shall have a flame spread classification of 25, smoke development rating 0, and fuel contribution 20.
- C. Acoustical Performance.
  - 1. Sound trap shall be tested by an independent testing laboratory and shall certify that units meet the scheduled acoustic ratings as scheduled on drawings.
- D. Certification.
  - 1. The sound traps shall meet all applicable codes and shall be so certified.
- E. Testing.
  - 1. A representative sample shall be tested in accordance with the procedure specified to demonstrate compliance with these specifications.
  - 2. Applicable Standards: ADV Test Code No. 1062R1 and ASHRAE Standards 36-62 and 36B-63.
  - 3. Test conditions: Unit to be tested to be same type and size as that specified in the schedule.
  - 4. Insertion Loss: The acoustical performance of the sound traps shall meet or exceed the values indicated in the schedule and shall be determined by the Dynamic Net Insertion Loss method utilizing air flow through the attenuator at the face velocities indicated on the schedule. The test method shall be conducted in a manner to eliminate effects such as end reflection, directivity, flanking transmission, standing waves, etc.
  - 5. Self Noise: At the time the Insertion Loss measurements are conducted, the self noise of the sound trap shall be measured by turning off the sound source and measuring the noise generated by the Sound trap alone.
  - 6. Static Pressure Drop: The unit shall be installed in a duct of the same inside dimensions as the unit. Measurements shall be made in the duct at a point not less than 6 ft. upstream or 12 ft. downstream from the unit. The data shall be obtained using pressure traverses to assure uniform readings within 10% of the duct centerline pressure value.
- F. Acoustical Specifications.

1. The minimum dynamic insertion loss, the maximum self noise sound power level and the maximum static pressure drop shall be in accordance with the tabulated values in the schedule, when tested at the face velocity and static pressure specified.
- G. Submittal.
1. Construction details and certified test results for forward and reverse flow, and a complete description of test conditions and measurement procedure shall be submitted to the Architect for approval.
- H. Sound Trap Schedule. See Mechanical drawings.

## **2.08 AIR FILTERS**

### **A. General**

1. Furnish filters complete with media, retainer frames and housing certified to meet design requirements.
2. Filters shall be by Luwa Aerostar, Eco-Aire, Camfil-Farr, American Air Filter or equal.

### **B. Types**

1. Disposable
  - a. Air filters shall be Filtration Group Aerostar Series 400 medium efficiency, 2-inch pleated extended media replacement type. Filter shall be preformed, pleated design having not less than 4.4 square feet of filtering media per square foot of face area and shall have a minimum of 11 pleats per foot. Filter frame shall be constructed of rigid, heavy duty, high wet strength board. Stiffening members shall be used for pleat stabilization. Filter media shall be reinforced lofted non-woven cotton fabric continuously laminated to a supporting welded wire grid conforming to the configuration of the pleats. Initial resistance shall not exceed 0.20 inches w.g. at 500 FPM, approach velocity.
  - b. The efficiency of the filter shall average not less than 25% on the ASHRAE 52-2 Standard test. Arrestance value shall be 89% - 92% Merv 8 minimum.
  - c. The filter shall be U.L. listed Class 2.

### **C. Holding Frames**

1. Holding Frames for Built Up Filter Banks shall be Burke Environmental Astr-Frame Model ASF-24243 (304 SS). Holding frame shall be constructed of 16 gage 304 Stainless Steel.
2. The holding frame shall be of all welded construction. Welds shall be continuous on all matching joints and miters. Welds shall be ground to form a smooth surface on the outside periphery of the frame and on the flush mitered joints on the sealing flange of the frame.
3. The frame shall be equipped with various lances to facilitate the use of various types of fasteners depending on the application. The lances shall be designed in such a manner that they can be installed and removed without the use of tools.

4. Holding frames shall be assembled to form built up filter banks with the use of nuts and bolts and vertical support members as detailed on the drawings.
5. Dow 732 Sealant shall be applied to the periphery of all Holding Frames prior to clamping, assembly and bolting.
6. Refer to assembly drawings for assembly and reinforcing detail.

## **2.09 SPECIAL EXHAUST SYSTEMS**

- A. Kitchen hood exhaust dishwasher, cart and can wash area.
  1. Ductwork construction shall be 16 gauge for duct areas 4 sq. ft. or under: 14 gauge for duct areas larger than 4 sq. ft.
  2. Where round ductwork is shown, ducts and fittings may be similar to Selkirk Metalbestos Model PS.

## **PART 3 - EXECUTION**

### **3.01 SHEET METAL DUCTWORK AND PLENUMS**

- A. General.
  1. Install ductwork of sizes, runs and connections as shown on the drawings.
  2. DUCT DIMENSIONS INDICATED ON THE DRAWINGS ARE NET INSIDE DIMENSIONS. SHOULD DUCT BE INDICATED WITH ACOUSTIC LINING, ADD TWICE THE THICKNESS OF THE ACOUSTIC LINER IN BOTH DIMENSIONS (WIDTH AND HEIGHT) TO OBTAIN THE GROSS SHEET METAL DUCT DIMENSIONS.
  3. All sheet metal construction not shown or specified shall be constructed to conform to SMACNA HVAC Duct Construction Standards latest edition."
  4. Verify all dimensions at the site, making all field measurements and shop drawings necessary for fabrication and erection of sheet metal work. Make allowances for beams, pipes or other obstructions in building construction and for the work of other sections. Check plans showing work of other trades and consult with Engineer in the event of any potential interference.
  5. Fabricate ductwork in workmanlike manner with airtight joints, presenting smooth surfaces on inside, neatly finished on outside, construct with curves, bends, turning vanes to aid the easy flow of air.
  6. Install ductwork at maximum practical height above the work of other trades whenever possible so as to clear all obstructions, preserve headroom, and keep openings and passageways clear, whether shown on plans or not. The use of variation in duct sizes and additional duct fittings will be allowed, if required, to clear minor obstructions and maintain clearances. These shall be reviewed by the Engineer. Make such changes without additional cost to the Owner.
  7. Pipes, conduits, tie or hanger rods or other work shall not pierce and/or pass through the air passageway of ducts or plenum except where shown.
  8. Make internal ends of "S" slip joints in direction of airflow.

9. For pocket lock transverse joints, the pocket frame shall be made 1/8" smaller than the ducts in both dimensions (width and depth) for ease of field locking. All clips used in the flanges shall be of the same gauge as duct material.
10. Intermediate reinforcement shall be on all four sides of duct, bolted together and bolted or riveted to the duct.
11. Ductwork shall have rectangular or circular cross-section as shown on drawings.
12. Rectangular ducts shall be diagonally creased (crossbroken) in both directions or machine beaded on all four sides. Circular ducts shall be spirally seamed.
13. Longitudinal seams shall be hammered airtight.
14. Caulk automatic damper frames airtight.
15. Caulk ductwork connecting to fresh air intakes watertight for a minimum length equal to the height and shall be installed to pitch to intakes and drain to outside of building.
16. Clean all dirt and foreign matter from ductwork, and clean diffusers, registers and grilles.
17. Round duct may be substituted for rectangular duct and vice versa, maintaining the same cross sectional area. Submit for approval.

B. Construct low pressure rectangular steel ductwork as follows:

1. Wall thickness shall be:

<u>Maximum Duct Size In Inches</u>	<u>US. Standard Gauge</u>
Up through 12	26
13 through 30	24
31 through 54	22
55 through 84	20
85 and over	18

2. Construction shall be:

- a. Longitudinal seams shall be Pittsburgh Lock seams.
- b. Transverse or cross joints and duct reinforcing shall be in accordance with the following schedule:

CROSS JOINTS

<u>MAX. DUCT DIM., INCHES</u>	<u>DUCTS IN CONCEALED AREAS</u>	<u>DUCTS VISIBLE FROM REGULARLY OCCUPIED AREAS</u>
18 & under	Hemmed "S" slip on 8' max centers	20-gauge drive slip & plain slip on 8' max. centers.
19 thru 30	Hemmed "S" slip on 5' max. centers	16-gauge drive slip & Hemmed "S" slip on 5' max. centers.

- 31 through 42      1" x 1/8" bar reinforced standing "S" on 5' centers or 10' centers with 1" x 1" x 1/8" intermediate reinforcement angles on center lines between.
- 43 through 54      1-1/2" x 1/8" bar reinforced standing "S" on 4' centers, or on 8' maximum centers with 1-1/2" x 1-1/2" x 1/8" intermediate reinforcement angles on centerline between.
- 55 through 84      Angle reinforced 1-1/2" standing "S" on 4' maximum centers using 1-1/2" x 1-1/2" x 1/8" reinforcing angles with 1-1/2" x 1-1/2" x 1/8" intermediate reinforcement angles centered in between.
- 85 through 96      Angle reinforced 1-1/2" standing "S" on 4' maximum centers using 1-1/2" x 1-1/2" x 3/16" reinforcing angles with 1-1/2" x 3/16" intermediate reinforcement angles centered in between.
- Over 96              Angle reinforced 2" standing "S" on 4' maximum centers using 2" x 2" x 1/4" reinforcing angles with 2" x 2" x 1/4" reinforcing angles with 2" x 2" x 1/4" intermediate reinforcement angles centered in between.

c.      Manufactured flanged joints by Ductmate Industries, Inc. may be used instead of pocket lock standing seams except that cleats shall be of steel.

3.      Sealant Joints

- a.      Make all cross joints and all transverse joints of all metal ducts airtight by sealing with Design Polymerics DP 1010 water based high pressure duct sealant. Sealant shall be, water based, UL rated, crack resistant, mildew resistant, non-flammable and meets the requirements of NFPA 90A & 90B. Installation shall be in accordance with manufacturer's installation instruction.
- b.      Seal punched holes and corner cracks with mastic.
- c.      Manufactured seams shall be sealed as recommended by the Manufacturer except that leaks shall be sealed by same method as 3.a. above.

D.      Construction of circular steel ductwork.

1.      Wall thickness for circular ducts shall be as follows:

<u>Duct Diameter</u>	<u>Spiral Lock Seal Duct</u>	<u>Round Duct Fittings</u>	<u>Girth Joints</u>
Up to 8"	26 ga.	22 ga.	2" long beaded sleeve joint.
9" thru 22"	24 ga.	20 ga.	4" long beaded sleeve joint.
23" thru 36"	22 ga.	20 ga.	4" long beaded sleeve joint or draw band.
38" thru 50"	18 ga.	18 ga	4" long beaded sleeve joint or draw band.

2.      Fittings and connections for circular ducts.

- a.      Duct and fitting shall be joint by slipping the projecting collar of the fittings into the duct. Insertion length shall be a minimum of 2". Mechanically fasten and seal.
- b.      Make all cross joints and all transverse joints of all metal ducts airtight by sealing with Design Polymerics DP 1010 water based high pressure duct



sealant. Sealant shall be, water based, UL rated, crack resistant, mildew resistant, no-flammable and meets the requirements of NFPA 90A and 90B. Installation shall be in accordance with manufacturer's installation instructions.

- c. Seal punched holes and corner cracks with mastic.
- d. Manufactured seams shall be sealed as recommended by the Manufacturer except that leaks shall be sealed by same method as 2.a above.

F. Duct Hangers.

- 1. Duct supports for rectangular ducts shall be in accordance with, Chapter 6 of the 2016 California Mechanical Code, except hanger spacing shall be 5'-0" maximum.
  - a. Single horizontal ducts shall have hanger straps double bolted to transverse joints, to reinforcing angles, or extended continuously under the ducts and riveted or screwed to both sides.
  - b. For metal deck construction, double bolt the hangers to inserts of the same material as the hanger inserted in slots in the decking prior to concrete deck pour.
  - c. Where ducts are run one above the other, they shall be individually supported on a trapeze of steel angles with threaded steel rods and full-size nuts securely fastened to the overhead construction with bolted clip angles. Maintain a distance of 3" between ducts wherever possible, but in no event shall the distance be less than 2". The minimum sizes of the horizontal angles and the hanger rods shall be in accordance with Chapter 6, of the 2016 California Mechanical Code.
  - d. Support vertical ducts with bolted angles located at each floor on each side of each duct. Angles shall be in accordance with, Chapter 6, of the 2016 California Mechanical Code.

- 2. Hangers for circular ducts shall conform to the following:

<u>Duct Diameter</u>	<u>Strap Hangers</u>	<u>Maximum Spacing</u>	<u>No. Of Hangers</u>
Up to 18"	1" x 22" ga.	6'-0"	1
19" thru 36"	1" x 20" ga.	6'-0"	1
37" & Larger	2" x 18" ga.	6'-0"	1

- 3. Earthquake restraints shall be in accordance with Seismic Restraint Manual Guidelines for Mechanical Systems, Latest Edition.

G. Plenum Construction.

- 1. Construct Plenums in accordance with SMACNA, HVAC Duct Construction Standard, latest edition. This section is general and does not show arrangement of a particular installation.
- 2. Add additional angles for reinforcing, bracing, or supporting when required by the Engineer to prevent bulging, sagging, breathing, or vibration in excess of 1% of span at the center of the span.

3. Make plenum doors of No. 18 USS gauge galvanized steel, 20" x 54" size minimum. Reinforce doors with steel angle stiffeners and close on an angle reinforced opening. Provide adequate hinges on each door for a tight rigid connection and provide cinch type latches that will draw door tightly closed and will be operable from both sides of door by means of lever handles. The handles and latches shall be "Ventlok" No. 260, or equivalent by Elgin or Duro-Dyne. Install felt or rubber gaskets completely around each door to provide an airtight fit. Doors shall be arranged to open against air pressure.
  4. Seal seams around filter and coil housing and all plenums with caulking compound. Examine all plenum spaces carefully to assure that they will be airtight. Seal all openings airtight where ducts, pipes, and conduits pierce the plenum spaces.
  5. Joint caulking or sealing compound shall be 3M Standard Grade Duct Sealer, Tuff-Bond No. 29, Permacel No. EZ-4719, United Duct Sealer, Benjamin Foster No. 30-02, or Chicago Mastic #10-108, as recommended and guaranteed by the Manufacturer for this specified application and shall be applied in accordance with the manufacturer's recommendations.
- H. Transitions - all ductwork.
1. Taper sides of ducts in a diverging airflow maximum of 1 to 8 slope per side.
  2. Taper sides of ducts in a converging airflow maximum of 1 to 4 taper.
- I. Duct elbows - rectangular ducts.
1. All duct elbows, including supply, exhaust, and return shall be either square or made with the inside radius ells to accomplish this radius requirement.
  2. Square elbows may be used instead of radius type and shall be fitted with turning vanes whether shown on the drawings or not. The turning vanes shall be as shown in SMACNA duct manual, except that the first vane shall be tightly fitted against the heel of the elbow. Shop fabricated duct turns may be used, provided that they are mounted in manufactured rails and are submitted and approved by the Engineer. Duct turning vanes shall be of the same metal as ductwork. Except where space will not otherwise permit, a duct size change in the elbow is not acceptable.
  3. All duct offsets and branches to more than one outlet shall be made with elbows, except that each change in direction may be made with a single mitered joint in lieu of an elbow provided the change is not more than 1 to 5.
  4. For all branch duct connections, a 90-degree, tap-in type connection may be used. Such connections will not require an outside radius on the branch ducts, and the inside radius may be a 45-degree angle of length equal to 20% of branch duct width. A branch duct is any duct which does not rebranch.
- J. Flashing ducts through roof: Install flashing to cover top and sides of curb and fit closely around duct. Cover top edge of base flashing with collar soldered to duct and turned down over base flashing. Fabricate flashing from 24-gauge galvanizing steel.
- K. Support ducts above roof with 1-1/2" X 1-1/2" X 1/8" angles (minimum), fitted with 6" X 6" X 1/8" thick base plate all welded construction. See detail on drawings. Secure base plate to roof structure and set in pitch pocket.
- L. Test holes: Drill instrument test holes into ductwork for pitot tube tests where required by testing agency under Equipment & Systems Tests Section 15020. Install Ventlok No. 699

and/or 699-2 instrument plugs.

- M. Provide and install access doors in ducts where fire, smoke or automatic dampers, fan bearings, filters, humidifiers or other equipment is installed in ducts.
- N. Provide and deliver to the appropriate trade for installation where you direct, access doors or panels in building construction for access to duct doors or panels, damper quadrants, control devices, or other devices requiring access.
- O. Duct liner.
  - 1. Ducts and plenums shall be lined as specified in Section 15180, "Insulation".
- P. Flexible duct connection: Provide 16-ounce neoprene impregnated glass fabric at all connections to fans. Install with metal collar frames at each end of connections. Attach fabric tightly to ducts. Allow at all connections to fans. Install with metal collar frames at each end of connections. Attach fabric tightly to ducts. Allow at least 1-inch slack in connections. Make fabric connections minimum 4-inches long. Ventfabrics, Duro-Dyne or equal. Provided galvanized sheet metal cover on top and 2 sides of the flexible connections secured to the units, for all equipment above roof and exposed to weather.
- Q. Kitchen hood exhaust
  - 1. Installed to conform with requirements of NFPA 96 and local codes.
  - 2. All joints and seams shall be welded tight, longitudinal seams shall be top side.
  - 3. Adequate number of cleanout doors shall be provided for access to all interior parts of duct for cleaning without reaching in excess of 5'-0".
  - 4. Cleanout door shall also be provided at every change in direction of duct and at every branch duct.
  - 5. Doors shall be 12" x 24" of same material as duct, hinged with cam type latches, made airtight by means of mechanically secured mineral wool rope strips. Door frame shall be welded 1" x 1" x 1/8" angles.
  - 6. Install ducts with a minimum slope of 1" per foot upward away from exhaust hood.
  - 7. Manufactured ducts shall be installed in conformance with the manufacturers recommendations.
- R. Cart and can wash area exhaust
  - 1. All joints shall be welded air and watertight.
  - 2. Longitudinal seam shall be top side.
  - 3. Duct shall be installed with 1/4" per foot upward slope away from the area.
- S. Dishwasher
  - 1. All joints shall be welded air and water tight.
  - 2. Longitudinal seems shall be top side.
  - 3. Duct shall be installed with 1/4" per foot upward slope away from the hood.

### **3.02 ACCESS TO EQUIPMENT**

#### **A. General.**

1. Install all ductwork, equipment and accessories to permit access for maintenance.
2. Any relocation of conduit, piping, equipment and accessories required to provide maintenance access shall be accomplished by the Contractor at no additional cost.

#### **B. Access.**

1. Provide access doors where any dampers, instruments, controls, motors and other equipment requiring access for servicing, repairs, or replacement are located behind walls, chases or above non-removable ceilings.
2. The location of access doors shall be coordinated with and installed by the applicable trade installing walls or ceilings.
3. The Contractor shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

### **3.03 DIFFUSERS, REGISTERS AND GRILLES INSTALLATION**

#### **A. Coordination with ceiling features.**

1. Install all inlets and outlets as close as possible to that shown on the plans but adjust to fit into the ceiling materials shown on the Architectural, Electrical and Fire Sprinkler plans.
2. In dry wall and plaster ceilings, diffuser, register or grilled trim shall overlap the plaster line with adequate trim.
3. In ceilings with acoustic tile adhesively applied to drywall or plaster ceilings, furnish diffusers, registers or grilles with overlapping margins.
4. In perforated metal plan systems: Square or rectangular diffuser and grille edge trim shall be flush with the finished ceiling.
5. Furnish and install plaster frames for diffusers, grilles and registers which are located on finish plaster surfaces. Plaster frames for grilles and registers shall be set flush with the finished surface and attached to ductwork by hickey punching, with rivets or sheet metal screws. Grilles and registers shall be fastened to the frames with sheet metal screws. All inlet and outlet devices shall be gasketed for air tight mounting.
6. Provide any intake duct not protected by a louver, grille or register with a 1/4" mesh galvanized screen over open end.
7. Paint all ductwork visible through grilles, registers, and other openings with one coat of flat black paint.

### **3.04 AIR FILTERS**

- A. Provide clean filters as required by "Equipment and System Tests" Section 15020.

- B. New filter media: After completion of the testing of the air handling equipment and systems and approval of same, but before final acceptance of the project, replace all disposable filters.

### **3.05 FLEXIBLE AIR DUCT**

- A. Installation

- 1. Insulated flexible ducts shall be continuous, single pieces not over 3' in length for medium pressure and 7' in length for low pressure, and shall be adequately supported and shall have a minimum inside bending radius two-thirds the internal diameter, but ducts shall not be installed with a radius of bend less than two duct diameters.
- 2. Install flexible ducts in as straight a manner as possible. Cut ducts to lengths required rather than create bends to take up excess lengths.

- B. Joining

- 1. Where flexible ducts join other ductwork and air terminals, use duct sealer and sheet metal or nylon cinch type bands to secure flexible duct and make the joint airtight..

**END OF SECTION 15840**

## 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 16712: Fire alarm Systems.

#### 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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass&amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass&amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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;

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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:

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
Single pole	PS20AC1-RPL	HBL1221-PL	1221-PL
Double pole	PS20AC2-RPL	HBL1222-PL	1222-PL

Three way	<u>PS20AC3-RPL</u> <u>Pass &amp; Seymour</u>	<u>HBL1223-PL</u> <u>Hubbell</u>	<u>1223-PL</u> <u>Leviton</u>
Single pole	<u>PS20AC1-RPL7</u>	<u>HBL1221-PL7</u>	<u>1221-7P</u>

- 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.

<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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, 0.25 inches 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

**Note to project architect: Semi-recessed units shall be used unless existing site conditions will prevent their use.**

- 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 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 16712: Fire alarm Systems.

#### 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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass&amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

<u>NEMA #</u>	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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.

<u>NEMA #</u>	<u>Pass&amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
(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;

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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:

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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.

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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

	<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
Single pole	PS20AC1-RPL	HBL1221-PL	1221-PL
Double pole	PS20AC2-RPL	HBL1222-PL	1222-PL

Three way	<u>PS20AC3-RPL</u> <u>Pass &amp; Seymour</u>	<u>HBL1223-PL</u> <u>Hubbell</u>	<u>1223-PL</u> <u>Leviton</u>
Single pole	<u>PS20AC1-RPL7</u>	<u>HBL1221-PL7</u>	<u>1221-7P</u>

- 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.

<u>Pass &amp; Seymour</u>	<u>Hubbell</u>	<u>Leviton</u>
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, 0.25 inches 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

**Note to project architect: Semi-recessed units shall be used unless existing site conditions will prevent their use.**

- 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.

**NOTE TO SPECIFIER: FOR NEW CONSTRUCTION PROJECTS MODIFY THIS PARAGRAPH TO INCLUDE STRUCTURAL STEEL AS PART OF THE GROUNDING ELECTRODE SYSTEM.**

- 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-pressure 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:

**Note To Specifier:** In new schools and some existing schools the program signal is through the pa system; program bells are not present. Delete reference to program bells as needed.

<u>SYSTEM</u>	<u>COLOR CODE</u>
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. Section 16120: 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:

**NOTE TO PROJECT ARCHITECT: Drawings shall indicate locations where these types of fittings are required.**

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 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:

**NOTE TO PROJECT ARCHITECT: Drawings shall indicate locations where these types of fittings are required.**

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 16215

### ELECTRICAL POWER AND CONTROL

#### PART 1 - GENERAL

##### 1.1 BIDDER QUALIFICATIONS

- A. Successful bidder will provide a complete, operational electronic access control system without regard to specific components that may not be called out in this document.
- B. Successful bidder will have a current C-10 license provided by the State of California.
- C. Successful bidder will be an authorized Identocard dealer that has successfully completed all factory trainings to maintain that dealership.
- D. Successful bidder will be responsible to ensure all aspects of the installation are to specification including wiring, terminations, and power supplies. Coordination with other trades to ensure this criteria is met.

##### 1.2 REFERENCES

- A. The following reference standards and model code documents shall be used in estimating and detailing door hardware, and shall be considered as a standard of quality, function, and performance, as applicable:
  - 1. I.B.C. Current Adopted edition for construction documents.
  - 2. NFPA-80 Fire Doors & Windows (current year adopted).
  - 3. NFPA-101 Life Safety Code (current year adopted).
  - 4. NFPA-105 Smoke Control Door Assembly. (current year adopted)
  - 5. ANSI-117.1 1992 Edition Providing Accessibility and Usability for Physically Handicapped People.
  - 6. A.D.A.A.G Americans with Disabilities Act Accessibility Guidelines.

##### B. DEFINITIONS

###### 1. DEFINITIONS

- a. API: Application Programming Interface
- b. AVI: Audio Video Interleave
- c. CA: Certificate Authority
- d. CAC: Common Access Card
- e. CE: European Union Conformity
- f. CPU: Central Processing Unit
- g. CSV: Comma Separated Values
- h. DNS: Domain Name Server
- i. DSM: Door Status Monitor
- j. DVR: Digital Video Recorder
- k. EACS: Electronic Access Control System
- l. EPS: Events Per Second
- m. FCC: Federal Communications Commission
- n. FIPS: Federal Information Processing Standard
- o. FIFO: First In – First Out
- p. FTP: File Transfer Protocol
- q. FRAC: First Responder Authentication Credential
- r. GB: Gigabyte
- s. GSOC: Global Security Operations Center
- t. HA: High Availability
- u. HTML: Hypertext Markup Language
- v. H.264: Video Compression Standard
- w. I<sup>2</sup>C: Inter-Integrated Circuit



- x. IEEE: Institute of Electrical and Electronics Engineers
- y. I/O: Input/Output
- z. IP: Internet protocol
- aa. IS: Integrated System
- bb. JPEG: Joint Photographic Experts Group
- cc. LAN: Local area network
- dd. LDAP: Lightweight Directory Access Protocol
- ee. MB: Megabyte
- ff. MJPEG: Motion JPEG
- gg. MSATA: Mini-Serial Advanced Technology Attachment
- hh. MSO: Mobile Security Officer
- ii. MTBF: Mean-Time Between Failure
- jj. NAS: Network Attached Storage
- kk. NBAPI: NetBox Application Programming Interface
- ll. NECA: National Electric Code Association
- mm. NFPA: National Fire Protection Association
- nn. NVR: Network Video Recorder
- oo. ODBC: Open Database Connectivity
- pp. OS: Operating System
- qq. OVID: Open Video Integration Driver
- rr. PDF: Portable Document Format
- ss. PIN: Personal Identification Number
- tt. PIV: Personal Identity Verification
- uu. PoE: Power over Ethernet
- vv. PTZ: Pan-tilt-zoom
- ww. RAID: Redundant Array of Inexpensive Disks
- xx. RAM: Random Access Memory
- yy. REX: Request to Exit
- zz. RFID: Radio Frequency Identification
- aaa. RoHS: Restriction of Hazardous Substances
- bbb. ROM: Read Only Memory
- ccc. RU: Rack Unit
- ddd. SFTP: Secure File Transfer Protocol
- eee. SHA: Secure Hash Algorithm
- fff. SIO: Serial Input/Output
- ggg. SLA: Sealed Lead-Acid
- hhh. SMS: Security Management System or Short Message Service (text messaging)
- iii. SSL: Secure Sockets Layer
- jjj. SUSP: Software Upgrade and Support Plan
- kkk. TCP: Transmission control protocol - connects hosts on the Internet
- lll. TIA: Telecommunications Industry Association
- mmm. TWIC: Transportation Worker Identification Credential
- nnn. UI: User Interface
- ooo. UPS: Uninterruptible power supply
- ppp. UTP: Unshielded Twisted Pair
- qqq. VMS: Video Management System
- rrr. WAN: Wide area network
- sss. Wi-Fi: Wireless Network

- A. Product Data: Provide a catalog cut sheet, clearly marked and identified, illustrating and describing each product included in the Access Control Schedule.
1. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
  2. Formulate catalog cut sheets into sets and include a set with each copy of the Hardware Schedule submitted.
- B. Access Control Schedule: Prepared by or under the supervision of Access Control Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Access Control Schedule.(ACS)"
  2. Organization: Organize the ACS Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Coordinate ACS Schedule with Section 08710. DO NOT DUPLICATE PRODUCT CALLED OUT IN SECTION 08710
  3. Content: Include the following information:
    - a. Type, style, function, size, label, hand, and finish of each ACS item.
    - b. Complete designations of every item required for each door or opening including name and manufacturer.
    - c. Fastenings and other pertinent information.
    - d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule. Use same scheduling sequence and format and use same door numbers and hardware set numbers as in the Contract Documents.
    - e. Explanation of abbreviations, symbols, and codes contained in schedule.
    - f. Mounting locations for Access Control System product.
    - g. Access Control System product sizes and materials.
    - h. Verify the Section 08710 Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems. Notify Architect and Owner Representative if operational description does not meet the need and provide corrected description
  4. Submittal Sequence: Submit the final Access Control System at earliest possible date, particularly where approval of the Access Control System must precede fabrication of other Work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Access Control Schedule.
- C. Wiring Diagrams: Verify the Section 08710 for all electrified hardware items specified for this Project, If Section 08710 is not correct, provide complete wiring diagrams along with riser drawings and elevations, showing locations where such material is to be installed. Wiring Diagrams shall be submitted with Hardware Schedule. Verify and coordinate with the electrical systems installer.
1. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
- D. Keying: Verify with Section 08710 all keying will function properly with the Access Control System devices.
- E. Operation and Maintenance Data: For each type of Access Control door include in maintenance manuals. Provide latest, revised and updated schedule of Access Control System devices, cut sheets, and project schedule. In addition, furnish one (1) copy of maintenance and parts manuals for those items for which they are readily available and normally provided.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Minimum of two (2) experienced and certified installers who have completed ACS material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance for a minimum of 5-years. Submit copies of the Certificates of Completion for the ACS platform being submitted.
- B. Source Limitations: Obtain each type and variety of Access Control System hardware from a single manufacturer, unless otherwise indicated.
- C. Fire-Rated Door Assemblies: Provide ACS hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- E. Access Control System contractor with physical location for technical staff within 130 miles of the project. Submit copies of State issued driver's license for installation technicians.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Marking and Packaging: All items of hardware shall be delivered to the site in manufacturer's original cartons or boxes. Mark each box with hardware heading and door number according to approved hardware schedule.
- B. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation: Provide a complete packing list showing items, door numbers and hardware headings with each shipment.
- C. Store hardware in shipping cartons above ground and under cover to prevent damage. Provide secure lockup for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable -so that completion of the Work will not be delayed by hardware losses both before and after installation
- D. Aluminum Door Hardware: Coordinate with Section 08411 for all Access Control System hardware prior to Aluminum Door Hardware Delivery. Deliver hardware for aluminum doors as directed by the door supplier for installation by Section 08411.

#### 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system, as applicable.
- C. Pre-Installation meetings with Electrical Contractor for all associated cable for the ACS and with the Door Hardware Contractor to insure requested door operation by owner.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Access Control Schedule" Article. Products are identified by using door hardware designations, as follows:
1. Provide the materials or products indicated by trade names, manufacturer's name, or catalog number.
  2. Provide manufacturer's standard products meeting the design intent of this Specification, free of imperfections affecting appearance or serviceability.
  3. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.

## 2.2 SPECIAL REQUIREMENTS

- A. Electrified Locksets:
1. All locksets to be grade 1 heavy duty mortise. Refer to Section 08710 and ACS below for electrified locksets
  2. Terminate, test, and commission all electrified locksets
  3. Provide all manufacturer recommended cable for Electrified Lockset and Intelligent Integrated Access Control Locks
- B. Electrified Exit Devices:
1. Refer to Section 08710 and ACS below for all electrified exit devices
  2. Terminate, test, and commission all electrified openings
  3. Provide all manufacturer recommended cable to electrified exit devices
- C. Card readers:
1. Coordinate with Section 08710 for all card reader locations and operation. DO NOT DUPLICATE card readers call out in section 08710
  2. Mount readers no more than 36" from finished floor.
  3. Provide all manufacturer recommended cable for card readers
  4. Terminate, test, and commission all card reader
- D. Integrated Access Control Locks
1. Coordinate with Section 08710 for all integrated access control lock locations, description of operation.
  2. Terminate, test, and commission all Integrated Access Control Locks
  3. Provide all manufacturer recommended cable for Integrated access control locks unless connected to Owner Supplied Local Area Network (LAN) and then coordinate IP address(es) required from Owner Representative.
  4. Coordinate with Section 08710 for all "LOCKDOWN" buttons & keyed campus "LOCKDOWN" buttons as required. Button locations shall be as follows: Reception Area Room # 103 & Office Manager Room # 105. Coordinate sequence of operations for each button. STI Stopper Station product is preferred. Coordinate location with Architect.
- E. ACS control panels
1. Coordinate with Electrical Contractor for all for rack or wall space required for panel installation
  2. Coordinate with Electrical Contractor for wire runs from panel location to all ACS devices. Electrical Contractor shall supply, install, and test all cable for ACS, Nurse Call, and iPhone. System Integration Contractor shall supply wiring diagrams, wiring paths, and wire types for Electrical Contractor.

- F. Power Supplies
  - 1. Coordinate with section 08710 for all power supplies. DO NOT DUPLICATE power supplies. Verify with section 08710 amps required to operate Access Control System devices.
  - 2. Coordinate 110/120 VAC connections required for all power supplies with Division 16.
  - 3. Terminate, test, and commission all ACS devices to power supplies in Section 08710. Notify in writing the Architect and Owner Representative if additional power.
  - 4. All power supplies to include dual Battery Back Up.
- G. Software License
  - 1. All software license, support agreements and control operational license to be provide for a period of Two (2) years.
  - 2. Disclose all support agreements and cost associated with those agreements listed in G 1 above for years 3, 4, and 5 at the time of bid.
- H. Credentials
  - 1. Shall be proximity card 37x, Facility code 1462, start @ #316451, Schlage Part Number 7510.
  - 2. Shall be compatible with the card readers for aptiQ wall mounted
  - 3. Shall be compatible with Schlage AD and NDE series integrated access control locks for future growth.
  - 4. Shall be ordered in a 37 bit format or higher with the Facility Code and Sequential numbering provided by an Owner Representative at the time of order.
  - 5. Provide 200 + proximity cards for campus use.

## 2.3 MATERIALS

- A. Screws and Fasteners: Provide all screws and fasteners of the proper size and type to properly anchor or attach the item of hardware scheduled. Provide all fasteners with Phillips heads, unless security type screws (spanner-head or torx-head) are hereinafter specified.

## 2.4 HARDWARE PRODUCTS

ITEM	SPECIFIED	APPROVED EQUIVALENT
Software	Identicard	No Substitution
Licenses	Identicard	No Substitution
Panels	Identicard	No Substitution
Cards/FOBs	Schlage	No Substitution
Cables	Belden Plenum	Architectural Approved Equal
Wireless Locks	Schlage AD	No Substitution
Hardwired Locks	Schlage AD	No Substitution
Card Readers	Schlage MT Series	No Substitution

## 2.5 FINISHES

- A. Hardware finishes as follows:
  - 1. 626 - Satin Chrome-plated.

## 2.6 CABLE

- A. Cable shall comply with ACS and Door Hardware Manufacturer specified requirements and supplied, installed, and tested by Electrical Contractor. All cable must comply with access control and locking hardware manufacturer specifications.
- B. Access Software Control consultant is responsible to establish all cable runs, termination, testing, and commissioning for all ACS devices.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Establish all wiring paths for ACS devices.

#### **3.2 PREPARATION**

- A. Coordinate with Owner Representative for all IP address, router ports, and other Owner Supplied LAN equipment or ports required for an operational access control system.
- B. Coordinate rack space or wall space required for ACS devices.
- C. Verify Owner Supplied LAN or VLAN is to ACS manufacturer standards.
- D. Verify Owner supplies PC, Laptops, and PDAs are compatible with all ACS devices and software.

#### **3.3 INSTALLATION**

- A. Installation shall be by a qualified installer with a minimum five (5) years' experience in the installation of commercial grade ACS devices. Manufacturer's instructions shall dictate templating and installation. NOTE: Supplier to provide all necessary mounting brackets, special templates, shoe supports, spacers or other special items required to make door closers and overhead stops to function together. Also if shim kits or drop brackets are required provide them as well for a complete installation. Extras will not be allowed for these items after bid.
- B. Mounting Heights: Mount ACS hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- C. Prior to hardware installation, the Contractor shall setup a meeting with the Hardware Supplier, the Door Hardware installer and the ACS supplier to ensure the installer has and understands the manufacturers installation requirements for all hardware items
- D. Install each ACS item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

- E. Boxed Power Supplies: Coordinate with Section 08710 and Contractor to locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.
- F. Work with all other trades to establish wiring paths for all ACS devices.
- G. Work with all other trades to establish the location of each Power Supply. Each power supply shall power (2) o Von Duprin QEL devices and the ACS devices in the same area requiring power. Power cable for devices connecting to the ACS devices shall be supplied and installed by Access Software Control consultant.

### 3.4 FIELD QUALITY CONTROL

- A. Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation, and check for damaged or defective items before installing additional ACS devices. Observe and inspect that all hardware has been installed to its correct destination in proper working order.
- B. Independent ACS Consultant: Owner reserves the right to engage a qualified independent ACS Consultant to perform a separate independent inspection and to prepare an inspection report.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended.
  - 1. Coordinate door control devices with Contractor to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 2. Have all ACS opening Adjusted immediately before installing ACS devices.
- B. At completion of the installation and prior to Substantial Completion, make final adjustments to all ACS devices. Leave all hardware clean and fully operable. Should an item be found to be defective, it shall be repaired or replaced as directed.
- C. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's ACS Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware. Coordinate activity with the Installer's Door Hardware Consultant

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by ACS installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.7 DEMONSTRATION

- A. Instruct Owner's Personnel in proper adjustment ACS devices at final installation.
- B. After ACS is installed and adjusted, the Supplier shall inspect the job with the Architect and the General contractor to determine if the hardware is functioning properly

3.8 HARDWARE SCHEDULE

- A. Install, terminate, test, and commission all devices listed in section 3.8 and listed below. Coordinate Operational Description with Section 08710 supplier and Owner Representative. Section 08710 Hardware Groups are listed below to prevent DUPLICATION of access control devices. Use operational description as a guide and verify in writing a description requiring changes for turn-key ACS operation.
- B. The hardware sets listed below represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process.

**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 16515: Lighting.

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 2<sup>nd</sup> Edition Suppressed 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 44 dB.
    - b. 100 MHz at 44 dB.
    - c. 10 MHz at 44 dB.
    - d. 100 MHz at 44 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 2<sup>nd</sup> Edition.
    - d. IEEE C 62.45.
    - e. IEEE 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 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 2<sup>nd</sup> Edition Suppressed 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 44 dB.
  - b. 100 MHz at 44 dB.
  - c. 10 MHz at 44 dB.
  - d. 100 MHz at 44 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 2<sup>nd</sup> Edition.
  - d. IEEE C 62.45.

- e. IEEE 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 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 16470

### POWER DISTRIBUTION UNITS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- 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 16515  
LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes:
  - 1. Furnish and install a low-voltage lighting control system, as indicated on the Drawings and as specified.
  - 2. Systems shall be furnished with networkable relay panels each complete with the required relays, transformers, and control electronics. The system shall be furnished with all hardware and resident software, occupancy sensors, constant light controllers, exterior light sensors, occupancy sensors, local wall switches and dimmer switches and all required conduit and wiring for a complete and functional installation.
- C. Related Sections:
  - 1. Section 16010: Basic Electrical Requirements.
  - 2. Section 16050: Basic Electrical Materials and Methods.
  - 3. Section 16120: Low-Voltage Wire 600
  - 4. Section 16130: Raceways
  - 5. Section 16445: Panelboards and Signal Terminal Cabinets.
  - 6. Section 16515: Lighting Control Systems

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Submit a complete one-line diagram of the proposed system configuration for Architect/Engineer's review. The riser diagram shall identify but not be limited to all wiring, equipment, components, interconnection with other systems, and location and type of raceways.
- C. Manufacturer's Data: Submit catalog cuts and description of each system component.
- D. Provide wiring diagrams and installation details for lighting control equipment.

- E. Shop Drawings: Submit a complete set of detailed Shop Drawings for the entire lighting control system; the shop drawings shall include but not be limited to relay panels with designations and dimensions, day light sensors locations based on manufacturer's recommendations, and system components with manufacturer's part numbers.
- F. Installation Instructions: Submit manufacturer's written installation instructions, wiring diagrams. Instructions shall include recommendations for handling of equipment and parts, and protection and storage requirements.

### 1.03 QUALITY ASSURANCE

- A. Components shall be listed and labeled by Underwriter's Laboratories (UL), or another Nationally Recognized Testing Laboratory (NRTL).
- B. Lighting Control Systems shall comply with the state of California Building and Electrical Codes, and Title 24 energy requirements in effect at time of submittal for building permit.
- C. Conduct a coordination meeting with the lighting control contractor, electrical contractor, EOR, Manufacturer Representative, and the OAR to validate the location of all lighting control system components, including daylight sensors. Sensors shall be located based on manufacturer's recommendations.

### 1.04 WARRANTY

- A. Manufacturer shall provide a 3 year material warranty.
- B. Installer shall provide a 2 year labor warranty.

### 1.05 SYSTEM REQUIREMENTS

- A. The lighting control system must be able to communicate with fully digital centralized relay panels, remote relay panels, digital switches, photocells, analog switches, various interfaces, and shall include all operational software. The lighting control system shall be integrated into a single system, except for areas controlled by a motion sensor; such as rooms with one luminaire and emergency fixtures designed to operate 24 hours a day, 7 days a week. Distributed lighting control shall be provided using a networkable remote relay panel. A Centralized relay panel shall control corridors and site lighting. Lighting control system shall include all hardware and software; software shall be resident within the lighting control system. System shall provide local access to all programming functions at the master Lighting Control Panel (LCP) and remote access to all programming functions via dial-up modem and through any standard computer workstation running an industry standard internet browser. Lighting control system shall have a server built into the master LCP that "serves" HTML pages to any authorized workstation. WEB front end shall be accessible over an LAUSD provided Ethernet 10/100 Mbps to the local area network. Protocol shall be TCP/IP and allow either http (hypertext transfer protocol) or https (hypertext transfer protocol secured)



connections. Desktop computers are not part of this section and will be provided by others. Non-networked, non-digital, non-server capable systems are not acceptable.

- B. System software shall provide real time status of each relay, each zone and each group.
- C. Lighting control system shall be able to be monitored and take commands from a remote Personal Computer (PC); should the remote PC go off-line all system programming uploaded to the lighting control system shall continue to operate as intended. Systems requiring an on line PC or server for normal operation are not acceptable
- D. All devices shall be able to be pre-addressed at the factory. Systems requiring field addressing only are not acceptable.
- E. All programs, schedules, time of day, etc., shall be held in non-volatile memory at power failure. At restoration of power, lighting control system shall implement programs required by current time and date.
- F. System shall be capable of flashing lighting OFF/ON for any relay or lighting zone prior to the lights beings turned OFF. The warning interval time between the flash and the final lights off signal shall be definable for each zone. Occupant shall be able to override any scheduled OFF sweep using local lighting zone override switches within the zone or occupied space. Occupant override time shall be pre-programmed not to exceed two hours, or current California Title 24 requirements.
- G. The system shall be capable of implementing ON, OFF, Raise (dimming), and Lower (dimming) commands for any relay, group or zone by means of digital specification grade line voltage type wall switches, analog low voltage switches, photocells, web based software, or other devices connected to programmable inputs in the lighting control system.
- H. The lighting control system shall provide the ability to control each relay and each relay group. All programming and scheduling shall be able to be done locally at the master LCP and remotely via dial up modem and via the Internet. Remote connection to the lighting control system shall provide real time control and real time feedback.
- I. System may consist of centralized relay panels, remote relay panels, digital switches, analog switches, photocells, motion sensors, lumen control devices, dimmer switches, and various digital interfaces. Verify exact components specified. Remote relay panels, smart breaker panels, centralized relay panels and digital switches shall communicate as one network. Where Remote Relay Panels (RRP) are indicated on drawings, they shall control all lighting fixtures in that area or space, provide power to occupancy sensors and take input from daylight and occupancy sensors. RRP's shall be capable of taking inputs from LAUSD specification line voltage type switches, and if classroom dimming is indicated on the plans, they shall be capable of outputting an independent 0v - 10v dimming signal for each remote relay provided. All remote relay panels, switches, photocells and occupancy sensors shall be wired per lighting control manufacturers instructions.

## 1.06 LIGHTING CONTROL OVERVIEW-BY AREA CONTROLLED

### A. Classrooms:

1. Classrooms are controlled by a combination of occupancy sensors, daylight controllers and dimmers switches, ON/OFF and quiet time switches.
  - a. The purpose of the occupancy sensors is to automatically switch lights OFF when the room is not occupied.
  - b. Daylight controls shall automatically adjust light intensity according to the natural light level in the room. The daylight sensors shall be enabled and disabled by the occupancy sensors to ensure daylight controlled lights never automatically turn ON when room is unoccupied. The lighting control system shall allow an authorized person to disable the daylight sensors and dimming controls.
  - c. Wall switches are used to manually switch lights ON and OFF as required. Switches shall comply with all the operational requirements of the current T24, and include location of device, accessibility and override capability.
  - d. Quiet time switch is used to temporarily bypass the occupancy sensors for a programmed time period, typically 1 hour. This will prevent nuisance OFF sweeps when the room is quiet with no human movement.

### B. Corridors and Open Areas:

1. Corridors and other common areas are controlled by a combination of programmable low voltage keyed switches and time schedules supplied by the networked lighting control system.
  - a. Low voltage keyed switches are operable 24 hours a day and are used to manually switch lights ON and OFF as required.
  - b. The central timer is used to automatically sweep lights OFF after hours, and provide other scheduling capability as necessary.
  - c. Interior corridors also require occupancy sensors.

### C. Restrooms and Utility Rooms:

1. Restrooms and Utility rooms contain line voltage switches that operate downstream of the adjoining corridor or open area.
  - a. When the upstream relay is activated by either the central timer or the programmable switch, power will be present and the local line voltage switch will be operable.
  - b. When the upstream relay is de-activated, power will not be present and the local line voltage switch will be inoperable.

- D. Exterior Security Lights:
1. Exterior wall packs and security lights are controlled via exterior light sensors. (Refer to article 2.06)
    - a. When natural light level is insufficient, the lights are ON.
    - b. When natural light level is sufficient, the lights are OFF.
- E. Exterior, Non-Security Lights:
1. Exterior parking lot lights, pathway lights and decorative lights are controlled by an exterior light sensor in conjunction with time schedules provided by the networked lighting control system.
    - a. When natural light level is insufficient or the timer is ON, the lights are ON.
    - b. When natural light level is sufficient or the timer is OFF, the lights are OFF.

## PART 2 - PRODUCTS

### 1.01 CENTRAL LIGHTING CONTROL PANELS

- A. Central Lighting Control Panels (CLCP) shall be located in the electrical closets and shall be Douglas PWEX Series or LC & D #GR-2400 series or approved equal. Panels shall be surface or flush mounted type as indicated on Drawings, with a hinged door assembly. Doors shall be furnished with flush type locks, spring latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys. Panels shall include the following components or features:
1. Shall be preprogrammed and preassembled with all required control equipment and relays as indicated on the lighting plans.
  2. Shall be equipped with suitable dividers separating Class 1 and Class 2 compartments, 120v and 277v compartments as well as “normal and emergency” compartments.
  3. Lighting control relays as indicated on Drawings. Provide 10% spare relays for all centralized relay panels up to the maximum capacity of panel.
  4. Shall be equipped with a neatly typewritten schedule with number and name of rooms or areas served by the relay circuits. Room numbers and names used shall be determined at the Project site and may not be those indicated on Drawings. Schedule shall indicate panel designation and voltage and shall be mounted in a frame under transparent plastic 1/32” thick on inside of panel cabinet.
  5. Each panel shall be rated for 120 or 277 VAC.
  6. Shall be preassembled, preprogrammed and include relays capable of switching 20 amps lighting loads for 120 or 277 VAC.

7. Central lighting control panels, remote lighting control panels, relays, low voltage switches, interior light sensors, exterior light sensors, and associated control electronics shall be furnished by Lighting Control and Design (LC & D), Douglas Lighting Controls, or approved equal.

#### 1.01 REMOTE LIGHTING CONTROL PANELS

- A. Remote lighting control panels shall be mounted in the ceiling space per plans and shall be LC&D GR-2404 Series or Douglas WSP-2718. Each panel shall be connected to the network lighting control system using manufacture's recommended wiring method and configured using central lighting control software. Add a printed label "RLCP" to the T-bar grid below the RLCP".
- B. Each remote relay panel shall contain the following hardware features:
  1. Programmable, matrix able switch inputs
  2. 12 VDC and 24 VDC inputs for occupancy sensors requiring DC voltage.
  3. DC power supply rated for 250 ma for supplying power to occupancy sensors.
  4. Digital light sensor inputs.
- C. Switch inputs are to be capable of switching individual relays, local groups of relays within the panel or global groups of relays system wide. Each switch input can be configured for connection to momentary 24 VAC switches or maintained contact 24 VAC switches. Each input can also be configured to be ON, OFF or Toggle.
- D. The remote panels shall accept 12 or 24 VDC or 24 VAC occupancy sensors. The inputs may be configured for OFF only or ON/OFF switching scenarios. It shall be possible to link the photo sensor control with occupancy sensing so that when light levels are high enough, the occupancy sensor will not switch the photo controlled relays ON.

#### 2.03 RELAYS

- A. Relays shall be warranted for a minimum of 3 years.
- B. Relays shall be individually added or replaced. Lighting control systems not capable of replacing individual relays are not acceptable.
- C. Each lighting control relay shall be capable of controlling incandescent, fluorescent, electronic ballast and HID lighting loads. Relays not rated for all types of lighting loads are not acceptable.
- D. Relays shall be:
  1. Single Pole: Douglass WR-6161, LC&D SL-277-NC, or equal.
  2. Double Pole: Douglass WR-6172, LC&D SL-480-NC, or equal.

## 2.04 LOW VOLTAGE SWITCHES

- A. All low voltage switches shall be wired per the lighting control manufactures requirements. Digital switches shall be part of the lighting control system network. Analog switches shall be wired to lighting control panel designated by manufacturer. Use LC&D Chelsea series or Douglas WNS-2000 series or Owner approved analog switch.
- B. Physical removal of any single switch shall have no effect on the communication between relay panels in the rest of the lighting control network. Lighting control systems requiring the continuous connection of all low voltage switches are not acceptable.
- C. Keyed switches shall be analog or digital and connect to programmable inputs in the nearest lighting control panel or be digital and connect to the lighting control system network. Use Douglas WR-8200 Series or LC&D KS Series approved equal.
- D. Provide stainless steel switch covers as specified.
- E. Local switches controlling lights in classrooms shall be wired to programmable inputs in the remote lighting control panels. Each switch shall be [programmable to control one, some or all relays in the entire network ON only, OFF only or ON & OFF. Use standard toggle switches as specified or digital low voltage switches by lighting control manufacturer as indicated on plans.
- F. Switches controlling the “quiet time” function in the remote lighting control panels shall connect directly to programmable inputs within the panel or connect to the lighting control system network. Use standard toggle switches or digital low voltage switches by lighting control manufacturer as indicated on plans.
- G. High abuse areas (common areas, gymnasiums, etc.) shall be controlled using a vandal resistant, touch sensitive high abuse switch and available with up to three buttons in a single gang. Multi gang versions shall also be available. Touch pads shall be stainless steel and capable of handling both high abuse and wash down locations. High abuse switches shall be digital or analog. Each high abuse switch touch button shall be able to control any relay or any group in any panel or panels that is part of the lighting control system. Each touch button shall be able to be programmed for ON, OFF, Toggle or Maintain operation. All programming shall be done locally or remotely via dial up modem or web interface as described in other paragraphs of this section. High abuse switches shall be able to be enabled or disabled digitally. Each touch pad is to be identified as to function by an engraved label. Switches must be capable of handling electrostatic discharges of at least 30,000 volts (1cm spark) without any interruption or failure in operation.

## 2.05 INTERIOR DAYLIGHT SENSORS

- A. In rooms requiring day lighting control provide an interior daylight sensor. Refer to lighting plans to determine which switch legs are controlled by the daylight controller. Use LC&D iPC Series, Douglas WPS-5533, or approved equal.

- B. Interior daylight sensors shall cause light fixtures within the room to brighten or dim to maintain pre-determined and uniform light levels between 30 and 50 foot candles; in areas not provided with dimming ballasts the sensors shall permit any relay to switch at a unique light level and shall attempt to maintain a constant light level by switching individual relays ON or OFF as the ambient light level changes. Controllers offering single set point controls are not acceptable.
- C. Each interior daylight sensor shall continuously monitor the true light level and shall broadcast this level to lighting control network. Controllers requiring readings at the sensor head itself are not acceptable.
- D. Each interior daylight sensor shall be fully adjustable via the lighting control software. Controllers requiring adjustments at the sensor head are not acceptable.

## 2.06 EXTERIOR LIGHT SENSORS

- A. Provide one exterior rated light sensor for control of all exterior lights. Use Douglass WPS-5941 or LC&D PCO.
- B. One exterior light sensor shall permit different relays to switch at different light levels. Sensors offering less than 14 remotely settable trip points are not acceptable.
- C. Exterior light sensor shall continuously monitor the true light level and shall broadcast this level over the lighting control network. Sensors requiring adjustments at the sensor head are not acceptable.
- D. Exterior light sensor shall be fully adjustable via the networked lighting control system. Controllers requiring adjustments at the sensor head are not acceptable.

## 2.07 DIMMING BALLAST CONTROLLER

- A. If plans indicate classrooms and other areas to be dimmed, remote relay panels shall be capable of outputting one independent 0V – 10V dimming signal for each relay provided in the remote relay panel. All dimming ballasts shall be controlled by industry standard 0V-10V control input. Ballasts using proprietary control protocols shall not be acceptable. In order to maximize daylight harvesting and minimize disruption to occupants, each dimming output shall provide adjustment for baseline, start point, mid point, end point, trim fade up rate, fade down rate, time delay and enable/disable masking. All photocell settings must be remotely accessible. Systems that provide ON, OFF with Time Delay only and systems that do not provide remote access are not acceptable.
- B. Mount photocells in locations indicated on plans and according to manufacturer's recommendations for daylight system type, open or closed loop. All trip points shall be able to be changed remotely via internet or dial up modem. Photocells requiring manual trip point adjustment are not acceptable. Photocell used for interior lighting control shall have multiple settings such as start-point, mid-point, off-point, fade-up rate, fade-down etc. All settings shall be remotely accessible and adjustable. Systems that provide local adjustments only are not acceptable. Photocells are to be certified

to be in compliance with California Energy Commission Title 24 requirements at time of submittal of plans for building permit. Use Douglass WPC-5533, LC&D iPC series, or approved equal.

## 2.08 OCCUPANCY SENSORS

### A. Occupancy Sensors:

#### 1. Ceiling-Mounted Dual Technology Sensors:

- a. Sensors shall be dual technology infrared-ultrasonic capable of detecting presence in floor area to be controlled, by detecting Doppler shifts in transmitted ultrasound and infrared technology.
- b. Detection shall be maintained when a person moves only within a maximum distance of 12 inches, in either a horizontal or vertical manner, at approximate speed of 12 inches per second. Lights shall not go off when a person is reading or writing while seated at a desk.
- c. Each sensor shall be furnished with a convenient shunt provision, which will enable a person to by-pass sensor in event of failure.
- d. Sensitivity shall not change more than 10 percent in temperature range of 0 degrees F. to 120 degrees F., and in humidity range of 10 percent to 80 percent. Sensitivity adjustment shall be provided for each technology.
- e. Time delay range shall be adjustable from 15 seconds to 15 minutes.
- f. Sensors shall operate on DC power (12 volts to 24 volts). Power supply shall be provided by power pack, consisting of a transformer and contact closure relay in one package. Power output of transformer shall be capable of operating a minimum of 2 sensors.
- g. Manufacturers: Watt Stopper No. DT-200, or equal by Leviton, Sensor Switch, or Unenco.

#### 2. Passive Infrared Wall Switch Sensors with Daylight Controls:

- a. Sensors shall be capable of detecting presence in floor area to be controlled, by detecting changes in infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk.
- b. Passive infrared sensor shall utilize a dual-element sensor and a multi-element fresnel lens.
- c. Sensor shall be furnished with a daylight filter which ensures that sensor is insensitive to short-wavelength infrared waves, such as those emitted by the sun.
- d. Sensors shall be furnished with convenient bypass provisions, which

- enable lighting to be turned on in case of failure.
- e. Time delay range shall be adjustable from 15 seconds to 15 minutes.
  - f. Sensitivity adjustment shall range from 0 (off) to 10 (maximum).
  - g. Adjustments and mounting hardware shall be concealed under a removable cover to prevent tampering with adjustments and hardware.
  - h. Each sensor shall cover up to 800 square feet, with a field-of-view of 150 degrees.
  - i. Sensor shall be 2-wire, completely self-contained control system that replaces standard toggle switch. Power supply shall be an internal transformer, and switching mechanism shall be a latching dry contact relay.
  - j. Sensor shall be capable of switching from 50 to 1000 watt, incandescent or fluorescent.
  - k. Sensor shall be furnished with a daylight feature, adjustable from 10 to 400 foot-candles, that maintains lighting off when a desired foot-candle level is present.
  - l. Sensors shall be dual voltage, 120 volt and 277 volt.
  - m. Manufacturers: Watt Stopper No. WI 200, I 300, or equal by Leviton Sensor Switch, or Unenco.

## 2.09 LIGHT LEVEL CONTROLLERS (EXISTING FACILITIES)

1. Controller shall be capable of detecting changes in lighting levels; it shall utilize an internal photoconductive cell to measure light levels through 50 percent diffused lens.
2. Controller shall be capable of controlling any type of lighting. It shall be a self-contained 24 VDC device that controls lighting through use of power switch packs.
3. Controller shall be capable of turning lighting on and off between 10 and 200 foot-candles.
4. Controller shall be furnished with an adjustable dead-band feature of 10 percent to 100 percent, to prevent lighting from cycling when lighting goes on and off and from minor changes due to cloud cover.
5. Controller shall be furnished with an adjustable time delay range of 3 seconds to 5 minutes.
6. Controller shall be furnished with a dual color LED-indicating status of sensor. LED shall have an on level with one color and an off level with another.



7. Adjustments and mounting hardware shall be concealed under a removable cover, to prevent tampering with adjustments and hardware.
8. Each controller shall be furnished with a convenient by-pass provision, which will enable lighting to be turned on in event of failure.
9. Manufacturers: Watt Stopper No. LS-100 XA, or equal by Leviton, Sensor Switch, or Unenco.

## 2.10 UNIT INVERTERS

Unit Inverters shall be rapid start type consisting of emergency fluorescent power packs designed to be installed in channels of new lighting fixtures.

- A. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- B. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- C. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- D. Units shall be furnished with test switches and pilot lights.
- E. Units shall automatically power designated fluorescent lamp(s) in fixture to provide a minimum of 1100 lumens for 90 minutes of emergency service upon failure of utility power.
- F. Upon return of utility power, battery shall automatically recharge for future emergency use.
- G. Batteries shall be field-replaceable, sealed, rechargeable, spill-proof, maintenance-free nickel cadmium.
- H. High efficiency inverter/charger design shall include low-voltage disconnect to prevent deep discharge of battery and dual voltage designed for connection to either 120 or 277 volts. Chargers shall recharge fully discharged batteries to provide 90 minutes operation within 24 hours. An additional hot wire shall connect to unit in order to signal unit in event of a power failure. Power pack will not operate if shut off manually.
- I. An unconditional 5 year warranty is required.
- J. Units shall be Dual-Lite UFO-5 Series, Bodine, or equal.

## 2.11 INTERFACE TO BUILDING MANAGEMENT SYSTEM

- A. When interface to the Building Management System is required, the lighting control system shall provide a BACnet/IP interface module that communicates with the BMS via a BACnet/IP network (a collection of one or more IP sub networks (IP domains) that are assigned a single BACnet network number). Verify if interface to BMS is required.
- B. BACnet/IP interface module shall provide the capability for the BMS to:
  - 1. Communicate directly with each relay in the lighting control system network and each group used within the lighting control system.
  - 2. Monitor the current status and status changes of each relay and each group.
- C. Electrical contractor shall be responsible for installing, wiring and confirming operation of the lighting control BACnet/IP interface module per the lighting control manufacturer's instructions. Installing, wiring, and interfacing of BMS components to the lighting control system are not the responsibility of the electrical contractor.

## PART 3 – EXECUTION

### 2.03 GENERAL

- A. Lighting control system shall not be used for any other purpose other than its intended use and application.
- B. Provide all required interconnections with other systems such as emergency power sources, fire alarm systems, and building management system as required or indicated on drawings.
- C. Installation shall meet or exceed standard practice of workmanship and quality.
- D. Drawings generally indicate work to be provided, but do not indicate all 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 furnished and install required fittings.

### 2.03 INSTALLATION AND SET-UP

- A. Verify that conduit for line voltage wires enters panel in line voltage areas and conduit for low-voltage control wires enters panel on low-voltage areas. Refer to manufacturer's drawings for location of line and low-voltage areas.
- B. Provide for classroom Owner specified line voltage type switches, and wire according to lighting control manufacturer's requirements.
- C. Digital switches and wire shall be according to lighting control manufacturer's requirements.
- D. Central lighting control panels and remote lighting control panels are connected via a dataline (Douglas uses a non-polarized Beldon No. 8471 LC&D use Cat5 4 twisted pair cable, with RJ45 end connectors). Connect entire lighting control system per

manufacturer's requirements. Do not exceed manufacturer's total dataline length requirement.

- E. Panels shall be located so that they are readily accessible and not exposed to physical damage.
- F. Panel locations shall be furnished with sufficient working space around panels to comply with the California Electrical Code.
- G. Panels shall be securely fastened to the mounting surface by at least 4 points.
- H. Unused openings in the cabinet shall be effectively closed.
- I. Cabinets shall be grounded in accordance with Article 250 of the California Electrical Code, and manufacturer's recommendations.
- J. Lugs shall be suitable and listed for installation with the conductor being connected.
- K. 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.
- L. Maintain the required bending radius of conductors inside cabinets.
- M. Clean cabinets of foreign material such as cement, plaster and paint.
- N. Distribute and arrange conductors neatly in the wiring gutters.
- O. Follow the manufacturer's torque values to tighten lugs.
- P. Before energizing the panelboard, the following steps shall be taken:
  - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been furnished.
  - 2. Remove shipping blocks from component devices and the panel interior.
  - 3. Remove debris from panelboard interior.
- Q. Follow manufacturers' instructions for installation.

## 2.03 OPERATING/SERVICE MANUALS

- A. Service and Operation Manuals:
  - 1. Submit operation and service manuals. Complete manuals shall be bound in flexible binders and data shall be typewritten or drafted.
  - 2. Provide a printed copy of the systems configuration as programmed, including all system labeling codes, and passwords.

3. Provide an electronic copy on compact disk of the system configuration program.
4. Manuals shall include instructions necessary for proper operation and servicing of system and shall include complete wiring circuit diagrams of system, wiring destination schedules for circuits and replacement part numbers. Manuals shall include as-built cable Project site plot plans and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on cables. Programming forms of systems shall be submitted with complete information.
5. Record Drawings: Provide a copy on vellum of Project site and building drawings, indicating location of equipment, conduit and cable runs, and other pertinent information.

### 2.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

### 2.03 TESTING

Set-up, commissioning and testing of the lighting control system, and Owner instruction shall include:

1. Confirmation of system programming.
2. Confirmation of operation of individual relays, switches, occupancy sensors and daylight sensors.
3. Operation of system's features under normal and emergency operations.
4. Before energizing check and demonstrate in the presence of the IOR that cables and wire connections are free from short circuits, ground faults, and that there is continuity, and necessary insulation.
5. Confirm system operations and functionality.
6. Check system interface response to other systems such as fire alarm and emergency power system conditions.
7. Provide training to cover installation, maintenance, troubleshooting, programming, and repair and operation of the lighting control system.

### 2.03 INSTRUCTION PERIODS

- A. Before Substantial Completion, arrange and provide an eight hours Owner instruction period for designated personnel.

### 2.03 SPARE PARTS

- A. Provide a minimum of 5% spare parts of each type of relay, sensors, switches, and peripheral devices.

## 2.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 16515  
LIGHTING CONTROL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Section Includes:
  - 1. Furnish and install a low-voltage lighting control system, as indicated on the Drawings and as specified.
  - 2. Systems shall be furnished with networkable relay panels each complete with the required relays, transformers, and control electronics. The system shall be furnished with all hardware and resident software, occupancy sensors, constant light controllers, exterior light sensors, occupancy sensors, local wall switches and dimmer switches and all required conduit and wiring for a complete and functional installation.
- C. Related Sections:
  - 1. Section 16010: Basic Electrical Requirements.
  - 2. Section 16050: Basic Electrical Materials and Methods.
  - 3. Section 16120: Low-Voltage Wire 600
  - 4. Section 16130: Raceways
  - 5. Section 16445: Panelboards and Signal Terminal Cabinets.
  - 6. Section 16515: Lighting Control Systems

1.02 SUBMITTALS

- A. Provide in accordance with Division 01.
- B. Submit a complete one-line diagram of the proposed system configuration for Architect/Engineer's review. The riser diagram shall identify but not be limited to all wiring, equipment, components, interconnection with other systems, and location and type of raceways.
- C. Manufacturer's Data: Submit catalog cuts and description of each system component.
- D. Provide wiring diagrams and installation details for lighting control equipment.

- E. Shop Drawings: Submit a complete set of detailed Shop Drawings for the entire lighting control system; the shop drawings shall include but not be limited to relay panels with designations and dimensions, day light sensors locations based on manufacturer's recommendations, and system components with manufacturer's part numbers.
- F. Installation Instructions: Submit manufacturer's written installation instructions, wiring diagrams. Instructions shall include recommendations for handling of equipment and parts, and protection and storage requirements.

### 1.03 QUALITY ASSURANCE

- A. Components shall be listed and labeled by Underwriter's Laboratories (UL), or another Nationally Recognized Testing Laboratory (NRTL).
- B. Lighting Control Systems shall comply with the state of California Building and Electrical Codes, and Title 24 energy requirements in effect at time of submittal for building permit.
- C. Conduct a coordination meeting with the lighting control contractor, electrical contractor, EOR, Manufacturer Representative, and the OAR to validate the location of all lighting control system components, including daylight sensors. Sensors shall be located based on manufacturer's recommendations.

### 1.04 WARRANTY

- A. Manufacturer shall provide a 3 year material warranty.
- B. Installer shall provide a 2 year labor warranty.

### 1.05 SYSTEM REQUIREMENTS

- A. The lighting control system must be able to communicate with fully digital centralized relay panels, remote relay panels, digital switches, photocells, analog switches, various interfaces, and shall include all operational software. The lighting control system shall be integrated into a single system, except for areas controlled by a motion sensor; such as rooms with one luminaire and emergency fixtures designed to operate 24 hours a day, 7 days a week. Distributed lighting control shall be provided using a networkable remote relay panel. A Centralized relay panel shall control corridors and site lighting. Lighting control system shall include all hardware and software; software shall be resident within the lighting control system. System shall provide local access to all programming functions at the master Lighting Control Panel (LCP) and remote access to all programming functions via dial-up modem and through any standard computer workstation running an industry standard internet browser. Lighting control system shall have a server built into the master LCP that "serves" HTML pages to any authorized workstation. WEB front end shall be accessible over an LAUSD provided Ethernet 10/100 Mbps to the local area network. Protocol shall be TCP/IP and allow either http (hypertext transfer protocol) or https (hypertext transfer protocol secured)

connections. Desktop computers are not part of this section and will be provided by others. Non-networked, non-digital, non-server capable systems are not acceptable.

- B. System software shall provide real time status of each relay, each zone and each group.
- C. Lighting control system shall be able to be monitored and take commands from a remote Personal Computer (PC); should the remote PC go off-line all system programming uploaded to the lighting control system shall continue to operate as intended. Systems requiring an on line PC or server for normal operation are not acceptable
- D. All devices shall be able to be pre-addressed at the factory. Systems requiring field addressing only are not acceptable.
- E. All programs, schedules, time of day, etc., shall be held in non-volatile memory at power failure. At restoration of power, lighting control system shall implement programs required by current time and date.
- F. System shall be capable of flashing lighting OFF/ON for any relay or lighting zone prior to the lights beings turned OFF. The warning interval time between the flash and the final lights off signal shall be definable for each zone. Occupant shall be able to override any scheduled OFF sweep using local lighting zone override switches within the zone or occupied space. Occupant override time shall be pre-programmed not to exceed two hours, or current California Title 24 requirements.
- G. The system shall be capable of implementing ON, OFF, Raise (dimming), and Lower (dimming) commands for any relay, group or zone by means of digital specification grade line voltage type wall switches, analog low voltage switches, photocells, web based software, or other devices connected to programmable inputs in the lighting control system.
- H. The lighting control system shall provide the ability to control each relay and each relay group. All programming and scheduling shall be able to be done locally at the master LCP and remotely via dial up modem and via the Internet. Remote connection to the lighting control system shall provide real time control and real time feedback.
- I. System may consist of centralized relay panels, remote relay panels, digital switches, analog switches, photocells, motion sensors, lumen control devices, dimmer switches, and various digital interfaces. Verify exact components specified. Remote relay panels, smart breaker panels, centralized relay panels and digital switches shall communicate as one network. Where Remote Relay Panels (RRP) are indicated on drawings, they shall control all lighting fixtures in that area or space, provide power to occupancy sensors and take input from daylight and occupancy sensors. RRP's shall be capable of taking inputs from LAUSD specification line voltage type switches, and if classroom dimming is indicated on the plans, they shall be capable of outputting an independent 0v - 10v dimming signal for each remote relay provided. All remote relay panels, switches, photocells and occupancy sensors shall be wired per lighting control manufacturers instructions.



## 1.06 LIGHTING CONTROL OVERVIEW-BY AREA CONTROLLED

### A. Classrooms:

1. Classrooms are controlled by a combination of occupancy sensors, daylight controllers and dimmers switches, ON/OFF and quiet time switches.
  - a. The purpose of the occupancy sensors is to automatically switch lights OFF when the room is not occupied.
  - b. Daylight controls shall automatically adjust light intensity according to the natural light level in the room. The daylight sensors shall be enabled and disabled by the occupancy sensors to ensure daylight controlled lights never automatically turn ON when room is unoccupied. The lighting control system shall allow an authorized person to disable the daylight sensors and dimming controls.
  - c. Wall switches are used to manually switch lights ON and OFF as required. Switches shall comply with all the operational requirements of the current T24, and include location of device, accessibility and override capability.
  - d. Quiet time switch is used to temporarily bypass the occupancy sensors for a programmed time period, typically 1 hour. This will prevent nuisance OFF sweeps when the room is quiet with no human movement.

### B. Corridors and Open Areas:

1. Corridors and other common areas are controlled by a combination of programmable low voltage keyed switches and time schedules supplied by the networked lighting control system.
  - a. Low voltage keyed switches are operable 24 hours a day and are used to manually switch lights ON and OFF as required.
  - b. The central timer is used to automatically sweep lights OFF after hours, and provide other scheduling capability as necessary.
  - c. Interior corridors also require occupancy sensors.

### C. Restrooms and Utility Rooms:

1. Restrooms and Utility rooms contain line voltage switches that operate downstream of the adjoining corridor or open area.
  - a. When the upstream relay is activated by either the central timer or the programmable switch, power will be present and the local line voltage switch will be operable.
  - b. When the upstream relay is de-activated, power will not be present and the local line voltage switch will be inoperable.

- D. Exterior Security Lights:
1. Exterior wall packs and security lights are controlled via exterior light sensors. (Refer to article 2.06)
    - a. When natural light level is insufficient, the lights are ON.
    - b. When natural light level is sufficient, the lights are OFF.
- E. Exterior, Non-Security Lights:
1. Exterior parking lot lights, pathway lights and decorative lights are controlled by an exterior light sensor in conjunction with time schedules provided by the networked lighting control system.
    - a. When natural light level is insufficient or the timer is ON, the lights are ON.
    - b. When natural light level is sufficient or the timer is OFF, the lights are OFF.

## PART 2 - PRODUCTS

### 1.01 CENTRAL LIGHTING CONTROL PANELS

- A. Central Lighting Control Panels (CLCP) shall be located in the electrical closets and shall be Douglas PWEX Series or LC & D #GR-2400 series or approved equal. Panels shall be surface or flush mounted type as indicated on Drawings, with a hinged door assembly. Doors shall be furnished with flush type locks, spring latching, Corbin locks for metal doors, keyed to Corbin No. 60 keys. Panels shall include the following components or features:
1. Shall be preprogrammed and preassembled with all required control equipment and relays as indicated on the lighting plans.
  2. Shall be equipped with suitable dividers separating Class 1 and Class 2 compartments, 120v and 277v compartments as well as "normal and emergency" compartments.
  3. Lighting control relays as indicated on Drawings. Provide 10% spare relays for all centralized relay panels up to the maximum capacity of panel.
  4. Shall be equipped with a neatly typewritten schedule with number and name of rooms or areas served by the relay circuits. Room numbers and names used shall be determined at the Project site and may not be those indicated on Drawings. Schedule shall indicate panel designation and voltage and shall be mounted in a frame under transparent plastic 1/32" thick on inside of panel cabinet.
  5. Each panel shall be rated for 120 or 277 VAC.
  6. Shall be preassembled, preprogrammed and include relays capable of switching 20 amps lighting loads for 120 or 277 VAC.

7. Central lighting control panels, remote lighting control panels, relays, low voltage switches, interior light sensors, exterior light sensors, and associated control electronics shall be furnished by Lighting Control and Design (LC & D), Douglas Lighting Controls, or approved equal.

#### 1.01 REMOTE LIGHTING CONTROL PANELS

- A. Remote lighting control panels shall be mounted in the ceiling space per plans and shall be LC&D GR-2404 Series or Douglas WSP-2718. Each panel shall be connected to the network lighting control system using manufacture's recommended wiring method and configured using central lighting control software. Add a printed label "RLCP" to the T-bar grid below the RLCP".
- B. Each remote relay panel shall contain the following hardware features:
  1. Programmable, matrix able switch inputs
  2. 12 VDC and 24 VDC inputs for occupancy sensors requiring DC voltage.
  3. DC power supply rated for 250 ma for supplying power to occupancy sensors.
  4. Digital light sensor inputs.
- C. Switch inputs are to be capable of switching individual relays, local groups of relays within the panel or global groups of relays system wide. Each switch input can be configured for connection to momentary 24 VAC switches or maintained contact 24 VAC switches. Each input can also be configured to be ON, OFF or Toggle.
- D. The remote panels shall accept 12 or 24 VDC or 24 VAC occupancy sensors. The inputs may be configured for OFF only or ON/OFF switching scenarios. It shall be possible to link the photo sensor control with occupancy sensing so that when light levels are high enough, the occupancy sensor will not switch the photo controlled relays ON.

#### 2.03 RELAYS

- A. Relays shall be warranted for a minimum of 3 years.
- B. Relays shall be individually added or replaced. Lighting control systems not capable of replacing individual relays are not acceptable.
- C. Each lighting control relay shall be capable of controlling incandescent, fluorescent, electronic ballast and HID lighting loads. Relays not rated for all types of lighting loads are not acceptable.
- D. Relays shall be:
  1. Single Pole: Douglass WR-6161, LC&D SL-277-NC, or equal.
  2. Double Pole: Douglass WR-6172, LC&D SL-480-NC, or equal.

## 2.04 LOW VOLTAGE SWITCHES

- A. All low voltage switches shall be wired per the lighting control manufactures requirements. Digital switches shall be part of the lighting control system network. Analog switches shall be wired to lighting control panel designated by manufacturer. Use LC&D Chelsea series or Douglas WNS-2000 series or Owner approved analog switch.
- B. Physical removal of any single switch shall have no effect on the communication between relay panels in the rest of the lighting control network. Lighting control systems requiring the continuous connection of all low voltage switches are not acceptable.
- C. Keyed switches shall be analog or digital and connect to programmable inputs in the nearest lighting control panel or be digital and connect to the lighting control system network. Use Douglas WR-8200 Series or LC&D KS Series approved equal.
- D. Provide stainless steel switch covers as specified.
- E. Local switches controlling lights in classrooms shall be wired to programmable inputs in the remote lighting control panels. Each switch shall be [programmable to control one, some or all relays in the entire network ON only, OFF only or ON & OFF. Use standard toggle switches as specified or digital low voltage switches by lighting control manufacturer as indicated on plans.
- F. Switches controlling the “quiet time” function in the remote lighting control panels shall connect directly to programmable inputs within the panel or connect to the lighting control system network. Use standard toggle switches or digital low voltage switches by lighting control manufacturer as indicated on plans.
- G. High abuse areas (common areas, gymnasiums, etc.) shall be controlled using a vandal resistant, touch sensitive high abuse switch and available with up to three buttons in a single gang. Multi gang versions shall also be available. Touch pads shall be stainless steel and capable of handling both high abuse and wash down locations. High abuse switches shall be digital or analog. Each high abuse switch touch button shall be able to control any relay or any group in any panel or panels that is part of the lighting control system. Each touch button shall be able to be programmed for ON, OFF, Toggle or Maintain operation. All programming shall be done locally or remotely via dial up modem or web interface as described in other paragraphs of this section. High abuse switches shall be able to be enabled or disabled digitally. Each touch pad is to be identified as to function by an engraved label. Switches must be capable of handling electrostatic discharges of at least 30,000 volts (1cm spark) without any interruption or failure in operation.

## 2.05 INTERIOR DAYLIGHT SENSORS

- A. In rooms requiring day lighting control provide an interior daylight sensor. Refer to lighting plans to determine which switch legs are controlled by the daylight controller. Use LC&D iPC Series, Douglas WPS-5533, or approved equal.

- B. Interior daylight sensors shall cause light fixtures within the room to brighten or dim to maintain pre-determined and uniform light levels between 30 and 50 foot candles; in areas not provided with dimming ballasts the sensors shall permit any relay to switch at a unique light level and shall attempt to maintain a constant light level by switching individual relays ON or OFF as the ambient light level changes. Controllers offering single set point controls are not acceptable.
- C. Each interior daylight sensor shall continuously monitor the true light level and shall broadcast this level to lighting control network. Controllers requiring readings at the sensor head itself are not acceptable.
- D. Each interior daylight sensor shall be fully adjustable via the lighting control software. Controllers requiring adjustments at the sensor head are not acceptable.

## 2.06 EXTERIOR LIGHT SENSORS

- A. Provide one exterior rated light sensor for control of all exterior lights. Use Douglass WPS-5941 or LC&D PCO.
- B. One exterior light sensor shall permit different relays to switch at different light levels. Sensors offering less than 14 remotely settable trip points are not acceptable.
- C. Exterior light sensor shall continuously monitor the true light level and shall broadcast this level over the lighting control network. Sensors requiring adjustments at the sensor head are not acceptable.
- D. Exterior light sensor shall be fully adjustable via the networked lighting control system. Controllers requiring adjustments at the sensor head are not acceptable.

## 2.07 DIMMING BALLAST CONTROLLER

- A. If plans indicate classrooms and other areas to be dimmed, remote relay panels shall be capable of outputting one independent 0V – 10V dimming signal for each relay provided in the remote relay panel. All dimming ballasts shall be controlled by industry standard 0V-10V control input. Ballasts using proprietary control protocols shall not be acceptable. In order to maximize daylight harvesting and minimize disruption to occupants, each dimming output shall provide adjustment for baseline, start point, mid point, end point, trim fade up rate, fade down rate, time delay and enable/disable masking. All photocell settings must be remotely accessible. Systems that provide ON, OFF with Time Delay only and systems that do not provide remote access are not acceptable.
- B. Mount photocells in locations indicated on plans and according to manufacturer's recommendations for daylight system type, open or closed loop. All trip points shall be able to be changed remotely via internet or dial up modem. Photocells requiring manual trip point adjustment are not acceptable. Photocell used for interior lighting control shall have multiple settings such as start-point, mid-point, off-point, fade-up rate, fade-down etc. All settings shall be remotely accessible and adjustable. Systems that provide local adjustments only are not acceptable. Photocells are to be certified

to be in compliance with California Energy Commission Title 24 requirements at time of submittal of plans for building permit. Use Douglass WPC-5533, LC&D iPC series, or approved equal.

## 2.08 OCCUPANCY SENSORS

### A. Occupancy Sensors:

#### 1. Ceiling-Mounted Dual Technology Sensors:

- a. Sensors shall be dual technology infrared-ultrasonic capable of detecting presence in floor area to be controlled, by detecting Doppler shifts in transmitted ultrasound and infrared technology.
- b. Detection shall be maintained when a person moves only within a maximum distance of 12 inches, in either a horizontal or vertical manner, at approximate speed of 12 inches per second. Lights shall not go off when a person is reading or writing while seated at a desk.
- c. Each sensor shall be furnished with a convenient shunt provision, which will enable a person to by-pass sensor in event of failure.
- d. Sensitivity shall not change more than 10 percent in temperature range of 0 degrees F. to 120 degrees F., and in humidity range of 10 percent to 80 percent. Sensitivity adjustment shall be provided for each technology.
- e. Time delay range shall be adjustable from 15 seconds to 15 minutes.
- f. Sensors shall operate on DC power (12 volts to 24 volts). Power supply shall be provided by power pack, consisting of a transformer and contact closure relay in one package. Power output of transformer shall be capable of operating a minimum of 2 sensors.
- g. Manufacturers: Watt Stopper No. DT-200, or equal by Leviton, Sensor Switch, or Unenco.

#### 2. Passive Infrared Wall Switch Sensors with Daylight Controls:

- a. Sensors shall be capable of detecting presence in floor area to be controlled, by detecting changes in infrared energy. Small movements shall be detected such as when a person is writing while seated at a desk.
- b. Passive infrared sensor shall utilize a dual-element sensor and a multi-element fresnel lens.
- c. Sensor shall be furnished with a daylight filter which ensures that sensor is insensitive to short-wavelength infrared waves, such as those emitted by the sun.
- d. Sensors shall be furnished with convenient bypass provisions, which

- enable lighting to be turned on in case of failure.
- e. Time delay range shall be adjustable from 15 seconds to 15 minutes.
  - f. Sensitivity adjustment shall range from 0 (off) to 10 (maximum).
  - g. Adjustments and mounting hardware shall be concealed under a removable cover to prevent tampering with adjustments and hardware.
  - h. Each sensor shall cover up to 800 square feet, with a field-of-view of 150 degrees.
  - i. Sensor shall be 2-wire, completely self-contained control system that replaces standard toggle switch. Power supply shall be an internal transformer, and switching mechanism shall be a latching dry contact relay.
  - j. Sensor shall be capable of switching from 50 to 1000 watt, incandescent or fluorescent.
  - k. Sensor shall be furnished with a daylight feature, adjustable from 10 to 400 foot-candles, that maintains lighting off when a desired foot-candle level is present.
  - l. Sensors shall be dual voltage, 120 volt and 277 volt.
  - m. Manufacturers: Watt Stopper No. WI 200, I 300, or equal by Leviton Sensor Switch, or Unenco.

## 2.09 LIGHT LEVEL CONTROLLERS (EXISTING FACILITIES)

1. Controller shall be capable of detecting changes in lighting levels; it shall utilize an internal photoconductive cell to measure light levels through 50 percent diffused lens.
2. Controller shall be capable of controlling any type of lighting. It shall be a self-contained 24 VDC device that controls lighting through use of power switch packs.
3. Controller shall be capable of turning lighting on and off between 10 and 200 foot-candles.
4. Controller shall be furnished with an adjustable dead-band feature of 10 percent to 100 percent, to prevent lighting from cycling when lighting goes on and off and from minor changes due to cloud cover.
5. Controller shall be furnished with an adjustable time delay range of 3 seconds to 5 minutes.
6. Controller shall be furnished with a dual color LED-indicating status of sensor. LED shall have an on level with one color and an off level with another.

7. Adjustments and mounting hardware shall be concealed under a removable cover, to prevent tampering with adjustments and hardware.
8. Each controller shall be furnished with a convenient by-pass provision, which will enable lighting to be turned on in event of failure.
9. Manufacturers: Watt Stopper No. LS-100 XA, or equal by Leviton, Sensor Switch, or Unenco.

## 2.10 UNIT INVERTERS

Unit Inverters shall be rapid start type consisting of emergency fluorescent power packs designed to be installed in channels of new lighting fixtures.

- A. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- B. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- C. Power pack construction shall be of durable polycarbonate housing having same size as low profile rapid start ballast.
- D. Units shall be furnished with test switches and pilot lights.
- E. Units shall automatically power designated fluorescent lamp(s) in fixture to provide a minimum of 1100 lumens for 90 minutes of emergency service upon failure of utility power.
- F. Upon return of utility power, battery shall automatically recharge for future emergency use.
- G. Batteries shall be field-replaceable, sealed, rechargeable, spill-proof, maintenance-free nickel cadmium.
- H. High efficiency inverter/charger design shall include low-voltage disconnect to prevent deep discharge of battery and dual voltage designed for connection to either 120 or 277 volts. Chargers shall recharge fully discharged batteries to provide 90 minutes operation within 24 hours. An additional hot wire shall connect to unit in order to signal unit in event of a power failure. Power pack will not operate if shut off manually.
- I. An unconditional 5 year warranty is required.
- J. Units shall be Dual-Lite UFO-5 Series, Bodine, or equal.

## 2.11 INTERFACE TO BUILDING MANAGEMENT SYSTEM



- A. When interface to the Building Management System is required, the lighting control system shall provide a BACnet/IP interface module that communicates with the BMS via a BACnet/IP network (a collection of one or more IP sub networks (IP domains) that are assigned a single BACnet network number). Verify if interface to BMS is required.
- B. BACnet/IP interface module shall provide the capability for the BMS to:
  - 1. Communicate directly with each relay in the lighting control system network and each group used within the lighting control system.
  - 2. Monitor the current status and status changes of each relay and each group.
- C. Electrical contractor shall be responsible for installing, wiring and confirming operation of the lighting control BACnet/IP interface module per the lighting control manufacturer's instructions. Installing, wiring, and interfacing of BMS components to the lighting control system are not the responsibility of the electrical contractor.

## PART 3 – EXECUTION

### 2.03 GENERAL

- A. Lighting control system shall not be used for any other purpose other than its intended use and application.
- B. Provide all required interconnections with other systems such as emergency power sources, fire alarm systems, and building management system as required or indicated on drawings.
- C. Installation shall meet or exceed standard practice of workmanship and quality.
- D. Drawings generally indicate work to be provided, but do not indicate all 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 furnished and install required fittings.

### 2.03 INSTALLATION AND SET-UP

- A. Verify that conduit for line voltage wires enters panel in line voltage areas and conduit for low-voltage control wires enters panel on low-voltage areas. Refer to manufacturer's drawings for location of line and low-voltage areas.
- B. Provide for classroom Owner specified line voltage type switches, and wire according to lighting control manufacturer's requirements.
- C. Digital switches and wire shall be according to lighting control manufacturer's requirements.
- D. Central lighting control panels and remote lighting control panels are connected via a dataline (Douglas uses a non-polarized Beldon No. 8471 LC&D use Cat5 4 twisted pair cable, with RJ45 end connectors). Connect entire lighting control system per

manufacturer's requirements. Do not exceed manufacturer's total dataline length requirement.

- E. Panels shall be located so that they are readily accessible and not exposed to physical damage.
- F. Panel locations shall be furnished with sufficient working space around panels to comply with the California Electrical Code.
- G. Panels shall be securely fastened to the mounting surface by at least 4 points.
- H. Unused openings in the cabinet shall be effectively closed.
- I. Cabinets shall be grounded in accordance with Article 250 of the California Electrical Code, and manufacturer's recommendations.
- J. Lugs shall be suitable and listed for installation with the conductor being connected.
- K. 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.
- L. Maintain the required bending radius of conductors inside cabinets.
- M. Clean cabinets of foreign material such as cement, plaster and paint.
- N. Distribute and arrange conductors neatly in the wiring gutters.
- O. Follow the manufacturer's torque values to tighten lugs.
- P. Before energizing the panelboard, the following steps shall be taken:
  - 1. Retighten connections to the manufacturer's torque specifications. Verify that required connections have been furnished.
  - 2. Remove shipping blocks from component devices and the panel interior.
  - 3. Remove debris from panelboard interior.
- Q. Follow manufacturers' instructions for installation.

## 2.03 OPERATING/SERVICE MANUALS

- A. Service and Operation Manuals:
  - 1. Submit operation and service manuals. Complete manuals shall be bound in flexible binders and data shall be typewritten or drafted.
  - 2. Provide a printed copy of the systems configuration as programmed, including all system labeling codes, and passwords.

3. Provide an electronic copy on compact disk of the system configuration program.
4. Manuals shall include instructions necessary for proper operation and servicing of system and shall include complete wiring circuit diagrams of system, wiring destination schedules for circuits and replacement part numbers. Manuals shall include as-built cable Project site plot plans and floor plans indicating cables, both underground and in each building with conduit, and as-built coding used on cables. Programming forms of systems shall be submitted with complete information.
5. Record Drawings: Provide a copy on vellum of Project site and building drawings, indicating location of equipment, conduit and cable runs, and other pertinent information.

### 2.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

### 2.03 TESTING

Set-up, commissioning and testing of the lighting control system, and Owner instruction shall include:

1. Confirmation of system programming.
2. Confirmation of operation of individual relays, switches, occupancy sensors and daylight sensors.
3. Operation of system's features under normal and emergency operations.
4. Before energizing check and demonstrate in the presence of the IOR that cables and wire connections are free from short circuits, ground faults, and that there is continuity, and necessary insulation.
5. Confirm system operations and functionality.
6. Check system interface response to other systems such as fire alarm and emergency power system conditions.
7. Provide training to cover installation, maintenance, troubleshooting, programming, and repair and operation of the lighting control system.

### 2.03 INSTRUCTION PERIODS

- A. Before Substantial Completion, arrange and provide an eight hours Owner instruction period for designated personnel.

### 2.03 SPARE PARTS

- A. Provide a minimum of 5% spare parts of each type of relay, sensors, switches, and peripheral devices.

## 2.03 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

## SECTION 16712

### FIRE ALARM SYSTEMS

#### 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 Suppression Systems.
3. Section 15800: Heating, Ventilating, and Air Conditioning Equipment.
4. Section 16010: Basic Electrical Requirements.
5. Section 16050: Basic Materials and Methods.
8. Section 16120: Low-Voltage Wiring
9. Section 16215: Electrical Power Control.

##### 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 FACP's 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 or 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 from 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. FACP's 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 or 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. FACP's:
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 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

## SECTION 16730

### CLOCK AND PROGRAM SIGNALING SYSTEMS

#### PART 1 - GENERAL

##### 1.01 SUMMARY

- A. Provisions of Division 01 apply to this section
- B. Furnish and install a synchronized clock program system. Section also includes stand-alone and independent analog and digital clocks as well as bells where required on Drawings.

##### 1.02 RELATED SECTIONS

- A. Section 16010: Basic Electrical Requirements.
- B. Section 16050: Basic Electrical Materials and Methods.
- C. Section 16120: Low Voltage Wire (600 Volts A.C.)
- D. Section 16445: Panelboard and Signal Terminal Cabinets.
- E. Section 25821: Public Address Systems.

##### 1.03 SYSTEM DESCRIPTION

- A. Synchronized clocks and a master controlled program system responsible for continually synchronizing and controlling both digital and analog secondary clocks. Battery operated display clocks shall not be provided unless specifically indicated on the Drawings.
- B. Primary components of the clock systems shall be:
  - 1. Master Clock Program Controller shall be a standalone unit.
  - 2. Synchronized indicating clocks, both interior and exterior, and both digital and analog.
  - 3. Cables, conduit/raceway, power supplies, pullboxes, and all termination panels.
  - 4. Power supplies for the controller as well as boosters for 24 VDC synchronized clocks.
- C. Bell Systems: In some cases, vibrating bells may be shown in Drawings instead of tone systems generated by the Public Address system for class changing requirements. Furnish, cable, and test according to the Drawings.

1.04 REGULATORY REQUIREMENTS

- A. Equipment and components furnished shall be per manufacturers' product descriptions and be UL or another Nationally Recognized Testing Laboratory (NRTL) listed. Systems shall be installed in compliance with local and state authorities having jurisdiction.

1.05 SUBMITTALS

- A. Provide in accordance with Division 01.
  - 1. Shop Drawings shall include catalog cuts and technical data on components specified. Data shall be clearly marked and noted to identify model numbers, physical sizes, and other pertinent information.
  - 2. Indicate interfaces with equipment furnished by others, identifying numbers of wires, termination requirements, voltages, and other pertinent details. Responsibility for each end of interface shall be noted on Shop Drawings.
  - 3. Shop Drawings shall indicate panel configurations, sizes, and point-to-point circuit schematics.

1.06 QUALITY ASSURANCE

- A. Work shall be performed by a manufacturer certified installer.
- B. Installer must have successfully completed at least 5 projects of equal scope in the past 5 years, and have been in business of furnishing and installing clock and program systems of this type for at least 5 years.
- C. Installer must be a factory authorized distributor and service provider for the brand of equipment offered and shall provide proof upon request.
- D. Installer must maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of all major parts for the system for at least 2 years after Substantial Completion.

PART 2 - PRODUCTS

2.01 EQUIPMENT

- A. Master Clock/Program Controller:
  - 1. Master Clock / Program Controller shall be Lathem LTR8-512-M, or District approved equal, containing 6 bell circuits and other necessary components to provide for a complete functioning system. Control panel components shall be contained in a 13 x 7"h. x 4 1/2"d. NEMA metal surface mounted cabinet. Outer door assembly shall be furnished with a lock and transparent door panel.



2. Programming shall be accomplished using a keypad and 9 mode indicators on the Master Clock front panel.
  3. Standby battery shall be Lithium type and shall be capable of 7 days of standby operation.
  4. General Requirements:
    - a. Master clock controller shall be able to control 24 VDC analog or digital synchronized indicating secondary clocks by any manufacturer.
    - b. Digital display and selectable menu including zones of bell operation, program or programs being operated, and controls being operated or disabled. Display shall be through a polycarbonate lens.
    - c. Output circuits for bells or public address signal tones shall be "A" form dry contacts rated at 10 amps.
    - d. A minimum of 64 events shall be possible on each of 6 schedules for, audible signal control.
    - e. An event shall be considered a combination of day AM or PM, date (Julian), day or days of the week to be activated, zone or zones to be activated, schedule or schedules to be assigned.
    - f. In event of power failure, Master Clock/Program Controller shall correct all system driven clocks after resumption of power within 30 minutes. This correction shall apply to synchronous and impulse systems.
    - g. Menu selections shall be prompted on initial booting of system and all selections shall be user selected without destroying any and all information contained therein.
    - h. Bell zones and wall clocks shall be capable of being manually controlled by keypad.
    - i. Furnish additional transformer, power supply, relay, and wiring and provide additional enclosure and terminal blocks to activate bells or controls when required.
    - j. A password shall be required to prevent all keypad operations, except manual signal circuits.
    - k. No more than 30 clocks per power supply or booster.
- B. Remote Program Selector Switch: At secondary schools only, provide a Lathem model LTR\_RSS selection switch to allow the selection of a minimum of 8 bell schedules consisting of a minimum of 3 signaling zones each.. The program selector switch shall include a program off and manual bell selection switch.

- C. Power Supply: Power supply shall be Lathem PS 8-24, or equal, and shall operate from 120VAC. The outputs shall be 24 VAC, 24 VDC and 15 volts DC. All outputs shall be controlled by an ON/OFF switch and shall be protected by a fuse connected in series with the transformer primary. The power supply shall be housed in a 6" x 6" x 4" black surface mounted box with hinged door. Universal knockouts shall be provided on all sides of the box. Sufficient terminal blocks shall be provided to terminate all field devices.
- D. Power Supply Boosters: Power supply boosters shall be Lathem PS 8-24B, or equal, and shall be used for in-system drop voltage enhancement.
- E. Backboxes for Wallclocks: Backbox shall be Lathem SAM, 0576, or equal, 8" x 6" x 4" D for hanging wallclocks.
- F. Field Devices:
  - 1. Indicating Clocks: 12 hour correction, 59<sup>th</sup> minute correction, 2 wire reverse polarity.
    - a. Interior Type: Clocks shall be minute impulse, 12", round, semiflush, 24 VDC.. Finish shall be matte black case and hands with white face. Lens shall be shatterproof Lucite. Use 8" x 8" x 3" wall box.
    - b. Exterior type: Clocks shall be 15" diameter with weatherproof housing with polycarbonate protective cover. Similar to Lathem ISC15RFA, or equal.
    - c. Where indicated on the Drawings, digital secondary clocks may be supplied. Digital display clocks shall be solid state, 2 inch high LED Arabic characters, 12 and 24 hour display with AM/PM indicator for 6 gang masonry box. Terminations shall be made to a plug-in connector suitable for 24 VDC operation.
  - 2. Bells: Bells shall be 6" alloy steel gongs, 120 volt AC. For indoors, and 10" gong, 120 volt AC. For outdoors, with weatherproof housing. Bells shall be vibrating type with a minimum sound pressure level output of 81 db at 10' -0"; beige or gray in color and suitable for surface or semi-flush mounting.
  - 3. For Project sites without master synchronized clock systems, clocks shall be 120 volt, synchronous motor driven type and shall be Cincinnati #3012, or equal, with 12 inch dial, shatterproof Lucite lens, and metal frame. Each clock shall be wired solid to circuit wiring in outlet box. Each clock shall be provided with a hanger designed to assure clock shall remain on hanger during any seismic Zone 4 activity.
- G. Wiring:
  - 1. Interfacing with P.A. System (1 pair per zone): #14 AWG, or manufacturer's recommended gage.

2. Indicating Clocks: #14 AWG, or manufacturer's recommended gage.
3. Power Feeds: #12 AWG, 600V.

### PART 3 - EXECUTION

#### 3.01 SYSTEM INSTALLATION

- A. Install all necessary conductors to all devices indicated on Drawings, and provide all necessary conductor terminations to all devices. Furnish all necessary pathway support including conduit, cable tray, and/or raceway as required.
- B. There shall be no splices made in junction boxes. All terminations shall be in terminal cabinets, or on equipment terminals in secured equipment spaces.
- C. All conductors shall be installed within conduits, boxes, and terminal cabinets, in a manner, which shall provide for completely metal enclosed installation.
- D. Wiring shall be cabled, laced, and securely fastened in place so that no weight is imposed on any equipment or terminals.
- E. Install required terminal blocks within each terminal cabinet. All incoming wiring shall be terminated on the left side of the terminal blocks, and all outgoing wires shall be terminated on the right side of the terminal blocks.
- F. Conductors shall be color coded and tagged with code markers at each terminal cabinet, junction box, pull box, and equipment. A wire index shall be typed and installed on the terminal cabinet door. Each index shall be covered with clear plastic adhesive cover. Wiring shall be identified as to building and location of devices in the index.
- G. Each wire shall be properly numbered in numerical order and shall maintain same number throughout the Project site.
- H. The complete installation shall conform to all applicable local codes and applicable provisions of the California Electrical Code.
- I. Location of devices and equipment on Drawings is approximate, unless dimensions are indicated. Location of devices 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.
- J. Drawings generally indicate Work to be performed, but do not indicate all bends, transitions or 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.

- L. Provide all instruments and temporary power for testing and demonstrate in the presence of the IOR that all circuit and wiring tests are free of shorts and grounds and that the installation performs per specifications and manufacturer's recommendations.

### 3.02 SYSTEM OPERATION

- A. Zoning: A secondary School campus shall generally be divided into three different areas for program signaling (Classrooms, Gymnasiums, and Shops). Coordinate zoning with OAR. Elementary school campuses shall consist of only one zone.
- B. When system is interfaced with a public address system, the program selection switch, all call switch, and speakers shall be furnished and installed under Public Address System: Section 16821.
- C. Provide and arrange for a manufacturers representative of clock system to instruct designated personnel of the Owner in the operation and maintenance of system. Instruction time shall consist of at least 2 hours on the Project site and shall be performed in the presence of the IOR.

### 3.03 PROJECT RECORD DOCUMENTS

- A. In addition to requirements specified in other sections, submit the following project record documents to the Architect.
  - 1. As-Built Drawings indicating equipment locations, wiring types, panel configurations, sizes, and a point-to-point-wiring diagram of all circuits. Drawings shall indicate interfaces to equipment furnished by others, identifying numbers of wires, termination requirements, and other pertinent details. Drawings shall be presented in both hard copy and electronic form (.DWG format prepared using the most recent version of AutoCAD on a labeled CD-ROM prepared for use on a Windows platform. Provide one hard copy and one electronic copy. Size A (8-1/2 inches x 11 inches) and size B (11 inches x 17 inches) shall be bound into the manual. Larger drawings shall be folded and inserted into transparent envelopes bound into the manual.
  - 2. Test Results: Submit test results to the Architect and OAR. .
  - 3. A detailed explanation of the operation of the system.
  - 4. Instructions for routine maintenance.
  - 5. Detailed instructions for repair of all major components of the system.
  - 6. Pictorial parts list and part numbers.
  - 7. Pictorial and schematic electrical drawings of system, including operating and safety devices, control panels, and all major components.
  - 8. Installation instructions for all system components.

9. Programming instructions.
10. Program listing: Completion documentation, both electronic and bound hard copy, shall contain an index organized vertically by assembly and item number and horizontally by columns. The leftmost column shall be the item number; next shall be the description, followed by the applicable Specification section number, and followed by the specified item, which is followed by the submitted item.

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 the Project site.

END OF SECTION

## SECTION 16776

### ASSISTIVE LISTENING SYSTEMS

#### PART 1 - GENERAL

##### 1.01 RELATED DOCUMENTS

A. Addenda, Alternates, Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specifications collectively apply to work of this Section.

##### 1.02 WORK INCLUDED

A. Assistive Listening Systems in the Library. Provide Assistive Listening System per CBC Section 1104.B.2. The minimum number of receivers shall be equal to 4% of seating, but not less than two. System shall be composed of various components as specified.

##### 1.03 REGULATORY REQUIREMENTS

A. Equipment and components furnished shall be of manufacturers latest model, UL listed. System shall be installed in compliance with local and State authorities having jurisdiction.

##### 1.04 SUBMITTALS

A. Shop drawings shall include catalog cuts and technical data on components specified. Data shall be clearly marked and noted to identify model numbers, physical sizes and other pertinent information.

B. Indicate interfaces with equipment furnished by other Sections identifying numbers of wires, termination requirements, voltages, and other pertinent details. Responsibility for each end of interface shall be noted on Shop Drawings.

C. Shop Drawings shall indicate panel configurations, sizes and point-to-point circuit schematics.

##### 1.05 QUALITY ASSURANCE

A. Work shall be done by qualified contractor holding C-10 and other licenses required.

B. Contractor must have successfully completed at least 10 projects of equal scope in the past 2 years, and have been in business of furnishing and installing clock and program systems of this type for at least 5 years.

C. Contractor must be a factory authorized distributor and service provider for the brand of equipment offered and shall provide proof upon request.

D. Contractor must maintain a fully equipped service organization capable of furnishing repair service to the equipment and shall maintain a spare set of all major parts for the system at all times.

E. Contractor must furnish a letter from the manufacturer of the equipment which certifies that the equipment has been installed according to factory intended practices and that the system is operating satisfactorily.

F. Provide all instruments for testing and demonstrate in the presence of the District's

representative that all circuit and wiring tests are free of shorts and grounds and that the installation perform as per these specifications and manufacturers specifications.

G. System shall be installed in accordance with best trade practice by persons skilled in trade represented by the work, and in accordance with local building codes and applicable provisions of the California Electrical Code.

H. All electrical materials and equipment installed shall be of new manufacture, and shall bear the UL label.

## 1.06 WARRANTY

A. Contractor shall warrant completed system wiring and equipment to be free from inherent mechanical and electrical defects for a period of year from date of completed and certified test, or from date of first beneficial use.

## PART 2 - PRODUCTS

### 2.01 EQUIPMENT

A. Hearing Assistance System: FM hearing assistance system shall be as manufactured by Phonic Ear, Williams Sound, or equal, and shall be furnished with the following components:

1. Base Station: No. PE 550T mounted inside the amplifier cabinet. The base station shall operate in 72MHz - 76 MHz bands and shall be furnished with remote-mounted antenna to cover a minimum of 1,000 feet. Determine the best location for the antenna for optimum reception within the room, before installation.

2. Single-Channel Receiver: No. PE 300R, for use by the listener with standard Walkman-style headset No. AT541. Receiver shall be capable of being clipped to a pocket or belt. Units shall be furnished with 2 AA rechargeable nickel cadmium batteries and quantity of receivers equal to 4% of seating capacity, but not less than 2, shall be furnished and transmitted to the OAR before Substantial Completion.

3. Battery Charger Organizer: No. 300C, unit shall be capable of storing or recharging up to 12 receivers at one time. The charger shall be capable of recharging the nickel cadmium batteries without removing the batteries from the receiver. A total of 4 battery chargers shall be furnished.

## PART 3 - EXECUTION

### 3.01 ACCEPTANCE

A. Acceptance will be given after successful testing.

B. Contractor shall submit to the District as a condition of final payment and acceptance 5 copies of service manuals including the following:

1. A detailed explanation of the operation of the system.
2. Instructions for routine maintenance.
3. Detailed instructions for repair of all major components of the system.
4. Pictorial parts list and part numbers.
5. Pictorial and schematic electrical drawings of system, including operating and safety

devices, control panels, and all major components.

6. Installation instructions for all system components.
7. Program listing.
8. Final test report.

END OF SECTION



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